OptoTest

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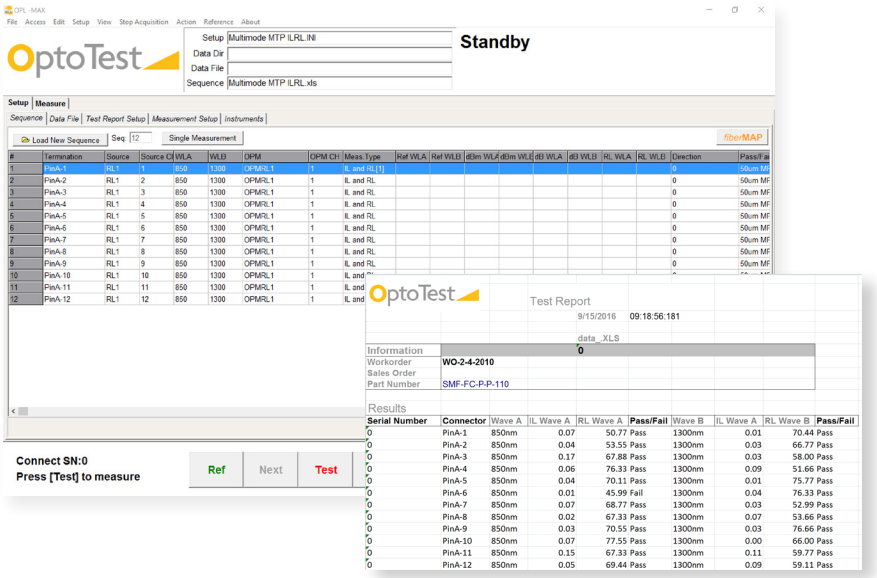

OPL-MAX

Application Software

Instruction Manual

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MnOPL-MAX RevE

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Overview

The OPL-MAX application supports multichannel serialized cable testing for Insertion Loss and Return Loss. It offers the following features and functions:

Configuration of Following Measurements

- Insertion Loss measurement
- Return Loss measurement
- Single, dual, or quad wavelength measurement

User Selectable Parameters for

- Data logging of reference measurements for traceability
- Pass/Fail condition for IL or RL in either direction for either wavelength
- User prompts

Data Handling

- Storage of the measurement data to individual Excel files for further processing
- Test Report generation based on Excel template
- Support of part number and sequencing serial number
- Measurement log for auditing purposes
- Data log for storage of detailed test information

Typical MTP Configuration

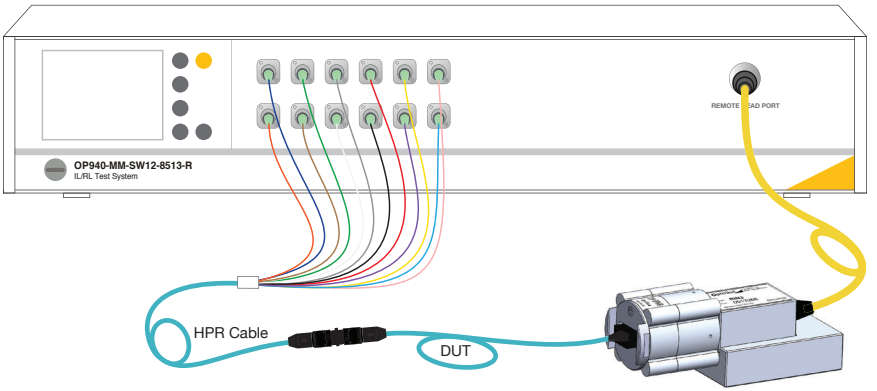


Figure 1

Typical Multichannel Simplex Configuration

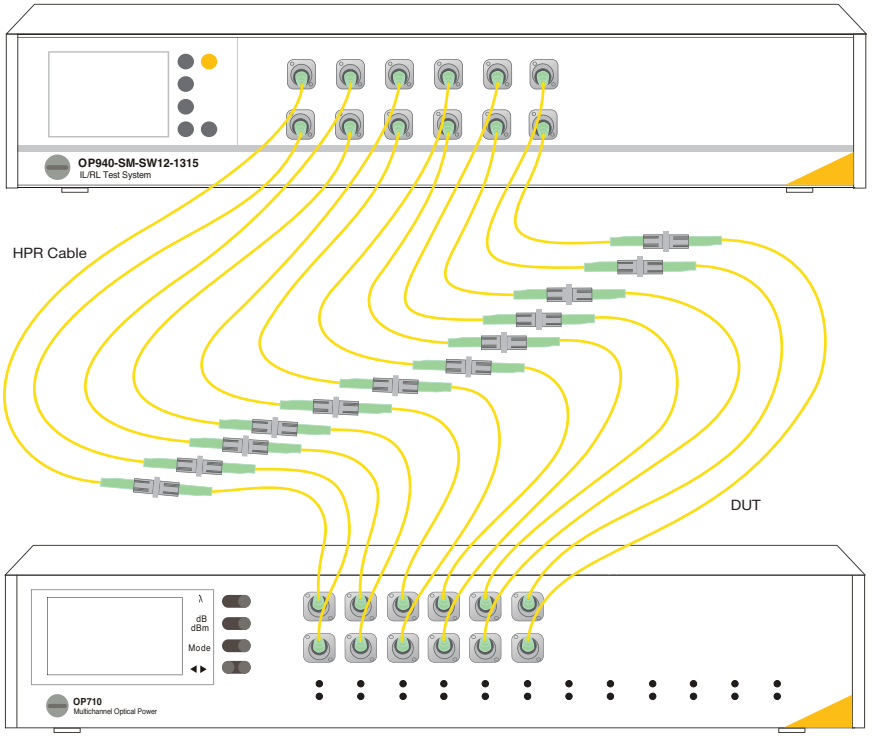


Figure 2

Installation

1. Insert supplied OPL-MAX USB drive into the computer. Select the installer from the Application folder and the following screen should appear.

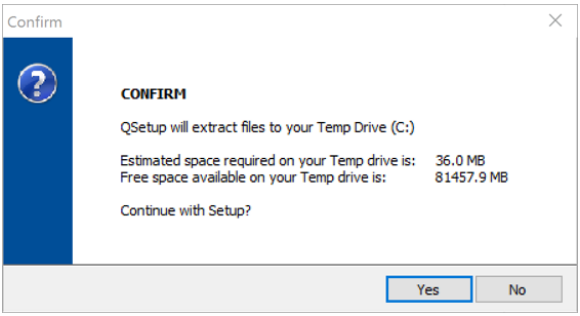


Figure 3

2. Click Yes on the Confirm popup. This will begin the installation process. Click Next on the Welcome screen.

Figure 4

3. On the next window, select which components are to be installed. The installation will automatically install the Main Group, but there is also an option to install the USB drivers.

NOTE: If the drivers have already been installed they will not need to be installed again.

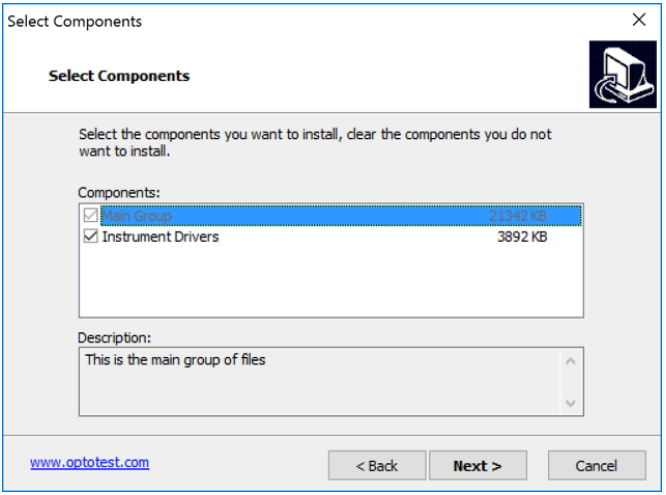


Figure 5

4. Choose Destination Location

Here the user can choose to which directory the software will be installed. Click Next after specifying the directory.

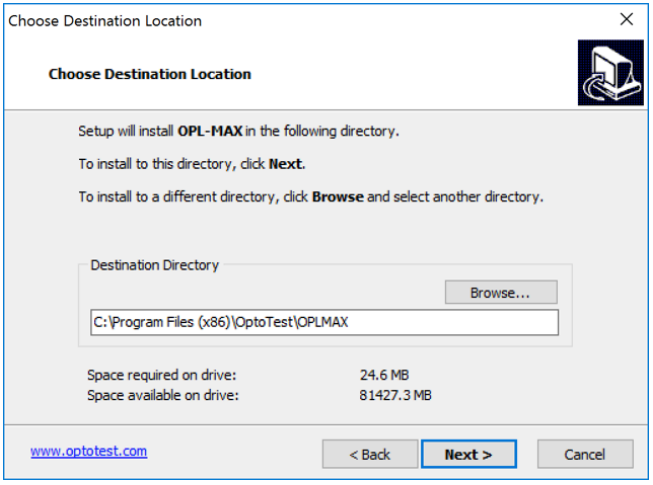


Figure 6

5. Set Program Shortcuts

Here the user can choose whether to create shortcuts on the desktop and in the start menu. Select either or both checkboxes and click Next.

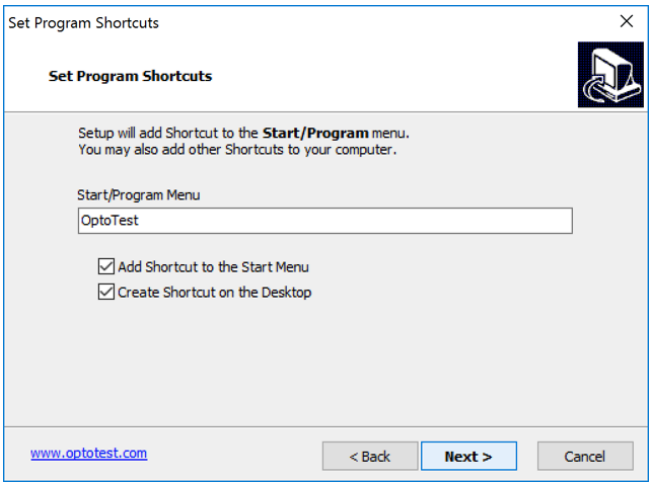


Figure 7

6. Confirm Setup Settings

Verify that all the settings are correct and click Next.

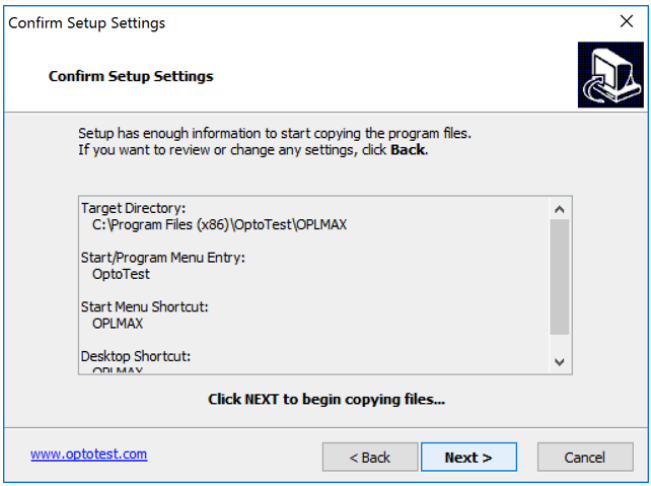


Figure 8

7. The installation will begin to extract the files to the computer.

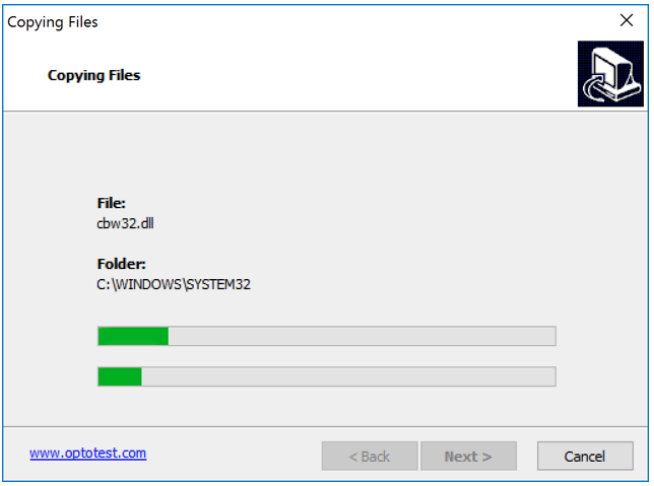


Figure 9

8. Once the software is done installing, the drivers will install. Click OK to proceed.

NOTE: If the user's computer is 32 bit machine, this popup will say 32 bit.

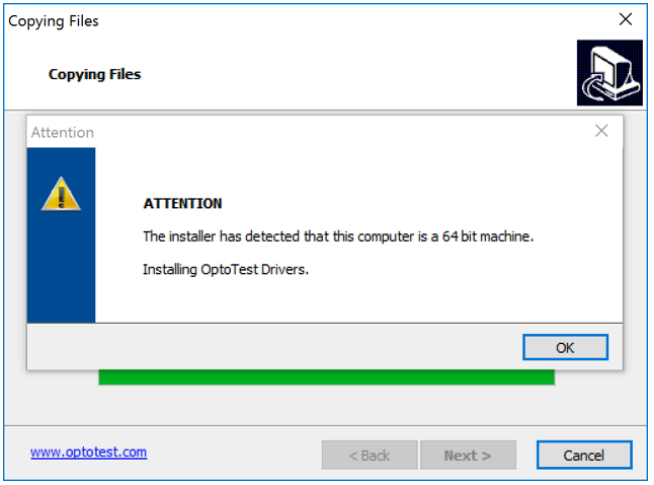


Figure 10

10. Click Finish on the final dialog box and the software installation is complete.

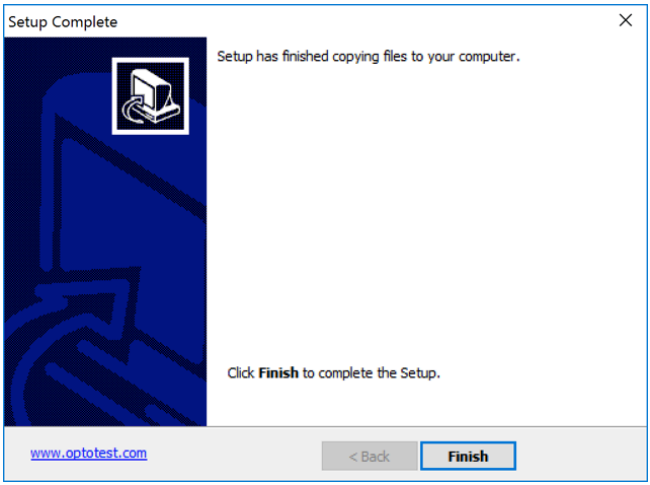


Figure 11

Password Protection (Admin/Operator Modes)

OPL-MAX has the option of password protecting the software so that settings cannot be changed by accident or by a user that is not cleared to do so. The default password is **admin** and can be changed only when in admin mode. To set the software's protection level select the proper option under the **Access** menu at the top of the software. When switching from **Operator** mode to **Admin** mode the user must supply the password, but to go from admin to operator mode one just needs to select **Operator** from the menu.

