HP E6090A: OTDR Toolkit

Operating Instructions

Notices

Subject Matter

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HP E6090A: OTDR Toolkit

Operating Instructions

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WARNING **Use of controls or adjustments or performance of procedures other than those specified for the laser source may result in hazardous radiation exposure.**

WARNING **Refer Servicing only to qualified and authorized personnel.**

WARNING **Do not enable the laser when there is no fiber attached to the optical output connector of the connected instrument.**

Front Matter

WARNING   **Under no circumstances look into the end of an optical cable attached to the optical output when the instrument is operational.**
The laser radiation can seriously damage your eyesight.

WARNING   **You *must* return instruments with malfunctioning laser modules to a HP Service Center for repair and calibration, or have the repair and calibration performed on-site by HP personnel.**

Front Matter

The Purpose of this manual

This manual is intended as a general introduction to the OTDR Toolkit Software. It explains what you can see, what the software can do, and some common procedures.

The manual is intended to be brief, and does not explain more advanced features of the software. For this detailed information, please consult the online help.

The Structure of this Manual

This manual is divided into 3 parts:

- Chapter 1 introduces the main OTDR Toolkit screens

- Chapter 2 gives you step-by-step instructions relating to taking a trace measurement

- Chapter 3 gives you step-by-step instructions relating to processing existing traces.

Conventions used in this manual

- Menu items are written in SMALL CAPITALS. The top level entry that you see in the menu bar is in [SQUARE BRACKETS]; Submenu entries are given in <ANGLED BRACKETS>.
  For example, [FILE]<OPEN TRACE>,
  [EVENT]<LANDMARK><ADD>.

- Dialog (for example program names or window headers) is written in `Courier` font.
  For example, `OTDRTOOL.EXE`, `Hewlett-Packard OTDR Toolkit - Trace 1`.

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Getting Started

Getting Started

This chapter introduces the features of the HP E6090A OTDR Toolkit software.

Here you will find a quick description of the windows, menus and icons you see within the OTDR Toolkit software.

1.1 How to start the OTDR Toolkit software

To start the Toolkit software, you need at least a 486 DX PC with 4 MByte of RAM, running Windows software.

You also need the HP OTDR-Toolkit 3.5" Floppy containing a self-extracting archive called `HPTOOL.EXE`. `HPTOOL.EXE` extracts itself when executed in your chosen directory.

After you have executed the self-extracting archive, you see the executable file `OTDRTOOL.EXE`, and the help file `OTDRTOOL.HLP`.

1   Run `OTDRTOOL.EXE`.

You see 6 empty windows. The front window, headed `Trace`, may obscure some of those behind it.

2   Select the menu option [WINDOW]<TILE>.

The windows are tiled so that you can see all 6 windows clearly. You can reposition or resize any window by selecting any edge, then dragging the left mouse button.

NOTE   **If the windows are too small, resize the outer window using your left mouse button, then select [WINDOW]<TILE> again.**

The windows are resized to fit the outer window.

The windows are all blank, apart from the Event Table, which has a header row. This is because you are not yet displaying any traces.

3   Select the menu option [WINDOW]<SAVE POSITIONS>.

This means that the next time you start the Toolkit software, the windows will be already tiled.

4   Bring up a trace

You can either open an existing trace (see "How to Open an Existing Trace" on page 18), or attach your PC to an HP OTDR

and take a new measurement (see "How to Take a New Measurement" on page 45).

1.2 How to Open an Existing Trace

1 Select the menu option [FILE]<OPEN TRACE>.

You see a menu listing all the Bellcore trace files in the current directory (that is, all the files with the extension `.SOR` or `.TRC`).

NOTE   **Demo traces are provided with your OTDR Toolkit software.**

2 Click once on one of the file names.

You see information about this file in the Trace Information window (Figure 1-1).

This information includes the date and time when the trace was taken, and the range, pulsewidth, and wavelength used.
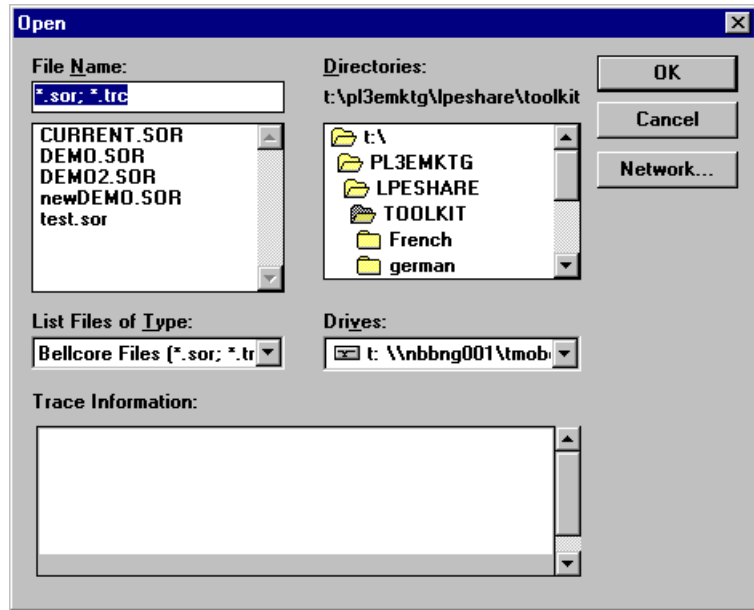
Figure 1-1   **Open File - Trace Information**

3 Press the OK button to select the highlighted trace.

Alternatively, you can double-click on any entry in the list of traces.

You now see information for this trace in the various windows (see "The OTDR Toolkit Windows" below).

NOTE **You may select up to four traces, which are loaded into the four Toolkit trace slots. See "How to Display more than one Trace" on page 87.**

1.3 The OTDR Toolkit Windows

The Trace window

The `Trace` window contains a graphical representation of the main trace information (Figure 1-2).

Figure 1-2   **The Trace window**

The contents of the Trace window are explained in the sections below.

The Trace

The trace window contains a graph of the reflected power displayed as a function of distance. This graph is called the trace.

You can change the vertical position of any trace by clicking on it with your left mouse button and dragging it up or down.

Events

Events are changes in the fiber causing the trace to deviate from a straight line. Events can be *Reflective* or *Non-Reflective*.

Reflective Events occur when some of the pulse energy is reflected, for example at a connector. Reflective Events produce a spike in the trace (you see a steep rise and fall in the graph: see the first diagram below).

Non-Reflective Events occur at parts of the fiber where there is some loss but no light is reflected. Non-Reflective Events produce a dip on the trace (see the second diagram below).
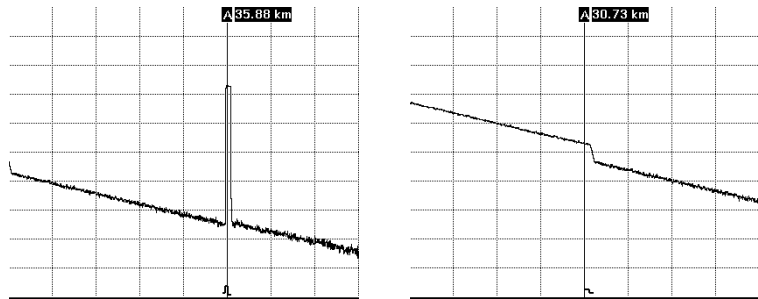
Figure 1-3   **Reflective (Left) and Non-Reflective (Right) Events**

The OTDR calculates the distance of such an "event" in the fiber from the time it takes the reflected signal to return. The further away an event is, the longer it takes for its reflection to return to the OTDR.

By examining the trace of the reflected signal, the parameters of the fiber and the connectors, splices and so on can be determined.

The Event Bar

The Event Bar is a set of symbols at the bottom of the Trace window showing the position of the detected events (see "The Event Table window" on page 23). You see different symbols for the following:

- non-reflective events such as splices,

- reflective events such as connectors,

- defined landmarks,

- the defined end of the trace,

- out-of range Events.

NOTE **You can remove the Event Bar by selecting [VIEW]<PREFERENCES> and deactivating `Show Event Bar.`**

Markers

The `Trace` window contains two Markers, A and B. You can use the markers to mark and analyze single events, parts of the trace, and distances.

You also see information relating to the markers in the `Marker Info` window, (see "The Marker Info window" on page 26).

You move a marker by clicking on it with your left mouse button and dragging it.

NOTE **If you select [VIEW]<LOCK A-B MARKERS>, or press the equivalent icon (see Table 1-1, "OTDR Toolkit icons", on page 31), the markers stay the same distance apart.**

This means that when you move one marker, the other also moves by an equivalent distance.

Zooming

You can zoom in on any part of the trace by dragging your left mouse button to select a rectangle in the `Trace` window. To return to the full trace, double-click anywhere in the window.

You can also select a rectangle in the `Overview` window (see "The Overview window" on page 29). You can then use your left mouse button to move this rectangle. The `Trace` window is updated to show the selected area.

NOTE   **The Overview window always shows the full trace, so that you can always see what the trace looks like, even when you are zooming.**
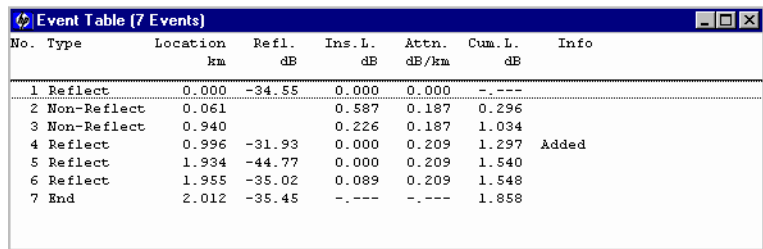
If the Trace window is active (that is, after you have clicked on it once), you can also zoom using your keyboard:

• Use the Left and Up arrows to zoom out, and the Right and Down arrows to zoom in.

• Hold down the <SHIFT> key, then use the Left and Right arrows to move the active marker.

• If you have selected a zooming rectangle (see above), hold down both the <CTRL> and <SHIFT> keys, then use the arrows to move the zooming rectangle.

For a worked example of zooming, see "How to Zoom Around an Event" on page 65.

The Event Table window

The Event Table window contains information about each of the Events found in the trace (Figure 1-4) For more information about events, see "Events" on page 21.

No.	Type	Location km	Refl. dB	Ins.L. dB	Attn. dB/km	Cum.L. dB	Info
1	Reflect	0.000	-34.55	0.000	0.000	-.---	
2	Non-Reflect	0.061		0.587	0.187	0.296	
3	Non-Reflect	0.940		0.226	0.187	1.034	
4	Reflect	0.996	-31.93	0.000	0.209	1.297	Added
5	Reflect	1.934	-44.77	0.000	0.209	1.540	
6	Reflect	1.955	-35.02	0.089	0.209	1.548	
7	End	2.012	-35.45	-.---	-.---	1.858	

Figure 1-4   **The Event Table window**

For each event in the table, you see the following information:

Type	the type of Event (Reflective, Non-Reflective, End, or Landmark).
Location	the distance of the Event from the start
Refl.	the Reflectance of the Event
Ins.L.	the Insertion Loss of the Event.
Attn.	The Attenuation Coefficient between this Event and the next one.
Cum.L	The cumulative loss, that is total loss budget up to the selected event.
Info	Extra information about the Event: Added: Event has been added to the trace. Modified: Event has been modified. Out-of-Range: Event is beyond the detection range.

The Event following the current marker is highlighted.

NOTE   **If you click on an Event in the Event Table, this Event is highlighted, and the active (highlighted) marker moves to the event.**

You can now use the Up and Down cursors on your keyboard to move to other Events. The active marker moves to these events automatically.

The Parameters window

The Parameters window contains information relating to the whole trace (Figure 1-5).
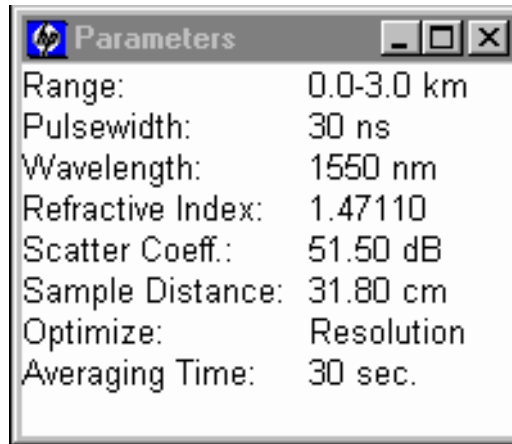
Figure 1-5   **The Parameters window**

You see the following information in the Parameters window:

- Range: the start position and the measurement span.

- Pulsewidth: the length in seconds (ns or μs) of the pulses launched by the OTDR into the fiber. Short pulses improve resolution, but longer pulses are required for higher dynamic on long fibers.

- Wavelength: the laser wavelength at which the measurement was taken.

- Refractive Index: the Refractive index describes the relationship between the speed of light in a vacuum and within a given medium. The Refractive Index influences the distance scale of the OTDR.
  The Refractive Index can be set to any value between 1.0 and 2.0.

- Scatter Coeff.: the scatter coefficient describes the ratio between the launched power and the backscatter light at 1 μs. This affects the value of return loss and reflectance measurements.

