

3M Mini OTDR 2000



3M Mini-OTDR 2000 User training - Agenda

8:00 Welcome and Agenda Review

8:45 Introduction to Fiber Optics and OTDR Theory

9:45 Introduction to OTDR Measurements

11:00 Introduction to the 3M 2000 Mini-OTDR

11:30 Hands on Measurements with the 3M Mini-OTDR
2000

12:30 Lunch

13:30 Question and Answers

14:00 END

The Light Side by J.P. Rini



"I can see a light at the end of the fiber. What more testing do you need?"

OTDR Measurements Agenda



- Introduction to 3M Lightwave
- Fibers and Connectors
- Optical Time Domain Reflectometer Theory
- OTDR Measurements
- Introducing the 3M Mini-OTDR 2000
- Software Utilities the 3M Mini OTDR 2000
- Using the 3M Mini OTDR 2000

3M Lightwave Test Equipment

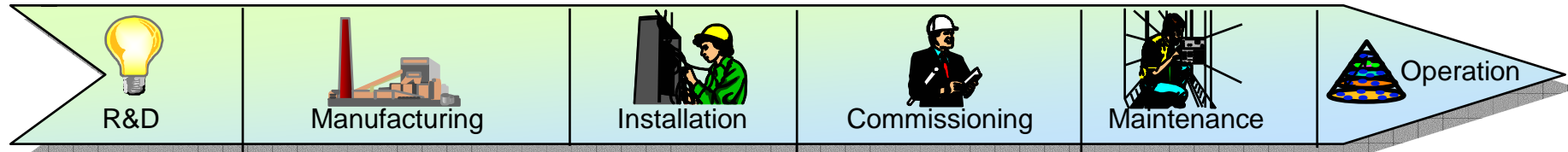


- Optical Switches
- Optical Routers
- Optical Mediaconverters
- Power Meters
- Loss Test Sets
- Tunable Laser Sources Amplifier Test Systems

- Fiber Management Systems
- Mini-OTDR's
- Handheld Test Sets

3M Optical Communication Measurement - Purpose

To help our customers accelerate the development, deployment and operation of the All-Optical Network.



- Tun. + Fixed Sources
- Powermeters, Components
- Manuf. Test Systems e.g. EDFA

- OTDR
- Mini-OTDR
- RackOTDR
- Handhelds

- Network Management. Systems Agilent AccessFiber

Trends -Fiber usage is increasing

Worldwide Deployment of Fiberoptic Cable 1997-2001

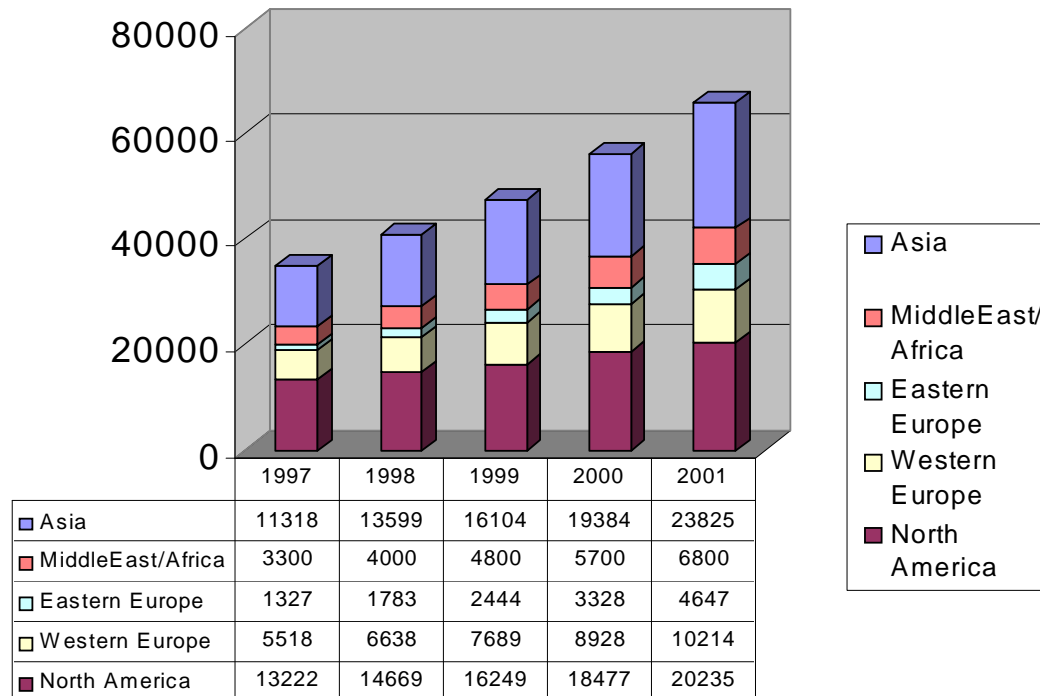


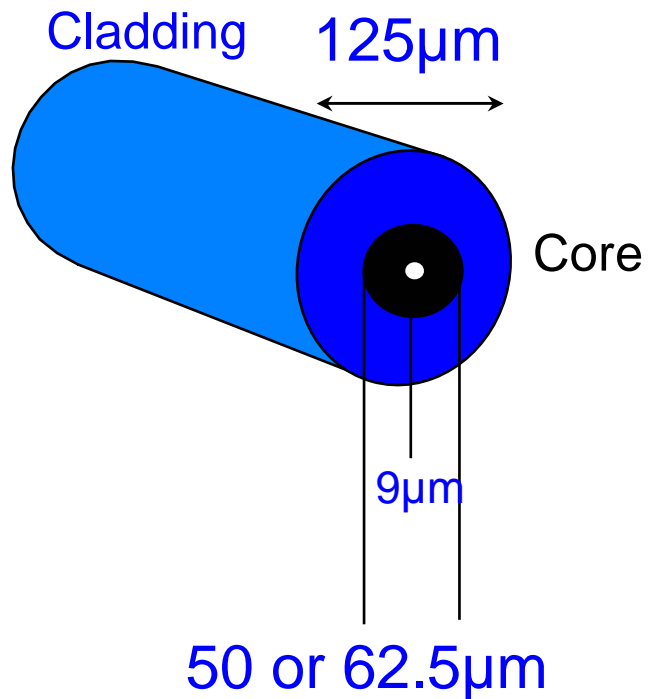
Table reflects kilo-fiber-km Source PMR

6 miles of fiber has been used in the time it takes to read this sentence.



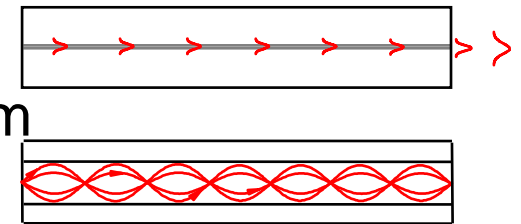
Fiber Manufactures could sell you a cable pair to connect up the Moon every week!

Fiber Fundamentals



Fiber types

- 9/125 μm Single mode
- 50/125 μm and 62.5/125 μm multimode

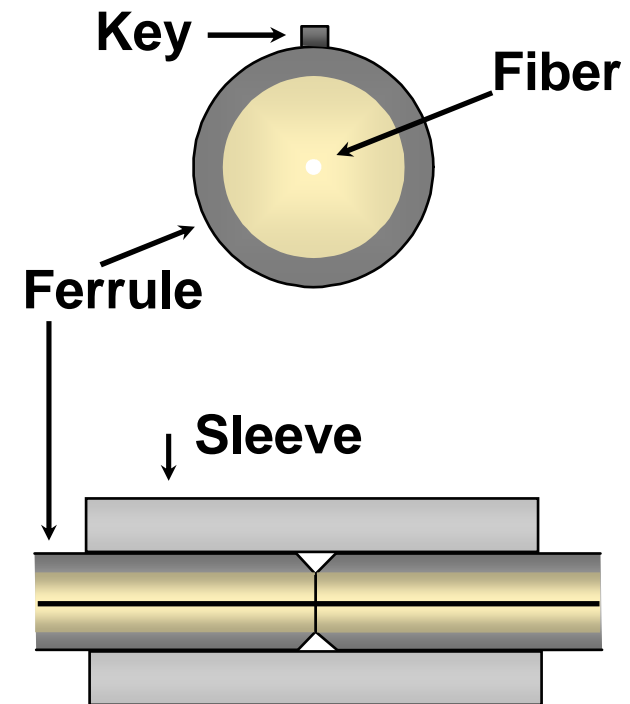


Trends

- Lower attenuation and dispersion
- Lower cost per ft.
- More fibers per cable: From 8 to 288

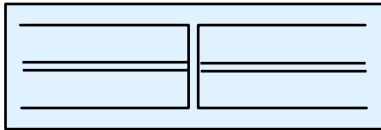
Connector Technology

- Ultra-high precision
 - *Optical axis aligned to better than $\pm 1 \mu\text{m}$ (single-mode)*
 - *Physical contact of the glass end surfaces necessary to avoid strong reflections.*
- Connector cleanliness is paramount
 - *dirt can add insertion loss, and damage connections.*

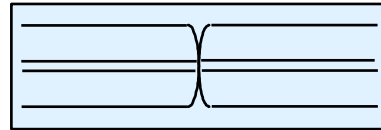


Common Connector Types Used with OTDRs

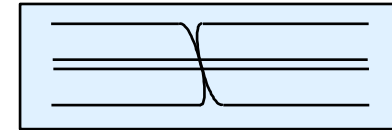
Air Gap
(straight)



Physical Contact
(straight)



Physical Contact
(Slanted)

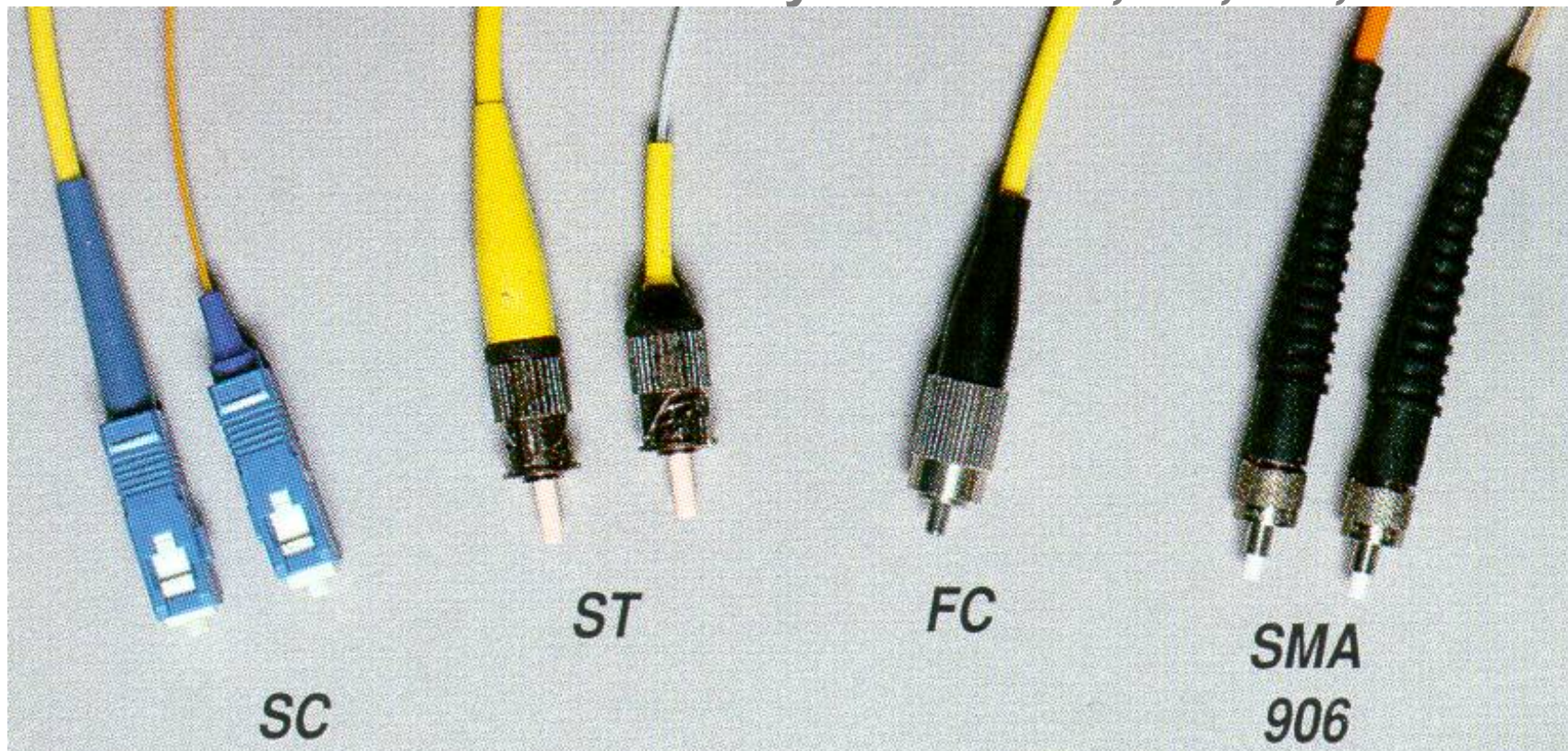


- Worst return loss: <math><14\text{ dB}</math> (Fresnel)
- Formerly common multimode fiber connector
- Good return loss: $>30\text{-}55\text{dB}$ dB
- Common single-mode fiber connector
- Best return loss: $>60\text{ dB}$
- Used in highspeed telecom and CATV links

A physical contact, angled-type connector on the OTDR could reduce deadzones.

Connector Types

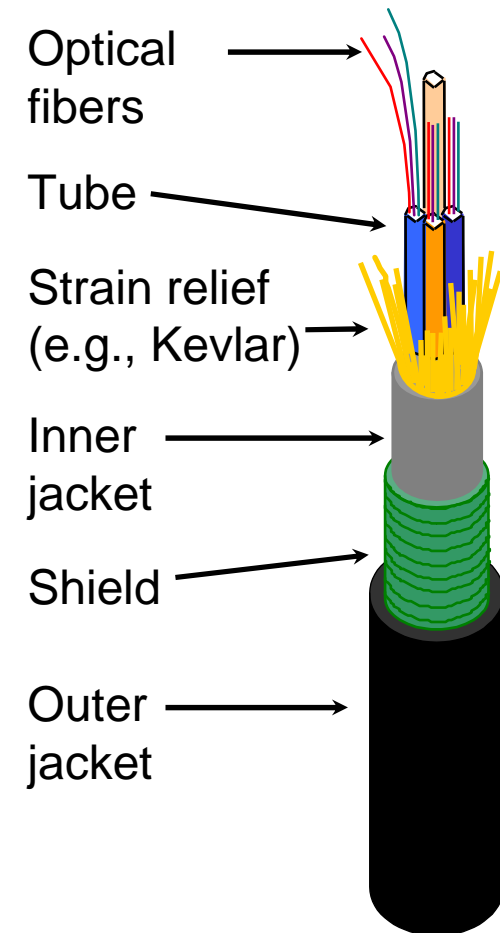
- Fiber end polishing: *straight or angled*
- Common mechanical styles: *FC/PC, ST, SC, DIN*



Gould
Optics

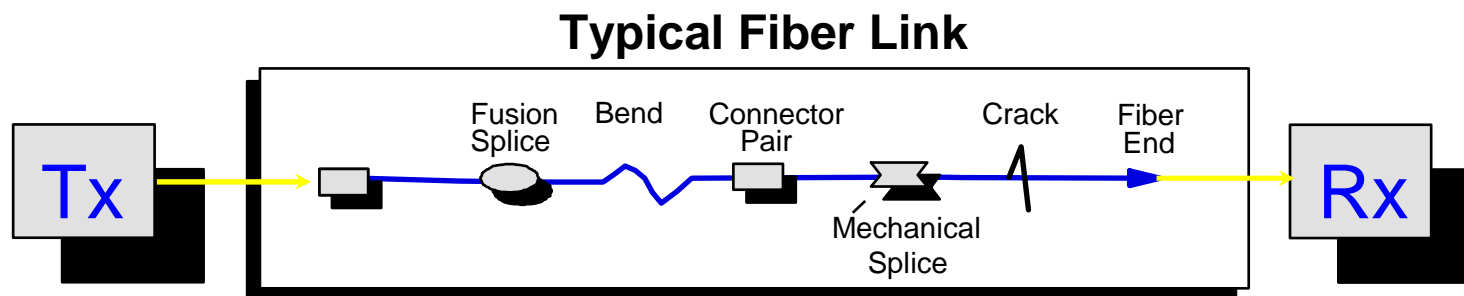
Cables

- Mechanical design: *Indoor, outdoor, or submarine installation*
- Typical attenuation:
 - 0.2 - 0.25 dB/km @ 1550 nm, SM
 - 0.3 - 0.4 dB/km @ 1310 nm, SM
 - 0.5 - 0.7 dB/km @ 1300 nm, MM
 - 2.2 - 3.0 dB/km @ 850 nm, MM



What is a fiber optic link

- Used to connect a transmitter to a receiver from distances between 2ft to 200 miles
- Main specifications are
 - Total Link loss and loss over distance
 - Individual reflection and total link return loss
 - Link length



What can an OTDR do?

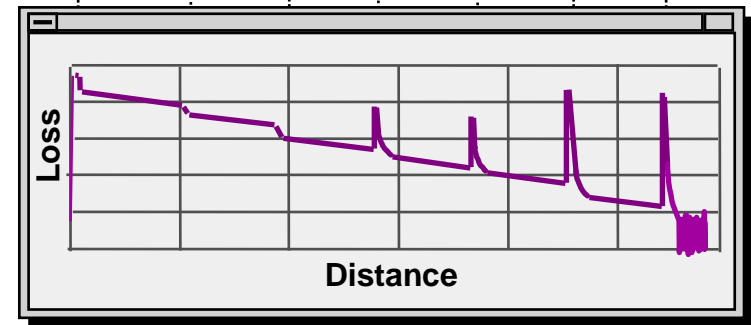
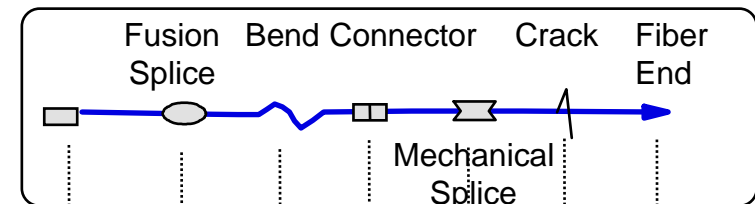
It is optical radar and can measure:

- a break point
- splice and connector losses
- point-to-point distances
- total cable length
- connector quality (return loss)
- attenuation of the fiber

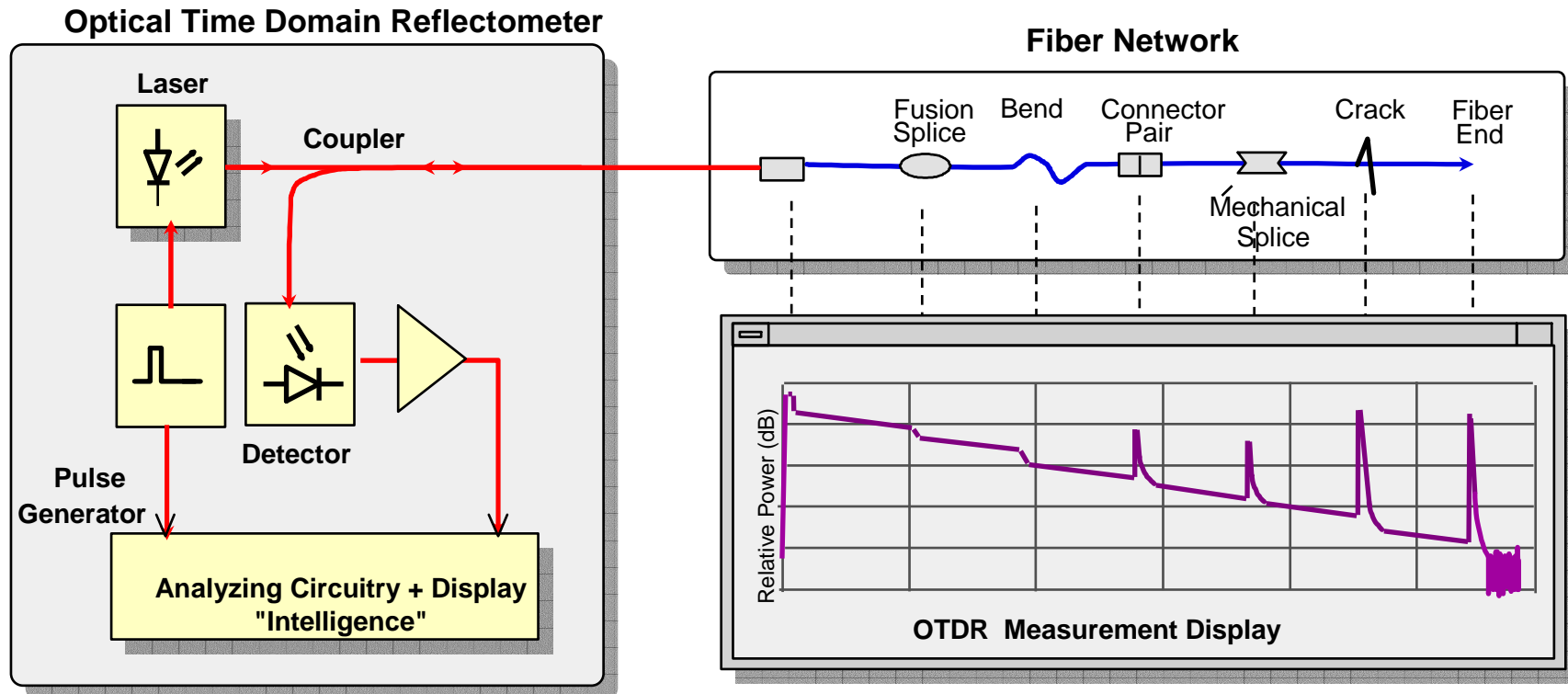


An OTDR is used for fiber:

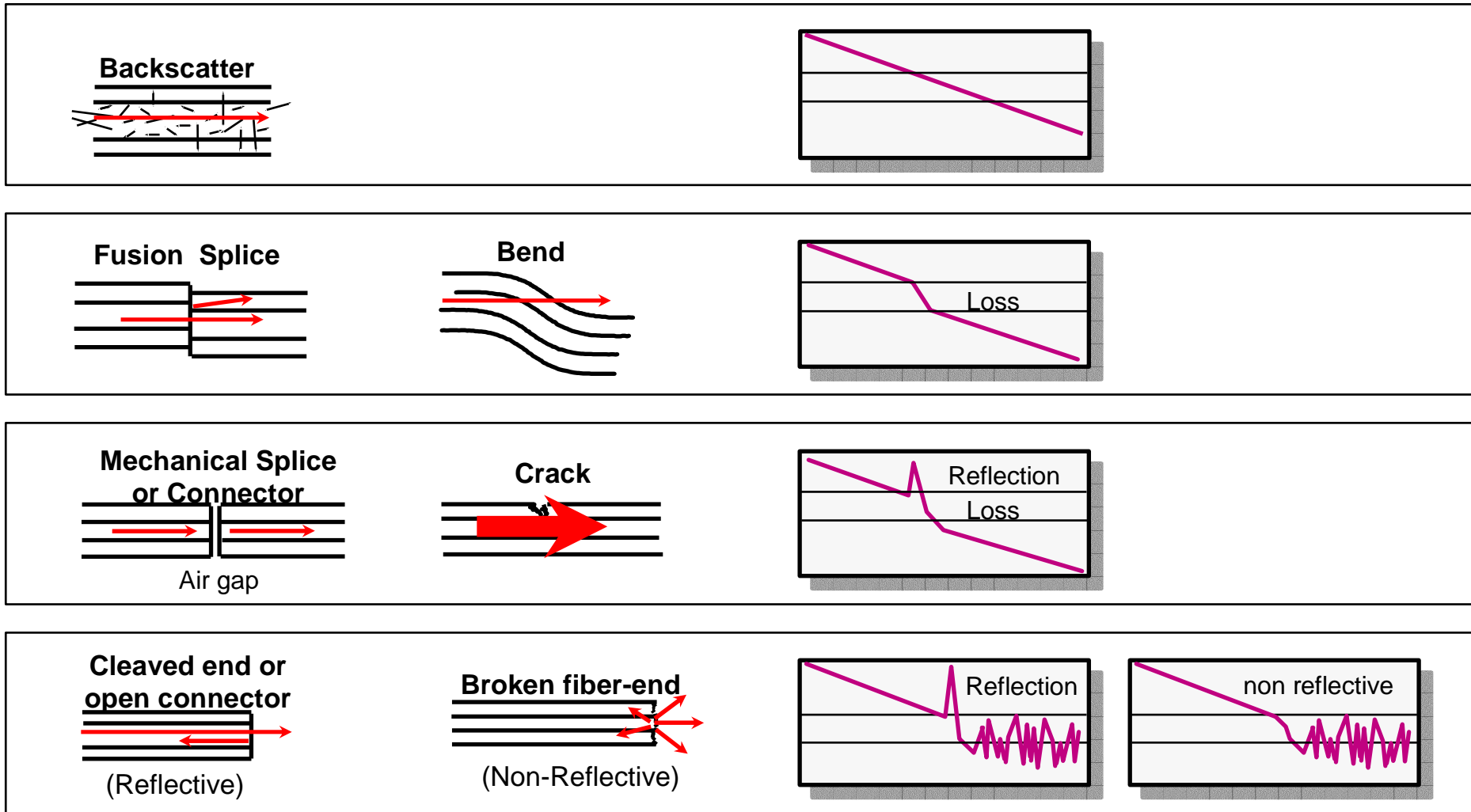
- Installation and Commissioning
- Maintenance.
- Emergency Restoration
- Fiber identification.



What is an OTDR?



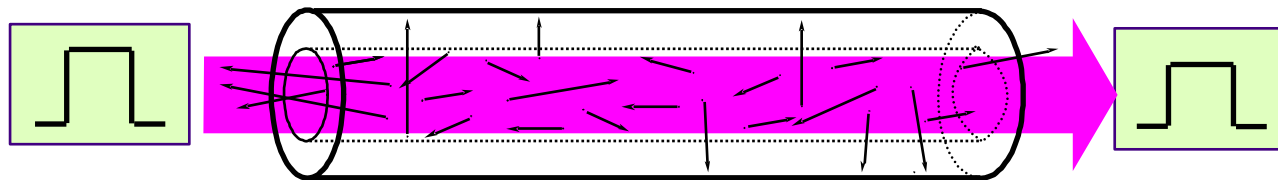
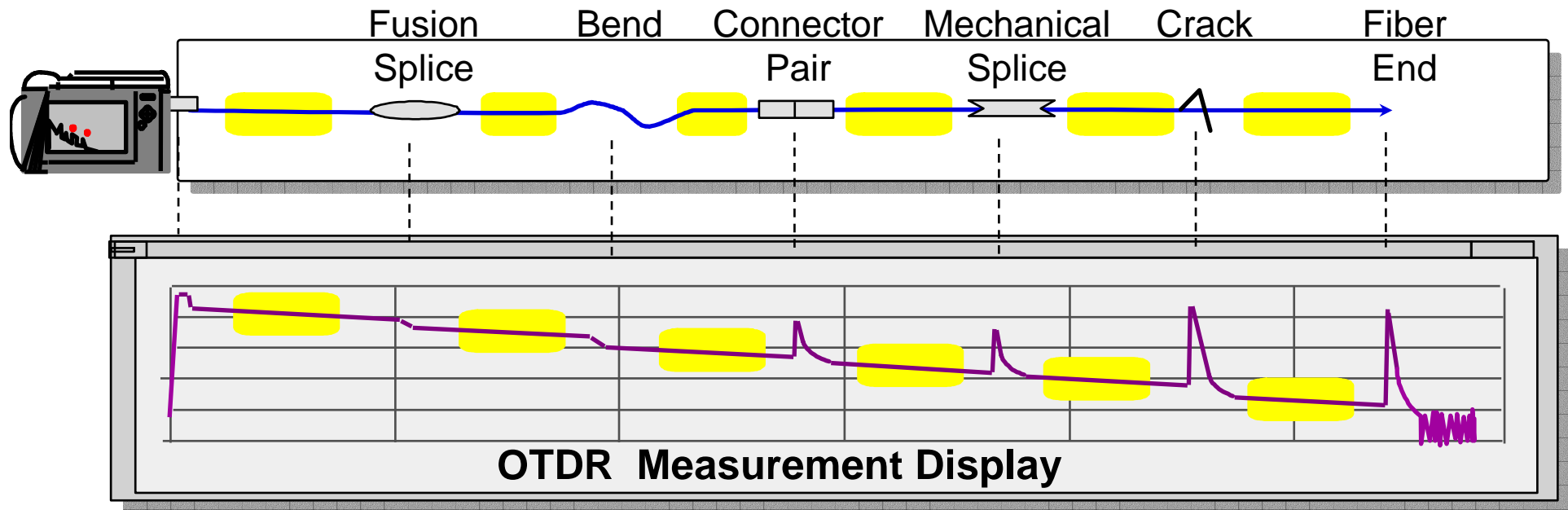
Fiber events and their trace representation



Basic Terms

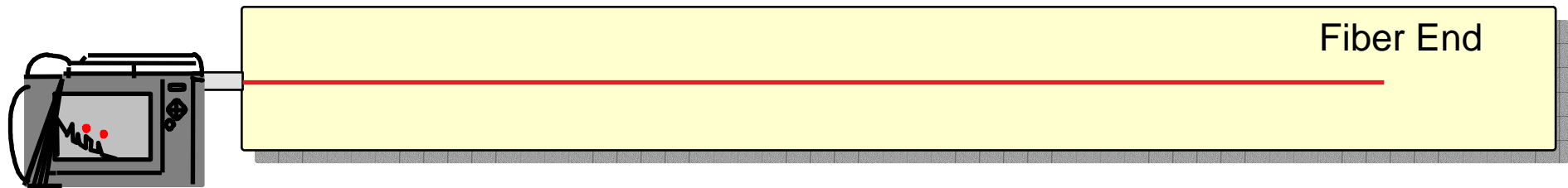
- Backscatter
- IOR - Index of Refraction
- Non-Reflective Events
- Reflective Events
- Fiber End

Backscatter



Backscatter is the small part of the Raleigh scattering which returns to the OTDR.

Index Of Refraction - IOR



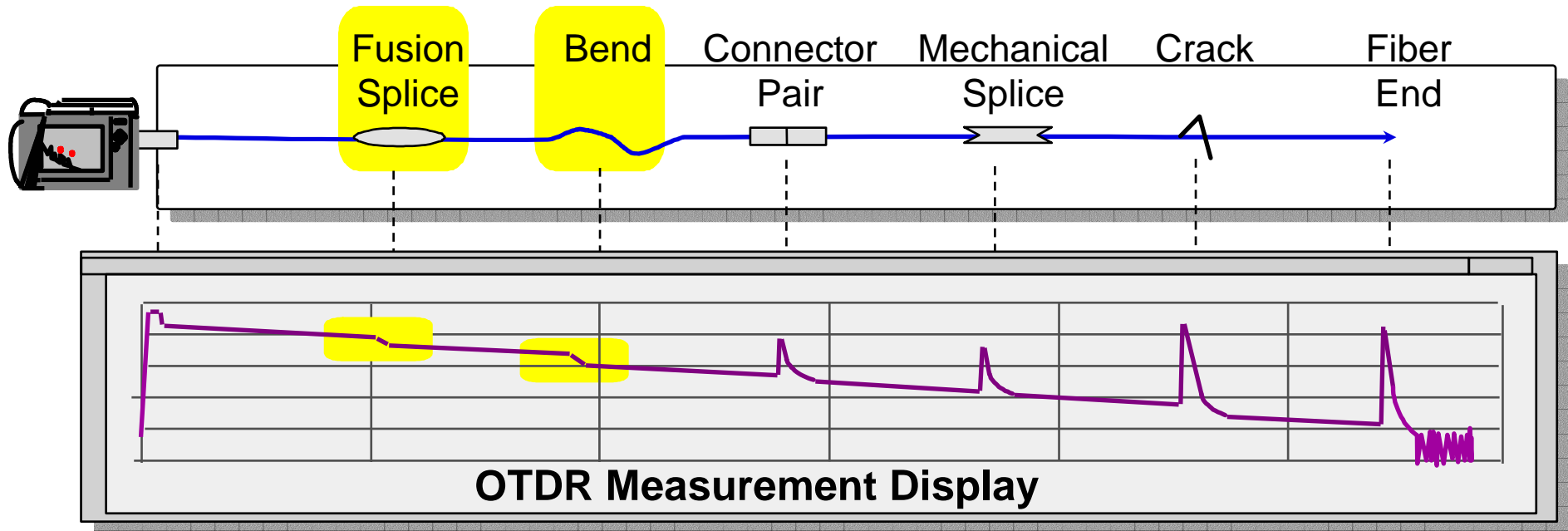
The IOR for the fiber-under-measurement must be accurately known and entered into the OTDR.