Operator Mode

In this mode the user cannot:

- Save INI files
- Save Sequence files
- Edit Sequence files
- The Measurement tab and Instruments tab are not visible
- The sequence editor box is not accessible (double click on sequence step)

Load New Configuration

At startup the software will display the popup screen below. This screen allows the user to load a configuration (a set of saved settings and files) prior to the software loading. OPL-MAX comes pre-loaded with a selection of configurations that can be used as-is or modified to meet specific needs. A list of default configurations can be found at the end of this manual.

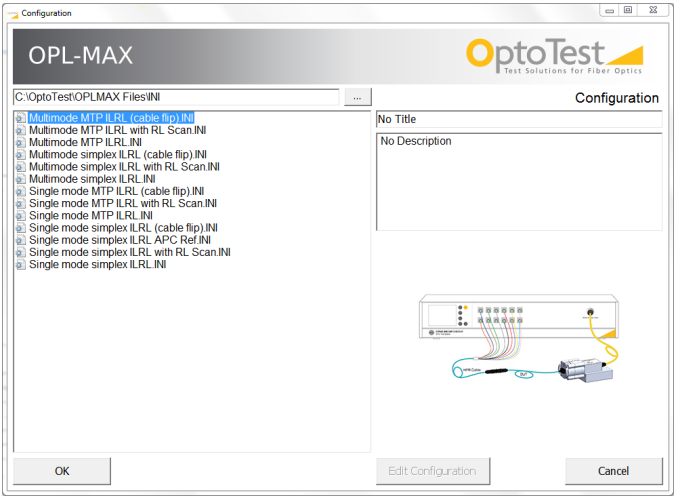


Figure 12: Setup File Selection Screen

Heading	Description
Selected Folder	The current folder of setup files. By default this is in C:\OptoTest\OPLMax Files\INI\ but can be moved to another location. Setup files in this location will be displayed on the screen and can be selected to load all parameters for a test.
Available Setups	Displays the available setups in the currently selected setup file folder. To change this, click the folder icon. Upon selecting the new folder, the software will display the setup files in that folder.
Selected Setup	Displays the current selected setup. To change this, select another setup from the drop down menu. Once the [Launch Application] button is pressed the selected setup file will be loaded.
Title and Description	A title and brief description of the selected setup file. This can be edited by the user by pressing the **Edit Configuration** button.
Edit Configuration	Allows for the editing of the **Title** and **Description** of the configuration, including the admin password.

NOTE: This screen only allows the user to select a configuration. They cannot change the sequence file, template file, or data handling settings. These changes can be made from within the software once it is loaded.

Startup

Once the setup file has been selected, the software will load the settings and start up. The currently active setup file and most other relevant files are shown in the top middle of the screen.

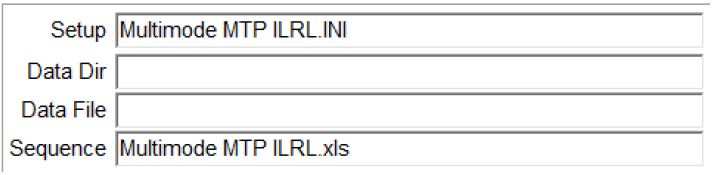


Figure 13: Files shown at Startup

OPL-MAX checks for and lists all available OptoTest USB devices, the active list of devices that are connected can be found in **Setup | Instruments**

USB Device: Sequential enumeration of USB device.

NR: Index of USB source or power meter.
ID: Identifying type of instrument.

Description: Model type of instrument.

Status: status of instrument (1: OK)

Sequence | Data File | Test Report Setup | Measurement Setup | Instruments

Instruments

USB Device	NR	ID	SerialNumber	Description	Status
0	0	SM1	Demo 10101	OP750	Status: 1
1	1	SRC1	Demo 10112	OP750	Status: 1
2	0	OPM1	Demo 10132	OP710	Status: 1
3	1	OPM2	Demo 10136	OP710	Status: 1
4	2	RL1	Demo 10136	OP930	Status: 1
1	1	OP930		OP930	Status: 1

Figure 14

Configuration Files at Startup

At startup the following configuration files are required:

C:\Program Files(x86)\OptoTest\OPL-Max\INI\OPLMAX.INI
Structured text file that stores the overall settings of the OPL-MAX Application.

C:\OptoTest\OPL-Max Files\INI\
Folder contains numerous default setup files.

C:\OptoTest\OPL-Max Files\Config\
Folder contains numerous default sequence files.

C:\OptoTest\OPL-Max Files\Config\terminations.xls
Excel spreadsheet that stores the pass/fail criteria for separate terminations.

Changing the Configuration

A different earlier stored setup is recalled through the **Setup | Change Configuration** from File menu.

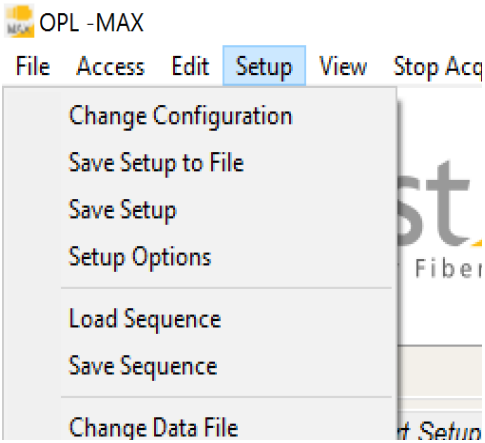


Figure 15

Pass/Fail Criteria

The pass/fail parameters are retrieved from the termination list.

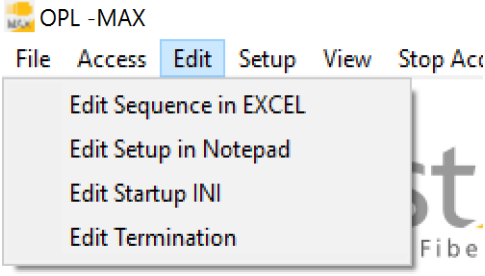
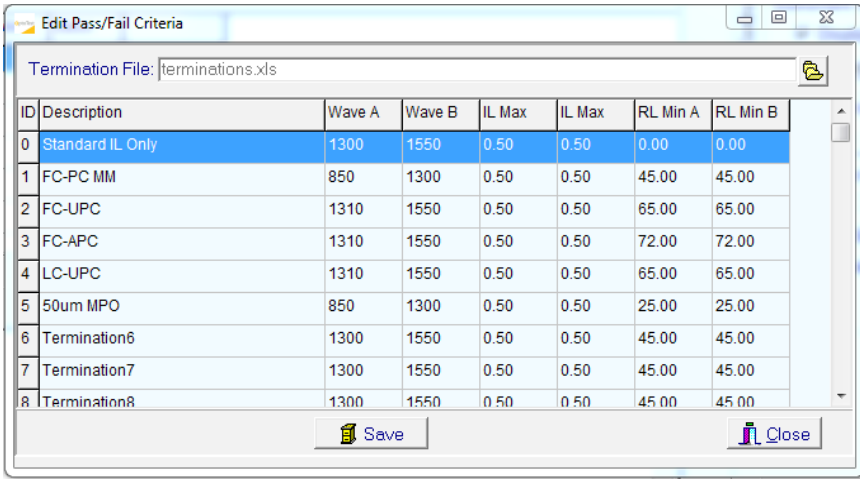


Figure 16

Pass/Fail Criteria

All the Pass/Fail criteria are stored in a single Excel file, the default filename is termination.xls. **Edit | Edit Termination** will allow the user to view this file. To change the individual parameters double click on the particular row.



ID	Description	Wave A	Wave B	IL Max	IL Max	RL Min A	RL Min B
0	Standard IL Only	1300	1550	0.50	0.50	0.00	0.00
1	FC-PC MM	850	1300	0.50	0.50	45.00	45.00
2	FC-UPC	1310	1550	0.50	0.50	65.00	65.00
3	FC-APC	1310	1550	0.50	0.50	72.00	72.00
4	LC-UPC	1310	1550	0.50	0.50	65.00	65.00
5	50um MPO	850	1300	0.50	0.50	25.00	25.00
6	Termination6	1300	1550	0.50	0.50	45.00	45.00
7	Termination7	1300	1550	0.50	0.50	45.00	45.00
8	Termination8	1300	1550	0.50	0.50	45.00	45.00

Figure 17

	A	B	C	D	E	F	G	H
1								
2	0	Standard IL Only	1300	1550	0.5	0.5	0	0
3	1	FC-PC MM	850	1300	0.5	0.5	45	45
4	2	FC-UPC	1310	1550	0.5	0.5	65	65
5	3	FC-APC	1310	1550	0.5	0.5	72	72
6	4	LC-UPC	1310	1550	0.5	0.5	65	65
7	5	50um MPO	850	1300	0.5	0.5	25	25
8	6	Termination6	1300	1550	0.5	0.5	45	45
9	7	Termination7	1300	1550	0.5	0.5	45	45
10	8	Termination8	1300	1550	0.5	0.5	45	45
11	9	Termination9	1300	1550	0.5	0.5	45	45

Figure 18: List of Terminations

The pass/fail entry can be edited individually by double-clicking on a description from the **Edit Pass/Fail Criteria** popup window.

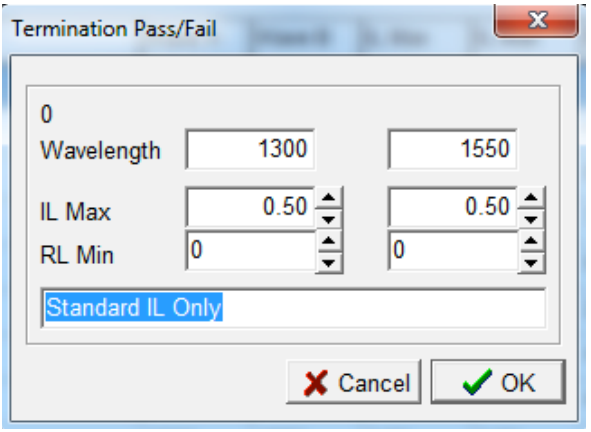


Figure 19

Wavelengths: IL/RL criteria wavelengths

IL Max: max allowable passing value for IL

RL Min: min allowable passing value for RL

The bottom field is for the Description of the termination and used for identification in the sequences.

Setup

Sequence File

The sequence file is in Excel format and can be modified easily using any version of Excel. The Excel file is configured into a header with overall cable information and the sequence section.

Sequence File Header

	A	B	C
1	**Configuration File OPL-LOG**		
2	**Identification**		
3	Partnumber	SMF-FC-P-P-110	
4	SerialNumber		457818
5	Data File	WO-2-4-2010	
6	Number of Sequences	12	
7	Lotnumber	LN 2-4	
8	Customer		
9	Sales Order		

Figure 20: Sequence File Header Information

Each entry in the Identification column identifies fields that have a corresponding field in the header information of the measurement screen.

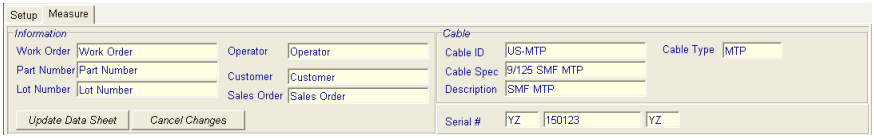


Figure 21: Its corresponding placement in OPL-Max

Measurement Sequence

Each row in the configuration file defines a measurement sequence for a certain cable type. See figure 14.

	Description	Source Instrument				OPM						Return Loss		Alternate Reference						
Seq	Sequence Label	Source Instrument	Source Channel	WavelengthA	WavelengthB	OPM Rack	OPM Channel	Termination for Pass/Fail	Measurement Type	Delay	Comment	Refl Num	Reference Channel	Reference Module	Reference Channel	Force RL Zero offset? 0=No, 1=Yes	Serial Number Index	Direction	Assigned Source Channel	Assigned OPM Channel
<num>	<string>	<num>	<num>	<num>	<num>	<num>	<num>													
1	PinA-1	RL1	1	850	1300	OPMRL1	1	5	1	0		1	1	OPMRL1	1	1		0	1	1
2	PinA-2	RL1	2	850	1300	OPMRL1	1	5	1	0		1	2	OPMRL1	1	1		0	1	1
3	PinA-3	RL1	3	850	1300	OPMRL1	1	5	1	0		1	3	OPMRL1	1	1		0	1	1
4	PinA-4	RL1	4	850	1300	OPMRL1	1	5	1	0		1	4	OPMRL1	1	1		0	1	1
5	PinA-5	RL1	5	850	1300	OPMRL1	1	5	1	0		1	5	OPMRL1	1	1		0	1	1
6	PinA-6	RL1	6	850	1300	OPMRL1	1	5	1	0		1	6	OPMRL1	1	1		0	1	1
7	PinA-7	RL1	7	850	1300	OPMRL1	1	5	1	0		1	7	OPMRL1	1	1		0	1	1
8	PinA-8	RL1	8	850	1300	OPMRL1	1	5	1	0		1	8	OPMRL1	1	1		0	1	1
9	PinA-9	RL1	9	850	1300	OPMRL1	1	5	1	0		1	9	OPMRL1	1	1		0	1	1
10	PinA-10	RL1	10	850	1300	OPMRL1	1	5	1	0		1	10	OPMRL1	1	1		0	1	1
11	PinA-11	RL1	11	850	1300	OPMRL1	1	5	1	0		1	11	OPMRL1	1	1		0	1	1
12	PinA-12	RL1	12	850	1300	OPMRL1	1	5	1	0		1	12	OPMRL1	1	1		0	1	1
13	Pause	RL1	12	850	1300	OPMRL1	1	2	100	0	Please d	1	-1	OPMRL1	1	1				

Figure 22: Sample Sequence file in Excel

Field Description of Sequences

Column	Header	Description
A	Sequence Number	Consecutive number
B	Termination ID	User-defined sequence step or connector indicator such as “Blue” or “Aqua”
C	Source	Selects the source for the measurement RL1 - OP930/940 Single channel or multi IL1 - OP815/850 unit SRC1 - Source only system (OP750) NO - No source to be used in this step
D	Source Channel	Selects the source channel for the measurement. For systems with external switches, this should be the channel that the switch will be on
E	Wavelength A	First wavelength (nm) configured for IL/RL measurements
F	Wavelength B	Second wavelength (nm) configured for IL/RL measurement Enter “0” if this is a single wavelength measurement
G	OPM Unit	Selects the optical power meter OPM1 - OP710/OP712/OP735/OP1302 Power meter unit OPMRL1 - OP930/OP940 power meter OPMIL1 - OP815/OP850 power meter
H	OPM Channel	Selects the channel of the optical power meter for the measurement, the channels correspond to the optical port of the power meter. For systems with external switches, this should be the channel that the switch will be on. For multichannel systems with one remote head (OPMRL1, OPMIL1, etc.) the power meter channel is set to “1” for the remote head. For systems with two remote heads, for instance an analog remote head and a digital remote head, the analog remote head is channel 1 and the digital remote head is channel 2.
I	Termination Type	Correlates to the termination pass/fail criteria in terminations.xls This number points to the row of the termination being used.
J	Measurement Type or Pause/ Delay	The type of measurement is defined in this column IL only = 0 IL and RL = 1 RL only = 2 RL scan = 4 Pause for any cycle = 100 Pause during measurement cycle = 101 Pause during reference cycle = 102 Delay = 110 For more information on Reference/Measurement Pauses, see page 24.
K	Delay Duration	Designated as the length of the delay in milliseconds

