NetWorks/OTDR v3.0a

Operators Manual

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1.0 Getting Started

NetWorks/OTDR is an Optical Time Domain Reflectometer emulation software package that allows PC processing of saved trace and power meter information, maximizing valuable OTDR time by allowing traces taken in the field to be saved for future processing.

1.1 What's New in NetWorks/OTDR v3.0a?

NetWorks/OTDR v3.0a contains all of the features of NetWorks/OTDR v2.10a plus the following features:

- NetWorks/OTDR v3.0a reads, processes, and writes CMA 5000/4500 OTDR trace files (T6 format) in their native format.
- NetWorks/OTDR v3.0a converts other trace file formats to T6 for internal processing.
- NetWorks/OTDR v3.0a reads, processes, and writes CMA 5000/4500 LTS Power Meter files (P6 format) in their native format.
- NetWorks/OTDR v3.0a converts other power meter file formats to P6 for internal processing.
- Read and write traces in the Telcordia Technologies SR-4731 format.
- A Wizard that automatically generates a 1 or Bi-Directional Splice Loss Summary Report.
- Added Calculate ORL option in Batch Process.
- Remove Events based on distance option in Batch Process.

1.2 Manual Overview

This manual details all the program features for NetWorks/OTDR. The terminology and processes described assume familiarity with standard Windows operating procedures.

Chapter Two is an overview of the NetWorks/OTDR display screen and gives information on the various components of the display. The chapter also contains information on setting the display preferences.

Chapter Three details working with traces, trace lists, setting the view mode, performing manual loss measurements, and other NetWorks/OTDR program elements.

Chapter Four describes the various print and print preview options.

Chapter Five details Power Meter File Processing.

Chapters Six through Ten explain in detail the advanced functions of NetWorks/OTDR.

Chapter Eleven details the Automatic Bi/1-Directional Splice Loss Summary Report wizard.

Chapter Twelve provides an example of the advanced functions, as detailed in Chapters Six through Eleven, using the sample traces provided with the software.

This manual includes six appendices that provide information on Special Key Presses, Graphical Printout Examples, Report Examples, Report File Formats, basic Trace Collection information, and Data Preparation.

References to CMA throughout the manual refer to the CMA40/4000/8800 OTDRs (Optical Time Domain Reflectometers), the CMA 4500 OTDR, and the CMA 5000 equipped with an OTDR module.

1.2.1 Manual Conventions

The term *context menu* refers to the menu accessed by clicking the right mouse button.

The following is an example of the notation used in this manual to indicate stepping through the NetWorks/OTDR menu structure.

- Select View>Event Marks>None

This indicates that *View* is selected from the menu bar. The chevrons ">" indicate that *Event Marks* is to be selected from the View menu, and *None* is to be selected from the Event Marks submenu as shown in Figure 1-1.