- `Sample Distance`: the distance in the specified units (such as meters) between adjacent samples.

- `Optimize`: the Optimizing mode. This is the range for measurements. Possible Optimizing modes are

  - *Resolution*: for short fibers,

  - *Dynamic*: for long fibers,

  - *Standard*: for a compromise between Resolution and Dynamic, and

  - *Linearity*: to improve relative measurements between 2 points on the fiber.

NOTE **Linearity is only available on traces measured on an E4310A mainframe OTDR.**

- `Averaging Time`: the Averaging time of a measurement.

- `Horizontal Offset`: the position of the Horizontal Offset. You only see this value if a horizontal offset has been set. See "How to Set the Horizontal Offset" on page 53

NOTE **The `Parameters` window shows the parameters for the current trace. If you want to change the parameters for future traces, select [MEASUREMENT]<RUN/SETTINGS> and edit the parameters in the `Measurement Settings` edit fields.**

The Marker Info window

The `Marker Info` window contains information relating to the markers. The last 3 entries relate to the 'active marker', that is the marker highlighted in the `Trace` and `Overview` windows.
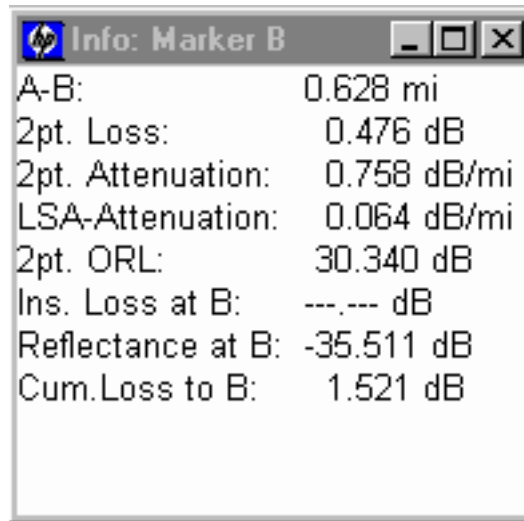
Figure 1-6   **The Marker Info window**

You see the following information in the Marker Info window:

- A-B: the distance between the markers

- 2pt.Loss: 2-point loss between the markers. This is the difference in power level between the marker points

- 2pt.Attenuation: The 2-point loss per length unit between the two markers.

- LSA-Attenuation.: The least square approximation for the fiber loss per length unit between the markers.

- 2pt. ORL: The 2-point Optical Return Loss between the two markers.

- Ins. Loss at A: The insertion loss of the event close to the marker.

- Reflectance at A: the return loss (in dB) of the event close to the marker.

- Cum. Loss to A: the cumulative loss between the initial backscatter value interpolated to the start of the fiber, and the marker point.

NOTE	If the active marker is B, the last 3 entries will be **Ins Loss at B, Reflectance at B,** and **Cum. Loss to B.**

The Total Fiber Info window

The Total Fiber Info window contains information relevant to the whole fiber.
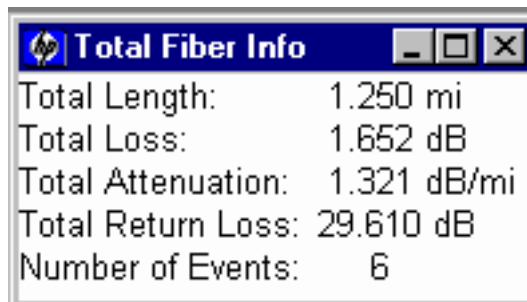
Figure 1-7   **The Total Fiber Info window**

All information in this window is only relevant for the part of the trace between the Horizontal Offset and the Fiber End. See "How to Set the Horizontal Offset" on page 53 and "How to set the Fiber End" on page 56.

So, for example, Events before the Horizontal Offset are not included in the Number of Events.

If you have not set a Horizontal Offset, the information is from the beginning of the fiber to the Fiber End. If you have not set a Fiber End, there are no entries for Total Length, Total Loss, or Total Attenuation.

- `Total Length`: the distance between the Horizontal Offset and the Fiber End.

- `Total Loss`: the loss between the Horizontal Offset and the Fiber End.

- `Total Attenuation`: the attenuation between the Horizontal Offset and the Fiber End.

- `Total Returnloss`: the return loss between the Horizontal Offset and the Fiber End.

- `Number of Events`: the number of events between the Horizontal Offset and the Fiber End. This does not include Landmarks.

The Overview window

The `Overview` window contains an overview of the trace and markers (Figure 1-8).

Figure 1-8   **The Overview window**

You always see the full trace in this window, even if the main trace window only shows a part (for example, after zooming).

NOTE **You zoom in on an area by selecting a rectangle either in the Trace window, or in the Overview window (see "Zooming" on page 22).**

If you are displaying more than one trace (see "How to Display more than one Trace" on page 87), the trace in the Overview window represents the current trace. The color of the trace in the Overview window is the same as the color of the current trace.

The Two-Way Event Table window

If you have made a Two-way Averaging measurement, you can also see the Two-Way Event Table.

See "How to take a Two-Way Averaging measurement" on page 86.

1.4 Icons and Menus

Icons

The OTDR Toolkit has a number of icons (Figure 1-9) The icons give shortcuts to common functions. All functions started by icons can also be started from the OTDR Toolkit menu.

Figure 1-9   **OTDR Toolkit icons**

NOTE **If you cannot see the toolbar, select [View]<Toolbar>.**

If you can see the toolbar, but want to hide it, you should also select [VIEW]<TOOLBAR>.

NOTE   **To see what an icon does, click on the icon and keep your mouse button held down. A brief explanation of the icon's function is written at the bottom of the OTDR Toolkit window.**

If you do not want to activate this function, move the cursor away from the icon before you release the mouse button.

To activate a function, just click on the icon.

Table 1-1 shows the icons that are available:

Icon	Function	Menu equivalent
	Opens a file	[FILE]<OPEN>
	Saves a file	[FILE]<SAVE TRACE>
	Copies the contents of the active view to the clipboard	[EDIT]<COPY TO CLIPBOARD>
	Shows you additional trace information, and allows you to modify this information.	[EDIT]<TRACE INFORMATION>
	Prints the trace and tables (as specified in [FILE]<PRINT SETUP>)	[FILE]<PRINT>

Table 1-1   **OTDR Toolkit icons**

Icon	Function	Menu equivalent
	Connects/Disconnects an OTDR with your PC	[OTDR]<CONNECT> [OTDR]<DISCONNECT>
	Makes Trace 1 the current trace	[VIEW]<TRACE 1>
	Makes Trace 2 the current trace	[VIEW]<TRACE 2>
	Makes Trace 3 the current trace	[VIEW]<TRACE 3>
	Makes Trace 4 the current trace	[VIEW]<TRACE 4>
	Keeps markers A and B the same distance apart when you move one marker.	[VIEW]<LOCK A-B MARKERS>
	Brings up the level markers to allow you to analyze Insertion Loss	[ANALYSIS]<ANALYZE INSERTION LOSS>
	Brings up the level markers to allow you to analyze Reflectance	[ANALYSIS]<ANALYZE REFLECTANCE>
	Specifies that when an Event is selected in the Event Table, the Trace zooms around this Event.	[VIEW]<SNAP TO EVENT>

Table 1-1   **OTDR Toolkit icons**

Icon	Function	Menu equivalent
	Zooms out one step horizontally and vertically.	[VIEW]<ZOOM OUT>
	Zooms out to show the full trace	[VIEW]<ZOOM OUT TO FULL TRACE>
	Immediately interrupts a measurement on the OTDR and cleans up the communication.	[MEASUREMENT]<CANCEL>
	Tells you about the OTDR Toolkit software version	[HELP]<ABOUT OTDR TOOLKIT>

Table 1-1   **OTDR Toolkit icons**

Menus

The OTDR Toolkit has 9 different menus. For information about specific menu items, either consult the online help, or look at the text at the bottom of the OTDR Toolkit window when the menu item is highlighted.

Table 1-2 gives a brief overview of each menu, and the type of functions that you can find there.

Menu	Function	Example
[FILE]	Perform Trace-related functions	Open a Trace Save a Trace Print a Trace

Table 1-2   **OTDR Toolkit menus**

Menu	Function	Example
[EDIT]	Edit current trace	Copy to clipboard View/Edit trace labels
[VIEW]	Alter the appearance of current trace	Zoom Set Offset
[OTDR]	Communicate with connected OTDR	Connect/Disconnect OTDR Set Instrument Config Send remote commands
[MEASUREMENT]	Perform a task on connected OTDR	Set measurement settings Start Measurement Cancel Measurement

NOTE	**Most of the [OTDR] and [MEASUREMENT] menu options are only useful if you have an OTDR connected to your PC. See "How to Take a New Measurement" on page 45.**

[EVENTS]	Perform Event-specific functions	Add/Modify Event Add/Modify Landmark Delete Events/Landmarks
[ANALYSIS]	Take a measurement on current trace	Scan trace for Events Analyze Insertion Loss Analyze Reflectance
[WINDOW]	Alter the window layout	Tile the windows Specify the windows you see
[HELP]	Online Help information	

Table 1-2   **OTDR Toolkit menus**

1.5 Right mouse button menus

If you click with your right mouse button in any window, you see a list of functions that you can perform. The menu stays until you select a menu item, or you click somewhere else with your left mouse button.

The list that you see depends on what you are doing at the time. For example, if you click close to the active marker when it is at an Event, you see different options than when you click elsewhere in the Trace window.

Menu options that are not possible at the moment are grayed. For example, if you have no horizontal offset, <CLEAR HORIZONTAL OFFSET> is grayed.

The possible menu options are discussed in this section.

Trace window

Table 1-3 lists the menu options you see if you click on the Trace window with your right mouse button.

NOTE   **If you click on a marker, you see a different set of menu options. See "Marker" on page 36.**

Menu option	Function
<SNAP TO EVENT>	Specifies that when an Event is selected in the Event Table, the Trace zooms around this Event.
<LOCK A-B MARKERS>	Keeps markers A and B the same distance apart when you move one marker.
<ZOOM OUT TO FULL TRACE>	Zooms out to show the full trace.

Table 1-3   **Trace window right mouse button options**

Menu option	Function
<ZOOM OUT>	Zooms out one step horizontally and vertically.
<CLEAR VERTICAL OFFSET>	Repositions the current trace. This menu option is only valid if you have moved the trace up or down with your left mouse button.
<SET HORIZONTAL OFFSET>	Resets all locations and marker positions so that the active marker is at 0 km. Locations to the left of the active marker will therefore have negative distances. See "How to Set the Horizontal Offset" on page 53.
<CLEAR HORIZONTAL OFFSET>	Resets the Horizontal Offset to the actual start of the measurement.
<COPY TO CLIPBOARD>	Copies the current trace to the clipboard. The trace is copied as a bitmap file.

Table 1-3   **Trace window right mouse button options**

Marker

Table 1-4 lists the menu options you see if you click with your right mouse button on a Marker in the Full Trace Window.

NOTE

A number of menu options are only valid if the marker is at an Event or Landmark. However, to preserve performance, the menu is not updated every time a marker moves. This means that the menu option may not be grayed.

Menu option	Function
<ADD REFLECTIVE EVENT>	Adds a Reflective Event at the marker. See "How to Add a Reflective Event" on page 75.
<ADD NON-REFLECTIVE EVENT>	Adds a Non-Reflective Event at the marker. See "How to Add a Non-Reflective Event" on page 81.
<MODIFY EVENT>	Modifies the Event at the marker. See "How to Modify an Event" on page 83.
<DELETE EVENT>	Deletes the Event at the marker. See "How to Delete an Event" on page 82.
<DECLARE END>	Sets an End Event at this marker. All Events to the right of the End will be deleted. See "How to set the Fiber End" on page 56.
<ADD LANDMARK>	Adds a landmark at the marker. See "How to Add a Landmark" on page 65.
<MODIFY LANDMARK>	Modifies the landmark at the marker.
<DELETE LANDMARK>	Deletes the landmark at the marker.
<ADJUST REFR.INDEX/DISTANCE>	Specifies the Refractive Index or the exact position at the marker
<ADJUST SCATTER COEFF./REFL>	Allows you to change the Scatter Coefficient or Reflectance of the Event at the marker to a known value. As the Scatter Coefficient and Reflectance are related by a formula, if you alter one value, the other will also change. The marker must be near a Reflective Event.

Table 1-4   **Marker right mouse button options**

Menu option	Function
<LOCK A-B MARKERS>	Keeps markers A and B the same distance apart when you move one marker.
<SET HORIZONTAL OFFSET>	Resets all locations and marker positions so that the marker is at 0km. Locations to the left of the marker will therefore have negative distances. See "How to Set the Horizontal Offset" on page 53.

Table 1-4   **Marker right mouse button options**

NOTE   **You can also modify an Event or a Marker by double-clicking on the appropriate entry in the Event Table.**

Event Table window

Table 1-5 lists the menu options you see if you click on the Event Table window with your right mouse button.