The IOR lies typically between 1.4 and 1.5.

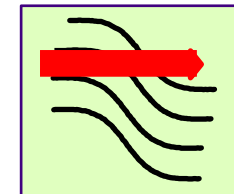
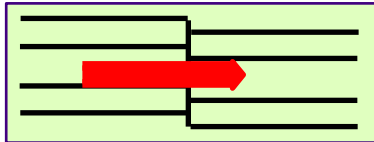
The exact value is supplied by the cable manufacturer.

The Index of Refraction is a number used to express the ratio of the speed of light in vacuum to the speed of light in the fiber.

Non-Reflective Events



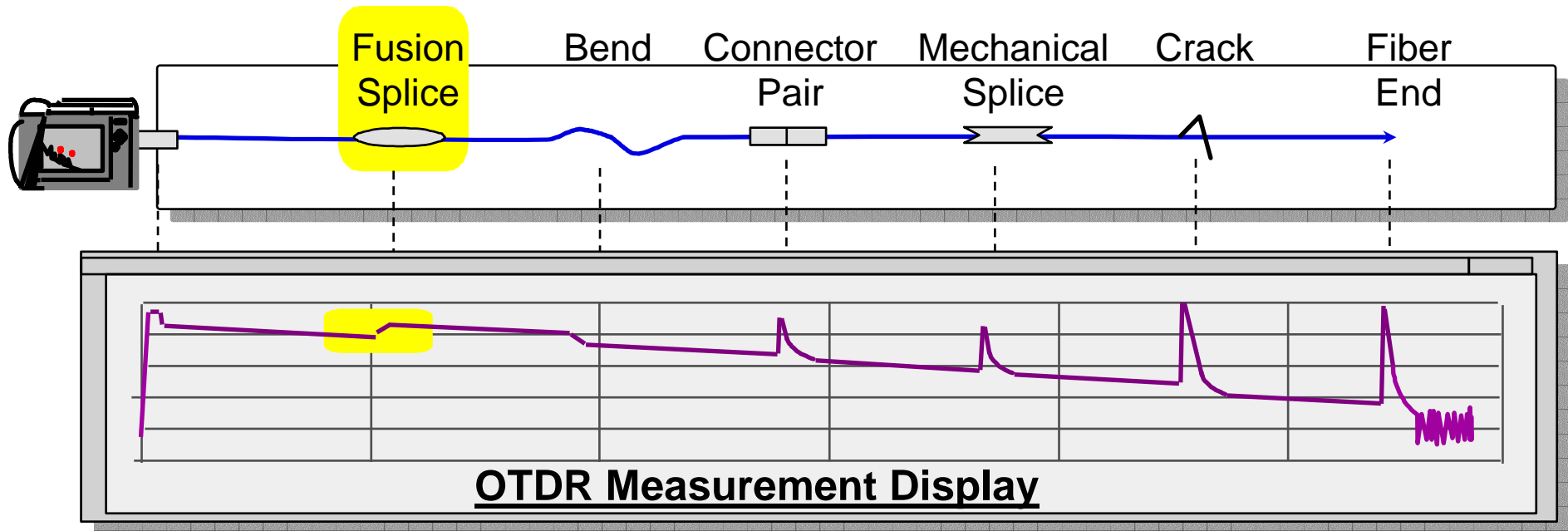
Fusion Splice



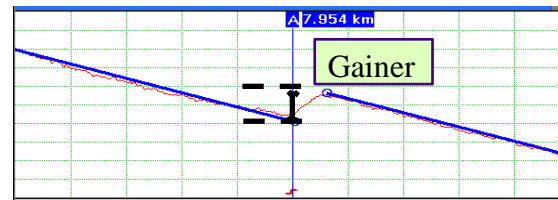
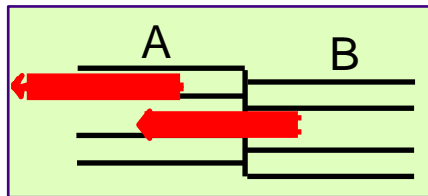
Bend

Fusion splices and bends cause loss, but no reflection. Their signatures are similar on an OTDR display.

Gainer Phenomena

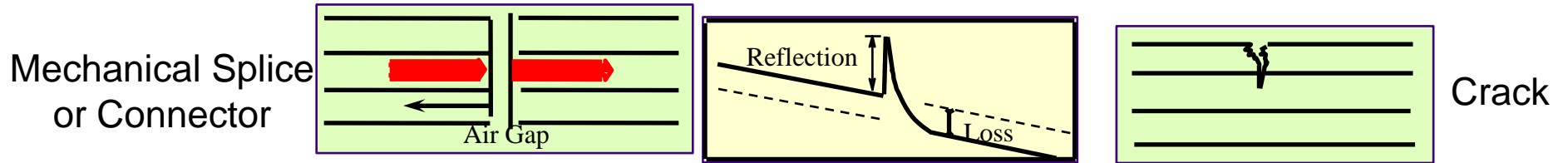
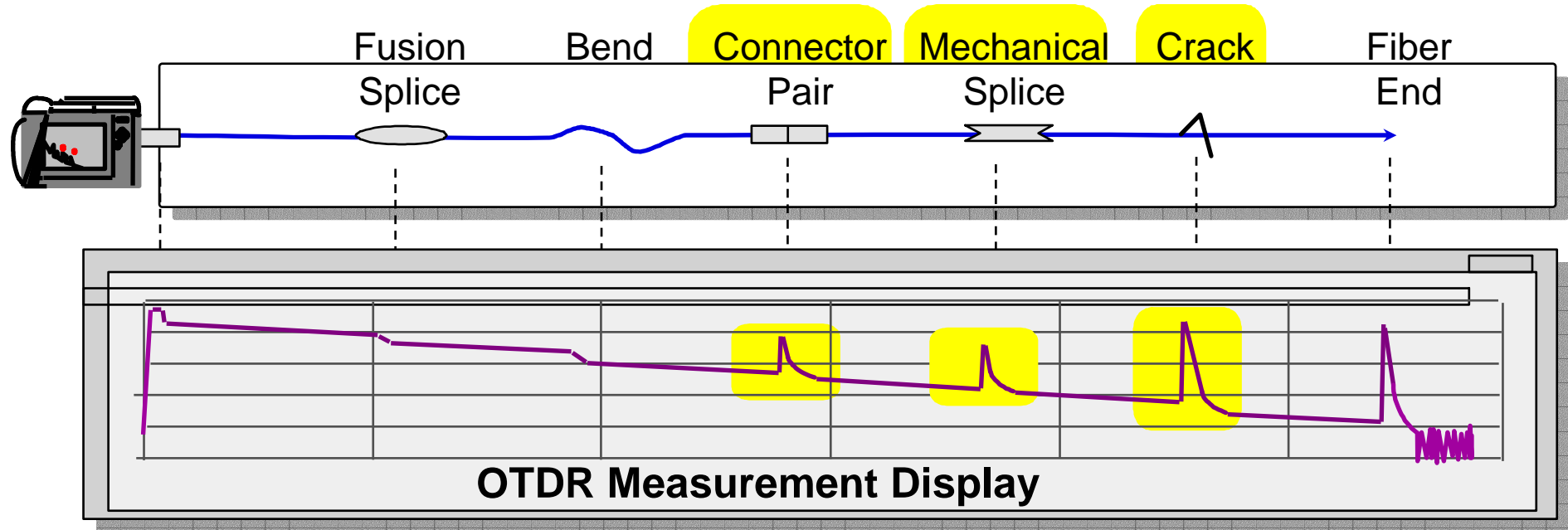


Backscatter coefficient
Fiber B > Fiber A



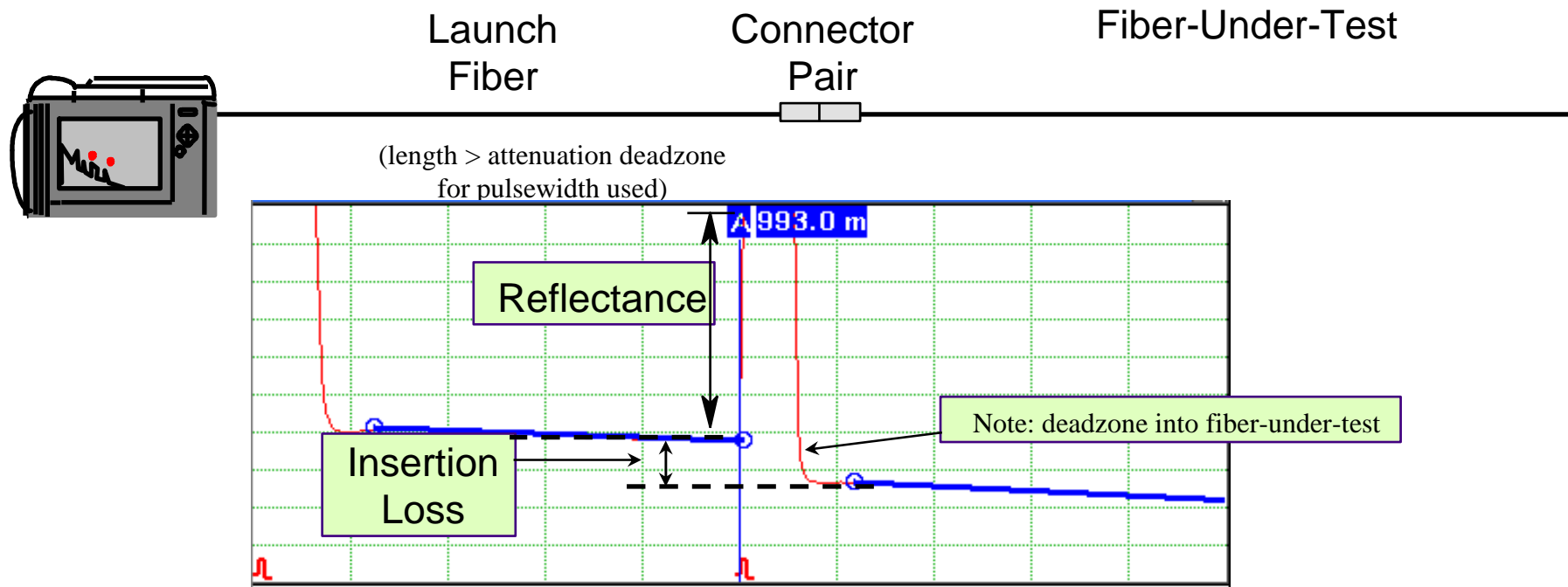
To find the "real" splice loss, measure the splice from both sides and take the average.

Reflective Events



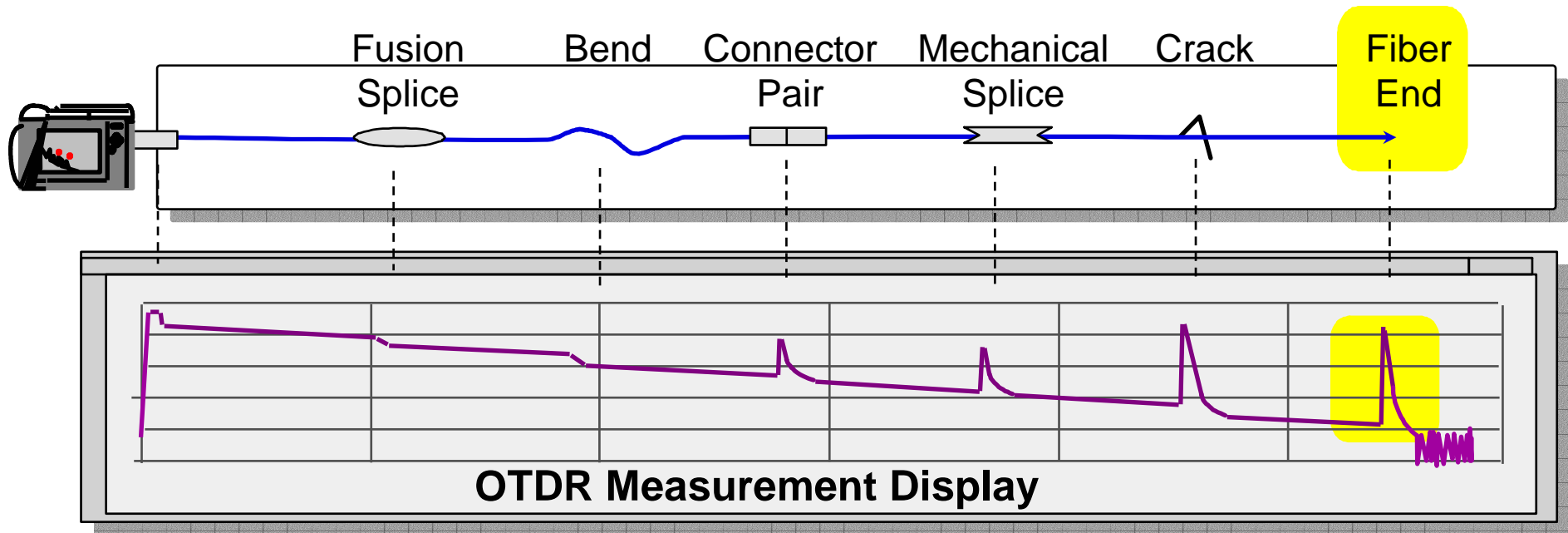
Mechanical splices, connectors and cracks cause both reflections and loss. Their signatures are similar on an OTDR display.

Measuring Insertion Loss and Reflectance of the First Connector

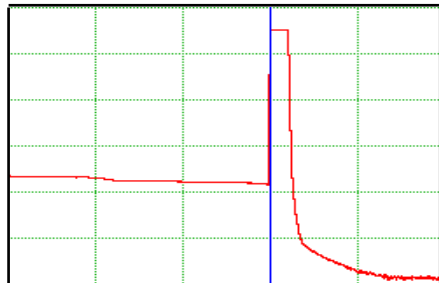
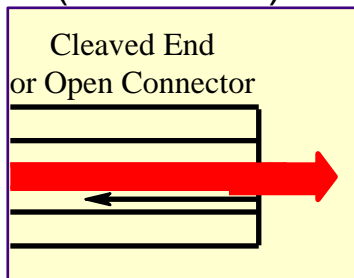


An external or connectorized launch fiber can be used so that the first connector's insertion loss and reflectance can be measured.

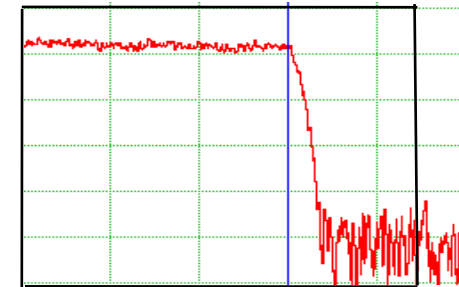
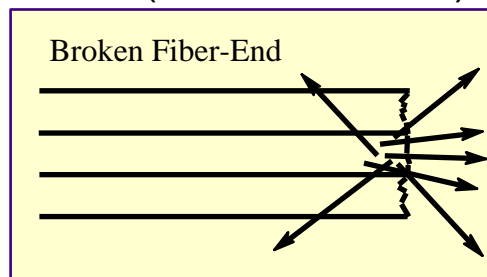
Fiber-End



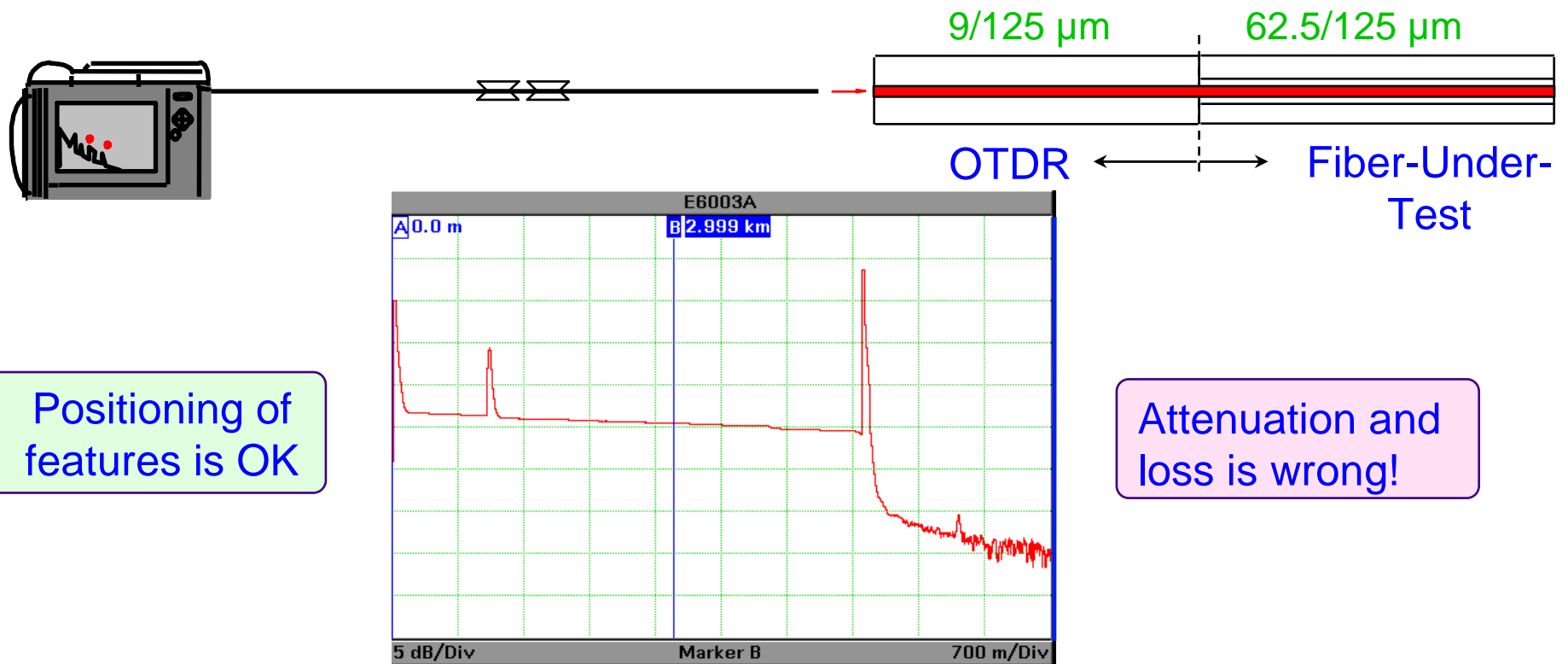
(Reflective)



(Non-Reflective)

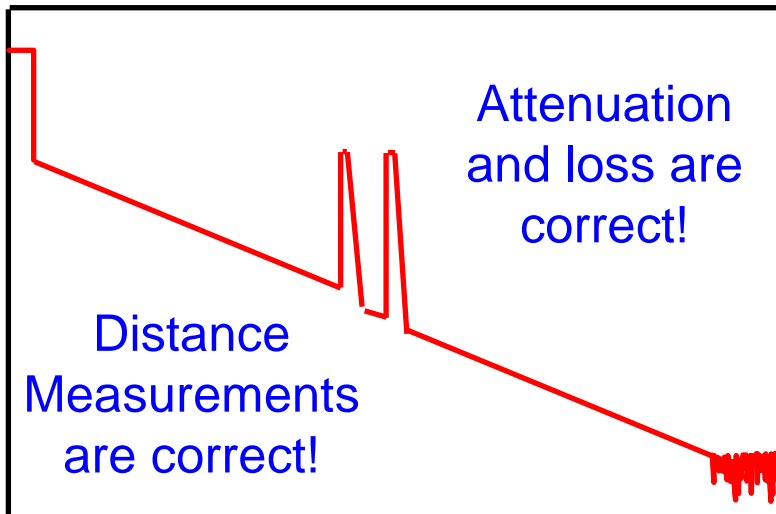
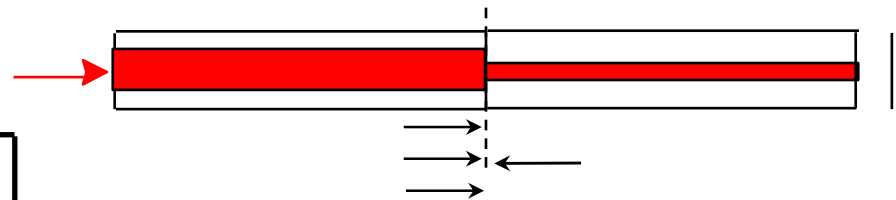
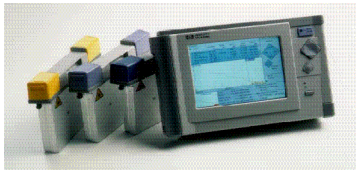


What Happens if a Single Mode OTDR is Used to Measure a Multimode Fiber ?



You can use the OTDR to locate features or breaks for a larger fiber core diameter, but not to measure loss accurately.

Can I use an Agilent Multimode OTDR to Measure a Singlemode Fiber? YES!




Agilent OTDR with Advanced Multimode Module

Singlemode Fiber Under Test

You lose about 7dB at the front connection. All measurements are accurate. You can easily measure 10 km of singlemode fiber

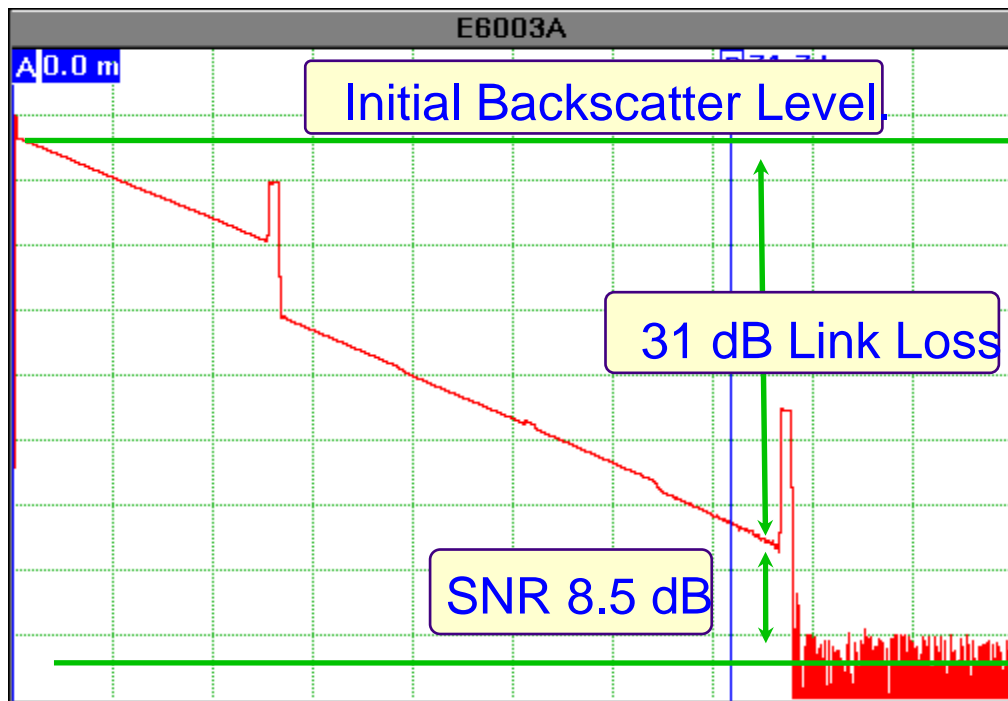
OTDR Measurements Agenda

- Basic Terms
- Fibers and Connectors
-  ○ OTDR Measurements
- Introducing the 3M Mini-OTDR 2000
- Software Utilities

Performance Parameters

- Dynamic Range
- Deadzone
- Distance Accuracy
- OTDR Design

The Need for Large Dynamic Range

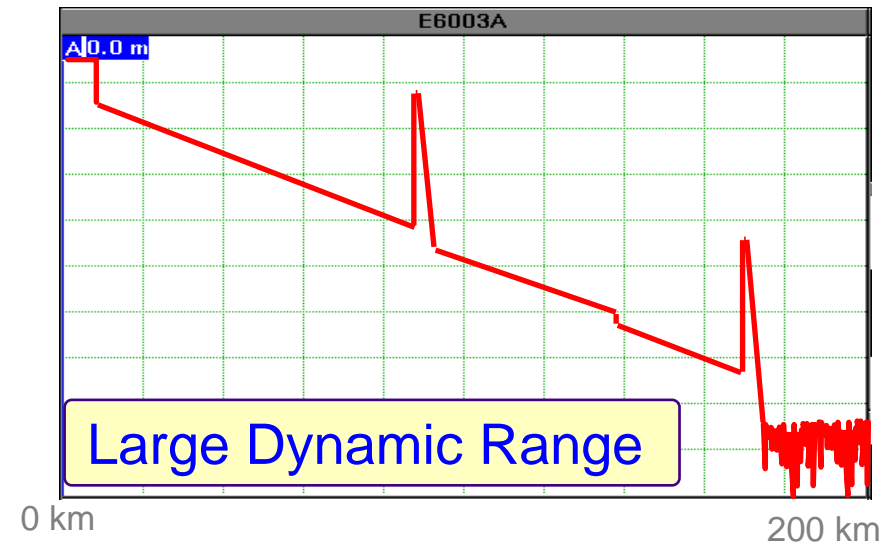
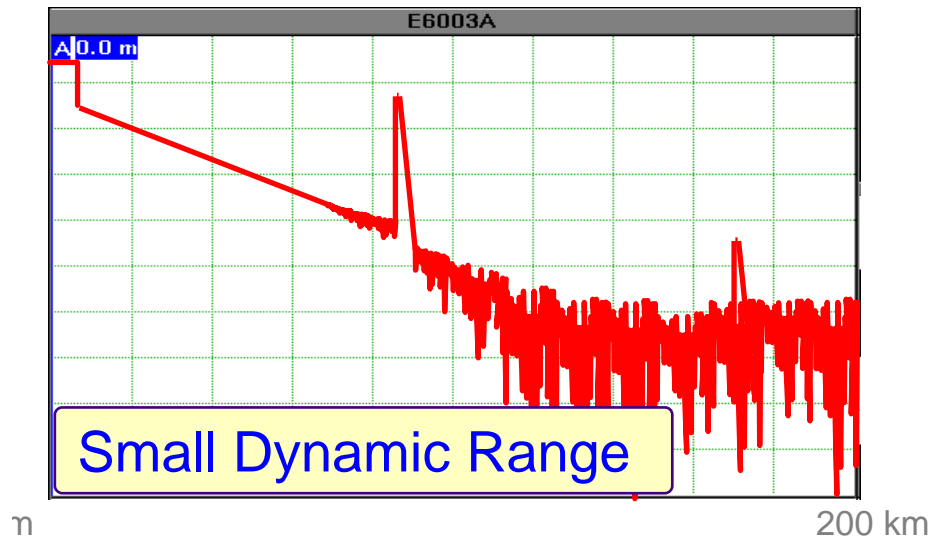


Splice Loss	Required Signal /Noise Ratio
0.1 dB	8.5 dB
0.05 dB	10.0 dB
0.02 dB	12.0 dB

= 39.5 dB of Dynamic Range (SNR=1)

Add the required Signal/Noise Ratio to the total link loss to determine the dynamic range (SNR=1) required.

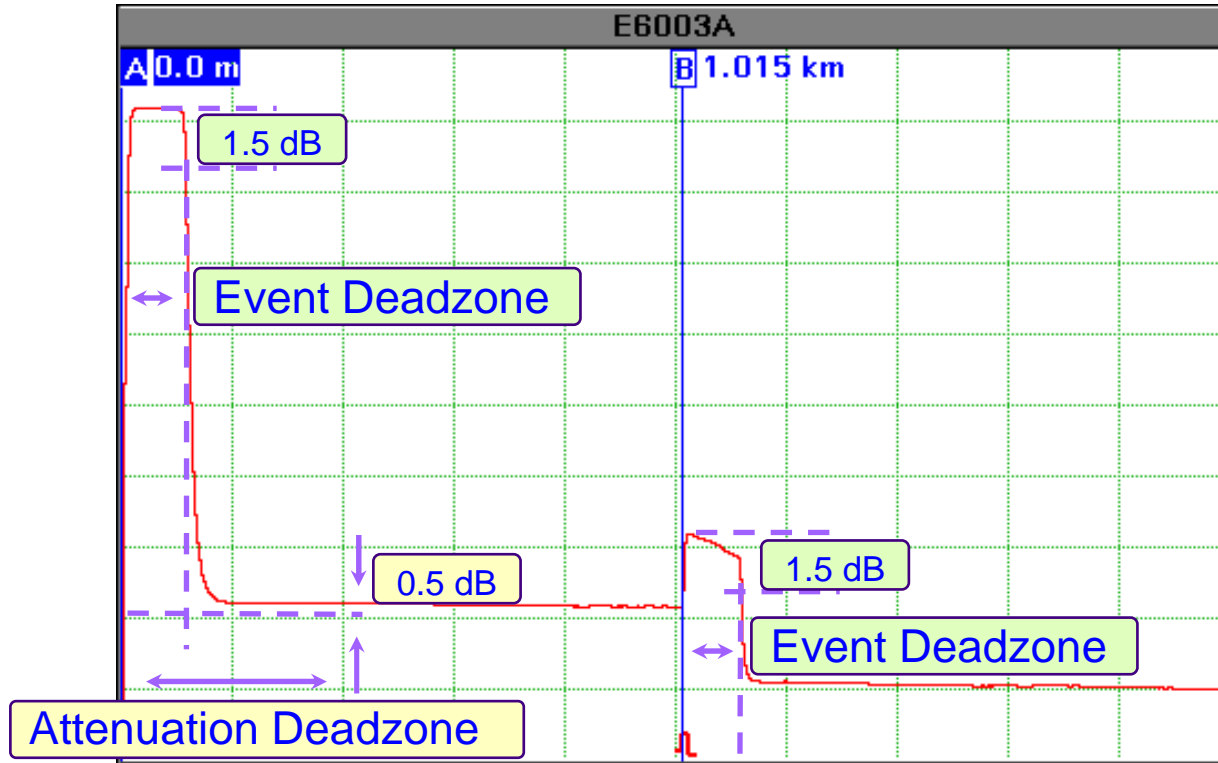
What Distance Can I Measure ?



The maximum distance you can measure depends on the attenuation of the fiber and the dynamic range of your OTDR.

To measure long fibers, or fast measurements on short fibers, you want a high dynamic range.

