



*COMPLETE FIBER OPTIC  
TESTING SOLUTIONS*

*WWW.AFSI.US*

*OLK6A-POF MANUAL  
& OM210A MANUAL*



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Advanced Fiber Solutions  
OLK6A-POF Manual

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## General Description:

Advanced Fiber Solutions offers the complete solutions necessary for the installer to test, terminate, troubleshoot and document fiber optic systems. The OLK 6A series is designed to enable testing of all operating parameters of fiber optic networks, including output power levels from the fiber, coupled source power and attenuation loss in a cable. The OM210A saves 501 readings and documentation is made easy with AFS Cable Plant Reporter Software.

Advanced Fiber Solutions offers complete test kits for both Multimode and Singlemode applications. The OLK61A-MM test kit is designed for Multimode applications, the OLK61A-SM test kit is designed for Singlemode applications and the OLK61A-P is designed for POF applications.

## Kit Content:

The **OLK61A-POF** test kit includes the following items:

Fiber Optic Power Meter (OM210A) calibrated at 650nm, 665nm, 790nm & 850nm

Fiber Optic Source (OS417-MD) with a 650nm LED and a 850nm LED

Two connector adaptor

Carrying case

4 AA batteries

Instruction manual for testing fiber optic systems

\*Other kit combinations exist, please visit [www.AFS-I.com](http://www.AFS-I.com) for more details

*Add on options:* The customer may also order **cable test kits** that are not in the standard kits. Reference and receive cables shall be ordered separately. The customer may also order **adaptor kits** for the their specific applications.

*Ask Advanced Fiber Solutions sales representatives for more details.*

## **Cleaning Procedures For Fiber Optic Cables:**

Fiber optic connectors are sensitive to all types of dirt and skin oil. Because the fiber size is so small, the slightest spec of dirt can cause signal blockage and attenuation to a connector end. Always avoid touching the end of the ferrule. Always keep unconnected connectors covered with dust caps. This will ensure that the fiber does not become scratched or dirt does not settle on the end of the ferrule.

When cleaning the connector use only lint free pads or isopropyl alcohol wipes. Some solvents may attack epoxy or leave residue. All Advanced Fiber Solution test kit come provided with Texwipes Alco Pads. If a connector surface can not be cleaned with a Alco Pad because it is in a bulkhead or an active device mount use canned air. Canned air sometimes leave residue if not used with caution. Spray for 3/5 seconds to ensure that propellant is removed from the nozzle.

Other optical surfaces, like the meter detector should also be cleaned with a Texwipe when necessary. After a quick rub with the Texwipe let the surface air dry before replacing the adaptor back on the detector housing.

### **Warning: Never look or stare directly into a fiber optic cable.**

Optical radiation that is harmful to the eye may be present. This may result in permanent eye damage. While the chances of such an occurrence taking place is very unlikely it is best advised to always use the fiber optic power meter when detecting light.

The DO's:      Always use Alco Pads for cleaning fiber optic cables  
                    Replace dust caps on connector end when finished testing

The DONT's: Touch the end of a cable with fingers  
                    Leave ferrule without dust caps  
                    Drop the connector on its face  
                    Look directly into a fiber optic cable

## OM210A:

The OM210A meter is calibrated over four wavelengths to  $\pm 0.2$  dB of the NIST standard for each wavelength through the dynamic range of the meter. The OM210A is designed to measure loss (attenuation) and output power in both Multimode and POF systems. With the ability to save 501 readings and the cable plant reporter software, the OM210A makes documentation easy. The OM210A 3mm Silicon detector is potted in a threaded housing for versatility. This enables the user to interchange adaptors for numerous connector styles.