Menu option	Function
<SNAP TO EVENT>	Specifies that when an Event is selected in the Event Table, the Trace zooms around this Event.
<MODIFY/DELETE EVENT>	Modifies or Deletes the Event or Landmark selected. If nothing is selected, this option is grayed.
<DECLARE END>	Sets an End Event at the active marker. All Events to the right of the End will be ignored.
<DELETE ALL LANDMARKS>	Deletes all landmarks from the Event Table.
<DELETE EVENT TABLE>	Deletes all Events from the Event Table.

Table 1-5   **Event Table right mouse button options**

Menu option	Function
<FONT>	Change the font for all entries in this window.
<COPY TO CLIPBOARD>	Copies the Event Table to the clipboard. The Event Table is copied as ASCII text separated by tabs.

Table 1-5   **Event Table right mouse button options**

Parameters window

Table 1-6 lists the menu options you see if you click on the Parameters window with your right mouse button.

Menu option	Function
<SETTINGS...>	Change the settings for the next measurement. These changes will not appear in the Parameters window until a new measurement has been taken. See "How to Take a New Measurement" on page 45.
<LENGTH UNITS...>	Changes the Units used to measure Range and Sample Distance (meters, feet, or miles). Changing the Length Unit also affects the units used in other windows.
<FONT>	Change the font for all entries in this window.
<COPY TO CLIPBOARD>	Copies the Parameters table to the clipboard. The Parameters table is copied as ASCII text separated by tabs.

Table 1-6   **Parameters right mouse button options**

Marker Info window

Table 1-7 lists the menu options you see if you click on the Marker Info window with your right mouse button.

Menu option	Function
<ANALYZE INSERTION LOSS>	Lets you manually calculate the Insertion Loss. See "How to Calculate Insertion Loss" on page 84.
<ANALYZE REFLECTANCE>	Lets you manually calculate the Reflectance. See "How to Calculate Reflectance" on page 83.
<LOCK A-B MARKERS>	Keeps markers A and B the same distance apart when you move one marker.
<LENGTH UNITS...>	Changes the Units used to measure A-B, 2-pt Attenuation, and LSA-Attenuation (meters, feet, or miles). Changing the Length Unit also affects the units used in other windows.
<FONT>	Change the font for all entries in this window.
<COPY TO CLIPBOARD>	Copies the Marker Info table to the clipboard. The Marker Info table is copied as ASCII text separated by tabs.

Table 1-7   **Marker Info right mouse button options**

Total Fiber Info window

<LENGTH UNITS...>	Changes the Units used to measure Total Length, and Total Attenuation (meters, feet, or miles). Changing the Length Unit also affects the units used in other windows.
<FONT>	Change the font for all entries in this window.

<Copy to Clipboard>	Copies the Total Fiber Info table to the clipboard. The Total Fiber Info table is copied as ASCII text separated by tabs.

Overview window

Table 1-8 lists the menu options you see if you click on the Overview window with your right mouse button.

Menu option	Function
<Zoom out to Full Trace>	Zooms out to show the full trace in the Trace window.
<Grid>	Adds or removes a grid from the Overview window.
<Dotted Trace>	Sets that the trace in the Overview window as a solid or a dotted line.

Table 1-8   **Overview right mouse button options**

Getting Started

Right mouse button menus

2

Sample Sessions: Taking a Measurement

Sample Sessions: Taking a Measurement

This chapter contains a number of sample sessions of step-by-step guides showing how to use common features of the OTDR Toolkit.

The first example shows how you take a measurement on an attached HP OTDR, and save this measurement. Subsequent examples show how you can alter the settings, change the area analyzed, and print the trace.

For examples showing how you can perform operations on existing measurements, please consult Chapter 3 "Sample Sessions: Analyzing Traces".

For a simple example of how to open an existing trace, see "How to Open an Existing Trace" on page 18.

2.1 How to Take a New Measurement

If you attach your PC to an OTDR (E4310A OTDR, E6000A Mini-OTDR, or E6053A/E6058A/E6060A Rack OTDR), you can use the HP OTDR Toolkit software to take a new measurement. You do this as follows:

How to Connect an OTDR

1   Attach your PC to an OTDR with a serial cable (HP Part Number 5180-2477).

2   Connect a fiber to your OTDR.

For details of how to connect a fiber and configure an OTDR, please consult the appropriate User's Guide: the *OTDR User's Guide* (HP Part Number E4310-91011), or the *Mini-OTDR User's Guide* (HP Part Number E6000-91011).

3   Switch on your OTDR and wait until it is ready to operate.

4   Select the [OTDR]<COM SETTINGS> from the OTDR Toolkit menu.

You see a window headed `Communications Settings` (Figure 2-1).

Figure 2-1   **Communications Settings window**

5 Check that the settings are correct for your OTDR configuration.
Be sure that hardware handshaking is specified.

6 Press the Connection icon (Figure 2-2).

Figure 2-2   **Connection icon**

NOTE   **You could also select [OTDR]<CONNECT> from the OTDR Toolkit menu.**

If your OTDR is properly connected, you see a message at the bottom of the OTDR Toolkit window telling you that the connection has been successful.

If you see an error message saying OTDR not responding, check that your OTDR is properly connected and switched on.

How to Start the Trace

7 Select the menu option [MEASUREMENT]<RUN/SETTINGS>.

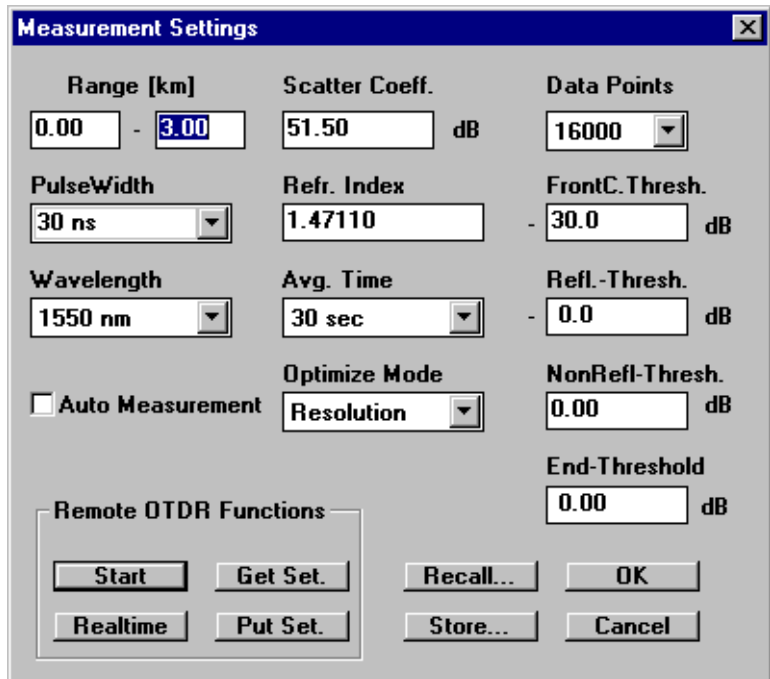You see a window headed Measurement Settings (Figure 2-3). This contains settings for future measurements.

Measurement Settings

Range [km]	Scatter Coeff.	Data Points
0.00 - 3.00	51.50 dB	16000

PulseWidth	Refr. Index	FrontC.Thresh.
30 ns	1.47110	- 30.0 dB

Wavelength	Avg. Time	Refl.-Thresh.
1550 nm	30 sec	- 0.0 dB

	Optimize Mode	NonRefl-Thresh.
☐ Auto Measurement	Resolution	0.00 dB

End-Threshold
0.00 dB

Remote OTDR Functions

Start	Get Set.	Recall...	OK
Realtime	Put Set.	Store...	Cancel

Figure 2-3   **Measurement Settings window**

8 Specify the correct settings for your fiber. For example, if your

fiber is 5 km long, set the Range to 6 km.

NOTE	**You either enter text in the appropriate edit field, or select a value from the dropdown menu.**
	For PulseWidth and Averaging Time you can either select a value, or type on directly into the edit field.

For an explanation of some of the measurement settings, see "The Parameters window" on page 24. For more information, please consult your online help.

NOTE	**If you want to get the settings from the OTDR, press Get Set.**

9 When you have selected all the settings you want, press the Start button in the Measurement Settings window. The trace is started on the OTDR, and you see the current settings in the Parameters window.

NOTE	**If you have selected an Unlimited Averaging time, you see a warning message telling you that you must stop the trace manually. Otherwise, the trace is completed after the specified Averaging time expires.**
	The Averaging time is listed in the Parameters window.
	You can stop the trace manually at any time by selecting [MEASUREMENT]<STOP>.

NOTE	**You can start a trace in real time, by pressing the Realtime button.**

You see a window on the Toolkit headed `Realtime Preview`. This shows you the measurement that is currently taking place on the OTDR (Figure 2-4).
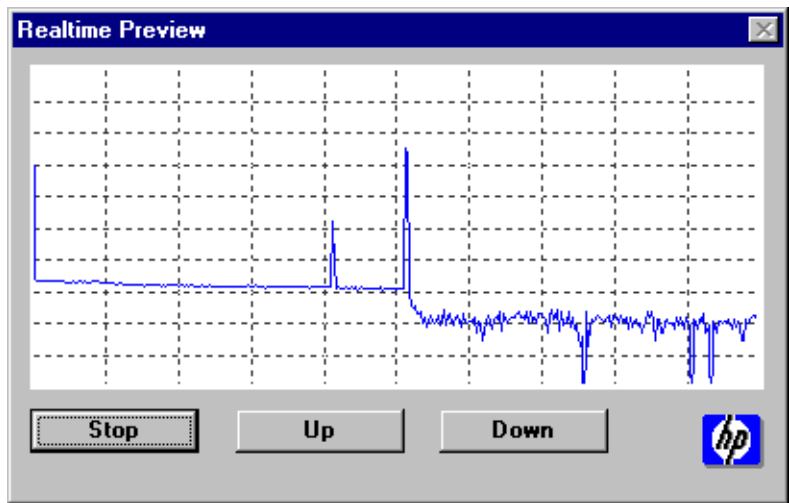

Figure 2-4   **Realtime preview window**

Use the `Up` and `Down` buttons in the Realtime Preview window to move the trace up and down. Press `OK` to exit this window,

When the trace is completed (and not before), you see the new trace in your Trace window.

10 To see the events on the trace, select [ANALYSIS]<SCAN TRACE>.

The OTDR scans the trace for Events, and writes them on the Event Table window and (if selected) the Event Bar at the foot of the Trace window (see "The Event Bar" on page 21).

NOTE   **After a Scan Trace has been performed, the OTDR Toolkit software calculates the end of the fiber.**

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Any Events beyond the End of the Fiber are listed as type `Out-of-Range` in the Event table.

How to Save a Trace

Now you have taken your trace measurement, you may wish to save the trace to a file. You do this as follows:

11 Select the menu option [FILE]<SAVE TRACE>

NOTE

You could also use the `Save` icon. See Table 1-1 "OTDR Toolkit icons" on page 31.

You see a window inviting you to select a new trace name.

NOTE

As this is a new trace, you must select a name. By default, all traces are saved with the name `CURRENT.SOR`, and each trace overwrites the previous one with this name.

Existing traces are saved with their original name. To save an existing trace with a new name, select [FILE]<SAVE TRACE AS>.

12 Select a name for your trace, and a directory where you want to store it.

2.2 How to Set the Trace Information

How to set the Default Trace Information

1 Press the Trace Information icon (Figure 2-5).

Figure 2-5　　　　　　**Trace Information icon**

You see a window headed `Trace Information` (see Figure 2-6).

**NOTE**　　　　　**You can also bring up this window by selecting the menu item [EDIT]<TRACE INFORMATION>.**

At the top of the Trace Information window, you see the instrument and module from which the trace was taken.
Below, you see 2 sets of information: a set of 5 labels, and 5 corresponding comments.

2 If you want to clear all the existing labels in the Comments field, press the `Clear` button.

Click on each edit field in turn, and add new labels as required (Figure 2-6).
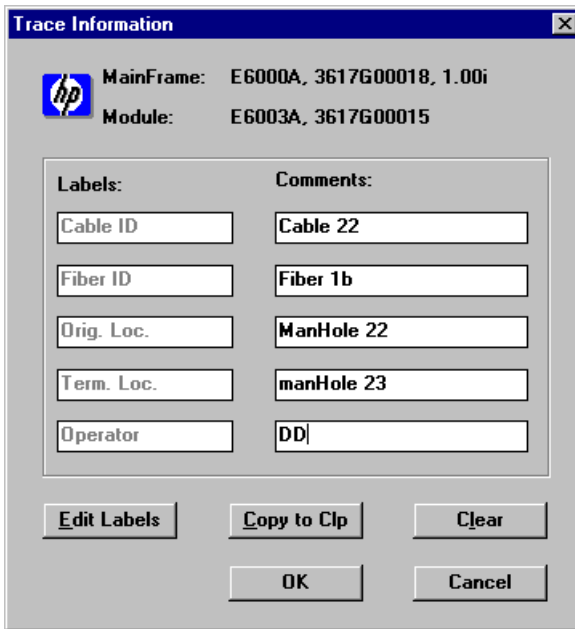
Figure 2-6   **Trace Information - example**

NOTE   **You will normally only want to edit the Comments. If you need to
change the labels as well, press `Edit Labels`, and enter new text in
the Labels edit fields.**

3 Press OK to exit the window and set the new labels.
Press Cancel to exit the window, and keep the previous labels.

When you print or save a measurement, the comments and labels
that you have set are also printed/saved.

