M310/M210e OTDRs

with TruEvent™

User's Guide

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OTDR Software Options

This is a user's guide for the M310 and M210e OTDRs. It assumes basic knowledge in the use of an OTDR, OPM, and a PC.

DFS1 Digital FiberScope

When a DFS1 hardware kit is ordered, the fiberscope can be plugged in M series OTDR and ready for use.

TRM (Test Results Manager) trace analysis and reporting PC Software

- A CD containing TRM 2.0 is included with every OTDR. The CD jacket has a sticker with a license activation key for TRM Basic Software (OTDR Trace/OLTS viewer, Batch Editor, and Reports). The activation key is good for up to five fulfillments to allow multiple PCs to run TRM 2.0 Basic. The multiple fulfillments also allows a user to activate TRM 2.0 Basic when changing to a new PC. Once the five fulfillments have been used for a license key, the user must purchase a new license, which will provide a new activation key good for five fulfillments.

- To install TRM Basic on additional PCs, additional licenses of TRM Basic Software may be purchased by ordering part number TRM-00-0900PR.

- A single license version of TRM Advanced Software (incudes TRM Basic plus Advanced Analysis for PC) may be purchased by ordering part number TRM-00-0910PR. TRM Advanced Software is included in M310 OTDRs.

- To upgrade from TRM Basic to TRM Advanced software a single license version may be purchased by ordering part number TRM-00-0920PR.

TruEvent™ Event Analysis Technology

The M series OTDRs utilize AFL's industry leading TruEvent technology to provide a new level of accuracy and reliability in event analysis. Events on a fiber include connectors, splices, optical splitters and macro-bends. To accurately locate an event, OTDRs need to find its location, identify event type, measure reflectivity and loss. M series OTDRs with TruEvent technology provide better baseline documentation of fiber links and enables the user to troubleshoot faulty networks more effectively.

LinkMap™ with Pass/Fail

M series OTDR LinkMap with Pass/Fail enables even novice users to easily and accurately troubleshoot optical networks. LinkMap presents an icon-based view of the tested network clearly identifying fiber start, end, connectors, splices and macro-bends. A LinkMap Summary provides end-to-end link length, loss, and ORL. Loss and reflectance of detected events is compared to industry-standard or user-settable pass/fail thresholds and displayed with clear pass/fail indications.

LinkMap feature is only available on M310 OTDR.

Hardware Overview

Controls, Indicators, and Ports

Top Panel View

Front Panel View

Ref	Control/ Feature	Description
1	MM port	**This is a CLASS I LASER output** - 850/1300 nm multimode OTDR port.
2	SM port	**This is a CLASS I LASER output** - 1310/1550 nm single-mode OTDR port.
3	VFL port	**This is a CLASS II LASER output. Do not stare into beam.** The VFL (visual fault locator) port is a 650 nm (red) laser. Used for short-range fault-location.
4	OPM port	Optical Power Meter port. Used for power (dBm, W) or loss (dB) measurements.
5	Dust cap	Used to protect optical ports from dust/damage.
6	Boot	A proven shock-absorbing rubber boot.
7	Touchscreen display	Contains on-screen controls and menus. Used to show setup menus, test results, and saved test data information.
8	Function keys	These are the hard function keys and soft function keys. See section "Front Panel Keys and Functions" on page 7 for details.
9	VFL Indicator	This indicator Illuminates when the VFL port is active.

Controls, Indicators, and Ports

Back Side View

Left Side View

Right Side View

Ref	Feature	Description
1	Power port	This is interface for the AC power adapter/charger.
2	AC/Charger indicator	When ON, indicates that an AC adapter is connected to the OTDR. - **Red** light - rechargeable battery is charging. - **Green** light - rechargeable battery is fully charged.
3	Mini-USB function port	This port may be used to connect OTDR to a USB host port on PC with the supplied cable.
4	USB function port	This USB port allows connection to a PC for transferring stored test results. Also this port may be used to connect USB Flash Drive for data storage and copying Internal files.
5	Tilt stand	Surface-top tilt stand may be used for the convenience of operation.
6	Wrist strap buckle	Used to attach an adjustable wrist strap supplied with your OTDR.
7	Wrist strap	This is an adjustable wrist strap is supplied with an OTDR and may be used for the convenience of carry and operation.
9	Battery compartment	Holds removable/rechargeable Li-ion battery. Slide the battery compartment door (A) to open.

User Interface Overview

Front Panel Keys and Functions

The use of each key is summarized in the table below.

Key Symbol	Key Name	Key Function
	Power	Press and hold (~1 second) to turn power on or off.
	VFL laser	**ON VFL** - Press and hold (~1 second) LED will be blinking. **ON CW** - Press and hold (~2 seconds) LED will be solid. **OFF** - Press and hold (~1 second) LED should be OFF.
	Menu	Press to access the Main Menu. The Menu Icon ☰ must be displayed on the top bar for the key to perform the action. If you are at the top level the Menu key will be disabled.
	Left and Right Tab keys	• Press to display the next/previous page in one of the test modes: OTDR, OPM, or DFS. • In text editor menus, press these keys to move the cursor left or right.
	Five way navigation button cluster	The arrow keys provide several functions: • In menus, these keys are used to navigate menus and change setup parameters. • In the Trace page, these keys are used to move the cursors. • In the Zoom Adjust page, these keys adjust vertical and horizontal zoom levels. • In the LSA Adjust page, these keys move cursors and adjust zoom levels.
	Enter	This key provides several functions: • On the Main Menu page: press this key to open a Test Mode, Results Manager, Settings, or New Job. • On Settings pages: for setting followed by "...", press this key to open a submenu. • On the Trace page: press this key to toggle between [A] and [B] cursor.
	Back	Press to return to previous page. The Back Icon ↩ must be displayed on the top bar for the key to perform the back action. If you are at the top level, the Back key will be disabled.
	Test	Press to start or stop an OTDR test, or toggle between Live and Stopped in OPM testing.
	Save	Press to save the currently displayed test results or image using the current job settings.
	Soft keys	Press soft keys (or touch labels on touch-screen) to perform the indicated functions or expand menu.

User Interface Overview

Two types of modes are available from the Main Menu as follows:

TEST MODES: OTDR and OPM	
Used to perform OTDR and OPM tests.	**To select the desired mode** • Tap the appropriate Touchscreen icon. • Use ◆ arrows to indicate the desired mode icon, and then press ⬤ key.
UTILITY MODES: Results, Settings, and New Job	
Used to select user preferences, perform general settings, create a new job (set up a file structure and define the fiber under test location), manage saved test results, and perform other non-test functions.	**To select the desired mode** • Tap the appropriate Touchscreen icon. • Press the appropriate soft key located below each Touchscreen icon.

Test modes icons

OLS Test Mode is only available on M310 OTDR

Utility modes icons

DFS Test Mode is optional (see page 4 for details)
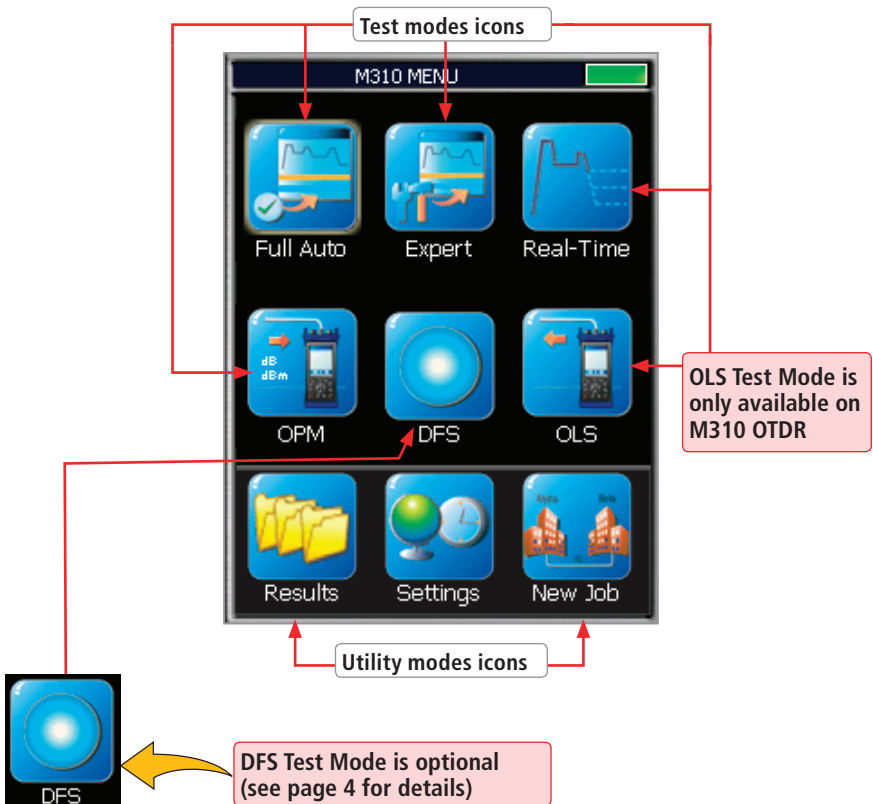
Test Modes Settings Summary

Full Auto (Automatic OTDR)	Real-Time (Real-time OTDR)	Expert (Manual OTDR)	OPM (Optical Power Meter)	OLS (Optical Light Source)
Fiber type, launch and receive test cord lengths				
Automatic or default settings	Wavelength, range, pulse-width, and filter		Wavelength	Wavelength
	Automatic or default settings	Averaging time	Units (dB/dBm)	Tone selection
		Event thresholds	(Set) Reference	

Menus Tip: "..." Function

When a menu option is followed by three dots "…",

it means that there is a submenu/page available. Press ⊙ key to display and see additional information.

Test Port	Single-mode
Fiber Type...	User
Launch Cable	User
Length...	160.0 m

Utility Modes Summary

Results (Saved Results)			Settings (General Settings)		New Job (New or Existing Job)
OTDR .sor files	OPM .atd files	DFS .jpg files	Language, Formatting, Distance Units, Date, Time Company Name, etc.	Software version numbers	Create New or add to existing Jobs
				Reset all Settings to default	

Selecting Operating Mode from the Main Menu

Mode	Description
Full Auto	**Full Auto OTDR**: This is the recommended mode for users who are not familiar with OTDR operation. In the Full Auto mode, OTDR parameters such as Range, Pulse Width, and Averaging Time are set automatically. Full Auto Tests are done at all available wavelengths and always include an Event Table and Summary page. Pass/Fail Thresholds are set to default with an option to be turned off. **Note:** in the Expert mode, the Events Menu contains Event Threshold and Pass/Fail Threshold Settings allowing users to change these settings and turn them on or off.
Expert	**Expert OTDR:** This mode provides the most setup flexibility. Auto-Once will set Pulse Width, Range, and Averaging time for one test and then return the OTDR to manual mode. Auto will select the Pulse Width, Range and Averaging time for each test. Manual allows users to set Range, Pulse Width, and Averaging Time manually. Users can either enable event or disable the event table (Events = Auto / Off). **Note:** in the Expert mode, the Events Menu contains Event Threshold and Pass/Fail Threshold Settings allowing users to change these settings and turn them on or off.
Real-Time	**Real-Time OTDR:** This is the best mode for real-time troubleshooting. Note that the Wavelength setting can only be set to individual wavelengths. The Range and Pulse Width parameters are set by the user.
OPM	**OPM:** This mode is available to perform Optical Power Meter measurements.
DFS	**DFS Test Mode is optional (see page 4 for details).** When the DFS1 is connected to an OTDR, this mode allows users to inspect fiber optic connector end-faces for damage or contamination.
OLS	**OLS:** This mode is available to turn on Optical Light Source using OTDR port. **OLS Test Mode is only available on M310.**
Results	**Results:** This mode provides file manager functions enabling users to open, review and manage (cut/copy/paste/rename) stored results. Icons show the stored results for each fiber (OTDR, OPM, or end-face image).
Settings	**Settings:** This mode allows the user to adjust General Settings (Language, Distance Units, Sounds, Auto Off function, Date/Time, Company Name, Keyboard Style) and displays the OTDR version information.
New Job	**New Job:** This mode is available for creating new jobs (setting up a file structure and defining the fiber under test location: Drives, Folders, Jobs, Routes End Locations, Cables, Test Equipment Location, and Operators).

User Interface Overview

Display Features

Ref	Description
1	Page header - Displays page name and test status.
2	Battery status icon: Green - fully charged Red - discharged Charging - AC connected Fully Charged - AC connected
3	Main Menu touch key.
4	Back touch key.
5	**1310*** This field indicates the currently displayed wavelength.
6	Screen/Page tabs. Use Tab keys ◀▶ to change screens/pages.
7	Menus and test results are displayed in this area.
8	Soft key labels and touch keys.
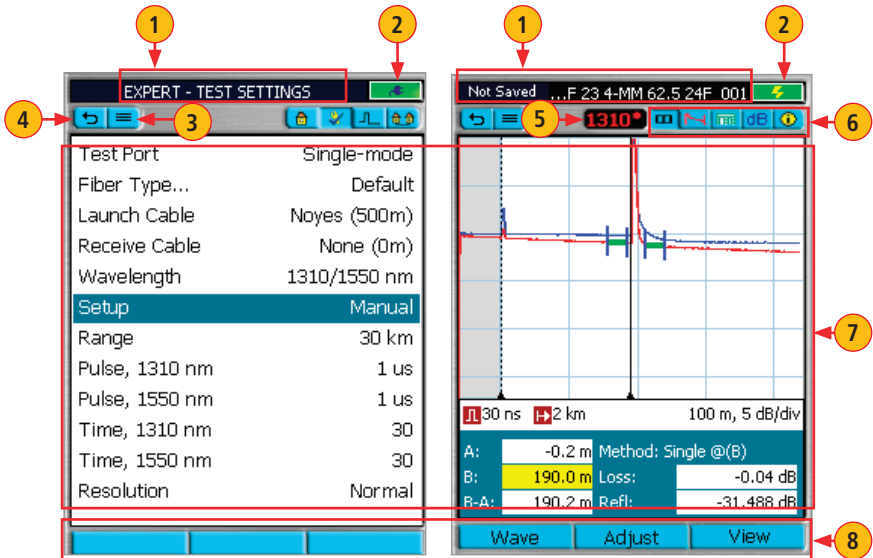
User Interface Overview

When a test mode (OTDR or OPM) is enabled, your OTDR will display the 'Home' screen of the enabled test mode.

• Use Tab keys ◀▶ to change test pages/screens available for the enabled test mode.

Full Auto/Expert OTDR mode

Real-Time OTDR mode
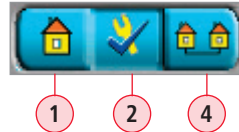
1. **Home** - display OTDR setup, change Fiber and Cable ID parameters.

2. **Test Settings** - define OTDR test setup.

3. **Event Settings** - define OTDR Event settings and Pass/Fail settings.

4. **Job Settings*** - review current job settings.

OPM mode

1. **Home** - display OPM setup; shows Live power or loss readings.

2. **Loss Table** - review results saved for the current cable.

3. **Job Settings*** - review current job settings.

DFS mode
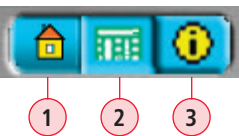
DFS Test Mode is optional (see page 4 for details)

1. **Home Page** - activate Live DFS mode and capture the displayed fiber end-face image.

2. **Results page** - display captured end-face image; shows saved image of current fiber or from Results Manager.

3. **Job Settings*** - review current job settings.

* The Job Settings tab is included in each test mode as a convenience. Current Job settings can also be viewed and changed using the New Job tool accessed from the Main Menu.

Use ↕ arrows to highlight the desired parameter

Press ⦿ key to display submenu, which allows the selection of available languages.

Press ⦿ key to display submenu, which allows the selection of available date/time/numbers formatting options.

Press ◀▶ to select units of measure.

Use ◀▶ arrows to toggle the Beeper function On/Off.

Use ◀▶ to define the Auto Off (set number of minutes) function.

Press ⦿ key to display submenu, which allows setting Date.

Press ⦿ key to display submenu, which allows setting Time.

