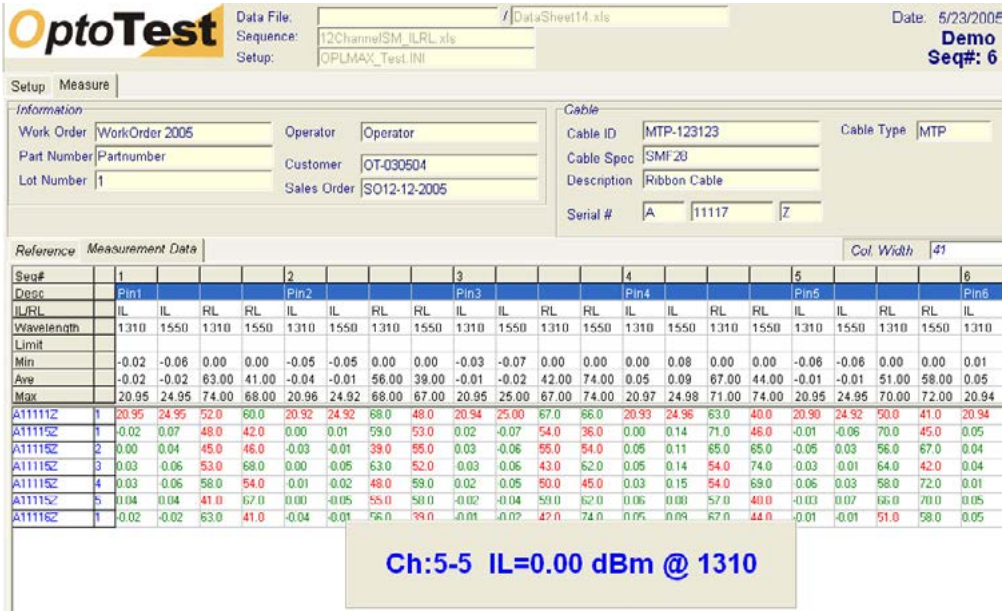
Measurement Devices

OptoTest
Test Solutions for Fiber Optics

LASER COMPONENTS®

OPL-MAX
Instruction Manual



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OPL-Max Instruction Manual

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OPL-Max Instruction Manual

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MnOPL-MAX-RevB11

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OPL-Max Instruction Manual

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.

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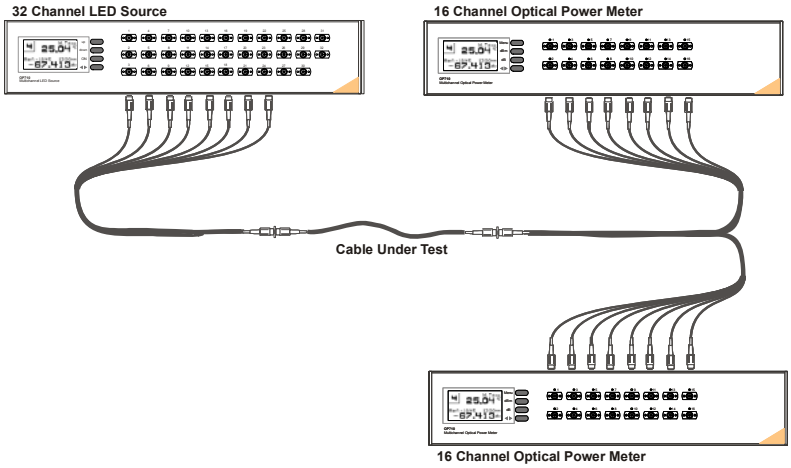
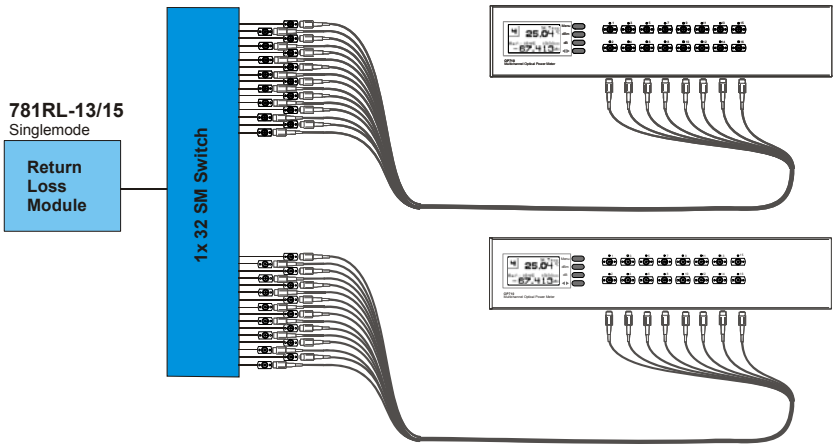
Typical Multimode Configuration



Typical Singlemode Configuration



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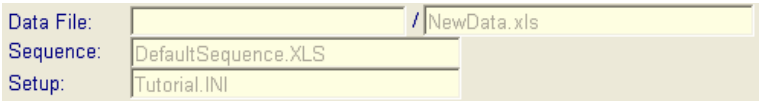
Quick Start

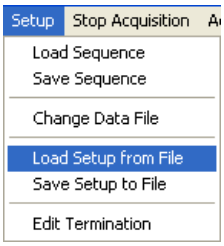
Startup

At startup most of the settings of the last session are being restored from the Setup, this includes data file, sequence, termination file and template for the test report. The currently active setup file and most other relevant files are shown in the top middle of the screen.



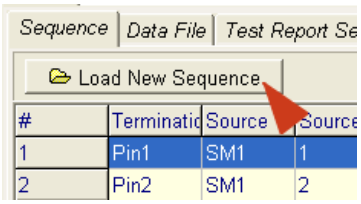
Load a different Setup

A different earlier stored setup is recalled through the Setup | Load Setup from File menu.



Load a different Sequence File

The sequence file defines the measurement steps to be performed. At startup the main screen lists the sequence steps. To change the sequence file either load the file from the Setup menu or using the “Load New Sequence” button from the Setup Page (see below)



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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.

For details about setting up sequences follow the instructions in the chapter *Sequences*. The example shows a 12 channel measurement where each multimode (MM1) channel corresponds with the power meter channel (OPM1).

#	Termination	Source	Source	WLA	WLB	OPM	OPM	Pass/Fail	Meas.Typ
1	Pin1	MM1	1	850	1300	OPM1	1	FC-PC MN	IL only
2	Pin2	MM1	2	850	1300	OPM1	2	FC-UPC	IL only
3	Pin3	MM1	3	850	1300	OPM1	3	FC-APC	IL only
4	Pin4	MM1	4	850	1300	OPM1	4	LC-UPC	IL only
5	Pin5	MM1	5	850	1300	OPM1	5	FC-UPC	IL only
6	Pin6	MM1	6	850	1300	OPM1	6	FC-UPC	IL only
7	Pin7	MM1	7	850	1300	OPM1	7	FC-UPC	IL only
8	Pin8	MM1	8	850	1300	OPM1	8	FC-UPC	IL only
9	Pin9	MM1	9	850	1300	OPM1	9	FC-UPC	IL only
10	Pin10	MM1	10	850	1300	OPM1	10	FC-UPC	IL only
11	Pin11	MM1	11	850	1300	OPM1	11	FC-UPC	IL only
12	Pin12	MM1	12	850	1300	OPM1	12	FC-UPC	IL only

Figure 1

NOTE: To avoid errors during the load of the sequence maintain the row and column allocation of the sample files. For details of the sequence structure please refer to the chapter “Sequence File” in this manual.

Test the Sequence File

Connect all the necessary fibers consistent with the sequence that has been loaded. The “Single Measurement” button exercises all the sequence steps one-time and records the measurement data. If the reference has not been taken yet the user is prompted to take the reference. If the sequence involves Return Loss measurement the user is also prompted to reference the Return Loss.

Executes a single measurement sequence; if a reference has not been taken the user is prompted for the reference.

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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

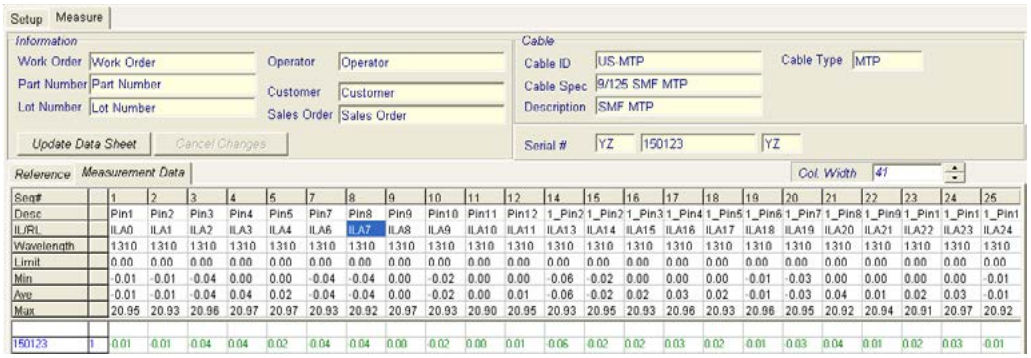

Figure 2

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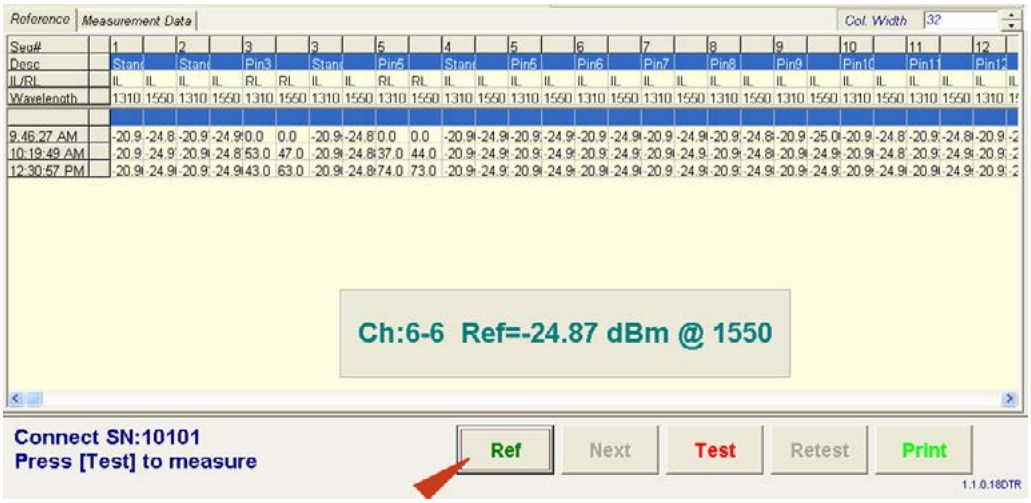
Reference

To measure insertion loss the optical power from the launch or reference cable is measured in a first step. This reference power is stored for each channel and each wavelength and displayed on the *Reference* screen.

If the sequence calls for a return loss measurement the user is prompted to reference the return loss measurement. Referencing the return loss involves selecting a reference channel for RL (see Instrument Setup), disconnecting the reference cable of that channel from the cable to be measured and letting the return loss module “find” the reflection of the reference cable.



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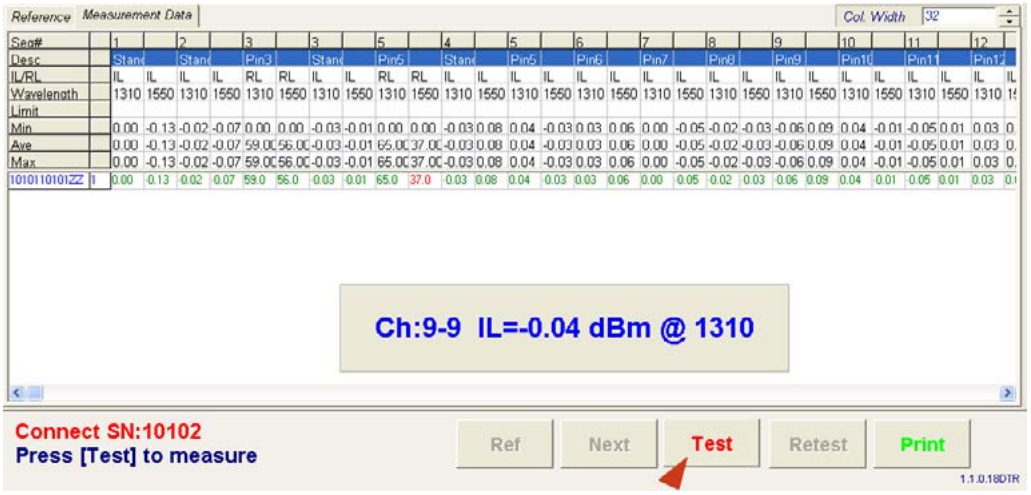
Test

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 EXCEL data file is assigned during the setup or can be changed in Setup | Data File or the software can create test reports with names based on the serial number of the cable under test.