See "How to Print a Measurement" on page 59 and "How to Save a
Trace" on page 50 for information on printing and /saving
measurements.

2.3 How to Set the Horizontal Offset

You set the Horizontal Offset to reset all distances (for example the marker position, or locations in the Event Table) relative to the point. You do this as follows.

1 Move your marker to the point where you want to set the offset.

You move a marker by dragging it with the left mouse button. If you want to position the marker precisely, see "How to Zoom Around an Event" on page 65.

2 Select the menu option [VIEW]<SET HORIZONTAL OFFSET>

NOTE   **You can also click with your right mouse button on the marker, and select the menu option <SET HORIZONTAL OFFSET>**

The position of the current marker is now equal to 0 km, and all Events and Markers to the left of the offset have negative distances.

By default, all Events to the left of the Offset are not shown in the Event Table and the Event Bar at the foot of the trace (Figure 2-7).
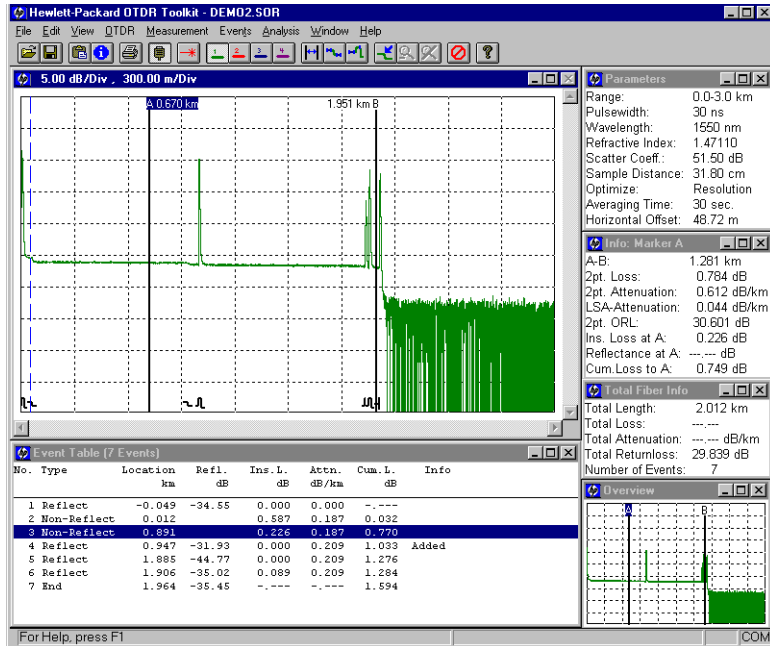
Figure 2-7   **Trace with Horizontal Offset set**

NOTE   **Landmarks are always positioned relative to 0 km.**

This means that when you set a Horizontal Offset, the location distance of the landmark stays the same, but the position of the marker on the trace changes by the amount of the Offset.

If you move the marker away from the offset, you see a dashed vertical line marking the offset. Printouts also contain this line (see "How to Print a Measurement" on page 59).

How to View Events before the Offset

3 Select [VIEW]<PREFERENCES> from the Toolkit menu.

4 You see a window headed View Preferences (Figure 2-8).

At the top right of the View Preferences window, there is an option `Show Events Before Offset`. By default, there is no tick next to this option.
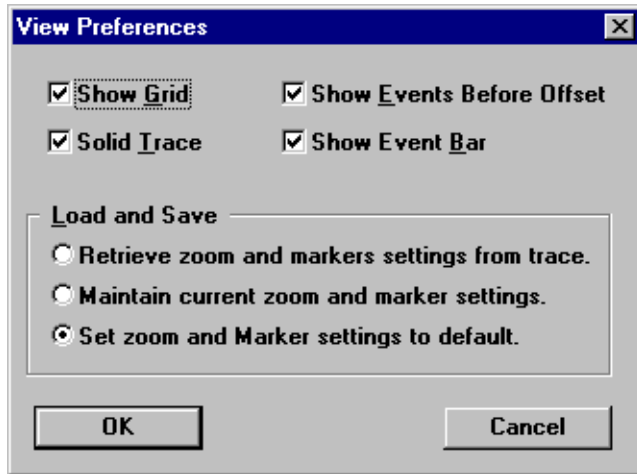
Figure 2-8   **View Preferences window**

5 Click on the box next to `Show Events Before Offset`. A tick appears in the box.

6 Press `OK` to confirm your new view preferences.

You can now see all events in the Event Bar and Event Table. Events to the left of the horizontal offset have negative distances in the `Location` column of the Event Table.

How to Clear the Horizontal Offset

7 Select the menu option [VIEW]<CLEAR HORIZONTAL OFFSET>, or click on the Trace window with your right mouse button and select <CLEAR HORIZONTAL OFFSET>.

The offset is cleared, and you see all events in the Event Table and Event Bar even if `Show Events Before Offset` is not set.

2.4 How to set the Fiber End

You set the Fiber End if you know how long your fiber is. For example, if your fiber is 50 km long, you can set an End at 50 km and any measurements beyond this point are ignored. You must declare the End at an existing Event.

1   Select an Event from the Event Table.

NOTE   **Alternatively, you can move a marker to an Event in the Trace window. But note that if the marker is not at an Event, no End can be set.**

2   Select the menu option [EVENTS]<DECLARE END>

NOTE   **You can also click with your right mouse button on the marker, and select the menu option <DECLARE END>**

The end marker is listed as type `End` in the Event table, and marked on the Event Bar with a special symbol (see Figure 2-9). All events to the right of the End are removed.
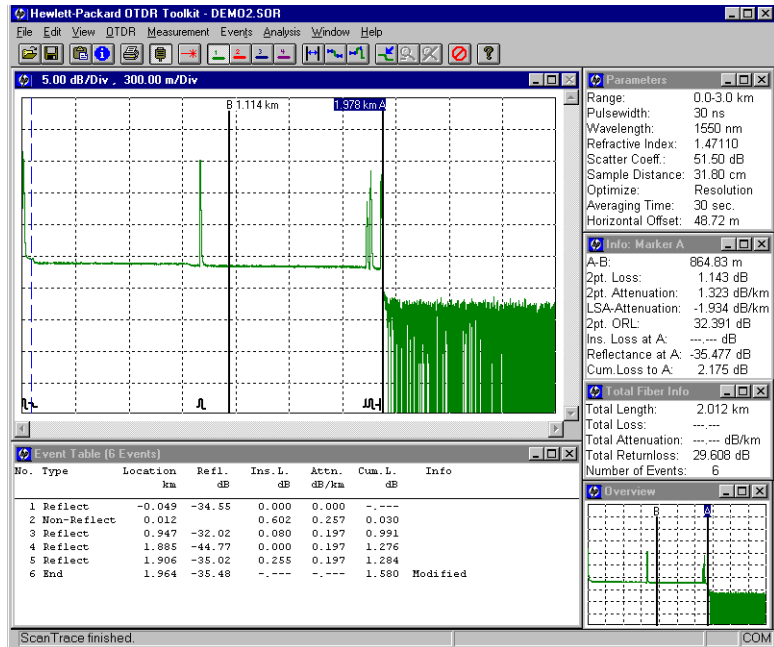
Figure 2-9   **Trace with an End set at Marker A**

If you add an Event after the End (see "How to Add a Reflective Event" on page 75 and "How to Add a Non-Reflective Event" on page 81), the End is removed, and its Event reverts to its original type.

How to Scan for the Fiber End

The above example showed you how to set the Fiber End at a specific position. You can also set the Fiber End at the first point on the trace where the Insertion Loss is greater than a value that you specify.

You scan for an End Threshold as follows.

1 Select the menu option [ANALYSIS]<SCANTRACE
THRESHOLDS>.

You see a window allowing you to set Thresholds for
Reflective, Non-Reflective, and End Events (Figure 2-10).
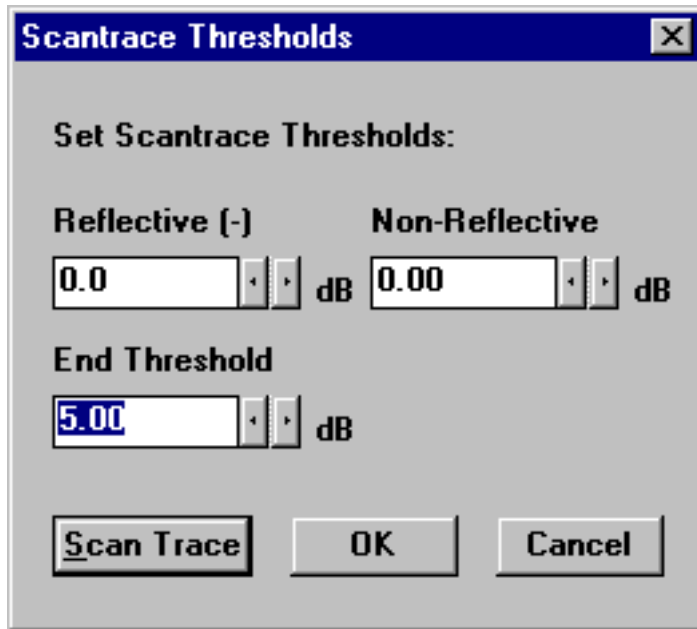
Figure 2-10   **Scantrace Thresholds window**

2 Select an appropriate value (for example, 5dB) in the End
Threshold edit field.

You can alter the current value with the arrows to the right of
the edit field, or you can type in a new value.

3 Press the Scan Trace button.

The Trace is scanned, and you see a Fiber End at the first point
where the Threshold is exceeded. No Events are added after this
point.

2.5 How to Print a Measurement

This example demonstrates how to print the results of a measurement.

1 Attach an external printer to your PC.

How to set up the Printer Configuration

2 Select the menu item [FILE]<PRINT SETUP>.
You see a window headed Print Setup (Figure 2-11).
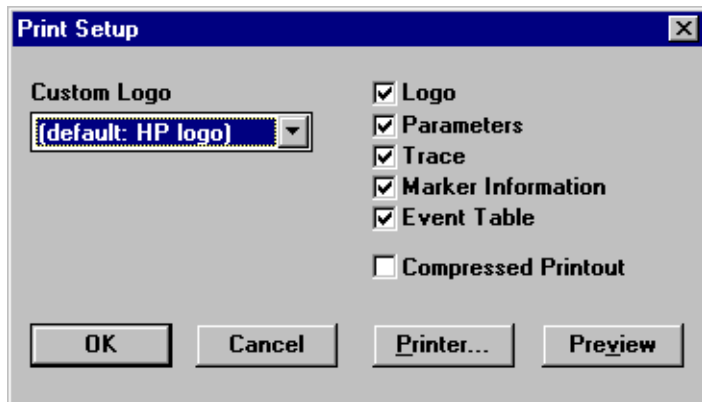
Figure 2-11   **Print Setup window**

3 Select which of the following information you want to print:

• **Logo**: as specified in Custom logo

NOTE   **In this release of the HP OTDR Toolkit software, only a Hewlett-Packard logo is available.**

- **Parameters**: information from the `Parameters` window, labels set in "How to Set the Trace Information" on page 50, and details of the instrument and module on which the measurement was taken.

- **Trace**: the trace, markers, and Event Bar from the Trace window.

- **Marker Information**: information from the `Marker Info` window.

- **Event Table**: information from the Event Table window.

4 Select `Compressed Printout` if you want a smaller picture. Compressed printout can be useful if you want to try to fit all the information on one page.

How to See what the Printout will Look Like

5 Press `Preview`

You see a window containing one or more pages showing what the printout will look like (Figure 2-12).
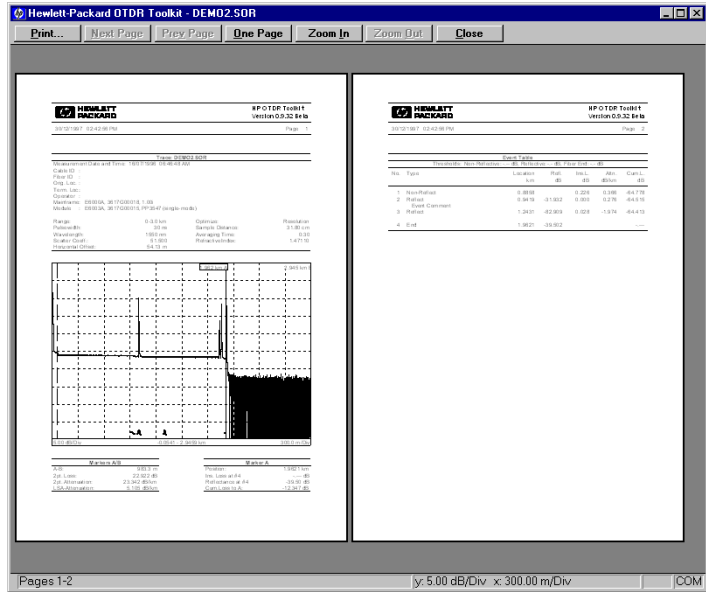
Figure 2-12   **Print preview window**

You can also see this window by selecting [FILE]<PRINT PREVIEW> from the Toolkit menu.