Field Description of Sequences

Column	Header	Description
L	Comment	A comment can be placed to instruct the user during the sequence
M	Reflection #	Corresponds to the location of the reflection on the cable assembly to be tested. Reflection 1 can be thought of as side A of a cable and reflection 2 can be thought of as side B. In most cases this number is set to 1.
N	Reference Channel	Positive value = channel will be referenced. Negative value = reference position will be copied.
O	Reference Module	The OPM used for reference. (In most cases this column should match column G). An alternate reference is usually only used when measuring fanouts.
P	Reference Channel	Corresponds to the channel on the alternate reference module. (In most cases this column should match column H). An alternate reference is usually only used when measuring fanouts.
Q	Force RL Zero Correction	Triggers the software to enable the RL Zero correction for an open flat during reference. For information on adjusting the value the RL Zero feature corrects to, see page 32.
R	Serial Number Index	This serial index value is the number that will be added to the seed serial number. The seed serial number is designated in the software under the Measurement tab. This is mainly used when testing multiple assemblies to be included on one data sheet and is only used when the “Serial Number Indexing” box is checked under the “Data Columns” heading of the Test Report Setup tab.
S	Direction (Bidirectional units only)	Used to specify forward (1) or reverse (2) testing. May be labeled “Direction” or blank.
T	Assigned Source Channel (For use with external switches)	This refers to the channel of the actual source, which is routed into an External Switch. This applies only if an external switch is assigned to the source under the “Instruments Tab.” May be labeled “Assigned Source Channel” or blank.
U	Assigned OPM Channel	This refers to the channel of the OPM reading power, which is routed from the external switch. This applies only if an external switch is assigned to the OPM under the “Instruments Tab.” May be labeled “Assigned OPM Channel” or blank.

Loading a Sequence File

To select or change the sequence file use either the **Setup | Load Sequence** or use the **Load New Sequence** button.

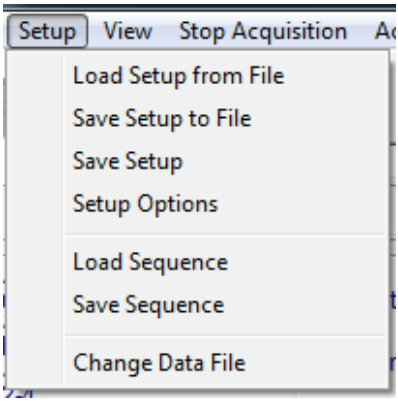


Figure 23

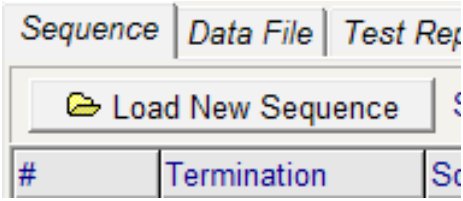


Figure 24

There are already a few sequences included with the installation. To setup your particular sequence file it is easiest to modify an existing file in Excel and save it under a new name. Changes can be made in Excel or with the sequence editor of this application.

Editing the Sequence in OPL-MAX

By double-clicking on a **step (termination)** in the Sequence Tab one can edit the attributes of that step.

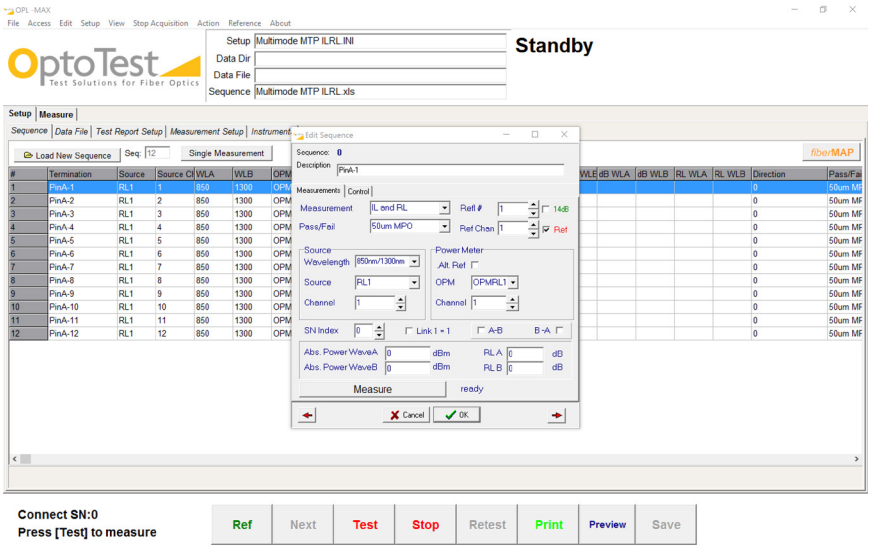


Figure 25: Edit Single Sequence

Adding a Delay or Pause to the Sequence File

There are two ways to add a delay or pause to a sequence file. One is through direct manipulation of the Excel sequence file and the other is through OPL-MAX interfaces.

There are three distinct types of pauses available to be utilized in OPL-MAX. The first type of pause is a static pause which will pause on both a reference cycle and a measurement cycle. This pause can be utilized by entering a 100 in **Column J** of the sequence file. The second two types are dynamic pauses which are active for either a measurement cycle or a reference cycle, but not both. **To insert a pause to the measurement cycle, enter a value of 101 into Column J** of the sequence file. **To insert a pause to the reference cycle, enter a value of 102 into Column J** of the sequence file.

Entering a value of 110 will give you a delay and the integer value listed in **Column K** will be the length (in milliseconds) of the delay.

The other method of adding a pause or delay is discussed below.

Using External Switches

When creating sequence files for setups that will include external switches, there are a few important things that need to be done. The first thing that needs to be done once the software is loaded is to open the **Instruments Tab** and assign the switch to either the source or the OPM. Next, make sure that the sequence file is set up correctly for using external switches. The channel which the external switch is connected to should be entered in **Column T** for the source switch or **Column U** for the OPM switch. If these fields are empty but switches are assigned on the **Instruments Tab**, the program will default to Channel 1 for each.

	S	T	U
	Direction 1: A-B , 2: B-A	Assigned Source Channel	Assigned OPM Channel
	1	1	2
	1	1	2
	1	1	2
	1	1	2
	1	1	2
	1	1	2
	1	1	2

Figure 26

Bidirectional Units (OP931)

When creating sequence files for bidirectional units, there are a few important things to keep in mind. Column D should be 1 (or higher if a switch is integrated into the system—for more information on this, please refer to **Application Note AN-113 Measuring Insertion Loss and Return Loss Bidirectionally for Multiple Channels Using an OP931 and Two OP720s**. For bidirectional testing, a “2” should be entered in Column U while a “1” or a “3” should be entered for unidirectional testing on the first external power meter and the second external power meter, respectively. In Column S, a “1” or “2” will define forward, or A B, testing and reverse, or B A, testing, respectively.

To perform a complete bidirectional measurement, two sequence steps are required; one for the forward direction and one for the reverse direction. The two lines should be identical with the exception of Column S which should read “1” and “2”.

Sequence Editor

Measurement Tab

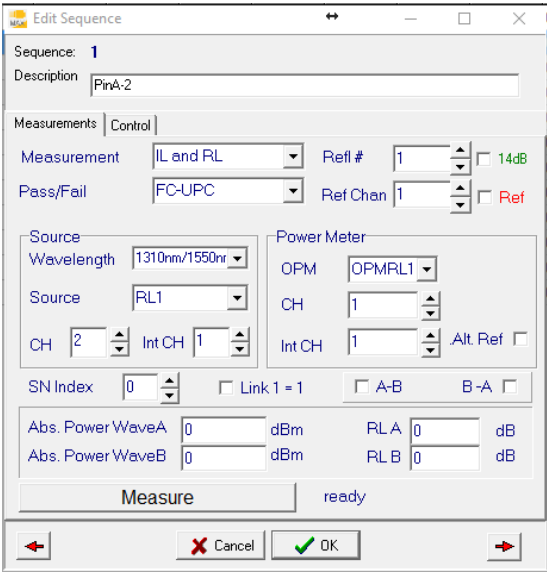


Figure 27

Description: Name of sequence step.

Measurement: Measurement type for sequence.
NOTE: *If a return loss measurement is taken during this step then the Refl# and Ref Chan boxes will pop up. These are to setup the reference positions for the RL measurements.*

14dB Checkbox: Reset the RL reference value to the specified RL Zero value (see page 32).

Source: Change wavelength, and source module and/or channel.

Power Meter: Change Optical Power Meter module and/or channel.

Alt. Ref. Checkbox: Reference to one channel and apply that reference power to another power meter specified in the boxes to the left.
NOTE: *If Link 1 = 1 is checked that means the source channel will match the OPM channel.*

Measure: Quickly take a single measurement for this step.

Sequence Editor

Control Tab

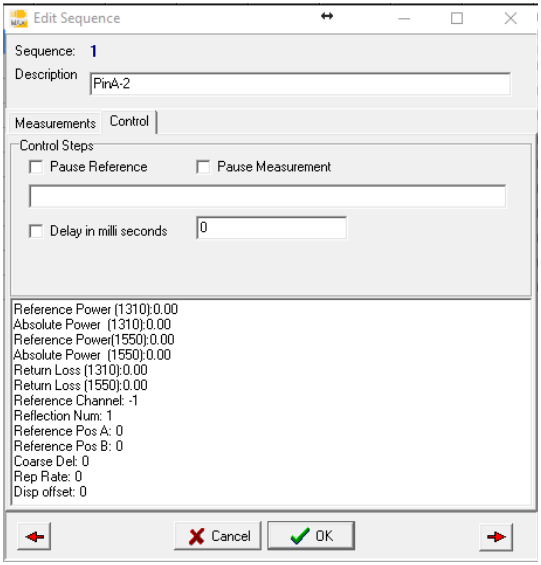


Figure 28

Pause Reference/Measurement: Checking the Pause Reference setting will initiate a pause step during only the reference process, while checking the Pause Measurement setting will initiate a pause step during only the measurement process. Checking both boxes simultaneously will trigger a pause on both the reference cycle and the measurement cycle. This command allows the user to change cables, review data, etc. The user can continue beyond the Pause step at any time by clicking the Continue button or terminate the measurement/reference by clicking the Stop button. A command to be displayed during the pause step can be entered into the space below the pause check box.
NOTE: *To hide the pause step from the test reports, leave Description entry blank.*

Delay: Checking this box allows the user to insert a delay. The length of the delay can be specified in the space provided.

Status Box: Displays information about step.

Data File: All data files are stored in Excel format in the file and location indicated on the **Setup | Data File** page.

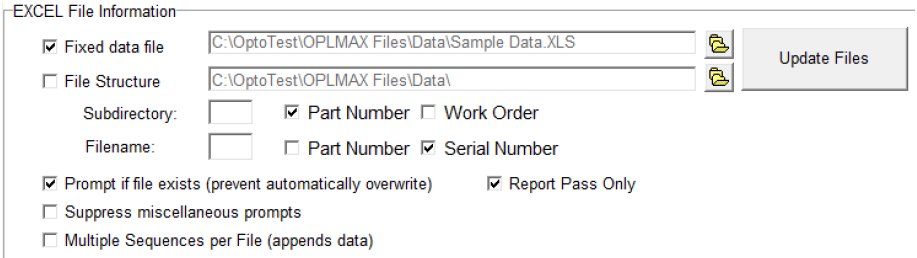


Figure 29: Excel File Information in Data File tab

Fixed data file	All measurement data for each Test is stored in one data file
File structure	Once a “seed directory” is specified by clicking the folder button to the right of the “File Structure” field, the program will create a new file for each test named after either the Part Number or Serial Number. These files will be grouped together in a common folder named after either the associated Part Number or Work Order. Optionally, add a prefix before the directory and/or filename using the boxes to the left of the checkboxes.
Prompt if file exists	Notify the user if a file already exists by the current name
Suppress miscellaneous prompts	Checking this box will eliminate many of the file creation prompts associated with the creation of new test reports. With this box checked you will still be notified if a file already exists upon trying to create a test report with the same name, but you will not be notified when a new file or directory is created that doesn’t exist.
Multiple Sequences Per File	Appends data for multiple cables onto the one test report. Note: Without this box checked the software will create a separate test report every time the user runs through a sequence or overwrite the existing data.
Report Pass Only	If the test results are failing, the data will not write to file. Each retest of the same cable will also not write. When the results are finally passing or the cable is scrapped, the operator must click Save to record this data regardless of Pass/Fail status.

Once a data handling system is specified or updated, it is important to click the **Update Files** button to make sure those settings are loaded.

Serial Number Settings

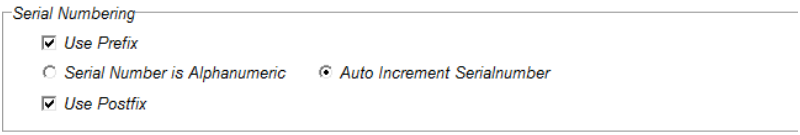


Figure 30: Serial Number Settings

Use Prefix	Enter a Prefix for the Serial Number in Measure tab
Use Postfix	Enter Postfix for Serial Number in Measure tab
Auto Increment Serial Number	Automatically increments the Serial Number (numeric only) when Next button is pressed (This option is automatically greyed out when “File Structure” and “Multiple Sequences per File” are both selected)
Serial Number is Alphanumeric	Alphanumeric option for Serial Numbers but must be manually set each time in the Measure tab

Data Grid Options

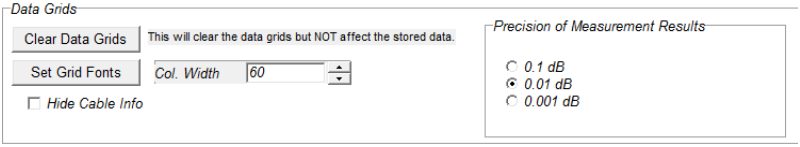


Figure 31: Data Grid Options

Clear Data Grids	Clears the data out of the spreadsheet grids under the Measure tab.
Set Grid Fonts	Change the font of the data under the Measure tab.
Hide Cable Info	Removes the cable header information under the Measure tab.
Precision of Measurement Results	Sets the precision of the data displayed in the software. NOTE: The precision as reported in Excel is defined by the cell formatting of the template used.