The pass/fail condition is indicated with green as pass and red as fail.



If the cable passes the selected pass/fail criteria, which are determined by parameters set in the Termination setup, then the Next button is activated, in case of a fail condition the Retest button is activated.

Configuring the IL measurements

OPLMax allows the user to choose as to how they would like to define IL. Is insertion loss a negative gain or a positive loss? In other words, should insertion loss be described and printed in the test report as a positive number or a negative number. OPLMax comes with the IL defined as a negative, meaning it will be printed in the results as a negative number. This option can be changed though. Altering the OPLMax.INI file can change this setting.

To do this the user should first open the OPLMax.INI configuration file in a text editor, such as Notepad®.

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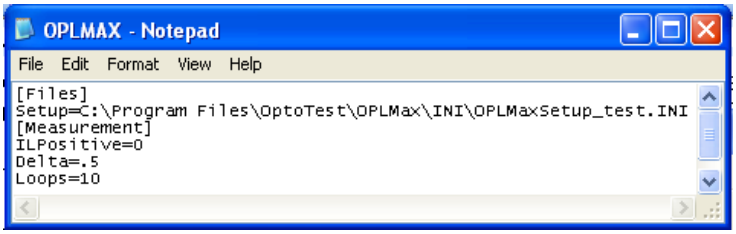

If the user wants to change the IL measurement to be positive, then one needs to simply change line 4 of OPLMax.INI to read, “ILPositive=1”. Then save the file and reload OPLMax. The IL readings will now be positive for a loss.

Test sequence passes

To print the test report for the current cable press Print. The report will be printed according to the template that has been setup in **Setup | Test Report Setup**. To check the data file before printing, click on the Preview button. This will open Excel and display the current test report.

To measure the next cable press Next and connect the next cable with the prompted serial number. If your serial numbers are alphanumeric, then enter the new serial number, press Next and connect the cable to be tested.

Test sequence fails

A failed cable can be retested by pressing Retest. Usually the cable is disconnected, cleaned and connected again as most likely the cause for a high insertion loss or low return loss is a contaminated connector. The number of retests is set on the main setup screen:

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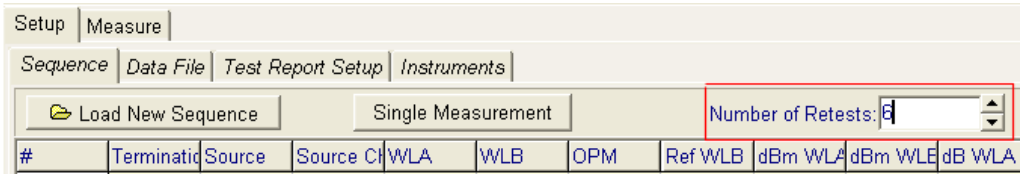
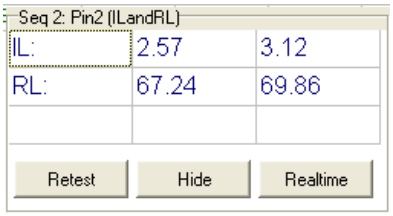


If the user wishes not to retest the entire sequence then it is possible to test just one strand of the multiple step assembly. This retest can be performed under the [Measure|Measurement Data] tab. Scroll over the step you would like to retest and right-click on the value to be retested. A pop-up will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



There are three options in this pop-up.

Retest	This button will perform the retest for the highlighted Sequence step.
Hide	Closes this box
Realtime	Pressing this button allows the user to view a realtime IL/RL measurement of that cable/connector. When an acceptable value is reached the [Retest] button is pressed.

Print/Review Test Report

Pressing the Print button opens up EXCEL or EXCEL Viewer and generates the test report for printing.

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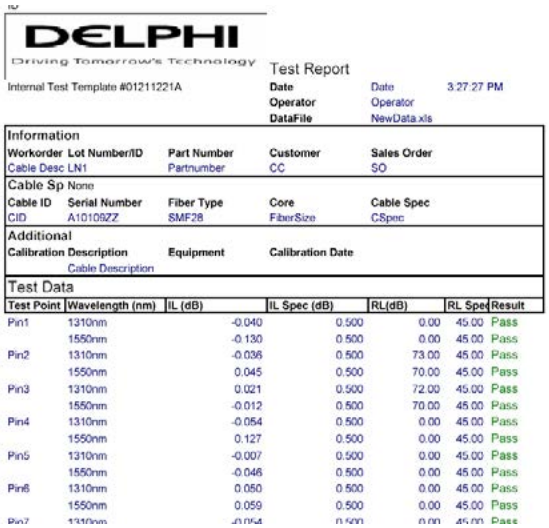
Sample Test Report



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Test Report

Internal Test Template #01211221A

Date Date 3:27:27 PM
Operator Operator
DataFile NewData.xls

Information

Workorder	Lot Number/ID	Part Number	Customer	Sales Order
Cable Desc	LN1	Partnumber	CC	SO

Cable Sp None

Cable ID	Serial Number	Fiber Type	Core	Cable Spec
CID	A101092Z	SMF28	FiberSize	CSpec

Additional

Calibration Description	Equipment	Calibration Date
Cable Description		

Test Data

Test Point	Wavelength (nm)	IL (dB)	IL Spec (dB)	RL(dB)	RL Spec	Result
Pin1	1310nm	-0.040	0.500	0.00	45.00	Pass
	1550nm	-0.130	0.500	0.00	45.00	Pass
Pin2	1310nm	-0.036	0.500	73.00	45.00	Pass
	1550nm	0.045	0.500	70.00	45.00	Pass
Pin3	1310nm	0.021	0.500	72.00	45.00	Pass
	1550nm	-0.012	0.500	70.00	45.00	Pass
Pin4	1310nm	-0.054	0.500	0.00	45.00	Pass
	1550nm	0.127	0.500	0.00	45.00	Pass
Pin5	1310nm	-0.007	0.500	0.00	45.00	Pass
	1550nm	-0.046	0.500	0.00	45.00	Pass
Pin6	1310nm	0.050	0.500	0.00	45.00	Pass
	1550nm	0.059	0.500	0.00	45.00	Pass
Pin7	1310nm	-0.054	0.500	0.00	45.00	Pass

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Installation

OPL-MAX is shipped or downloaded as a self-extracting executable OPLMAX.EXE.

Upon execution the software is extracted and installed into the directory:

C:\Program Files\OptoTest\OPLMAX.

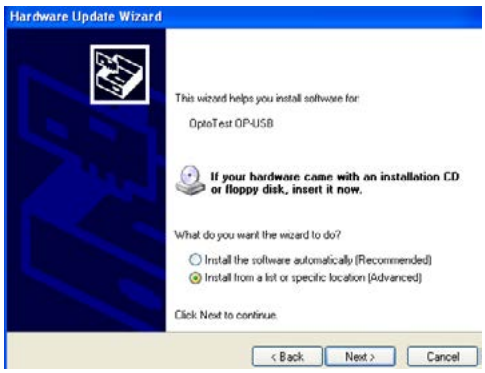
Included in the installation are sample configuration files and a sample template file.

USB Driver Installation
To operate any of the OP-Instruments from the computers' USB bus, the USB driver needs to be installed. By executing the file DRIVER.EXE the necessary files are being copied to C:\OptoTest\Driver.

When any of the OP-Instruments are first connected to the computer via the USB cable, the operating system will inform you that a new USB device has been connected and eventually starts the wizard.

Follow these steps:

Use the option "Install from a list or specific location" that allows you to select the location of the driver yourself.



Use the browse button to locate the directory C:\OptoTest\Driver and proceed with the installation.

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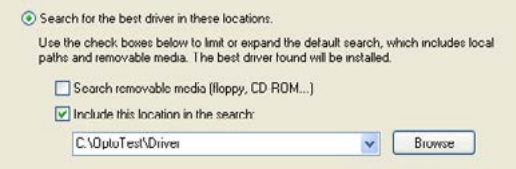

Windows XP
Some installations of Windows XP will prompt with an incompatibility warning, select “Install Anyway”.

The wizard will recognize the “OptoTest OP-USB” extract the driver files into the windows system directory.

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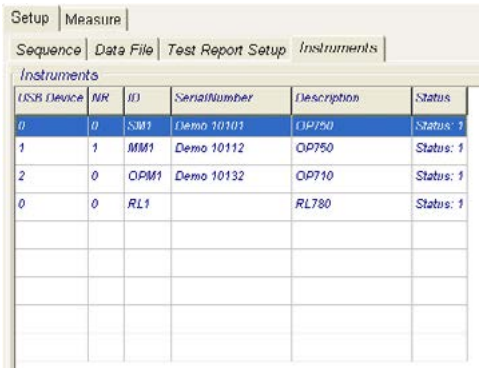
Startup

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 ID: Sequential enumeration of USB device.
NR: Index of USB source or power meter.
ID: Identifying type of USB instrument.
Description: Model type of instrument.
Status: status of instrument (1: OK)

NOTE: Some USB devices such as RIFOCS RL780 do not have a USB Device ID

Configuration Files at Startup

At startup the following configuration files are required:

c:\program files\optotest\OPL-MAX\Ini\OPLMAX.INI
Structured text file that stores the overall settings of the OPL-MAX application.

c:\program files\optotest\ OPL-MAX\Config\defaultParameters.xls
EXCEL spreadsheet file that stores a basic set of measurement configurations.

c:\program files\optotest\OPL-Max\Config\terminations.xls
Excel spreadsheet that stores the pass/fail criteria for separate terminations.

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Sequence File

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

Sequence File Header

The EXCEL header information is structured as follows

	A	B	C	D	Sort Ascending	F	G	H	I	J
1	**Configuration File of OPL-MAX**									
2	Identification	ID								
3	*Partnumber*	PN								
4	*SerialNumber*	ZZ	10101	ZZ						
5	*WorkOrder*									
6	Number of Sequences	12								
7	*Lot Number*	LN1								
8	*Customer*	CC	*SalesOrder*	SO						
9	*Cable ID*	CID	*CableSpec*	CSpec						
10	*Cable Description*	CD	*CableType*	SMF28						
11			**Instrument Control**							
12	**Seq**	**Termination**	**Source**	**Source Channel**	**WavelengthA**	**WavelengthB**	**OPM Rack**	**OPM Channel**		
13	START	<string>	<num>	<num>	<num>	<num>	<num>	<num>		

Figure 3

Each entry in italics identifies fields that have a corresponding field in the header information of the measurement screen (see below).

Header information on measurement screen:

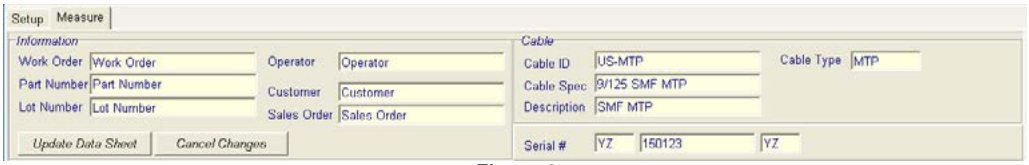

Figure 4

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Measurement Sequence

Each row in the configuration file defines a measurement sequence for one particular cable type. A typical listing is shown below.