If the printout takes up more than one page, you can move to different pages with the Next Page and Prev Page buttons. You can also toggle between showing One Page and Two Pages on the preview screen.

You can zoom in and out of the screen either by using the Zoom In and Zoom Out buttons, or by clicking on the screen with your left mouse button.

How to print the measurement

6   Press the Print button.

You see a window headed Print telling you about the configured printer.

NOTE   **You can also see this window by selecting [FILE]<PRINT> from the Toolkit window.**

7   Check that the printer is properly configured, then press OK.

The measurement is now printed (Figure 2-13).
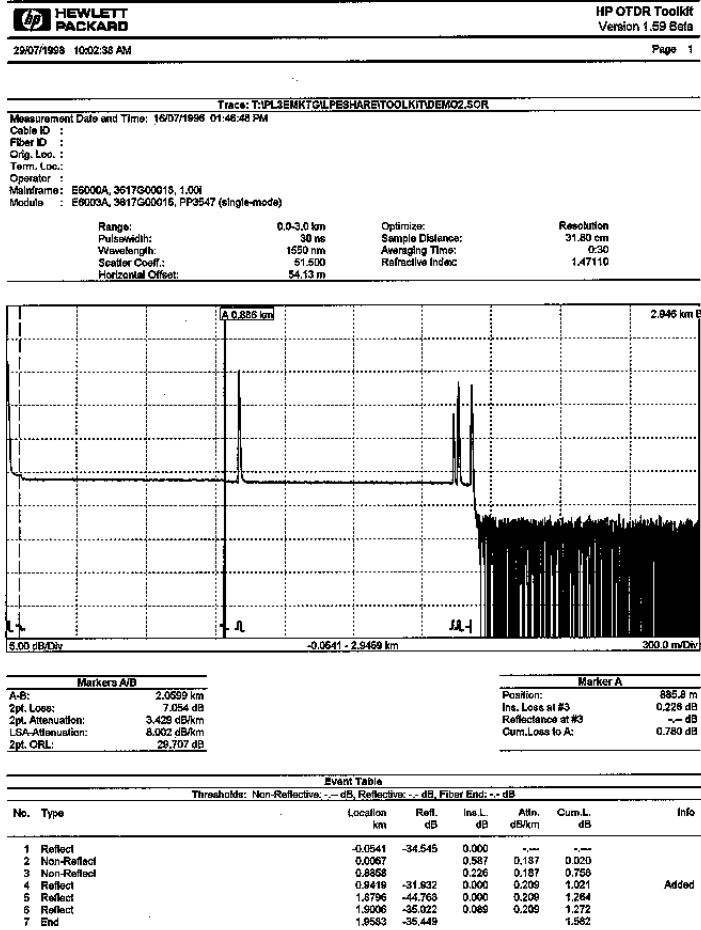
Figure 2-13   **Typical Printout**

How to Print Multiple traces

1 Configure the printer, following the steps in "How to set up the Printer Configuration" on page 59.

2 Select the menu item [FILE]<PRINT MULTIPLE TRACES>

You see a window headed `Select Multiple Files to Print`, containing all the appropriate files in the current directory (Figure 2-14).
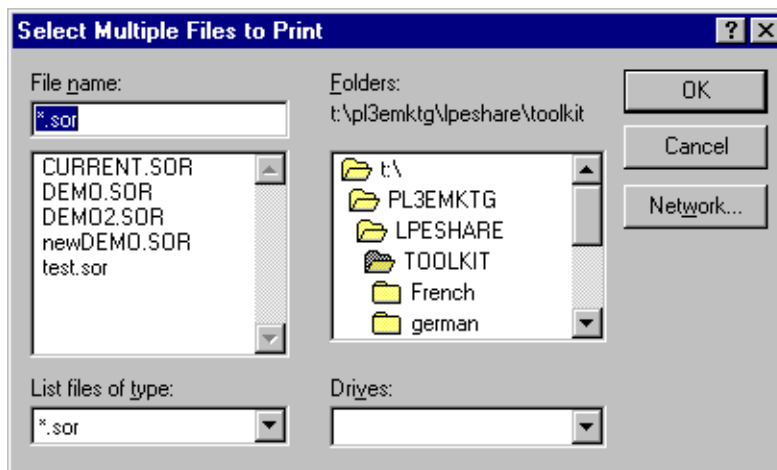
Figure 2-14   **Select Multiple Files to Print window**

By default, only files with the extension .SOR are displayed.

3 Select the files that you want to print.

NOTE   **You can select a contiguous range of files by dragging on the range with your left mouse button. You can also select a range by holding down the <SHIFT> button and selecting two files. All files between them are also selected.**

Otherwise, select multiple files by holding down the <CTRL> button and clicking on the files that you want to print.

4 Press OK.

You see the Print window that appears after step 6 on page 61.

5 Check that the printer is properly configured, then press OK.

The files are printed consecutively on the configured printer.

2.6 How to Add a Landmark or Event Comment

There are 2 ways of documenting points on a fiber:

- A **landmark** documents a point on the fiber. For example, if there is a manhole 20 km from the start of the fiber, you can add a landmark at 20 km.

- An **event comment** documents a particular event. The position of the event comment can change, for example if you change the refractive index of the fiber.

Both landmarks and event comments can help identify the physical location of an event.

How to Add a Landmark

1 Move your marker near the point you wish to mark.

So, for example, if you want to add a landmark at 20 km, drag the current marker with your left button to around 20.00 km.

How to Zoom Around an Event

2 View the Event more closely by dragging a rectangle around the area you want to see with your left mouse button (see "Zooming" on page 22).

You see the area you have selected in the Trace window. The
full trace is always visible in the Overview window (Figure 2-
15).

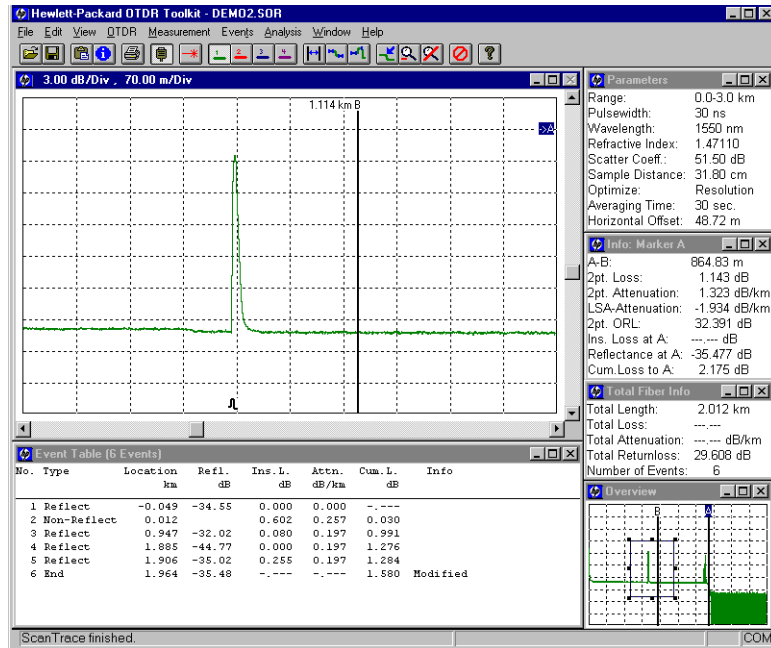**Figure 2-15**   **Zooming around an Event**

NOTE   **You can return to viewing the full trace by double-clicking anywhere in
the Trace window.**

3   Move the marker to the point on the trace where you want to add
    the Event.

    You move a marker by dragging it with the left mouse button.

How to Enter the Landmark Text

4   Select the menu item [EVENTS]<LANDMARK><ADD>.

NOTE	**You can also click with your right mouse button on the marker, and select the menu option <ADD LANDMARK>**

If there is an Event near the landmark, you are asked if you want to add the landmark to this Event.
Answer Yes to add an Event Comment (see "How to Add an Event Comment" on page 68).
Answer No to add a Landmark (continue following the steps below).

If there is no Event near the landmark, you see a window headed Add New Landmark (see Figure 2-16).

5 Use the left and right arrows under Position (km) to alter the landmark position, if necessary.

You can also enter a value directly into the Position edit field.

6 Add text for the landmark into the lower edit field (Figure 2-16).
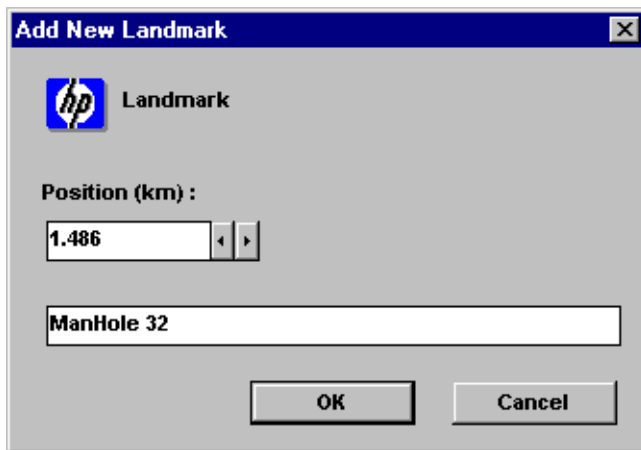
Figure 2-16   **Add New Landmark - example**

7 When you have the correct text and position, press OK.

You can now see the landmark in the Event Table, and in the Event Bar at the foot of the Trace window (see Figure 2-19).

NOTE   **You can save landmarks by selecting [EVENTS]<LANDMARK><STORE>. Previously saved landmarks can be loaded by [EVENTS]<LANDMARK><LOAD>**

How to Add an Event Comment

1   Double-click on an Event in the Event Table.
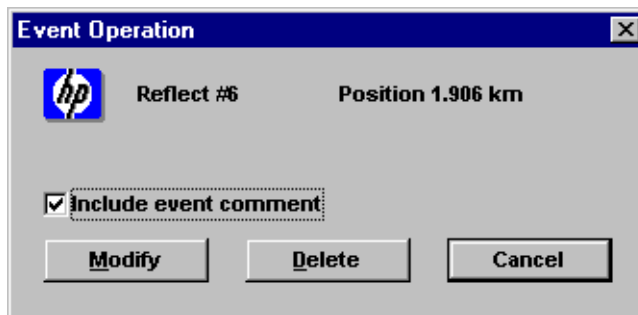
You see a window headed Event Operation (Figure 2-17).

Figure 2-17   **Event Operation window**

2   If there is no tick next to Include event comment, click in this box.

3   Press Modify.

You see a window headed Add Event Comment (see Figure 2-18).

NOTE   **If the event already has a comment, the window is headed `Set Event Comment`, and you see the comment in the edit field.**

If there is no existing comment, the edit field is empty.

4   Enter a comment and press OK (Figure 2-18).
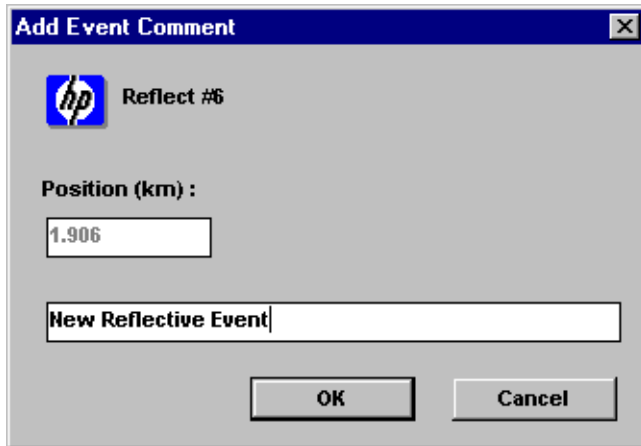
Figure 2-18   **Add Event Comment- example**

You now see a window inviting you to modify level markers.

5   As you only want to add a comment now, just press Cancel.

NOTE   **For more information about level markers, see "How to Add a
Reflective Event" on page 75 and "How to Add a Non-Reflective Event"
on page 81.**

You can now see the comment in the Event Table.

Figure 2-19 shows an Event Table containing a landmark and event
comment. The landmark is also marked in the Event Bar at the foot
of the trace.

Figure 2-19   **Landmark and Event Comment**

2.7 How to operate an OTDR remotely

You can use the HP OTDR Toolkit software to send SCPI commands to an OTDR, as described below. For a full list of useful SCPI commands, please consult the *OTDRs Programming Guide* (HP Product number E4310-91016).

1 Connect your PC to an HP OTDR.

Follow the instructions in "How to Connect an OTDR" on page 45.

2 Select [OTDR]<TERMINAL> from the Toolkit menu.

You see a window headed OTDR Terminal (see Figure 2-20).

3 Enter commands in the Command: edit box, then press Send.

An action is performed. If you have sent a query, the response appears in the Results: box.