*Ask Advanced Fiber Solutions sales representatives for more details on available adaptors.*

### Specifications:

Model	OM210A
Calibrated Wavelength	650nm, 665nm, 790nm & 850nm
Detector	3mm Silicon
Dynamic Range	+3dBm to -55dBm

### OM210A:

Accuracy →	+/- 0.2 dB Calibrated to NIST standard
Detector Housing →	Threaded for interchangeable adaptors
Display →	128x64 dot matrix display
Resolution →	0.1 or 0.01 user selectable
Low Battery Indicator →	Yes
Auto Power Down →	Yes
Backlight →	Yes
Controls →	Seven soft rubber keypads: On/Off, backlight, Wavelength/↑, Range (dB&dBm)/↓, Zero ref/Select, Save/Delete, Test/Results
Memory →	501 Reading with time and date stamp
Serial interface →	Yes
USB interface →	Yes
Power →	2 AA's or optional AC adaptor.
Typical Life →	30 hours continuous operation ( <i>typical</i> )
Case Dimensions →	4.7 x 2.7 x 1.2
Operational Temp Range →	-10Deg C to 50Deg C (45% Hum, non condensing)
Storage Temp Range →	-20Deg C to 60Deg C (45% Hum, non condensing)
Regulatory Approval →	CE

## OM210A Operating instructions:

Control Key's: (All key's are rubber key pads)

1. On/Off
2. Backlight
3. Wavelength Select  $\lambda$  (650nm, 665nm, 790nm & 850nm)/  $\uparrow$
4. dB\dBm\mW/ $\downarrow$
5. Zero reference (for all specified wavelengths)/Select
6. Save/Delete
7. Test/Results

The OM210A optical power meter has 3 separate modes.

Mode 1  $\rightarrow$  Initialization mode AFS screen

Mode 1A  $\rightarrow$  Testing Guide and Time Setup Fields

Mode 2  $\rightarrow$  Test mode

Mode 3  $\rightarrow$  Results mode

### Backlight Key:

This key is the same for all modes. It gives the user the option to turn the display backlight on or off. During the Test mode and the Results mode the unit will display a light bulb at the top of the screen to signify the backlight is on.

### Mode 1: Initial power up.

During initial power up mode the meter can be customized to the users specifications. The keys have the following functions:

$\lambda\uparrow$ : Enables or disables the **auto power down** mode. If the Auto Power down is selected an "A" will be displayed in the top right corner of the screen. If it is disabled then the "A" will not be present. The **auto power down** will shut the unit down after 15 minute period with a last minute count down if none of the keys (with the exception of the backlight or On/Off) have been pressed.

**dB\dBm/ $\downarrow$** : Adjusts the **contrast** of the screen **darker**.

**Test/Results:** **Memory initialization Key.** When pressed during unit start up the user will be asked if they would like to re-initialize the memory database. To re-initialize the database press the "**Test/Results**" key again. Press any other key to return to the start up screen.

### Mode 1A:

This mode is the second screen of the initialization modes. The user will have the option to enter the **Testing Guide** or to set the **Time and Date**. To enter the **Test Procedure Field** select the **Wavelength** key  $\lambda$ . This will jump the meter to the **Test Procedure Field** main screen which will give the user four selectable quick guide options.

- 1). Setting Zero Ref
- 2). Single Ended Loss Test
- 3). Double Ended Loss Test
- 4). dB to Watts Conversion Chart

The second selectable option enables the user to set the time and date for the power meter. To enter the **Time Setup Field** select the **Save/Delete** key. Once in the **Time Setup Field** the  $\uparrow$  key and  $\downarrow$  key enables the user to scroll to the desired time for each selection. When the desired value is reached the user hits the **Save/Delete** key to move to the next time value.

- 1). Enter Minute      00 - 59
- 2). Enter Hour        00 - 23
- 3). Enter Day         01 - 31
- 4). Enter Month       01 - 12
- 5). Enter Year 2010   2000 - 2099

## Mode 2: Test Mode.

This mode is used for testing fiber optic cables. Key functions for this mode are colored in maroon on the unit label.

**Wavelength Key  $\lambda$ :** Enables the user to **select** between the calibrated **wavelengths** of the OM200 series meter. All wavelengths are calibrated to  $\pm 0.2$  dB of the NIST standard.

**dB\dBm select Key:** Enables the user to select between **absolute power** which is measured in dBm or **relative power** which is measured in dB. Both units are referenced to 1 milliwatt and are a function of the log scale.