	A	B	C	D	E	F	G	H	I	J	K	L
			Source Instrument				OPM					
	Seq	Value8	Source Instrument	Source Channel	WavelengthA	WavelengthB	OPM Rack	OPM Channel	Termination for Pass/Fail	Measurement Type	Delay	Comment
	<num>	<string>	<num>	<num>	<num>	<num>	<num>	<num>				
1	1	Pin1	RL1	1	1310	1550	OPM1	1	2	1	0	
2	2	Pin2	RL1	2	1310	1550	OPM1	2	2	1	0	
3	3	Pin3	RL1	3	1310	1550	OPM1	3	2	1	0	
4	4	Pin4	RL1	4	1310	1550	OPM1	4	2	1	0	
5	5	Pin5	RL1	5	1310	1550	OPM1	5	2	1	0	
6	6	Pin6	RL1	6	1310	1550	OPM1	6	2	1	0	
7	7	Pin7	RL1	7	1310	1550	OPM1	7	2	1	0	
8	8	Pin8	RL1	8	1310	1550	OPM1	8	2	1	0	
9	9	Pin9	RL1	9	1310	1550	OPM1	9	2	1	0	
10	10	Pin10	RL1	10	1310	1550	OPM1	10	2	1	0	
11	11	Pin11	RL1	11	1310	1550	OPM1	11	2	1	0	
12	12	Pin12	RL1	12	1310	1550	OPM1	12	2	1	0	

Figure 5

Field Description of Sequences

Column	Header	Description
A	Sequence Number	Consecutive number. START must be in the ROW above the first step in the sequence so the program knows where the sequence begins.
B	Termination ID	This text identifies the sequence step and is usually used to indicate the connector such as “PinA”
C	Source	Selects the source for the measurement. Available options are: SM1, SM2, MM1, MM2, RL1, NO
D	Source Channel	Selects the source channel for the measurement. For switched sources such as RL module and switch combination this is the output port of the optical switch.
E	Wavelength A	Wavelength(1) in [nm] of the first wavelength to be used to measure the insertion loss and/or return loss.
F	Wavelength B	Wavelength(1) in [nm] of the second wavelength to be used to measure the insertion loss. Leave the field blank if this is a single wavelength measurement.
G	OPM Unit	Selects the optical power meter. Available options are: OPM1, OPM2
H	OPM Channel	Selects the channel for the optical power meter for the measurement, the channels correspond to the optical port of the power meter.
I	Termination Type	This number correlates to a termination pass/fail criteria setup in a termination spreadsheet, which defines certain pass/fail criterias.
J	Measurement Type or	The type of measurement is defined in this column, options are: IL only = 0

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	Pause/Delay	IL and RL = 1 RL =2 Bidirectional IL = 3 (if supported by the instrument) If 100 is entered into this column it indicates that the measurement taking process will be paused until the user wishes to proceed (see below). If 110 is put into this field then a delay will be implemented for a certain interval defined by a value in column K.
K	Delay Duration	If a 110 is entered into column J then this cell is designated as the length of the delay in milliseconds.
L	Comments	If a 100, a pause step, is entered into column J, then a comment can be placed in this cell to instruct the user during the sequence.

Return Loss / Alternate Reference Configurations: The return loss configurations are in the same sequence file as the other configurations. The RL configurations are in columns M-Q of the Excel sequence file.

M	N	O	P	Q
Return Loss		Alternate Reference		Force 14dB
Reflection Number	Reference Channel	Reference Module	Reference Channel	1 = Yes, 0 = No
1	1	OPM1	1	1
1	-1	OPM1	2	1
1	-1	OPM1	3	1
1	-1	OPM1	4	1
1	-1	OPM1	5	1
1	-1	OPM1	6	1
1	-1	OPM1	7	1
1	-1	OPM1	8	1
1	-1	OPM1	9	1
1	-1	OPM1	10	1
1	-1	OPM1	11	1
1	-1	OPM1	12	1

M	Reflection #	The reflection number corresponds to the location of the reflection on the cable assembly to be tested. The first reflection to be measured should be the closest to the front panel and the 2nd reflection to be measured should be the next reflection out from the front panel and so on. In most cases this number should be set to 1.
N	Reference Channel	This designates which channel will be referenced for this particular sequence step. A positive value means that the channel will actually be referenced, while a negative number means that the reference position will be copied from another channel.
O	Reference Module	The alternate reference module is specified here. If there is to be no alternate reference module then this module should be the same as in column G. If one would like to reference to a different channel than where the actual IL measurement will take place then the alternate module should be listed here. (Note: Many times an alternate reference is used when measuring fanouts.)

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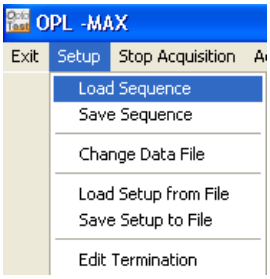
P	Reference Channel	The reference channel corresponds to the channel on the alternate reference module where the IL reference is to take place.
Q	Force 14dB	The force 14dB column tells the software whether or not the user would like for a return loss reference to be forced to 14dB. Many times insertion loss can be added to a system and this can affect the return loss reading. An open PC reflection could read 16dB, rather than 14dB. Calling the software to force the reference to 14dB will add an offset to all RL measurements that is equal to the difference between the measured open PC reflection and 14dB.

(1) Note that the selected wavelength needs to be supported by the instrument in use.

Loading a Sequence File

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

Editing the Pass/Fail Criteria – the Termination list

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

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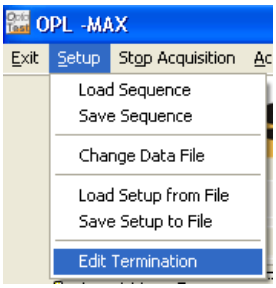
OPL-Max Instruction Manual



Launches the editor for the Pass/Fail criteria. All the Pass/Fail criteria are stored in a single EXCEL file, default filename is Termination.XLS. To change individual parameters double click on the particular row, a separate menu will appear and allow for a change

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.

Setup | Measure

Sequence | Data File | Test Report Setup | Instruments

Load New Sequence | Single Measurement | Average

#	Termination	Source	Sour	WLA	WLB	OPM	OPM CH	Pass/Fail	Meas.Type
1	Pin1	SM1	1	1310	0	OPM1	1	FC-PC MM	IL only
2	Pin2	SM1	2	1310	0	OPM1	2	FC-PC MM	IL only
3	Pin3	SM1	3	1310	0	OPM1	3	FC-PC MM	IL only
4	Pin4	SM1	4	1310	0	OPM1	4	FC-PC MM	IL only
5	Pin5	SM1	5	1310	0	OPM1	5	FC PC MM	IL only
6	Pin6	SM1	6	1310	0	OPM1	6	FC-PC MM	IL only
7	Pin7	SM1	7	1310	0	OPM1	7	FC-PC MM	IL only
8	Pin8	SM1	8	1310	0	OPM1	8	FC-PC MM	IL only
9	Pin9	SM1	9	1310	0	OPM1	9	FC-PC MM	IL only
10	Pin10	SM1	10	1310	0	OPM1	10	FC-PC MM	IL only
11	Pin11	SM1	11	1310	0	OPM1	11	FC-PC MM	IL only
12	Pin12	SM1	12	1310	0	OPM1	12	FC PC MM	IL only
13									PAUSE
14	1_Pin2	SM1	2	1310	0	OPM1	2	FC-PC MM	IL only
15	1_Pin2	SM1	2	1310	0	OPM1	2	FC-PC MM	IL only
16	1_Pin3	SM1	3	1310	0	OPM1	3	FC-PC MM	IL only
17	1_Pin4	SM1	4	1310	0	OPM1	4	FC-PC MM	IL only
18	1_Pin5	SM1	5	1310	0	OPM1	5	FC-PC MM	IL only
19	1_Pin6	SM1	6	1310	0	OPM1	6	FC PC MM	IL only
20	1_Pin7	SM1	7	1310	0	OPM1	7	FC-PC MM	IL only

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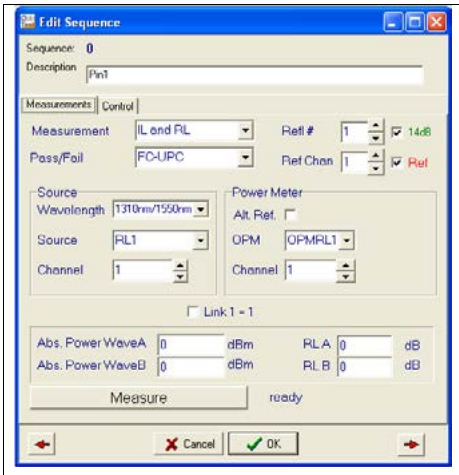
Sequence Editor



Measurement Tab

Description: Allows user to change the description of the sequence step.

Measurement: One can designate the type of measurement for this sequence. 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: Checking this will instruct the software to force an Open PC reflection to 14dB. This will take into account loss in the system between the source and the open PC reflection to be referenced.

Source: Allows user to change wavelength, source module, and the source channel.

Power Meter: The user may choose which Optical Power Meter module should take the measurement and which channel to take that measurement at.

The Alt.Ref. checkbox allows the user to reference to one channel specified in the two selection boxes to the right of a power meter 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 Button: Clicking this will quickly take a single measurement for this particular step of the sequence. (Note: For an accurate RL measurement the return loss must be referenced.)

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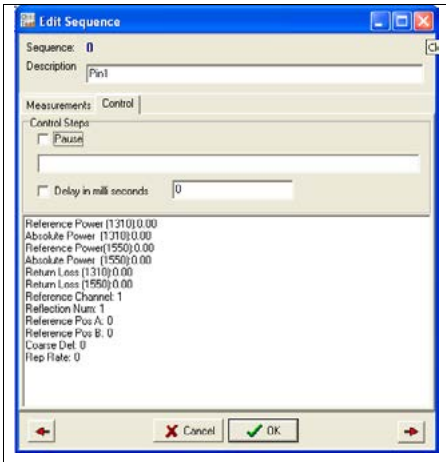

Control Tab

Pause: Checking the pause setting will initiate a pause step during the measurement process, which allows the user to change cables, review data, etc. During the measurement process the user can exit out of the Pause step at any time by clicking the Continue button. A command to be displayed during the pause step can be entered into the space below the pause check box. Note: If one does not want to see the pause step in the test reports then make sure the Description entry is left 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: This status box will display various information about the current step in the sequence.

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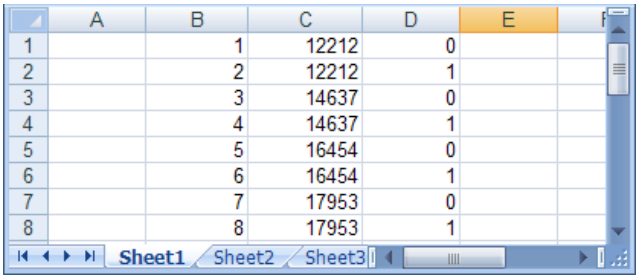
OP1302 power meter control

The OP1302 is a linear encoder driven power meter that moves two detectors behind the fiber optic adapters. Each adapter position on the front panel corresponds to a linear encoder position. This position is a value between 1 and 33000. Position 1 refers to the position furthest to the left and position 33000 refers to the position furthest to the right. The two scanning detectors are positioned one on top of the other, so when one detector is aligned on the top row of adapters the bottom detector is aligned on the bottom row of adapters.

Loading Channel Positions for OP1302

The OP1302 can be preset with detector "channels." These channels are loaded in through an excel spreadsheet that designates these detector positions. The excel spreadsheet is laid out as the following:



	A	B	C	D	E
1		1	12212	0	
2		2	12212	1	
3		3	14637	0	
4		4	14637	1	
5		5	16454	0	
6		6	16454	1	
7		7	17953	0	
8		8	17953	1	

Sheet1 Sheet2 Sheet3

Figure 6: Spreadsheet for OP1302 Positions. In the above screen capture Ch 1 corresponds to a linear encoder position of 12212 and uses the top detector for the power readings. Ch 6 corresponds to position 16454 and the bottom detector for power readings.

Column	Function
B	This column designates the Channel number for the 1302.
C	This column designates the linear encoder position that corresponds to the channels designated in column B
D	This column designates which detector will be used for the channel assignment. A "0" corresponds to the detector for the top row of the OP1302 and a "1" corresponds to the bottom row of the OP1302.