For example, if you enter *idn?, you see the identification string for your OTDR in the Results: box (Figure 2-20).
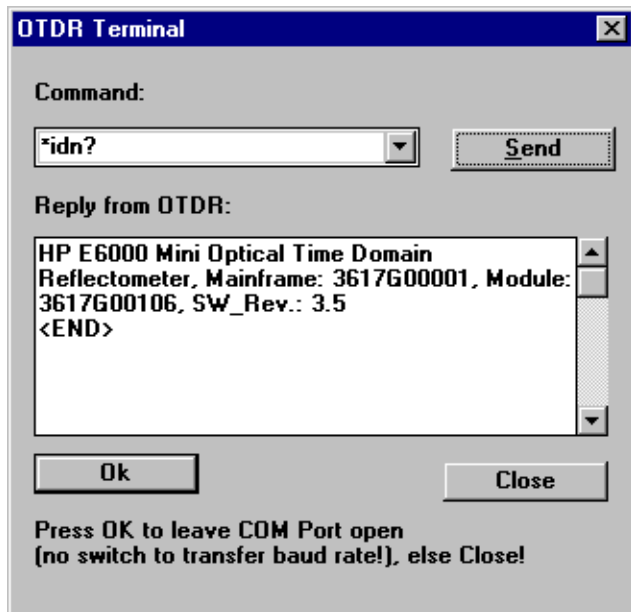
Figure 2-20   **OTDR Terminal window - example**

Sample Sessions: Taking a Measurement
How to operate an OTDR remotely

3

Sample Sessions: Analyzing Traces

Sample Sessions: Analyzing Traces

This chapter contains a number of sample sessions of step-by-step guides showing what you can do with existing traces.

It shows how you can add Events, analyze the trace, and include the trace information in other documents.

For examples showing how to set up and take a measurement, see "How to Open an Existing Trace" on page 18 and Chapter 2 "Sample Sessions: Taking a Measurement".

3.1 How to Add a Reflective Event

If your trace contains a Reflective Event that has not been detected by the Scan Trace algorithm, you can add an Event manually, as described below:

1 Move a marker to the position where you want to add the Event.

You move a marker by dragging it with the left mouse button. To use the zooming facilities to position the Event more precisely, see "How to Zoom Around an Event" on page 65

2 Select the menu item [EVENTS]<ADD REFLECTIVE EVENT>.

NOTE   **You can also click with your right mouse button on the marker, and select the menu option <ADD REFLECTIVE EVENT>**

If your marker is at an existing Event, you are asked if you want to modify this Event. See "How to Modify or Delete an Existing Event" on page 82.

You see a message box asking you if you want to add a comment for this Event.

3 If you want to add an Event Comment, answer `Yes`, and follow the steps below.
Otherwise, answer `No`, and go straight to "How to Set the Level-markers for Reflectance" on page 76.

How to Add an Event Comment

You see a message box title Add Event Comment (see Figure 2-18). The position of the Event on the trace is given. You cannot edit this value.

4 Enter text for the comment from your keyboard, for example
`New Reflective Event`.
The text appears in the edit field.

5 Press `OK` to confirm your Comment.

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The comment now appears with the Event in the Event Table.

The Event now appears in the Event Table, with its characteristics (Location, Reflection, and so on). If you have specified a comment, the comment also appears in the Event Table.

How to Set the Level-markers for Reflectance

You now see 3 *level-markers* on the trace (Figure 3-1). Two level-markers are to the left of the Event, and are joined by a *regression line*. A third level-marker is to the right of the Event.
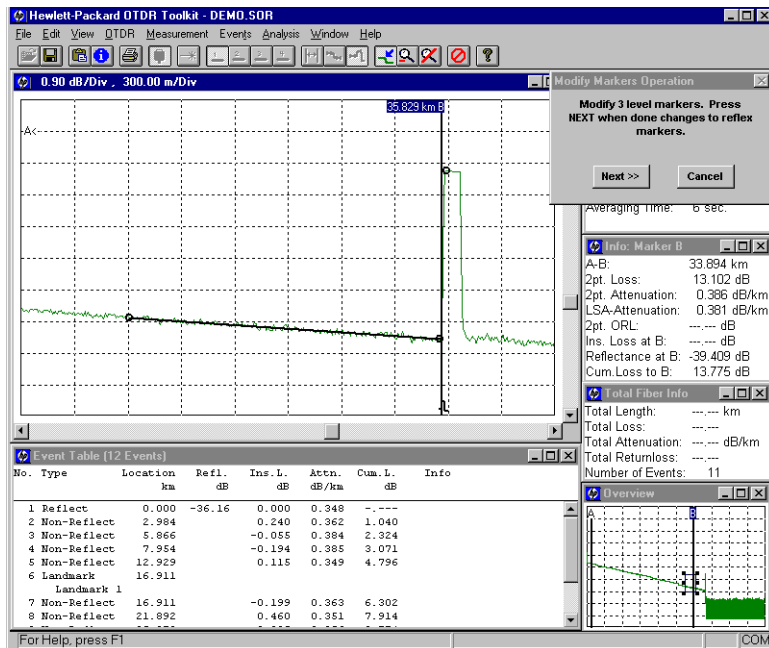

Figure 3-1 **Level-markers for analyzing reflectance**

You also see a message box telling you to modify the level-markers. You modify the level-markers by moving them with your left mouse button. You should do this as follows:

6 Move the second level-marker as close as you can to the main
marker.

You may not move this marker to the right of the marker.

7 Move the first level-marker as far left as you can, so that the
regression line is as long as possible, and as close to the path of
the trace as possible.

You should not move this level-marker to the left of any
previous event.

8 Move the third level-marker to the peak of the reflection.

NOTE   **As you move the level-markers, the Reflectance value in the Marker
Info window changes accordingly.**

When you have set the level-markers properly, they should look
something like Figure 3-2.
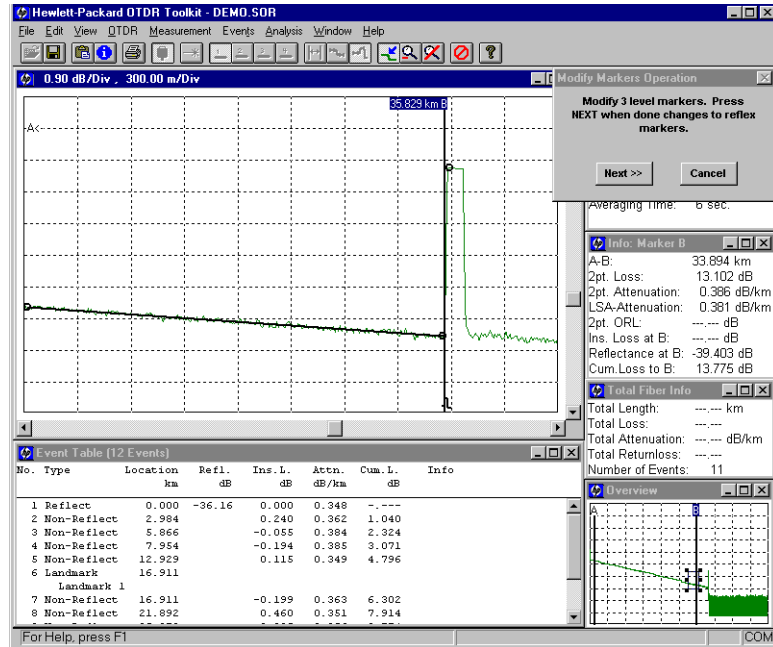
Figure 3-2   **Level-markers positioned for analyzing reflectance**

9   Press Next>>> to confirm that the level-markers have been
properly set.

How to Set the Level-markers for Insertion Loss

You now see 4 *level-markers* on the trace (Figure 3-3). These level-
markers allow you to analyze the Insertion Loss.

Two level-markers are to the left of the Event, and are joined by a
regression line. Two more level-markers are to the right of the
Event.
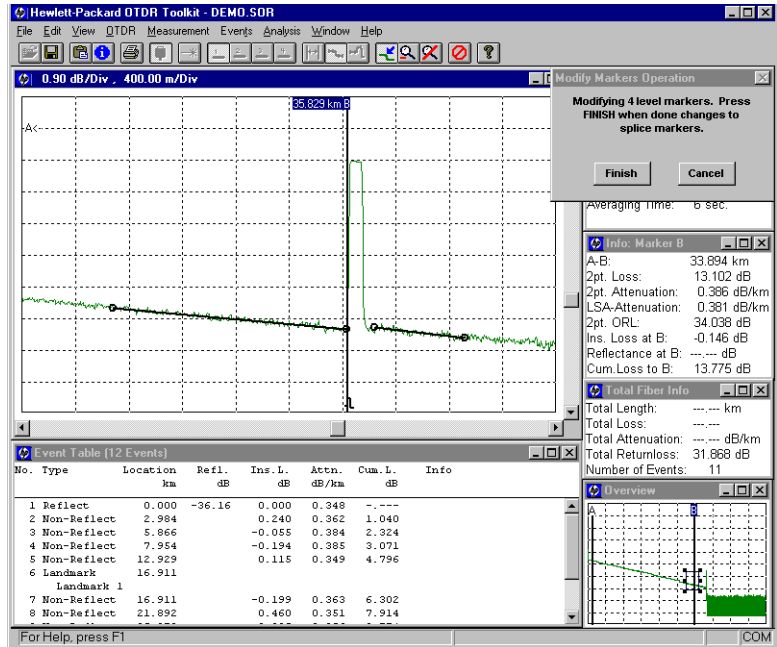
Figure 3-3   **Level-markers for analyzing insertion loss**

You also see a message box telling you to modify the level-markers. You modify the level-markers by moving them with your left mouse button. You should do this as follows:

10 Move the second marker as close as you can to the Event.

You may not move this marker to the right of the Event.

11 Move the first marker as far left as you can, so that the regression line is as long as possible, and as close to the path of the trace as possible.

The first level-marker should be to the right of all previous events.

12 Move the third level-marker as close as you can to the Event.

You may not move this marker to the left of the Event.

13 Move the fourth marker as far right as you can, so that the regression line is as long as possible, and as close to the path of the trace as possible.

If necessary, use the cursor keys to increase the zooming range.

You should not move this level-marker to the right of any subsequent event.

NOTE   **As you move the level-markers, the Insertion Loss value in the Marker Info window changes accordingly.**

When you have set the level-markers properly, they should look something like Figure 3-4.
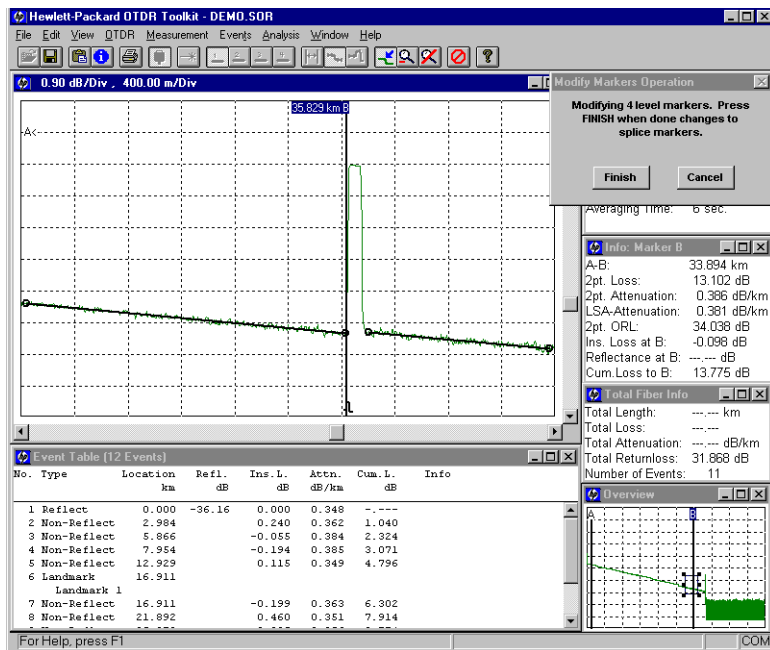
Figure 3-4   **Level-markers positioned for analyzing insertion loss**

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14 Press Finish to confirm that the level-markers have been properly set.

NOTE **The level-markers are still active. To deactivate them, press the Analyze Insertion Loss icon (see Figure 3-6).**

You can now see the Reflective Event in the Event Table, and in the Event Bar at the foot of the Trace window.

3.2 How to Add a Non-Reflective Event

Most of the steps for adding a Non-Reflective Event are also required to Add a Reflective Event. Cross-references in this example refer to steps in "How to Add a Reflective Event" above.

1 Follow "How to Zoom Around an Event" on page 65 to move your marker to where you want to add the event.

2 Select [EVENTS]<ADD NON-REFLECTIVE EVENT>

NOTE **You can also click with your right mouse button on the marker, and select the menu option <ADD NON-REFLECTIVE EVENT>**

You see a message asking you if you want an Event Comment.

3 If you want to see a comment accompanying this Event in the Event Table, select Yes, and follow "How to Add an Event Comment" on page 68.
Otherwise, select No, and continue.

You now see 4 level-markers, and a message box asking you to modify them.

4 Follow "How to Set the Level-markers for Insertion Loss" on page 78, to set the level-markers.

You can now see the Non-Reflective Event in the Event Table, and in the Event Bar at the foot of the Trace window.

3.3 How to Modify or Delete an Existing Event

1   Double-click on the Event you want to modify/delete in the Event Table.

You see a message box titled Event operation (see Figure 2-17).