Data Log Options

Figure 32: Data Log Options

Enable Data Log	Creates an excel file with detailed results of both failed and passed tests and retests
Log Directory	Specifies the location of the data log files
Log Base Filename	A base name for the data log file, to which the timestamp is appended

Test Report

The Test Report is based on an Excel template file (1.xls):

OptoTest Corporation

OPL-MAX Test Report

Date	7/26/2012	10:52:30 AM
Operator	Operator	
DataFile	1.XLS	

Information	
Workorder	w01625asdasdf
Sales Order	SO1255
Part Number	PN15-06

MTP

Test Point	Wave A	IL Wave A	Pass/Fail	Wave B	IL Wave	Pass/Fail
Pin1	850nm	0.0760457	Pass	1300nm	0.04871	Pass
Pin1	850nm	0.0318477	Pass	1300nm	0.07601	Pass
Pin1	850nm	0.0781392	Pass	1300nm	0.02972	Pass
Pin1	850nm	0.1094211	Pass	1300nm	-0.0536	Pass
Pin1	850nm	0.0592614	Pass	1300nm	0.01064	Pass
Pin1	850nm	0.0885916	Pass	1300nm	0.00213	Pass
Pin1	850nm	0.1011012	Pass	1300nm	0.10521	Pass

Figure 33: Sample Test Report

For each test report this template file is copied into the assigned data file (another spreadsheet) and the header information and data points are transferred into the corresponding cells.

All formatting from the test report template will be carried into the data files.

Test Report Setup

To configure the heading locations in the test report click on the **Setup Template** button under the Test Report tab.

Each field such as Workorder, Partnumber and so on is assigned a destination cell in the spreadsheet (row, col). The data then is transferred accordingly.

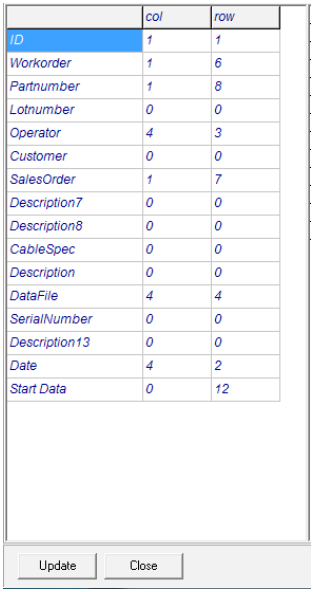


Figure 34: Rows & Columns

OptoTest						
OPL-MAX	[ID]	Test Repo				
			Date	[Date]		
			Operator	[Operator]		
			DataFile	[DataFile]		
Informatio						
Workorde	[Workorder]					
Sales Ord	[SalesOrde					
Part Num	[Partnumbe					
MTP						
Test Poin	Wave A	IL Wave A	RL Wave	Pass/Fail	Wave B	IL Wave A
[Start Data]						

Figure 35: Preview of Test Report

Update: Updates the test report setup

Close: Exit Test Report Setup but does not save

Loading in a Template File

To load in a new test report template file press  under the Test Report Setup tab. This will allow the user to select a new template file. Upon loading this template file a sample test report will be displayed in the spreadsheet on the right of the screen. The headings will be placed as they would in the report and sample data is listed for the place where the data will be output. It may look something like this:

OptoTest						
OPL-MAX		Test Report				
			Date	2/26/2009	8:38:50 AM	
			Operator	Lebron Jam		
			DataFile	1203.XLS		
Informatio						
Workorde	WO1702					
Sales Ord	SO1255					
Part Numb	PN1628-19					
MTP						
Test Point	Wave A	IL Wave A	Pass/Fail	Wave B	IL Wave A	Pass/Fail
[Pin1]	[850nm]	[0]	[Fail]	[1300nm]	[0]	[Fail]
[Pin1]	[850nm]	[0]	[Fail]	[1300nm]	[0]	[Fail]
[Pin2]	[850nm]	[0]	[Fail]	[1300nm]	[0]	[Fail]
[Pin2]	[850nm]	[0]	[Fail]	[1300nm]	[0]	[Fail]
[Pin3]	[850nm]	[0]	[Fail]	[1300nm]	[0]	[Fail]
[Pin3]	[850nm]	[0]	[Fail]	[1300nm]	[0]	[Fail]
[Pin4]	[850nm]	[0]	[Fail]	[1300nm]	[0]	[Fail]
[Pin4]	[850nm]	[0]	[Fail]	[1300nm]	[0]	[Fail]
[Pin5]	[850nm]	[0]	[Fail]	[1300nm]	[0]	[Fail]
[Pin5]	[850nm]	[0]	[Fail]	[1300nm]	[0]	[Fail]
[Pin6]	[850nm]	[0]	[Fail]	[1300nm]	[0]	[Fail]
[Pin6]	[850nm]	[0]	[Fail]	[1300nm]	[0]	[Fail]

Figure 36: Sample Test Report displayed in Software

Edit Test Report Template in Excel

The user can also choose to edit the template file in Excel (or any Excel compatible software). Pressing the button *Edit Template in EXCEL* will open the template file in Excel and one can edit it. To save the changes one needs to save the changes in Excel and then this template file needs to be reloaded in OPL-MAX for the changes to take effect.

NOTE: Any images in the template file will not be displayed in the OPL-Max sample report, but will be displayed in the actual test reports.

Configuring Data Columns

Customize test reports by choosing which data gets recorded in the test reports.

Single Row Data

Checked: Output all data into a single row of an Excel spreadsheet.

Unchecked: Data is separated by wavelength. One row for Wave A and the next row for Wave B.

Show Serial Numbers: Adds an extra column at the beginning of the test report which will display the serial number for each sequence step.

Report Reflection Distance: Adds an extra column at the end of the test report which will display the distance from the front panel of the RL measurement for each sequence step.

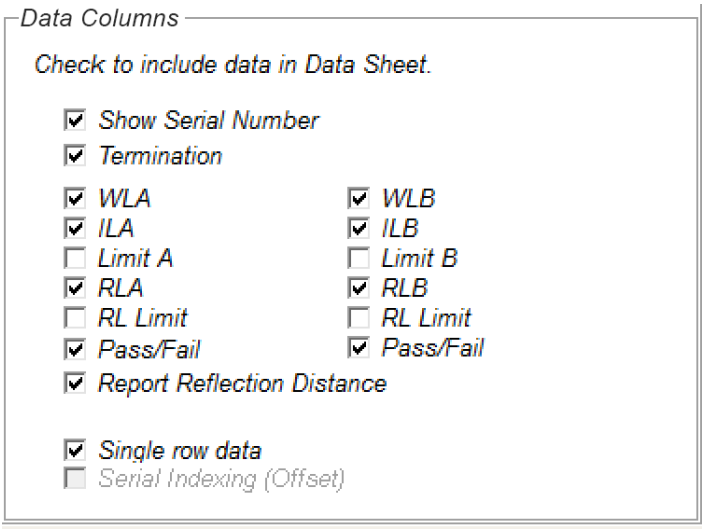


Figure 37

Measurement Setup

Context Images: Double click on existing images and a window will pop up allowing the user to select their own images followed by a prompt to change the label for the tab. Images will be scaled to fit the area allotted and must be in JPG format. To add images if there are none displayed, simply double click in the space above the tab labels.

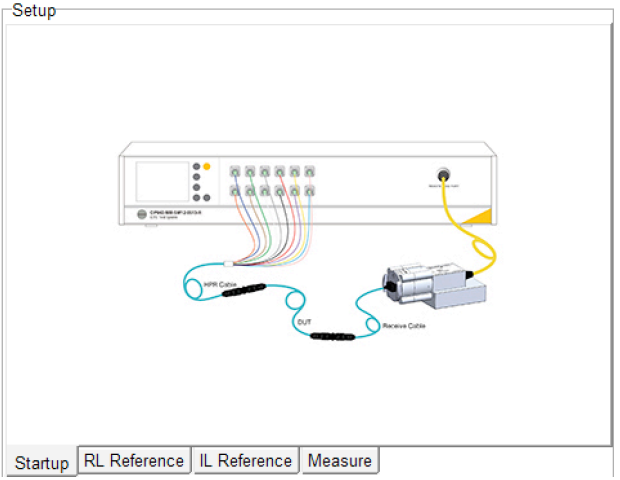


Figure 38

Measurement Mode

See figure 30 on page 26.

Range Hold: Puts the power meter into range hold mode based on the reference powers. This is not advisable in most situations, but if the application requires fast measurements then putting the system into range hold mode will speed up the process.

Reference Return Loss First: Prompts the user to reference return loss prior to referencing insertion loss

RL Zero carry over to next reflection: Takes the 14dB offset from the first reflection position and applies it to the second position, third position, etc. This is good when return loss will be measured on both ends of a DUT in a unidirectional fashion without flipping the cable.

Show dBrl offset in Reference dialog: The software will display the 14dB offset values in the return loss reference dialog.

Hold for Return Loss Measurement: For cables <2.5m it is required that the cable be mandrel wrapped (or connected to a matching block) so that the far end reflection does not interfere with the return loss reading. Checking this box will force the software to perform all IL measurements at once, then the RL measurements.

RT Measurement: Activates real time measurement as part of the test sequence.

Pretest mode: Activates a single real time measurement prior to beginning each full test sequence, useful to check a single channel before running a whole test to avoid failed results and retests.

Capture mode: Activates a real time measurement before each step. Useful when testing fanouts instead of using pauses.

Max Reference Distance: Sets the maximum distance the software will look for an RL reference.

DUT Range: These two fields set the minimum and maximum distance (in meters) for the RL Scan measurement.

Receive Cable Length: Establishes the length of the receive cable used with the RL Scan measurement.
NOTE: More info on the RL Scan measurement on page 58.

RL Zero Offset: Change the value that the RL Zero Correction adjusts. In most cases this will be 14.7dB unless using a different RL artifact with a known value.

Flat Reference Threshold: Core threshold setting. It is strongly recommended to leave this value as-is. Contact OptoTest for more information.

APC Reference Threshold: Core threshold setting. It is strongly recommended to leave this value as-is. Contact OptoTest for more information.

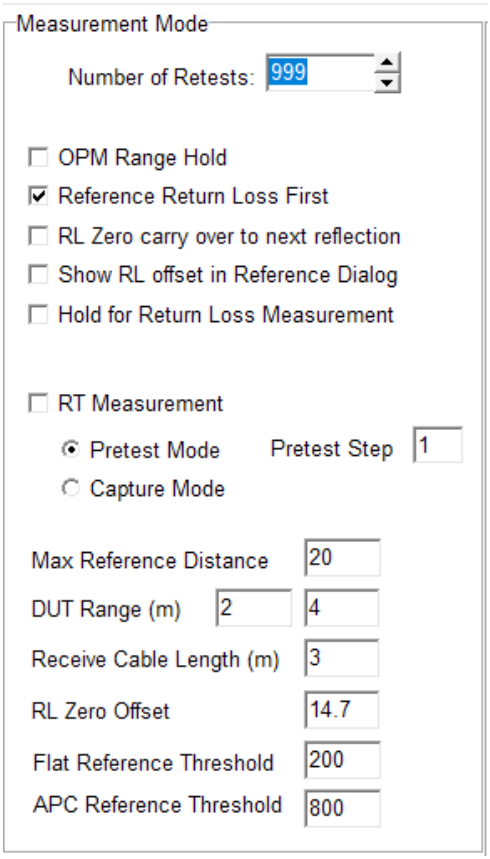


Figure 39

Real Time Measurement

Real Time Measurement can be a useful tool for situations where it might benefit the operator to have a live update of the IL and RL values for a channel before testing. **Pretest Mode** can be beneficial for testing cables where there is a correlation between bad results on a single channel and bad results on a number of channels, such as MPO cables. Fanout cable testing and testing of duplex connectors are two situations which could be greatly improved by the use of Capture Mode.

Pretest Mode allows the user to select a single channel to have the software run a real time measurement on. This is useful to spot-test results and will allow the operator to clean the connector without having to run an entire test. To set up this feature, check **RT Measurement** and **Pretest Mode** on the **Measurement Setup tab**. Also, it is necessary to enter the sequence step that should be used for the Pretest in the field to the right of the **Pretest Mode** option.

Capture Mode is designed to allow a real time update for every step in a sequence. This can speed up measurements in cases where pause steps have been used in the past. By providing live results of the cable's performance, the operator is provided the opportunity to clean a dirty cable before the test rather than needing to retest any time a connector has a failing result. To activate this feature, simply check **RT Measurement** and click the **radio button** next to **Capture Mode** on the **Measurement Setup** tab.

Dwell Times

Dwell Times can be used to adjust the speed at which measurements are performed. These are advanced features that can be used to fine tune the overall speed of tests. Decreasing dwell times can speed up a test in a small way, while introducing the possibility of instability due to settling times. Increasing dwell times will increase the stability of measurements, but the testing time will increase slightly.

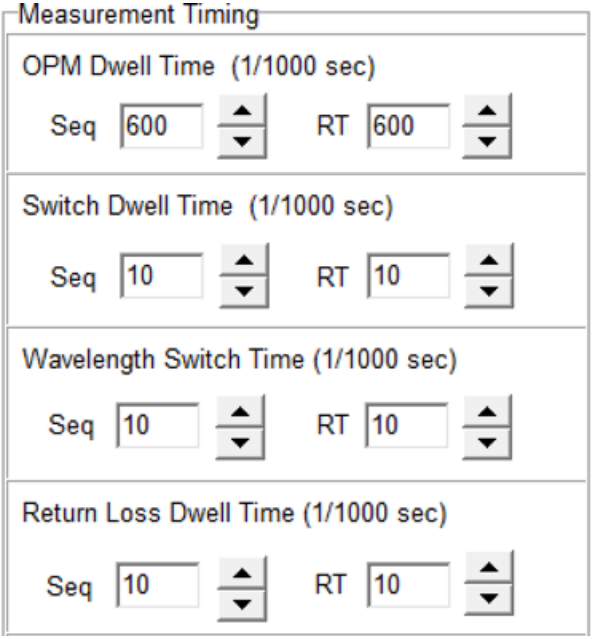


Figure 40

The two sets of dwell times appear; one for standard measurements and another for real time measurements. These should generally match, but there might be certain times when it is advantageous to raise or lower the dwell times for one or the other.

Configuring Dwell Times

If measurements seem to be unstable, one of the easiest changes to make to try to rectify this is to increase dwell times. OPM and Wavelength dwell times will help improve IL measurements, Return Loss dwell times will help improve RL measurements, and Switch Dwell times will help improve channel-to-channel stability.

Instrument Control

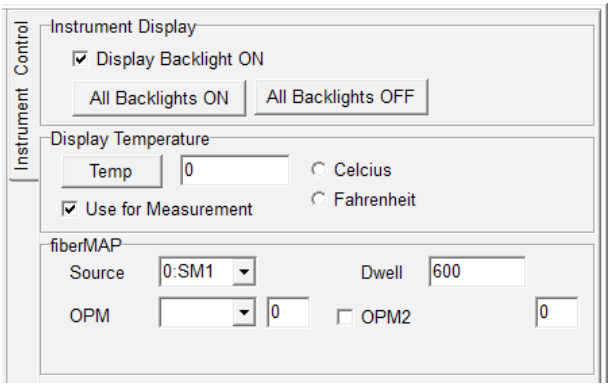


Figure 41: Instrument Controls

Instrument Display	Control the backlight illumination of the display of the selected instrument in the instruments list to the left. This is a convenient tool to identify which instrument is which (OPM1, OPM2, and so on).
Display Temperature	Switches the OPxxx displays between Celcius and Fahrenheit.
fiberMAP	Built-in sequence to test continuity for multi-fiber cables. The only requirement is that the user has a multichannel source and a multichannel power meter. **Source Selection:** if more than one source, the proper unit must be selected. **OPM Selection:** if more than one multichannel power meter, then it must be selected.