Press ⦿ key to display submenu, which allows defining Company Name.

Use ◀▶ arrows to select keypad: Alphanumeric or Qwerty.

Use ◀▶ arrows to select SOR version: SOR Version 1 (GR-196-CORE) or SOR Version 2 (SR-4731 Issue 2).

Press ⦿ key to display Touch Panel calibration screen.

Press ⦿ key to reset all Settings to the default values.

Press ⦿ key to display the System Information screen.
Note: This page contains all information the user would need to have available in case of returning test equipment or contacting AFL Technical Support for assistance.

GENERAL SETTINGS	
Language...	
Formatting...	
Distance Units	Meters
Beeper	On
Auto Off (minutes)...	0
Date...	2011/11/17
Time...	02:52 PM
Company Name...	Name2
Keyboard Style	Alphanumeric
OTDR Result Version	SOR V2
Calibrate Screen...	
Reset All Settings to Default...	
View System Information...	
Edit	

SYSTEM INFORMATION	
Calibration Date	2012/08/24
Serial Number:	1Z35MRENGB7
M310 Version	2.2.20.0
OS Version	3.4.1.595
OS Build Date	2012/08/24
Power Interface	0.0.0.6
Power Controller	1.0.1
OTDR Interface	1.0.1.0
OTDR Version	0.0.4.0
OPM Firmware	1.0.2

New Job Utility

The New Job utility mode is available for creating new jobs (setting up a file structure and defining the fiber under test location: Drives, Folders, Jobs, Routes End Locations, Cables, Test Equipment Location, and Operators).

The New Job utility menu is accessed from the Main Menu by tapping the New Job Touchscreen icon or by pressing the New Job soft key.

If the active job does not exist in the job hierarchy, the new job creation screen will start with all settings set to "--"(none) .

In the new job creation screen, the user is allowed to:

 – Create a new job and make the newly created job "Active".

 – Create multiple new Jobs, Routes, or Cables without closing the screen. Then select one of the newly created jobs and make it "Active".

 – Add, remove, and modify static lists associated with each job setting.

To create a New Job:

• Use ▲▼ arrows to navigate up/down the list of available parameters/options.

• Use ◄► arrows to scroll through the available parameters/options (if applicable).

• With the desired parameter/option highlighted, press Select to open a submenu (A),which allows the user to perform the following tasks:

 – Select one of the existing names

 – Create New (B) Folders, Jobs, Routes, Cables, or Operator Name

 – Edit (C) the selected parameter

 – Delete (D) the selected parameter
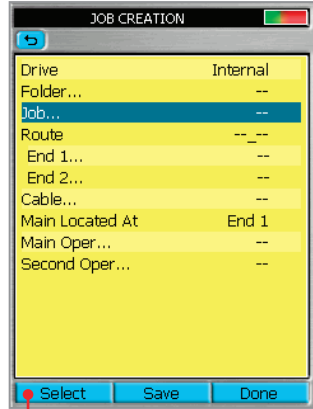
Example: Job Submenu
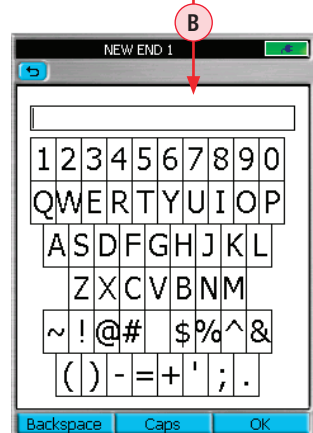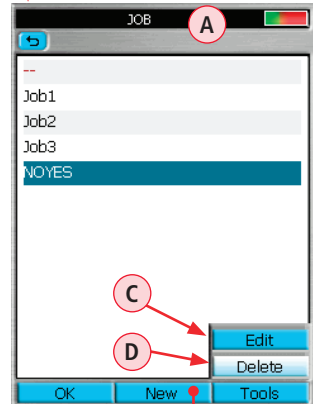
New Job Utility

New Job Creation

Use ◀▶ arrows to scroll through available drives.

Folder, Job, End 1, End 2, and Cable parameters:
Highlight the desired parameter.
Use ◀▶ arrows to scroll through the lists of existing/previously created names.
Or, press the Select key to display a submenu, which allows the user to select one of the existing names or create a new Folder/Job/End 1/End 2/Cable.
Note: It is not required to create a Folder. The Job is a folder and will keep the routes, cables and tested fibers organized.

Use ◀▶ arrows to toggle between the End 1 and End 2 options.

Use ◀▶ arrows to scroll through the list of existing names.
Or, press Select to access a submenu, which allows the user to select one of the existing names or create a new Operator Name.

Not Saved	JOB CREATION	
Drive	Internal	
Folder...	--	
Job...	AAA	
Route	MDF_IDF 204	➕
End 1...	MDF	
End 2...	IDF 204	
Cable...	SM 24 FIBER	➕
Main Located At	End 1	
Main Oper...	Operator1	
Second Oper...	Operator2	

➕ New Item

| Select | Save | Done |

Press the Select soft key to display a submenu, which allows the user to select one of the existing names or create a new Folder/Job/End 1/End 2/Cable.

Press the Save soft key to perform the following:
Store the newly created Job and remain in New Job mode to add more Routes and Cables to the created Job.
Create additional new Jobs.

Press the Done soft key to store the created new job and exit the New Job utility mode, where you can select a test mode to begin testing in the job you just created.
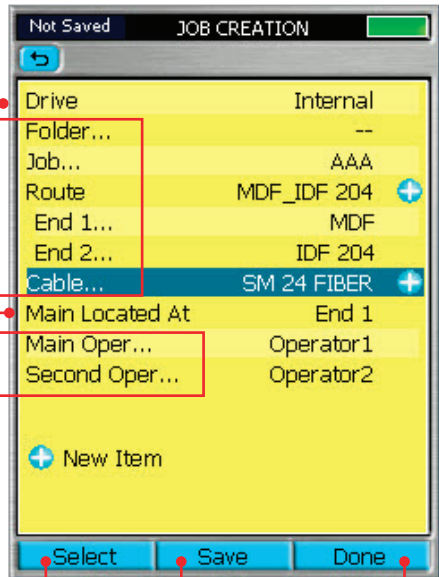
Full Auto Mode Settings

Core Settings

Full Auto mode settings are common for all OTDR Test modes and will be referred to as Core Settings.

Parameter	Definition
Test Port	This parameter indicates that a multimode or single-mode laser is used to generate an OTDR trace.
Fiber Type	This parameter is used to set fiber type which determines the GIR and Backscatter Coefficient.
Launch Cable (Launch Cord)	This is a test cable used to connect the OTDR to the near end of the link under test that is long enough to allow the OTDR to measure the loss of the first connection under test.
Receive Cable (Tail Cord)	This is a test cable used to terminate the far end of the link under test that is long enough for the OTDR to measure the loss of the last connection.

Use ◀▶ arrows to select Single-mode or Multimode Test Port (QUAD models).

Use ◀▶ arrows to select Fiber Type. If set to User, press ⬤ key to display submenu, which allows defining the GIR and Backscatter parameters.

Use ◀▶ arrows to select the Launch Cable option. If set to User, define the Length parameter.

Press ⬤ key to display editor submenu, which allows setting the Length of the Launch Cable used.

Use ◀▶ arrows to select the Receive Cable option. If set to User, set Length parameter.

Press ⬤ key to display editor submenu, which allows setting the Length of the Receive Cable used.

AUTO - TEST SETTINGS

Test Port	Single-mode
Fiber Type...	User
Launch Cable	User
Length...	160.0 m
Receive Cable	User
Length...	250.0 m

FIBER TYPE

User, single-mode	
GIR, 1310 nm...	1.4678
GIR, 1550 nm...	1.4682
Backscatter, 1310 nm...	-79.6 dB
Backscatter, 1550 nm...	-82.0 dB
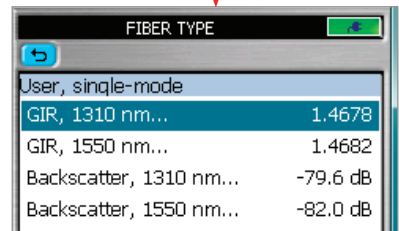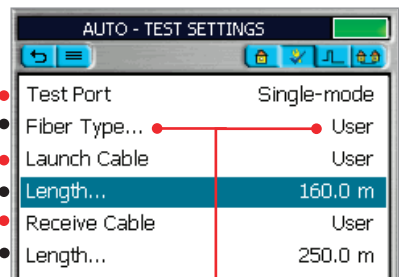
OTDR Test Settings

Expert Mode Settings

In addition to Core Settings (see "Full Auto Mode Settings" on page 16 for details), the Expert test mode allows you to set the Wavelength, Range, Pulse Width, Averaging Time, and Resolution parameters.

Setup - Auto	Setup - Auto Once

EXPERT - TEST SETTINGS

Test Port	Single-mode
Fiber Type...	Default
Launch Cable	Noyes (150m)
Receive Cable	None (0m)
Wavelength	1310/1550 nm
Setup	Auto

EXPERT - TEST SETTINGS

Test Port	Single-mode
Fiber Type...	Default
Launch Cable	Noyes (150m)
Receive Cable	None (0m)
Wavelength	1310/1550 nm
Setup	Auto Once
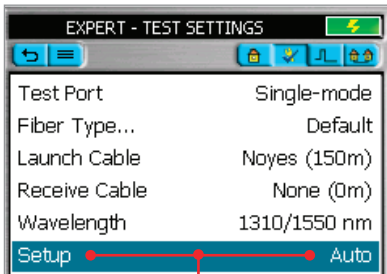
If set to Auto, OTDR sets Range, Pulse Width, Time, and Resolution for each test.

Use ◀▶ arrows to select a single wavelength or dual wavelengths for next tests.
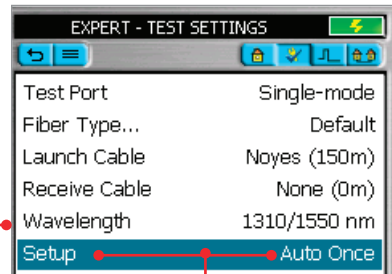
If set to Auto Once, OTDR sets Range, Pulse Width, Time, and Resolution for the first test. After test, returns user to OTDR Home page in Manual mode, where user may change any setting for next tests.

Expert Mode Settings: Setup - Manual
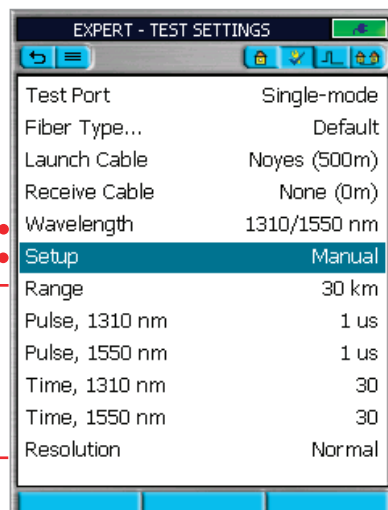
Use ◀▶ arrows to select a single wavelength or dual wavelengths.

If set to Manual, you will need to set Range, Pulse, Time, and Resolution.

Use ◀▶ arrows to display the desired value or option.

EXPERT - TEST SETTINGS

Test Port	Single-mode
Fiber Type...	Default
Launch Cable	Noyes (500m)
Receive Cable	None (0m)
Wavelength	1310/1550 nm
Setup	Manual
Range	30 km
Pulse, 1310 nm	1 us
Pulse, 1550 nm	1 us
Time, 1310 nm	30
Time, 1550 nm	30
Resolution	Normal

Expert Mode Settings: Setup - Manual (continued)

Note: The Range, Pulse Width, and Averaging Time parameters are user-selectable if the Setup parameter is set to Manual.

Parameter	Description
Range	The Range parameter determines the distance range of the full (unzoomed) trace. It also determines Resolution - the distance between data points in the trace: the longer the range, the wider the data point spacing. We recommend selecting the shortest distance range that is longer than the fiber under test. For example, to test a fiber that is 1.5 km long (including launch and receive cables), select the 2 km range. Available Range: | Wavelength (nm)	Range Settings
MM 850, MM 1300	250 m to 30 km
SM 1310, SM 1550,	250 m to 240 km	
Pulse Width	The M-series OTDR can operate using different pulse widths. Short pulse widths provide the shortest event and attenuation dead zones. Long pulse widths provide the best event detection on long fibers.
Averaging Time	The Time parameter determines the duration of a timed test. Available time settings: 5 • 10 • 30 • 60 • 90 • 180 sec.
Resolution	The Resolution parameter may be set to "Normal" or "High" "Normal" resolution averages a higher number of acquired trace data samples than "High" resolution does in a given time frame by using a more coarse data-spacing, providing increased dynamic range. "High" resolution has closer data point spacing which may reduce the dynamic range while improving dead zones.

Real-Time Mode Settings

In addition to Core Settings, the Real Time mode allows you to set the Wavelength, Range, Pulse Width, and Resolution parameters.

See section titled "Setup: Full Auto mode Settings".

Use ◀▶ arrows to select a wavelength.

Use ◀▶ arrows to display the desired value or option.

REAL-TIME - TEST SETTINGS

Test Port	Single-mode
Fiber Type...	Default
Launch Cable	Noyes (150m)
Receive Cable	None (0m)
Wavelength	1310 nm
Range	10 km
Pulse, 1310 nm	100 ns

Event Settings

The Event Settings parameters varies by OTDR test mode.

In the **Full Auto OTDR** test mode these parameters are set as follows:

Parameter	Option	Description
Events	Auto	An Event Table is calculated for every test.
Bi-derectional Analysis	On	For tests in End 1 > End 2 and End 2 > End 1 direction, an Event Table is generated with added bi-directionally averaged data.
	Off	Bi-directionally averaged data is not calculated.
Macro/ Microbend Detection	Enabled	Macro/Microbend detection is On.
	Disabled	Macro/Microbend detection is Off.
Front Panel Check	On	Enables OTDR to check the quality of the connection at the OTDR front panel and provides on-screen suggestions for corrective actions if the Front Panel connection is BAD or FAIR (see "Front Panel and First Connector Check" on page 37 for details).
	Off	Disables the OTDR Front Panel connection check.
First Connector Check	On	Enables OTDR to check the quality of the first connection at fiber under test and provides on-screen suggestions for corrective actions if the First Connector is BAD or FAIR (see "Front Panel and First Connector Check" on page 37 for details).
	Off	Disables the First Connector check.
Event Thresholds	Default	Set to default values (see page 23). Press ⬤ key to view the default values.
Pass/Fail Thresholds	Default	Set to default values (see page 23). Press ⬤ key to view the default values and turn Event Pass Thresholds On/Off (Threshold set to default values).
Last Event Status	Show Pass/Fail	Show Pass/Fail indicates the last event will be included from pass/fail determination based on pass/fail thresholds.
	Exclude Pass/Fail	Exclude Pass/Fail indicates the last event will be excluded from pass/fail determination based on pass/fail thresholds.

Event Settings

In the **Expert OTDR** test mode, these parameters may be set as indicated below:

Parameter	Option	Description
Events	Auto	An Event Table is calculated for every test.
	Off	Event Table is not calculated.
Bi-derectional Analysis	On	For tests in End 1 > End 2 and End 2 > End 1 direction, an Event Table is generated with added bi-directionally averaged data.
	Off	Bi-directionally averaged data is not calculated.
Macro/ Microbend Detection	Enabled	Macro/Microbend detection is On.
	Disabled	Macro/Microbend detection is Off.
Front Panel Check	On	Enables OTDR to check the quality of the connection at the OTDR front panel and provides on-screen suggestions for corrective actions if the Front Panel connection is BAD or FAIR (see "Front Panel and First Connector Check" on page 37 for details).
	Off	Disables the OTDR Front Panel connection check.
First Connector Check	On	Enables OTDR to check the quality of the first connection at fiber under test and provides on-screen suggestions for corrective actions if the First connection is BAD or FAIR (see "Front Panel and First Connector Check" on page 37 for details).
	Off	Disables the First Connector check.
Event Thresholds	Default	Set to default values (see page 23). Press ⏺ key to view the default values.
	User	Values may be adjusted within allowed limits (see page 23).
Pass/Fail Thresholds	Default	View default values (see page 23) and turn Event Pass Thresholds On/Off (Threshold set to default values).
	User	Values may be adjusted within allowed limits (see page 23).
Last Event Status	Show Pass/ Fail	Show Pass/Fail indicates the last event will be included from pass/fail determination based on pass/fail thresholds.
	Exclude Pass/ Fail	Exclude Pass/Fail indicates the last event will be excluded from pass/fail determination based on pass/fail thresholds.