NOTE   **You can also select an Event by moving the current marker to the event in the Trace in the Trace window, then selecting [EVENTS]<MODIFY EVENT> or [EVENTS]<DELETE EVENT>.**

Alternatively, you can click with your right mouse button on the marker, and select the menu option <MODIFY/DELETE EVENT>.

2   If you want to delete the Event, follow "How to Delete an Event" below.

If you want to modify the Event, follow "How to Modify an Event" below.

Otherwise, press the Cancel button.

How to Delete an Event

3   Press the Delete button.

You see a message box telling you the position of the Event, and asking if you want to delete it.

4   Press OK.

The Event is deleted, and removed from the Event Table, and the Event Bar at the foot of the Trace window.

How to Modify an Event

with a new event comment

3 If you want to modify the Event Comment, make sure that there is a tick next to `Include event comment`, then press the `Modify` button.
You can now follow the steps in "How to Add an Event Comment" on page 68.

with the same event comment as before

3 If you want to leave the comment as it is, click on the `Include event comment` box to remove the tick, then press the `Modify` button.

4 If the event is a Non-Reflective event, follow the steps in "How to Set the Level-markers for Insertion Loss" on page 78. Otherwise, follow the steps in both "How to Set the Level-markers for Reflectance" on page 76 and "How to Set the Level-markers for Insertion Loss" on page 78.

3.4 How to Calculate Reflectance or Insertion Loss for existing Events

How to Calculate Reflectance

1 Move the active marker to an Event.

2 Press the Analyze Reflectance icon (Figure 3-5).
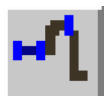
Figure 3-5   **Analyze Reflectance icon**

3 Follow the steps in "How to Set the Level-markers for Reflectance" on page 76 to position the level-markers properly.

4 Read the Reflectance for the Event in the Marker Info. window.

The Reflectance is written as `Reflectance at A` (or `Reflectance at B`, depending on the current marker).

How to Calculate Insertion Loss

1 Move the active marker to an Event.

2 Press the Analyze Insertion Loss icon (Figure 3-6).
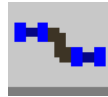
Figure 3-6   **Analyze Insertion Loss icon**

3 Follow the steps in "How to Set the Level-markers for Insertion Loss" on page 78 to position the level-markers properly.

4 Read the Insertion Loss for the Event in the Marker Info. window.

The Insertion Loss is written as `Ins. Loss at A` (or `Ins. Loss at B`, depending on the current marker).

3.5 How to include Trace Information in Other Documents

You can copy information from the HP OTDR Toolkit to include into other documents. You do this as follows.

1   Click the window containing the information you want to use in other windows applications with your right mouse button.

For example, if you want to copy the Trace window, click here.

You see a menu offering the options listed in Table 1-3 "Trace window right mouse button options" on page 35.

2   Select the menu option <COPY TO CLIPBOARD>.

NOTE   **Alternatively, you can click on the window you want and select [EDIT]<COPY TO CLIPBOARD> from the Toolkit menu.**

3   Open your new document, and paste this information into it.

4   Repeat steps 2 and 3 until you have copied all the information you want.

NOTE   **You can copy the Trace window, the Event table, the Parameters window, and the Marker Info window.**

The trace is saved as a bitmap file. Tables are saved as ASCII text separated by tabs. After you paste a table, you should check that its columns are properly aligned.

5   If you want to include the trace comments, press the information icon.

See "How to set the Default Trace Information" on page 50 and Figure 2-6.

6   Press Copy to Clp.

The comments are copied to the clipboard.

7   Open your new document, and paste the comments into it.

Figure 3-7 shows an example of a Microsoft Excel$^{©}$ document containing HP OTDR Toolkit information.

Microsoft Excel is a trademark of Microsoft Corporation.
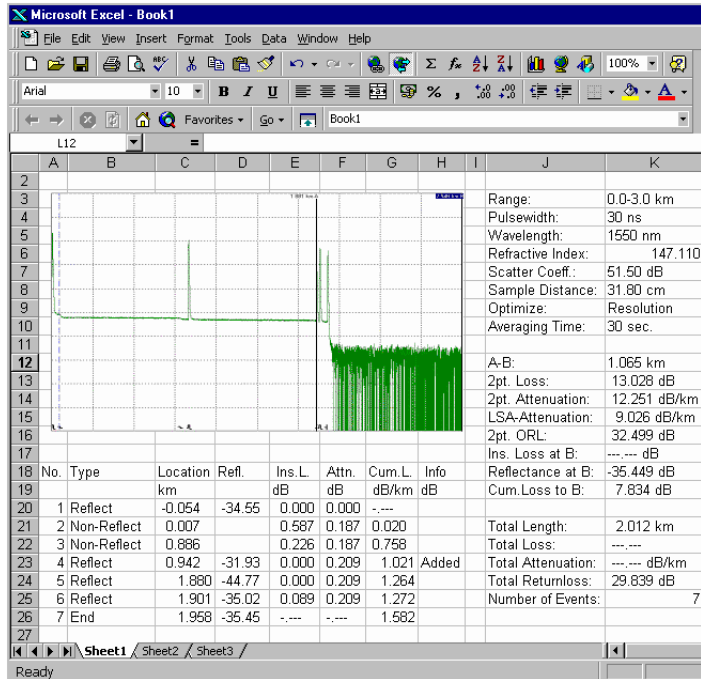
Figure 3-7   **Document containing HP OTDR Toolkit trace information**

3.6 How to take a Two-Way Averaging measurement

To improve accuracy of loss measurements, you can measure a fiber from both ends, and average the losses of events. This gives you the best possible loss measurements that you can make on the fiber. You take a two-way average as follows.

How to Display more than one Trace

1 Make your first measurement.

   See "How to Take a New Measurement" on page 45.

   If you want to compare measurements that have already been made, see "How to Open an Existing Trace" on page 18.

2 Click on one of the new trace icons (see Table 1-1 "OTDR Toolkit icons" on page 31 and Figure 3-8).

   For example, click on the red Trace 2 icon.

Figure 3-8   **New trace icons**

NOTE   **You can also select [VIEW]<TRACE N>, where *n* is the number of the new trace.**

A third method of selecting more than one trace at a time is from the Open File window (see "How to Open an Existing Trace" on page 18).

Select a contiguous range of files by dragging on the range with your left mouse button. You can also select a range by holding down the <SHIFT> button and selecting two files. All files between them are also selected.

Otherwise, select multiple files by holding down the <CTRL> button and clicking on the files that you want to print.

After you have selected the files you want, press OK, and all selected traces are loaded.

---

3 Take the second measurement.

NOTE   **If you are comparing 2 traces, you should make sure that you use the same measurement parameters for each trace.**

Different measurement parameters may produce inaccurate results.

You can now see two traces (Figure 3-9). The first trace, Trace 1, is green. The color of the second trace corresponds to the trace number that you have selected. If you selected trace 2, the second trace is red.
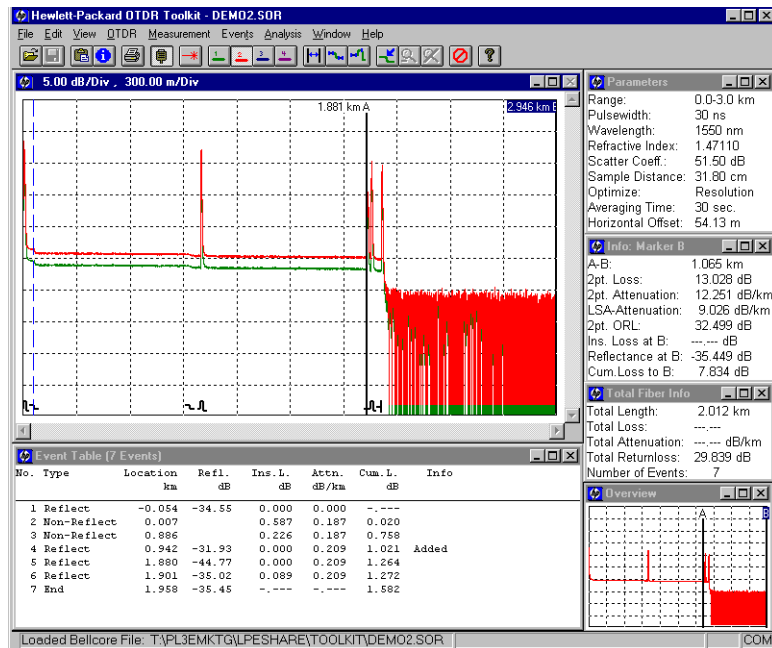
Figure 3-9   **Two traces on the same picture**

The information in the Event Table, Parameters, Marker Info, and Overview windows corresponds to the trace that you have selected most recently.

The color of the trace in the **Overview** window is the same as the color of this trace.

4   If you cannot see both traces properly, click on one of the traces

and drag it up or down.

NOTE	**You can select up to four traces by clicking on the four New Trace icons, and repeating steps 3 and 4**

How to take the Two-Way Average

5 Select [ANALYSIS]<TWO-WAY AVERAGE> from the Toolkit menu.

You see a message box asking you to select the first trace, and an Event from the Event Table.

6 Select an appropriate trace and Event as follows:

• By default, an Average is taken for the first 2 traces loaded (usually Trace 1 and Trace 2). If you want to average other traces, you should select the appropriate trace icon (see Figure 3-8).
In this example, you do not need to select another trace.

• The Average is taken between an Event on the fiber and the declared end (see "How to set the Fiber End" on page 56).
If you want to ignore the front reflection at the beginning of the fiber, you can select an Event in the Event Table. Only the part of the fiber between this Event and the End is averaged.
If you want to compare the whole of the fiber, you should select the first Event in the Event Table.

7 When you have selected the trace and Event that you want, press Next>> in the message box.

8 You see a new message asking you to select a second trace, and the corresponding Event.

As you automatically see the second loaded trace (Trace 2), you will not normally want to select a second trace (see the explanation to step 6).

9 Select an Event from the Event Table. This is the Event on the second trace corresponding to the Event you selected in step 6.

Please remember that the second trace has been measured in the opposite direction to the first. This means that if you selected
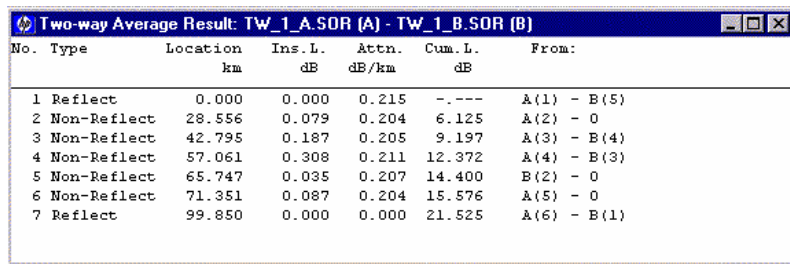
the first Event in step 6, you probably need to select the End of
the fiber here.

10 When you have selected an Event, press Finish in the message
box.

You see a new window containing the results of the Average
(Figure 3-10).

No.	Type	Location km	Ins.L. dB	Attn. dB/km	Cum.L. dB	From:
1	Reflect	0.000	0.000	0.215	-.---	A(1) - B(5)
2	Non-Reflect	28.556	0.079	0.204	6.125	A(2) - 0
3	Non-Reflect	42.795	0.187	0.205	9.197	A(3) - B(4)
4	Non-Reflect	57.061	0.308	0.211	12.372	A(4) - B(3)
5	Non-Reflect	65.747	0.035	0.207	14.400	B(2) - 0
6	Non-Reflect	71.351	0.087	0.204	15.576	A(5) - 0
7	Reflect	99.850	0.000	0.000	21.525	A(6) - B(1)

Two-way Average Result: TW_1_A.SOR (A) - TW_1_B.SOR (B)

Figure 3-10   **Two Way Average Result**

NOTE   **You can view or hide the this window by selecting the menu option
[WINDOW]<TWO-WAY EVENT TABLE>**

The window is similar to an Event Table, in that it contains the
Location, Insertion Loss, Attenuation, and Cumulative Loss for
each event measured.

However, this table contains an extra column, From: showing the
Event to which the measurement corresponds.

For example, A(1) - B(5) means that the measurements are
valid for the first event for Trace A and the fifth Event for Trace B.

A(2) - 0 means that the measurements are valid for the second
Event in Trace A, but no corresponding Event has been found on
Trace B. The Insertion Loss at Event A (2) will be half that
originally detected.

NOTE   **The resulting trace is Trace A and its Event Table is the Two Way Event Table. This Event Table contains the new comments described in the previous 3 paragraphs.**

You can save this trace, but no further Scan Trace can be performed on this trace.

3.7 How to Subtract one trace from another

Suppose you have taken two measurements on the same fiber with the same settings. You want to see if there are any differences between the results. If you cannot gather enough information from displaying the two fibers in the same Trace window, you can subtract one set of measurements from the other.

If the measurements on two fibers were exactly the same the result of subtracting one from the other would be a horizontal line. Any deviations from this horizontal show where the fibers have produced different measurements.

1 Load the two traces that you want to compare.

See "How to Display more than one Trace" on page 87.