Deadzone or 2-Point Resolution

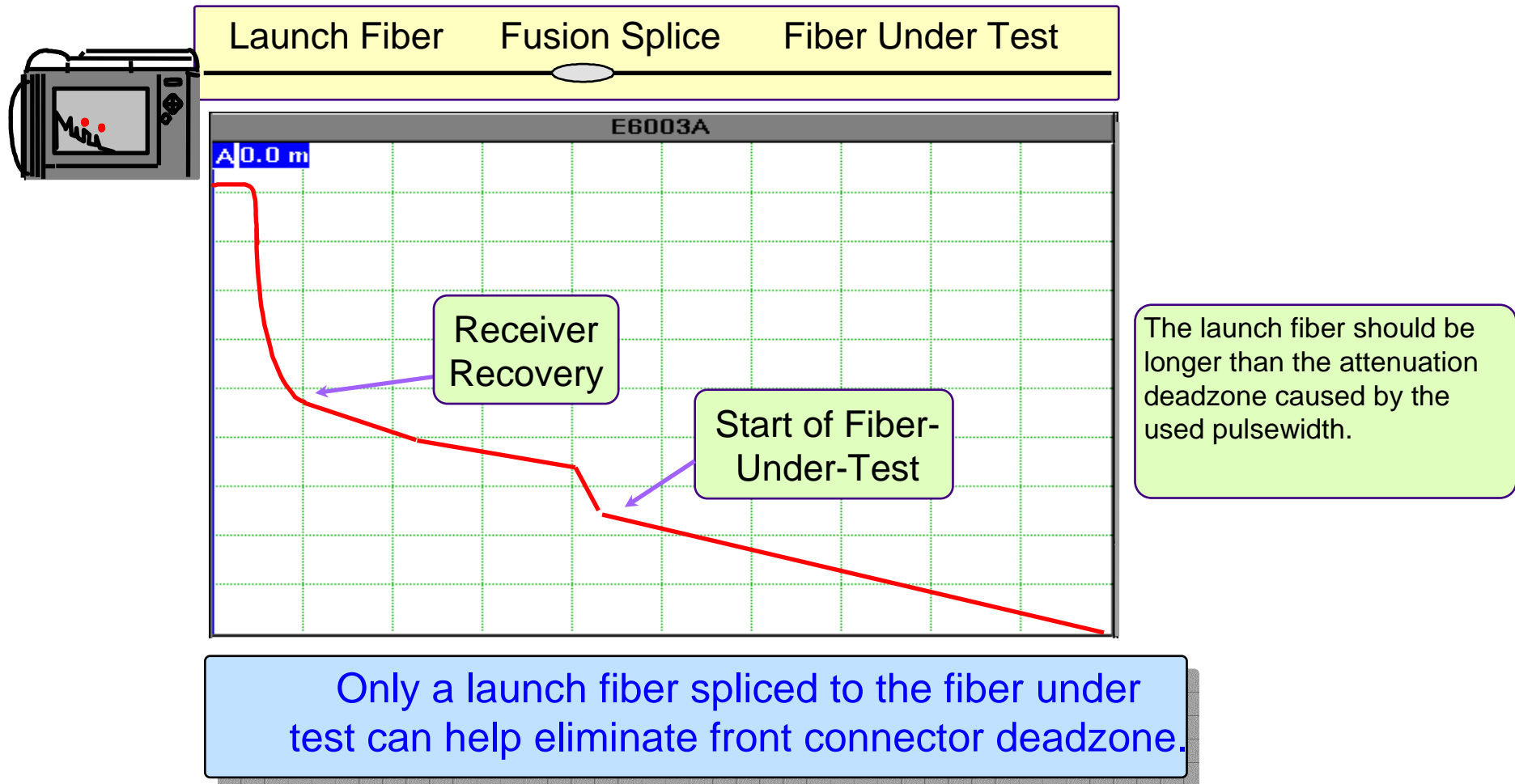


Event Deadzone
minimum 3 m.

Attenuation
Deadzone
minimum 10 m.

A deadzone always occurs at the front panel connector reflection and at any other reflective event on the link.

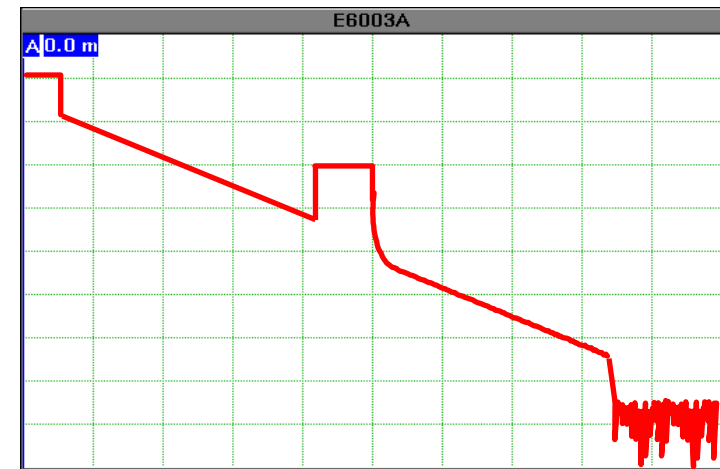
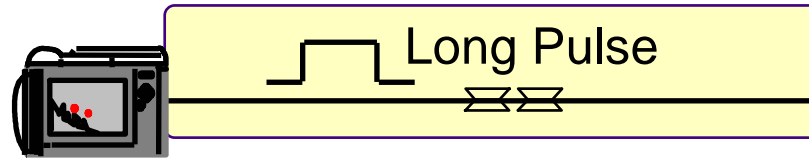
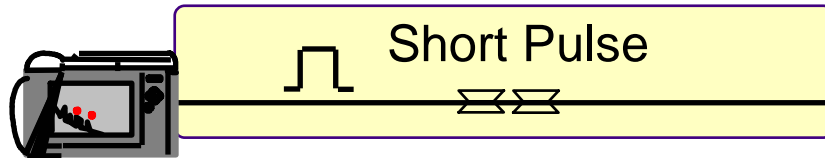
Using Launch Fibers to Eliminate the Deadzone



What Affects the Dynamic Range & Deadzone?

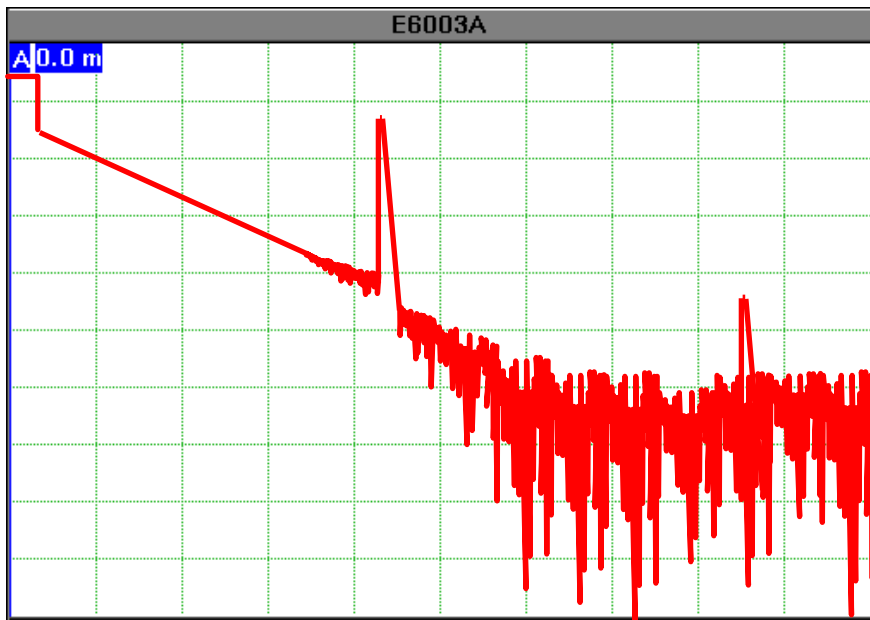
<ul style="list-style-type: none">Dynamic range is a function of:	<ul style="list-style-type: none">Deadzone is a function of:
<ul style="list-style-type: none">- pulsewidth- averaging time- OTDR design	<ul style="list-style-type: none">- pulsewidth- size of the reflection- OTDR design

How Pulsewidth Affects Dynamic Range & Deadzone

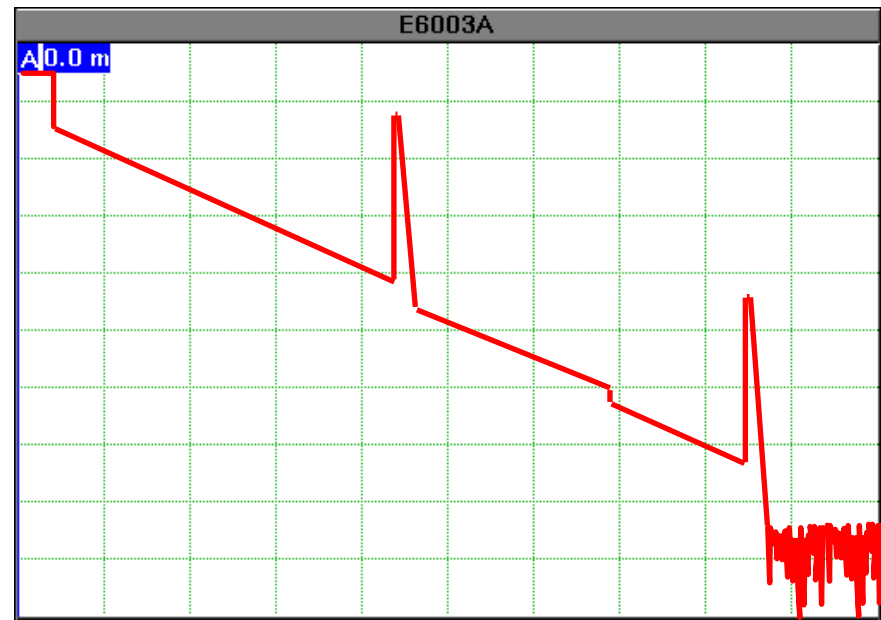


Short pulses provide better deadzones but a smaller dynamic range; long pulses provide a better dynamic range but longer deadzones.

How Averaging Time Affects the Dynamic Range



After 10 seconds

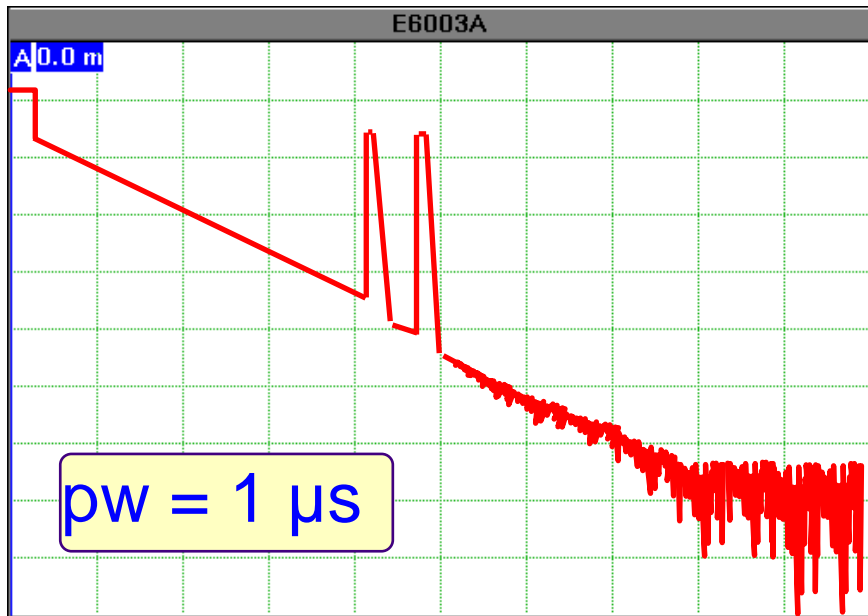


After 3 minutes

A longer averaging time increases the dynamic range by decreasing the noise floor of the OTDR.

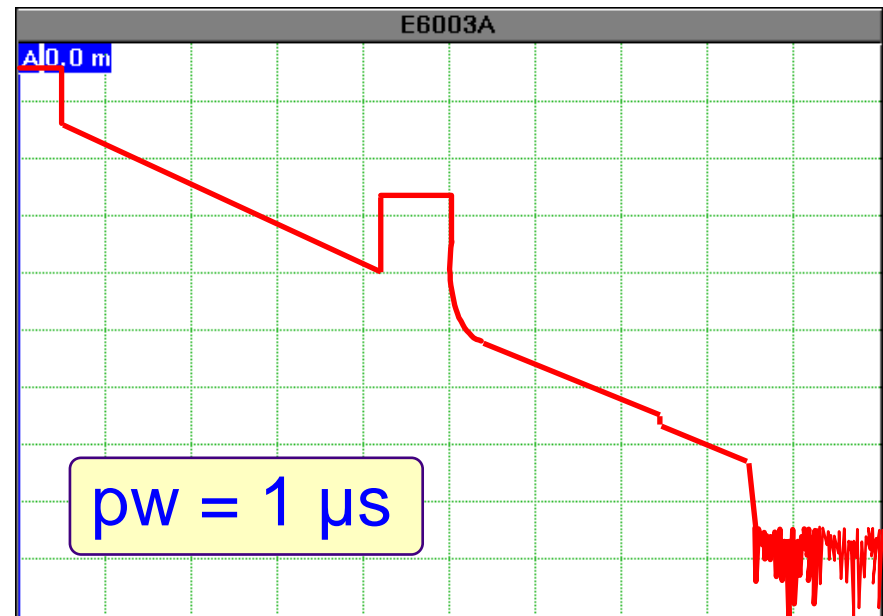
OTDR Design

Optimize for Resolution



Use a wide receiver bandwidth:

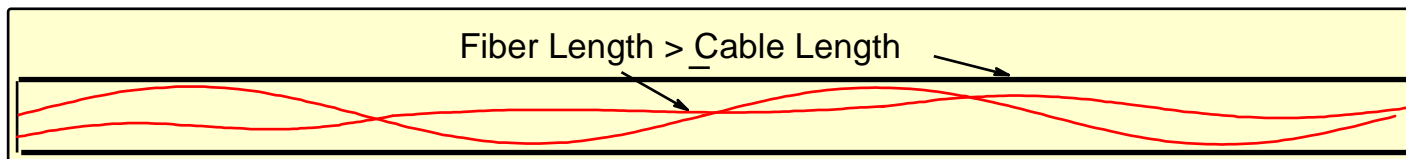
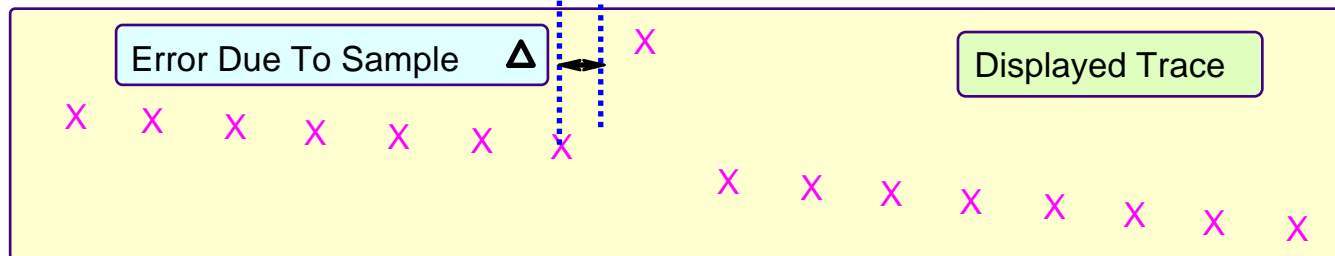
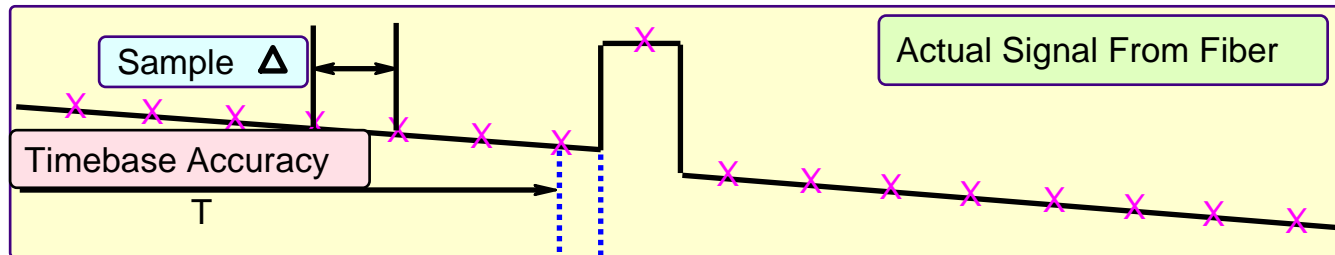
Optimize for Dynamic



Use a narrow receiver bandwidth

Optimizing for resolution offer short deadzones, but a smaller dynamic range;
Optimizing for dynamic offer a large dynamic range but long deadzones.

Distance Accuracy & 1-Point Resolution



Distance accuracy is a function of timebase accuracy, sample distance Δ , index of refraction setting and cabling factor.

Performance Parameters - Summary

- Dynamic Range: determines how far into the fiber you can measure as well as the time required to see an event.
- Deadzone: affects how close together you can resolve two events and can be reduced by decreasing pulsewidth.
- Distance Accuracy: of the event location. It is determined by sample distance spacing and error, IOR and cabling factors.
- Optimize for Dynamic Range: provides a larger dynamic range, but longer deadzones.
- Optimize for Resolution: provides a smaller dynamic range, but shorter deadzones, and better event resolution.

OTDR Measurements Agenda

- Basic Terms
- Fibers and Connectors
- OTDR Measurements
- Introducing the 3M 2000 Mini OTDR
- Software Utilities



3M 2000B Mini-OTDR



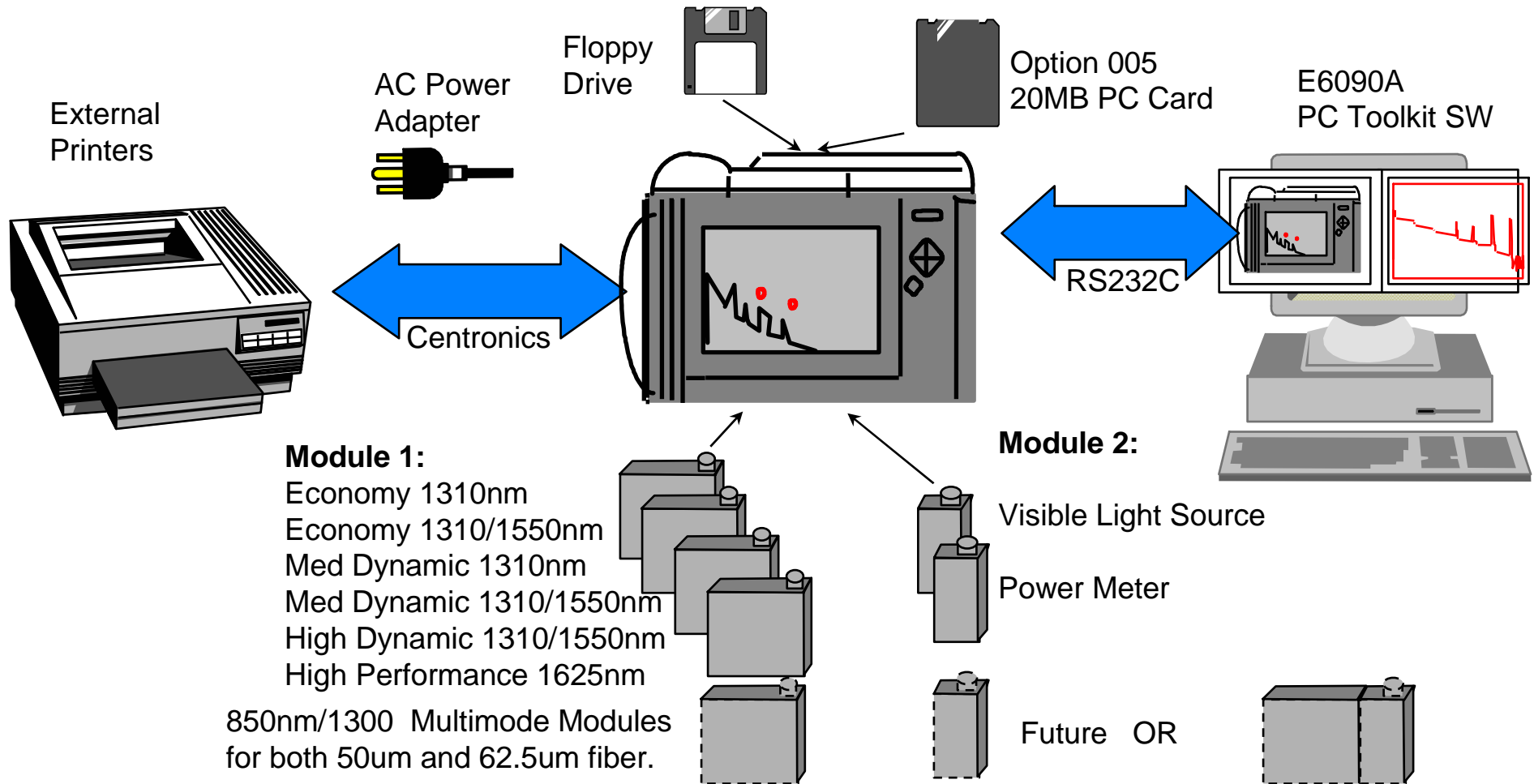
Target application:
Fault location and maintenance of single and multi-mode fiber cables

Key contributions:
Performance/speed
Ease of use
Low-Cost
Size (Lightweight)
Flexibility

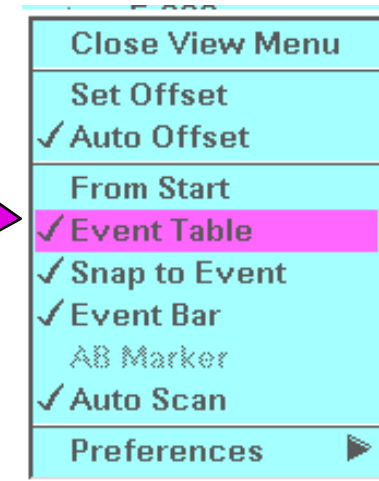
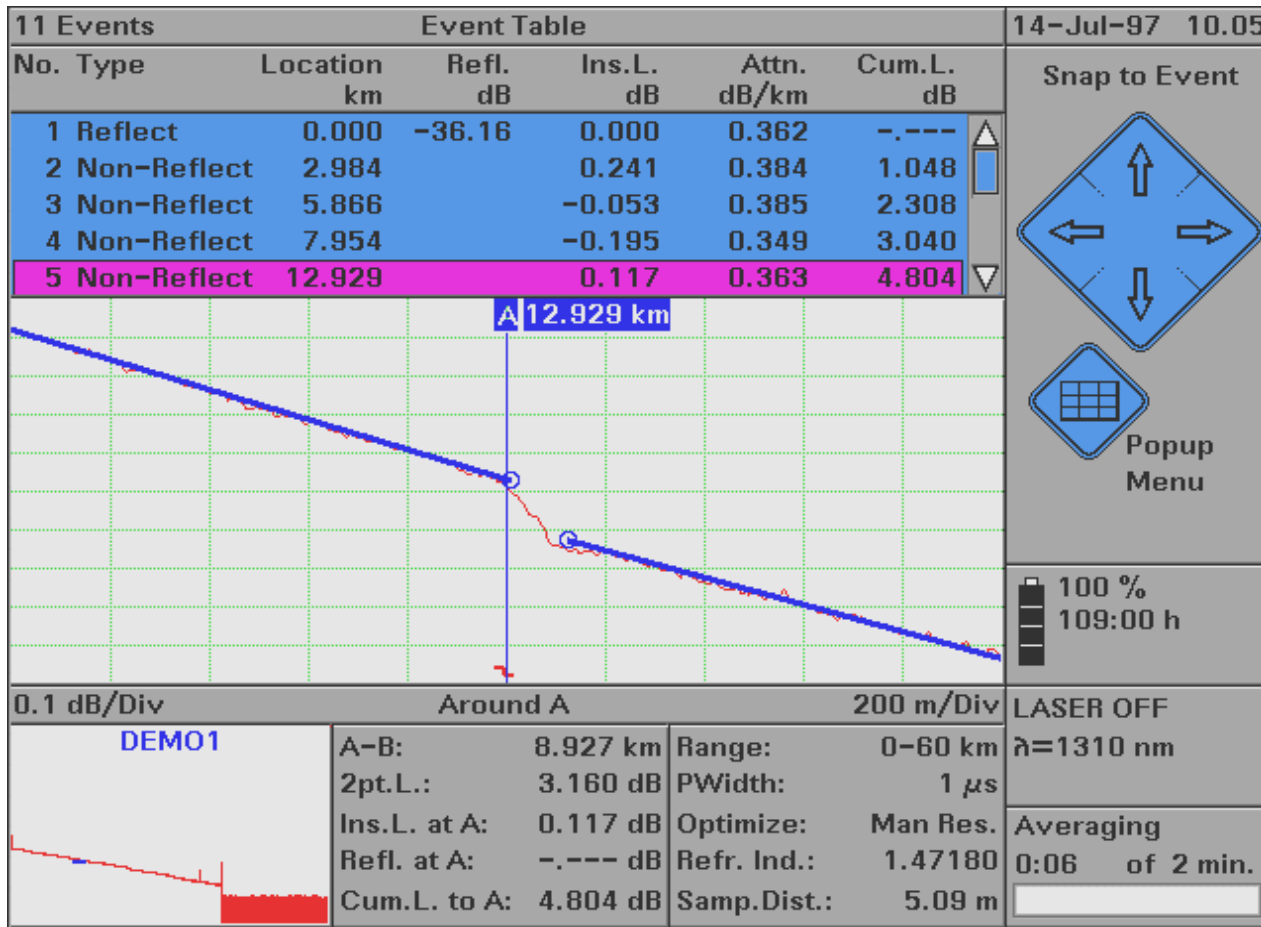
3M 2000 Mini OTDR Accessories supplied