**Zero reference Key:** The Zero reference key when in the **dBm mode** enables the users to toggle the resolution between 0.01dB and 0.1dB

The Zero reference key when in the **dB mode** enables the user to set the input launch power to a relative dB zero reference value for easy calculation of loss and attenuation of a fiber optic cable. For instance, if a launch cable output power value is  $-25.6$  dBm and a test cable is inserted between the launch cable and the meter with a reading of  $-27.1$  dBm, the user has to subtract  $-27.1$  dBm from  $-25.6$  dBm to get a result of  $-1.5$  dB. As simple as this test sounds it can sometimes get confusing to the user due to the fact that they are not sure if their result should be a positive value or a negative value also miscalculation can be an issue. The zero reference function eliminates these problems. The user simply sets their reference value (which in this case is  $-25.6$  dBm) to 0.0 dB then inserts the test cable to get a loss reading of  $-1.5$  dB. **\*EASY\*** Different references can be stored for all wavelengths. The stored reference value will be maintained until a new reference is stored. The screen also displays the value that the user has referenced too at the bottom left corner of the screen. This reading is the dBm (absolute) value of the users dB zero reference value.

Note: The above example refers to Multimode and Single mode applications.

POF cable is tested using the substitution method.



**Save Key:**

**Saves** all **data** that is currently being displayed on the screen. When the **Save** button is pressed it will jump into a **Continue to Save** or **Set Parameters** screen. The user has the options to change the current parameters by selecting the Down ↓ key then the **Save** key (Parameters options include **Number of Connectors**, **Number of Splices** and the fiber **Distance** associated with the current result) or continue to the save screen by simply selecting the **Save** key. Parameter data enables the AFS PC software to run **Pass/Fail** analysis of the tested link if the result that is being saved is in the **dB mode (relative mode)** and is on the 850nm wavelength by calculating industry standard allowable margins using the Saved data. **Pass/Fail analysis not available on 650/665/790nm POF wavelength.**

The **Save** screen will display all associated data. This data includes fiber ID, Result, Unit measurement, Wavelength, Time and Date stamp, number of connectors, number of splices and fiber length. If the user wants to continue to save the displayed data they simply press the **Save Key**, if not the user may press any other Key to go back to the test screen.

**Mode Key:**

Enters Results mode when pressed.

**Note:****Parameters are factory set to**

- 1). Number of Connector = 1
- 2). Number of Splices = 0
- 3). Distance in Km = 0.01

Set Parameters Field the ↑ key and ↓ key enables the user to scroll through the numeric values and once the desired value is reached the user may select that value by pressing the Save key.

**Set Parameters Field**

- |                           |                 |
|---------------------------|-----------------|
| 1). Number of Connector   | 00 - 99         |
| 2). Number of Splices     | 00 - 99         |
| 3). Distance in Km = 0.01 | 000.01 – 299.99 |

### Mode 3: Results mode.

This mode enables the user to scan or delete database results. When the meter is in results mode a list of saved fibers will be displayed. If the database is empty the meter will indicate this by displaying “Database Empty” with no fibers being displayed. Key functions for this mode are colored in blue on the unit label.

**↑ Key:** This key **scans up** through the fibers while looking at the database list or looking at individual fibers.

**↓ Key:** This key **scans down** through the fibers while looking at the database list or looking at individual fibers.

**Select Key:** While looking at the database list this key will choose the **selected fiber ID** and look at all the associated data parameters for that fiber. If looking at an individual fiber the unit will return to the list.

**Delete Key:** This key **deletes an individual fiber**. This function can be performed either from the database list or while looking at the individual fiber. After fiber deletion the unit will return to the database list. The user will be prompted a second time to delete the fiber. If the user wishes to delete a database result, they may do so by pressing the delete Key, if the user wishes not to delete a result they may exit the delete field by pressing any other Key.

**Mode Key:** Enters Test mode when pressed.

### Serial or USB Interface:

The OM200 series meter has a serial or USB interface for database download. The OM200 Series meter is accompanied with PC download software called AFS Meter Software.