Event Settings

Setup Parameters Available in Real-Time Mode

In the **Real-Time OTDR** test mode, these parameters may be set as indicated below:

Parameter	Option	Description
Front Panel Check	On	Enables OTDR to check the quality of the connection at the OTDR front panel and provides on-screen suggestions for corrective actions if the Front Panel connector is BAD or FAIR (see "Front Panel and First Connector Check" on page 37 for details).
	Off	Disables the OTDR Front Panel connection check.
First Connector Check	On	Enables OTDR to check the quality of the first connection at fiber under test and provides on-screen suggestions for corrective actions if the First Connector is BAD or FAIR (see "Front Panel and First Connector Check" on page 37 for details).
	Off	Disables the First Connector check.

Event Thresholds and Pass/Fail Thresholds are not used during real-time testing.

Event Settings

Event Setting menu is enabled either in Full Auto or Expert OTDR test mode.

From the **Full Auto**, **Expert, or Real-Time** test mode perform the following:
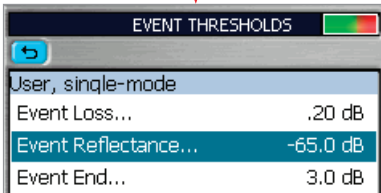
- Use Tab Keys ◀▶ to access the Event Settings page.
- Use ▲▼ arrows to highlight the desired parameter.

In Expert mode only: Auto is the default setting. Use ◀▶ arrows to toggle between the Auto or Off options.
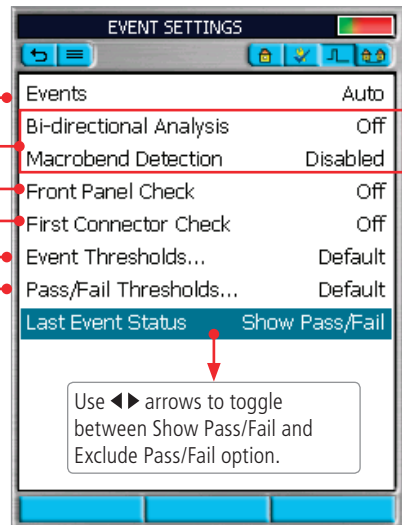
Expert and Full Auto modes only: Use ◀▶ arrows to toggle between the On/Enabled or Off/Disabled options.

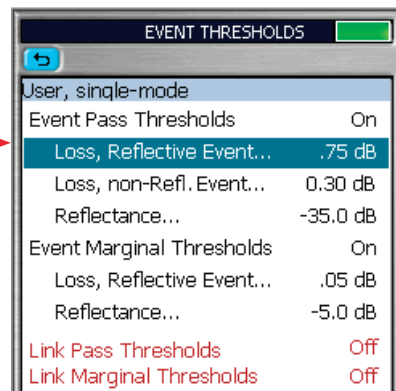Use ◀▶ arrows to toggle between the On/Enabled or Off/Disabled options.

EVENT SETTINGS	
Events	Auto
Bi-directional Analysis	Off
Macrobend Detection	Disabled
Front Panel Check	Off
First Connector Check	Off
Event Thresholds...	Default
Pass/Fail Thresholds...	Default
Last Event Status	Show Pass/Fail

In Expert mode only: Use ◀▶ arrows to select the Default or User option. If set to User, press ⦿ key to display editor submenu, which allows defining the Threshold parameters.

Use ◀▶ arrows to toggle between Show Pass/Fail and Exclude Pass/Fail option.

EVENT THRESHOLDS	
User, single-mode	
Event Loss...	.20 dB
Event Reflectance...	-65.0 dB
Event End...	3.0 dB

Use ◀▶ arrows to select the Default or User option. If set to User, press ⦿ key to display a submenu, which allows defining Event and Link Pass/Fail and Marginal Threshold values.

EVENT THRESHOLDS	
User, single-mode	
Event Pass Thresholds	On
Loss, Reflective Event...	.75 dB
Loss, non-Refl. Event...	0.30 dB
Reflectance...	-35.0 dB
Event Marginal Thresholds	On
Loss, Reflective Event...	.05 dB
Reflectance...	-5.0 dB
Link Pass Thresholds	Off
Link Marginal Thresholds	Off

Pass/Fail Thresholds

Set to Default

Set to User

Event Thresholds Chart

Threshold	Min Value (dB)	Default Value (dB)	Max Value (dB)
Event Loss	0.02	0.10	1.0
Event Reflectance	-65.0	-65.0	-35.0
Event End	1.0	3.0	25.0

Event Pass Thresholds

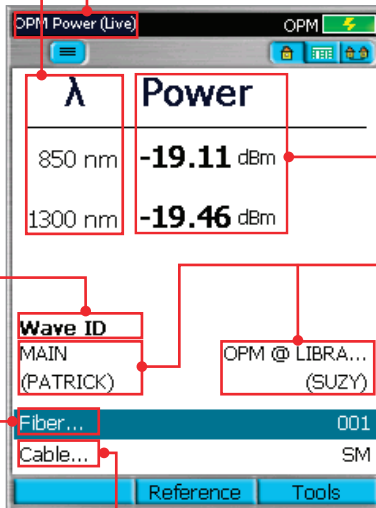| Threshold	Min Value (dB)	Default Value (dB)	Max Value (dB)
Event Pass Thresholds			
Loss, Reflective Event	0.05	0.75	3.00
Loss, Non-reflective Event	0.05	0.30	3.00
Reflectance: 1310, 1550,1625 nm	-65.0	-35.0	-20.0
Reflectance: 850, 1300 nm	-45.0	-22.0	-15.0
Event Marginal Thresholds			
Loss, Reflective Event	0.00	0.00	1.00
Reflectance	0.00	-5.00	-10.0
Link Pass Thresholds			
Loss: 850, 1300, 1310, 1550, 1625 nm	0.00	0.00	35.0
ORL: 850, 1300, 1310, 1550, 1625 nm	20.0	25.0	65.0
Link Marginal Thresholds			
Loss: 850, 1300, 1310, 1550, 1625 nm	0.00	0.00	5.00
ORL: 850, 1300, 1310, 1550, 1625 nm	0.00	0.00	10.0

OPM Test Settings

OPM Home Page Indicators

This field indicates mode: **Live or Saved.**

Displays the currently selected or detected wavelength(s).

This field displays the current OPM test mode:
Wave ID - receiving wavelength ID'd light.
Tone in Hz - receiving tone signal in Hz.

This field displays test readings:

Measured Insertion Loss values in dB or measured Power in dBm or mW.

If the power or loss is too high/low for the OPM to measure, High/Low label is displayed in place of the Loss or Power values.

Location and Operator ID are user set in the Job Settings Page.

OPM Power (Live) OPM

λ | Power
850 nm | **-19.11** dBm
1300 nm | **-19.46** dBm

Wave ID
MAIN
(PATRICK)

OPM @ LIBRA...
(SUZY)

Fiber... 001
Cable... SM

Reference | Tools

Fiber Number - user set
Use ⬍ arrows to select the Fiber parameter.
Use ◄► arrows to increment/decrement the Fiber number one number at a time.
Press ⬤ key to open a numerical editor, which allows entering a fiber number from 001 to 999.

Cable ID - user set
Use ⬍ arrows to select the Cable ID parameter.
Press ⬤ key to open the Results Manager, which allows the user to make changes to the Job Settings.

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Soft Keys/Touchscreen Icons
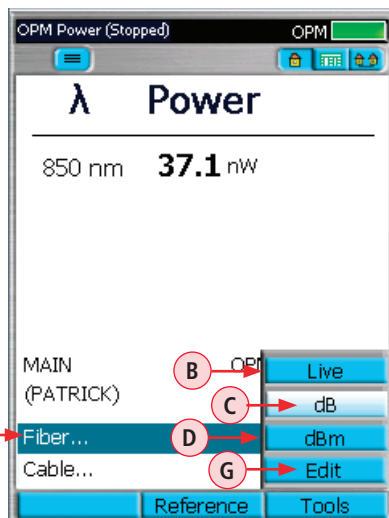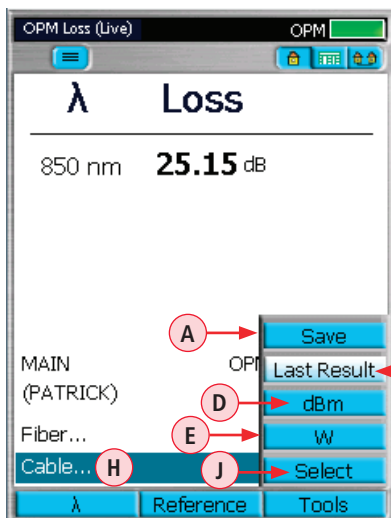
Note: The current function of each soft key is indicated by an icon or label on the Touchscreen. If you prefer using the Touchscreen, tap the appropriate icon or label.

Key	Icon	Function
Wavelength	λ	**In CW mode:** Press this key, and then use ⬍ arrows to select an available wavelength. **In Wave ID mode:** this soft key is not available, the detected wavelength(s) will be automatically displayed.
Reference	Set Ref View Ref Reference	Press the Reference key, and then use ⬍ arrows to select the following keys: **Set Ref** key to store the reference value(s) for the currently selected/detected wavelength(s) in Loss mode. **View Ref** key to display the saved Reference value(s).
Tools	Save Last Result dBm W Select Tools Edit	Press **Tools** to display a submenu. From the displayed submenu: • In Live mode: press **Save** (A) to store the currently displayed test results. • In Saved mode: press **Live** (B) to return to the Live test mode. • Press **dB** (C), **dBm** (D) or **W** (E) to select units of measure. Select dB to measure Loss. Select dBm or W to measure Power. • With the **Fiber** (F) selected, press **Edit** (G) to edit fiber number. • With the **Cable** (H) selected, press **Select** (J) to change cable. • Press **Last Result** (K) to display the last saved value(s).

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OLS Test Settings

OLS Home Page Indicators

- Use ⬍ arrows to select the desired OLS parameter as follows:

OLS Parameter	Options
Laser	On, Off
Mode	Wave ID, Tone(s) Hz, CW
Tone	270, 330, 1000, 2000 Hz (If Tone mode is enabled)
Wavelength	Depends on Mode selection and OTDR model: MM and/or SM selections

- With a parameter selected (highlighted), use ◄► arrows to select the desired option.

Mode Options:
Wave ID - transmitting wavelength ID'd light.
Tone in Hz - transmitting tone signal in Hz.
CW - transmitting continuous wave signal.

Depending on OTDR model, this icon indicates that either MM or SM light source laser is On.

If Tone mode is enabled, this field is active to select from the following options: 270, 330, 1000, 2000 Hz

Multimode OLS setup parameters and options.

Wavelength selection depends on Mode option, see table below for details

Single-mode OLS setup parameters and options.

	Multimode Laser		Single-mode Laser	
Mode	**Wavelength (nm)**	**Tone Frequency (Hz)**	**Wavelength (nm)**	**Tone Frequency (Hz)**
Wave ID	850, 1300, 850/1300	—	1310, 1550, 1310/1550	—
Tone(s) Hz	850, 1300	270, 330, 1000, 2000	1310, 1550	270, 330, 1000, 2000
CW	850, 1300	—	1310, 1550	—

Note: The light source can be kept on while user back to main menu for OPM operation.

Results Manager

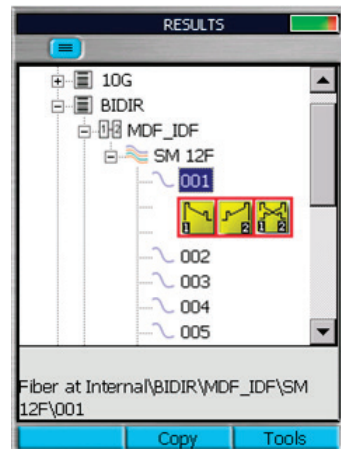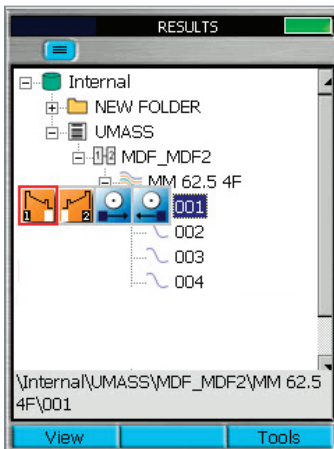## Results Manager Overview

Note: See section for a simplified means of creating new jobs. The Results Manager menu is accessed from the Main Menu by tapping the Results Touchscreen icon or pressing the Results soft key.

- Use the Results Manager to review results (or create jobs).

- Use the Tools menu within the Results Manager to Cut/Copy/Paste/Rename and copy test data from Internal drive to USB drive.

Test Results Icons Legend

Icon	Test Results Description
	OTDR test result of a single trace. Tested End 1 > End 2. Saved in .SOR file format. Results may include traces of one or more wavelengths as tested.
	OTDR test result of a single trace. Tested End 2 > End 1. Saved in .SOR file format. Results may include traces of one or more wavelengths as tested.
	Bi-directional results from both End 1 & End 2. Tested End 1 > End 2 and End2 > End 1. Saved in .SOR file format.
	OPM power and loss readings. Saved in .ATD file format.
	DFS fiber end-faces images. Saved in .JPG file format

Results Manager "File Tree" Structure

Test results are saved as files that are stored in Cable folders. Cable folders are organized into Route, Job, and Drive folders as shown below.

- Use ⬍ arrows to navigate up/down the list of folders and files.

- Use ◀▶ arrows to expand/contract the selected Drive/Folder/Job/Route/Cable.

- To open, navigate to the desired test result, and then press View (A) or Enter ⦿ key.

- Use the Tools (B) menu within the Results Manager to create or delete Jobs, Files, Folders and copy test data from Internal drive to USB drive.

Note: Folders 📁 are not required to store results.

In this example, fiber 001 contains both OTDR traces and fiber end-face images from both ends of the fiber.

DRIVE
FOLDER
JOB
ROUTE

CABLE
FIBER NUMBER

This field displays path/name of the selected file.

Press View to display selected test results.

Tools menus will vary depending on the selected level in the file tree structure as shown below.

Tools Menus in the File Tree Structure

ROUTE   JOB   FOLDER   DRIVE

CABLE

TEST RESULT

Results Manager

Tools Menu: Cut/Copy/Paste Features
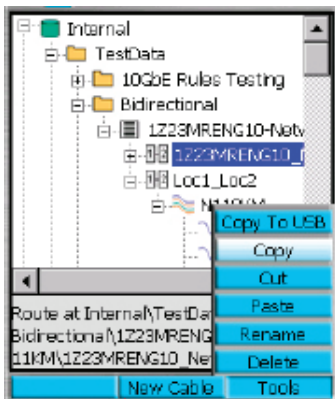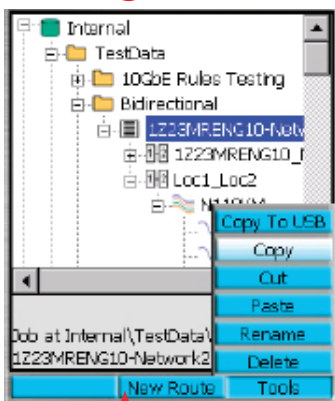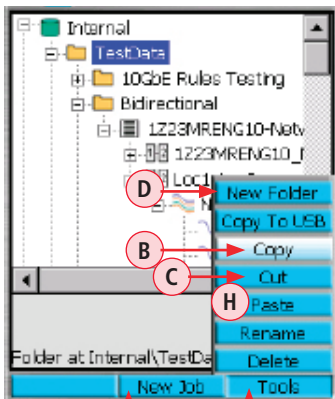
Tools Menu allows the user to manage stored test results. Using Copy/Cut/Paste features, stored test results can be moved to other locations on the OTDR Internal drive or to a USB drive.