This spreadsheet is user alterable to define different channel selections for different setups and cable assemblies. The channel designations can be confirmed in the software by navigating to the "Instruments" tab and selecting the OP1302 in the spreadsheet under the "Instruments" heading. Once the OP1302 is selected, press the [Update Instruments] button

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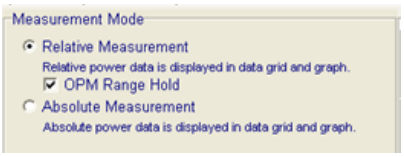
and the channel designations will be listed in the memo box at the bottom left of the screen. (Note: this spreadsheet needs to be reloaded by restarting the software for any changes to take effect on software measurements.)

Configuring Range Hold/Dwell Times for OP1302 Power meters

The detectors of the OP1302 may, depending on the setup, have a slow response time (>800ms), when switching from a completely dark input to a lit up measurement. Symptoms of this would be measurements that appear to toggle between two values. This means that the detector isn't given enough time to complete its gain switching. One way to alleviate this problem is to increase the OPM Dwell time located under the *Setup Measurement* tab. A typical dwell time is 800ms, but there are some cases where this may need to be increased to about 1500ms.

Another way to achieve stable power meter readings is to force the detector into range hold. This can be done by checking the box labeled OPM range hold under the *Setup Measurement* tab.



This will force the power meter to stay in the same gain stage for all of the measurements. The gain stage the power meter is held in is the gain stage that the reference was taken in. If the power measurements are to have a wide range (>10dB), then it is not advisable to have this option checked, because the measurement could saturate the detector gain stage yielding poor results. For signals that are expected to have range of +/-2dB, with respect to the reference, then this setting is advisable.

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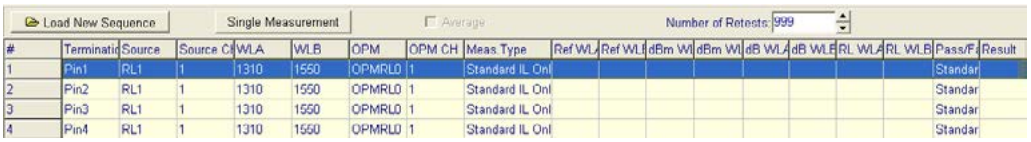
Configuring Return Loss Measurements

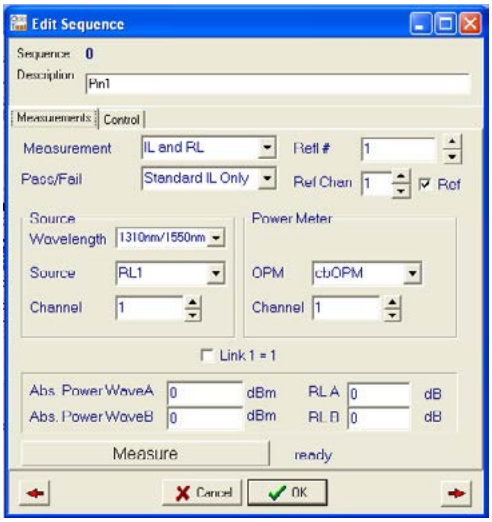
OPL-Max allows for measurement of return loss if a supported instrument is connected to the computer (either the OP930SM or OP931MM).

Referencing Return Loss

The key to a good return loss measurement is to setup a correct referencing sequence. To setup the referencing one needs to edit the sequence to allow for RL measurements. Open a sequence file that corresponds to the testing setup. There are a few sample sequences that are included with the software. Once the correct sequence is loaded one can configure each step for return loss measurements. In this instance the first step is selected.



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



For RL measurements to be measured the *Measurement* tab must either have [IL and RL] or [RL] only selected. Having one of these selected will cause the *Refl#* and *Ref Chan* boxes to be displayed.

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The box corresponding to *Ref#* designates which reflection will be measured for this particular sequence step. Typically, a value of "1" in this box will correspond to the first reflection of a particular link and a "2" corresponds to the second, etc. 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).

The *Ref Chan* corresponds to the channel that the reflection reference position will correspond to. This function is used if the user has multiple links that are the same length and would only like to reference to one of the links and use that measurement position for all of the links. This eliminates 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 check box next to the *Ref Chan* that is labeled *"Ref"* if checked will notify the software to actually reference to this position when going through the referencing process.

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.

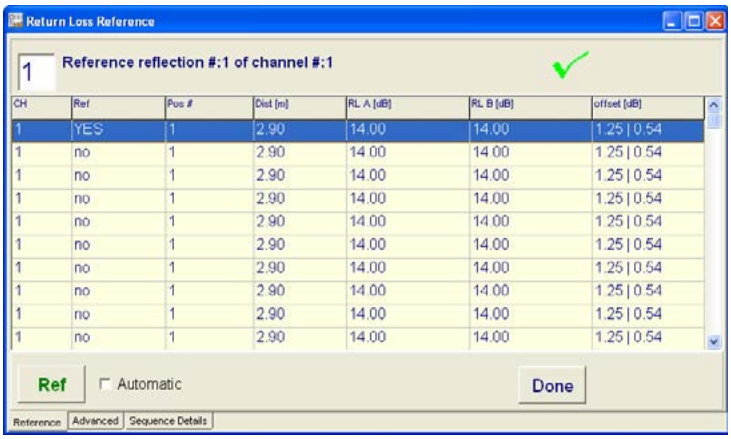

Figure 7

CH	This corresponds to the channel where the return loss will be referenced on.
Ref	This columns notifies the user that this sequence step is to be referenced. In the above reference sequence only sequence step 1 is referenced and that reference is copied down for the other sequence steps.
Pos#	This corresponds to the reflection number that is to be referenced.
Dist(m)	This shows the distance to the reflection.

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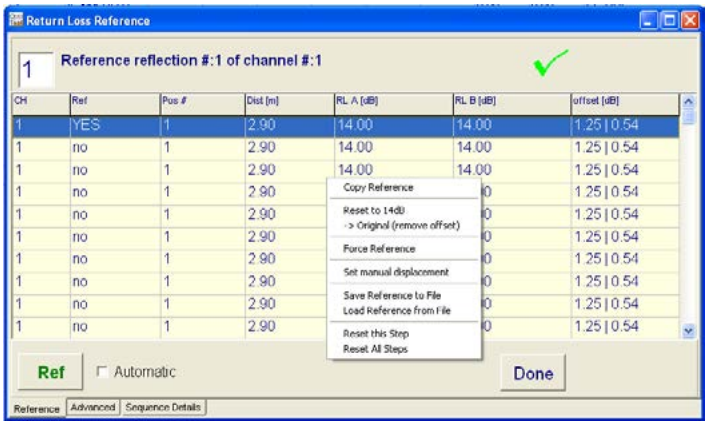
RL A, RL B	This shows the return loss measurement of the referenced position. For an open PC reflection this should be close to 14dB.
Offset (dB)	This column will display the offset that will be applied to each channel for the return loss measurement. In the above reference sequence the offset is 1.25dB for 1310nm and 0.54dB for 1550nm. This means that for each RL measurement 1.25dB and 0.54dB will be **subtracted** from each measurement.

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



Copy Reference	Clicking on this option will copy all references that are to be applied from one channel to another.
Reset to 14dB	If the user does not have the software automatically force the open PC reflection to 14dB then the user can manually reset the selected sequence step to 14dB.
Original (Remove Offset)	This allows the user to remove the 14dB offset that had already been applied.
Force Reference	If the user would like to set a reference position without actually referencing the return loss and knows the length to the reflection the clicking on Force reflection will allow the user to set the distance to the reflection. The following buttons will appear when “Force Reference” is selected.  The user can choose to force the reflection at a distance from the front panel or after the previous reflection.

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Set Manual Displacement	No functionality as of yet.
Save Reference	No functionality as of yet.
Load Reference	No functionality as of yet.
Reset this step	This allows the user to clear the reference data for this step. It is advisable to perform this step prior to re-referencing return loss. This will clear reference position and reference offset.
Reset all steps	Allows the user to clear all steps of the reference data.

Handling the 14dB Offset for systems with noticeable loss

An OP930 is calibrated to a system with negligible insertion loss between the front panel and a reflection. 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 it is advisable to add an offset to all RL measurements. This offset will take into account the loss in the system. In the case where the user references to an open PC connector, the software will measure the return loss at that connector. It will most likely show some number higher than 14dB. For example if the RL measurement on an open PC connector is 15.5dB then all RL measurements should be corrected by subtracting out 1.5dB.

One can force the software to calculate this offset by checking the 14dB box under the sequence editor for each RL measurement. This offset will also be applied to all RL references that correspond to a particular reference. So if a reference position is to be applied to another channel the offset can also be applied to the other channel (See Example: Referencing RL for a 12 fiber MTP UPC terminated cable.)

If a user would like to measure return loss on multiple connectors on a single fiber optic link the 14dB offset can be applied to all connectors on a link. To do this the 14dB checkbox needs to be checked for each sequence in the sequence editor and the checkbox under Measurement Mode in the **Setup | Setup Measurement** tab labeled *14dB – carry over to next reflection* needs to be checked. This checkbox is pictured below.

Checking this box will cause the offset for the first reflection of a link to be copied over to the second link, third link, and so on.

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Example: Referencing RL for a 12 fiber MTP UPC terminated cable

Load a 12 fiber sequence that corresponds to the measurement process. Edit the first step of the sequence and set the *Refl#* to “1,” set the *Ref Chan* to “1,” and make sure the box next to ”Ref” is checked. Check the box next to “14dB” so that the open PC reflection is forced to 14dB. The sequence editor should look like this:

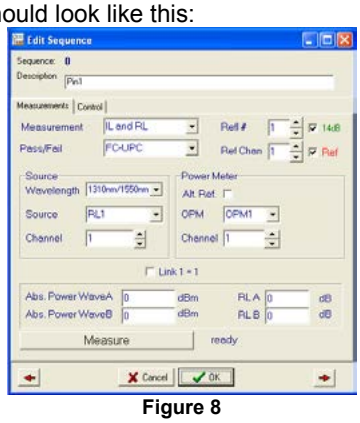

Figure 8

If the fiber links are known to all have the same length then edit the last 11 steps of the sequence so that the *Refl#* is set to “1,” *Ref Chan* is set to “1,” and the box next to “Ref” is **unchecked**. (Note: Leaving these unchecked will mean that during the referencing process these will not be referenced.) The remaining 11 steps would look like the following figure, except the OPM1 channel would correspond to the channel measured for IL reference.

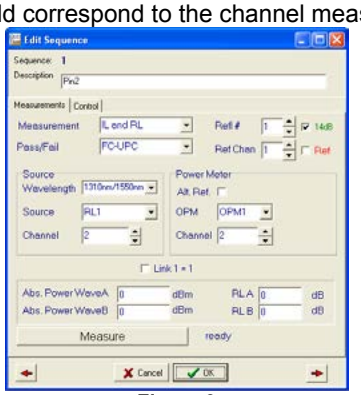

Figure 9

Notice that the “Ref” box is not checked. Also, notice that the source and power meter channel corresponds to the channel where IL will be measured.

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If the fiber links do not have the same length, then edit the last 11 steps so that the *Refl#* is "1," the *Ref Chan* corresponds to the channel the fiber is connected to, and that the box next to "Ref" is **checked**. The first sequence step would look the same as in Figure 7, but the second sequence step would look like this:

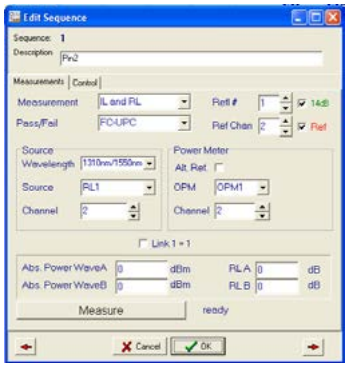

Figure 10

Once the sequence steps are correctly set up click on the [Ref] button. A prompt asking if the user would like to reference return loss will pop up. Select [Yes] in this screen.