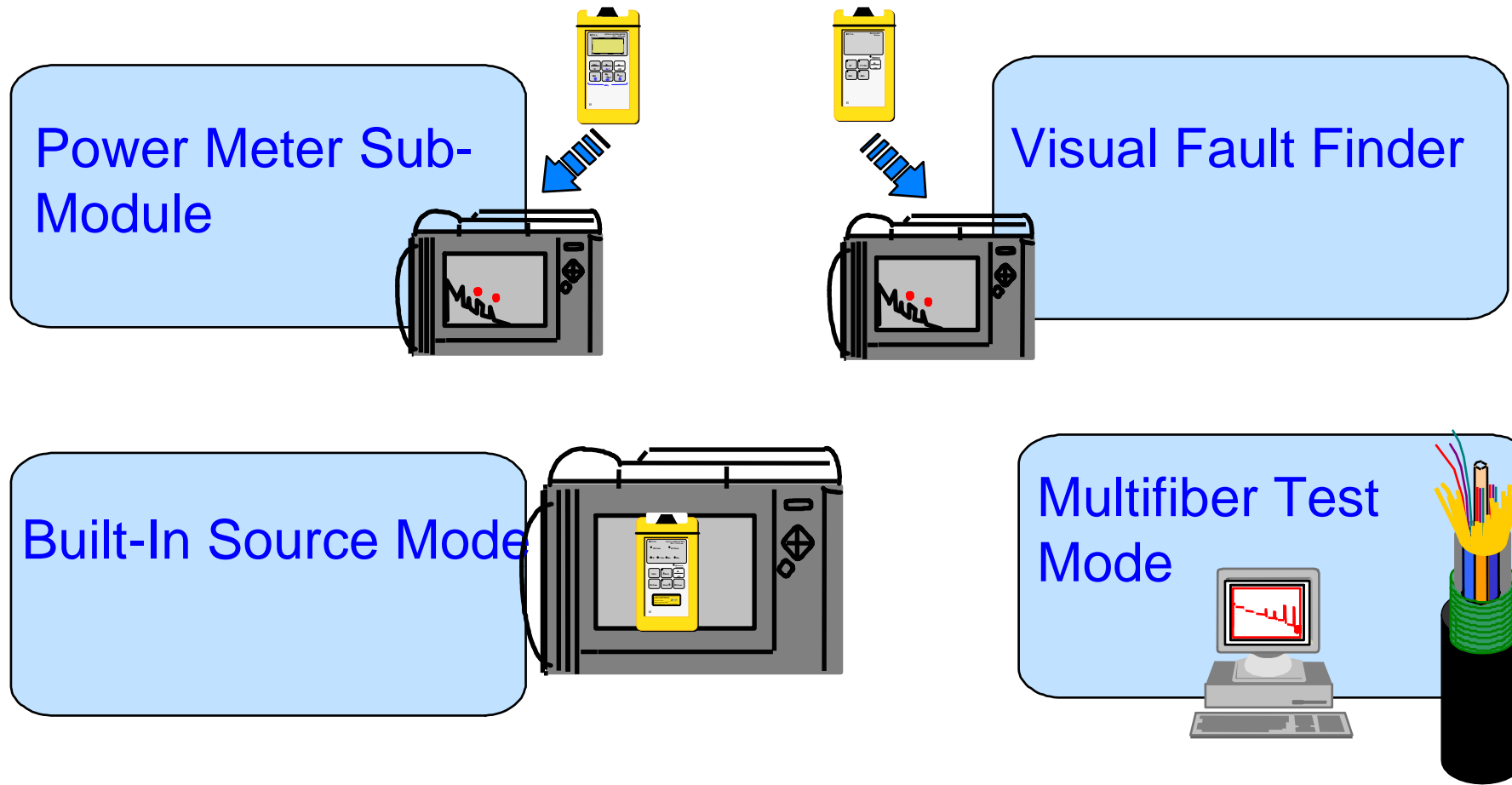
The 3M 2000 Mini OTDR Solution



A Full Featured OTDR



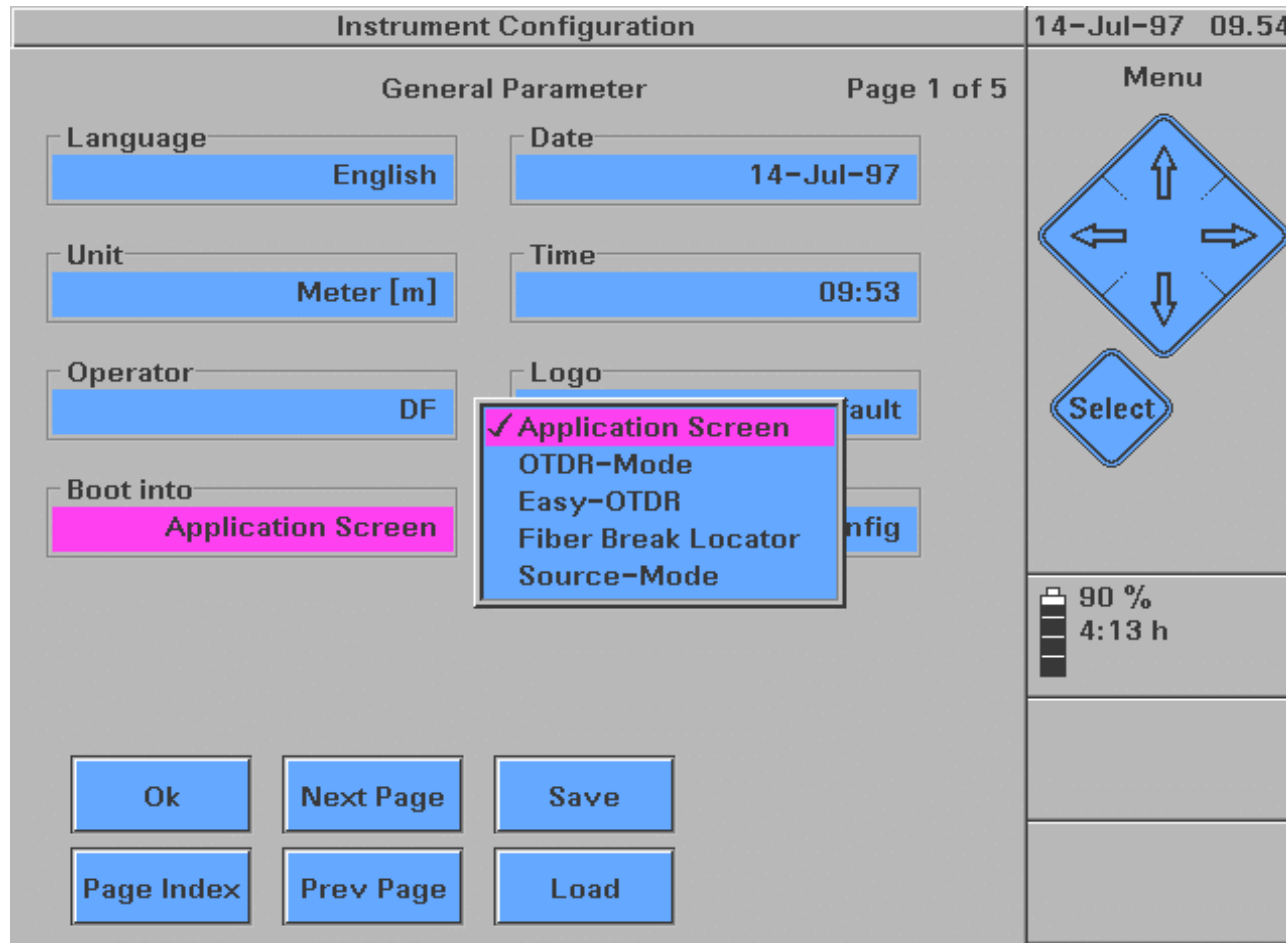
The 3M 2000 Mini-OTDR Tool Bag



When You Turn the Mini-OTDR On



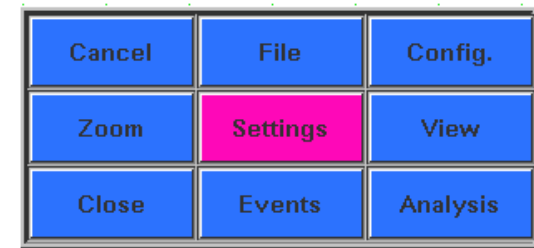
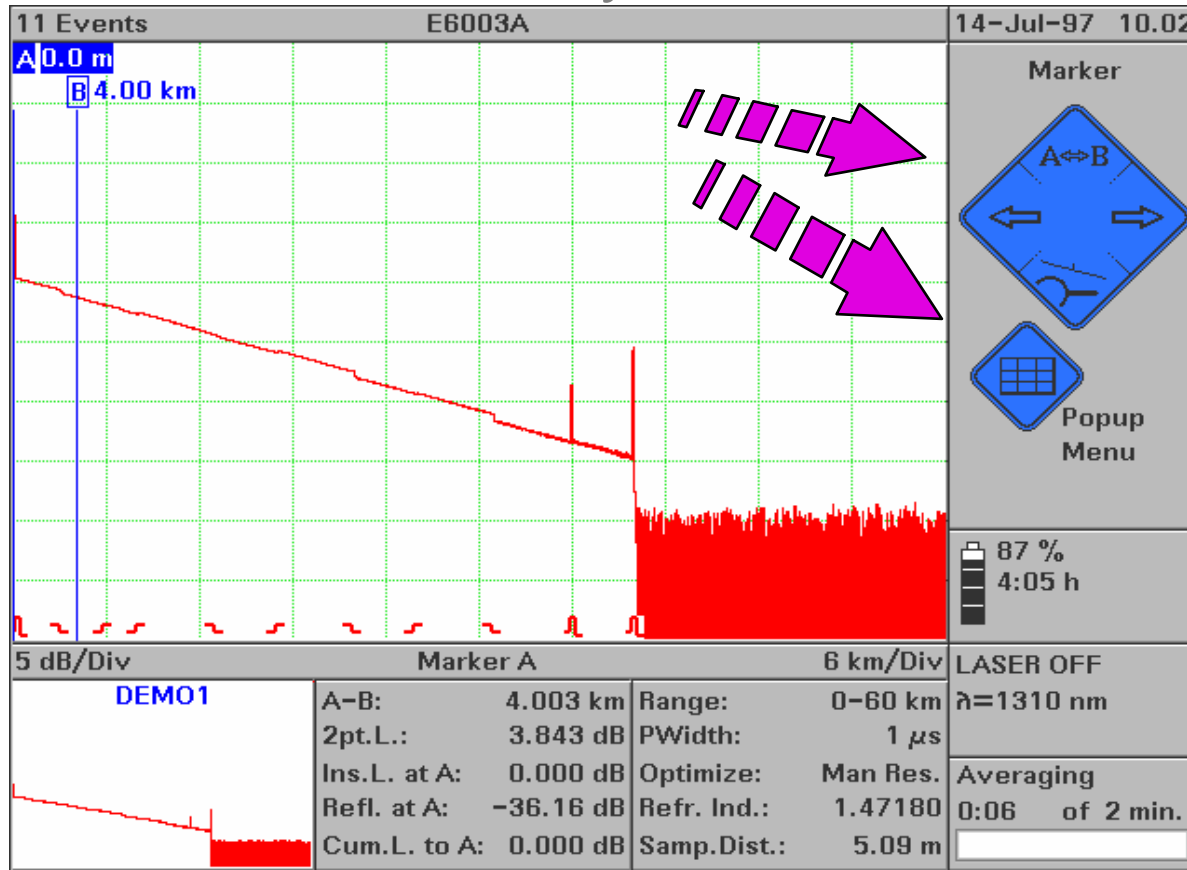
You Can Select



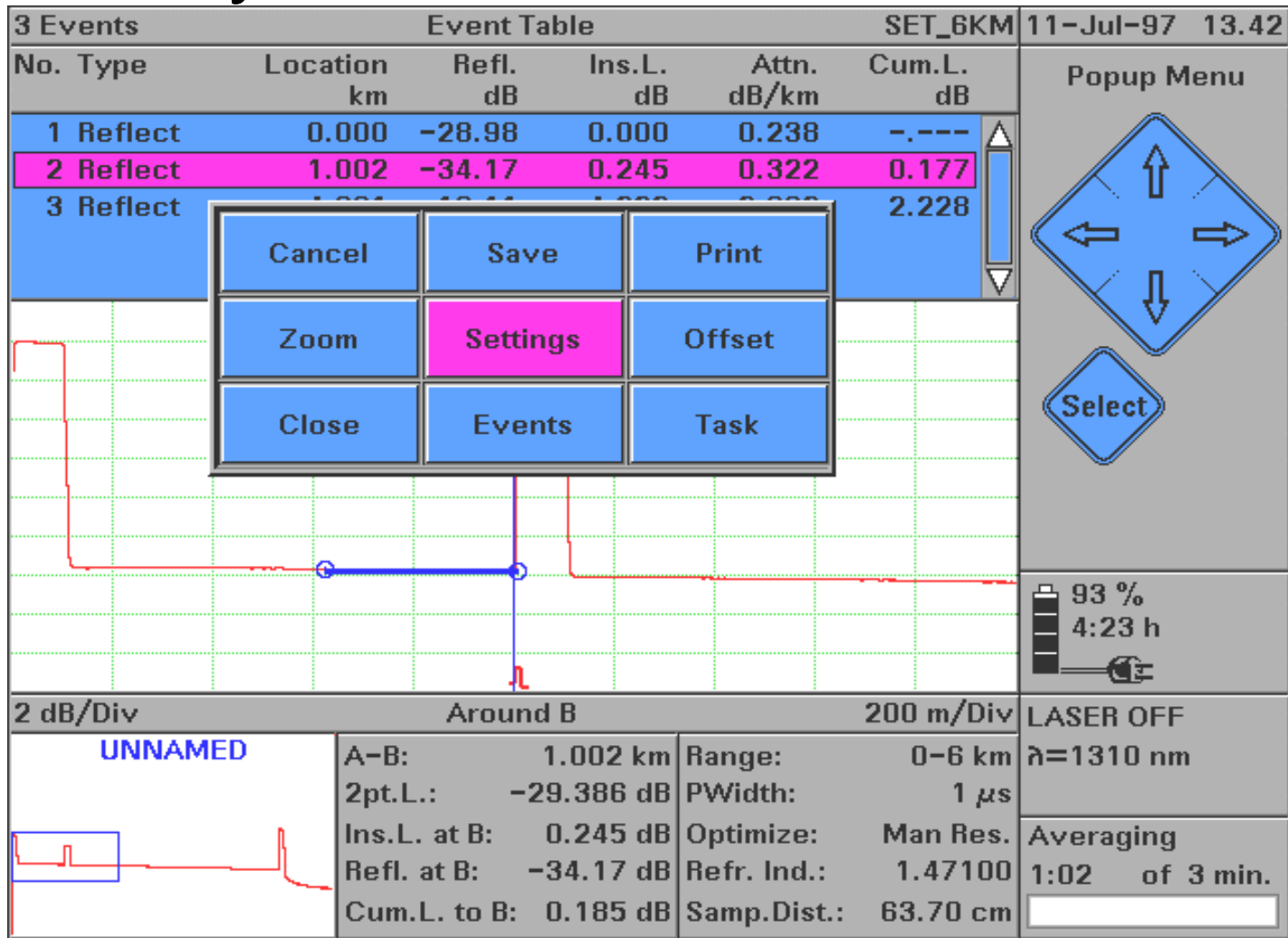
You can select which instrument you want the next time you turn the Mini on.

A Full Featured OTDR

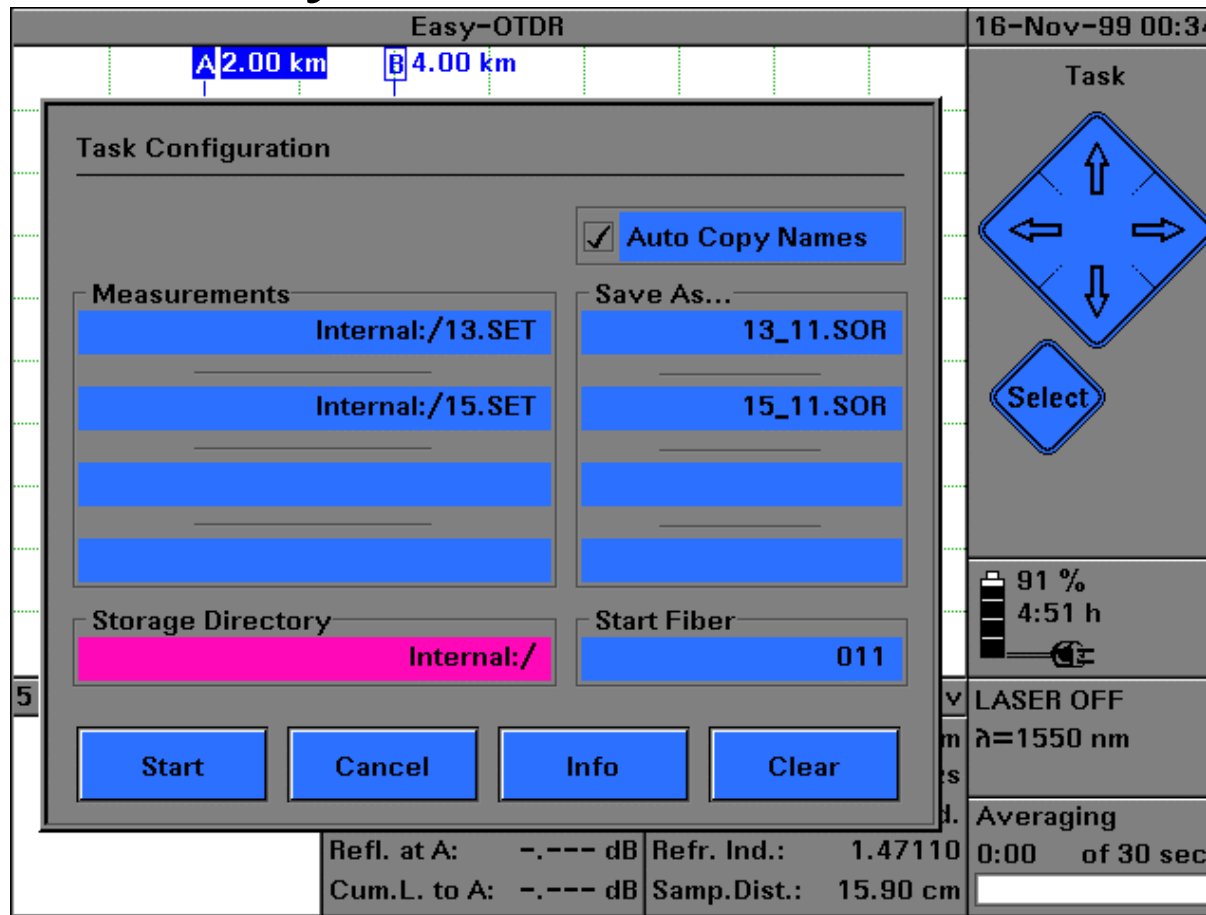
Control's under your thumb



Easy OTDR

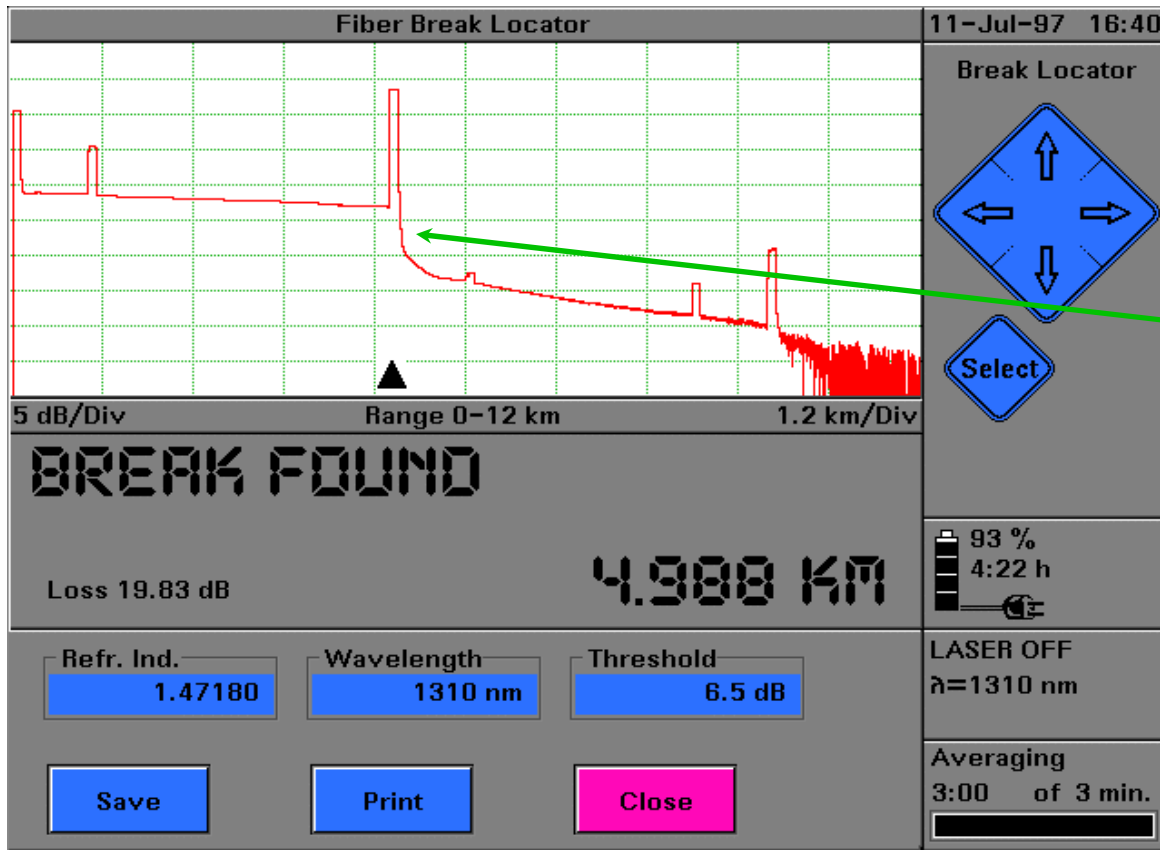


Multifiber Test Mode- The Task Key



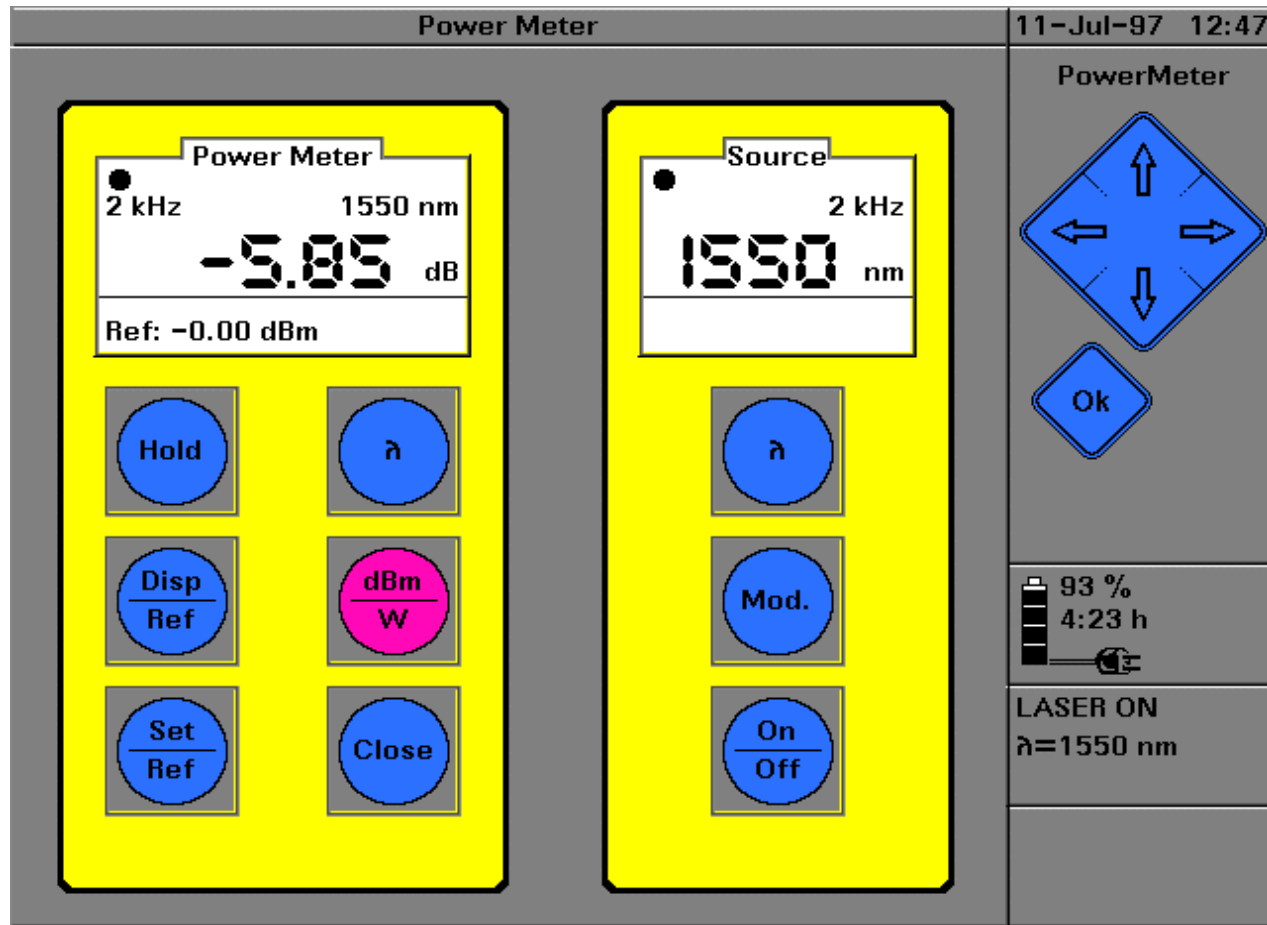
The Task key can run up to four tests on one or more fibers and can store all the traces.

The Fiber Break Locator

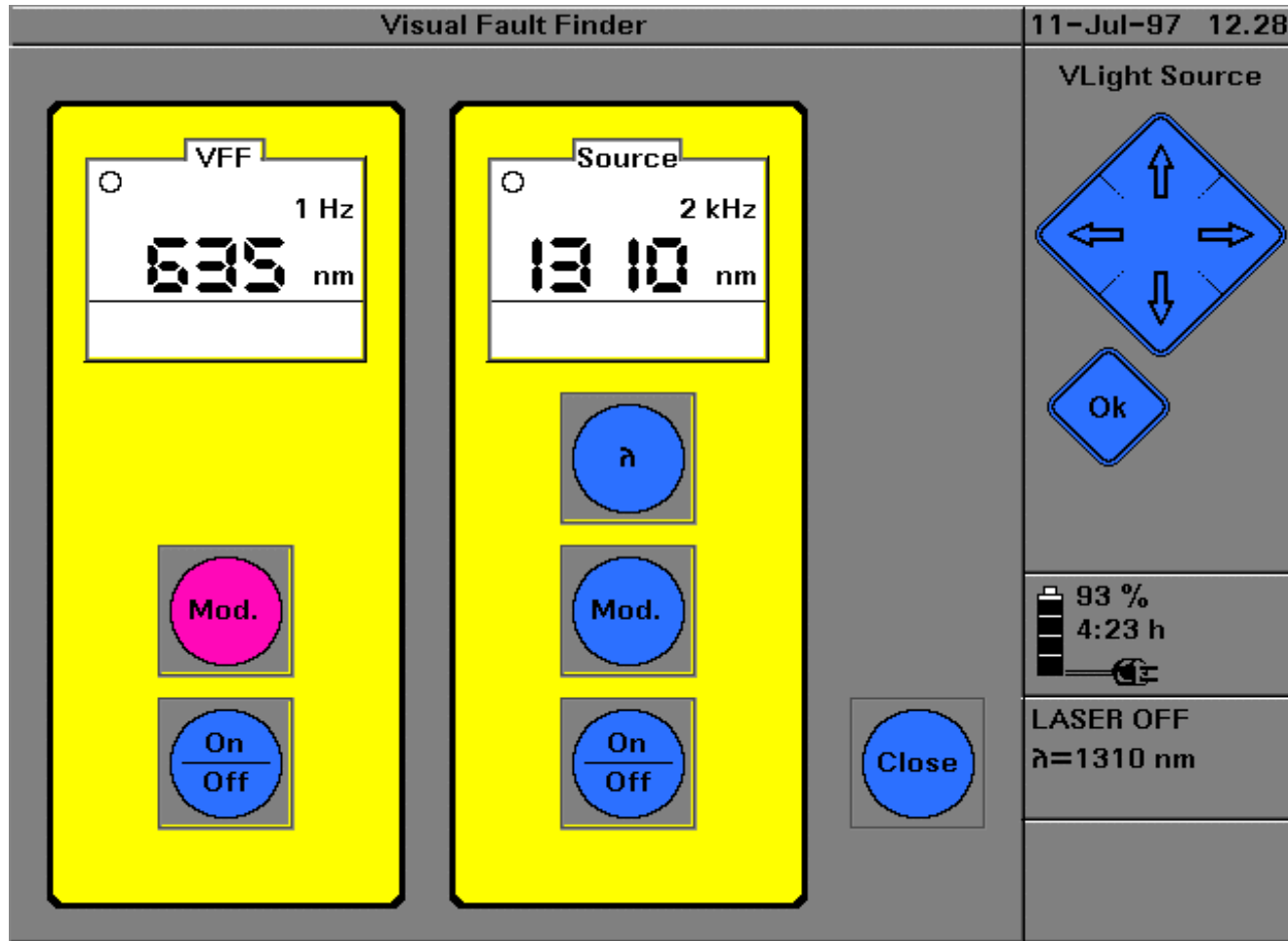


The first drop of the signal below the threshold will be marked.

The Optical Power Meter Sub-Module



The Visual Fault Finder



The Visual Fault Finder has two applications:

- fault location
- fiber identification

3M 2000 Mini OTDR`s Traffic Detection Protects The Transmitter

Fiber under traffic

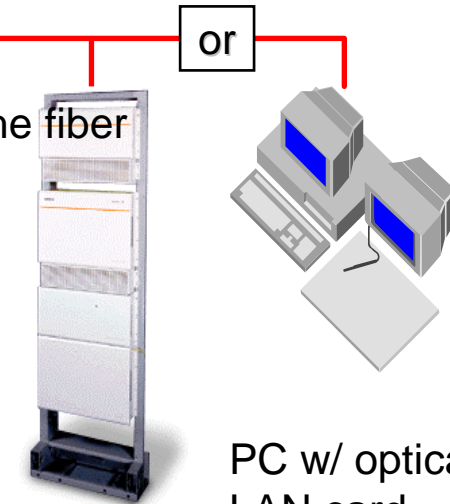
The OTDR checks whether there is optical power on the fiber BEFORE it begins to send high power pulses. This prevents possible damage to expensive transmitters and receivers attached to the fiber.

Traffic Detection

**Traffic-Signal
on fiber detected!**

Cancel

or



Transmission System

PC w/ optical LAN card



3M 2000 Mini OTDR's Traffic Detection Protects Other OTDRs

Fiber under test

The Agilent OTDR checks whether there is optical power on the fiber BEFORE it begins to send high power pulses. If power is detected it does not send pulses that could damage other OTDR's and it disables it's owns sensitive receiver to prevent damage from other sources



Traffic Detection

Traffic-Signal
on fiber detected!

Cancel



CAUTION

The OTDR, without a proper setup, should not be connected to live fiber. To avoid damage to the OTDR, make sure that all fiber to be tested is inactive at the time of connection and testing. Any incoming signal greater than -30 dBm can affect the accuracy of the OTDR acquisition and damage the OTDR module.

Remember:
A high power signal input can not damage the Agilent OTDR



OTDR Enabling technologies

Intelligent High Capacity NiMH batteries for long predictable performance



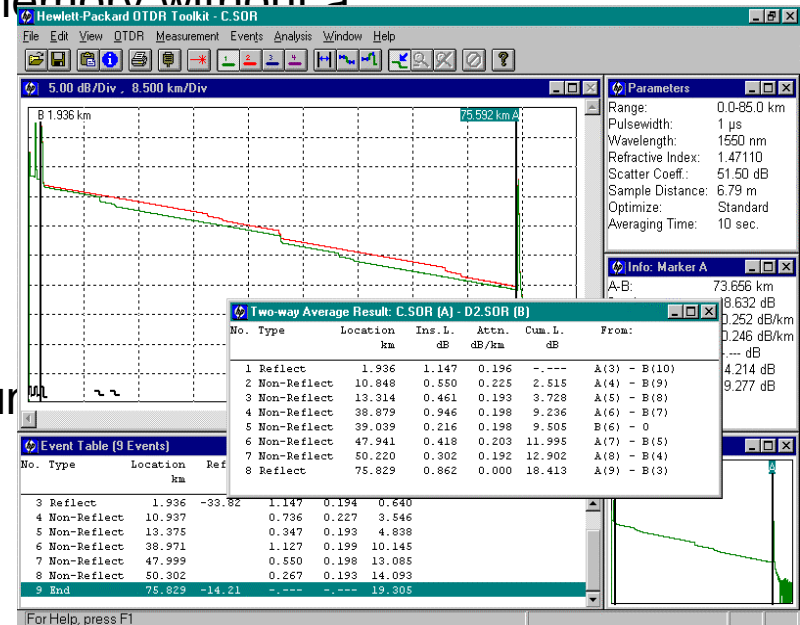
New Flash PC Card for the 3M Mini-OTDR

2000stores

up to 3000 traces in flash memory without a

battery!

3M's OTDR Support CD provides software tools, and files.

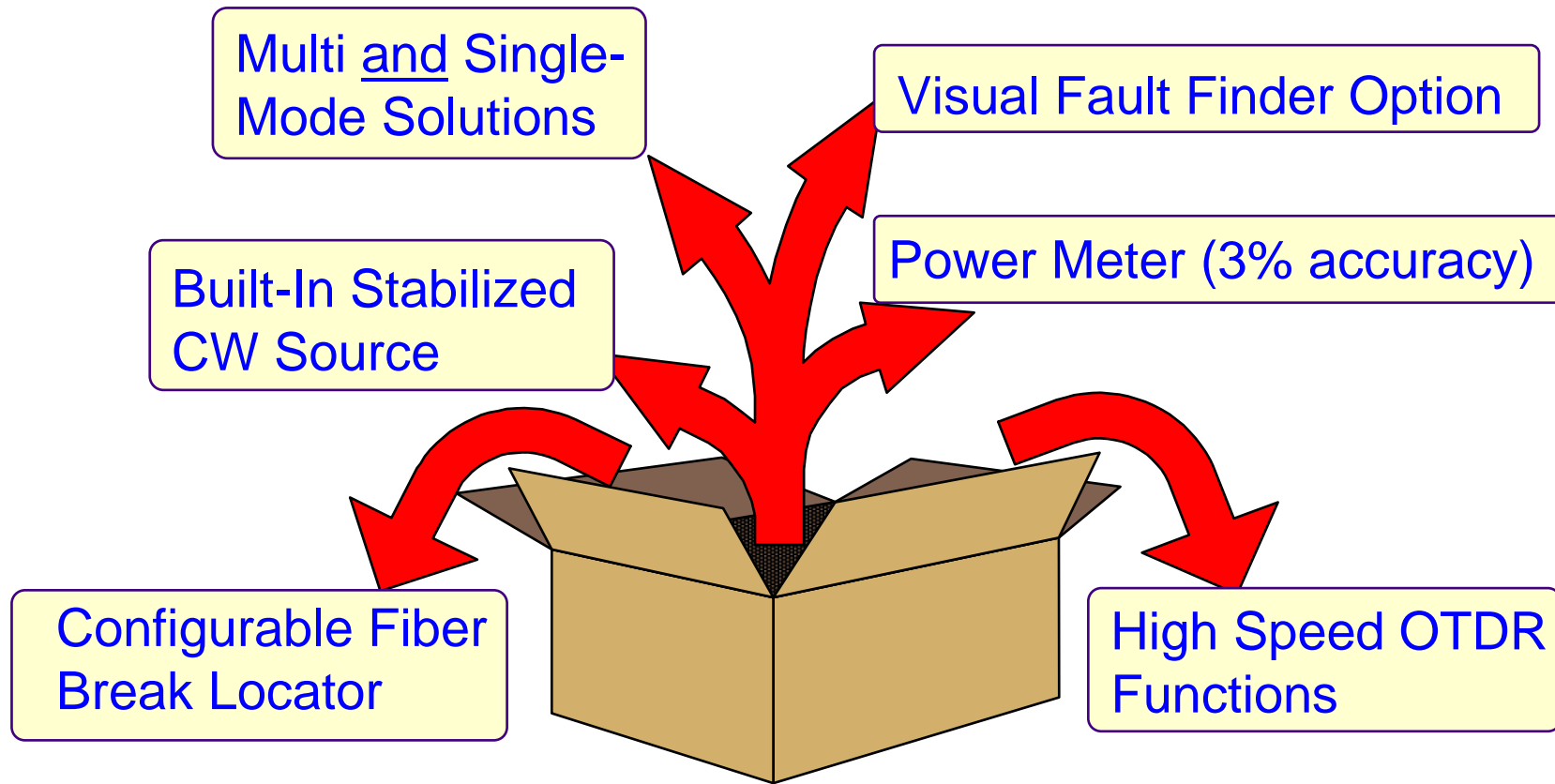


Free Trace Viewer and transfer PC Software run under all Windows versions.