To Copy/Cut and Paste Stored Test Results

Note: To copy the test data and place elsewhere (the original test data remains in its current location), choose the Copy feature.

To remove the selected test data from its current location and place it elsewhere, choose the Cut feature.

1. Navigate to the test result that you want to Copy or Cut.

2. Press the Tools key to display the Tools menu **A**.

3. Use ↕ arrows to highlight Copy **B** (Cut **C**).

4. Press the Enter ◉ key to copy the selected data.

5. Navigate to the destination location where you want to store the copy by doing one of the following:

   • Open the existing location (Drive/Folder/Job/Route/Cable).

   • Create new location if needed by using the

     – **New Folder** **D**

     – **New Job** **E**

     – **New Route** **F**

     – **New Cable** **G**

6. **Note:** The availability of these commands depends on the test result selection.

7. Press the Tools key to display the Tools menu **A**.
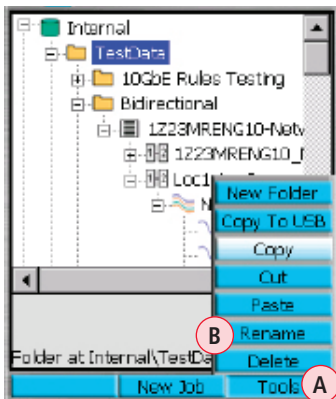
8. Use ↕ arrows to highlight Paste **H**.

9. Press the Enter ◉ key to paste the selected data.

10. The copy of the selected test data (if Copy feature used) or the original test data (if Cut feature used) is now stored in the new location.
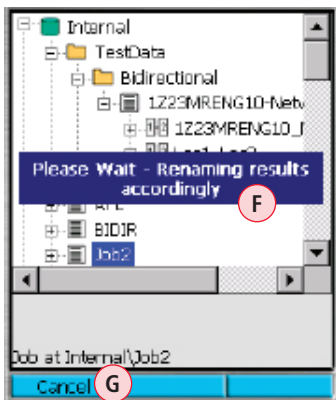
Results Manager

Tools Menu: Rename Feature

Rename feature allows the user to create new names or select from a list of the existing names. Rename task is done for one level at a time where all applicable files are updated.

To Rename Stored Test Results

1. Navigate to the test result that you want to Rename.

2. Press the Tools key to display the Tools menu (**A**).

3. Use ⬍ arrows to highlight Rename (**B**).

4. Press the Enter ⬤ key to open Text Editor (**C**).

5. Enter the new name (**D**). See "Text Editor" on page 65 for details.

6. When done, press OK (**E**).

7. OTRD will start the renaming task and display 'Please Wait' message (**F**).
   If needed, the renaming task may be cancelled by pressing Cancel (**G**).
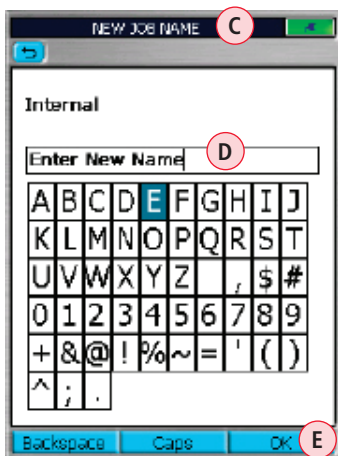
Results Manager

Note: See "New Job Creation" on page 15 for a simplified means of creating New Jobs.

1. From the Results Manager page, use ◄► arrows to highlight the desired Drive where test results will be saved.

2. Press the Tools soft key to display the Tools menu (Tools menus will vary depending on the selected level in the file tree structure as shown in "Tools Menus in the File Tree Structure" on page 28).

3. Use ▲▼ arrows to highlight the New Job option and press ◉ key to display the Text Editor (see "Text Editor" on page 65 for details on how to use it). Enter a name for the New Job. Press OK to return to the Results Manager page.

4. With the created New Job highlighted, press Tools > New Route. The Route page will be displayed.

5. Use ▲▼ arrows to highlight 'End 1...' or 'End 2...'.

6. Press Enter ◉ key to display the End Locations sub-page.

7. To create new End Location(s), press the New soft key. Using the displayed Text Editor, create new End name. Press OK.

8. Create as many End Names as needed for a Job and press ◉ key to return to the Route page.

9. From Route page, use ◄► arrows to select Ends for the Route. Press OK.

10. With the created Route highlighted, press Tools >New Cable.

11. Using the displayed Text Editor, enter a name for the new Cable. Press OK.
    If needed, create more Jobs, Routes, Cables.

12. With the Cable to be tested in the desired job selected, press Main Menu ⊜.

13. Select a Test mode to begin testing fibers in the selected Cable. Before pressing Test, verify test setup on the Job Settings page within the selected Test mode.
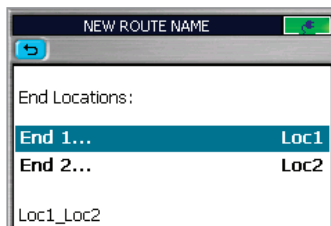
ROUTE PAGE
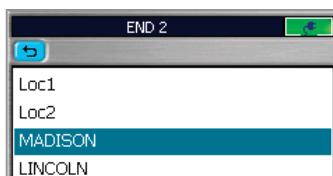
END LOCATIONS SUB-PAGE
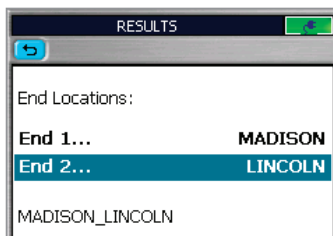
NEW ROUTE CREATED

Results Manager

Job Selection from the Results Manager

To select an existing job from the Results Manager utility:

1. Highlight the desired cable (**A**) in the Job/Route to be tested.

2. Press the Open soft key (**B**) to select.

3. The Main Menu (**C**) will be displayed.

4. Form the Main menu, select the desired test mode.

5. Job opens in the selected test mode with next fiber to be tested on the Home page and Job Settings page.

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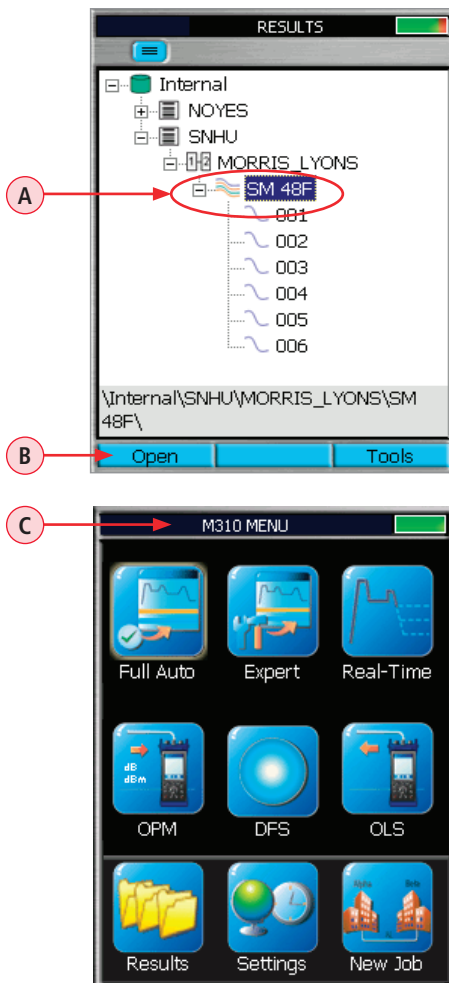
A Job is selected from the Job Settings page, which is accessed from each test mode. Within each test mode, use ⬅ ➡ tab keys to select [🔒🔒] tab and display the Job Settings page.

From the Job Settings page, use ⬍ arrows to highlight Cable...

Press ⬤ key to display the Results Manager page.

Use ◀▶ or ⬍ arrows to select the **Cable** within **Drive > Folder > Job > Route** you want to test and save results.

Press ⬤ key to return to the Job Settings page and verify Job Parameters, equipment Location, test Operators, and starting Fiber number information.

Use ◀▶ arrows to indicate your equipment location (End 1 or End 2).

Use ◀▶ arrows to increase/decrease fiber number, or press ⬤ key to display a numerical editor to set.

Press ⬤ key to display submenu to define Operators' IDs using Edit and New options.

JOB SETTINGS	
Drive...	Internal
Folder...	--
Job...	MCDOT
Cable...	MM12F62.5
End 1...	LYONS HALL
End 2...	MORRIS HALL
OTDR Located At	End 1
Fiber...	005
OTDR Operator...	SUZY
Second Operator...	PATRICK

Name Format (see screen above) as seen on a PC

Name Format – user set

Wavelength indicator- added automatically by OTDR as follows:

LYONS HALL-MORRIS HALL-SM4K_005_S15.sor

Route-CableID-Fiber_Wavelength.sor

.M85 for 850 nm
.M13 for 1300 nm
.S13 for 1310 nm
.S15 for 1550 nm

Fiber number - user set, will auto increment

Cable ID – user set

Route is made up of the two end names End 1 and End 2.
They are ordered in the file name such that the first end - End 1 is where the OTDR is located or the "Near end", followed by the other end - End 2 or the "Far end".

• Access Results Manager from the Main Menu by pressing the Results soft key.

Results soft key

• Use the ⬍ arrows to navigate up/down the list of folders/files.

• Use the ◂▸ arrows to expand/contract the selected Drive/Folder/Job/Route/Cable.

• Navigate to the desired result (A).

• Press View (B) or ⦿ key to open

In this example, 001 is a fiber with OTDR traces from both ends and Loss result(s)

This field displays path and name of the selected file
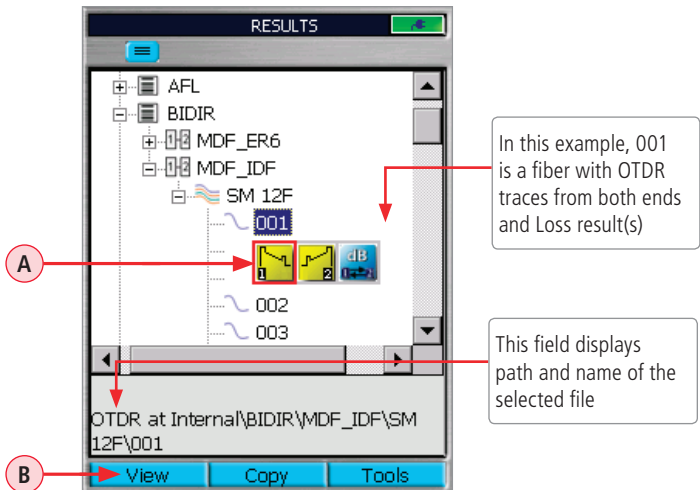
OTDR Testing

Running OTDR Tests

Press ✅ to start or stop an OTDR Test.

The OTDR page header will change to display test progress and the displayed test results status.

Initializing (A) header is displayed when the test started with the Front Panel Check/First Connector Check features enabled. The header field will turn Red.
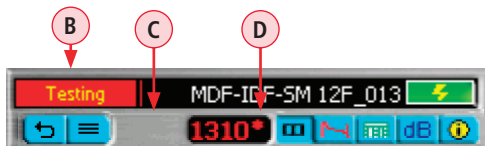
Starting Test header followed by **Testing** (B) is displayed at the beginning of an OTDR test. The header field will turn Red.

The Yellow Laser icon (C) will be displayed while the OTDR laser is on.

For multiple wavelength tests, the active wavelength is followed by an asterisk (D) during testing and when reviewing completed tests.

Stopping header will be displayed while stopping a test and will be followed by **Stopped** (E).

Not Saved (F) header indicates:

• Test is done and trace(s) are new.

• Saved trace(s) that have been edited since they were opened and edits are not saved.

Unchanged (G) header indicates that opened trace is saved and no edits have been made after opening.

Saved (H) header is displayed after test is saved.

OTDR Testing

How to Perform an OTDR Test

- Press Menu ☰ to display the Main Menu.
- Select desired test mode (Full Auto, Expert or Real-Time).
- Review settings using the tab ◀▶ keys.

Home Screen
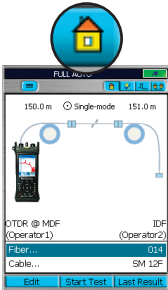
Test Settings
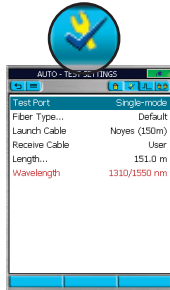
Event Settings
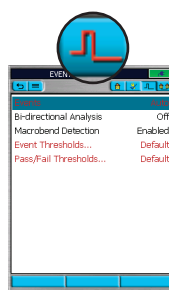
Job Settings
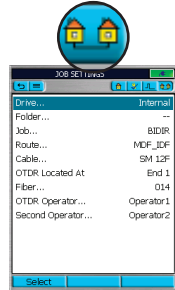
- If needed, change settings using ⊙ keys.
- Press Test ✓ to start a test
- When test is done, use the tab ◀▶ keys to view the results. See section "OTDR Test Results Viewer" on page 42 for details.

LinkMap
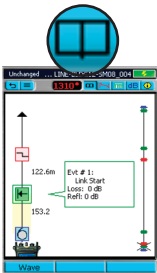
Trace View
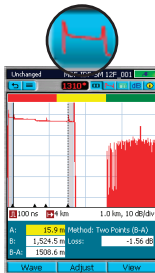
Event Table

Summary

Info
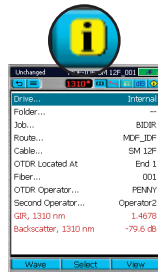
- To change any Job settings, go back to New Job and edit if you want to apply to the entire Job. Adjustments made on the Job Settings page will only apply to current unsaved trace(s).
- To save results press Save 🗁.

How to Save an OTDR Test

Save

After completing a test, press the Save 🗁 key to save file in current folder with name established in the setup process.

Save-As

To change the folder, job name, or other parameter after a test has been completed, go to the Job Information page 🛈 and make the changes. **Changes only apply to the current test!**

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OTDR Testing

Front Panel and First Connector Check

The Front Panel and First Connector Check features are available in all OTDR test modes and enabled in the Events Setting Menu (see "Event Settings" on page 19 for details). When enabled, these features provide an indication of the quality of the connections at the OTDR front panel and connection between the launch cable and the fiber under test allowing the user to minimize capturing poor test results.

To perform the Front Panel and First Connector Check:

• From the Event Setting menu, enable the Front Panel and First Connector Check feature.

• Press ✓ to start testing.

• If the OTDR detects poor quality connections (BAD or FAIR), suggestions for corrective actions is displayed as shown below.

Suggestions for corrective actions.

Pressing OK will allow the user to continue testing. After test is complete, Trace screen will display test results and FP (Front Panel) / FC (First Connector) check results indicated by FP or FC in the color grading bar **A**.
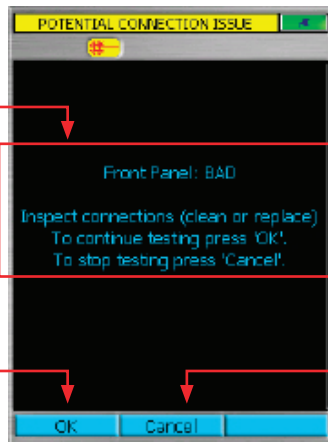
Pressing Cancel will stop testing.

POTENTIAL CONNECTION ISSUE

Front Panel: BAD

Inspect connections (clean or replace)
To continue testing press 'OK'.
To stop testing press 'Cancel'.

OK   Cancel
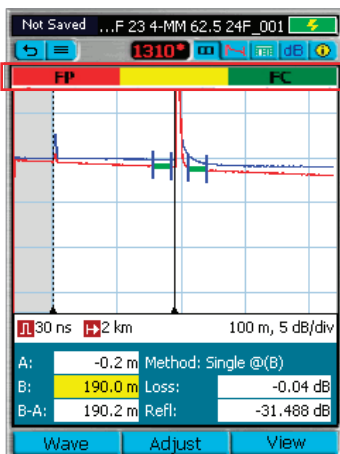
If the Front Panel/First Connector Check feature is enabled, the color grading bar is displayed to indicate quality of the connections at the OTDR front panel and the fiber under test.
In this example:
FP (Front Panel) indicator is shown in the RED color block - this indicates that the connection at the Front Panel is BAD.
FC (First Connector) indicator is shown in the GREEN color block - this indicates that First Connector condition is GOOD.