This is a real time interface that should be used in the **Test mode** when the meter is powered up. Just turn the meter on, connect it to the computer with the supplied cable and follow the AFS Meter software instructions. Please see appendix A for USB driver installation instructions.

### Power:

1. 2 AA batteries
2. *Optional AC power converter.*

The battery is in the compartment at the rear of the unit

*AC adaptors are not standard with the OLK61 test kits but may be ordered separately. Ask Advanced Fiber Solutions sales representatives for more details.*

## AFS Reporter V8.01

To install:

Place CD in disk drive.

Open drive labeled “AFSMeter V8.01”.

Double click on the setup file.

The PC will start the installation.

A window will pop up to notify the user that the publisher is unknown.

Click the install button.

The PC will now install the software under program files and also load and run the software.

Please read the pop up windows and follow the instructions.

If the unit fails to communicate with the software please check the COM port settings under **Start Menu → Control Panel → System → Hardware → Device Manager → Ports** to verify which COM port the meter is communicating with.

If the user is using a USB port to communicate with the meter it is necessary to install the USB driver.

Attach the meter to the USB port on the PC.

The PC will prompt the user to install the USB driver.

Place the USB driver CD in the disk drive and follow the windows prompt guide.

After the drivers have been successfully installed check the COM port settings (as indicated above) to establish the active COM port for the meter.

Select the COM port name (number) under the Setup drop down menu to the correct port for the meter.

# AFS Cable Plant Reporter Software V8.01



## Software instructions:

### Menu Items: File, Setup, Download Data, Version

#### File:

##### 1). Open file:

Enables the user to open a previously saved file. The software looks for .AFS extensions in the open folders.

##### 2). Save file:

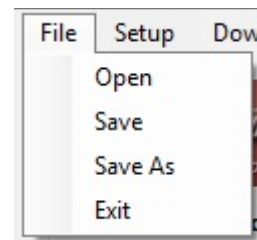
Enables the user to save the downloaded data or any changes the user makes to the downloaded data. All files are saved as .AFS extensions.

##### 3). Save As:

Enables the user to select the location and enter the file name.

##### 4). Exit:

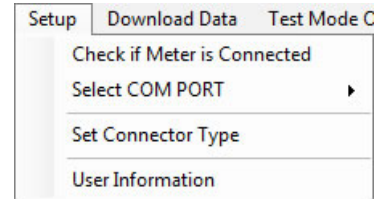
Exit the application.



## **Setup:**

### **1). Check If Meter Is Connected:**

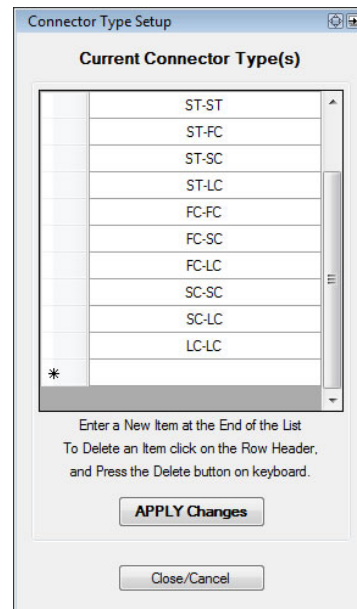
Checks to see if the meter is communicating with the software.



### **2). Select COM PORT:**

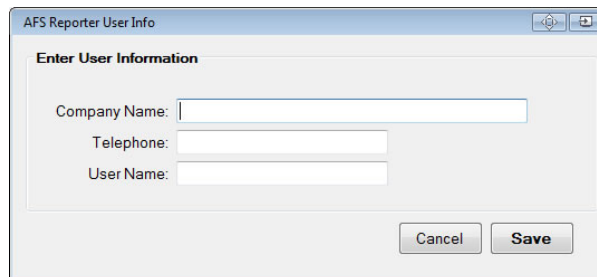
Enables the user to select which COM PORT to use.

**3). Set Connector Style:** Enables the user to add their own connector style to the dropdown list. Scroll to the bottom of the list and select the empty box. Enter the connector type to be added to the list. Then hit the “APPLY Changes” button and close the window. This connector type will then be available for selection on the data grid. Please see **column 4** below for more details.