NOTE: All these settings are being retained in the Setup File, either OPLMAX.INI or the user assigned file.

Measure

Switch to Measure Mode

Once the test setup and test sequence are satisfactory, switch from Setup mode to Measure mode. If necessary fill in the Header Information for the measurement such as:

Workorder	Operator
Partnumber	Customer
Lotnumber	Sales Order

Similarly the Cable Information should be filled in. Once the headers have been filled in correctly click on Update Data Sheet. This will change the header information for the next test report and the sequence file.

Main Screen in Measure Mode

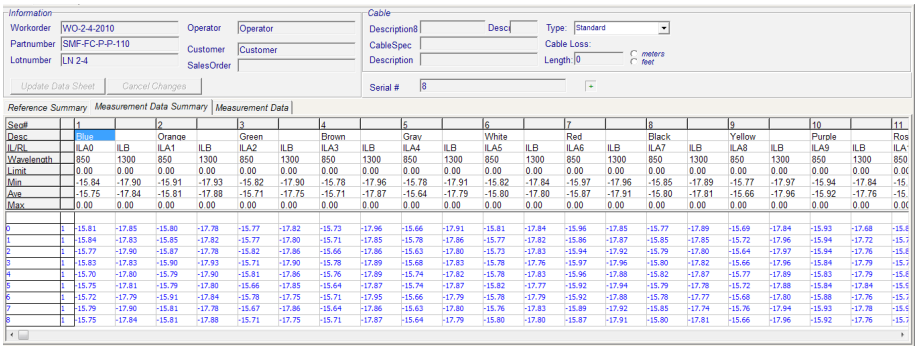


Figure 42: Measured data results

Reference

To measure insertion loss, the optical power from the launch (reference) cable is measured. This reference power is stored for each channel and each wavelength is displayed on the Reference screen.

The software prompts for a return loss measurement if the sequence calls for one. Disconnect the reference cable for the specified channel to allow the module to “find” the reflection.

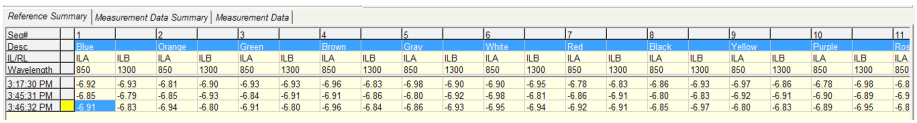


Figure 43: Reference Summary

Measurement Data Summary

Connect the cable with the corresponding serial number to the reference cable and press the Test button. The programmed test sequence is executed and the test results filled into the Measurement Data screen as well as into the Excel data file. The data file is assigned during the setup or can be changed in **Setup | Data File**.
The pass/fail condition is indicated with green as pass and red as fail.

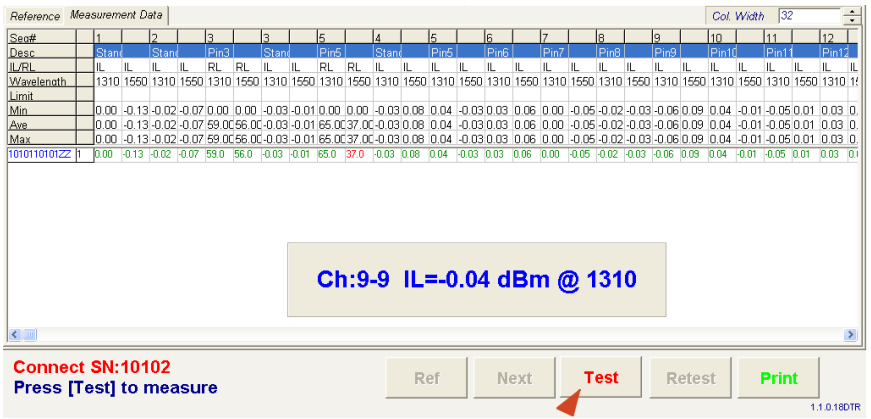


Figure 44: Measurement Data Summary

If the cable passes the selected pass/fail criteria (determined by parameters set in the Termination file) then the **Next** button is activated. Otherwise the **Retest** button is activated.

After testing is completed, the data is written to the data file. By pressing the **Save** button. The user can have the data save to a different location.

Personalizing OPL-Max Headings

OPL-MAX can be further configured to suit the user's needs by allowing the user to alter the heading labels under the **Measure** tab. This is done by altering certain configuration files.

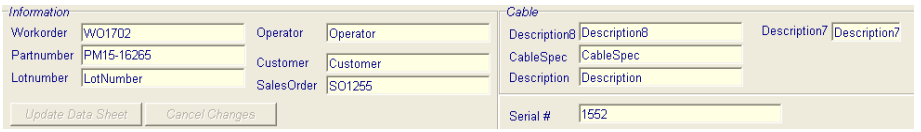


Figure 45: OPL-Max Test Report Heading Editor

NOTE: Changing configuration files can drastically alter the way in which OPL-MAX loads up, so before altering any configuration back up your C:\Program Files\OptoTest\OPLMax directories.

Configuring the Spreadsheet Layout

If the sequence is long and the left portion of the screen does not suffice to display all the data then the data can be “split” to show a portion on the left and a portion on the right side of the screen. This function can be performed by selecting the spreadsheet row where the data should be split and right clicking on the row and select **Split >>>**.

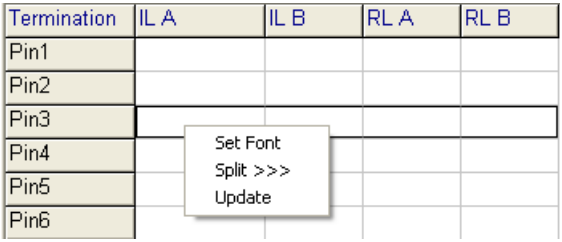


Figure 46: Right-click Option to Split Cells

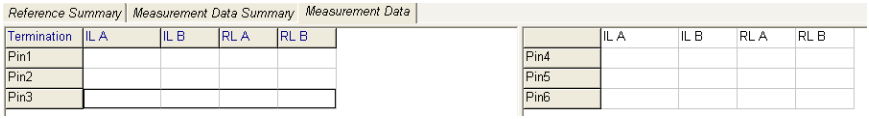


Figure 47: Result when the Example is Split on the Third Row

To “unsplit” the spreadsheet select the last row on the right portion of the screen, right-click the row, and select **<<< Split**. This will return the spreadsheet to its default setup.

Verifying Continuity with *fiber*MAP

OPL-MAX has a built-in sequence to test continuity for multi-fiber cables. The only requirement is that the user has a multichannel source and a multichannel power meter connected to the computer.

To access the fiberMap click on 

. This will bring up a matrix screen.

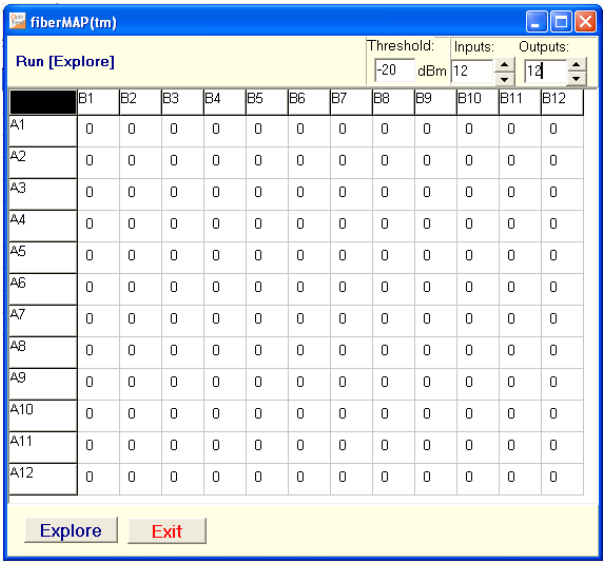


Figure 48: fiberMAP Setup Screen

Before running the fiberMap one needs to configure the setup.

Threshold (dBm)	The minimum power level which will be considered a “lit” channel The relative dB value creates a range of accepted measurements that indicate a fiber is connected.
Inputs	The number of input channels For a 12 fiber MPO cable this value would be 12
Outputs	The number of output channels to be monitored

Once the values have been configured correctly, connect the fiber under test, and click on **Explore**. The software will switch through each source channel and find the corresponding “lit” power meter channel. When the software finds a lit channel the corresponding cell will turn green. A fiberMap with a 1 to 1 pinout (Ch1-Ch1, Ch2-Ch2, etc.) will have green cells on the left to right diagonal.

Performing Measurements

NOTE: Before performing measurements it is advisable to load in a template file. Consult the manual on template file logistics.

To begin performing measurements select the **Measure | Measurement Data** tab. Enter in the appropriate header information as seen in Figure 42. The template loaded in only uses the work order, part number, lot number and operator fields, so those are the only fields that are populated. Once the header information is entered, click Update Data Sheet in the header area to update the test report.

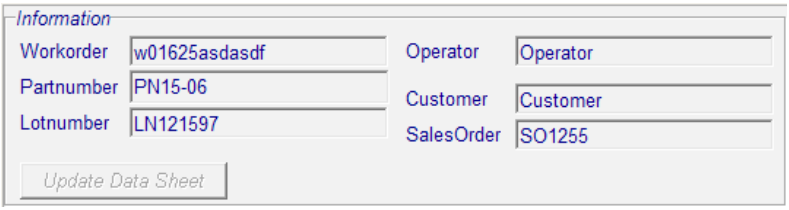


Figure 49: Header Information to get exported to Test Report

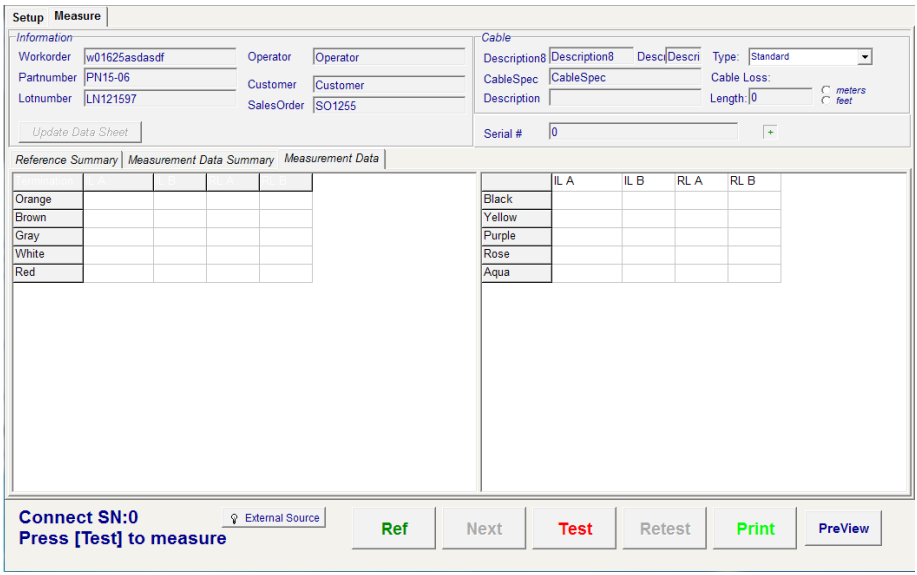


Figure 50: Measurement tab shows a 12-step Sequence

Under the **Measurement Data** tab the software will display a spreadsheet that corresponds to the Sequence file which is loaded. The user can choose how this spreadsheet is displayed. The default configuration is for all of the sequence steps to be located in the left portion of the tab as shown below. Use **<<< Split** to split from the selected sequence step.

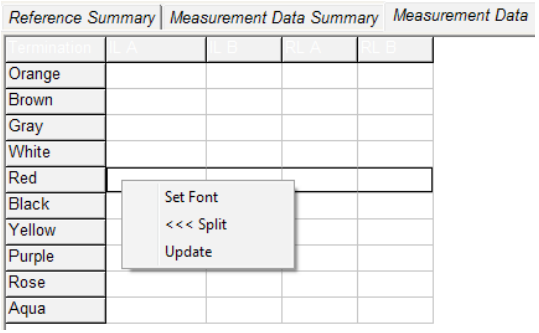


Figure 51: All Sequence Steps are shown on the left portion of the screen

Once the DUT is connected properly one can perform a test by clicking **Test**. The software will go through the process of performing the test and display the results in their corresponding columns as seen in figure below.

Termination	SN	IL A	IL B	RL A	RL B
Pin1	100000	-0.09	-0.02	52.17	54.38

Figure 52: Measurement Results

As you can see here the serial number is “100000”. Click PreView to see the test report. This will open the test report in Excel. To continue testing one **must close out of the data file**. The software cannot write to the data file while it is open.

Reference Summary | Measurement Data Summary | Measurement Data

Termination	IL A	IL B	RL A	RL B
Pin1			14.10	13.88
Pin2	0.00	0.01	57.60	57.09
Pin3			56.35	56.79
Pin4			14.07	13.87
Pin5	0.00	0.01	57.56	57.01
Pin6			56.21	56.61

Figure 53: Data output for IL/RL Measurements

The data displayed in green means that the measurement meets specifications as defined in the termination file. The data in red indicates a failed measurement.

When ready to test the second cable click **Next**. This will automatically increment the serial number if it is numeric. However, if the serial number is alphanumeric then the operator must enter it in manually into the serial number box (**Measure** tab) and then click **Next**.

If capturing data in a File Structure, a new test report will be created every time within the Subdirectory folder. If using a Fixed data file, the previous data will be overwritten. To append all measurements, check the box labeled **Multiple Sequences per File (appends data)** in the **Setup | Data File** tab.

Click **Test** to begin testing the next cable. If a cable fails it can be retested by clicking on **Retest** instead of Next. The serial number will not be incremented and the failed measurements in the test report will be overwritten with new data.

	A	B	C	D	E	F	G	H	I	J
1			t Data							
2	OptoTest Test Solutions for Fiber Optics			Test Report	MTP-12					
3				Date	2/11/2010 9:30:57 AM					
4				Operator	Lebron James					
5				DataFile	Sample Data.XLS					
6	Information									
7	Workorder	WO-2-4-2010								
8	Sales Order									
9	Part Number	SMF-FC-P-P-110								
10										
11	Results									
12	**Serial Number**	Fiber	Wave A	IL Wave A	RL Wave	**Pass/Fail**	Wave B	IL Wave A	RL Wave	**Pass/Fail**
13	100000	Pin1	1310nm	-0.087739	52.17	Pass	1550nm	-0.016296	54.38	Pass
14										

Figure 54: Test Report after a single test

When the lot has been tested one can look at the finished test report by clicking **Preview**.