Not Saved ...F 23 4-MM 62.5 24F_001

FP   FC

A: -0.2 m Method: Single @(B)
B: 190.0 m Loss: -0.04 dB
B-A: 190.2 m Refl: -31.488 dB

Wave   Adjust   View

30 ns 2 km   100 m, 5 dB/div

BAD   FAIR   GOOD   Color Grading Bar Legend.

OTDR Test Results Viewer

Navigate using ◄ ► keys to display the desired OTDR Test Results Viewer Page.

Page icon	Page name	Description
	LinkMap Page	Provides icon-based display of link events. Shows trace summary and event details are all in one screen
	Trace page	Displays OTDR trace(s), Test Settings (Range and Pulse Width) and graph scale (dB/dv), A/B cursor data, Loss Method, Loss, Reflectance (if applicable).
	Event Table	Displays OTDR trace(s) and event data as follows: Pass/Fail (if turned On), Type, Location, Reflectance (dB), Loss (dB).
	Summary page	Displays OTDR trace(s), Test Settings (Range and Pulse Width) and graph scale (dB/dv), A/B cursor data, Loss Method, Loss, Reflectance (if applicable),
	Job Information page	Shows setup parameters of the currently displayed trace.

OTDR Test Results Viewer

LinkMap Viewer Features

Ref	Feature	Description
1	Test status	Displays test status labels as follows: • **Testing** - indicates test in progress • **Stopped** - test is interrupted • **Not Saved** - the displayed test results are not saved • **Saved** - the displayed test results are saved
2	File name field	Displays file name of the currently displayed trace.
3	Battery indicator	Displays estimated battery status as follows: Green - fully charged Red - discharged Charging - AC connected Fully Charged - AC connected
4	Results Viewer tabs	Select a tab to display the corresponding View.
5	Wavelength field	Displays test wavelengths of the currently displayed trace. For the dual-wavelength test, press the Wave soft key to toggle between test results. **Note**: the currently selected wavelength is marked with an [*].
6	Overall trace view	This is an overall trace view proportion to length; shows Link map with proportionally spaced events

LinkMap Viewer Features

Ref	Feature	Description
7	Event icon	Event icons may be green (pass), red (fail), or blue (Information only, not evaluated for Pass/Fail). Pass/Fail is based on event loss and reflectance thresholds configured by the currently selected Pass/Fail Event Thresholds Same color as event pass/fail status.
8	Currently selected event	To select the desired event either touch it with stylus or use ⬍ arrows to highlight it. **Note**: selected event is also indicated on overall trace view **8A**.
9	Details of the currently selected event	Displays Event Information of the currently selected event as follows: • Event type • Event location • Event detailed information
10	Distance between two events	Displayed in user-selected units of measure.
11		Arrow means more events; touch to move to next or previous event
12	Wave soft key	For the dual-wavelength test, press the Wave soft key to toggle between test results.

OTDR Test Results Viewer

Event Icons and Types

Event Icon	Event Type
	Reflective event (i.e. connector) Pass
	Reflective event (i.e. connector) Fail
	Reflective event (information only, not evaluated)
	Closely spaced event Pass
	Closely spaced event Fail
	Closely spaced (information only, not evaluated)
	Macrobend Pass
	Macrobend Fail
	Macrobend (information only, not evaluated)
	Link Start Pass
	Link Start Fail
	Link End Pass
	Link End Fail
	Link End (Information only)
	Non-reflective event (i.e. splice) Pass
	Non-reflective event (i.e. splice) Fail
	Non-reflective event (i.e. splice) (information only, not evaluated)
	Gainer Pass
	Gainer Fail
	Gainer (information only, not evaluated)
	Launch cable
	Receive cable
	Arrows (indicating more events)

Trace Viewer Features

Ref	Feature	Description
1	Trace	This is a graph of insertion loss vs. distance. The vertical axis shows loss in dB. The horizontal axis shows distance in user-selected distance units.
2	LSA adjust lines	Available for LSA Loss Methods, not Two Point measurements.
3	Cursors	Used to measure loss and distance. • Press the ● key to toggle between the A and B cursors. • Use the ◄► arrows to move the active cursor left/right. • Use the ▲▼ arrows to jump the active cursor to the next or previous event location. • When cursors cross, the left cursor will become A and the right cursor will become B. • Zooming is centered around the active cursor. • The active cursor is shown as a solid line. • The inactive cursor is shown as a dashed line.
4	Test settings data field	This field displays various test settings data as follows: distance • dB per division • ⊓ pulse width setting • ➡ Range value.
5	Soft function key labels	Soft function keys are located on the front panel. The label shown on the display above each key indicates the current use of each function key.
6	Test results field	This field displays various test results as follows: Loss Method, A and B cursor location, distance from A to B in user-selected distance units, measured loss and reflectance, and event data.

OTDR Test Results Viewer

Trace Viewer Features

Ref	Feature	Description
7	Test status	Displays test status labels as follows: • **Testing** - indicates test in progress • **Stopped** - test is interrupted • **Not Saved** - the displayed test results are not saved • **Saved** - the displayed test results are saved
8	Wavelength field	Displays test wavelengths of the currently displayed trace. For the dual-wavelength test, press the Wave soft key to toggle between test results. **Note**: the currently selected wavelength is marked with an [*].
9	File name field	Displays file name of the currently displayed trace.
10	Battery indicator	Displays estimated battery status as follows: Green - fully charged Red - discharged Charging - AC connected Fully Charged - AC connected
11	Results Viewer tabs	Select a tab to display the corresponding View.

OTDR Test Results Viewer

Soft Keys Definitions and Functions
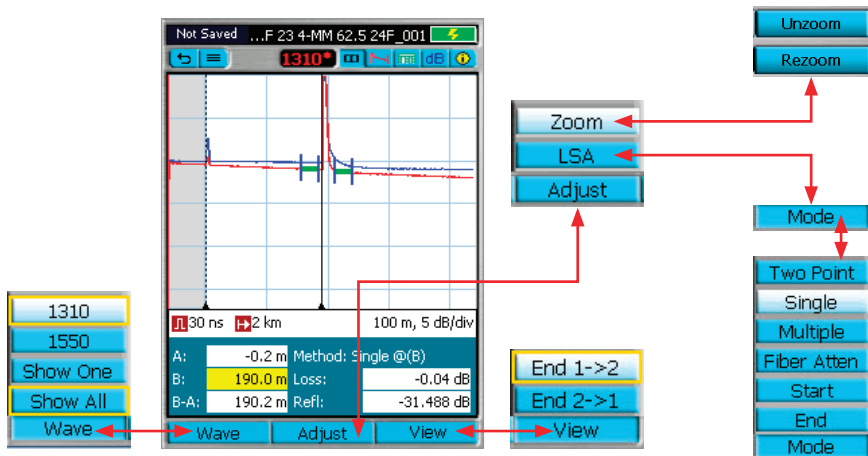
Soft Key	Description and function
1310 **1550** **Show One** **Show All** **Wave**	For the dual-wavelength test, press this key to toggle between the test results. For details, see section titled "Wavelength Selection Menu In OTDR Pages" on page 45.
Adjust	Press this key to display Zoom/LSA sub-menu [Zoom / LSA]
Zoom **Unzoom** **Rezoom**	Zoom magnifies the trace centered on the active cursor. • Press this key to display the Zoom Adjust view. • Use ⬍ arrows to adjust the Vertical zoom level. • Use ◄► arrows to adjust the Horizontal zoom level. • When done, press OK to return to the Trace window. • Press Unzoom to display trace at the original magnification level. The soft key label changes to Rezoom. • Press Rezoom to return to the previously set magnification level. The soft key label changes to Unzoom.
LSA **Mode** **Cursor** **Add Event**	Press the LSA key to display the LSA Adjust view. While in the LSA Adjust screen: • Press Mode to display the Loss Method Menu. Use ⬍ arrows to select the desired Loss Method as follows: Two Point (non-LSA), Single, Multiple, Fiber Attenuation, Start, End. • Press Cursor to toggle cursors. • Press Add Event to add an event (not available in 'Two Point' test mode).
End 1->2 **End 2->1** **View**	Press the View key to select the active trace direction. If the user has performed an OTDR test for both directions on a fiber then they can toggle between views of the trace from End 1 to End 2 and End 2 to End 1.

OTDR Test Results Viewer

Wavelength Selection Menu In OTDR Pages

Screen #1   **Screen #2**
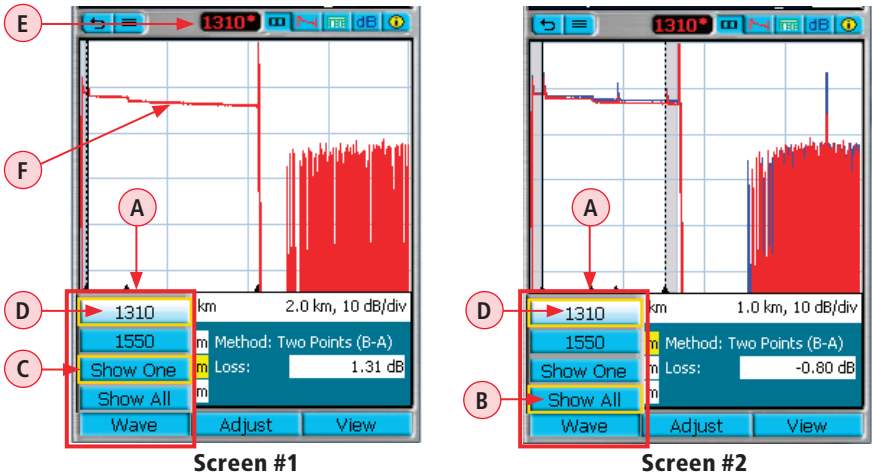
The Wave menu (A) is accessed by pressing the Wave key. This menu serves two purposes:

- Allows the user to select the active wavelength.

- Allows the user to select whether or not to show one or all wavelengths traces.

Note: Since two independent selections are accessed through the Wave menu, the selected two menu items will be indicated by Yellow rectangle border.

To enable/disable multi or single trace display:

- Use ⬍ arrows to select the desired display option as follows:

  – Select Show All option (B) to display multiple wavelength traces with the currently selected wavelength trace on top.
    Note: the selected option will indicated by the Yellow rectangle border.

  – Select Show One option (C) to display a single wavelength trace at the indicated wavelength. **Note:** the selected option will indicated by the Yellow rectangle border.

- Press ⬤ key to confirm selection and exit the Wavelength Selection menu.

To select the active wavelength:

- Use ⬍ arrows to select from the available wavelengths.

- Press ⬤ key to confirm selection and exit the Wavelength Selection menu.

As shown in the example screens above:

  – **Screen #1 and #2:** The 1310 is the currently selected wavelength (D);
    it is highlighted and indicated by the Yellow border.

  – **Screen #1 and #2:** The 1310* label (E) is displayed in the top menu bar to indicate that the currently selected wavelength is 1310 nm.

  – **Screen #1:** The Show One option (C) is selected, the 1310 trace (F) is displayed as a single trace in the trace image window.

  – **Screen #2:** The Show All option (B) is selected; both traces (1310 and 1550, with 1310 displayed on top) are shown in the trace image window. The cursor and loss information shown are for the active wavelength.

OTDR Test Results Viewer

View Results in Trace Page

1. Press Wave to display the Wave menu (**A**) and select the desired wavelength to be displayed (see "Wavelength Selection Menu In OTDR Pages" on page 45 for details).

2. Press View to display the View menu (**B**).

3. Use ⬍ arrows to select the desired option (Available when the fiber has been tested in both directions. If the fiber has only been tested in one direction one option will be shown greyed out.):

   – End 1 -> 2 to display the trace taken from End 1.

   – End 2 -> 1 to display the trace taken from End 2.

4. Press ◉ key to confirm selection and exit View menu.

5. Notice that the file name in top bar changes to indicate the selected direction (**C**).

6. If needed, use the Adjust menu (**D**) to perform the following operations:

   – (**E**) Zoom in/out (see "Soft Keys Definitions and Functions" on page 44 for details).

   – (**F**) Set-up/adjust LSA lines (see "Soft Keys Definitions and Functions" on page 44).

OTDR Test Results Viewer

View Results in Event Table

Event Table and Summary Results are generated together.

To generate the Event Table and Summary Results, set Mode to Full Auto or set Mode to Expert and Events (Event Settings) to Auto.
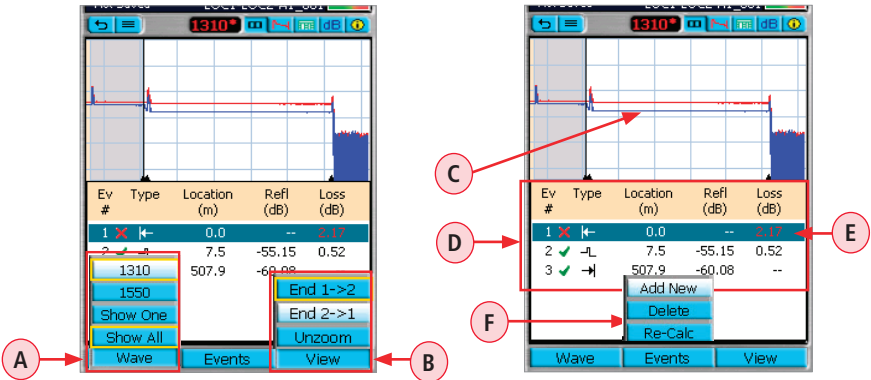
To View test results in the Event Table:

1. Press Wave to display the Wave menu **(A)** and select the desired wavelength to be displayed (see "Wavelength Selection Menu In OTDR Pages" on page 45 for details).

2. Press View to display the View menu **(B)**.

3. Use ⬍ arrows to select the desired option (Available when the fiber has been tested in both directions. If the fiber has only been tested in one direction one option will be shown greyed out.):

   – End 1 -> 2 to display the trace taken from End 1.

   – End 2 -> 1 to display the trace taken from End 2.

4. Press ⦿ key to confirm selection and exit View menu.

5. The Event Table page will display Trace Graph **(C)** and Event Table **(D)** for the selected test.

6. Use ⬍ arrows to highlight an event in the Event Table **(E)**.

7. You may use ◀▶ arrows to zoom in horizontally around the active cursor.

8. You may press ⦿ key to zoom in and measure the selected event on the Trace page.

9. If needed, display the Events menu **(F)** that allows users to add, delete, and re-calculate events. See "Re-Calculate Events" on page 48 for details.

Event Table Data

Ref.	Description
1	Event Number
2	Status field: ✔ - Pass, ✗ - Fail, i - Information only
3	Event Type
4	Event Location
5	Reflectance (dB)
6	Loss (dB)

OTDR Test Results Viewer

Event Icons and Types

Event Icon	Event Type
	Start of Fiber Under Test
	End of Fiber Under Test
	Reflective Event
	Non-Reflective Event

Event Icon	Event Type
	Gainer
	Multiple Event
	Macrobend

Re-Calculate Events

1. From the Event Table or Summary Results page, press Events to display the Events menu **A**.

2. Use ♦ arrows to select the Re-Calc option **B**.

3. Press ⦿ key to confirm selection.

4. The RECALCULATING TRACES page **C** will be displayed.

5. Use ♦ arrows to highlight the desired parameter to be changed.

6. Make changes as needed (see screen **C** below).

7. When done, press OK to re-calculate and return to the Event Table.
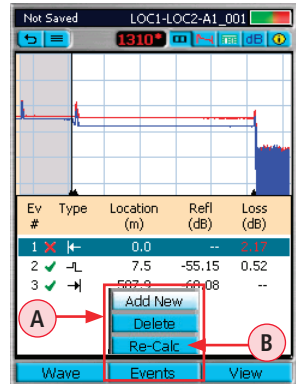
Use ◄► arrows to select Fiber Type. If set to User, press ⦿ key to display submenu, which allows defining the GIR and Backscatter parameters.