### **4). User Information:**

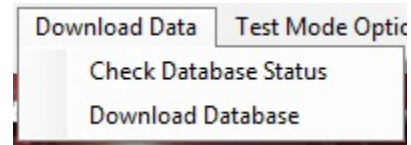
This will popup a panel that enables the user the input their Company Name, Telephone Number and User Name that they would like displayed on the cable plant test report.



### **Download Database:**

#### **1). Check Database Status:**

Enables the user to see how many data storage spaces are taken and how many data storage spaces are free (available).



#### **2). Download Database:**

Enables the user to download the entire database from the meter.

**Note:** the user will be given three helpful pop up hints to follow:

1. That the meter should be in the **TEST** mode before data download.
2. The number of database reading(s) that are going to be downloaded.
3. The approximate time it will take to download the data.

*Do not disconnect the cable or power down the meter during a download as this may cause the software to lockup.*

### **Test Mode Options:**

#### **1). Meter Data:**

When selected will popup a window with the current output that the meter is displaying.

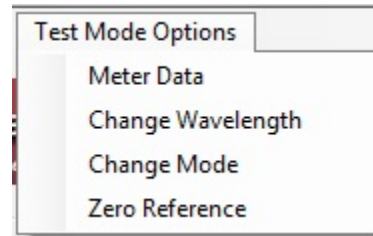
#### **2). Change Wavelength:**

When selected changes the wavelength on the power meter through the PC Software.

#### **3). Change Mode:**

When selected changes modes between the dBm mode (absolute) and the dB mode (relative) through the PC Software.

**4). Zero Reference:** When selected sets the zero reference but only when the power meter is in the dB mode (relative) through the PC Software.



## Data Grid:

AFS Reporter v8.01 - Designed by Advanced Fiber Solutions, Inc. ©2011

File Setup Download Data Test Mode Options

**ADVANCED FIBER SOLUTIONS, INC.**  
Complete Line of Fiber Optic Test Equipment

### Cable Plant Reporter

**User Information**

Company Name: AFS

Phone Number: 508-238-7100

Tested By: John Doe

Job ID:

**Fiber Analysis Results**

Wavelength: 1625 nm

Actual Reading: -0.25 dB

Allowable Loss: 0.750005 dB

Overhead Margin: 0.500005 dB

Pass/Fail: PASS

Meter Model: AFS OM250A

Cal Date: NOV 23, 2011

☐ Print All Readings

Print Preview Print Report

User ID	Fiber Type	Fiber Detail	Conn Type	Meter ID	Result	Wattage	Unit	WL	Time	Test Date	Length (km)	Num of	Num of Splices
				051	-24.68	3.404 uW	dBm	1550 nm	09:20	NOV 28, 2011	0.01	1	0
				052	-24.77	3.334 uW	dBm	1550 nm	09:20	NOV 28, 2011	0.01	1	0
				053	-26.34	2.323 uW	dBm	1625 nm	09:20	NOV 28, 2011	0.01	1	0
				054	-23.63	4.335 uW	dBm	1625 nm	09:20	NOV 28, 2011	0.01	1	0
				055	-25.47	2.838 uW	dBm	1625 nm	09:20	NOV 28, 2011	0.01	1	0
				056	-30.7	N/A	dB	1625 nm	09:24	DEC 1, 2011	0.01	1	0
John Doe	SM - Outdoor	SM 9/125	ST-LC	057	-0.25	N/A	dB	1625 nm	09:32	DEC 1, 2011	0.01	1	0
				058	-0.38	N/A	dB	1625 nm	09:32	DEC 1, 2011	0.01	1	0
				059	-0.2	N/A	dB	1625 nm	09:32	DEC 1, 2011	0.01	1	0
				060	-30.01	0.998 uW	dBm	1625 nm	12:15	DEC 2, 2011	0.01	1	1

Readings: 60

*\*Note the software will provide helpful hints to the user in the gray area below the Data Grid panel.*

The Data Grid can be filled either by downloading directly from the power meter or by opening a saved database file on the PC.