For the first case where the cable lengths are expect to be the same the reference screen will look like this:

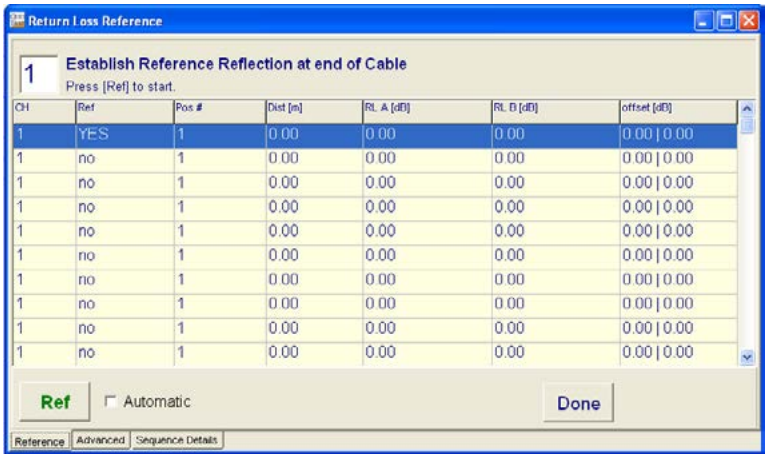

Figure 11

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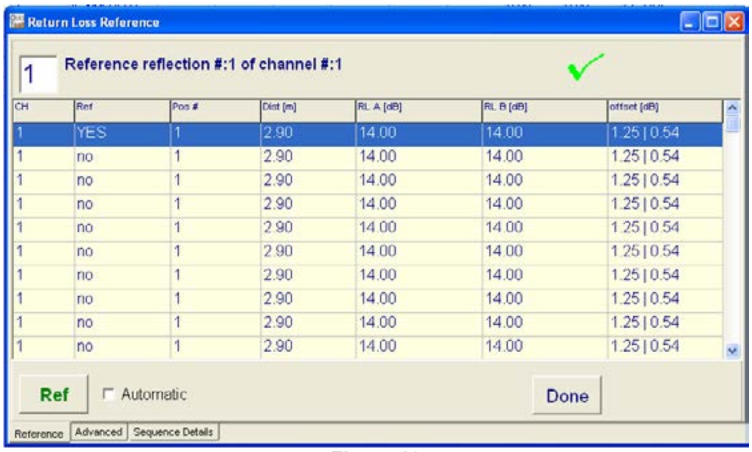
Figure 10 shows that only channel 1 needs to be referenced. The position and offset will be copied down for all 12 channels. The following screenshot shows after the first reflection is referenced and then copied down.



CH	Ref	Pos #	Dist [m]	RL A [dB]	RL B [dB]	offset [dB]
1	YES	1	2.90	14.00	14.00	1.25 | 0.54
1	no	1	2.90	14.00	14.00	1.25 | 0.54
1	no	1	2.90	14.00	14.00	1.25 | 0.54
1	no	1	2.90	14.00	14.00	1.25 | 0.54
1	no	1	2.90	14.00	14.00	1.25 | 0.54
1	no	1	2.90	14.00	14.00	1.25 | 0.54
1	no	1	2.90	14.00	14.00	1.25 | 0.54
1	no	1	2.90	14.00	14.00	1.25 | 0.54
1	no	1	2.90	14.00	14.00	1.25 | 0.54
1	no	1	2.90	14.00	14.00	1.25 | 0.54

Figure 12

The distance (2.90m in this case) is copied down for all 12 channels and the offset (1.25 for 1310nm and 0.54dB for 1550nm) is also copied down.

For the case where the distance to the reflection is not the same for each channel each reflection needs to be done manually. By checking the “Automatic” checkbox under the “Return Loss Reference” screen and pressing the [Ref] button the software will go through each sequence step and reference each channel for the user.

Example: Making two return loss measurements on one fiber optic link. (Supported OP930s only)

Open a two step sequence and edit them so that the first step in the sequence has the source channel set to one and measurement type as “RL only.” The *Refl#* for the first step should be set to “1,” the *Ref Chan* set to “1,” and the “Ref” box should be checked. The sequence step should look like this after done editing.

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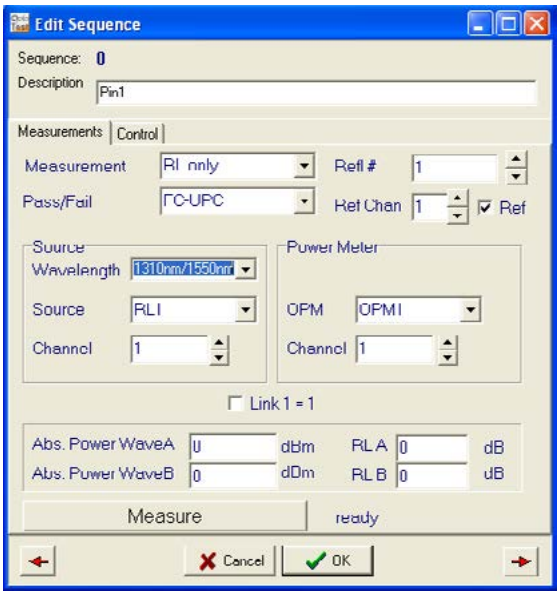
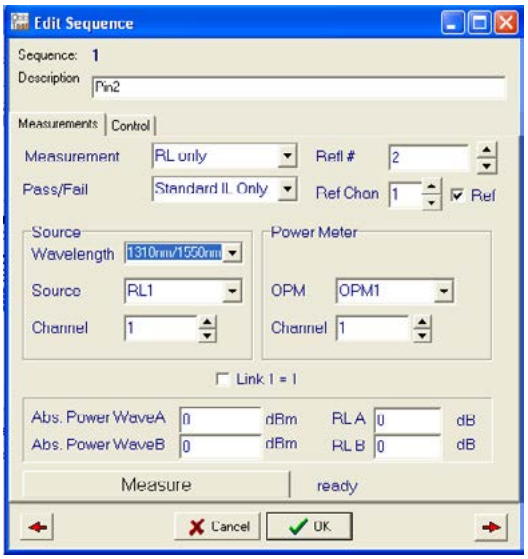


After the first step is complete the second step needs to be edited as follows:



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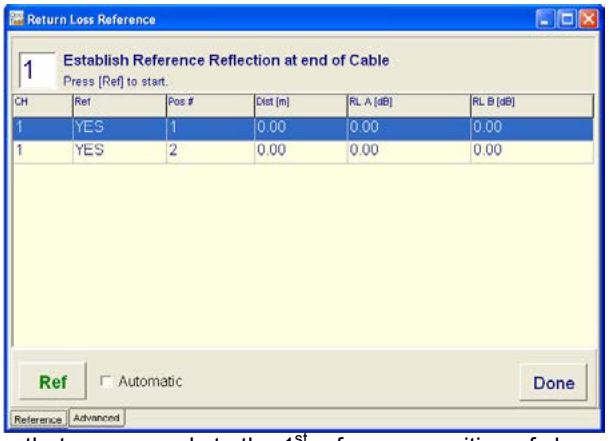
The step should be set up similar to the first step. The *Ref Chan* should be set to "1," the "Ref" box should be checked, the Measurement should be set to "RL only," the source channel should be set to "1," but the only difference is that the *Ref#* should be set "2." This designates it as the second reflection to be measured on the fiber optic link.

After both steps are setup correctly, click on [Ref] at the bottom of the OPLMax screen. This will initiate the reference process. Click [Yes] on the pop up that asks if the user would like to reference for return loss. An RL reference screen will pop up:



Click on the first step that corresponds to the 1st reference position of channel one. Make sure that the first reference reflection is established at the position the return loss is to be measured. Press the [Ref] button on the lower left corner of the RL reference screen. This will attempt to find the first reflection. When the reflection is found the Distance RLA and RLB will be displayed.

CH	Ref	Pos #	Dist [m]	RL A [dB]	RL B [dB]
1	YES	1	12.50	14.03	14.56
1	YES	2	0.00	0.00	0.00

In the above reference the reflection will be measured at a distance 12.5m from the front panel and the return loss measured for wavelength A and B are 14.03dB and 14.56dB respectively. If the results are not satisfying this reference can be repeated by pressing the [Ref] button again.

Once the first reflection is established the second reflection can be established. Connect the next cable length to the position where the 1st reflection was found. Now establish a sufficiently large reflection at the 2nd position (4%,14dB). Highlight the second position of channel 1 and click the [Ref] button. This will cause the unit to scan the fiber beginning where the first reflection was found.

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CH	Ref	Pos #	Dist [m]	RL A [dB]	RL B [dB]
1	YES	1	12.50	14.03	14.56
1	YES	2	19.40	14.52	14.81

In this example the 2nd reflection was found at a distance 19.4m from the front panel and the RL of the reflection is 14.52dB and 14.81dB for wavelength A and B respectively.

Once the referencing process is completed click on the [Single Measurement] button. (Note: If the magnitude of the two reflections are quite a bit different, like 20dB apart from each other, then the Return Loss Dwell time may need to be increased. A good value is 1000ms. If the unit is not given sufficient time to "settle" the return loss readings may be incorrect.)

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Example: Measuring IL on an MTP-Fanout patchcord.

Note: These measurements should be made with units that have been calibrated together. Discrepancies in channel calibration will lead to greater uncertainties in insertion loss measurements.

Measuring insertion loss on MTP-Fanout patchcords can be quite a daunting task if each cable is to be measured. There is no really time efficient method for manually measuring the insertion loss of these breakout cables. Manual measurements are cumbersome and requires referencing the MTP side of the fanout to a large area adapter and switching the adapter to one that matches the fanout connectors. Exchanging adapters can lead to uncertainties in the measurement as well as expose the large area detector to external elements which could easily damage the glass face.

The process employed using the OptoTest OPLMax software in conjunction with a multichannel power meter and multichannel source is to reference the MTP side to a single large area detector. This reference power is then applied to the corresponding power meter channels where the fanout connectors will be connected. For instance: For an MTP-FCPC fanout the reference MTP connector would be referenced to the large area detector. This reference MTP connector would be connected to the MTP side of the MTP-FCPC fanout and the FCPC fanount cables would be connected to their corresponding OPM channels. Fiber 1 would be connected to channel 1 of the power meter and Fiber 2 to channel 2 of the OPM, etc. The test power would then be measured for each channel 1-12 of the OPM. The test power for each channel would then be subtracted from the reference power measured at the large area detector yielding the insertion loss of each branch of the fanout. (Note: For this measurement to be reliable the power meters need to be calibrated together to confirm that their absolute calibration is within +/-0.01dB.)

To properly setup for an MTP-Fanout IL measurement the sequence needs to be correctly configured. The following is a sequence file that is configured for a 12 channel MTP-Fanout patchcord.

		Instrument Control										Return Loss		Alternate Reference	
Seq	Value8	Source	Source Channel	Wave A	Wave B	OPM Rack	OPM Channel	pass fail	Measurement Type	Delay	Comment	Reflection Number	Reference Channel	Reference Module	Reference Channel
<num>	<string>	<num>	<num>	<num>	<num>	<num>	<num>								
1	Pin1	MM1	1	850	1300	OPM1	1	1	0			0	0	OPM1	23
2	Pin2	MM1	2	850	1300	OPM1	2	1	0			0	0	OPM1	23
3	Pin3	MM1	3	850	1300	OPM1	3	1	0			0	0	OPM1	23
4	Pin4	MM1	4	850	1300	OPM1	4	1	0			0	0	OPM1	23
5	Pin5	MM1	5	850	1300	OPM1	5	1	0			0	0	OPM1	23
6	Pin6	MM1	6	850	1300	OPM1	6	1	0			0	0	OPM1	23
7	Pin7	MM1	7	850	1300	OPM1	7	1	0			0	0	OPM1	23
8	Pin8	MM1	8	850	1300	OPM1	8	1	0			0	0	OPM1	23
9	Pin9	MM1	9	850	1300	OPM1	9	1	0			0	0	OPM1	23
10	Pin10	MM1	10	850	1300	OPM1	10	1	0			0	0	OPM1	23
11	Pin11	MM1	11	850	1300	OPM1	11	1	0			0	0	OPM1	23
12	Pin12	MM1	12	850	1300	OPM1	12	1	0			0	0	OPM1	23

Figure 13: Sequence configured to measure MTP-Fanout Insertion Loss.