In summary

- Great features in a small package . . .



OTDR Measurements Agenda

- Basic Terms
- Fibers and Connectors
- OTDR Measurements
- Introducing the 3M Mini-OTDR 2000
- Software Utilities



3M 2000 MINI OTDR: The 3M OTDR Toolkit

Desktop viewing and post-processing of OTDR trace data in a Windows™ environment



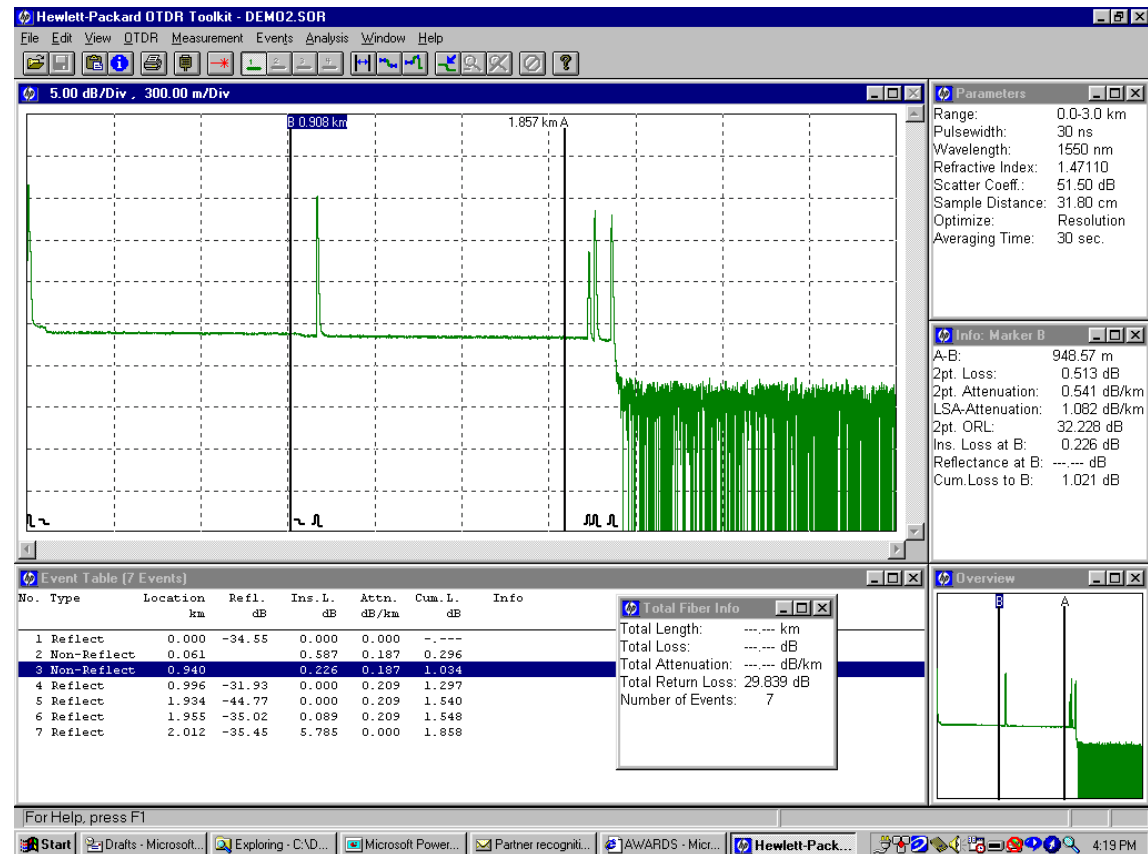
- Analysis of splices, connectors and attenuations.
- Comparison of up to four traces simultaneously.
- Remote control of Agilent's OTDR
- Trace Navigator
- Trace Browser
- Print multiple traces
- Process multiple traces
- Two-way averaging
- Subtract traces
- Comprehensive context sensitive online help.
- ASCII export
- Copy to clipboard

Try our free OTDR TraceViewer Software. Go to <http://www.tmo.hp.com/tmo/> and select Product Information In Search Key type "E6090A", select Agilent E6090A OTDR Toolkit and follow the instructions

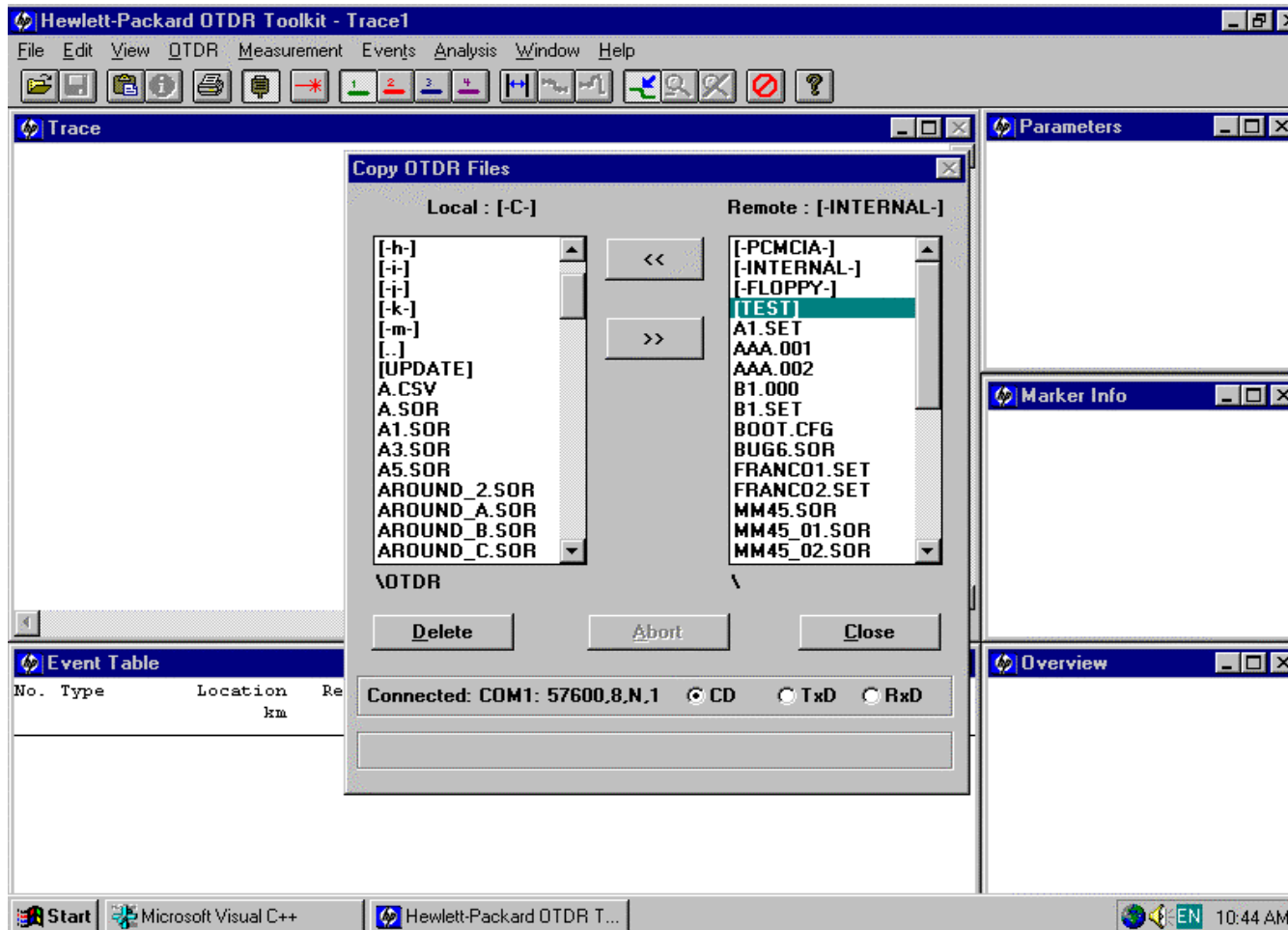
Free Trace Viewer

Download from the Web or from Agilent's OTDR Support CD

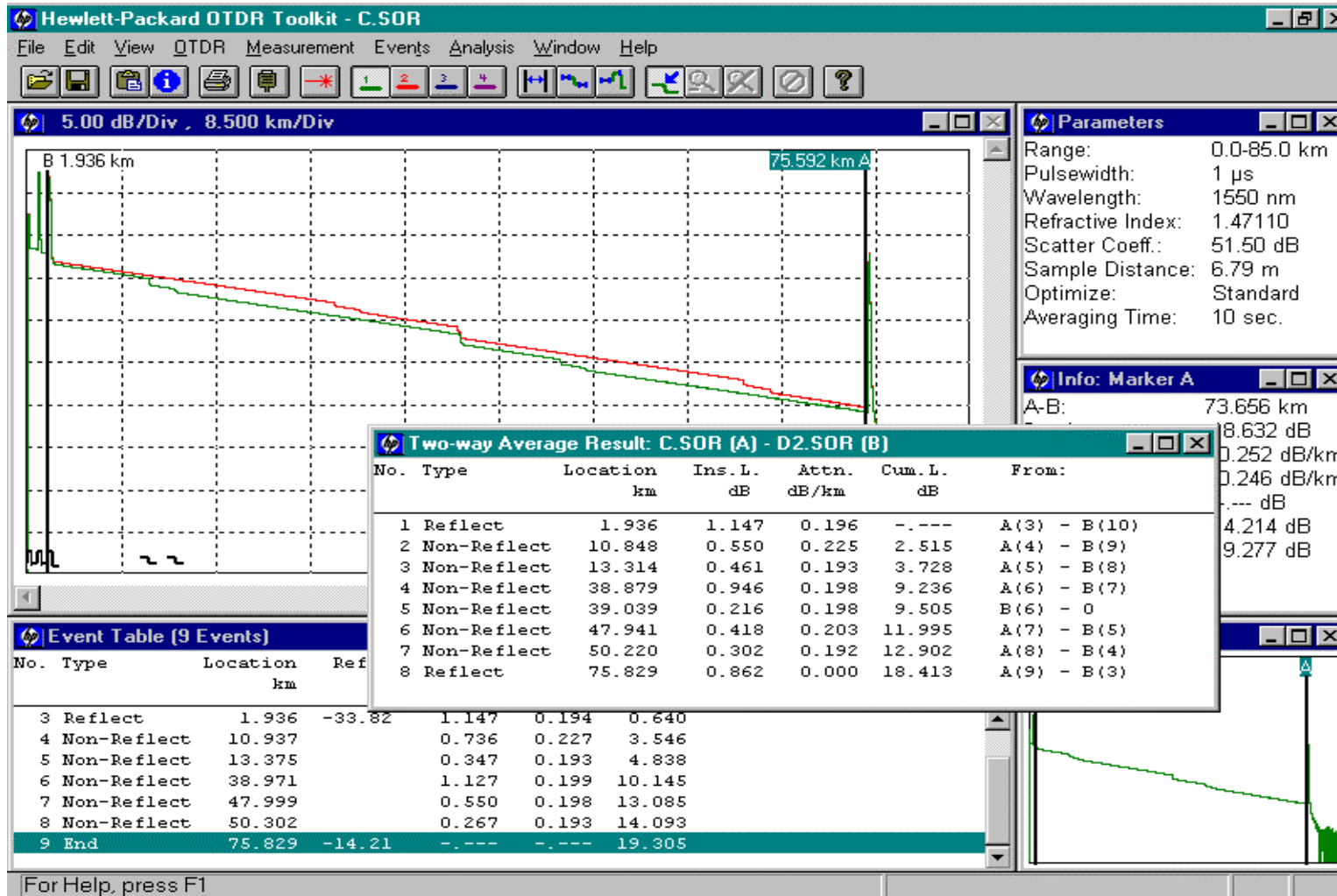
Free Trace Viewer and transfer PC Software runs under all Windows versions.



Trace Manager



Two-Way Averaging



Processing Multiple Traces

Hewlett-Packard OTDR Toolkit - C.SOR

File Edit View OTDR Measurement Events Analysis Window Help

5.00 dB/Div, 8.500 km/Div

0.000 km | A 26.717 km

Trace Processing Actions

Copy Trace Comments from Current Trace

- Cable ID
- Fiber ID
- Orig. Loc.
- Term. Loc.
- Operator

Perform Scantrace with Current Thresholds

Use Current Event Table as Template

OK Cancel

Parameters

Range: 0.0-85.0 km
Pulsewidth: 1 μ s
Wavelength: 1550 nm
Refractive Index: 1.47110
Scatter Coeff.: 51.50 dB
Sample Distance: 6.79 m
Optimize: Standard
Averaging Time: 10 sec.

Info: Marker A

A-B: 26.717 km
2pt. Loss: -30.716 dB
2pt. Attenuation: -1.149 dB/km
LSA-Attenuation: 0.307 dB/km
Ins. Loss at A: 1.127 dB
Reflectance at A: --- dB
Cum. Loss to A: 7.775 dB

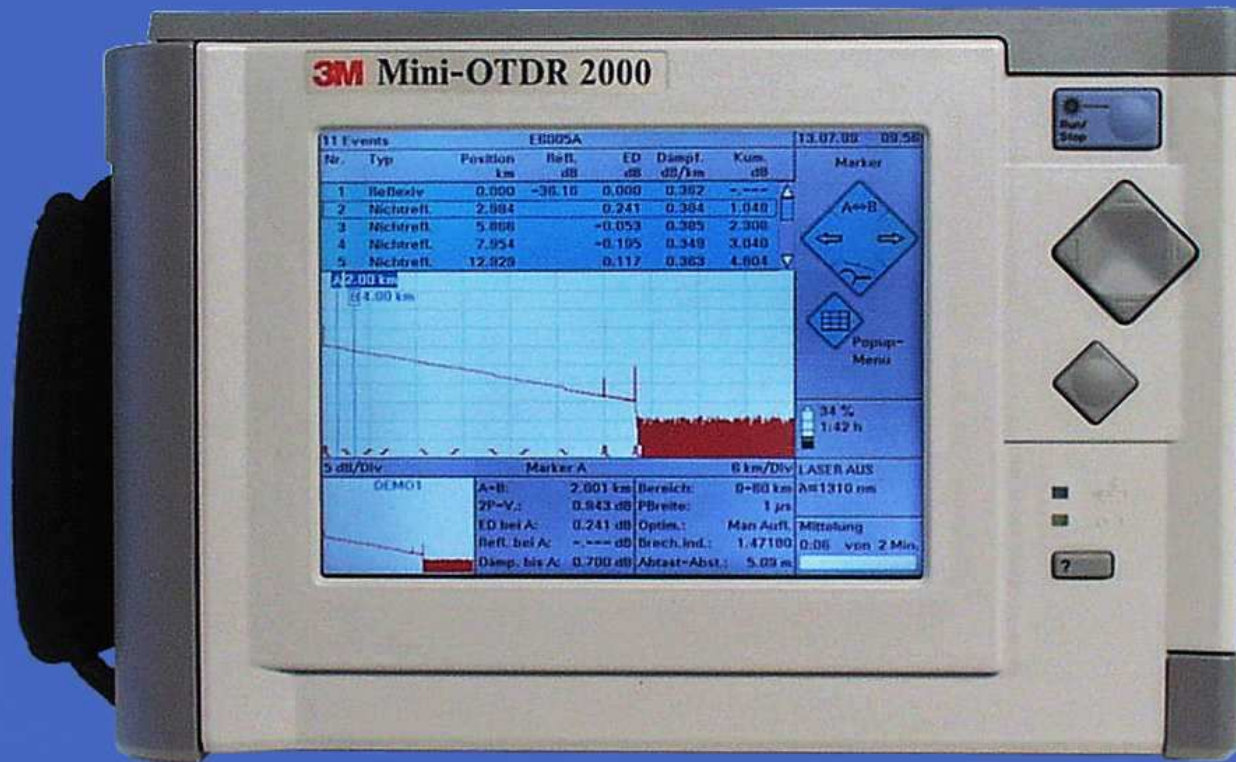
Event Table [9 Events]

No.	Type	Location km	Refl. dB	Ins. L. dB	Attn. dB/km	Cum. L. dB
1	Reflect	0.000	-30.23	0.000	0.000	---
2	Reflect	0.999	-33.28	0.299	0.000	0.148
3	Reflect	1.936	-33.82	1.147	0.194	0.640
4	Non-Reflect	10.937		0.736	0.227	3.546
5	Non-Reflect	13.375		0.347	0.193	4.838
6	Non-Reflect	38.971		1.127	0.199	10.145
7	Non-Reflect	47.999		0.550	0.198	13.085
8	Non-Reflect	50.302		0.267	0.193	14.093

For Help, press F1

Overview

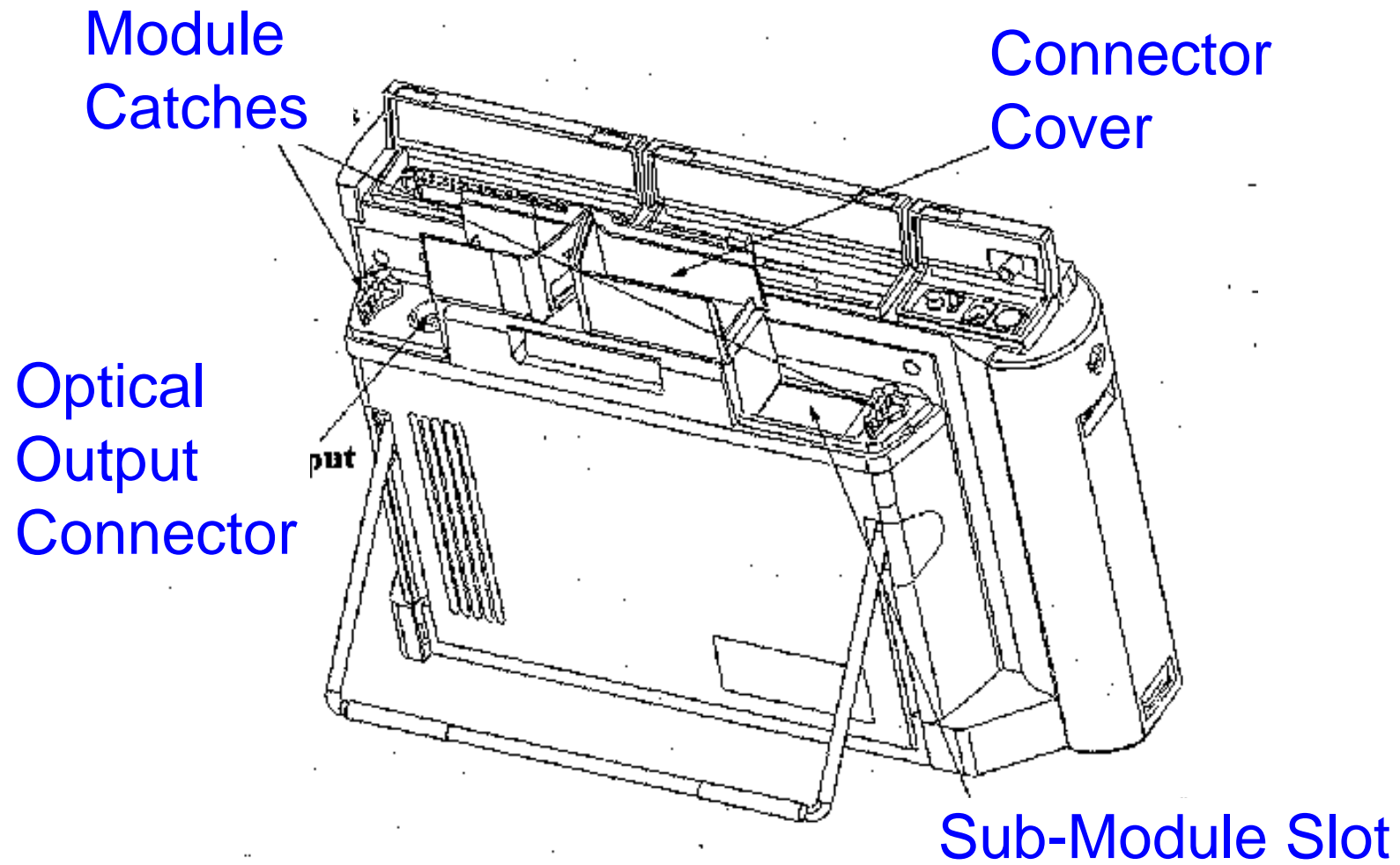
Hands on with the 3M 2000 Mini-OTDR



Using the 3M 2000 Mini-OTDR

- The Hardkeys- Softkeys and Menus
- Getting started- Storing your Setups
- Measurement Parameters
- Analyzing Traces
- Using Easy Mode
- Printing and Saving Traces

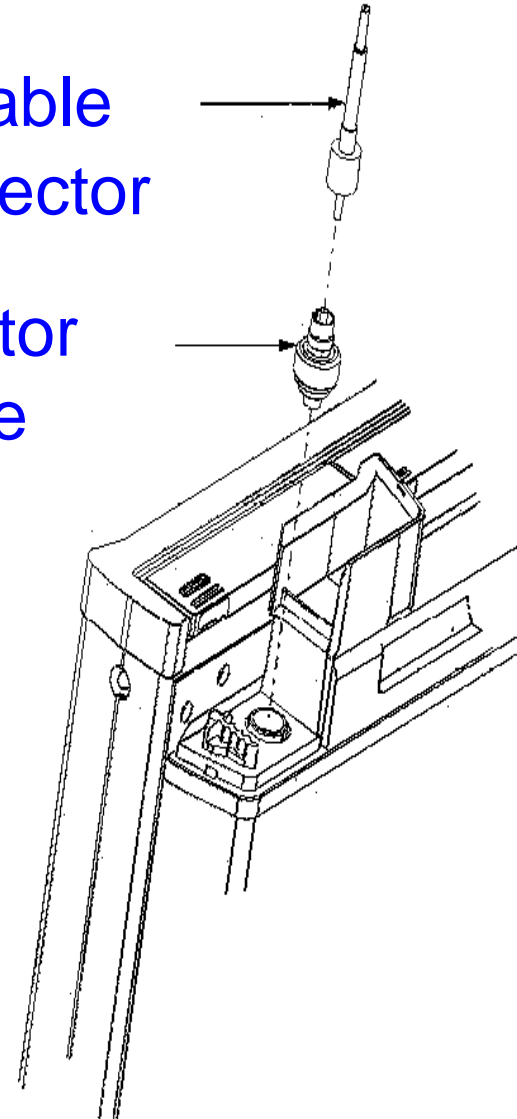
Preparing your Mini



Preparing your Mini

Optical Cable
and Connector

Connector
Interface



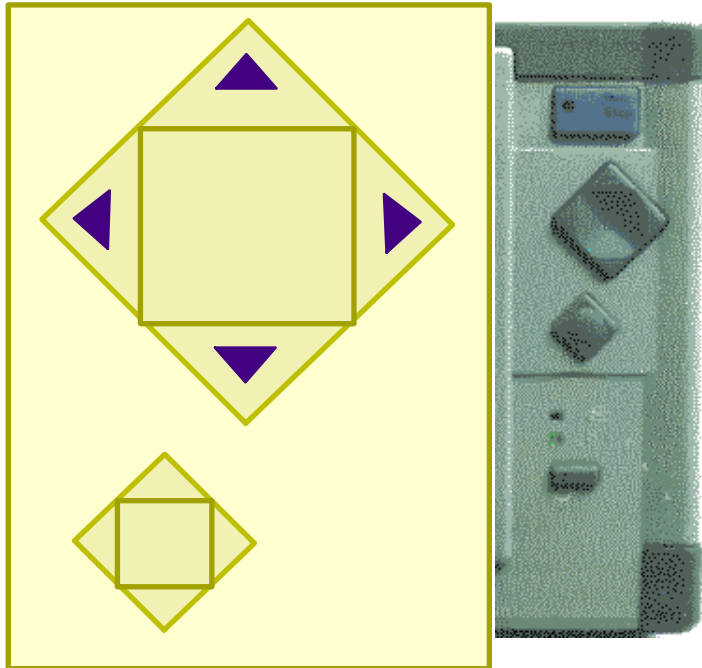
The Connector Interface
is exchangeable:

ST - Connector DE-0100-0830-3
SC - Connector DE-0100-0832-9
FC/PC - Connector DE-0100-0831-1
DIN - Connector DE-0100-0833-7
E-2000 - Connector DE-0100-0824-6
Angled Connectors are available on request

The Hardkeys on the Mini

These are the main Hardkeys.

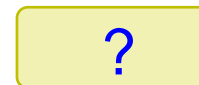
The upper "mouse-key" is used for moving the cursor; the lower key is the Select key.



The Run/Stop key is used to start and stop the measurements.

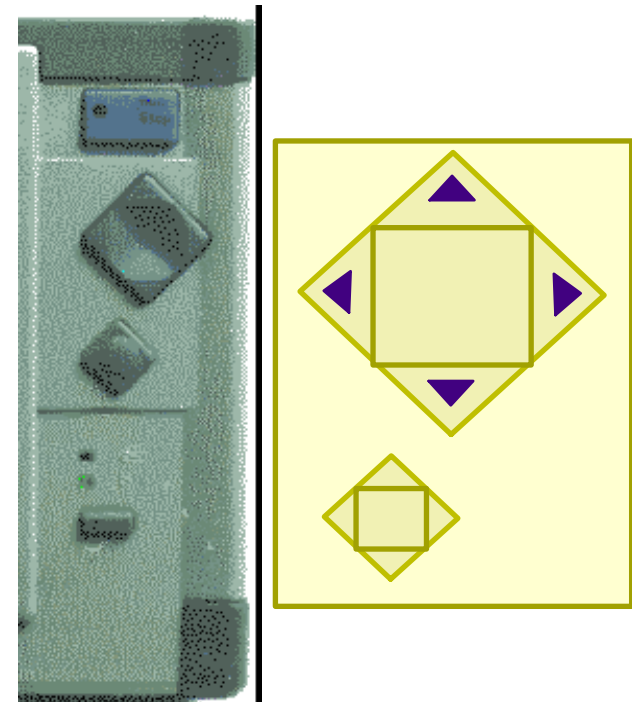


Push the Helpkey anytime to get on-line help.



The Function Hardkeys are used to activate a variety of simple tasks.

Selecting Instrument



Use the cursor keys to highlight your selection - then push the Select key.

Instrument Configuration 1

The screenshot displays the 'Instrument Configuration' software interface. The main window is titled 'Instrument Configuration' and shows 'Page 1 of 6'. The 'General Parameter' section includes settings for Language (English), Date (16-Nov-99), Unit (Meter [m]), Time (21:39), Operator, Logo (Default), Boot into (Application Screen), and Power-On Settings (User Config). A list of configuration options is shown, with 'Application Screen' and 'User Config' selected. The 'User Config' list includes OTDR-Mode, Easy-OTDR, Fiber Break Locator, Source-Mode, and Task Mode. Navigation buttons include Page Index, Prev Page, and Load. A status bar at the bottom right shows a battery level of 97% and a time of 5:05 h.

Operator Name:

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
/	1	2	3	4	5	6	7	8	9	0	.	\
+	-	*	_	@	!	#	=	:	()		

Ok Cancel Del CAPS

File

- General Parameter
- OTDR Settings
- Default Trace Info.
- Instrument Setup
- Printer Setup
- Firmware/Language Update

Page Index Prev Page Load

Instrument Configuration 16-Nov-99 21.39

General Parameter Page 1 of 6

Language English Date 16-Nov-99

Unit Meter [m] Time 21:39

Operator Logo Default

Boot into Application Screen Power-On Settings User Config

- Application Screen
- OTDR-Mode
- Easy-OTDR
- Fiber Break Locator
- Source-Mode
- Task Mode

User Config

- User Config
- Last Config
- Default Config

Save

Page Index Prev Page Load

97 % 5:05 h

Instrument Configuration 2

Instrument Configuration
OTDR Settings Page 2 of 6

<input checked="" type="checkbox"/> Event Bar	<input checked="" type="checkbox"/> Traffic Detection
<input type="checkbox"/> Event Table	<input checked="" type="checkbox"/> Grid
<input checked="" type="checkbox"/> Events before Offset	<input type="checkbox"/> Dotted Trace
<input type="checkbox"/> Snap to Event	<input checked="" type="checkbox"/> AB-Marker
<input checked="" type="checkbox"/> Auto Scan Trace	<input type="checkbox"/> Load Marker/Zoom
<input type="checkbox"/> Auto Trace Check	
Reflection Parameter Reflectance	Averaging Mode Averaging time

Check the settings you want to be activated.

Pre-define the Trace Info. Labels and the comments.

Instrument Configuration
Default Trace Info. Page 3 of 6

Label 1 Cable ID	Comment 1
Label 2 Fiber ID	Comment 2
Label 3 Orig. Loc.	Comment 3
Label 4 Term. Loc.	Comment 4
Label 5 Operator	Comment 5

Instrument Configuration 3

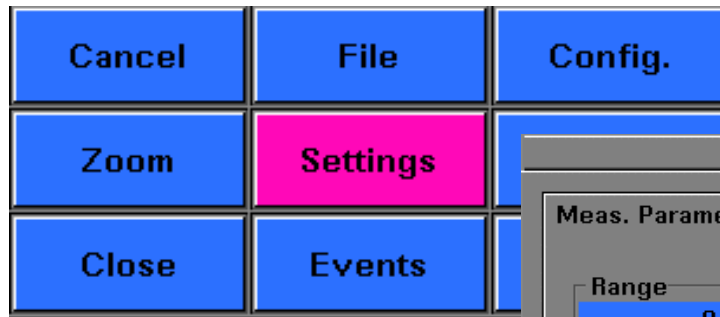
The image shows two overlapping screenshots of the 'Instrument Configuration' software. The top screenshot is 'Page 4 of 6' and shows the 'Instrument Setup' section with 'RS232 Baudrate' set to 19200 and 'Contrast' set to 30%. The bottom screenshot is 'Page 5 of 6' and shows the 'Printer Setup' section. It includes a 'Printer' dropdown set to 'HP LaserJet, 100 dpi' and a 'Printout Logo' dropdown set to 'Default'. Below these are several checkboxes for printout options: 'Header', 'Event Bar', 'Meas. Parameter', 'Event Table', 'Trace', 'Marker Information', 'Grid', and 'Trace Checker Results'. The 'Header', 'Meas. Parameter', 'Trace', and 'Event Bar' checkboxes are checked, while 'Trace Checker Results' is unchecked.

Check the information you want to have printed.