See "Event Settings" on page 19 for details.

Use ◄► arrows to select the Launch / Receive Cable option. If set to User, define Length.

Press ⦿ key to display submenu, which allows setting the Length of the Launch / Receive Cable used.
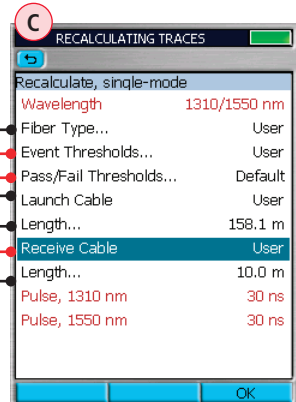
OTDR Test Results Viewer

View Results in Summary Page

1. Press Wave to display the Wave menu (**A**) and select the desired wavelength to be displayed (see "Wavelength Selection Menu In OTDR Pages" on page 45 for details).

2. Press View to display the View menu (**B**).

3. Use ⬍ arrows to select the desired option (Available when the fiber has been tested in both directions. If the fiber has only been tested in one direction, one option will be shown greyed out.):

   – End 1 -> 2 to display the trace taken from End 1.

   – End 2 -> 1 to display the trace taken from End 2.

4. Press ⬤ key to confirm selection and exit View menu.

5. The Summary page will display the Trace Graph (**C**) and Summary Table (**D**) for the selected test.

   – If needed, switch between two column sets views, Loss Cols and Max Cols, to see the complete analysis for the selected test.

   – If needed, press the Re-Calc (**E**) key that allows to re-calculate events (see "Re-Calculate Events" on page 48 for details).
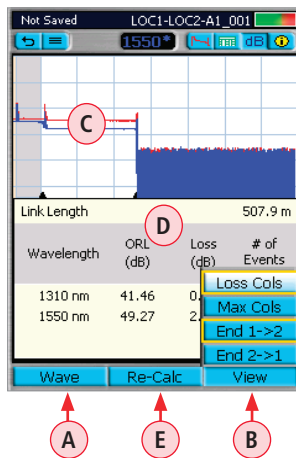
OTDR Test Results Viewer

How to Switch Test Data Column Sets in Summary Page

1. From the displayed View menu (**A**), use ⬍ arrows to select the desired option:

    • Loss Cols to display the following data:

       – Link ORL, Link Loss, Number of Events.

    • Max Cols to display the following data:

       – Max Splice Loss, Max Connector Loss, Max Reflectance.

2. Press ⬤ key to confirm selection and exit View menu.

3. The Summary Page page will display results for the selected Column Set (shown below).
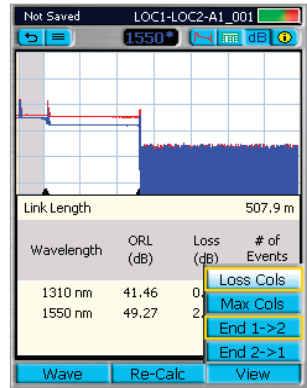
Column Set - "Loss Cols"

Ref.	Description
1	This row displays Link Length
2	Link ORL (dB) (SM only)
3	Link Loss (dB)
4	Number of Events

Column Set - "Max Cols"

Ref.	Description
1	This row displays Link Length
2	Status field ✔ - Pass ✗ - Fail i - Information only
3	Max Splice Loss (dB)
4	Max Connector Loss (dB)
5	Max Reflectance (dB)

1. Select Full Auto mode.

2. Clean and Connect launch cable.

3. Select Test Port: SM or MM.

4. Select Fiber Type.

5. Select Launch Cable: AFL (1 km), AFL (500 m), AFL (150 m), None, User.

6. In General Settings: Set Distance Units: m, ft, kft, km, mi.

7. Press Test key ✓ .

Trace displaying Fault

Expected trace

Launch Cable

Break
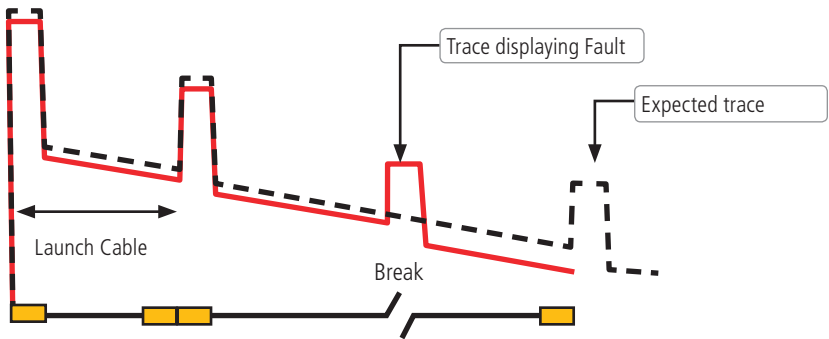
Two Point A/B Measurement

Measuring Loss on an OTDR Trace

An OTDR trace shows relative power vs. distance. The insertion loss (IL) between any two points (A to B) on the optical fiber link under test equals the trace level at A minus the trace level at B.

To measure the end-to-end loss of a link, use a launch and receive cable and put the [A] cursor before the first event in the link and the [B] cursor just after the tail of the last event.

1. Position the left cursor [A] at the start of the event.

2. Position the right cursor [B] beyond the event where the trace returns to a constant slope.

3. Read the insertion loss (Loss: in dB) measurement.

IL

A   B
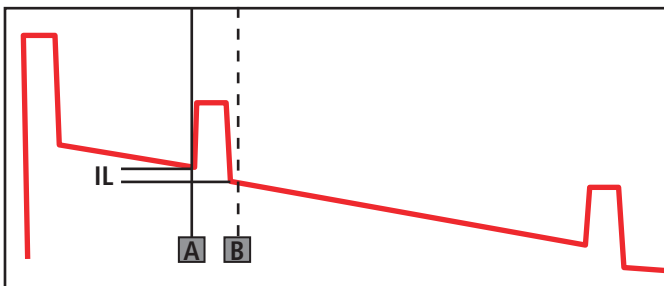
Shows IL of an event

Bi-directional Analysis Operation

Test the Complete Cable in One Direction

Applies only for M310 with the licensed Advanced Analysis software option installed

Enable Bi-directional Analysis Feature (see for details).
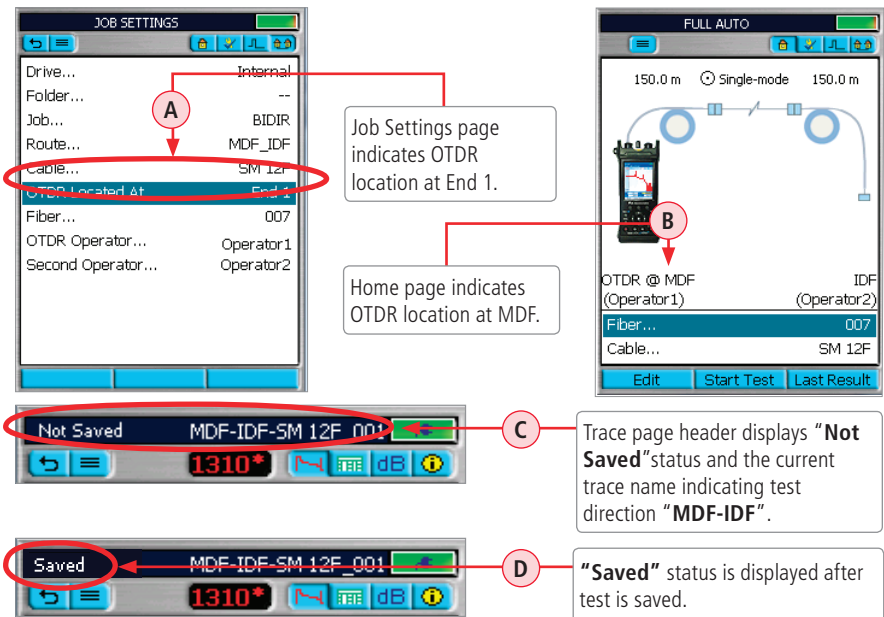
In the example screens below:

   – End 1 location is named 'MDF';

   – End 2 location is named 'IDF'

   – Route name is 'MDF_IDF'

1. Test the complete cable from the first end at one or more wavelengths as needed.
    Test from End 1:

    • Connect OTDR to a cable to be tested at End 1.

    • In the Job Setting page, set the 'OTDR Located At' parameter to End 1 **(A)**.

    • Notice that Home page indicates OTDR location at MDF **(B)**.

    • Test each fiber (1 to X fibers) at End 1.

    • Notice that the Trace page header displays "Not Saved" status and the currently tested fiber name "MDF-IDF-SM 12F_001" **(C)** indicating test direction "MDF-IDF".

    • Press the Save 🖿 key to save the currently displayed test result.
      Note: Save each fiber test result before proceeding to the next fiber number.

    • Notice that the Trace page header changes to display "Saved" **(D)**.

Important: Save End 1 and End 2 test results in the same fiber file.

Job Settings page indicates OTDR location at End 1.

Home page indicates OTDR location at MDF.

Trace page header displays "**Not Saved**"status and the current trace name indicating test direction "**MDF-IDF**".

"**Saved**" status is displayed after test is saved.

Bi-directional Analysis Operation

Test the Complete Cable in Opposite Direction

1. Once all fibers are tested in the first direction (End 1, MDF location), move the OTDR to the other end (End 2, IDF location).

2. At the second end make the following adjustments:

   • Connect the OTDR to a fiber to be tested from End 2.

   • On the Job Settings page, set 'OTDR Located At' parameter to End 2 **(E)**.

   • Test each fiber from End 2.

   • Notice that the Trace page header displays "Not Saved" status and the currently tested fiber name "IDF-MDF-SM 12F_001" **(F)** indicating opposite test direction "IDF-MDF".

   • Press the Save ⊟ key to save the currently displayed test result.
   Note: Save each fiber test result before proceeding to the next fiber number.

   • Notice that page header changes to display "Saved" **(G)**.

Important: Save End 1 and End 2 test results in the same fiber file.
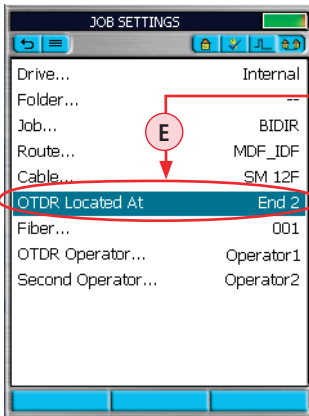
Job Settings page indicates OTDR location at End 2.

Home page indicates OTDR location at IDF.
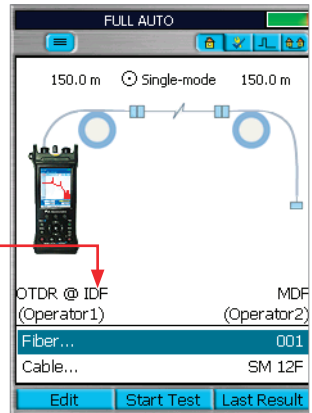
F — Trace page header displays "**Not Saved**" status and the current trace name indicating opposite test direction "**IDF-MDF**".

D — **"Saved"** header is displayed after test is saved.

Bi-directional Analysis Operation

View Results in Trace Page

1. Press Wave to display the Wave menu (A) and select the desired wavelength to be displayed (see "Wavelength Selection Menu In OTDR Pages" on page 45 for details).

2. Press View to display the View menu (B).

3. Use ⬍ arrows to select the desired option (Available when the fiber has been tested in both directions. If the fiber has only been tested in one direction one option will be shown greyed out.):

   – End 1 -> 2 to display the trace taken from End 1.

   – End 2 -> 1 to display the trace taken from End 2.

4. Press ⏺ key to confirm selection and exit View menu.

5. Notice that the file name in top bar changes to indicate the selected direction (C).

6. If needed, use the Adjust menu (D) to perform the following operations:

   – (E) Zoom in/out (see "Soft Keys Definitions and Functions" on page 44 for details).

   – (F) Set-up/adjust LSA lines (see "Soft Keys Definitions and Functions" on page 44).

Bi-directional Analysis Operation

View Results in Event Table: Single Direction View

1. Press Wave to display the Wave menu (**A**) and select the desired wavelength to be displayed (see "Wavelength Selection Menu In OTDR Pages" on page 45 for details).

2. Press View to display the View menu (**B**).

3. Use ⬍ arrows to select the desired option:

    – Single 1 -> 2 to display the Event Table and Trace taken from End 1.

    – Single 2 -> 1 to display the Event Table and Trace taken from End 2.

4. Press ⦿ key to confirm selection and exit View menu.

5. The Event Table page will display test results for the selected single direction test as follows:

    – Trace Graph (**C**)

    – Event Table (**D**)

6. Use ⬍ arrows to highlight an event in the Event Table (**E**).

7. You may use ◀▶ arrows to zoom in horizontally around the active cursor.

8. You may press ⦿ key to zoom in and measure the selected event on the Trace page.

9. If needed, Display the Events menu that allows to add, delete, and re-calculate events (**F**) (see "Re-Calculate Events" on page 48 for details).

Single Direction Event Table Data

For Event Icons legend, see "Event Icons and Types" on page 48.

Ref.	Description
1	Event # in both directions
2	Status field: ✓ - Pass, ✗ - Fail, ▮ - Information only
3	Event Type
4	Event Location
5	Reflectance (dB)
6	Loss (dB)

Bi-directional Analysis Operation
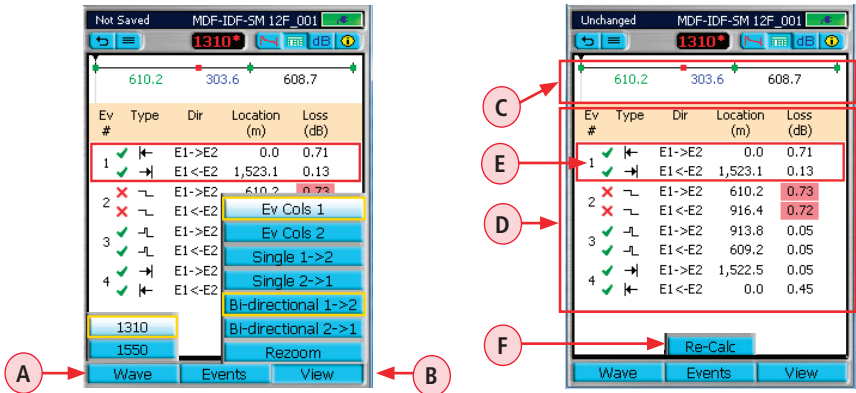
1. Press Wave to display the Wave menu (**A**) and select the desired wavelength to be displayed (see "Wavelength Selection Menu In OTDR Pages" on page 45 for details).

2. Press View to display the View menu (**B**).

3. Use ⬍ arrows to select the desired option:

   – Bi-directional 1 -> 2 to display the Event Table and Event Map taken from End 1.

   – Bi-directional 2 -> 1 to display the Event Table and Event Map taken from End 2.

4. Press ⬤ key to confirm selection and exit View menu.

5. The Event Table page will display test results for the selected bi-directional test as follows:

   – Event Map (**C**).

   – Event Table (**D**).

6. Use ⬍ arrows to highlight the desired event in the Event Table (**E**).

   – See test data shown from both Ends. For Event Icons legend, see "Event Icons and Types" on page 48.

or

   – If needed, switch between two column sets views, Ev Cols 1 and Ev Cols 2, to see the complete analysis for the selected bi-directional test.
     See "How to Switch Column Sets in Event Table (Bi-directional View)" on page 58 for details.

Bi-directional Analysis Operation

How to Switch Column Sets in Event Table (Bi-directional View)
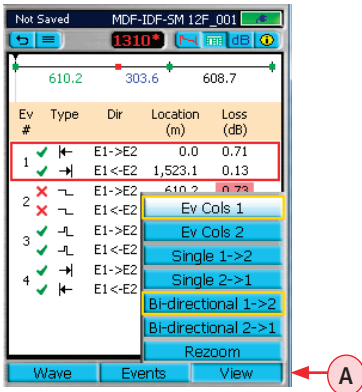
1. Press View to display the View menu **A**.