The above sequence shows that the alternate reference channel is to be taken on Channel 23 of OPM1. The reference at channel 23 is to be applied to the channel corresponding to the

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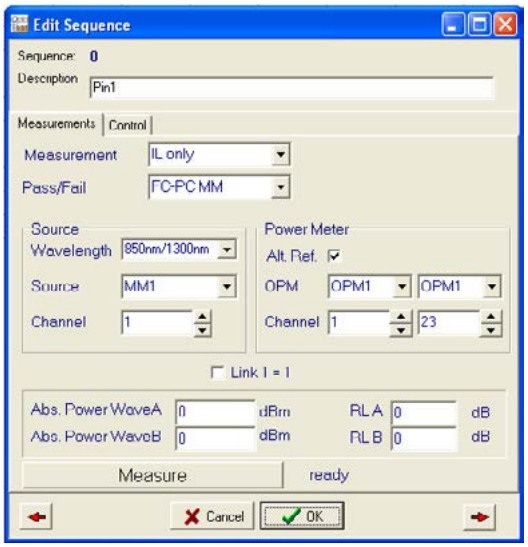
sequence step. For sequence step one the reference power will be applied to channel 1 of OPM1 and so on for sequence step 2, 3 etc.

This can be illustrated as well using the Sequence Editor in OPLMax as shown below.



Loading in calibration offsets for channel deviations

The method of referencing the MT side of a fanout connector to a large area detector and applying this reference to another channel is only accurate if the two detectors are calibrated together and the deviation between the two is minimal. If the detector to which the cable is being referenced to does not agree with the detector to which the insertion loss is to be measured to, then OPLMax can be configured so that an offset can be applied to a channel to make it agree with the channel being referenced to.

Creating a calibration offset table

To create a calibration offset table when one does not already exist, simply clicking on ***Save Sequence as OPM Correction*** from the [Reference] drop down menu will create the file and the correction table will be displayed. Clicking **OK** at the bottom of this popup will create the file.

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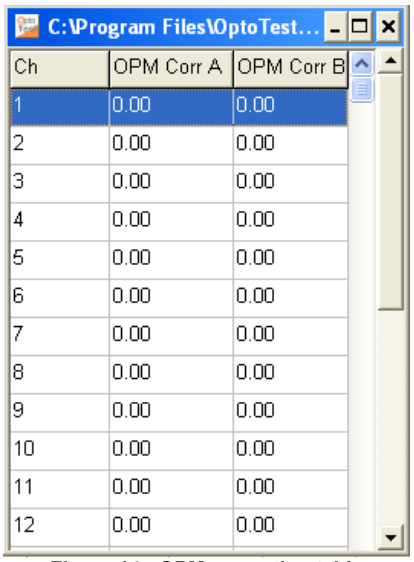

Ch	OPM Corr A	OPM Corr B
1	0.00	0.00
2	0.00	0.00
3	0.00	0.00
4	0.00	0.00
5	0.00	0.00
6	0.00	0.00
7	0.00	0.00
8	0.00	0.00
9	0.00	0.00
10	0.00	0.00
11	0.00	0.00
12	0.00	0.00

Figure 14: OPM correction table

The OPM correction table above shows the initial values of the created OPM correction file. If the user has already performed a reference to the channels, then these values will be displayed in the OPM correction table. The name of the file created will be the name of the sequence loaded with the post fix "_OPMreference." So if the sequence loaded is titled "12ch MTP test.xls," then the OPM reference file will be titled "12ch MTP test_OPMreference.xls." These reference values can be used as the correction factors, but many times this correction table needs to be configured manually.

Finding the calibration offsets

Once the correction table is created, one needs to find the calibration offset to enter into this table. To do this one needs to put a connector on the large area detector that matches that of the fanout connectors of the DUT. So if the connectors of the fanout portion of the DUT have FC connectors, then the adapters on the small area detectors and the large area detector need to accept FC connectors.

The first step is to take a stable source at the first wavelength to be tested. Connect the source to the large area detector where the reference is to be measured. Note the power of this measurement. Now go to the small area detectors and, using the same cable, measure the power at each channel for the source wavelength and record each power. The difference between the powers measured at each OPM channel and the reference channel (large area detector) will yield the offset necessary for the OPM correction. For instance:

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$$P_{LAAD} = -3.574dBm$$

Where P_{LAAD} is the power measured at the large area detector, and the powers measured at each OPM channel are:

P1 = -3.674 dBm
P2 = -3.457 dBm
P3 = -3.561 dBm
etc.

The resulting offset correction is the power that needs to be added to the channel reading to make it equal to P_{LAAD}. So,

$$P1_{correction} = P_{LAAD} - P1$$
$$P1_{correction} = 0.1dB$$

$$P2_{correction} = -0.117dB$$
$$P3_{correction} = -0.013dB$$

Repeat this process for all other wavelengths where the IL is to be measured. Once the correction for each power meter channel and at all wavelengths where IL is to be measured is calculated, then these need to be entered into the OPM correction file.

Editing the OPM correction file

To edit the OPM correction file select “Edit OPM correction” from the ***Reference*** drop down menu. This will open the OPM correction file in excel.

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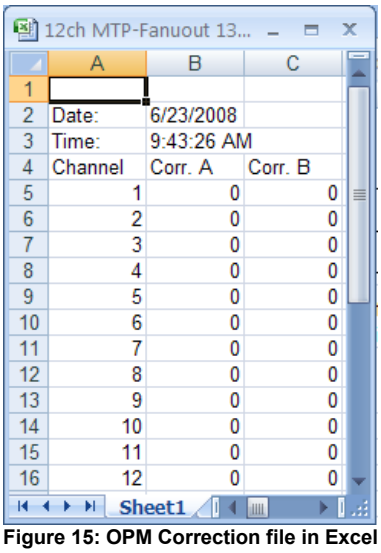

Figure 15: OPM Correction file in Excel

The corrections found will be inserted into this table. Column A corresponds to the channel of the power meter, Corr. A corresponds to the correction for wavelength A, and Corr. B corresponds to the correction for wavelength B. For the above example, the three corrections would be entered as such:

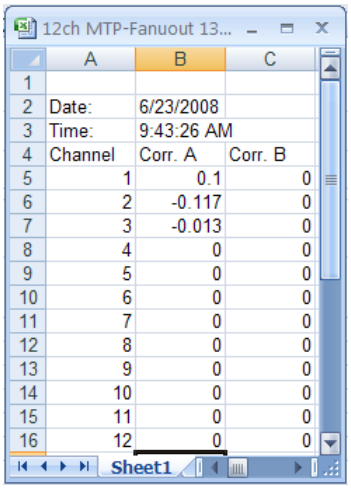

Figure 16: OPM corrections entered for P1-P3. The other corrections would be entered in accordingly.

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Loading in the OPM correction file

After the correction file has been edited for the correct offsets, save it in Excel, then it must be loaded into the software. To do this, select “Load OPM Correction” from the ***Reference*** drop down menu. Then navigate to the corresponding file and click [Open]. This will load in the correction for each sequence step. The user can accurately reference to the large area detector and measure IL at the corresponding power meter channel.

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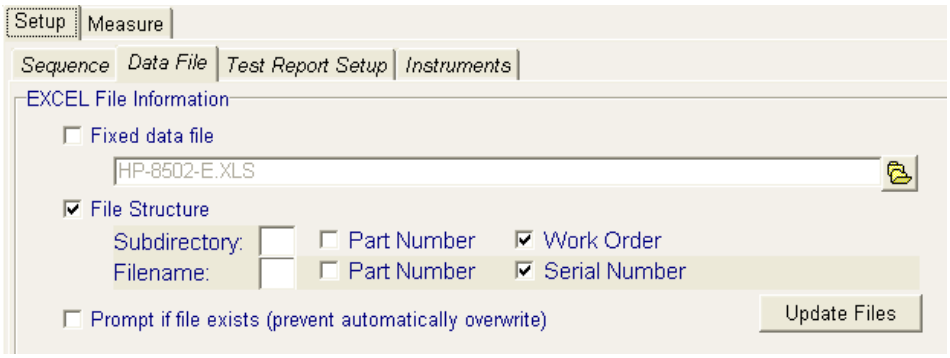
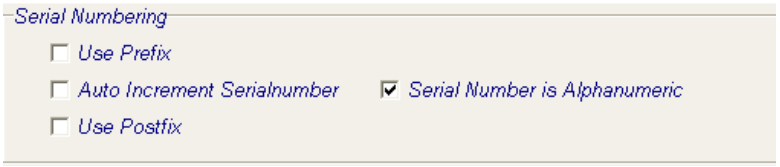
Data File

All data files are stored in EXCEL (filename.XLS) format in the file and location indicated on the Setup | Data File page.



Fixed data file	All the measurement data is stored into the same data file. NOTE: Newly taken data will overwrite already existing data. This option is meant to run experimental tests where data retention is not critical or only a hardcopy is produced for each measurement using Print.
File Structure	All the measurement data is stored in a file structure. For each measurement a new file is created. The user has the choice of what structure suits them best. One also has the choice of inserting a prefix before the directory name and/or the filename in the two small boxes provided. Note: there is only room for three characters in the spaces.
Prompt if file exists	The user will be notified if a file to be created already exists.

Serial Number Settings



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Use Prefix	If checked the user can enter a prefix for the serial number, which will not change through the measurement process, until the user chooses to do so.
Use Postfix	Same as above only the character sequence is placed after the serial number
Auto Increment Serial Number	If this box is checked OPL-Max will automatically increment the serial number of the cable under test when the NEXT button under the Measurement tab is pressed.
Serial Number is Alphanumeric	When this box is checked the user has to manually enter in the serial number for each cable. This option is particularly useful when the serial number is a mixture of numbers and letters.

Data Grids Options

Clear Data Grids	Pressing this button will clear the data out of the spreadsheet grids under the Measure tab.
Set Grid Fonts	This button allows the user to change the font of the data under the Measure tab
Hide Cable Info	Checking this box will remove the cable header information under the Measure tab.
Precision of Measurement Results	Selecting one of these radio buttons will set the precision of the data displayed.

Supress 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.

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Suppress Pop-Up Status	This will stop the dialog box from popping up and showing the data measurements.
Reference RL 1st	This allows the user to reference RL before referencing IL. The default procedure is to reference IL first then RL.

Test Report

The Test Report is based on an EXCEL template file (Template.XLS) for example:

OPL-MAX			Test Report			
			Date			
			Operator			
			DataFile			
Information						
Workorder	**Lot Number/ID**	**Part Number**	**Customer**	**Sales Order**		
Cable Specifications						
Cable ID	**Serial Number**	**Fiber Type**	**Core**	**Cable Spec**		
Additional						
Calibration	**Description**	**Equipment**	**Calibration Date**			
Test Data						
Test Point	**Wavelength (nm)**	**IL (dB)**	**IL Spec (dB)**	**RL(dB)**	**RL Spec(dB)**	**Pass/Fail**

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.

The cell allocation is done in the Test Report Setup Screen on the Setup | Test Report Setup page as shown on the following page.

Configuring Data Columns:

This feature allows the user to customize test reports by choosing which data gets recorded in the test reports.

Single Row Data: Checking this box will output all data into a single row of an Excel spreadsheet.

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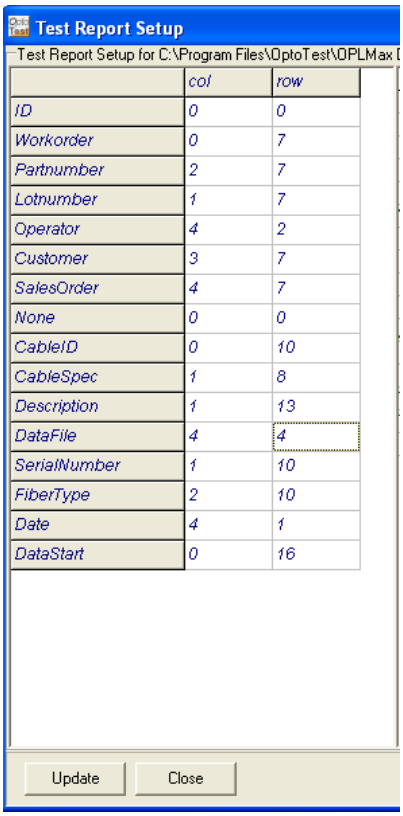
OPL-Max Instruction Manual

Test Report Setup:



To get to this screen 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.