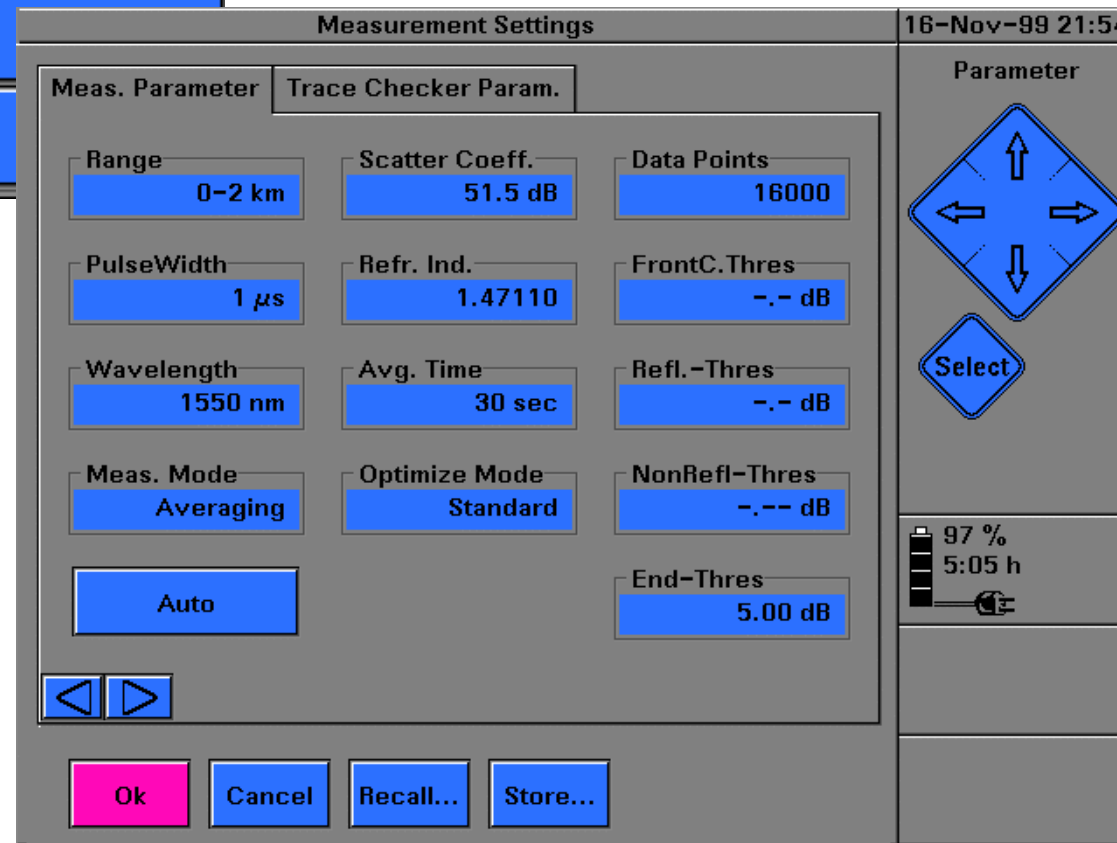
Update language selections and firmware.

The image shows a screenshot of the 'Instrument Configuration' software, 'Page 6 of 6', titled 'Firmware/Language Update'. It features four language selection dropdowns: 'First language' set to 'English', 'Second language' set to 'None', 'Third language' set to 'None', and 'Fourth language' set to 'None'. At the bottom of the screen are two blue buttons: 'Update Languages' and 'Update Firmware'.

The OTDR's Menu: Settings



Push the Select key two times...



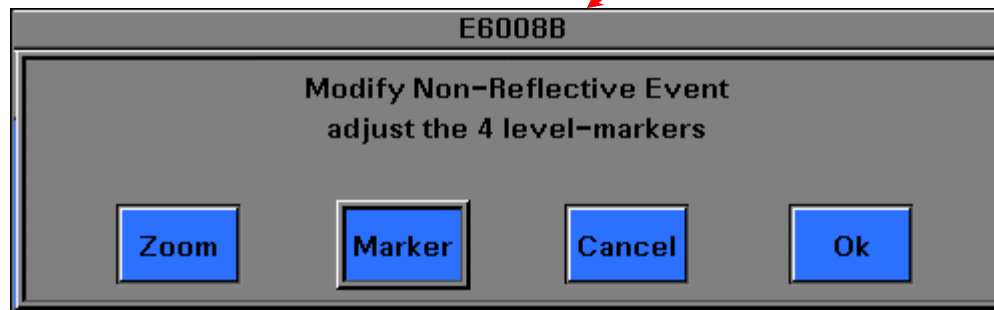
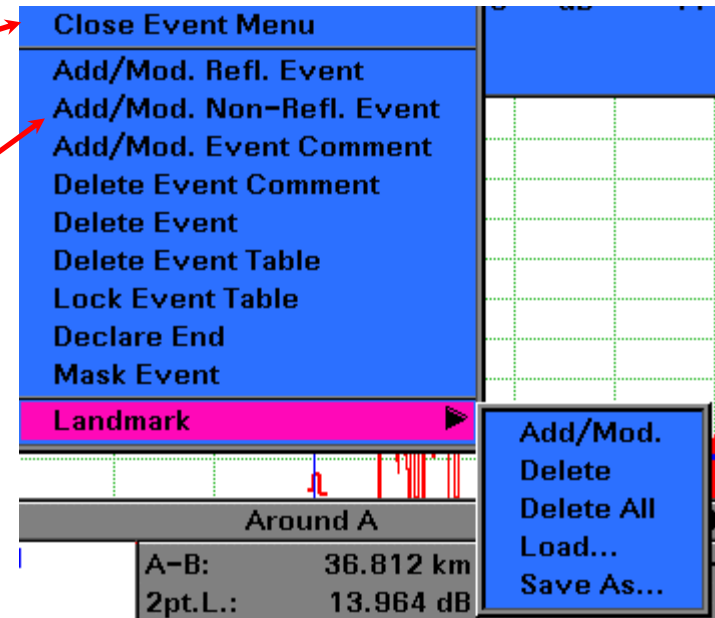
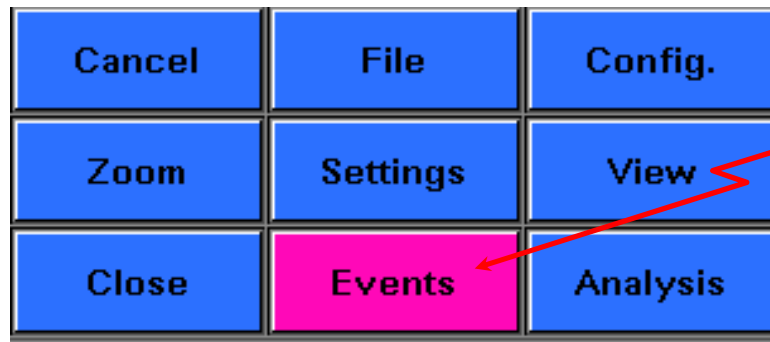
The OTDR's Menu: Analysis

Cancel	File	Config.
Zoom	Settings	View
Close	Events	Analysis

Close Analysis Menu
Scan Trace
Trace Checker
✓ Analyze Insertion Loss
Analyze Reflectance
Adjust Refr. Ind./Dist.
Adjust Scatter Coeff./Refl.
✓ 2pt. Loss
2pt. Attenuation
LSA-Attenuation
Opt. Return Loss

Manually analyzing the trace.

The OTDR's Menu: Events



The OTDR's Menu: **View**

Cancel	File	Config.
Zoom	Settings	View
Close	Events	Analysis

The screenshot shows the 'View' menu with the following options:

- Close View Menu
- Adjust V-Offset
- Clear V-Offset
- Set H-Offset to A
- Clear H-Offset
- From Start
- Event Table
- Trace Checker Table
- Snap to Event
- Events before Offset
- Event Bar
- AB Marker
- Auto Scan
- Auto Trace Check
- Preferences**

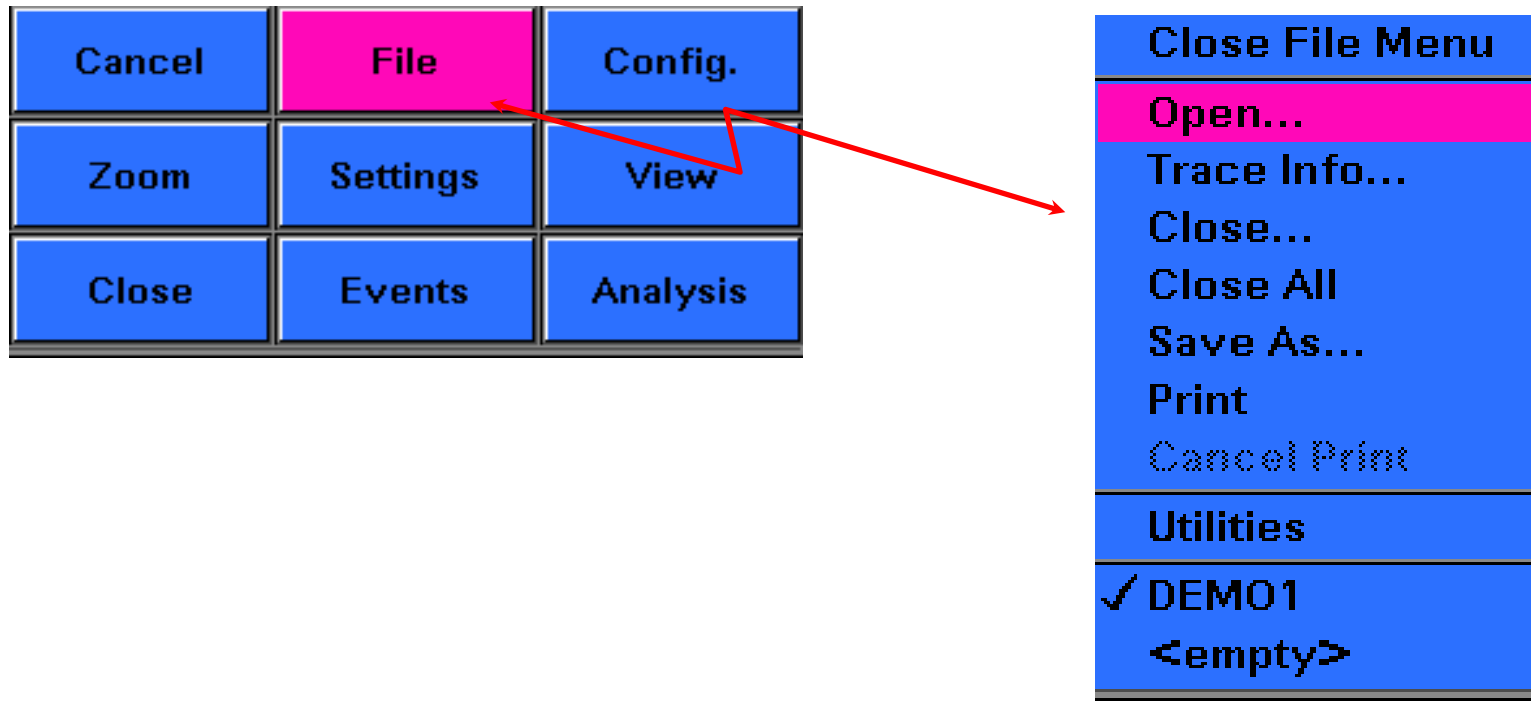
The 'Preferences' sub-menu is open, showing:

- Dotted Trace
- Grid
- Color Mode

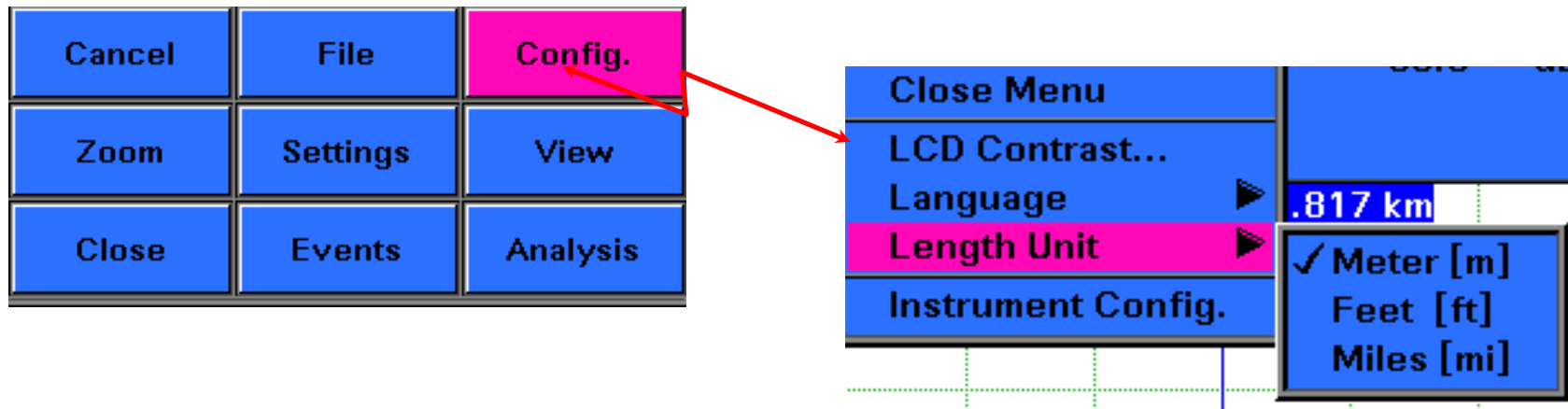
The background shows a portion of the OTDR display with a red trace, a blue line, and a grid. A distance of 1.811 km is visible on the display.

Select what you want on the display.

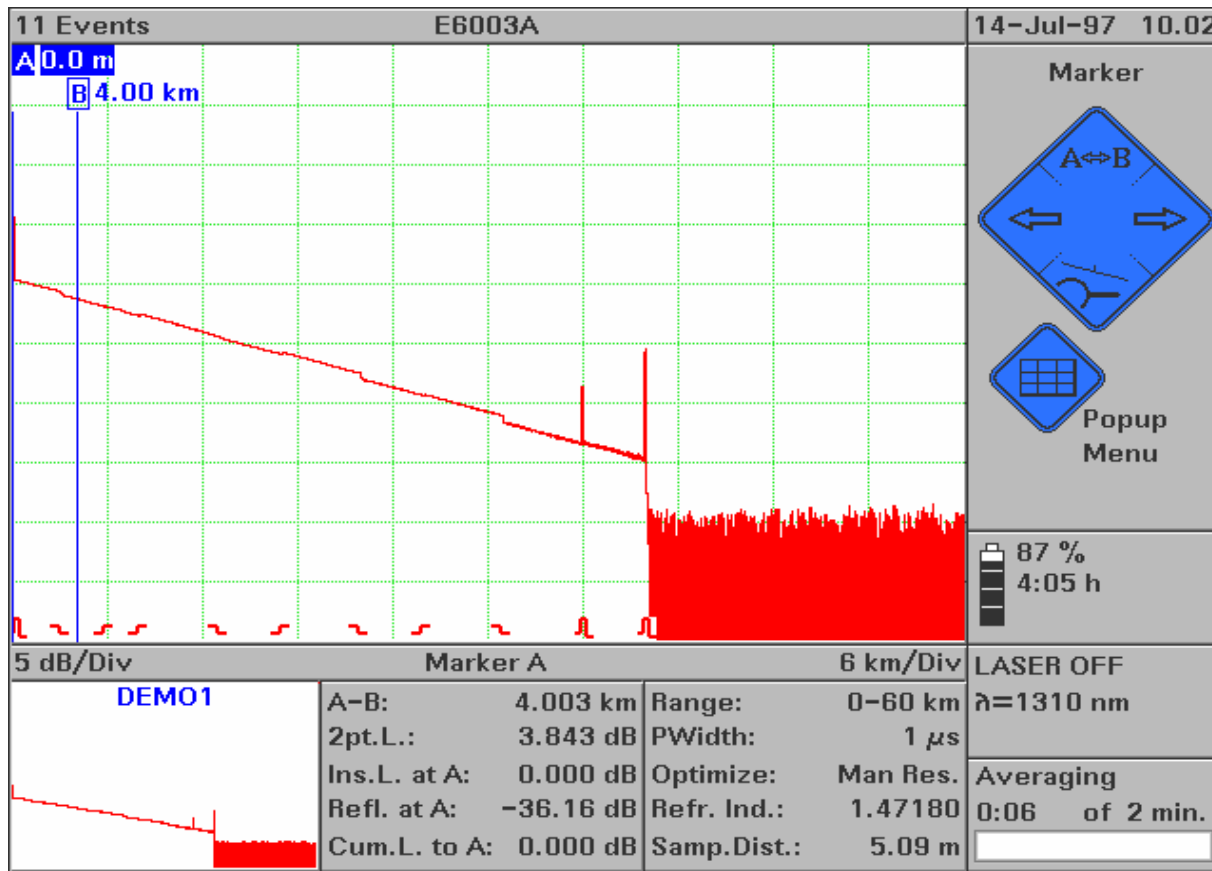
The OTDR's Menu: File



The OTDR's Menu: Config.



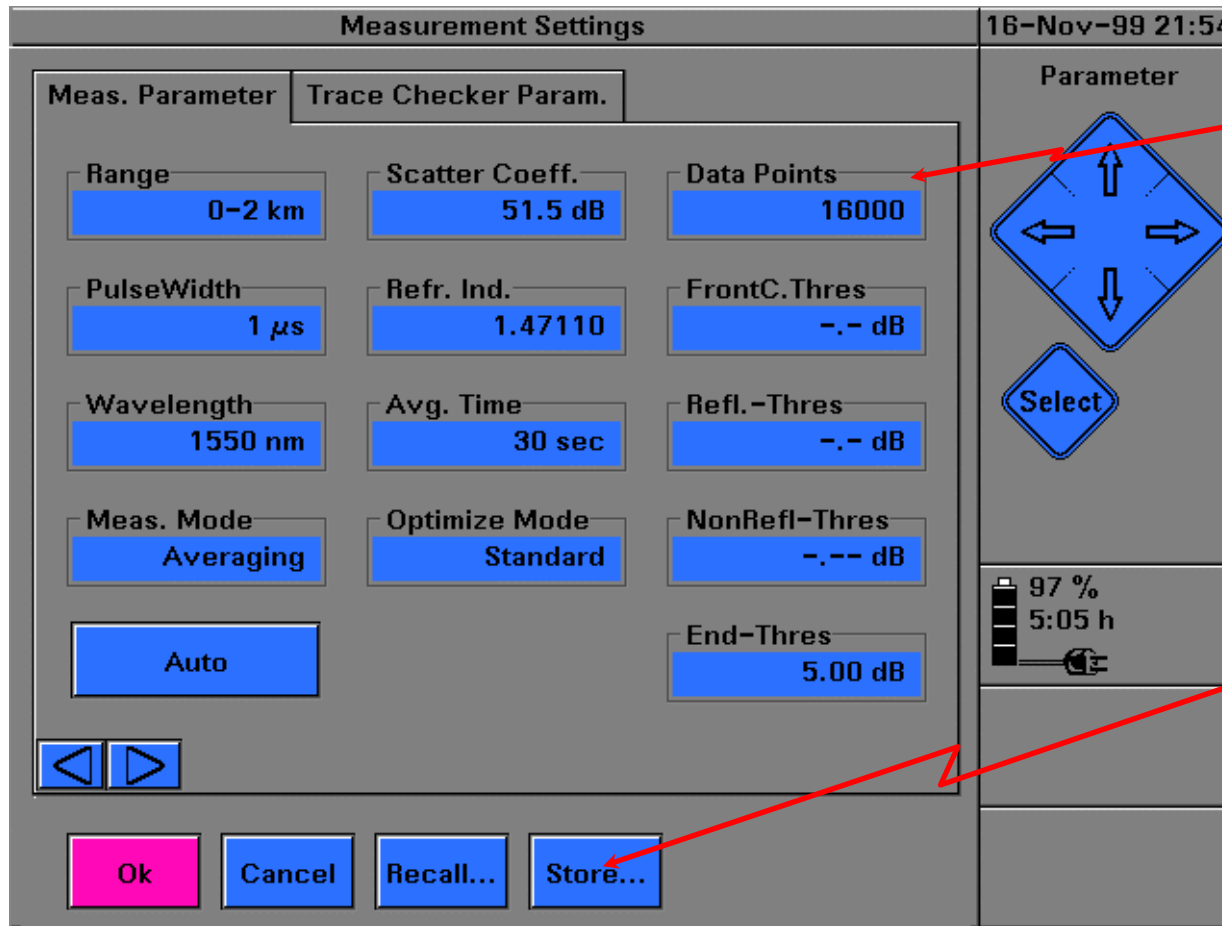
Measuring with the Mini-OTDR



1. Attach the fiber to be tested. (Clean the connectors).
2. Select wavelength if you have a dual wavelength module.
3. Check Refractive Index.
4. Check if set to "Auto".
5. Hit "Run/Stop".

THAT'S IT!!

Setting and Saving your Defaults



Modify the settings you need...

... and save them.

Saving Defaults . .

The image shows a screenshot of a device's settings menu. On the left, a vertical menu contains the following options: Close Menu, User Setting, Setup 1, Setup 2, Setup 3, Setup 4, Setup 5, and Save As... A red arrow points from the 'Save As...' option to a file selection dialog. The dialog has a title bar that says 'Enter filename for the settings file:'. It shows the current directory as 'Internal:/' and the current filename as 'SET.SET'. A list of files is displayed: ET, LAST.SET, SET_BKM.SET, T1310.SET, T1550.SET, and USER.SET. Below the list are buttons for 'New Name', 'Device', 'Save', and 'Cancel'. A second dialog box is overlaid on top, titled 'Enter the filename:', with a text input field containing 'SET'. Below the input field is a keyboard layout with letters A-Z, numbers 1-0, and symbols. At the bottom of this dialog are buttons for 'Ok', 'Cancel', 'Del', and 'CAPS'.

Select a name for your settings, and accept with Select.

Selecting the Defaults

(from the "Measurement Settings" page)

The screenshot displays the "Measurement Settings" interface. The top bar shows the date and time "16-Nov-99 21:54". The interface is divided into two main sections: "Meas. Parameter" and "Trace Checker Param.". The "Meas. Parameter" section contains several adjustable fields: Range (0-2 km), Scatter Coeff. (51.5 dB), Data Points (16000), PulseWidth (1 μs), Refr. Ind. (1.47110), FrontC.Thres (-.- dB), Wavelength (1550 nm), Avg. Time (30 sec), Refl.-Thres (-.- dB), Meas. Mode (Averaging), Optimize Mode (Standard), NonRefl-Thres (-.- dB), and End-Thres (5.00 dB). There is also an "Auto" button. The "Trace Checker Param." section is currently empty. To the right of these settings is a "Parameter" section with a diamond-shaped directional pad (up, down, left, right arrows) and a "Select" button. Below this is a battery indicator showing 97% and the time 5:05 h. At the bottom of the settings area are four buttons: "Ok", "Cancel", "Recall...", and "Store...". To the right of the main interface is a vertical menu with the following options: "Close Menu", "User Setting" (highlighted in pink), "Last Measurement", "Default Setting", "Setup 1", "Setup 2", "Setup 3", "Setup 4", "Setup 5", and "Load...". A red arrow points from the "Recall..." button in the settings area to the "User Setting" option in the menu.

Use the Recall Softkey to select the settings you want.

Measurement Parameters

The Settings Page (1)

To set the start and stop position for the measurement in any position.

Sets pulsewidth for the measurement.

Sets the wavelength based on module

Choose between Real-time, Continue or Average

Mode
Makes range and Pulsewidth automatic



Measurement Settings 16-Nov-99 21:54

Meas. Parameter Trace Checker Param.

Range 0-2 km Scatter Coeff. 51.5 dB Data Points 16000

PulseWidth 1 μ s Refr. Ind. 1.47110 FrontC.Thres -. dB

Wavelength 1550 nm Avg. Time 30 sec Refl.-Thres -. dB

Meas. Mode Averaging Optimize Mode Standard NonRefl-Thres -. dB

Auto End-Thres 5.00 dB

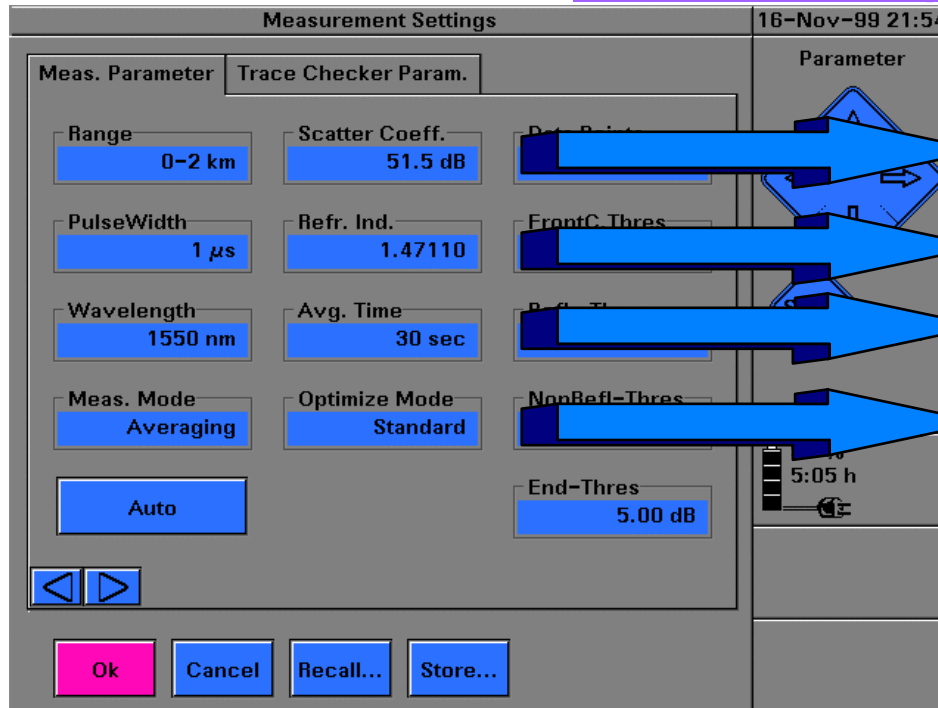
Parameter

97 % 5:05 h

Ok Cancel Recall... Store...

Measurement Parameters

The Settings Page (2)



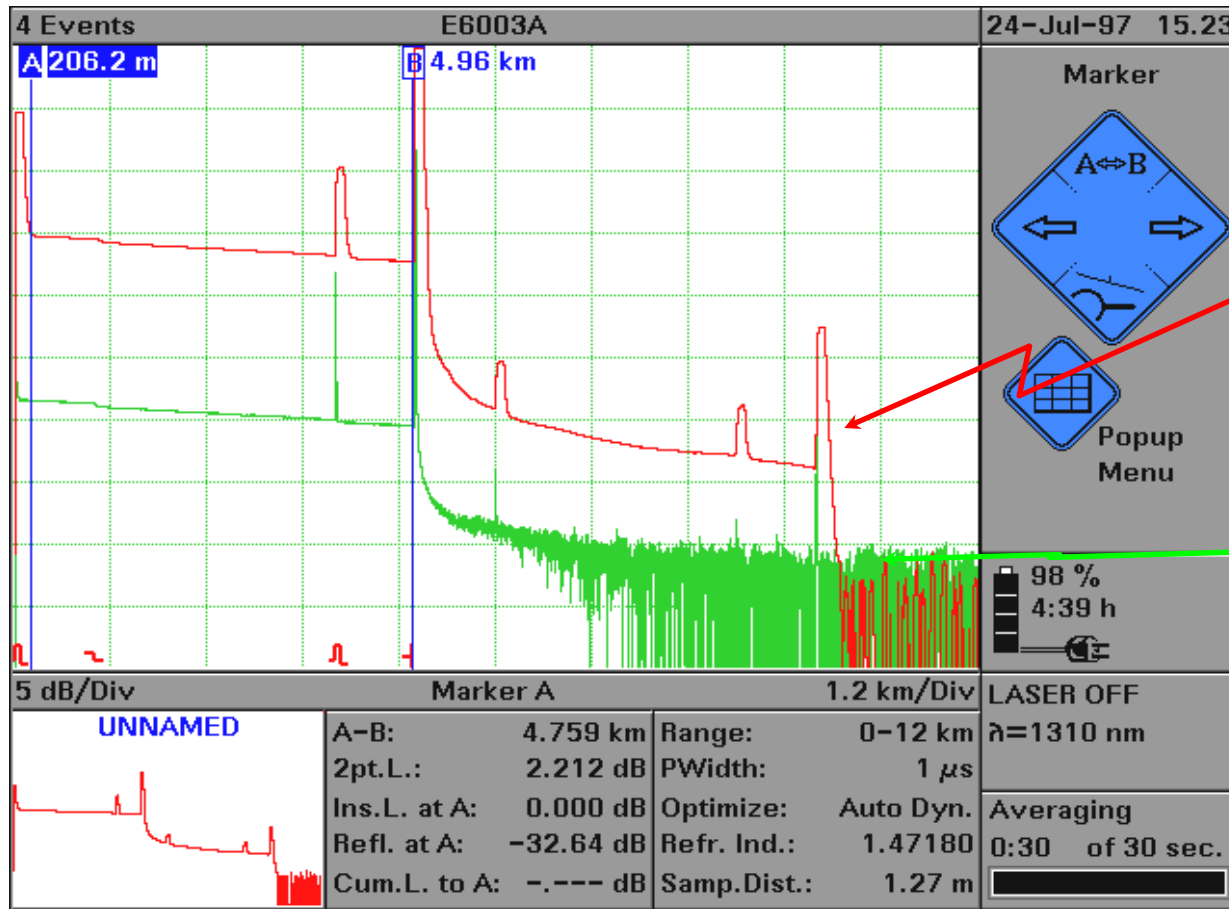
Sets the backscatter coefficient for the fiber.

Sets the Index of Refraction for the fiber.

Sets the averaging time.

Select Standard, Resolution or Dynamic Optimize Mode.

Optimize Mode - Dynamic

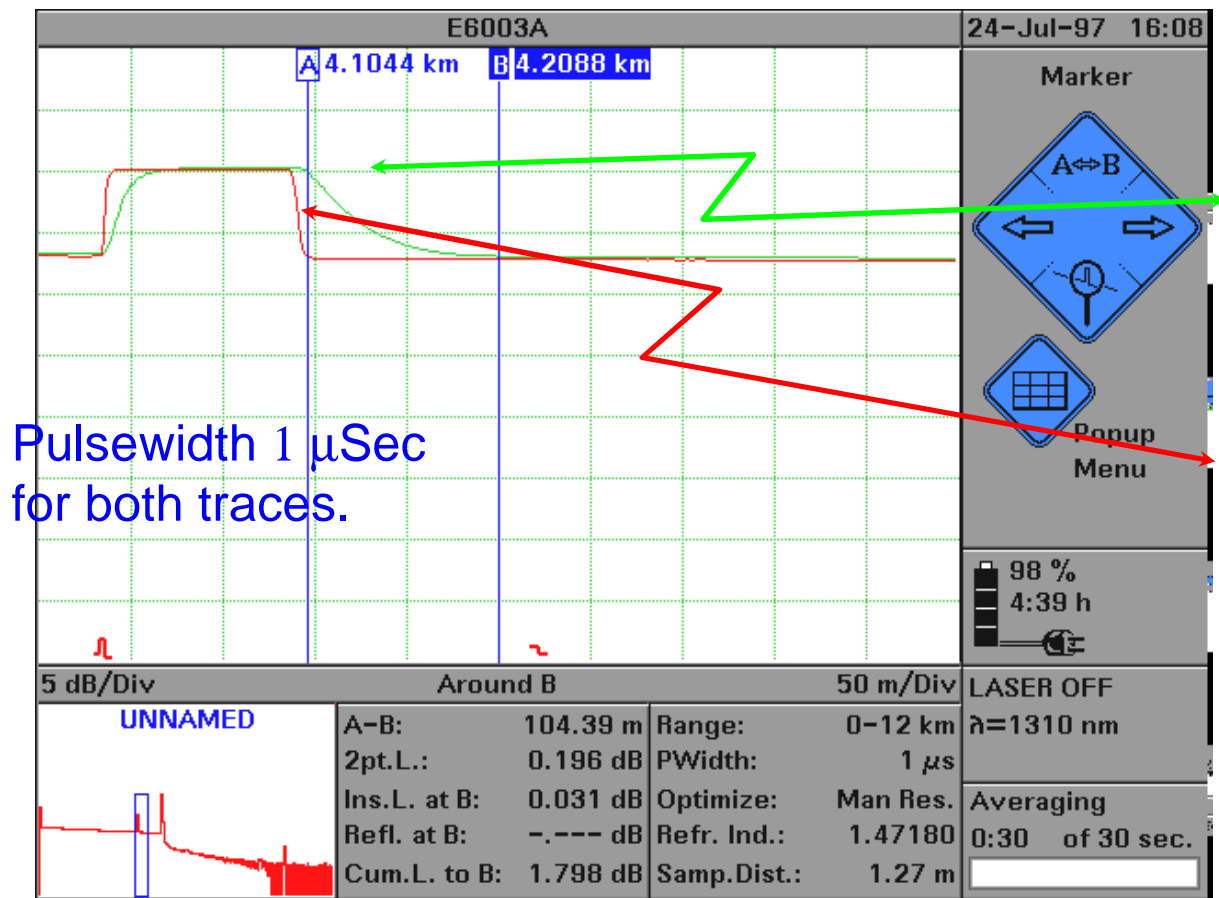


The red trace is optimized for Dynamic Range.