2. Use ⬍ arrows to select the desired option:

   – Ev Cols 1 -> 2 to display the column set # 1, which includes Event Location and Loss data.

   – Ev Cols 2 -> 1 to display the column set # 2, which includes Average Loss and Cumulative Loss data.

3. Press ⦿ key to confirm selection and exit View menu.

4. The Event Table page will display test results for the selected Column Set option as shown below.

Column Set - "Ev Cols 1"

Bidirectional Event table shows the following data

Ref.	Description
1	Event # in both directions
2	Status field: ✓ - Pass, ✗ - Fail, ⓘ - Information only
3	Event Type
4	Direction of trace
5	Event Location
6	Loss (dB)

Column Set - "Ev Cols 2"

Bidirectional Event table shows the following data

Ref.	Description
1	Event # in both directions
2	Status field: ✓ - Pass, ✗ - Fail, ⓘ - Information only
3	Event Type
4	Direction of trace
5	Average Loss (dB)
6	Cumulative Loss (dB)

Bi-directional Analysis Operation

View Results in Summary Page: Single Direction View

1. Press Wave to display the Wave menu (**A**) and select the desired wavelength to be displayed (see "Wavelength Selection Menu In OTDR Pages" on page 45 for details).

2. Press View to display the View menu (**B**).

3. Use ⬍ arrows to select the desired option:

   – Single 1 -> 2 to display Summary data and Trace taken from End 1 (single direction).

   – Single 2 -> 1 to display Summary data and Trace taken from End 2 (single direction).

4. Press ◉ key to confirm selection and exit View menu.

5. The Summary page will display the Trace Graph (**C**) and Summary Table (**D**) for the selected test.

   – If needed, switch between two column sets views, Loss Cols and Max Cols, to see the complete analysis for the selected test. See "How to Switch Column Sets in Summary Page (Single Direction View)" on page 60 for details.

   – If needed, press the Re-Calc (**E**) key that allows to re-calculate events (see "Re-Calculate Events" on page 48 for details).
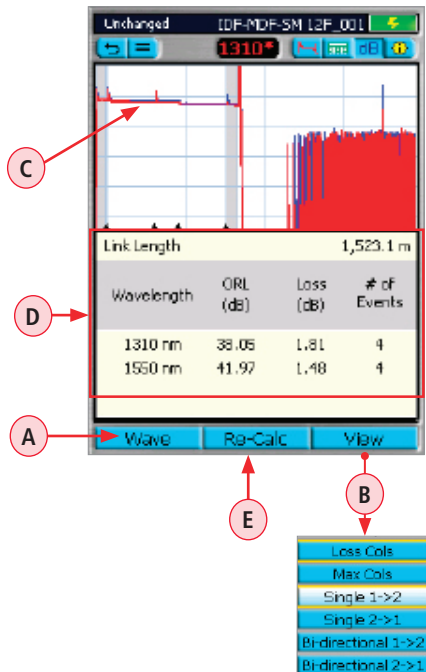
How to Switch Column Sets in Summary Page (Single Direction View)
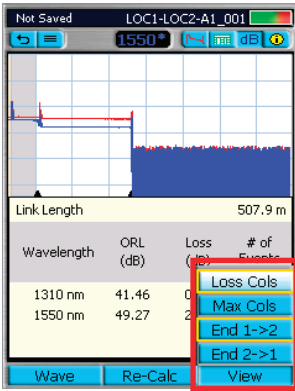
1. Press View to display the View menu (A).

2. Use ⬍ arrows to select the desired option:

   • Loss Cols to display the column set # 1, which includes the following data:

     – Link ORL

     – Link Loss

     – Number of Events

   • Max Cols to display the column set # 2, which includes the following data:

     – Max Splice Loss

     – Max Connector Loss

     – Max Reflectance

3. Press ⏺ key to confirm selection and exit View menu.

4. The Summary page will display test results for the selected Column Set option as shown below.

Column Set - "Loss Cols"

Ref.	Description
1	This row displays Link Length
2	Link ORL (dB)
3	Link Loss (dB)
4	Number of Events

Column Set - "Max Cols"

Ref.	Description
1	This row displays Link Length
2	Status field: ✓ - Pass, ✗ - Fail, ℹ - Information only
4	Max Connector Loss (dB)
5	Max Reflectance (dB)

Bi-directional Analysis Operation

View Results in Summary Page: Bi-directional View
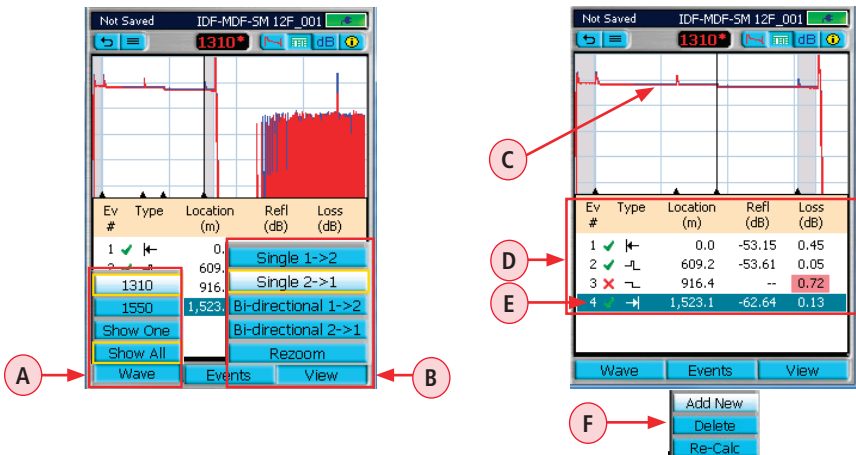
1. Press Wave to display the Wave menu (A) and select the desired wavelength to be displayed (see "Wavelength Selection Menu In OTDR Pages" on page 45 for details).

2. Press View to display the View menu (B).

3. Use ⬍ arrows to select the desired option:

   – Bi-directional 1 -> 2 to display Summary data and Trace taken from End 1

   – Bi-directional 2 -> 1 to display Summary data and Trace taken from End 2

4. Press ⦿ key to confirm selection.

5. The Summary page will display test results for the selected options.

6. The Summary page will display the Trace Graph (C) and Summary Table (D) for the selected test.

   – If needed, switch between two column sets views, Loss Cols and Max Cols, to see the complete analysis for the selected test. See "How to Switch Column Sets in Summary Page (Bi-directional View)" on page 62 for details.

   – If needed, press the Re-Calc (E) key that allows to re-calculate events (see "Re-Calculate Events" on page 48 for details).

Bi-directional Analysis Operation

How to Switch Column Sets in Summary Page (Bi-directional View)

1. Press Wave to display the Wave menu (A) and select the desired wavelength to be displayed (see "Wavelength Selection Menu In OTDR Pages" on page 45 for details).

2. Press View to display the View menu (A).

3. Use ⬍ arrows to make selection as follows:

   • Select Loss Cols option to display the column set # 1, which includes:

      – Link Loss End1 -> End2

      – Link Loss End2 -> End1

      – Average Link Loss data

   • Select Max Cols option to display the column set # 2, which includes:

      – Max Average Splice Loss between the directions,

      – Max Average Connector Loss between the directions,

      – Max Average Reflectance between the directions data.

4. Press ⏺ key to confirm selection.

5. The Summary page will display test results for the selected Column Set option as shown below.

Column Set - "Loss Cols"	Column Set - "Max Cols"

Ref.	Description
1	This row displays Link Length
2	Test Wavelength(s)
3	Link Loss End1 -> End2 (dB)
4	Link Loss End2 -> End1 (dB)
5	Average Link Loss data (dB)
6	Number of Events

Ref.	Description
1	This row displays Link Length
2	Test Wavelength(s)
2	Status field: ✓ - Pass, ✗ - Fail, ▌- Information only
4	Max Average Splice Loss (dB)
5	Max Average Connector Loss (dB)
6	Max Average Reflectance (dB)

OPM Operation - Testing Multimode/Single-mode Fibers

Step I - Set the Reference (One Jumper Method)

1. From the OTDR Main Menu, select the OPM (optical power meter) test mode. Turn on your OLS (optical light source) and allow the light source to stabilize (minimum of 15 minutes).

2. If not using the Wave ID feature, set both instruments to the desired test wavelength.

3. Select the appropriate fiber optic transmit and receive test jumpers. The fiber type of these jumpers must match the fiber type of the link to be tested. Perform one of the following:

   • For Multimode testing: wrap and secure the transmit jumper five times around the appropriate diameter mandrel.

   • For Single-mode testing: make a loop in a transmit jumper and secure it with a piece of tape. TIA testing - 30 mm loop. IS0 testing - 30-50 mm loop

   Note: Clean both ends of the transmit jumper.

4. Connect the transmit jumper to the appropriate (MM or SM) output port of the OLS.

5. Mount an adapter cap on the OPM port that matches the free connector on the transmit jumper.

6. Connect the free end of the transmit jumper to the OPM port.

7. If measured output power is outside of the normal range (specified by manufacturer), clean all fiber connections or replace the transmit jumper. Repeat steps 4 - 7.

8. To set the reference level at the current wavelength, perform the following:

   • On the equipment operating in OPM mode, press the Reference soft key, select Set Ref, then press ⏺ key.

   • The Reference value will be displayed briefly in dBm (μw).

   • Then the screen will toggle to display Loss values of the active wavelength (typ. 0.00 dB).

Step II - Verify Test Jumpers

9. Disconnect the transmit jumper from the OPM test port.

   Note: Do not disturb the transmit jumper at the OLS end.

10. If necessary, change the OPM adapter cap to match the connector on the receive jumper that will be connected to the OPM test port.

    Note: Clean both ends of the receive jumper.

11. Connect the receive jumper to the OPM test port.

12. Mate the free ends of the transmit and receive jumpers using an appropriate adapter.

13. Verify that the insertion loss of this mated connector pair is under 0.75 dB, the maximum allowed by the TIA and ISO (AFL recommends 0.4 - 0.5 dB typical), as follows:

    • Observe the displayed loss level. This is the mated connector pair insertion loss of the test jumpers in dB.

    • If the insertion loss is not acceptable, disconnect the transmit and receive jumpers at the adapter, clean the free ends of both test jumpers and repeat steps 12 and 13.

OPM Operation - Testing Multimode/Single-mode Fibers

Step II - Verify Test Jumpers

• If the insertion loss is still not acceptable, replace both test jumpers and repeat steps 1-13.

14. If the insertion loss is acceptable, disconnect the transmit and receive jumpers at the adapter.

15. Move the OPM and OLS to opposite ends of the link to be tested.

Step III - Measure Link Insertion Loss

16. Connect the free ends of the transmit and receive jumpers to the link under test.

   Note: Clean jumper end that connects to patch panel prior to every test.

17. The OPM will measure and display the insertion loss of the link under test.

18. Press the Save key on the OPM to save the displayed measurement.

19. Repeat steps 16-18 for all links to be tested at the current wavelength(s).
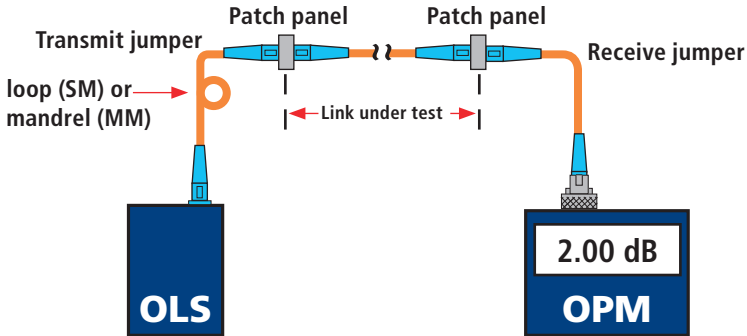
Text Editor

The user can select the keyboard style in the General Settings.

Alphanumeric keyboard

Qwerty keyboard

Editable text field.

NEW OTDR OPERATOR...

A	B	C	D	E	F	G	H	I	J
K	L	M	N	O	P	Q	R	S	T
U	V	W	X	Y	Z		,	$	#
0	1	2	3	4	5	6	7	8	9
+	&	@	!	%	~	=	'	(	)
^	;	.							

Backspace   Caps   OK

NEW END 1

1	2	3	4	5	6	7	8	9	0
Q	W	E	R	T	Y	U	I	O	P
A	S	D	F	G	H	J	K	L	
Z	X	C	V	B	N	M			
~	!	@	#		$	%	^	&	
(	)	-	=	+	'	;	.		

Backspace   Caps   OK

Touch Pad (tap with stylus or use Arrows and Enter keys).

Press when done.

Numerical Editor

Parameter name.

LENGTH...

Editable numeric field.

0 1 5 1 . 9

Selection cursor. Move by pressing ◀▶ arrows.

1	2	3
4	5	6
7	8	9
	0	

Numeric Touch Pad (tap with stylus or use ▲▼ arrows to increment/ decrement the selected value).

OK

Press when done.

Transferring Files

From OTDR via USB Memory Stick to a PC
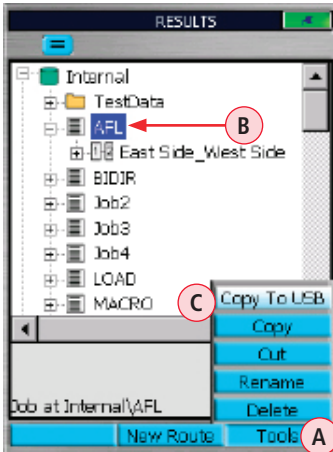
To Transfer Stored Test Results

1. Insert a USB memory stick into USB function port.

2. Navigate to the test result you want to transfer. In our example: the 'AFL' job (**B**).

3. Press the Tools key to display the Tools menu (**A**).

4. Use ⬍ arrows to highlight Copy to USB (**C**).

5. Press the Enter ⬤ key.

6. At the Copy screen (**D**), press OK (**E**) to confirm the copy task.

7. OTDR will display 'Please Wait' (**F**) message while performing the copy task **.**

8. Note that the selected job (in our example, the 'AFL' job (**G**)) and all of its sub-folders have been copied to the USB memory stick.
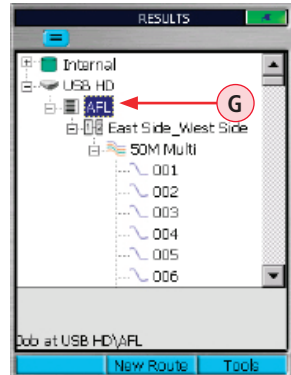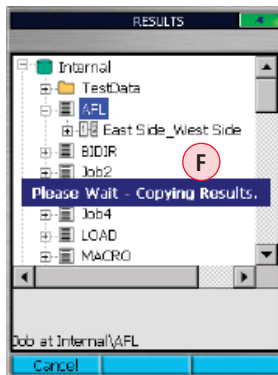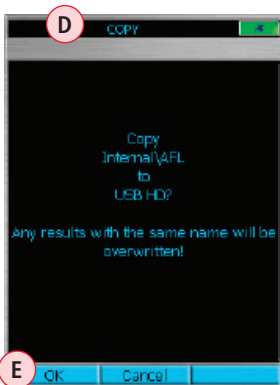
From OTDR via Mini-USB Function Port to a PC

To transfer files from your OTDR to a PC using a USB cable, perform the following:

1. Connect your OTDR to a PC using the supplied mini-USB to USB cable.
   Note: If your PC requests new USB drivers, install the CD-ROM that comes with your OTDR, which contains the needed drivers. This step only needs to be performed the first time you connect your OTDR and PC together. If your PC pops up a dialog box asking if you want to set up a new Partnership, select No (the OTDR should always be a 'guest').

2. Open
   My Computer > Mobile Device > File Storage > The desired folder (Internal or USB).

3. Copy (or move) the desired test data to your PC.

Fiber Optic Test Cables and Jumpers

Fiber optic test cables are necessary to connect an OTDR to the fiber under test (FUT). Test cables must have the same core and cladding size as the FUT. The connector at one end of the test cable must mate with the appropriate optical port on the OTDR. The connector on the other end must mate with the fiber optic link under test.