### User Fiber Parameters Section:

**Column1: User ID:** Enables the user to enter their information.

**Column2: Fiber Type:** Enables the user to select what the tested fiber type is from a dropdown menu which will appear on a mouse right-click (The Fiber Type Data selection is essential for the software to determine results analysis which is calculated in the Fiber Test Results field). *Please see the Fiber Type Select table below.*

**Column3: Fiber Details:** Enables the user to enter specific detail on the tested fiber.

**Column4: Connector Type(s):** Enables the user to enter the connector(s) types of the tested cable either manually or from the pre-installed dropdown which will appear on a mouse right-click.

**Fiber Analysis Result Section:**

This section is filled when the result is in the dB (relative) mode. The max allowable loss is calculated using the result data downloaded from the power meter and the when the user selects the fiber type in the **Fiber Type** box.

*Described above.*

**Fiber Analysis Results**

Wavelength:	1625 nm
Actual Reading:	-0.25 dB
Allowable Loss:	0.750005 dB
Overhead Margin:	0.500005 dB
Pass/Fail:	PASS

*Allowable loss calculations are determined using TIA specifications. The max allowable limits for wavelength, connectors, splices and cable type are presented below.*

**Fiber Type Selection:**

Only applicable @ 850nm

Multimode – 62.5/125

Multimode – 50/125

**Max Allowable Loss per Km per TIA**

3.5dB @ 850nm

3.5dB @ 850nm

**Max Allowable Connector Loss per TIA**

0.75dB only @ 850nm

**Max Allowable Splice Loss per TIA**

0.3dB only @ 850nm

**Version:**

Version 8.01



## OS400 Series:

The OS400 Series are handheld fiber optic sources. Advanced Fiber Solutions offers a number of sources in this series. Please visit Advanced Fiber Solutions website for more details. The OS417 source is an LED source for multimode (POF) applications. The OS417 source has two LED's. The wavelength's of the LED's are 650nm and 850nm. The 850nm LED is housed in a fixed ST adaptor (Active Device Mount) while the 650nm is housed a modulated adaptor for connector versatility.

## Specifications:

Model	OS417
Wavelength	650nm, 850nm
Type	LED
Application	MM (POF)
Connector Style	Modulated & ST

## OS417 Interface: Multimode Source

### Control indicators and switches:

Switch → The unit has a slide switch to turn either the 850nm LED or 665nm LED on.

Indicators → 3 LEDs that indicate 850nm on, 665nm on and low battery.

Pots → The unit has adjustment pots for both the 850nm LED and the 665nm LED. Having both pots makes the unit user friendly for easy referencing of both LEDs.

### ***OS417 Specifications:***

- |                            |  |
|----------------------------|--|
| 1. Transmitters →          | a) 850nm Active Device Mount.<br>b) 650nm in modulated adaptor                                     |
| 2. Connector Style →       | Modulated & ST   |
| 3. Output Power →          | > -20.0 dBm (for both LED's)   |
| 4. Wavelength →            | 850nm and 665nm  |
| 5. Stability →             | +/- 0.2 dB (over a 8 hour period with 5 minute warm up)  |
| 6. Coupled Power Ratio →   | 850nm category 1 (Overfill) according to the TIA/EIA-526-14A Standard.                             |
| 7. Batteries →             | 2 AA   |
| 8. Battery life →          | 16 Hours continuous operation ( <i>typical</i> )   |
| 9. Low Battery Indicator → | Yes  |
| 10. Serial Interface →     | No   |
| 11. Temperature →          | Operation -10 to +50 C (45% Hum, non condensing)<br>Storage -20 to +60 C (75% Hum, non condensing) |
| 12. Regulatory Approval →  | CE   |

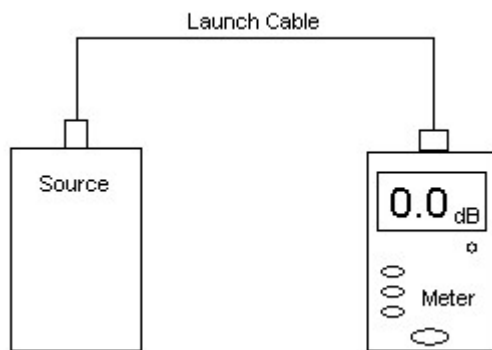
## PRODUCT APPLICATION AND TESTING GUIDE FOR MULTIMODE CABLES

In the following testing guide a meter refers to an Advanced Fiber Solutions OM220A, and a source refers to an Advanced Fiber Solutions OS420 LED source or OS430 Laser source.