The position of the [fields] are also shown in the representation of the data sheet (see below).

[None]				
OPL-MAX			Test Report	
			Date	[Date]
			Operator	[Operator]
			DataFile	[DataFile]
Information				
Workorder	Lot Number/ID	Part Number	Customer	Sales Order
[Workorder]	[Lotnumber]	[Partnumber]	[Customer]	[SalesOrder]
Cable Specificatio	[CableSpec]			
Cable ID	Serial Number	Fiber Type		
[CableID]	[SerialNumber]	[FiberType]		
Additional				
Calibration	Description	Equipment	Calibration Da	
	[Description]			
Test Data				
Test Point	Wavelength (nm)	IL (dB)	IL Spec (dB)	Pass/Fail
[DataStart]				

Close: Closes the Test Report Setup and saves the changes.

Update: Updates the test report setup after a change.

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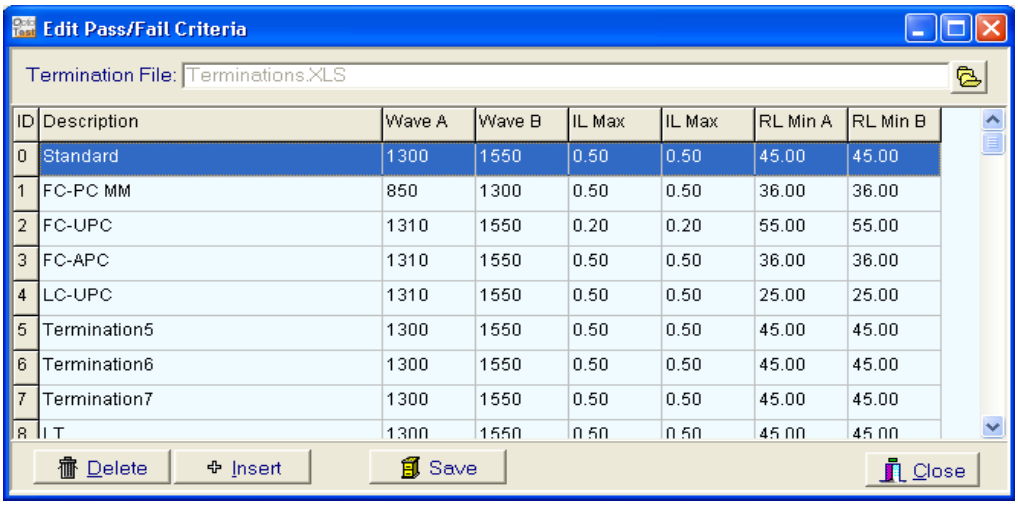
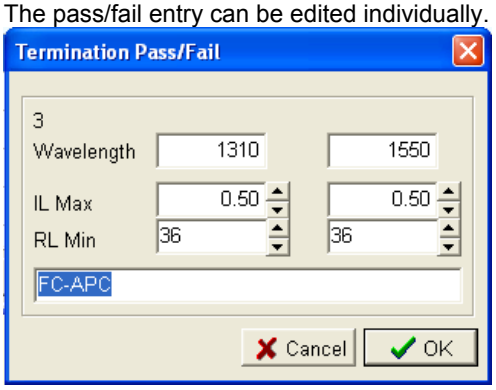
Pass/Fail Criteria

All the Pass/Fail criteria are stored in a single EXCEL file, the default filename is Termination.XLS. Clicking on *Edit Termination* under the Setup menu will allow the user to view this file. To change the individual parameters double click on the particular row. Termination entries can be inserted and deleted by clicking on the corresponding buttons.



ID	Description	Wave A	Wave B	IL Max	IL Max	RL Min A	RL Min B
0	Standard	1300	1550	0.50	0.50	45.00	45.00
1	FC-PC MM	850	1300	0.50	0.50	36.00	36.00
2	FC-UPC	1310	1550	0.20	0.20	55.00	55.00
3	FC-APC	1310	1550	0.50	0.50	36.00	36.00
4	LC-UPC	1310	1550	0.50	0.50	25.00	25.00
5	Termination5	1300	1550	0.50	0.50	45.00	45.00
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	LT	1300	1550	0.50	0.50	45.00	45.00

The pass/fail entry can be edited individually.



Wavelength:
Wavelength of the IL and RL criteria.

ILMax: Criteria for Insertion Loss, values greater than the IL Max are FAIL condition.

RLMin: Criteria for Return Loss, values less than the RL Min are FAIL condition.

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

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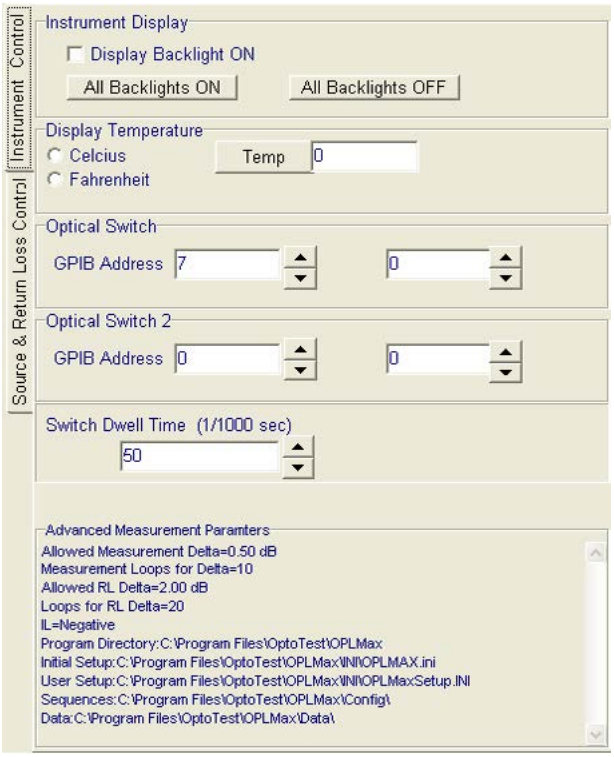
Options

The general options of OPL-MAX are accessible through Setup | Instruments.

Instrument Control Tab



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.
Optical Switch 1/2	Allows the user to set the GPIB address for up to two switches connected to the computer. Once these are set the Setup needs to be saved under the **Setup** menu and the software needs to be restarted.

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Measurement Timing	Switch Dwell Time: The dwell time is the time the instrument waits and lets the source, switch and power meter settle before taking a measurement. By shortening the times to less than 500milliseconds the insertion loss measurement will become less accurate however the overall measurement time will be shorter. Wavelength Switching Time: This is the time the system waits to allow the wavelength selection to settle.
Advanced Measurement Parameters:	Shows some of the current system files and global measurement parameters.

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

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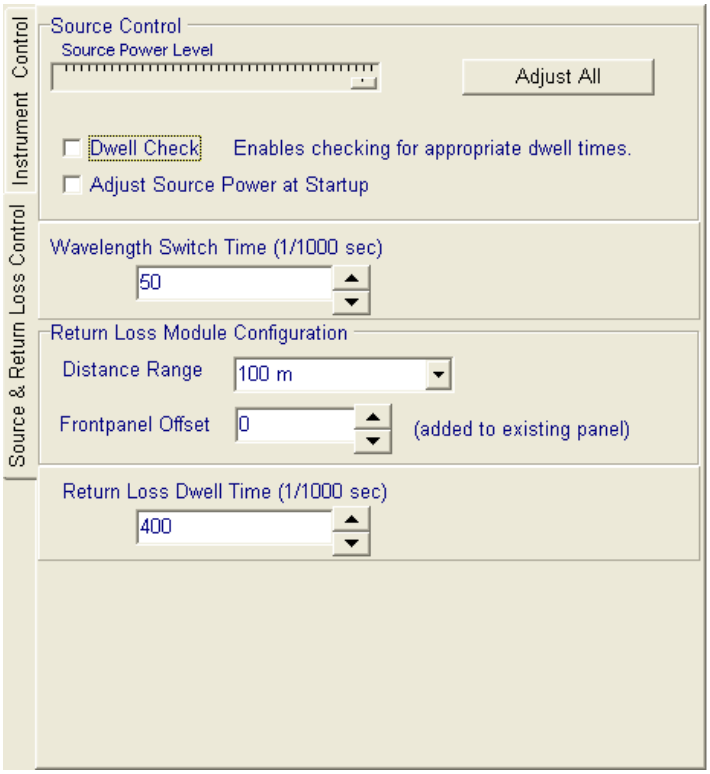
Source and Return Loss Control Tab



Source Control	*Source Power Level:* Adjusting the bar under *Source Power Level* will set the source power from 0 to 100%. Pressing the [Adjust All] button will adjust all source channels to the same setting. (Note: The source power of the OP930 is not adjustable.) *Dwell Check*: With this box checked it will look at all dwell times a make sure that they are above 400ms. *Adjust Source Power at Startup*: Having this box checked will cause the software to automatically adjust the source powers once the software is started.
Wavelength Switch Time	This value is the amount of dwell time when the source switches wavelengths. The value should be greater than 400ms, but depending on source types it may need to be larger.

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Return Loss Module Configuration	*Distance Range:* This setting adjusts the pulse rate of the RL unit to allow for measurements of long cables. This value determines both the length of the Ref cable, and the length of the fiber under test. The total distance of the fiber optic link must be less than this value. So the sum of the reference cable and all the fiber optic links must be less than the distance range setting. *Front Panel Offset*: This allows for the user to set an offset to the front panel for the unit to begin scanning from. (Note: This offset is typically used for multimode RL measurements where a switch is implemented. Setting the offset just past the MM switch will prevent the RL meter from referencing to the switch.)

Performing Measurements

Once the user has setup the software and configured the measurements to suit the test procedures, one can begin performing measurements. The data display for measurements is under the ***Measurement Data*** tab under the main **Measure** tab.

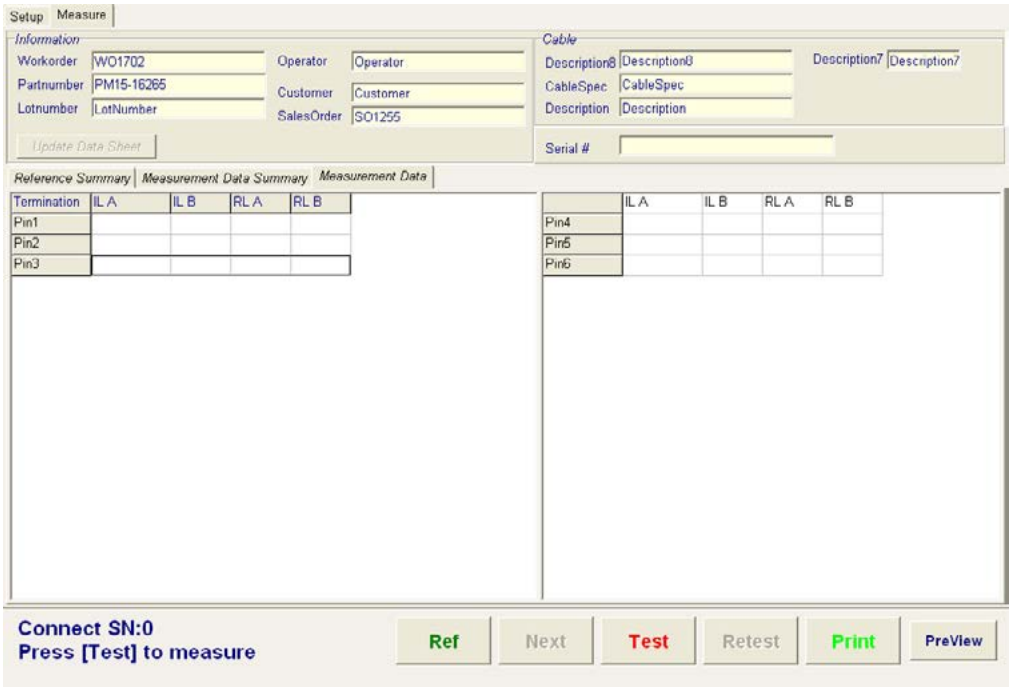

Figure 17: Measurement Tab showing a six step sequence.

Under the ***Measurement Data*** tab the software will display a spreadsheet which 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.