The green trace is optimized for resolution.

Dynamic range optimizes the OTDR for reducing the noise on the measurement.

Optimize Mode - Resolution



Pulsewidth 1 μSec
for both traces.

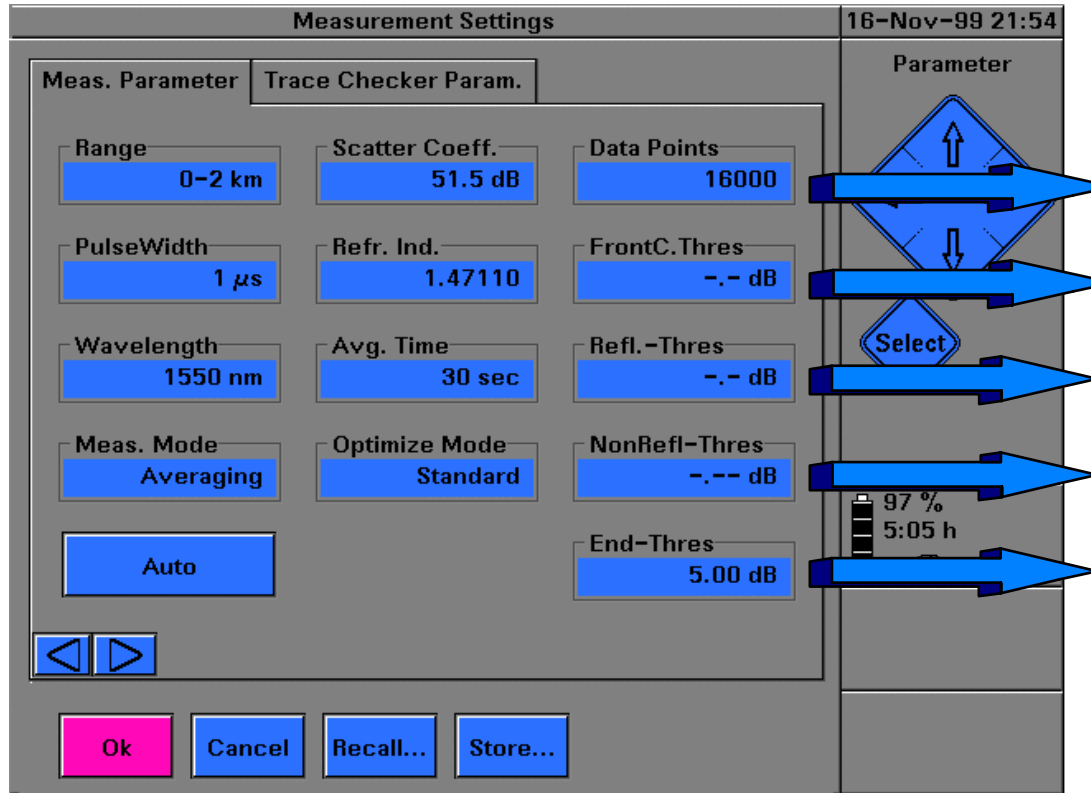
The green trace is optimized for Dynamic Range.

The red trace is optimized for Resolution.

Resolution optimizes the OTDR for reducing the "blind spots" due to reflections.

Measurement Parameters

The Settings Page (3)



Select the number of points sampled along the trace.

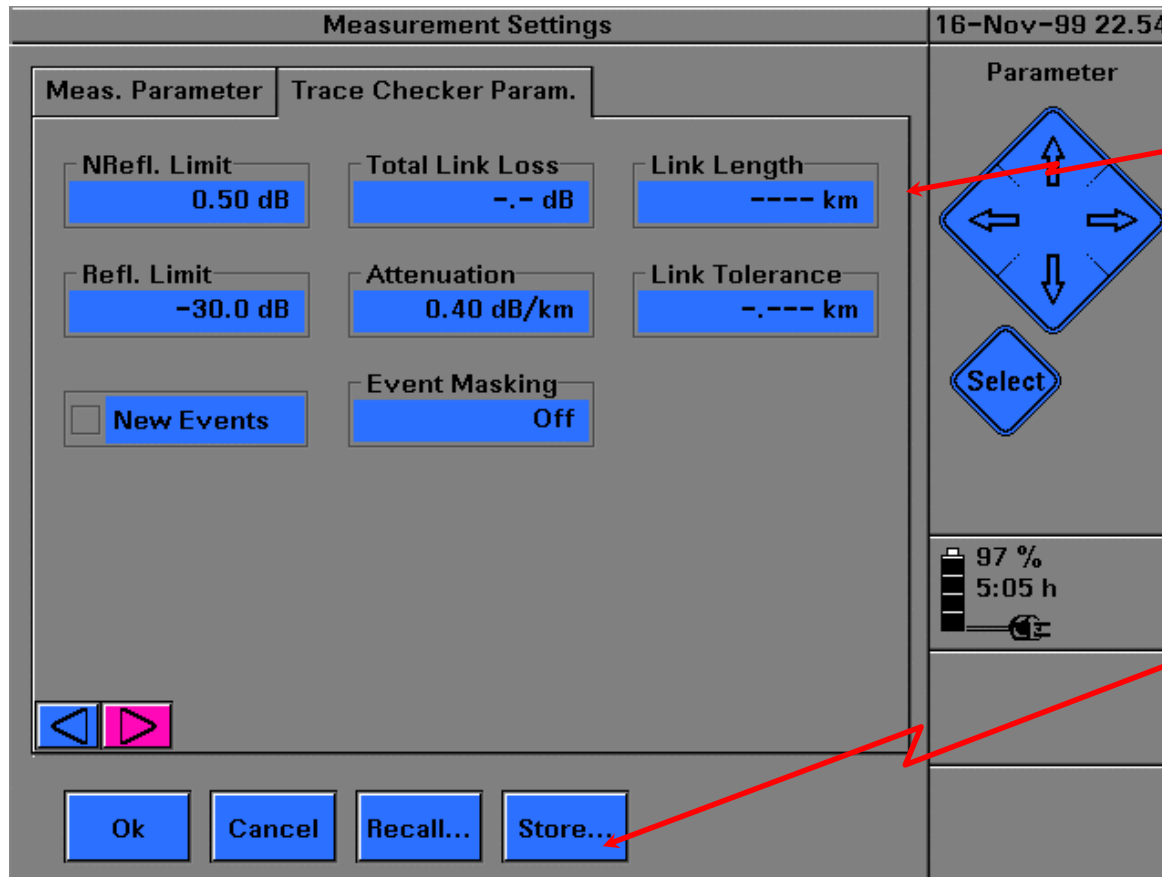
Sets the alarm threshold for front connector. 0.00 for off!

Sets the threshold for reflections to be measured.

Sets the threshold for non-reflective events to be measured.

Sets the threshold for the "End of Fiber" algorithm.

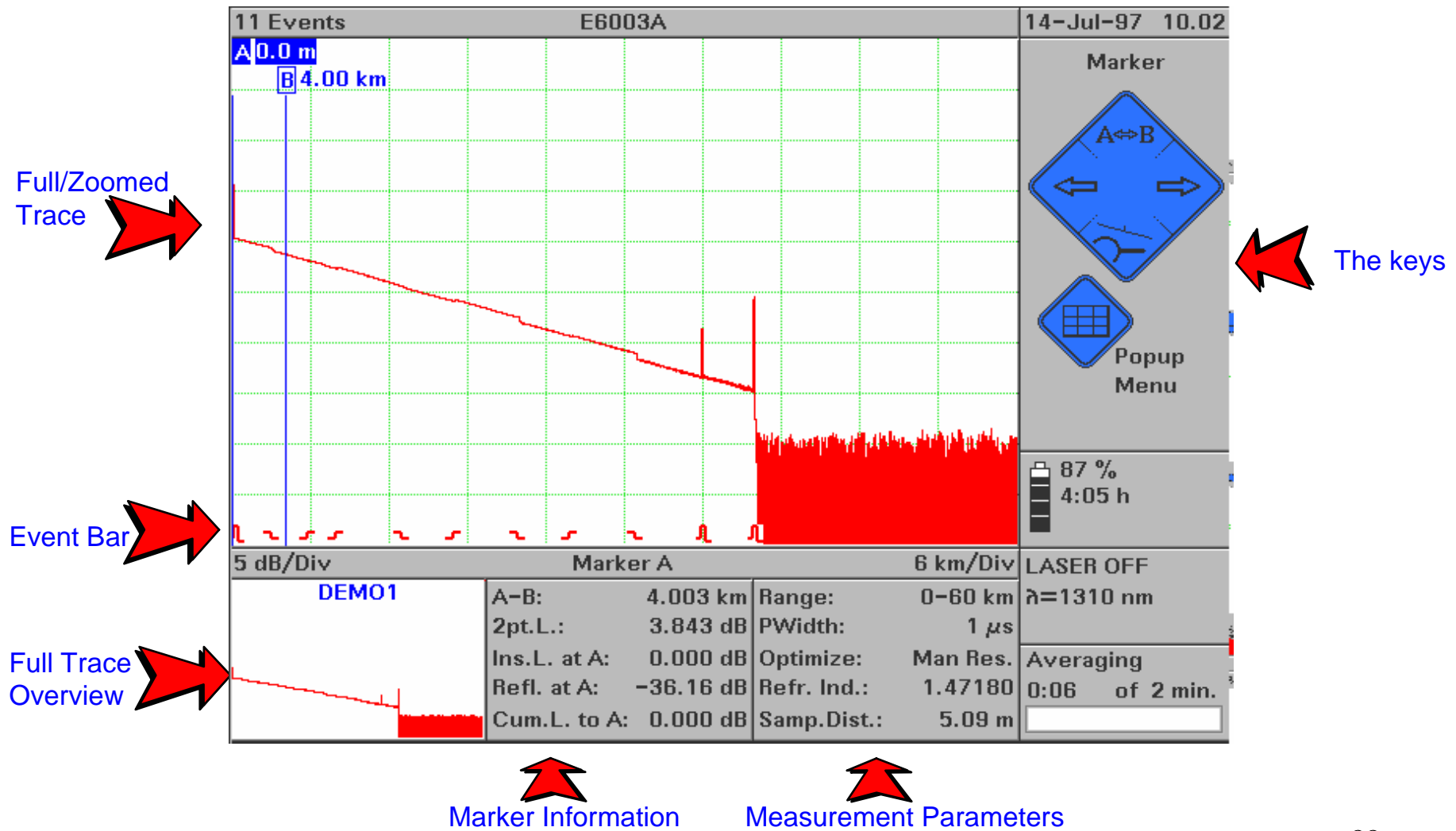
The 3M Trace Checker



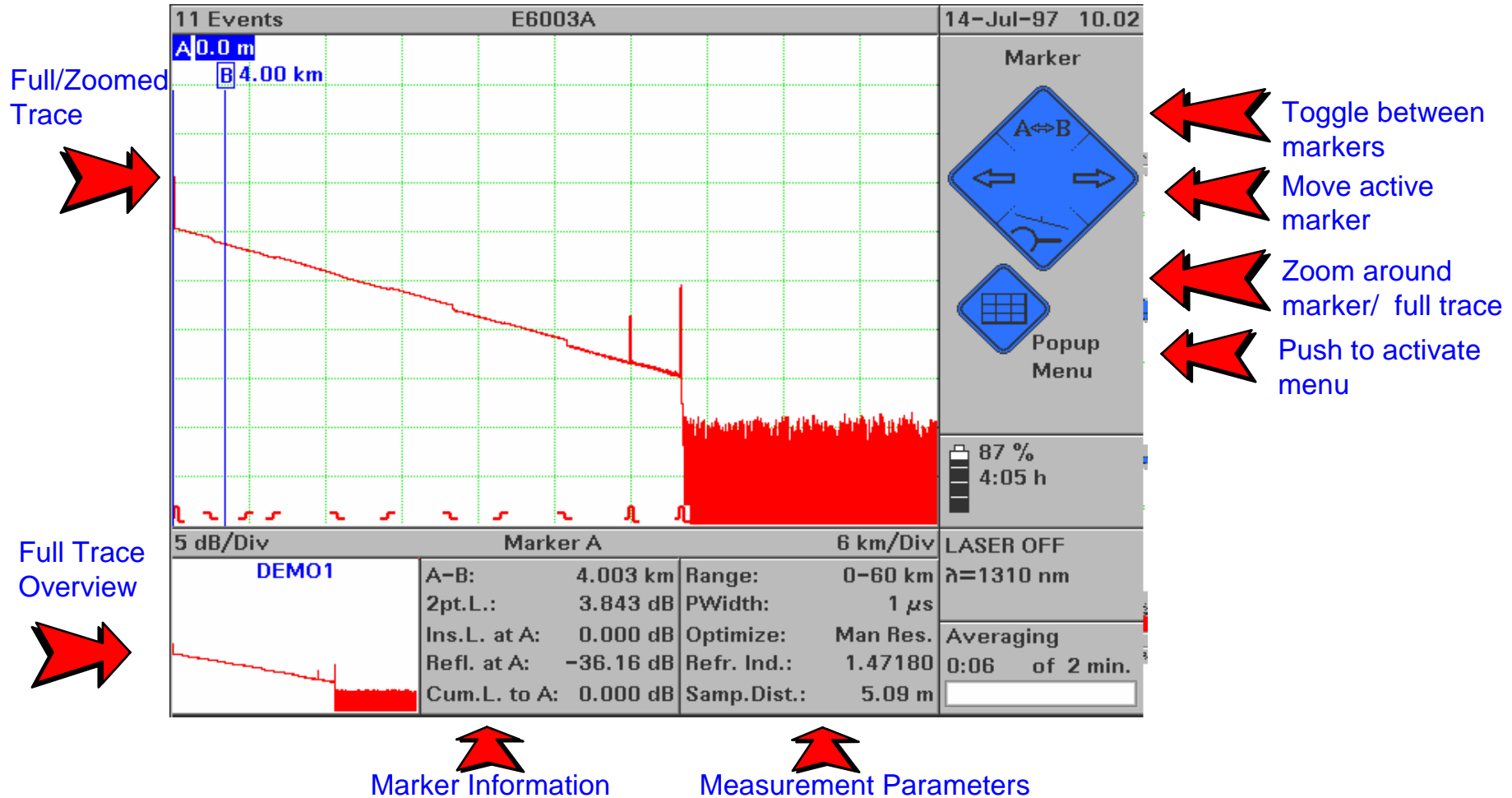
Modify the limits you need to test a link too..

Don't forget to save the parameters.

A Typical Trace Display



Analyzing the Trace

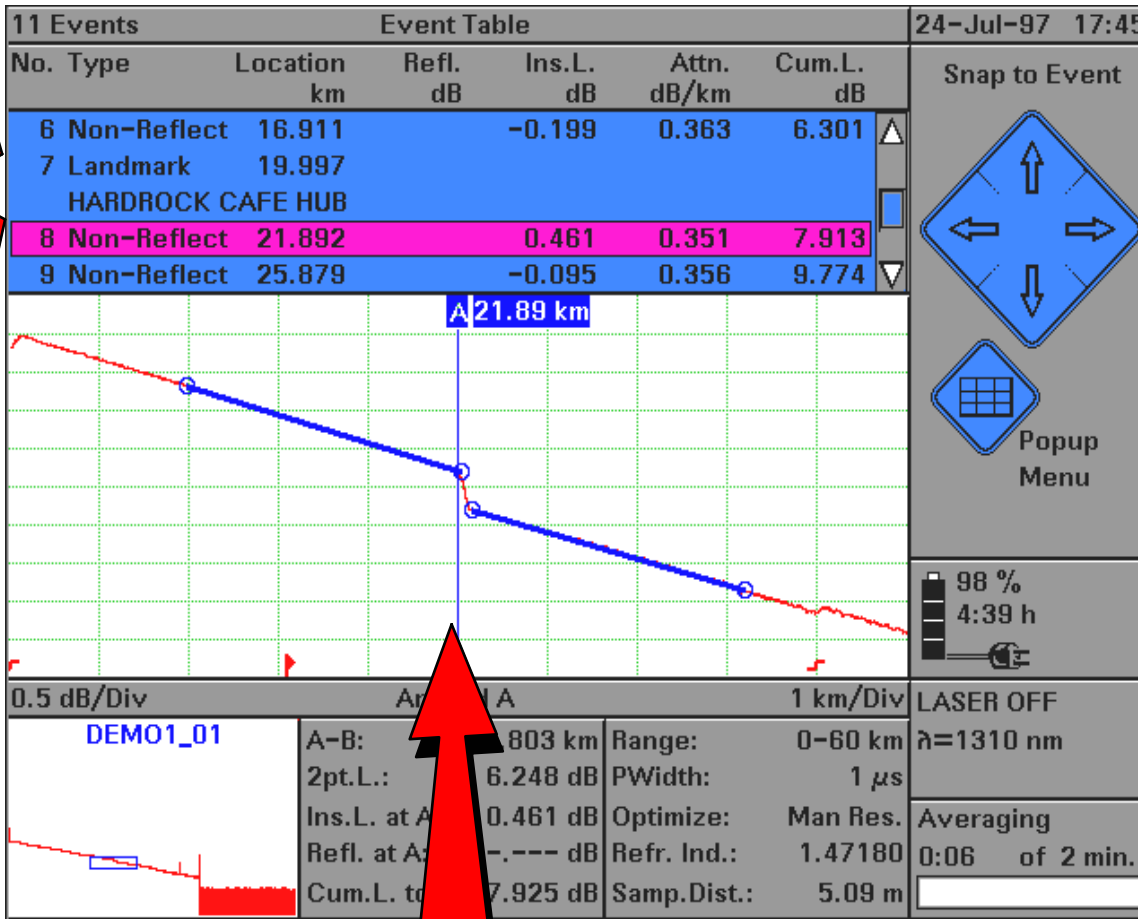


A Typical Event Table

Landmark Information

Selected Event

Full Trace Overview



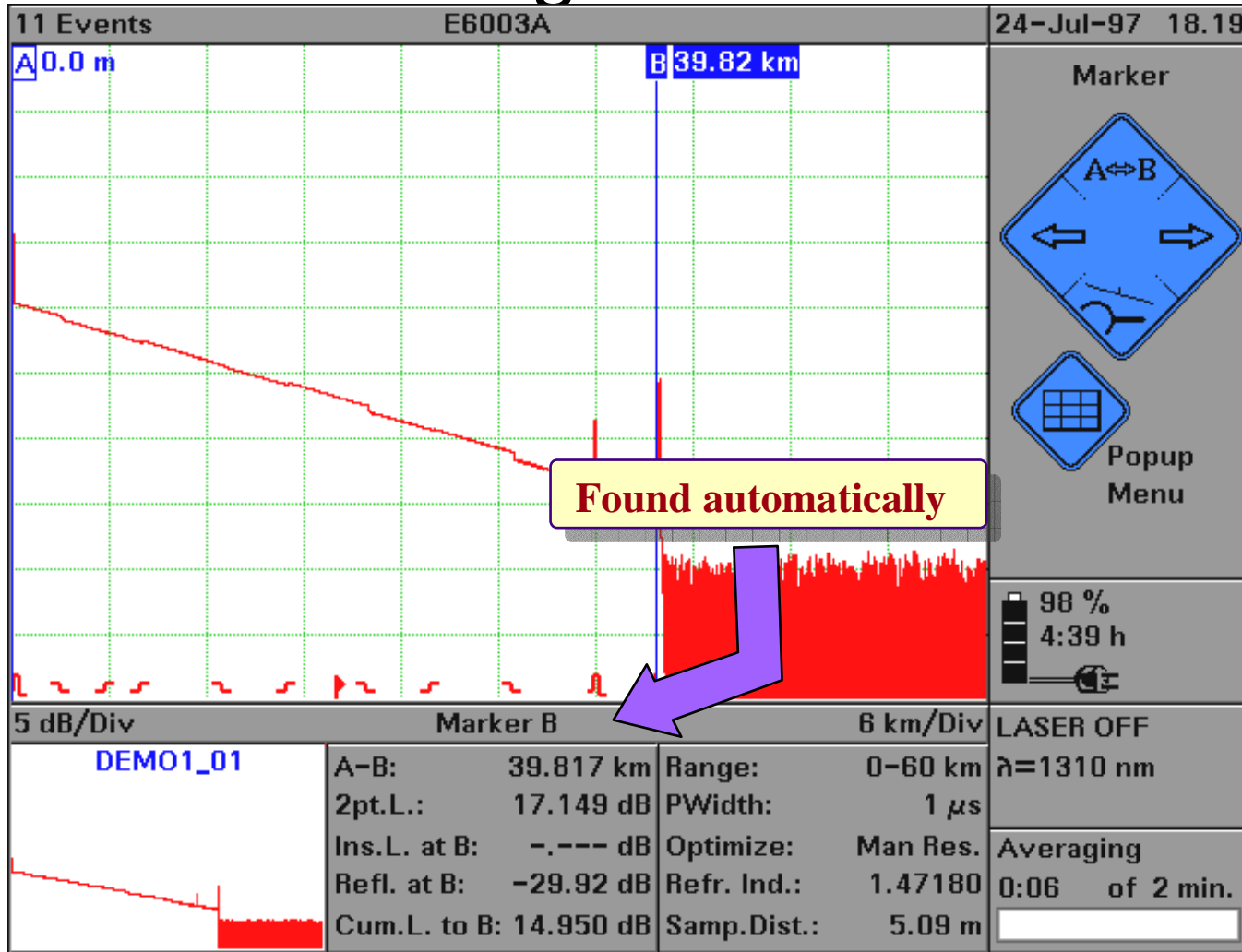
In Snap-to-Event Mode.

- Close View Menu
- Set Offset
- Auto Offset
- From Start
- Event Table
- Snap to Event
- Event Bar
- AB Marker
- Auto Scan
- Preferences

Zoomed Event

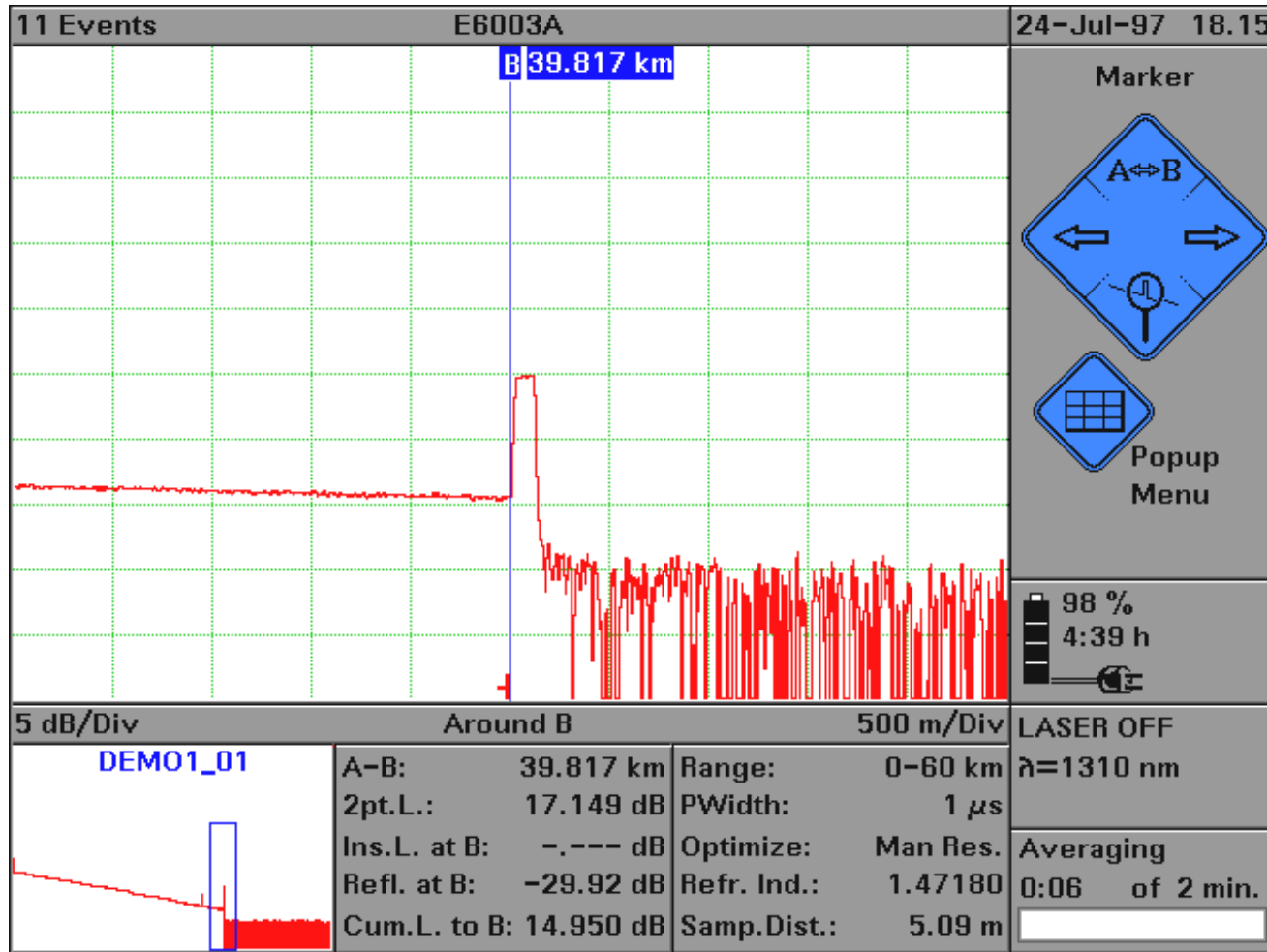


Locating the Fiber End



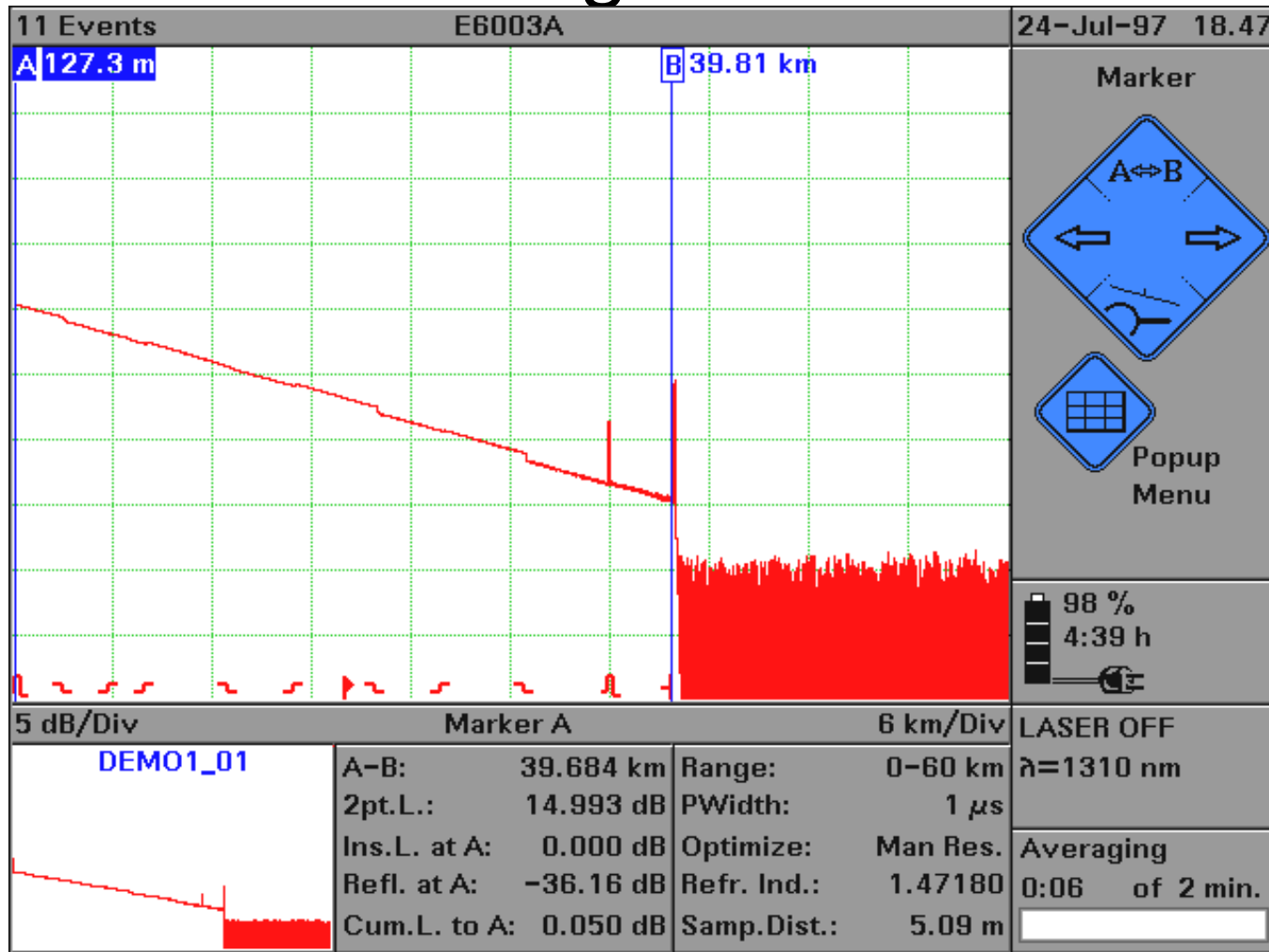
The end of the fiber is automatically found.