	A	B	C	D	E	F	G	H	I	J
1			t Data							
2	OptoTest Test Solutions for Fiber Optics			Test Report	MTP-12					
3				Date	2/11/2010 9:30:57 AM					
4				Operator	Lebron James					
5				DataFile	Sample Data.XLS					
6	Information									
7	Workorder	WO-2-4-2010								
8	Sales Order									
9	Part Number	SMF-FC-P-P-110								
10										
11	Results									
12	**Serial Number**	Fiber	Wave A	IL Wave A	RL Wave	**Pass/Fail**	Wave B	IL Wave A	RL Wave	**Pass/Fail**
13	100000	Pin1	1310nm	-0.087739	52.17	Pass	1550nm	-0.016296	54.38	Pass
14	100001	Pin1	1310nm	-0.083863	51.71	Pass	1550nm	-0.072638	54.19	Pass
15	100002	Pin1	1310nm	-0.082757	51.77	Pass	1550nm	-0.071457	54.25	Pass
16	100003	Pin1	1310nm	-0.082757	51.73	Pass	1550nm	-0.072047	54.21	Pass
17	100004	Pin1	1310nm	-0.080544	51.59	Pass	1550nm	-0.063786	54.09	Pass
18	100005	Pin1	1310nm	-0.08165	51.76	Pass	1550nm	-0.070276	54.26	Pass
19	100006	Pin1	1310nm	-0.065638	52.41	Pass	1550nm	-0.065555	54.91	Pass
20	100007	Pin1	1310nm	-0.062883	44.58	Fail	1550nm	-0.070866	46.85	Fail
21	100008	Pin1	1310nm	-0.09051	39.77	Fail	1550nm	-0.083284	41.68	Fail
22	100009	Pin1	1310nm	-0.092173	40.1	Fail	1550nm	-0.086838	42.03	Fail
23	100010	Pin1	1310nm	-0.072256	43.35	Fail	1550nm	-0.079141	45.51	Fail
24	100011	Pin1	1310nm	-0.072256	43.48	Fail	1550nm	-0.079141	45.65	Fail
25	100011	Pin1	1310nm	-0.077227	51.09	Pass	1550nm	-0.066735	53.73	Pass
26	100012	Pin1	1310nm	-0.076674	50.65	Pass	1550nm	-0.072047	53.3	Pass
27	100013	Pin1	1310nm	-0.076674	50.76	Pass	1550nm	-0.072047	53.41	Pass
28	100014	Pin1	1310nm	-0.112182	57.1	Pass	1550nm	-0.093362	58.52	Pass

Figure 55: Final Test Report

Configuring the Insertion Loss Measurement

OPL-MAX allows the user to choose as to how they would like to define insertion loss either as a negative gain or a positive loss (default). This option can be changed by altering the C:\Program Files\OptoTest\OPL-Max\INI\OPLMAX.INI file which will open in Notepad®.

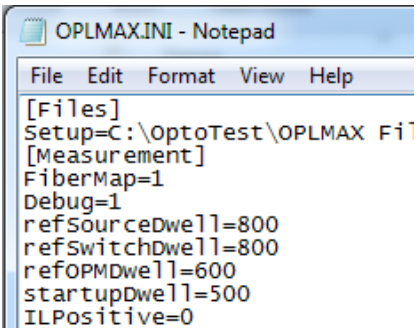


Figure 56: Setup File to alter IL Measurements

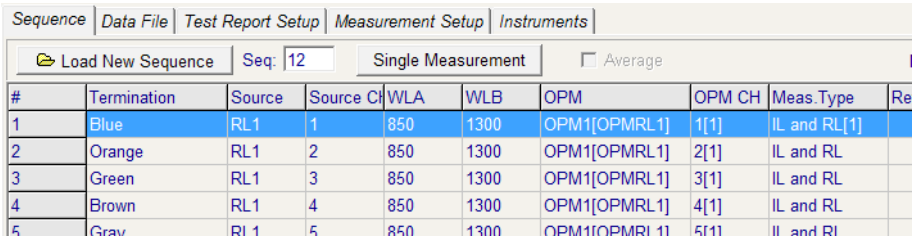
To change the IL measurement to a negative loss, change line 12 of OPLMAX.INI to read “ILPositive=1”. Then save the file and reload OPL-MAX. The IL readings will now be negative.

Configuring the Return Loss Measurements

OPL-Max allows for measurement of return loss if a supported instrument is connected to the computer.

Referencing Return Loss

The key to a good return loss measurement is to set up a correct referencing sequence. To do so, edit the sequence to allow for RL measurements. In this instance the first step is selected.



#	Termination	Source	Source CH	WLA	WLB	OPM	OPM CH	Meas.Type	Re
1	Blue	RL1	1	850	1300	OPM1[OPMRL1]	1[1]	IL and RL[1]	
2	Orange	RL1	2	850	1300	OPM1[OPMRL1]	2[1]	IL and RL	
3	Green	RL1	3	850	1300	OPM1[OPMRL1]	3[1]	IL and RL	
4	Brown	RL1	4	850	1300	OPM1[OPMRL1]	4[1]	IL and RL	
5	Gray	RL1	5	850	1300	OPM1[OPMRL1]	5[1]	IL and RL	

Figure 57: Sequence screen with RL measurement steps

To edit the sequence step double-click on the step and this will pull up the **Edit Sequence** dialog box.

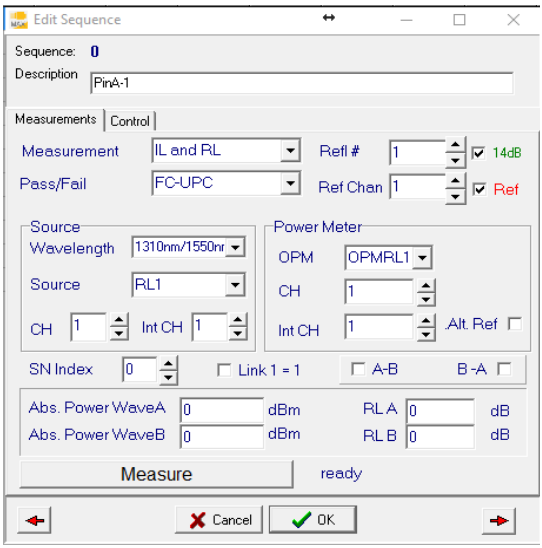


Figure 58: Edit Sequence popup screen

For **RL** measurements to be measured the Measurement tab must either have **IL** and **RL**, **RL Scan**, or, **RL only** selected. When selected, the Refl# and Ref Chan boxes will appear.

The Ref# field designates which reflection will be measured for this particular sequence step. Typically, a value of "1" would be entered in this field. Other values would indicate that more than one position would be measured. For example, a "2" corresponds to the second return loss position and a "3" corresponds to the third. It is advisable that if more than 1 reflection will be measured in a link (length of cables attached to each other) then the sequence steps should progress from the first reflection (closest) to the last reflection (furthest from the front panel). If there are connections between the front panel and the DUT, but those are not being measured, the user should be sure to enter "1" in this field.

The Ref Chan corresponds to the channel that will be used to reference return loss. In general, this should match the source channel for the sequence. If the checkbox next to the Ref Chan that is labeled "Ref' is selected, it will notify the software to actually reference to this position when going through the referencing process. If the checkbox is not selected, the software will copy the reference from the channel selected in the Ref Chan box.

Additionally, this function can be used if the user has multiple channels that are the same length and would only like to reference to one of those channels, using that measurement position for all of the channels. This can eliminate a lot of time in the referencing process, but this is only advisable if the link lengths are known to be within +/- 0.2m of each other.

The Return Loss Reference Screen

Return loss is referenced under this dialog box. There are 7 columns in this spreadsheet and each column conveys important information to the user.

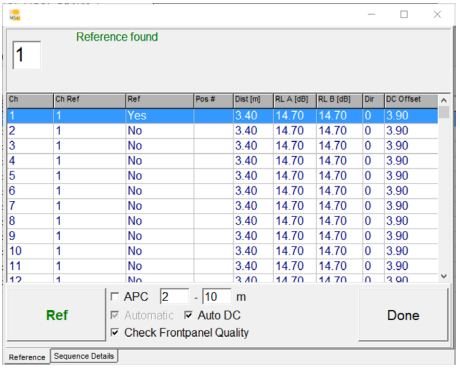


Figure 59: Return Loss Reference Screen

CH	The channel where return loss will be referenced
Ref	YES = will reference channel no = copy from referenced channel
Pos#	Reflection number to be referenced
Dist(m)	The distance to the reflection in meters
RL A [dB] RL B [dB]	Shows the return loss measurement of the referenced position An open PC reflection this should be approximately 14dB
DC Offset	Displays the offset applied to the measurement position based on reflections that interfere with the unit's ability to measure on an area without reflections. In the above image, the unit is scanning backwards 3.9 meters from the DUT to accurately measure return loss
APC	Sets the unit into APC Reference mode, looking for small reflections between the distance specified in the fields next to the checkbox
Auto DC	Checks the cable setup for reflections and automatically finds a spot without reflections to use as its baseline to increase accuracy
Check Front Panel Quality	Checks the front panel for dirt or damage and warns the user to clean the front panel connector and the reference cable

By right-clicking anywhere on the spreadsheet in the **return loss reference screen** a small dialog box will pop up.

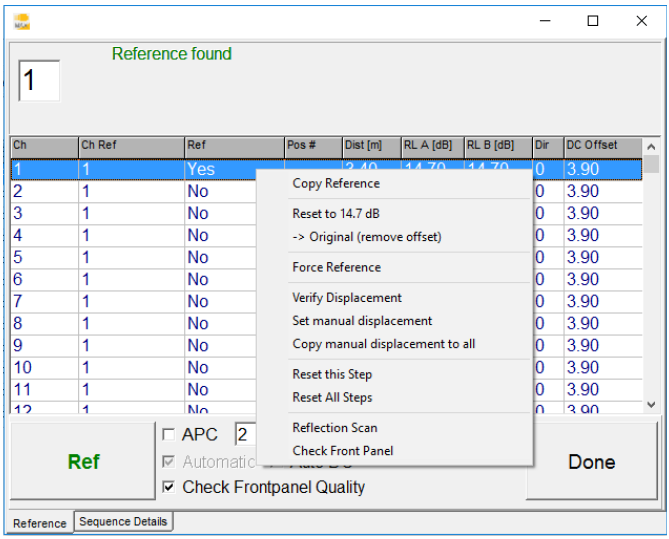


Figure 60: Options per Sequence Step

Copy Reference	Copies all references that are applied from one channel to another
Reset to XXdB	If the software does not automatically zero the return loss reference value, then it can be manually zeroed using this feature. The value that the return loss reference value is zeroed to can be set on the Measurement Setup tab
Original (Remove Offset)	Removes the applied 14dB offset
Force Reference	Manually sets a reference of known length  At = Distance from front panel (±0.1m) After last = Distance after previous reflection (±0.1m)
Verify Displacement	Manually checks the DC Offset and advises if there is a large reflection that will interfere with measurements
Set Manual Displacement	Sets a manual DC offset displacement Software normally measures a DC/noise level 2.2m in front of the measured reflection *Example:* *A PC-PC connector is 4m in front of the reflection being measured (DUT connector)* *Set a manual displacement of 4.0m* *This forces the DC/offset to be measured in front of the PC-PC connectors*
Copy manual displacement to all	Copies all DC offsets that are applied from one channel to another
Reset this step	Clears the reference data for this step (position and offset) Perform prior to re-referencing
Reset all steps	Clears all steps of the reference data
Reflection Scan	Performs an OTDR trace style scan. More info on page 59.
Check Front Panel	Checks the front panel for dirt or damage and warns the user to clean the front panel connector and the reference cable

Handling the RL Zero Offset for Systems with Noticeable Loss

If insertion loss is added to a system between the front panel and the reflection to be measured—such as a switch, coupler, or lossy connectors—then an offset that will take into account the loss in the system should be added to all RL measurements. For example, if an open PC connector has an RL measurement of 16.3dB, then it should be corrected down to 14.7dB by subtracting out 1.6dB. Force this calculation by checking the **14dB** box in the **Sequence Editor** for each RL measurement or entering a "1" in Column Q on the sequence file. This offset will be applied to all RL references that correspond to a particular reference (e.g. copied reference values). Additionally, to configure the value to which return loss zeroes out to, edit the value in the **Setup | Setup Measurement** tab.

An RL Zero offset can also be applied to all connectors to measure return loss on multiple connectors of a single fiber link. To do this, both the **14dB** checkbox needs to be checked for each sequence in the **Sequence Editor** and the 14dB – carry over to next reflection checkbox in the **Setup | Setup Measurement** tab needs to be checked. The user can specify the zero offset value under **Measurement Mode** of **Measurement Setup** tab.

Figure 61

Referencing Insertion Loss and Return Loss

Click **Ref** to prompt a dialog instructing the user to prepare for an insertion loss reference. Verify that the reference cable is connected from the source channel to the proper power meter channel then click **Yes**. The software will begin running through the IL referencing process taking power measurements.

When IL referencing has completed, a prompt for RL referencing will appear. Click **Yes** to confirm. The return loss referencing screen will be displayed.

NOTE: If referencing to an open APC connector, be sure to check the APC Reference feature on that window. Without this feature, the software will only look for large reflections and an open APC connector is not of sufficient magnitude.

Click **Ref** at the bottom of the **Return Loss Reference** window. The software will instruct the unit to begin searching for a reflection. Once the reflection is found the software will measure the reflection magnitude and then display the distance.

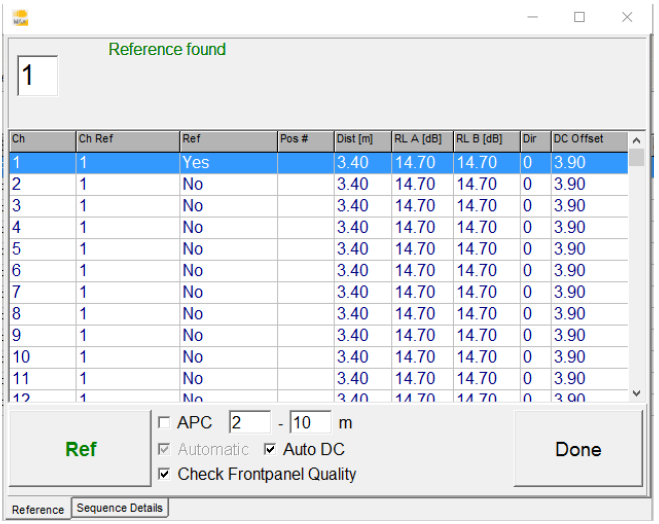


Figure 62

In the picture above, the unit finds a reflection at 3.4m and measures return loss of the open PC connector as 13.66dB and 14.15dB for 1310nm and 1550nm, respectively. After the cable has been successfully referenced click **Done**.

Test Sequence Passes

Press **Print** to print the most recently tested report, which is printed according to the template that has been setup in **Setup | Test Report Setup**. To check the data file before printing, click **Preview** to open the test report in Excel.