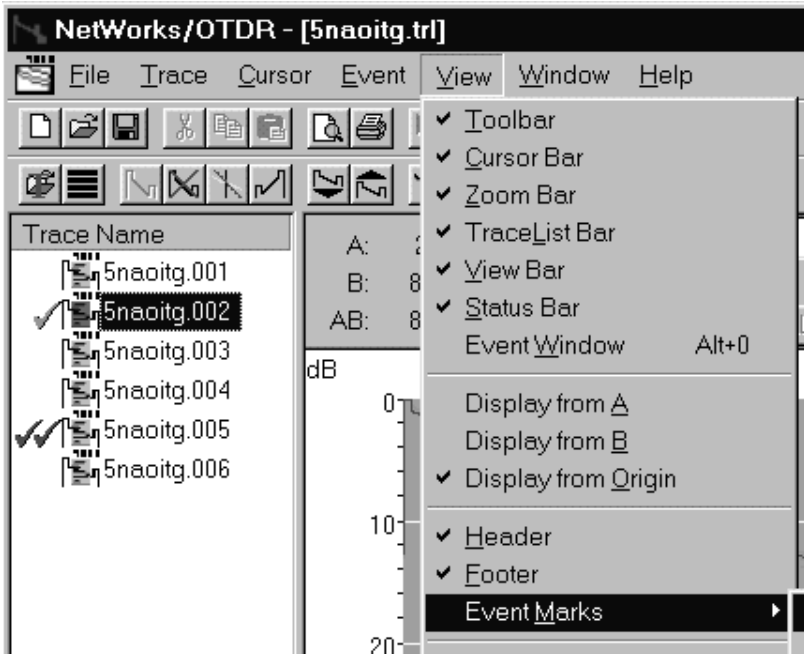


Figure 1-1: Menu Selection Example

1.3 Installing NetWorks v3.0a

NetWorks/OTDR v3.0a is available as both a stand-alone PC application, or as a pre installed application on the CMA 5000 and CMA 4500 featuring software versions later than 200405XX (see "Accessing NetWorks/OTDR on the CMA 5000/4500" on page 5 for CMA 5000/4500 details). The following sections detail the systems requirements and installation for the PC application .

1.3.1 System Requirements

The following are the recommended system requirements to operate NetWorks/OTDR v3.0a

- Pentium® class processor
- Windows® 2000/NT 4.0+/XP

NOTE

NetWorks/OTDR v3.0a does not run on Windows® 95 or 98 since they do not have unicode support.

- 32MB RAM
- 20MB free hard-drive space
- VGA display
- CD-ROM drive

1.3.2 Installation

NOTE

The following installation routine applies only for PC installation of NetWorks/OTDR v3.0a from the NetWorks/OTDR 3.0a CD.

To install NetWorks:

1. Insert the NetWorks/OTDR CD-ROM into the CD-ROM drive.
2. Select **Start**>**Run** from the desktop.
3. Type **`x:\setup`** in the Run dialog box, where X is the CD-ROM drive.

From this point the program will prompt requiring any necessary information. If the computer operating system language is one of the available installation languages then it will be used in all installation dialogs. Otherwise, English will be used.

4. Read and follow the display screen. Click **Next** to continue.
5. Click **Yes** to accept the Software License Agreement and continue.
6. Enter the appropriate name, company and serial number in the NetWorks Registration screen. (The serial number is printed on the software registration card.)

7. Verify that the suggested directory for installation is acceptable and click **Next**.
8. Click **Finish** in the setup dialog box that indicates installation is complete.

NOTE

If InstallShield® finds a previous installation of NetWorks 3.0 it will prompt the user to run the uninstall routine. Upon completion of the uninstall routine, re-start the NetWorks installation routine.

Older versions of NetWorks (2.X and lower) will be left intact.

1.3.3 NetWorks Sample Files

NetWorks contains sample OTDR traces for use in running through the manual's examples. On the PC installation version of NetWorks, the samples are found on the CD-ROM in the "Sample Files" directory. See "NetWorks/OTDR Manuals and Sample Files on the CMA" on page 6 for details on the location of the sample files on the CMA 5000/4500.

To load the sample files:

1. Create a sample file directory on the computer's hard drive. `X:\TRACES\ITGNAO` is recommended.
2. Copy the files from the NetWorks/OTDR CD-ROM "Sample Files" directory to the sample files directory on the computer's hard drive.

1.4 Accessing NetWorks/OTDR on the CMA 5000/4500

NetWorks/OTDR v3.0a is pre-installed on the CMA 5000 and CMA 4500 featuring software versions later than 200405XX.

1.4.1 To access NetWorks/OTDR on a CMA 5000/4500:

1. Power up the CMA, if necessary.
2. Tap the **Utility** tab.
3. Tap the **NetWorks/OTDR** button.

NOTE

If the NetWorks/OTDR button is not present on the Utility tab, or if the Utility tab itself is not present, press the **Setup** key on the CMA, tap the **Viewers** tab, select the **NetWorks/OTDR** checkbox and then run the CMA through a power cycle (power down/power up). The NetWorks/OTDR button will be available on the Utility tab. See the "Viewers Tab" section of the Standard OTDR Help Set (or the CMA Platform Help Set) for complete details.