### Setting 0 dB loss reference for testing

This is the reference power reading that is created by placing a launch cable between the meter and the source.

#### Test setup:

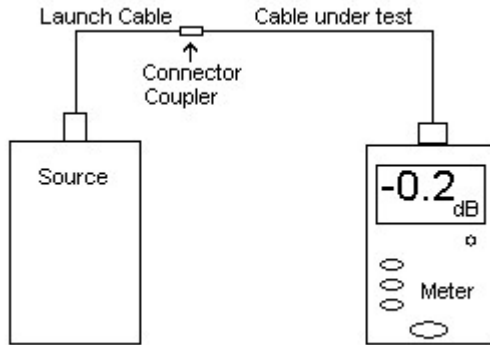


#### Procedure:

1. Attach launch cable to the output of the source.
2. Make sure the output power level from the source is over  $-30$  dBm.
3. With meter in "dB" mode, press the zero reference key. When the meter zeros out as illustrated in the above setup the launch reference power has been stored and the user is now ready to start testing cables.
4. Once the zero reference power has been set, do not remove the launch cable from the source as reattaching it may change the output power level.

## Fiber Optic Cable Testing Per EIA/TIA FOTP-171

**One-way loss test:** Tests loss of connector mated to launch cable. To test the other connector of the test cable, simply reverse the cable under test.



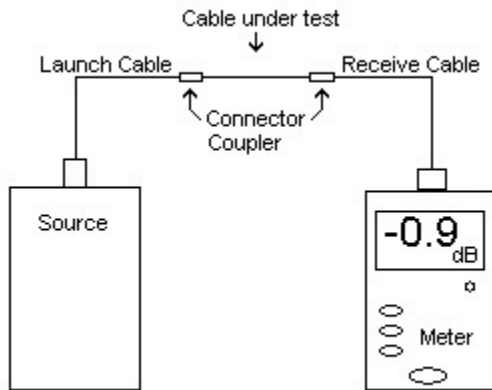
FOTP-171

### Procedure:

1. Attach the test cable to the connector coupler.
2. Attach the other end of the cable to the meter and read the value.
3. The indicated value on the display will be the loss of the mated connector of the cable under test and the test cable. To test the other connector on the test cable, simply reverse the cable under test and read the loss from the power meter.

### Fiber Optic Cable Testing Per EIA/TIA OFSTP-14

This test enables the user to test both connectors of the cable under test at once (Dual Connector Test).



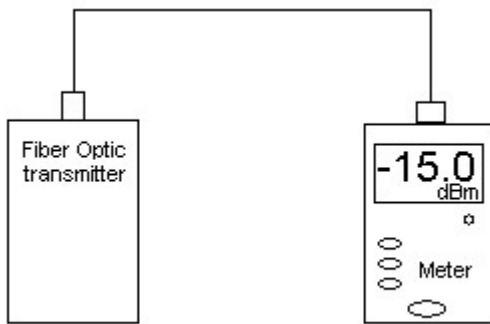
OFSTP-14

#### Procedure:

1. A loss reading for the receive cable should already be established by doing a single ended test on it as specified in the FOPT-171 illustration. The loss of the receive cable should be added on to the loss of the cable under test when the test is completed or zeroed out before the cable under test is placed between it and the launch cable.
2. Attach the cable under test to the launch cable.
3. Attach the other end of the cable under test to the receive cable.
4. The power indicated on the meter is the loss of the cable under test.