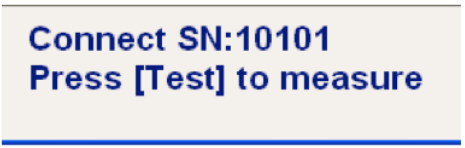


Figure 63

Test Sequence Fails

A failed cable can be retested by pressing **Retest**. Contaminants or loose connections are most likely the cause for a high insertion loss or low return loss. The number of retests is set on the main setup screen.

Figure 64

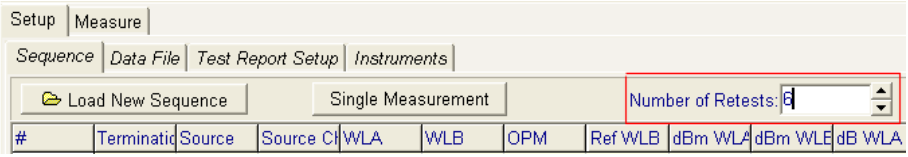


Figure 65: Number of Retests can be configured

If the user wishes not to retest the entire sequence then it is possible to test just one strand of the multiple step assembly. This retest can be performed under the **Measure | Measurement Data** tab. Scroll over the step you would like to retest and right-click on the value to be retested. A pop-up will appear with the real time results of the selected sequence step:

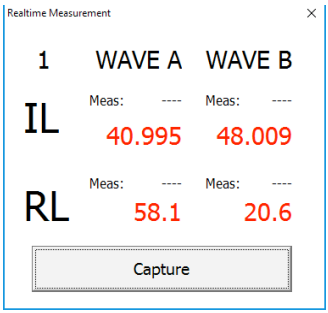


Figure 66

Capture: Grabs the current values and saves them as the test results for that sequence step

X: Close the pop-up without capturing the real time data as results

Viewing/Printing the Test Report

To view the test report after performing a test the user can click the Preview button and this will launch Excel and open the data file.

Figure 67: Click Preview to Open Excel Test Report

Measuring IL and RL on Short Cables

The OP940 measures RL via the pulsed (OTDR) method and has a specific resolution. The OP940 has trouble distinguishing pulses that are less than 1.7m apart. For measuring RL on these cables, one needs to employ a mandrel (this works for single mode cables only), matching gel, or a matching block to the far end reflection to diminish the reflection. For more information, please consult our Application Note #127- Measuring Return Loss on Short Cables—A Detailed Approach.

To signal the software to allow for time to apply reflection-reducing methods, select the check box next to the label **Hold for Return Loss Measurement** under the **Setup | Measurement Setup** tab. This will split the IL and RL measurements into two different steps since the two tests cannot measure simultaneously if the DUT is either mandrel wrapped or terminated.

Connect the DUT to the power meter and the software will step through the IL measurements followed by a return loss dialog prompt. Here the software will display the RL in real time for the first sequence step. At this point, the user would employ the necessary method of diminishing the far end reflection.

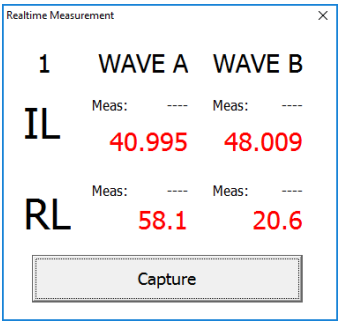


Figure 68: RL updates in realtime (not IL)

Once the far end reflection has been successfully reduced, click **Capture** and the software will save the on-screen values for return loss.

Moving on to a New Batch of Cables

Once the lot has finished and the test report saved and/or printed the operator can begin to test the next batch. To start over with a new data file one needs to re-specify a file or start over from scratch with the existing data file if it is to be overwritten.
Under the **Setup | Data File** tab the operator can redefine a data file or just click **Update Files** to overwrite the existing file.

Configuring Header Fields

OPL-MAX has "field" labels which are pointers to information. Some of these field headers are user configurable and some of them if changed will affect the functionality of the software. To begin altering these fields the user needs to open the active INI file. To find the active INI file the user should consult the top of the window to find the file name, then click on **Setup | Change Configuration** to find the location and verify that that file name is in that folder (shown below in the red boxes).

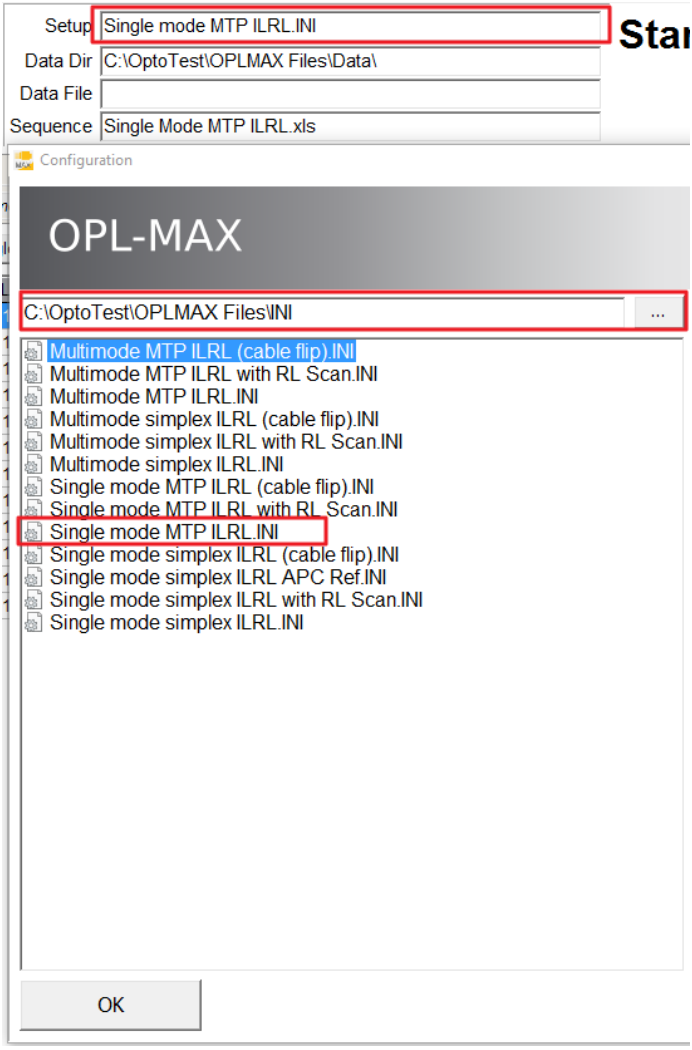


Figure 69: Load Setup File Popup Screen

Close the Change Configuration window and open the setup file using a text editor. This file contains all of the user specified setup information for OPL-MAX. Scroll through the INI file and find the line which reads **[Fields]**.

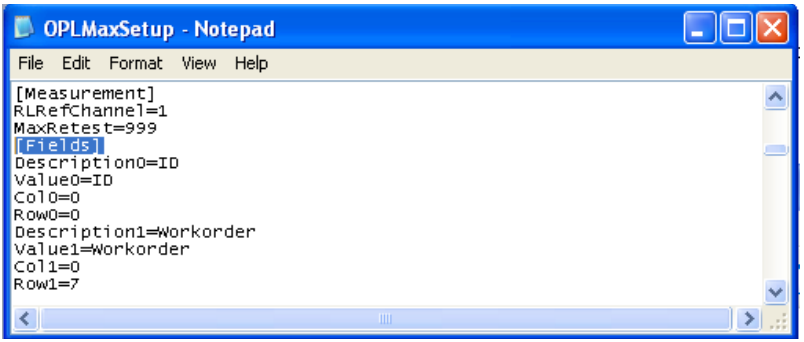


Figure 70: Setup file in Notepad

The text after the **[Fields]** label controls the information for each individual field. The available fields range from **"field0"** to **"field10"**. Fields zero and eleven through fifteen must not be changed. Changing these will alter the functionality of the software.

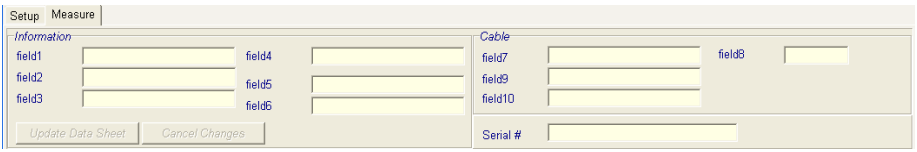


Figure 71: Change files in Measure tab

OPL-MAX is installed with default descriptions for each field. These correspond to a label and pointer in OPL-MAX.

To change the label to the left of each text box simply change the corresponding description. For example, to change the label of field1 then the user would change **"Description1"** and so on. After all headings have been changed to the user's liking, save the file and reload that setup in **OPL-MAX** using **Setup | Change Configuration**.

Configuring OPL-MAX for Multiple Cable Assemblies per Test Report

OPL-Max was created to facilitate testing multi-fiber cables and create a test report. This test report includes header information (sales order, part number, etc.) along with the data for the tests performed on the cable. The software can create one test report for each assembly. In some instances, though, one may want to include measurements for multiple cable assemblies onto one test report and include the serial number for each assembly. This can also be done in OPL-Max.

How the Software Creates Test Reports with Multiple Assembly's Data

OPL-Max is typically setup to perform one test per test report. After referencing, the software cycles through the entire sequence file, performing the specified measurements on the cable, and then outputs the data to the test report. Then the user would connect up the next cable assembly and repeat the process. A separate test report would be created for this assembly.

This process works for large assemblies. But what if the assembly is small, like a single set of duplex cables or several simplex cables that are part of the same order? It might be a waste of resources to create one test report for each cable if all the cables are going to reach the same customer, or be packaged together. In this instance OPL-Max can append test results so that multiple assemblies are all included on the same test report.

To do this, simply load in a sequence file corresponding to the single assembly. Then, reference insertion loss and return loss and perform the test. The software would cycle through the measurements and, when finished, output the measurements to the test report. The user would then connect up the next assembly and perform a test. The software would cycle through the same sequence, only this time instead of creating a new test report it will append this assembly's data to the previous test report. This would be repeated until all assemblies which are to be included on one test report are tested.

Creating a Sequence File for the Specific Cable Assembly

The sequence file instructs the software as to what measurements are to be performed for a specific cable assembly. When creating the sequence file for testing multiple assemblies that are identical, simply create a sequence file which will test a single assembly. This sequence will then be repeated over and over. For instance, if insertion loss and return loss is to be measured on many duplex cables, then a sequence file needs to be created to measure only one duplex cable.

There are some default Sequence files included with the software that can be altered for various measurements. One can edit these sequences in the software or in Excel. After creating the sequence file it is best to test it out on a single assembly to verify that it functions the way it is intended.

Setting up the Software for Multiple Assembly Test Reports

Once the sequence file has been properly configured for a single assembly, one needs to load it into the software. To load the sequence file into the software, click on 

under the **Setup | Sequence** tab. Then, in the dialog box, select the sequence file that was created for the assembly. The sequence file will be loaded into the software and it will be displayed under the **Setup | Sequence** tab in the form of a spreadsheet.

To enable the multiple assemblies per test report function, the checkbox next to 

under the **Setup | Data File** tab needs to be checked. Also, it is advised to check the box 

to enable the software to output the serial number for each assembly being tested. Without this function enabled, one would not be able to distinguish between each cable in the test report.

It is also good to setup a “fixed data file.” This can be done by checking the box 

and specifying a data file by clicking on the corresponding 
icon. One can also use the “File Structure” option as well, so that the software creates automatic data file names.

The software is now setup to output multiple assemblies to the same test report.

Examples

Example 1: *RL Scan Measurement*

The RL Scan measurement is intended to test the back connector of a cable assembly without having to reference to that position or flip the cable. This feature requires that the cable setup has a receive cable with a known length and that that, along with a range of lengths for the devices under test, be provided by the operator to the software.

To select this measurement, enter a “4” in the Measurement Type column (Column J) of the sequence file or select **RL Scan** on the sequence Editor from within the OPL-MAX software.

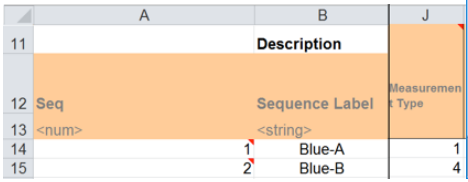


Figure 72

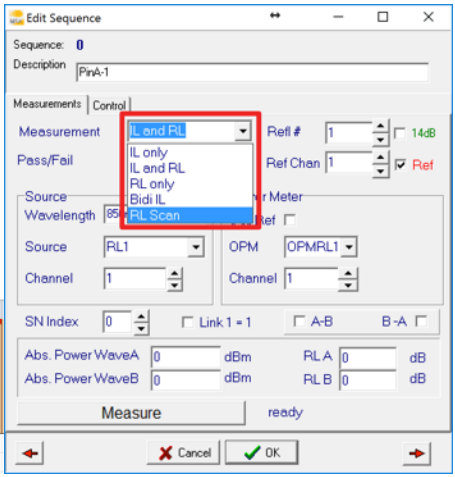


Figure 73

Example 1 (cont.): *RL Scan Measurement*

As with a standard reference, a negative number in Column N will direct the software to copy the position from the corresponding channel (e.g. -1 will copy the RL Scan position from channel 1). This can be used to find the end of the cable on one channel and simply measure at that spot on each other path of the same cable. This can also be set on the Sequence Editor window by choosing the **"Ref Chan"** and checking or unchecking the **"Ref"** box.

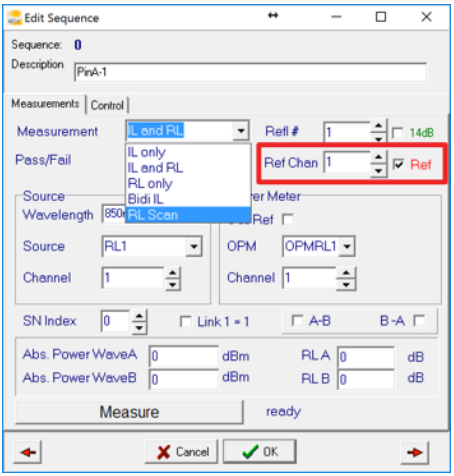


Figure 74

It is also necessary to enter a range for the DUT lengths as well as a length for the receive cable on the **Measurement Setup** tab, as below. For example, if the cable that will be tested will be between 5m and 10m, simply enter 5 and 10 in these fields. If the cable being tested is between 10m and 200m, enter that range, but be aware that the larger the range, the longer this measurement might take.

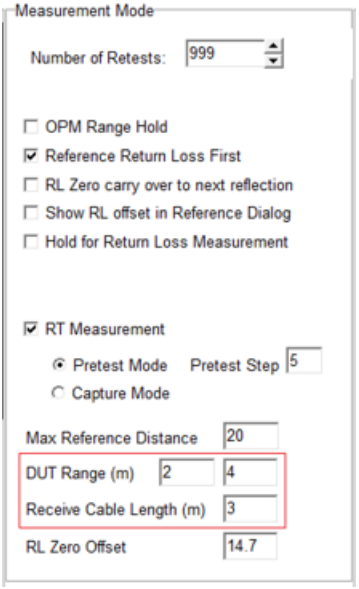


Figure 75

Example 1 (cont.): *RL Scan Measurement*

Once the operator has the **RL Scan** measurement selected and the necessary fields are filled in, they can reference the front connector like normal.