1.4.2 NetWorks/OTDR Manuals and Sample Files on the CMA

PDFs of the English versions of the NetWorks/OTDR 3.0a Operators Manual and Quick Reference Guide (along with foreign language translations) as well as the NetWorks/OTDR Sample Files can be found at the following locations on the unit's D drive:

Manuals	`D:\InstrNetworks\Manuals`
Sample Files	`D:\InstrNetworks\SampleFiles`

NOTE

The translated (non-English) versions of the Operators Manual and Quick Reference available in the Manuals folder are at version 2.0 level, not version 3.0a.

2.0 NetWorks/OTDR Window

This chapter contains an overview of the components of the NetWorks/OTDR display screen. More detailed information on working with traces and menu functions is contained in Chapter 3.

2.1 NetWorks/OTDR Start-up Window

Upon start-up of the NetWorks/OTDR program, a NetWorks/OTDR window with no trace grid or trace list pane is displayed. File and View menus with only those menu selections applicable to opening trace files and setting display parameters are available (See “NetWorks/OTDR Start-up Menus” on page 8.) All Help menu selections are also available.

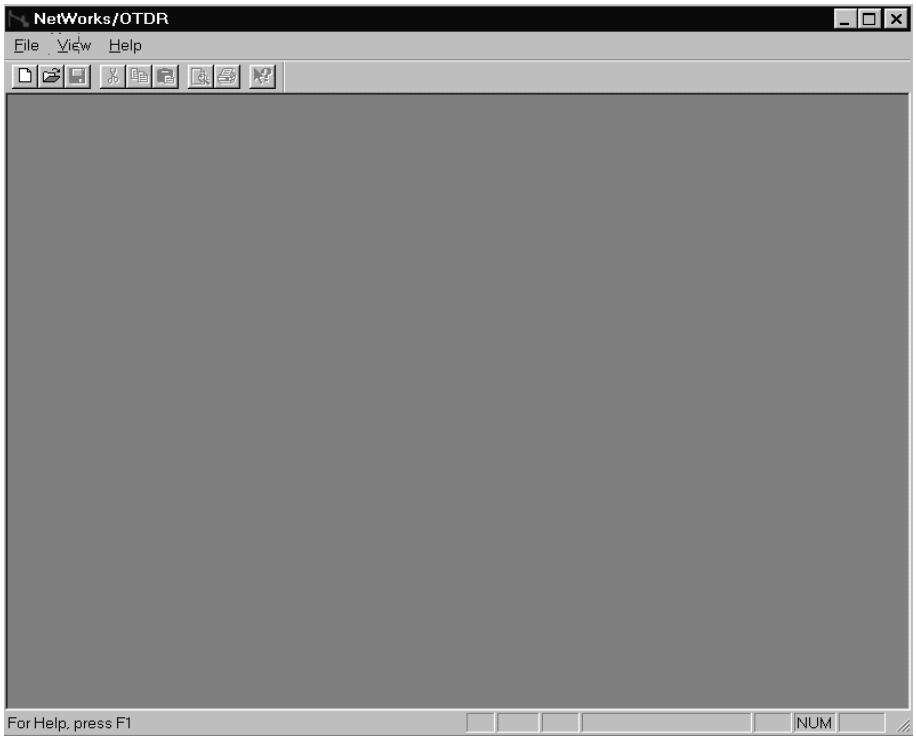


Figure 2-1: NetWorks/OTDR Start-up Screen with No Trace Displayed.

2.1.1 NetWorks/OTDR Start-up Menus

Menu	Menu Selections	Function
File	New	Displays an icon to create a new Trace List or Header Template
	Open	Displays the standard Windows dialog box for opening the following file types: Trace List, Trace, Power Meter, or Header Template
	Preferences	Displays dialog box for selection of preferences of program parameters
	Exit	Closes all windows and exit program
View	Toolbar	Displays/hides toolbar. Check mark indicates item selected for display.
	Status Bar	Displays/hides status bar. Check mark indicates item selected for display.
Help	Help Topics	Displays application help system
	About NetWorks/OTDR	Displays software information including version, serial number and registration information

2.2 NetWorks/OTDR Graph Window

Once a trace file or trace list file is opened, the NetWorks/OTDR window display changes to include Trace List and Graph panes as shown in Figure 2-2. Some of the window components seen in Figure 2-2 may be hidden by clearing their selection in the View menu.