2 Select [ANALYSIS]<SUBTRACT TRACES> from the Toolkit menu.

You see a message telling you to select the first trace slot.

The first trace loaded is automatically selected. This is usually Trace 1 (green).

3 If you do not want to compare Trace 1, select a new trace icon (see Figure 3-8 on page 87).

4 Press Next>> in the message box to continue.

You see a new message, asking you to select the second trace slot.

The first trace loaded is automatically selected. This is usually Trace 2 (red).

5 If you do not want to compare Trace 2, select a new trace icon.

6 Press Next>> in the message box to continue.

You now see a third message asking you to select a destination trace slot. If only 2 traces are loaded, the new, subtracted, trace will be loaded to trace 3. If you want to load it to a different trace, select the appropriate trace icon.

NOTE	**You should not load the new trace to either of the destinations containing the traces that you have just compared.**

7 Select Finish to make the comparison.

You now see a third trace, showing the average between the two traces (Figure 3-11)
You should expect significant differences at the end reflection, but any deviation from the horizontal before this shows a difference between the measurements on the same fiber.

Figure 3-11   **Subtracted trace**

8 If you just want to see the subtracted trace, close the other 2 traces.

Select the appropriate trace icon, then select [FILE]<CLOSE TRACE> from the Toolkit menu.

3.8 How to View Multiple Traces with the Trace Browser

The Trace Browser allows you to quickly view a series of Bellcore trace files. You activate the Trace Browser as follows.

How to Browse Traces

1 Select [FILE]<TRACE BROWSER> from the Toolkit menu.

You see a window headed Open (Figure 3-12).
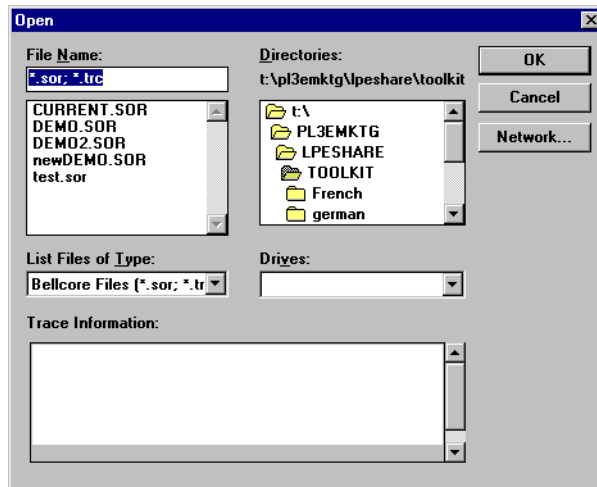
Figure 3-12   **Trace Browser: File Open window**

NOTE   **This is the same window you see when you select [FILE]<OPEN> or the Open File icon, but the use of this window is quite different.**

2 Select the files you wish to browse.
You can select some or all traces within a directory.

NOTE   **You can select a contiguous range of files by dragging on the range with your left mouse button. You can also select a range by holding down the <SHIFT> button and selecting two files. All files between them are also selected.**

Otherwise, select multiple files by holding down the <CTRL> button and clicking on the files that you want to print.

3 When you have selected all the files you want to browse, click OK.

   The first trace is loaded in the active trace slot. The trace and all parameter windows correspond to this trace.

Towards the top right of the Trace window, you see the Trace Browser Mode message box (Figure 3-13).

| Figure 3-13 | **Trace Browser Mode message box** |

4 Press Next>> from the Trace Browser Mode message box to view the next trace.

5 View subsequent and previous traces, by selecting Next>> and <<Prev. from the Trace Browser message box.

   If there is no subsequent/previous trace Next>>/<<Prev. is grayed.

6 When you have browsed all the traces you want, select Cancel from the Trace Browser message box.

NOTE **You must Cancel the Trace Browser before you open a new file.**

As long as the Trace Browser is active, you are not able to open a new file and the File Open icon and menu option are grayed.

How to set the Load and Save Settings

The Load and Save Settings determine the position of markers and zoom areas used for the browsed traces. You set them as follows.

7 Select [VIEW]<PREFERENCES> from the Toolkit menu.

You see the View Preferences window (Figure 3-14).
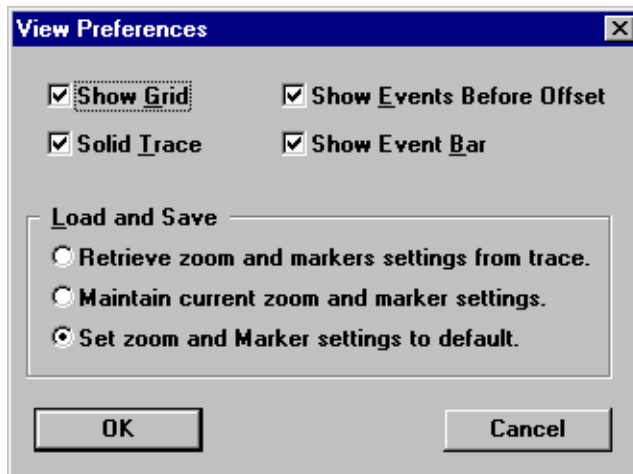
Figure 3-14   **View Preferences window**

8 Select one of the following Load and Save settings:

- **Retrieve zoom and marker settings from trace**: each time a new trace is loaded, you see the zoom state stored in this trace.

- **Maintain current zoom and marker settings**: the current zoom state is used for all traces.

- **Set zoom and marker settings to default**: the default zoom state is used for all traces.

3.9 How to Process Multiple Traces

If you have a number of traces that you want to process - for examples a set of fibers from the same cable - there are a number of applications that you may wish to repeat for each trace.

You can then copy a number of features from the current trace (labels, Events, and so on), and update all selected traces with these features.

How to Select the Traces to Process

You must first select the traces that you want to update with features from the current trace. You do this as follows.

1 Select [FILE]<PROCESS MULTIPLE FILES> from the Toolkit menu.

You see a window headed `Select Traces to Process` (Figure 3-15).

Figure 3-15   **Select Traces to Process window**

> **2** Select the files that you want to process.
>
> You must only select files which have the extension `.SOR`.

NOTE   **You can select a contiguous range of files by dragging on the range with your left mouse button. You can also select a range by holding down the <SHIFT> button and selecting two files. All files between them are also selected.**

Otherwise, select multiple files by holding down the <CTRL> button and clicking on the files that you want to print.

> **3** When you have selected the files you want, press `OK`.
>
> You see a window headed `Trace Processing Options` (Figure 3-16).

Figure 3-16   **Trace Processing Actions window**

This window has 3 pages: `Trace Information & View`, `Trace Analysis`, and `ASCII Export`. Click on the appropriate bookmark for the page you need.

The functions available on each page are described below. Make the settings that you require, then go to "How to Process the Traces" on page 104.

How to Copy Trace Information

4   Select the `Trace Information & View` page from the `Trace Processing Options` window.
By default this is the first page you see.

NOTE   The `Trace Information & View` page is shown in Figure 3-16.

5 Select the `Copy Trace Information` box.

When the `Copy Trace Information` box is selected, you are able to select and deselect from the labels listed below (`Cable ID`, `Fiber ID`, and so on). These are the labels that are set in "How to Set the Trace Information" on page 50.

6 Select (or deselect) the labels you want to copy.

When the traces are processed, the labels for the selected traces will be replaced by those from the current trace.

So, for example, if you have a series of fibers from the same cable, you can select `Cable Id` only, and copy the label for this cable to all affected fibers.

How to Copy Marker and Zoom Positions

7 Select the `Trace Information & View` page from the `Trace Processing Options` window.
By default this is the first page you see.

8 Select `Marker and Zoom Positions From Current View`

When the traces are processed, the current marker positions and zoom area will be copied to the selected traces.

How to Copy Trace Analysis

9 Select the `Trace Analysis` page from the `Trace Processing Options` window.
You see a new page (Figure 3-17).
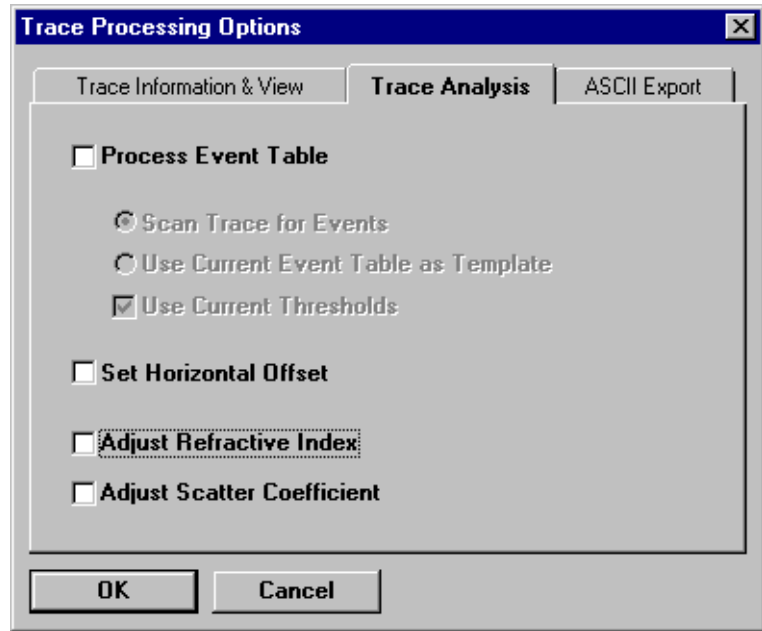
Figure 3-17   **Trace Analysis page**

10 Select `Process Event Table`.

When the traces are processed, a scan trace is performed on the selected traces. You are also able to specify how this scan trace is performed.

11 Select `Scan Trace for Events`.

The scan trace searches the trace for events and adds them, and their position to the event table.

NOTE   **`Scan Trace for Events` is a toggle with `Use Current Event Table as Template`.**

After you select `Use Current Event Table as Template`, the
Event Tables in the selected traces are replaced with the Events from
the current trace.
The Scan Trace recalculates the loss values for the given Events.

You should select `Use Current Event Table as Template` if
you have a number of fibers with events at known locations.

NOTE   If you want to fix the Events for all measurements taken on the current
trace, select [EVENTS]<LOCK EVENT TABLE> from the Toolkit menu.

12 Select `Use Current Thresholds`.

When the Scan Trace searches for Events, it uses the thresholds
set in the current trace.

To use the thresholds from the new trace, deselect `Use
Current Thresholds`.

NOTE   You set the trace thresholds by selecting [ANALYSIS]<SCANTRACE
THRESHOLDS> from the Toolkit menu.

13 Select `Set Horizontal Offset`.

When the traces are processed, the horizontal offset will be
copied to the selected traces.

NOTE   For details of how to set the horizontal offset, see "How to Set the
Horizontal Offset" on page 53.

How to export as ASCII

You can save the processed traces to an ASCII file. This file can
then be imported into other applications, such as a spreadsheet.

To export the processed trace to an ASCII file, you should follow
the instructions below.

14 Select the `ASCII Export` page from the `Trace
Processing Options` window.

You see a new page (Figure 3-18).
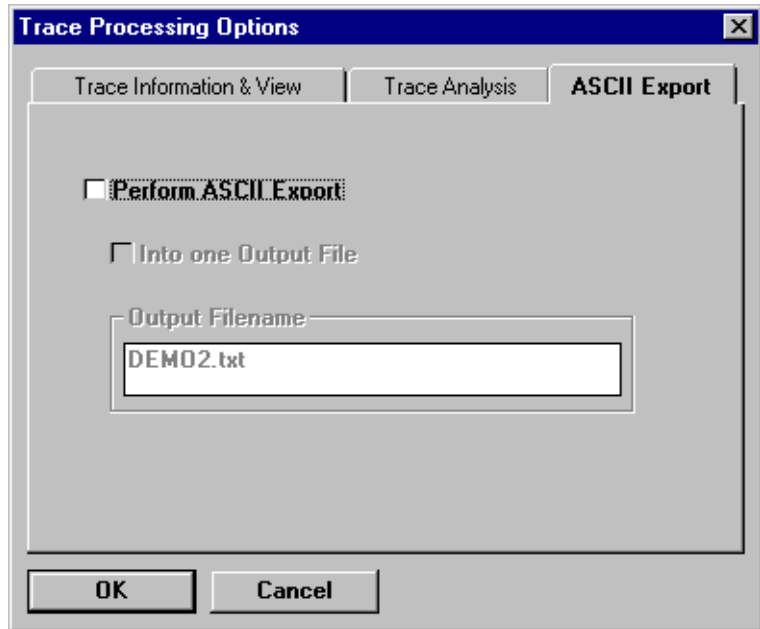
Figure 3-18   **ASCII Export page**

15 Select Perform ASCII Export.

16 When the traces are processed, they are written to a file
<fname>.TXT, where *<fname>* is the original filename of the
selected trace.

17 To output all traces to the same file, select Into one Output
File.
When the traces are processed, only one ASCII file will be
produced, containing all the traces in ASCII format. The name
of the new file is written in the Output Filename edit field.

18 Change the name in the Output Filename edit field, as
required.

How to Process the Traces

19 Press OK.

The processes that you selected are now performed.

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