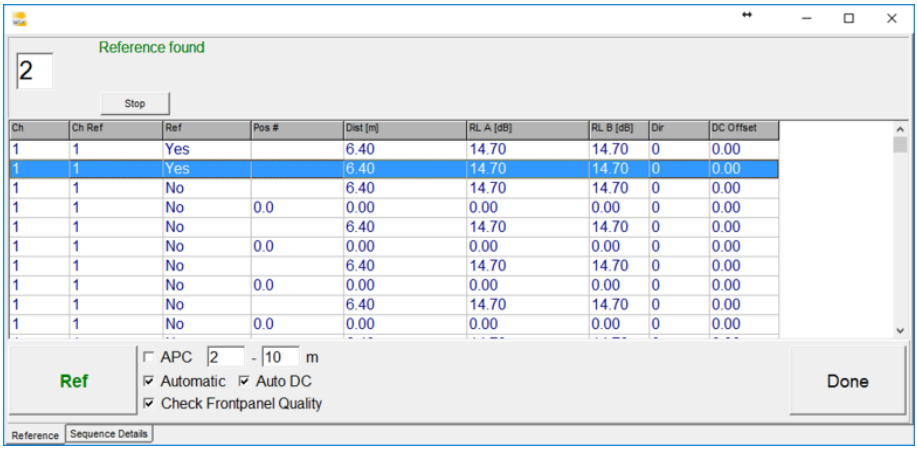


Figure 76

During the test, connect the DUT to the reference cable and connect the receive cable from the DUT to the detector as in the image below.

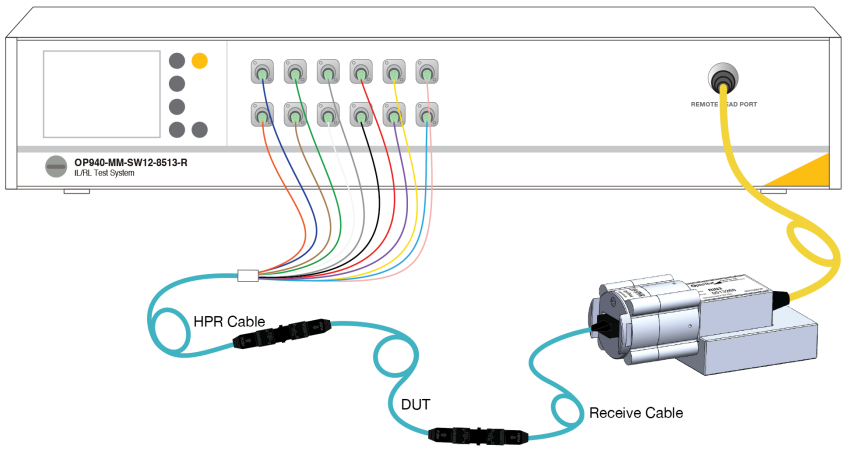


Figure 77

Example 2: *Performing OTDR Style Reflection Scan*

The Reflection Scan feature in **OPL-Max** is essentially an extension of the OTDR trace on the OP940's front panel. This feature creates OTDR-style scans as a means of diagnosing problems with insertion loss and return loss reference and measurement. The software will perform a scan of approximately 10-20m at a time. This mode is not intended to be used for measurement, or high-precision OTDR fault-finding, but as a tool that operators can use in diagnosing roughly where problematic reflections are located to expedite resolution of technical difficulties.

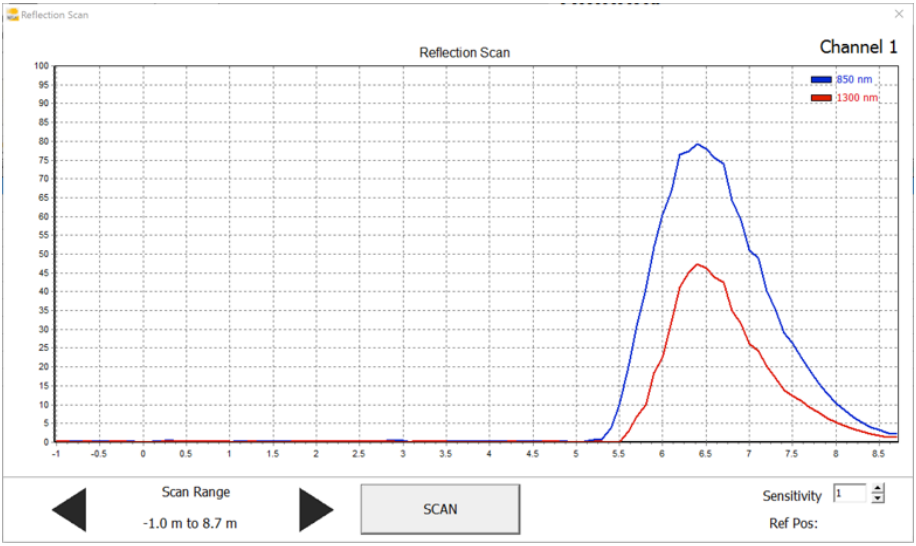


Figure 78

On the **Reflection Scan** screen, the operator will notice a pair of horizontal and vertical axes.

The vertical axis indicates the size of the reflection (in arbitrary units) while the horizontal axis indicates the distance of the reflection from the front panel. The horizontal axis is marked in increments of 0.5 meters. To change the scan window, simply click the **< or >** button to move the window by 10m. To repeat a scan, simply click the **Scan** button.

On this window, the operator can control several options such as the pulse intensity and sensitivity of the return loss module. By adjusting the pulse intensity from Low to High (single mode only), the operator will be able to view reflections in the range of about 30dB to 80dB rather than the range of 10dB to 30dB which Low mode covers. The Sensitivity setting determines how reactive the return loss meter will be when scanning. The higher the number of the Sensitivity, the more able the meter is to detect smaller reflections. This also means that a large reflection will saturate the meter at a higher Sensitivity setting and a smaller reflection may not show up at all with a lower Sensitivity setting.

Example 2 (cont.): *Performing OTDR Style Reflection Scan*

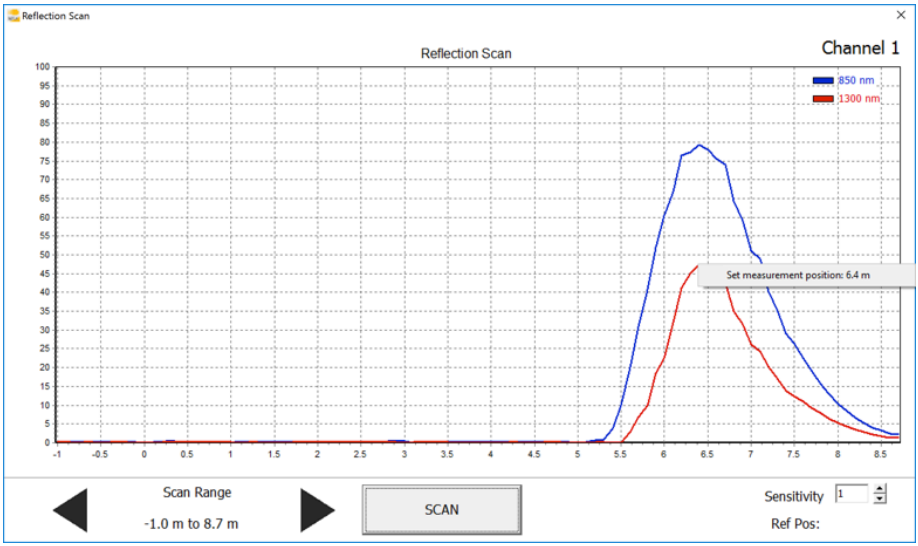


Figure 79

This mode also allows users to manually define a return loss reference position for use in RL measurements. Simply right-clicking on the graph will present the option to “Set measurement position” and list the distance with an accuracy of 0.1m.

Setup Files

OPL-MAX has the ability to store settings so that they may be loaded again in the future for a similar test procedure. Included with the software are sample configurations that can be loaded. Below is a list of setup files and associated files/settings with each configuration. These configurations can be loaded from the **INI File Check** splash screen by selecting **Change Configuration** under the **Setup** menu.

Simplex ILRL

Setup Filenames

Single mode: OPLMaxSetup_Simplex SMF ILRL.INI
Multimode: OPLMaxSetup_Simplex MMF ILRL.INI

Sequence Filenames

Single mode: Simplex ILRL SMF.xls
Multimode: Simplex ILRL MMF.xls

Template Filename

Template ILRL w-serial number.xls

Description

Uses an **OP940-SM** or **OP940-MM** to measure insertion loss and return loss on a single connector of a DUT.

Simplex ILRL Two-Directional (Cable Flip)

Setup Filenames

Single mode: OPLMaxSetup_Simplex SMF ILRL Bidirectional.INI
Multimode: OPLMaxSetup_Simplex MMF ILRL Bidirectional.INI

Sequence Filenames

Single mode: Simplex ILRL SMF Bidirectional.xls
Multimode: Simplex ILRL MMF Bidirectional.xls

Template Filename

Template ILRL w-serial number (termination included).xls

Description

Uses an **OP940-SM** or **OP940-MM** to measure insertion loss and return loss on both connectors of a DUT. The software measures IL/RL on connector A, pauses to allow the user to reverse the DUT, and measures IL/RL on connector B.

Simplex ILRL with RL Scan

Setup Filenames

Single mode: Single mode Simplex ILRL with RL Scan.INI
Multimode: Multimode Simplex ILRL with RL Scan.INI

Sequence Filenames

Single mode: Simplex ILRL SMF RL Scan.xls
Multimode: Simplex ILRL MMF RL Scan.xls

Template Filename

Template ILRL w-serial number (termination included).xls

Description

Uses either the **OP940-SM** or **OP940-MM** to measure total link loss (insertion loss of both connectors and cable) of the DUT and also measures the return loss of both connectors on the DUT without the operator having to disconnect side A and connect side B to the reference cable. This measurement does require two reference cables, one on the launch end and one on the receiving end. The DUT is placed between the two cables for the measurement cycle. This setup also requires that the user specify a range for the DUT length and the length of the receive cable. For further details see the example titled, “Making two return loss measurements on one fiber optic link.”

ILRL Bidirectional OP931 and OP940|OP725

Setup Filenames

Single mode: OPLMaxSetup SMF ILRL Bidirectional 931.INI
Multimode: OPLMaxSetup MMF ILRL Bidirectional 931.INI

Sequence Filenames

Single mode: ILRL SMF Bidirectional 931.xls
Multimode: ILRL MMF Bidirectional 931.xls

Template Filename

Template ILRL w-serial number (termination included).xls

Description

Uses an **OP931-SM** or **OP931-MM** to measure insertion loss and return loss on both connectors of a DUT. The associated sequence file will measure IL and RL from the A-B port then immediately measure IL and RL from the B-A port. Each measurement is appended to a single comprehensive test report.

12 channel MTP Single Sided ILRL

Setup Filenames

Single mode: Single mode MTP ILRL.INI
Multimode: Multimode MTP ILRL.INI

Sequence Filenames

Single mode: Single mode MTP ILRL.xls
Multimode: Multimode MTP ILRL.xls

Template Filename

Template ILRL w-serial number (termination included).xls

Description

Uses either the **OP940-SW-SM (or –MM)** or the **OP940-SM (or –MM)** in conjunction with an OptoTest-supported optical switch to accommodate for the multi-fiber connector using a large area detector or integrating sphere to measure IL and RL on a single side (connector) of an MTP cable. Each cable assembly is reported on its own test report.

12 Channel MTP ILRL Two-Directional (Cable Flip)

Setup Filenames

Single mode: Single mode MTP ILRL (cable flip).INI
Multimode: Multimode MTP ILRL (cable flip).INI

Sequence Filenames

Single mode: Single mode MTP ILRL (cable flip).xls
Multimode: Multimode MTP ILRL (cable flip).xls

Template Filename

Template ILRL w-serial number (termination included).xls

Description

This setup is configured to measure IL/RL on both sides of a 12 fiber MTP-MTP cable using an **OP940-SW-SM (or MM)** or a simplex **OP940** in conjunction with an OptoTest-supported switch. The sequence measures IL/RL on all 12 connectors of one side, then the user is instructed to flip the cable and connect the second side to the reference cable, then measure IL/RL on the second connector. Each cable assembly is reported on its own test report.

12 Channel MTP ILRL with RL Scan

Setup Filenames

Single mode: Single mode MTP ILRL with RL Scan.INI
Multimode: Multimode MTP ILRL with RL Scan.INI

Sequence Filenames

Single mode: Single mode MTP RL Scan.xls
Multimode: Multimode MTP ILRL RL Scan.xls

Template Filename

Template ILRL w-serial number (termination included).XLS

Description

Measures total link loss on a 12 fiber MTP cable and return loss on both connectors without the operator having to switch directions of the DUT. This measurement does require two reference cables, one on the launch end and one on the receiving end. The user does need to specify a range for the DUT length and the length of the receive cable. For further details see the example titled, “Making two return loss measurements on one fiber optic link.”

Additional Notes

File Handling

By default, all of these setup files are designed to utilize a fixed data file where all results append to the end of a single excel file. This creates a running log of test results until the target data file is changed. The other method for data handling is the “File Structure” option where the software will create a dedicated subdirectory and separate data files based on certain criteria such as part number, serial number, and work order. Find out more about this on page 25.

Test Report Template

By default, all of these setup files utilize the same test report template. A few extra templates are included in the standard installation and the templates can be customized to meet customer requirements. Find out more about test report template setup on page 28.

Additional Notes (cont.)

Serial Numbering

By default, the serial numbering scheme for the provided setup files will be set to autoincrement between tests. After testing on a cable is completed and the **"Next"** button is clicked, the software will automatically increment the serial number by one. For applications where a bar code scanner is used or where the serial numbers are composed of letters as well as numbers, it may be better to select the Alphanumeric option on the **Setup|Data** File tab.

Images

OPL-MAX features context images to help operators know how to set up the cables during IL reference, RL reference, and measurement. The default setup files have default image files to represent the intended flow of each testing setup. Users can add in their own images that fit with their processes and test setups by double clicking the existing images.

Additional Setup Files

Customers can save additional setups as needed by selecting the settings needed for the test (including sequence file, test report template, and all checkboxes) and saving the setup with the **Save Setup to File** option under the **Setup** menu on the top of the OPL-MAX window.

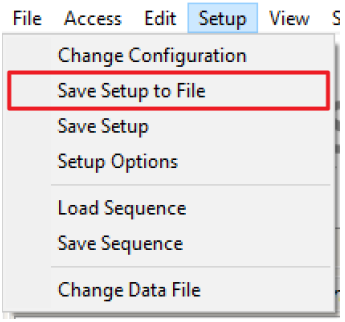


Figure 80

Warranty Information

OptoTest Corp. cannot be held responsible for any data loss due to the use of this application nor can OptoTest be held liable for corruption of hard disks or any other program or data storing devices.

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