*\*When testing cables make sure that the cable under test, the receive and the launch cable have the same core and cladding size otherwise the results will not be true loss readings.*

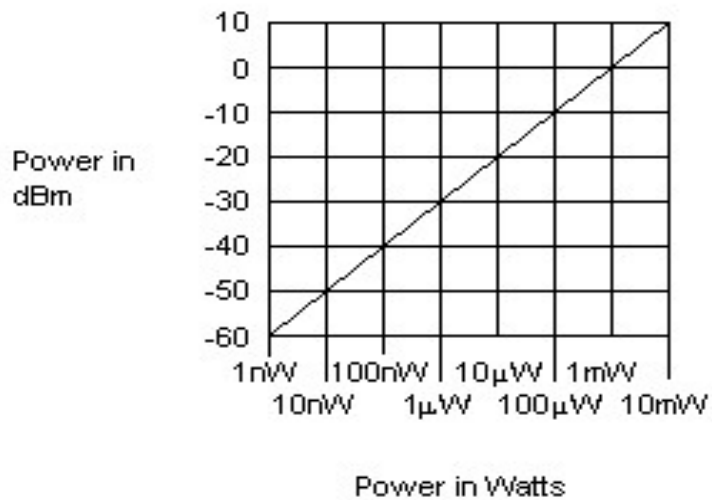
## Measuring output power of a fiber optic transmitter/system



### Procedure:

1. Measure output power from transmitter or at receiver by connecting to the power meter.
2. Set meter to correct wavelength.
3. Set meter to dBm for absolute power measurement.
4. Read power on meter.

Conversion Chart For dB to Watts



#### CALIBRATION:

Every ADVANCED FIBER SOLUTIONS fiber optic power meter calibrated is NIST traceable. Calibration should be preformed yearly by returning the unit to ADVANCED FIBER SOLUTIONS or to an ADVANCED FIBER SOLUTIONS certified calibration house.

## APPENDIX A:

1. INSERT SUPPLIED DISK LABELED “DRIVER”
2. OPEN USB TO SERIAL CABLE FOLDER
3. OPEN USER MANUAL FOLDER
4. OPEN APPROPREIATE FOLDER FOR YOUR SYSTEM
5. FOLLOW THE INSTALLATION INSTRUCTIONS

## COMMUNICATION TROUBLE SHOOTING:

ENTER START MENU → CONTROL PANEL → SYSTEMS → HARDWARE → DEVICE  
MANAGER → PORTS

**PORTS** WILL INDICATE WHICH COM PORT IS BEING USED BY THE BRIDGE DEVICE. IF NON IS  
INDICATED IT MAY BE NESCESSARY TO RE-LOAD THE DRIVER SOFTWARE

## WARRANTY:

ADVANCED FIBER SOLUTIONS offers a 1year limited warranty on all units sold (unless otherwise specified). This warranty starts on the date of shipment of the product to its purchaser. ADVANCED FIBER SOLUTIONS warrants that the product or products purchased will be free of defects in workmanship and material. ADVANCED FIBER SOLUTIONS warrants that the product or products purchased will conform in accordance with the specifications set forth for that product or those products as published by ADVANCED FIBER SOLUTIONS.

ADVANCED FIBER SOLUTIONS will on written notice by the purchaser correct product/products defects by repair or replacement of that product. ADVANCED FIBER SOLUTIONS will incur all cost to replace or repair the product/products in question if ADVANCED FIBER SOLUTIONS deem that the product malfunction is without question due to a manufacturers defect. Correction as stated herein will absolve ADVANCED FIBER SOLUTIONS from liability due to product defects.

ADVANCED FIBER SOLUTIONS will not honor the warranty if the product or products in question have defects due to improper use, lack of maintenance or damage to the product or products incurred outside of the ADVANCED FIBER SOLUTION facility.

ADVANCED FIBER SOLUTIONS will in no event be liable for death, injury to persons, damage to property or equipment, loss of profits or revenues, cost of capital, claims for service interruption or cost of product replacement.

ADVANCED FIBER SOLUTIONS liability due to product defect will never exceed the price of that product.

*ADVANCED FIBER SOLUTIONS reserves the right to make engineering improvements or changes without notice.*