Manually Locating the Fiber End



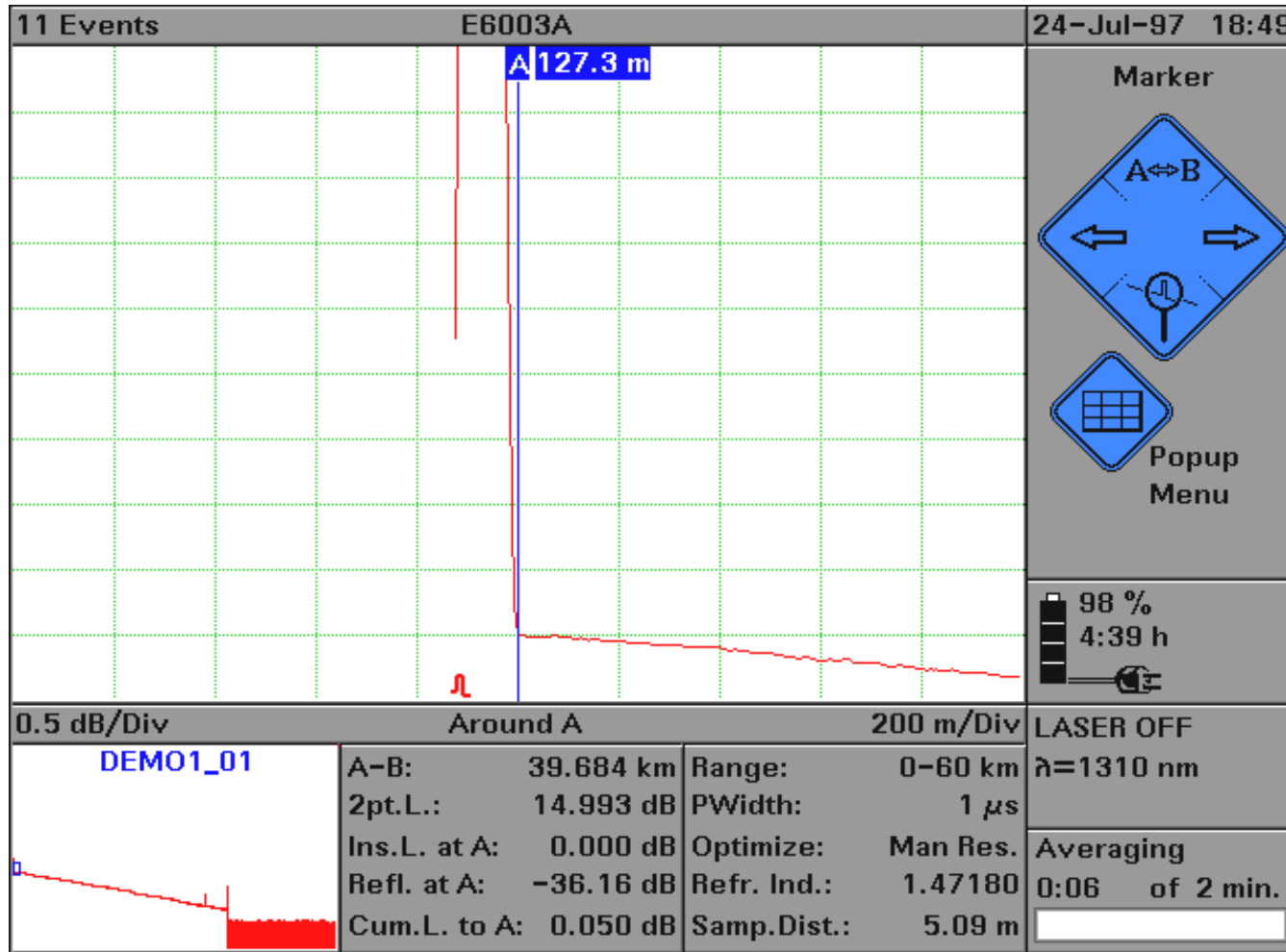
Press the "magnifying glass" to zoom in. Position the corner on Marker B.

Measuring Total Link Loss (1)



Position Marker A just at the right side of the front panel reflection

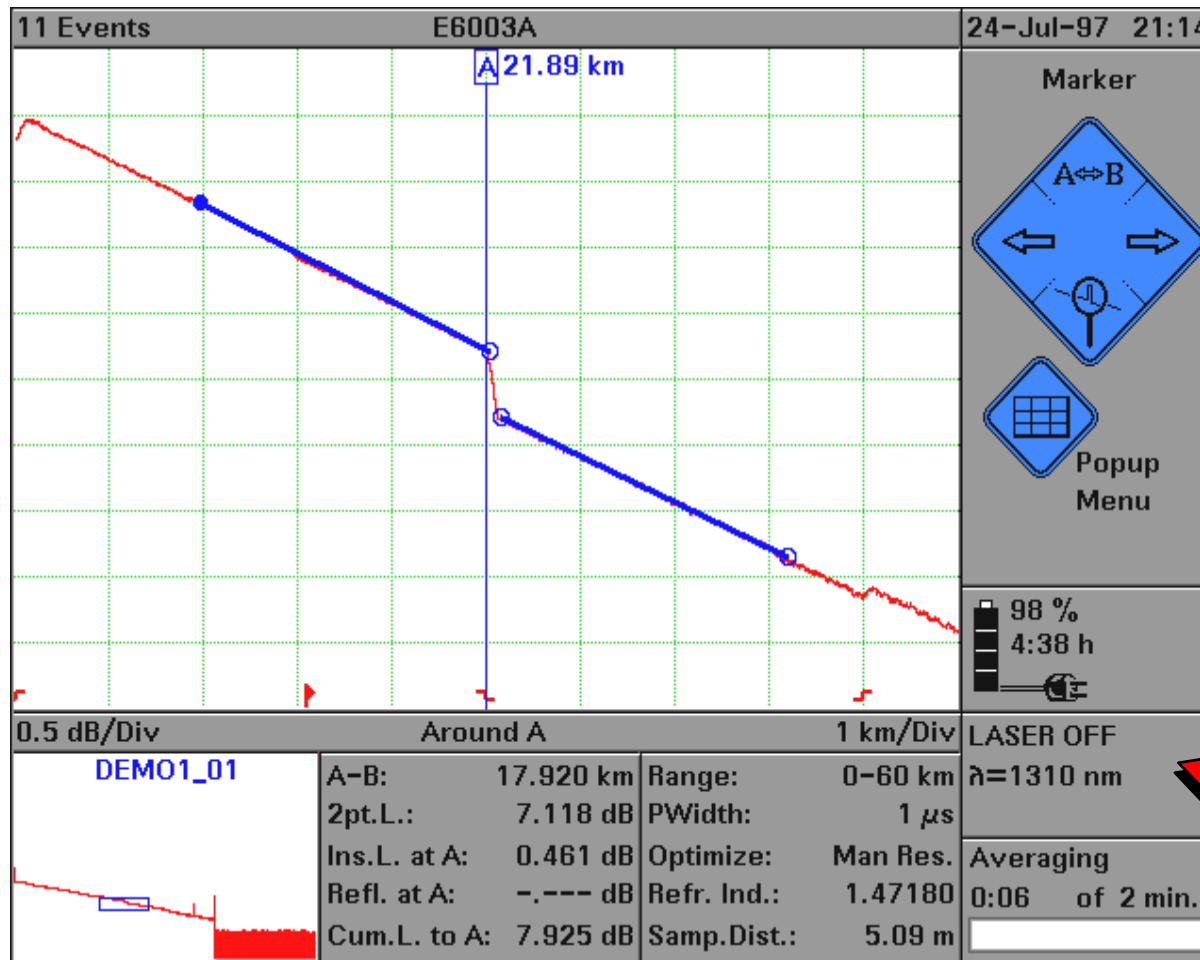
Measuring Total Link Loss (2)



Position Marker A, so it is in the same vertical position as the backscatter, extrapolated back to 0 m.

The total link loss is shown as "2pt.Loss".

Insertion Loss of Non-Reflective Events



Use Current Marker and position the four splice loss markers as shown. "Ins. Loss at <marker>" shows the splice loss.

Close Analysis Menu

Scan Trace

Analyze Insertion Loss

Analyze Reflectance

Adjust Refr. Ind./Dist.

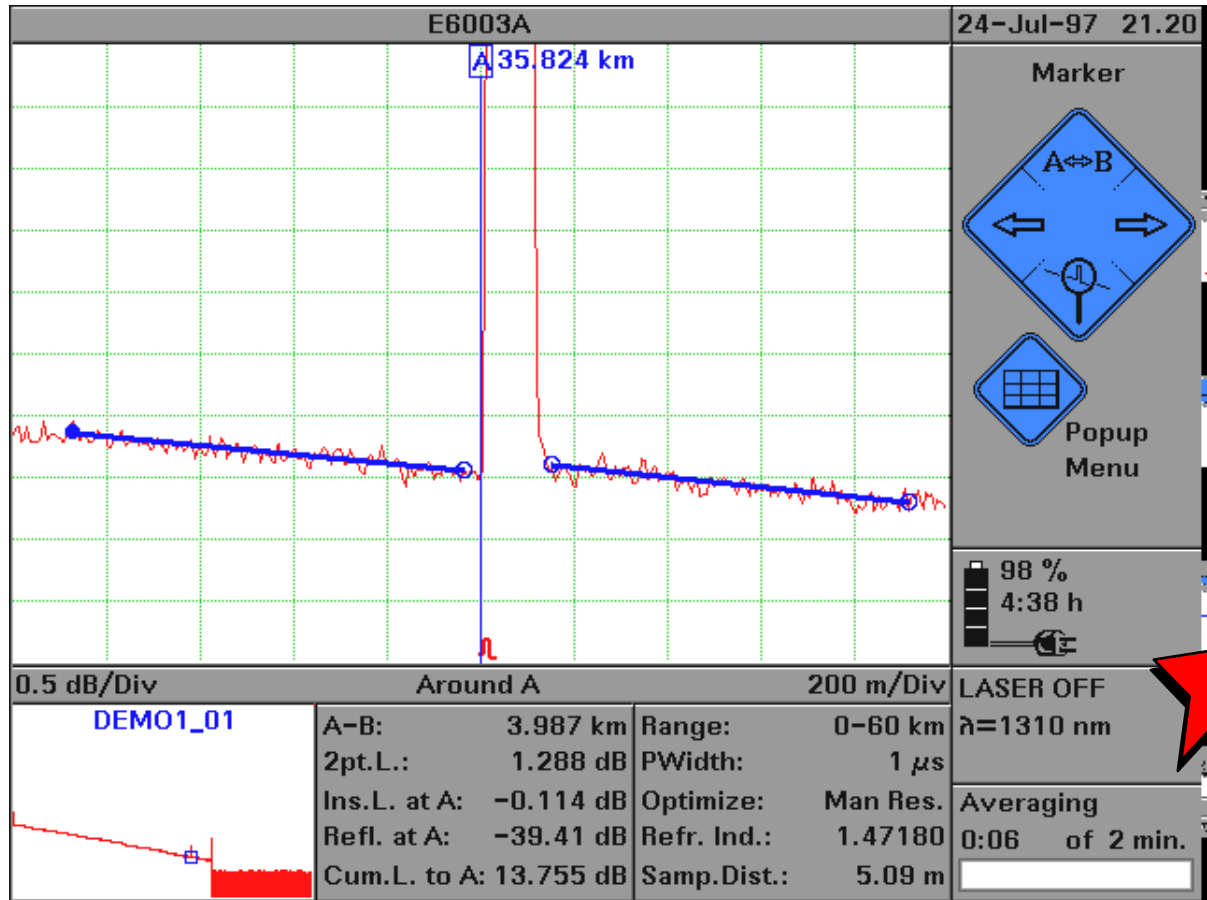
Adjust Scatter Coeff./Refl.

2pt. Loss

2pt. Attenuation

LSA-Attenuation

Insertion Loss of Reflective Events



Use Current Marker and position the four loss markers as shown. "Ins. Loss at <marker>" shows the insertion loss.

Close Analysis Menu

Scan Trace

Analyze Insertion Loss

Analyze Reflectance

Adjust Refr. Ind./Dist.

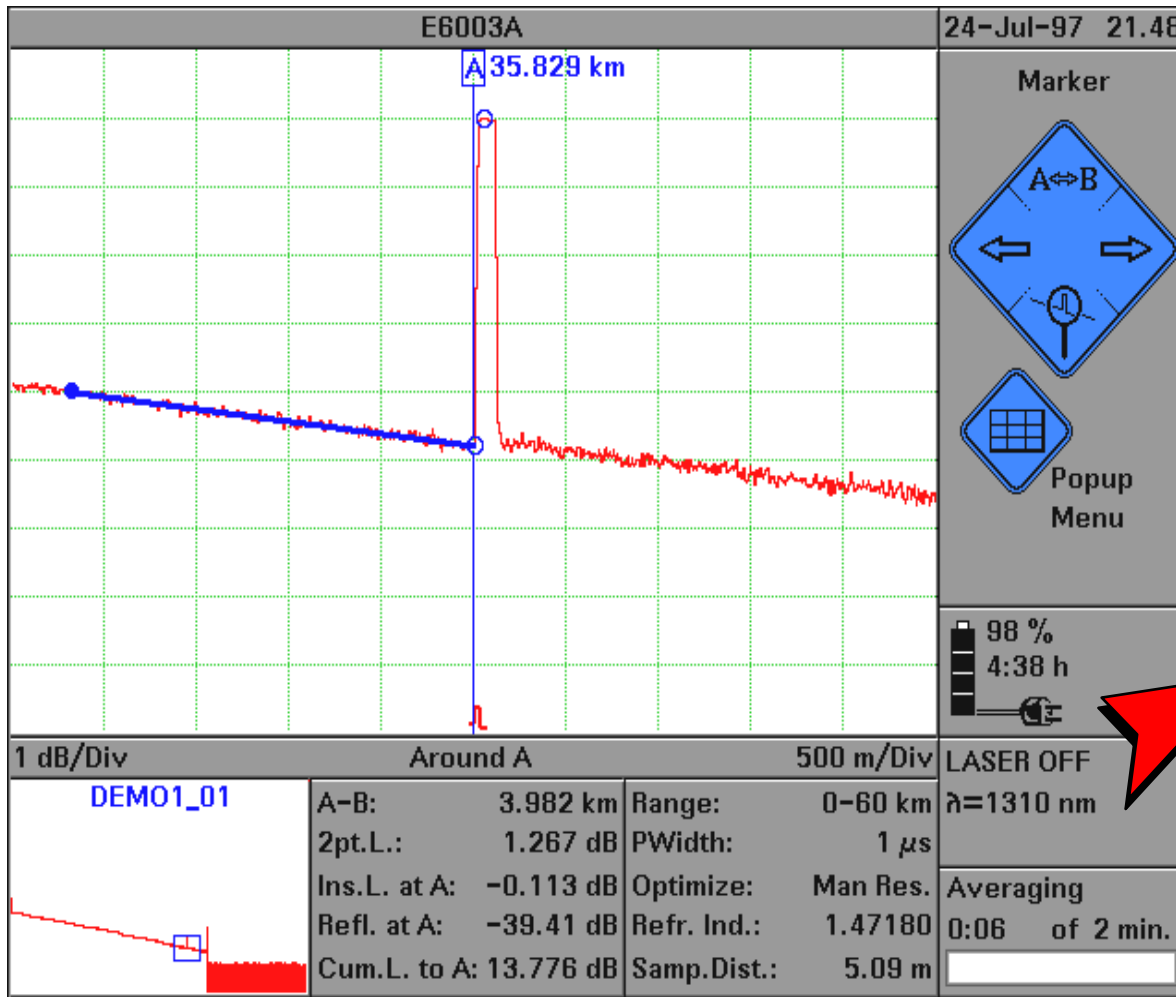
Adjust Scatter Coeff./Refl.

2pt. Loss

2pt. Attenuation

LSA-Attenuation

Reflectance of Reflective Events



Use current marker and position the three markers as shown. "Refl. at <marker>" shows the reflectance

Close Analysis Menu

Scan Trace

Analyze Insertion Loss

Analyze Reflectance

Adjust Refr. Ind./Dist.

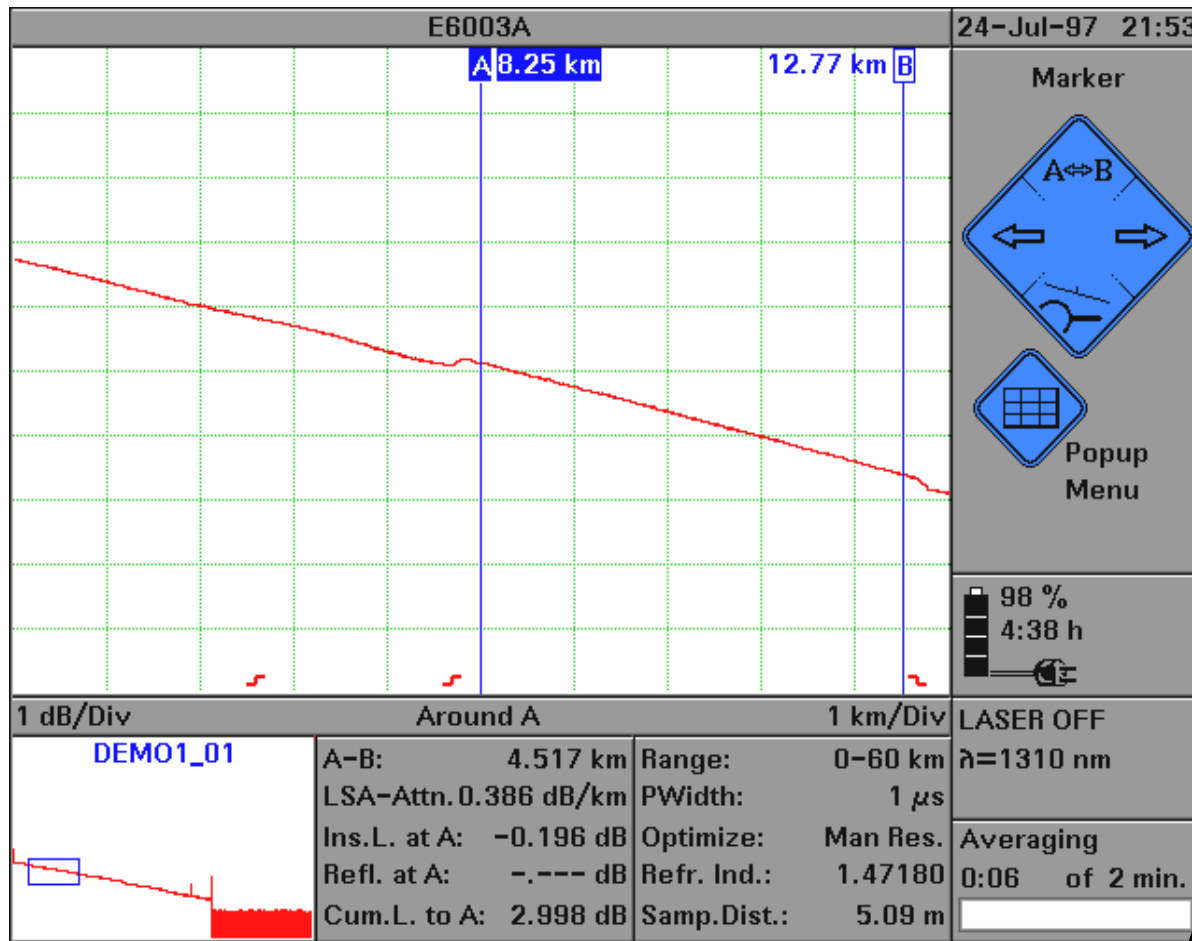
Adjust Scatter Coeff./Refl.

2pt. Loss

2pt. Attenuation

LSA-Attenuation

Measuring Fiber Attenuation



Position Markers A and B on the fiber between splices. The attenuation is shown as LSA-Attn.

Close Analysis Menu

Scan Trace

Analyze Insertion Loss

Analyze Reflectance

Adjust Refr.Ind/Dist.

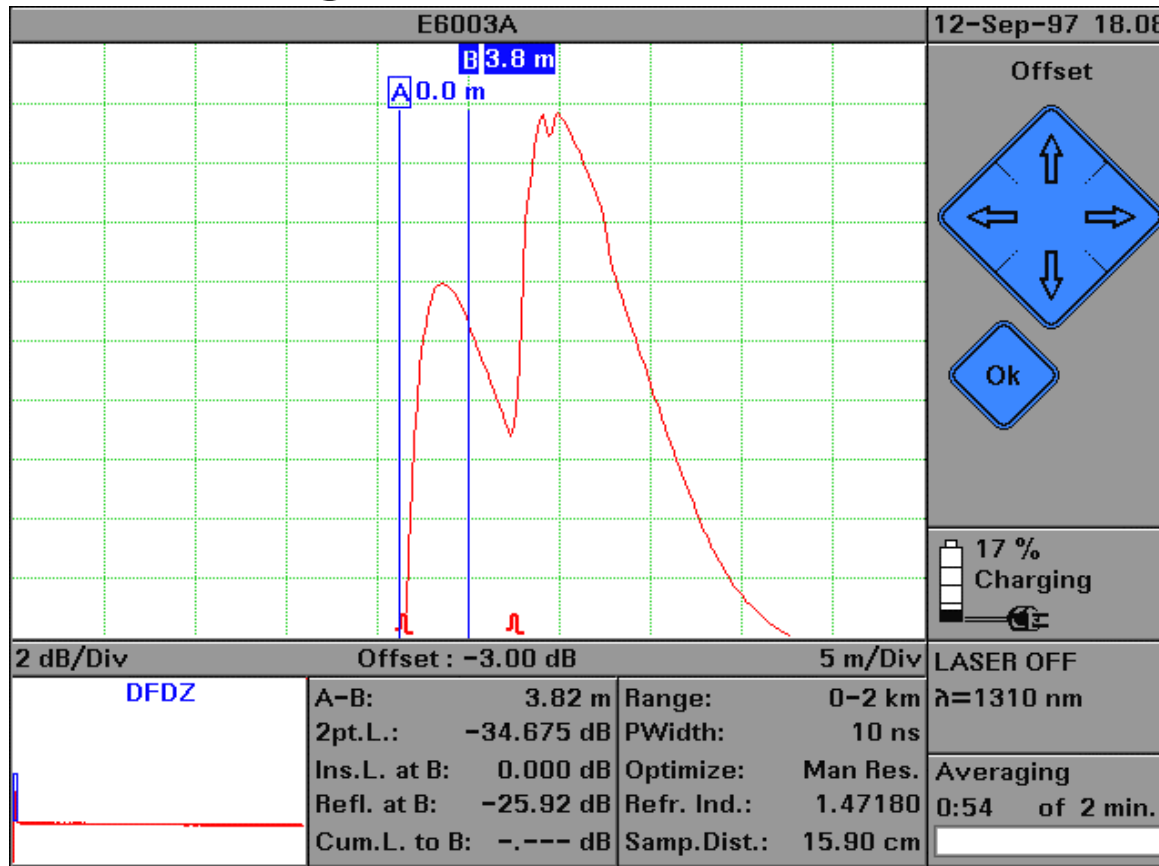
Adjust Scatter Coeff./Refl.

2pt. Loss

2pt. Attenuation

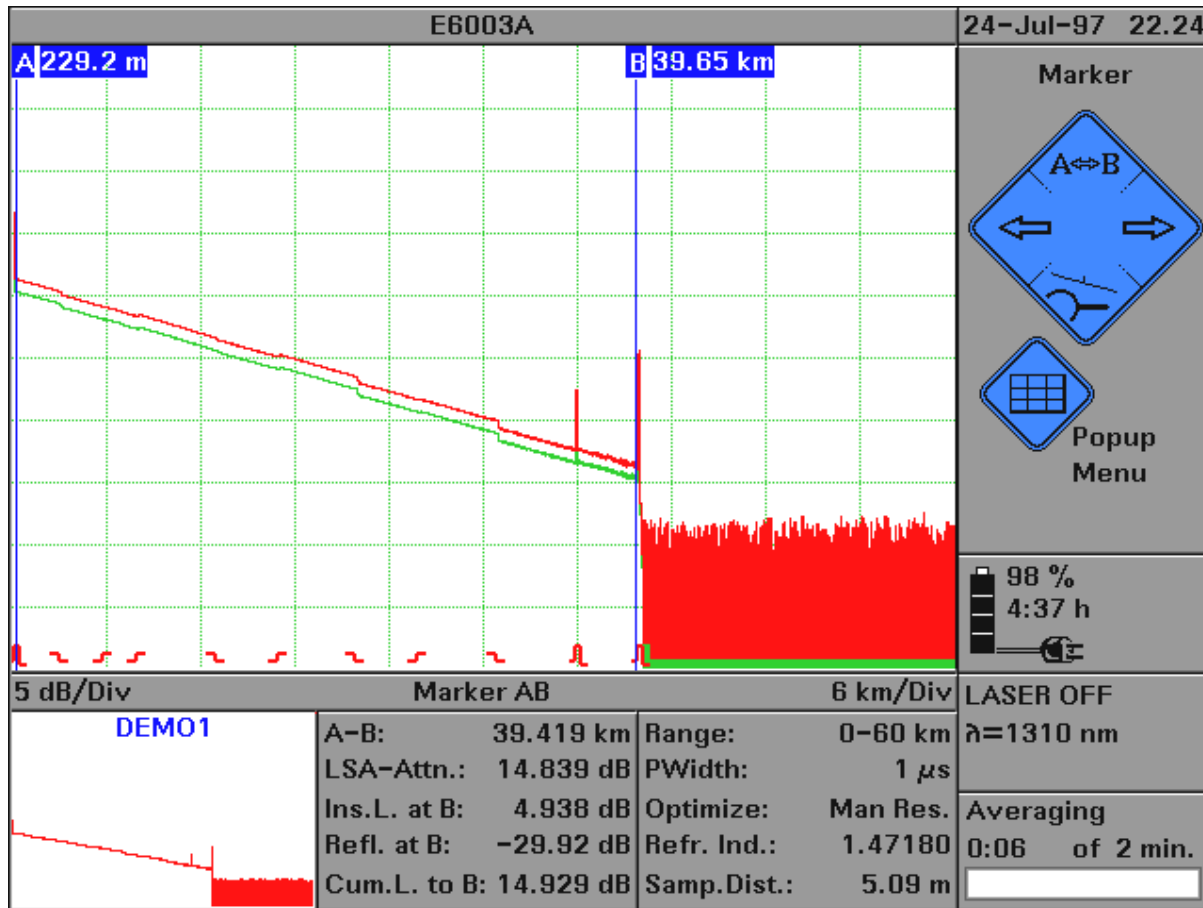
LSA-Attenuation

Measuring Reflections Close Together



To measure reflections close together, use 10 ns pulsewidth and the Resolution Mode for the shortest event deadzone.

Viewing Two Traces



Use the File menu, to select the active trace.

Close File Menu

Open...

Trace Info...

Close...

Close All

Save As...

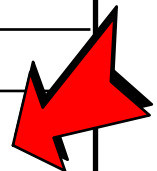
Print...

Cancel Print

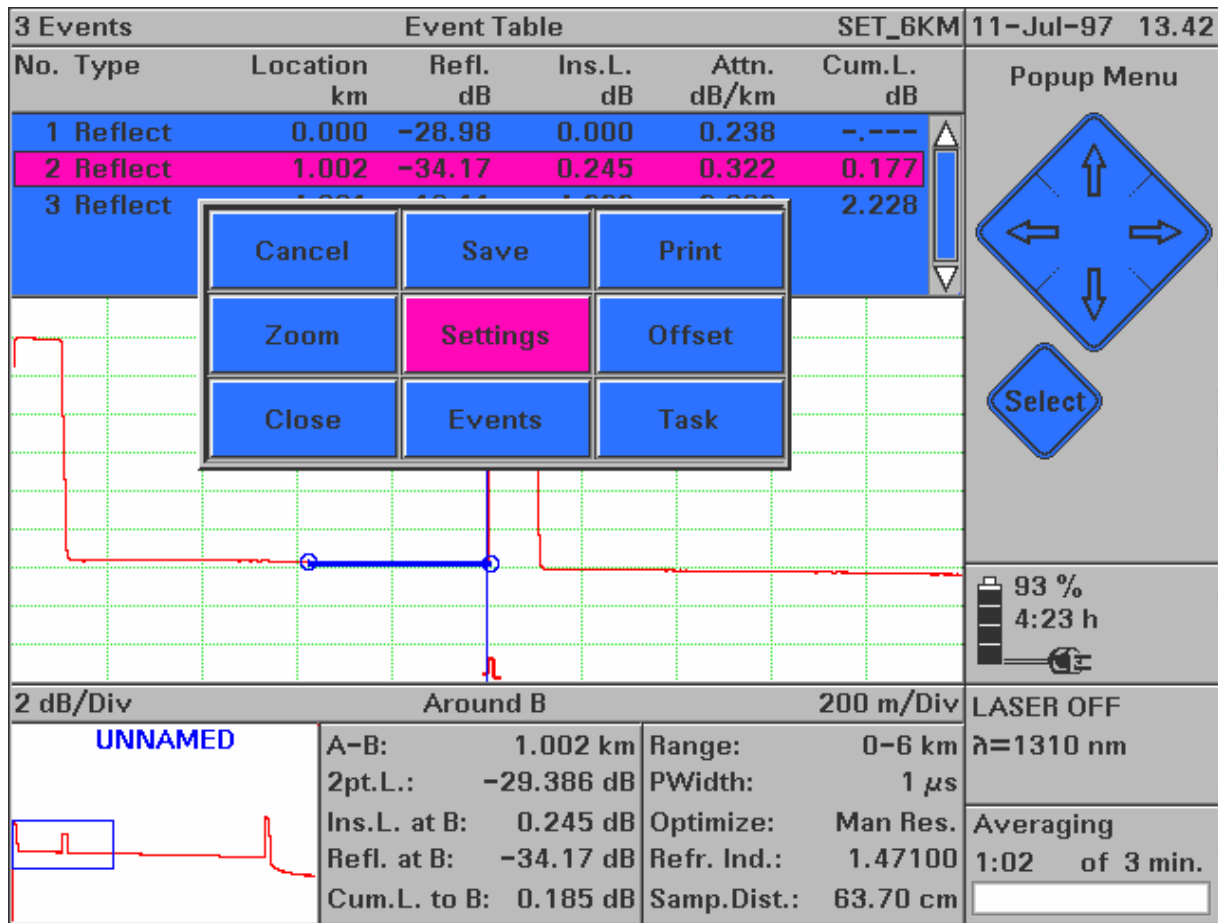
Utilities

DEMO1_1

◀ DEMO1



Using Easy OTDR



Select "Easy OTDR" from the Boot screen, or set "Boot into Easy-OTDR" on the Instrument Configuration Screen.

Configuring Multifiber test

Easy-OTDR 16-Nov-99 00:34

A 2.00 km B 4.00 km

Task Configuration

Auto Copy Names

Measurements

Internal:/13.SET	13_11.SOR
Internal:/15.SET	15_11.SOR

Save As...

Storage Directory Internal:/

Start Fiber 011

Start Cancel Info Clear

5

Refl. at A: -.--- dB Refr. Ind.: 1.47110
Cum.L. to A: -.--- dB Samp. Dist.: 15.90 cm

Task

91 %
4:51 h

LASER OFF
λ=1550 nm

Averaging
0:00 of 30 sec.

Use the Multifiber test application to define a series of measurements and how they are stored

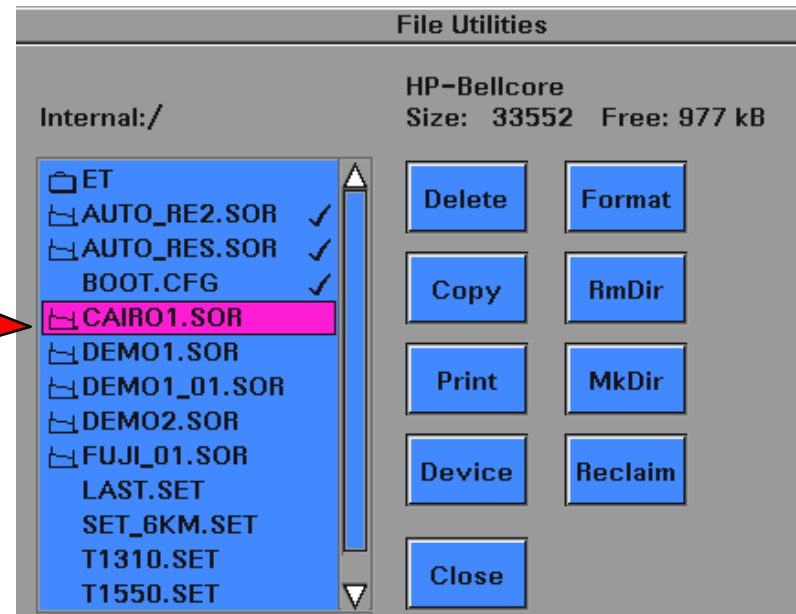
How to Print

Push the Help hardkey, and hold it a second:
this will print the current screen
Or select "Print" in the "File" menu

?

You can print more than one trace at a time using the "Utilities" selection in the "File" Menu.

Select the traces with the cursor and the Select key (labeled Ok)



In the Instrument Configuration Menu, you define your printer and what to print.

Your future is in your hands!



Welcome to 3M Performance!