Launch and Receive cables are required to measure the insertion loss and reflectance of the near-end and far-end connectors respectively, of the fiber link being tested. If the user has not used both Launch and Receive cables "Link Loss" and "Link ORL" will be flagged with an (*)asterisk indicating "does not include loss of last connector" or "Does not include Receive Cable" in the PC analysis and reports. AFL Fiber Rings may be used as Launch and Receive cables. Fiber Rings with a variety of lengths and connector styles are available from AFL.

Fiber Optic Test Cables and Jumpers Selection Chart

To do the following test	You will need the following accessories	
	To connect your OTDR to the fiber link under test	To terminate far-end of the fiber link under test
• Fault locate - find a break • Measure link length	Test Jumper (1-2 m typical)	None
• Measure near-end connector loss • Measure near-end connector reflectance	Launch cable (such as a AFL 150 m, 500 m, 1000 m Fiber Ring)	None
• Measure near-end and far-end connector loss and reflectance • Measure end to end link loss and link ORL	Launch cable (such as a AFL 150 m, 500 m, 1000 m Fiber Ring)	Receive cable (such as a AFL 150 m, 500 m, 1000 m Fiber Ring)

Fiber Ring (FR) Selection Chart

FR Length	Fiber Type	Fiber under Test Limits	Comments
150 m (492 ft)	Multimode	All runs 30 m to 3 km or 2 mi	Multimode runs are <3 km or 2 mi
150 m (492 ft)	Single-mode	All P W's up to 1,000 ns or 1 µs	* PW of 1 µs = pulse length of 100 m
500 m (1,640 ft)	Single-mode	All PW's up to 3,000 ns or 3 µs	PW of 3 µs = pulse length of 300 m
1 km (3,281 ft)	Single-mode	All PW's < 5,000 ns or 5 µs	PW of 5 µs = pulse length of 500 m
5 km (16,405 ft)	Single-mode	All PW's up to 20,000 ns or 20 µs	PW of 20 µs = pulse length of 2 km

* A PW of 1,000 ns (1 µs) requires reflective events lower than -45 dB of ORL to be used with the 150 meter fiber rings.

Clean Test Cables and FUT

It is important to keep connector end-faces on the launch and receive cables and those on the Fiber Under Test (FUT) clean, to ensure accurate measurements and operation.

IMPORTANT! Inspect optical connectors after cleaning to ensure cleaning was successful and to verify the end-face is not damaged (cracked, pitted, etc.).

CAUTION! Never view a live fiber. Laser radiation is harmful to eyes.

Follow your company's approved cleaning procedures.

AFL recommends cleaning test cables using a Cletop cassette cleaner or a One-Click Cleaner.

Cleaning the Optical Ports

CAUTION! Before conducting the following procedures be sure to have the OTDR turned OFF.

Cleaning the OTDR and VFL optical ports without removing the adapters

AFL One-Click Cleaner method

- Remove the protective dust cover from the tip of the One-Click Cleaner.
- Insert the tip of the One-Click Cleaner into the optical port adapter and gently press the body of the One-Click Cleaner until an audible "click" is heard.
- Remove the One-Click Cleaner.

AFL FCC2 fluid and CCT stick method

- Lean a can of FCC2 back (30°), press the button on FCC2 to fill the well.
- Dip a CCT stick into the well of the FCC2 to dampen the tip with optical cleaning fluid.
- Place the damp tip over the ferrule to be cleaned.
- Rotate the tip clockwise 10 revolutions while applying varying pressure to create a gentle pumping action where the tip contacts the ferrule.
- Discard the CCT stick after using both tips.

Cleaning the optical ports with adapters removed

Removing connector adapters for cleaning and inspection

To access the OTDR Port

- Rotate the adapter base counterclockwise approximately four times.
- Pull the adapter directly out away from the universal adapter mount to expose the ferrule.

To access the VFL Port

- Unscrew the adapter counterclockwise and pull the adapter straight out to expose the ferrule.

To access the OPM Port

• Unscrew the adapter cap from the adapter cap mount.

Cleaning the Exposed Ferrule or the OPM port

Use lint-free optical cleaning wipes such as AFL FiberWipes and optical quality cleaning fluid such as AFL FCC2 connector cleaning fluid.

Note: If using isopropyl alcohol (IPA), be sure to use 99% pure IPA that has not been contaminated.

• Dampen a portion of the wipe with the cleaning fluid.

• Gently wipe the exposed ferrule (OPM port) starting with the wet section of the wipe and pulling it to the dry section.

    – **Note:** Starting with the wet cleaning and finishing in the dry improves cleaning action, reduces static buildup, and finishes with the end-face dry.

Cleaning the adapters

Method 1:

• Insert a Cletop adapter cleaning stick into the sleeve of the adapter and rotate 10 times.

• Remove.

• After cleaning the adapter, replace the adapter over the ferrule; centering it onto the alignment pin.

• Tighten the adapter base.

Method 2:

• Use a can of filtered compressed air (held vertically), blow out any contaminates from the adapter.

• After cleaning the adapter, replace the adapter over the ferrule; centering it onto the alignment pin.

• Tighten the adapter base.

Can I save traces for viewing later?

Yes. There is a dedicated **Save** key. In the Main Menu "File tab", set up the location/folder (Internal or USB) to save the file, the file naming format, and fiber number. The fiber number will automatically increment after each trace is saved.

What is the advantage of the Expert Auto mode?

User is able to select a single λ and have the OTDR set the other test parameters.

What is the advantage of the Expert Auto Once mode?

User is able to select one or more wavelengths, let the OTDR select Pulse Width, Time, and Range for one test. Then allow the user to adjust any of these test parameters for the next test(s).

What is the purpose of the Real-Time mode?

With a launch cable, the Real-Time mode may be used to quickly view many short fiber links. It can also be used to quickly "trace" short fiber links.

Why do I need to use a launch and receive cable?

A launch cable allows the OTDR to settle down after the initial pulse and provides a reference cable for testing the first connector on the fiber under test. A receive cable provides a reference cable for testing the last connector of the fiber under test.

Bi-directional Averaging

Q: *Why should I average OTDR results from both ends (bi-directional averaging)?*

A: In networks built with a mix of fiber types (older and newer fiber, G.652 and G.655 or G.657 fiber), an OTDR scan may show excess loss at a splice joining these fibers when viewed in one direction, and may show "gain" (negative loss) when viewed in the opposite direction. The actual splice loss can be computed by averaging the excess loss in one direction with the gain in the opposite direction. If the average loss meets the carrier's splice acceptance criteria, there is no need to re-splice the connection, even though the excess loss when viewed in one direction exceeds the splice acceptance criteria. Bi-directional averaging automatically pairs traces taken from both ends, averages them and presents the averaged results.

Q: *To perform bi-directional averaging, must both traces be obtained using the same OTDR?*

A: Two different M310s may be used to acquire the results, but the results from both ends must be available in one M310 for that M310 to perform bi-directional averaging. This is most easily accomplished if the same M310 is used to test from both ends.

Q: *How should files be named so the M310 can automatically match results from both ends and perform bi-directional averaging?*

A: There is no special naming convention required for automatically matching results from both ends. What is required is that the both tests are run, and results stored, in the same job\route\cable\ file. It's preferable to run, and save, tests from both ends in the same fiber file, and use the same OTDR, for better results organization. After running the test with the OTDR at one end (say

END1) the user must change the "OTDR Located At" in the Job Settings screen to the other end (END2 in this case) when running the test in the other direction. Bi-directional Analysis must be set to "ON" in the Events Setting Screen.

Q: *Must the same OTDR settings be used from each end to perform bi-directional averaging?*

A: Yes. The OTDR must be set to the same range and pulse width settings for both traces in order to average the results. Otherwise the result will not be calculated by the OTDR.

Q: *If I use a launch fiber when testing from one end, must I also use a launch fiber of the same length when testing from the other end?*

A: It is recommended that the same launch cable be used in both directions to ensure the greatest accuracy in the average Link Loss calculation. While in theory different launch cables (either of the same or different length) could be used in each direction the bi-directional averaging of Link Loss may be skewed by differences in connector losses between cables.

Q: *If I use a receive fiber when testing from A -> B, must I also use a receive fiber of the same length when testing B -> A?*

A: It is recommended that the same receive cable be used in both directions to ensure the greatest accuracy in the average Link Loss calculation. While in theory different receive cables (either of the same or different length) could be used in each direction the bi-directional averaging of Link Loss may be skewed by differences in connector losses between cables.

Q: *If an event is detected in A -> B direction, but not in the B ->A direction, can results still be averaged? If so, how is the average loss computed for the event detected in one direction but missed in the other direction?*

A: The "missing event" is added as a 0 dB loss event. The average loss is ½ the measured loss of the automatically detected event (Avg = (measured + added 0 dB) / 2)

Q: *If the fiber in A -> B direction was measured at a significantly different length than in the B -> A direction, can the traces be averaged?*

A: No. If length in the second test direction is significantly different than the length measured in the first test direction then a screen will pop up indicating that the unit is unable to perform bi-directional analysis due the mismatch in link lengths.

Micro/Macrobend Detection

Q: *Why is macrobend detection only available in the QUAD and 1310/1550 nm single-mode M310s?*

A: Microbends and macrobends result in excess loss in single-mode fibers at longer wavelengths. Consequently, microbend and macrobend detection is only available by comparing single-mode traces obtained at 1310 and 1550 nm.

Q: *What is the criteria used by the M310 to detect a micro- or macrobend?*

A: A micro- or macrobend event is detected when the loss of a point defect at 1550 nm exceeds the loss at 1310 nm by 0.2 dB or more.

Q: *If a loss event is detected at 1550 but not 1310 nm, can a micro or macrobend still be detected?*

A: Yes. In this case, the M310 will add a 0 dB loss event at 1310 and report the new event as a macrobend, assuming the loss at 1550 nm is ≥0.2 dB.

Q: *How is a micro- or macrobend reported?*

A: Micro/macrobends are indicated in the event table with an event type displayed as "⌒".

Tips: Expert OTDR Setup

RANGE: LENGTH

- Too Short: you will not capture the entire fiber length
- Too Long: trace will be squashed to left side of Screen
- Good Range: 1.5 to 2 times length of actual fiber

PULSE WIDTH:

- Too Narrow: trace disappears into noise floor before end of fiber is reached
- Too Wide: events can not be resolved
- Good Pulse Width: Events can be seen and trace is smooth

AVERAGES:

- Too Few: Trace is noisy, trace floor is too high
- Too Many: Trace is smooth but wastes time
- Good Number of Averages: smooth trace

Test in feet or meters?

If you know your fiber distances in feet, it may be beneficial to measure distances to events/faults in feet.

Fiber loss specifications are given in dB/km. Therefore it is often beneficial to measure fibers in meters/kilometers when loss results are required.

Recharging Batteries

The batteries may be charged while the OTDR is switched on or off by attaching an AC power adapter.

- Plug the AC adapter/charger into a standard wall outlet.

- Connect the AC adapter/charger to the Power port located on the OTDR side panel.

- The AC/Charger indicator on the front panel will turn on Red.

- Charge batteries until the AC/Charger indicator turns Green.

Note: An external battery charger and spare batteries are available

Repair and Calibration

AFL has an authorized calibration/repair facility for AFL products in the USA, Europe and Asia Pacific. Please contact customer service for a return authorization number prior to sending your AFL test equipment in for repair or calibration.

Fujikura Europe LTD is an Authorized European Repair and Calibration facility for AFL Test and Inspection products and should be contacted directly for service.

Fujikura Asia LTD is an Authorized Asia Pacific Calibration facility for AFL Test and Inspection products and should be contacted directly for product calibrations.

USA

AFL Test & Inspection Division

16 Eastgate Park Road

Belmont, NH 03220

603-528-7780

800-321-5298

Asia

Fujikura Asia Ltd

438A Alexandra Road, #08-03 Blk A,

Alexandra TechnoPark

Singapore 119967

support@fal.com.sg

+65 62711312

Europe

Fujikura Europe Ltd

C51 Barwell Business Park

Leatherhead Road

Chessington, Surrey, KT9 2NY

+44 (0) 208 240 2020

Software Information

View Version Information

- From the Settings Menu, use ▲▼ arrows to highlight the 'View Version Information…' parameter.

- Press ⏺ key to enter the Version Information Screen.

1. **Note:** It is helpful to have your OTDR version number if you need to contact AFL Customer Service or Technical Support.

Software Updates

Please check our web site at **www.AFLglobal.com** for software updates and additional application information. If you have any questions about your test equipment and recommended accessories, or if you need technical or sales support, please contact AFL Customer Service.

Contact Us

You may call AFL Customer Service between 8 AM and 5 PM, United States Eastern Time.

Phone   800-321-5298

Phone   +1 (800) 321-5298

+1 (603) 528-7780

Fax   +1 (603) 528-2025

Email   AFLTestTechSupport@AFLglobal.com

Limited Warranty

M series OTDRs are warranted against defective material and workmanship for a period of (1) one year from the date of delivery to the end user.

Any product that is found defective within the warranty period will, at the discretion of AFL, be repaired or replaced. Warranty will be voided if the product has been repaired or altered by other than an authorized AFL product repair facility, if the void sticker has been compromised, or which have been subject to misuse, negligence, or accident. In no case shall AFL liabilities exceed the original purchase price.

CE Information

These instruments have been designed and tested to comply with the relevant sections of any applicable specifications including full compliance with all essential requirements of all applicable EU Directives.

Returning Equipment

To return equipment, please contact AFL to obtain additional information and a Service Request (S.R.) number. To allow us to serve you more efficiently, please include a brief description specifying the reasons for the return of the equipment.

AFL Test & Inspection

16 Eastgate Park Road

Belmont, NH 03220

Phone   +1 (800) 321-5298

           +1 (603) 528-7780

Fax   +1 (603) 528-2025

Email   AFLTestTechSupport@AFLglobal.com

WARNING! Use of procedures or adjustments other than those specified herein may result in hazardous radiation exposure.

850/1300 nm multimode OTDR port	**This is a CLASS I LASER output**	⚠️ CLASS 1 LASER PRODUCT
1310/1550 nm single-mode OTDR port	**This is a CLASS I LASER output**	⚠️ CLASS 1 LASER PRODUCT
VFL port	**This is a CLASS II LASER output. Do not stare into beam**	LASER RADIATION DO NOT STARE INTO BEAM CLASS 2 LASER PRODUCT WAVELENGTH: 610 to 690nm MAX OUTPUT: 1.0mW PULSE RATE: 2Hz, 50% DUTY IEC 60825-1:2007-3

CAUTION! To avoid serious eye injury, never look directly into the optical outputs of fiber optic network equipment, test equipment, patch cords, or test jumpers. Refer to your company's safety procedures when working with optical systems.

WARNING! Use only the specified AC adapter. Use of another type of AC adapter can damage the instrument and create the danger of fire and electrical shock.

WARNING! To avoid the danger of fire and electrical shock:

• Never use a voltage that is different from that for which the AC adapter is rated.

• Do not plug the unit into a power outlet that is shared by other devices.

• Never modify the power cord or excessively bend, twist, or pull it.

• Do not allow the power cord to become damaged. Do not place heavy objects on the power cord or expose it to heat.

• Never touch the AC adapter while your hands are wet.

• Should the power cord become seriously damaged (internal wiring exposed or shorted), contact the manufacturer to request servicing.

CAUTION! Do not run any tests or perform functions that activate an OTDR laser unless fiber is attached to the corresponding OTDR port.

NOTICE! AFL OTDR contains no user serviceable parts. Except for changing batteries and cleaning optical ports, this instrument must be returned to AFL or authorized agents for repair and calibration.

IMPORTANT! Proper care in handling should be taken when using any precision optical test equipment. Scratched or contaminated optical connectors can impact the performance of the instrument.

It is important to keep connector end-faces on the launch and receive cables and those on the Fiber Under Test (FUT) clean, to ensure accurate measurements and operation.

Inspect optical connectors after cleaning to ensure cleaning was successful and to verify the end-face is not damaged (cracked, pitted, etc.).

It is important to keep the dust caps in place when the unit is not being used.

Thank you for choosing AFL Test & Inspection!

www.AFLglobal.com