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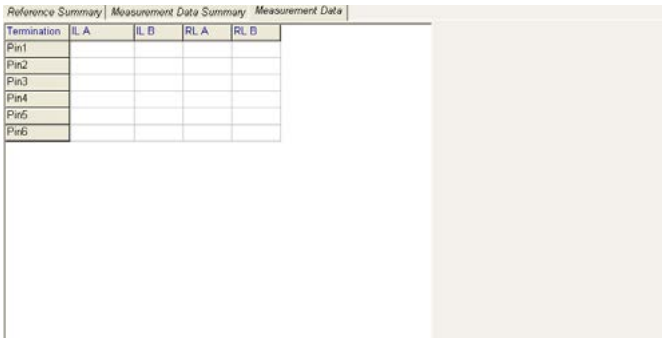

Figure 18: All Sequence steps are shown on the left portion of the screen.

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 >>>."

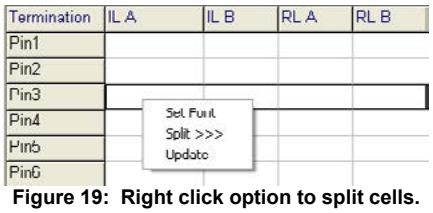

Figure 19: Right click option to split cells.

When the "Split >>>" option is selected it will perform the split and the result will look something like this:

Figure 20: 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.

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Configuring Header Information for Test Reports

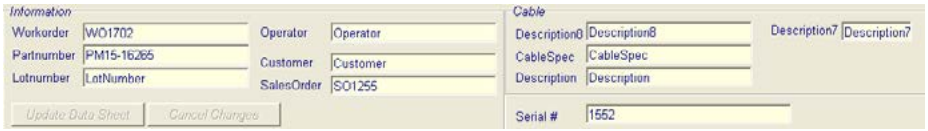

Figure 21: OPLMax's Test Report Heading Editor

OPLMax allows the user to configure headers for a test report. The data entered into the corresponding box will be included into the header structure of the test report to be stored or printed. To edit the header values, simply edit the corresponding box and click the [Update Data Sheet] button. This will populate the test report's headings with the new information.

Performing Measurements

Once the DUT is connected properly one can perform a test by clicking the **[Test]** button. The software will cycle through the sequence steps and insert IL and/or RL measurements into the corresponding spreadsheet cell. The data will look something like this:

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 22: Sample of data output

The data displayed in green means that the measurement meets specifications as defined in the **termination** file. The red data is data which did not meet specifications.

Retesting process

The software allows the user to retest either the entire sequence or just a single sequence step. To retest the entire sequence, which will overwrite the old data, the user just needs to press the **[Retest]** button. This will instruct the hardware to go through the measurements again and the new data will be inserted into the spreadsheet and also into the corresponding data file.

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If just a single sequence was out of specification and that fiber needs to be retested then this can be accomplished by double-clicking the corresponding row for the measurement. This will pull up the “Retest” dialog.

Figure 23: Retest dialog

Here the user can just retest the step by clicking the **[Retest]** button or the user has the option of clicking the **[Realtime]** button. This will instruct the software to perform the sequence measurements continuously so the user can see the measurements update. When the measurement is within specification the user can click the **[Retest]** button, which will record the data into the measurement spreadsheet and the corresponding data file.

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. To print the test report click the **[Print]** button and this will automatically print the test report file on the printer selected as the default printer in Windows©.

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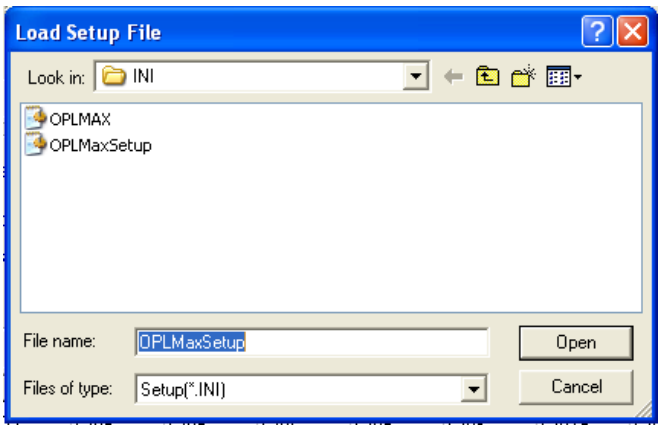
Personalizing OPLMax Headings

OPLMax 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. (Note: Changing configuration files can drastically alter the way in which OPLMax loads up, so before altering any configuration back up your c:\program files\optotest\OPLMax directories.)

Opening the active INI file and configuring existing fields

OPLMax 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 click on **Setup|Load Setup from file**.



The file listed in the text box is the active INI file. Click cancel to exit this dialog box.

Now open the INI file from the **C:\Program Files\OptoTest\OPLMax\INI** directory using a text editor such as **Notepad®**. This file contains all of the user specified setup information for OPLMax. Scroll through the INI file and find the line which reads "[Fields]."

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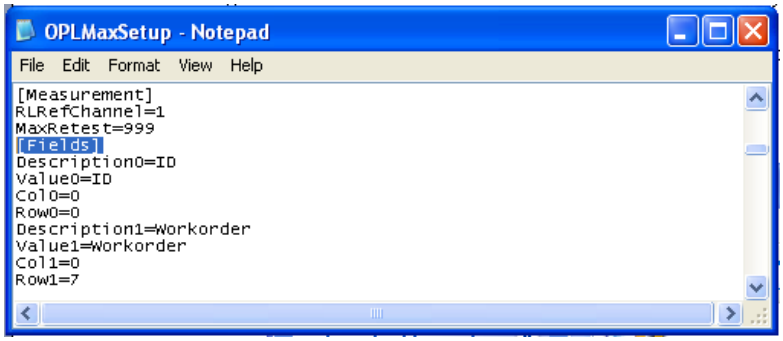

The text after the [Fields] label controls the information for each individual field. The available fields range from "*field0*" to "*field10*." Fields zero and eleven through fifteen must not be changed. Changing these will alter the functionality of the software.

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

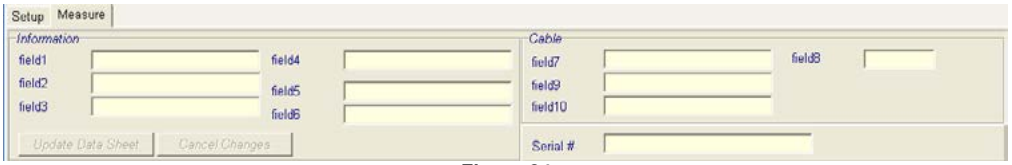

Figure 24

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, the test report layout can be changed by clicking on **Setup Template** under the **Test Report Setup** tab.

Using the sequence file to load header data

While sequence files contain information as to how many and what type of measurements will be recorded, they can also be configured to contain header information to be used in test report printouts. Once again the format for the sequence file is shown below:

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	A	B	C	D	E	F	G	H	I	J
1	Configuration File of OPL-MAX									
2	Identification	ID								
3	Field Desc 2	field2								
4	SerialNumber	ZZ	10101	ZZ						
5	Field Desc 1	field1								
6	Number of Sequences	24								
7	Field Desc 3	field3								
8	Field Desc 5	field5	Field Desc 7	field7						
9	Field Desc 6	field6	Field Desc 8	field8						
10	Field Desc 9	field9								
11	Field Desc 10	field10								
12	Seq	Termination	Source	Source Channel	WavelengthA	WavelengthB	OPM Rack	OPM Channel	pass fail	measurement type
13	START	<string>	<num>	<num>	<num>	<num>	<num>	<num>		
14	1	Pin1	MM1	1	850	1300	OPM1	1	1	0

Figure 25

This sequence template can be used to configure and customize test reports. Altering the field values in columns B and D, will change the values in OPLMax when a sequence file is loaded.

Example: Altering Headings and Fields:

If the user has a certain sequence file that only corresponds to a certain type of fiber, they may want to hard code that information into the header of their test reports. First, a field or fields must to be designated to hold that information. For this example two fields will be designated as “Cable Type” and “Core Size.” These will be designated as field9 and field10 from the above sequence template, since fields 7,8,9, and 10 are under the *Cable* heading as seen in **Figure 6**.

Next, the user needs to alter the corresponding descriptions in the current INI configuration file. Remember to back up the INI file before altering it.

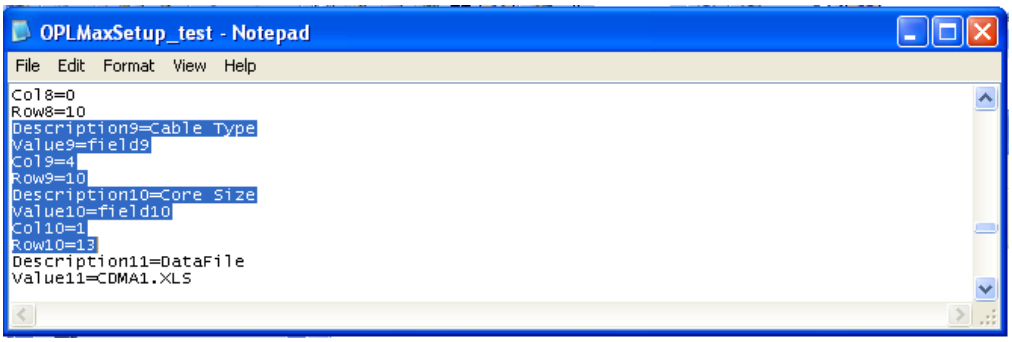

Figure 26

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Locate the descriptions that correspond to the fields to be configured as described above. Since field9 and field10 will be altered “Description9” and “Description10” need to be changed to “Cable Type” and “Core Size” respectively as shown in **Figure 8**. Save the INI file and then reload the INI file in OPLMax. The header section under the **Measure** tab should look like that of **Figure 9**.

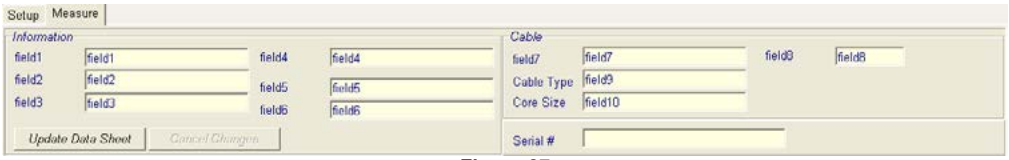

Figure 27

Now these fields need to be located in the sequence file so that the values can be loaded each time the sequence file is loaded. Open the sequence file to be altered and find the corresponding cells.

	A	B	C	D
1	**Configuration File of OPL-MAX**			
2	Identification	ID		
3	Field Desc 2	field2		
4	SerialNumber	ZZ	10101	ZZ
5	Field Desc 1	field1		
6	Number of Sequences	**24**		
7	Field Desc 3	field3		
8	Field Desc 5	field5	Field Desc 7	field7
9	Field Desc 6	field6	Field Desc 8	field8
10	Field Desc 9	fiber type		
11	Field Desc 10	core size		

Figure 28

The corresponding cells for field9 and field10 are B10 and B11 respectively. The data entered into these cells will show up in their corresponding text box under the **Measure** tab in OPLMax and in the test report. The corresponding cells for all field designations are:

Field #	Cell Location in Sequence File
1	B5
2	B3
3	B7
4	N/A
5	B8

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6	B9
7	N/A
8	N/A
9	B10
10	B11

Table 1

Some fields are not configurable via the sequence file, but are only configurable when using OPLMax. Fields 4, 7, and 8 can only be changed via their corresponding text boxes in the header section of OPLMax. Their descriptions, ie “Description4,” “Description7,” etc, can be changed via the INI file. These values will also be exported from OPLMax to the Excel test report.

Warranty Information

OptoTest Corp. warrants this product to be free from defects in material and workmanship for a period of one year from date of shipment. During the warranty period we will, at our option, either repair or replace any product that proves to be defective. To exercise this warranty contact OptoTest Corp. Headquarters. You will be given prompt assistance and return instructions. Repairs will be made and the instrument returned, transportation prepaid. Repaired products are warranted for the balance of the original warranty period, or at least 90 days.

NOTE: Do not send instruments for any reason without contacting OptoTest headquarters first.

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