As traces and trace lists are opened, and different modes and views selected, various menu and toolbars become available/unavailable. Unavailable options are grayed out.

The various components of the NetWorks/OTDR window, while in trace display mode, are described in the following sections.

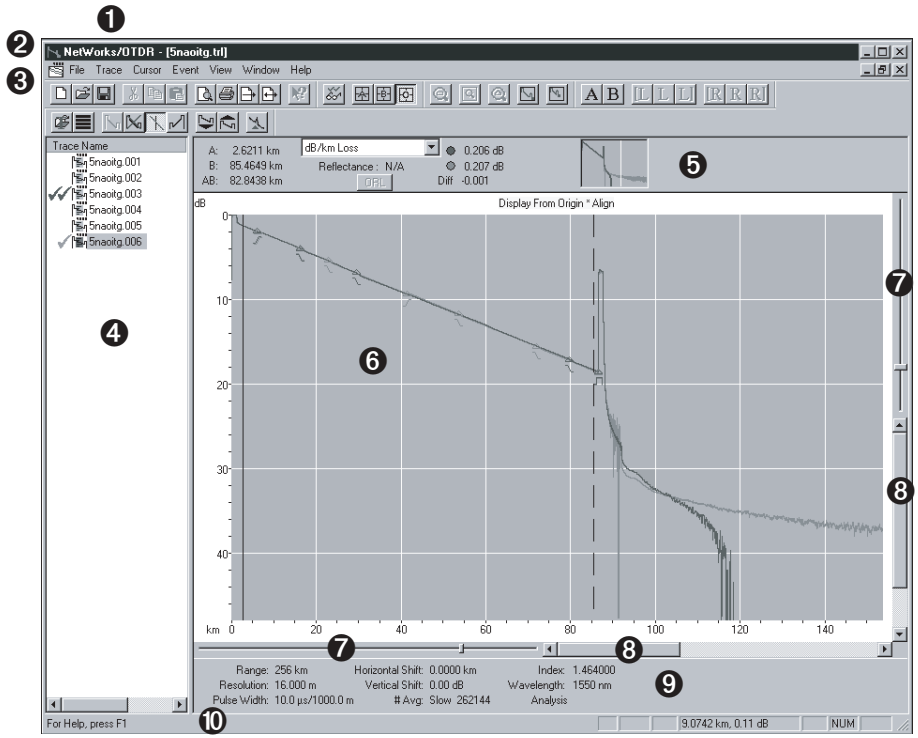


Figure 2-2: NetWorks/OTDR Screen with Fully Expanded Graph Window

1	NetWorks/OTDR Title Bar	Displays current trace list filename.
2	Menu Bar	Displays available menus. (Available selections are mode dependent.)
3	Toolbars	Contains buttons for save, print, display, zoom, trace and cursor functions.
4	Trace List Pane	Lists the traces contained in the currently open trace list.
5	Graph Header	Displays cursor, loss mode and loss information.

6	Trace Graph	Displays grid, trace waveform, A/B cursors, X & Y axes, and informative mouse cursors.
7	Trackbars	Expands and contracts the trace graph view vertically and horizontally.
8	Scroll Bars	Scrolls the trace graph view vertically and horizontally.
9	Graph Footer	Displays key parameters for the *primary trace*.
10	Status Bar	Left end displays function of highlighted menu selection when scrolling through a menu. Right end contains a readout of the current distance and dB value of the mouse cursor in the graph.

The Graph Pane includes the Graph Header and Footer, Trace Graph, Trackbars and Scroll Bars.

2.2.1 Trace List Pane

The t*race list pane* is displayed once a *trace list* is opened or created.

The trace list pane displays the trace filenames for the current trace list, sorted as defined in Preferences>Display>Sort Mask. The default view shows only the trace filenames; however, the full device/directory path can be viewed by increasing the trace list pane's width.

Traces displayed in the graph pane are designated with a check mark the same color as the plotted data. The *primary* trace has *two red* check marks.

For more information on trace files and trace lists, refer to Chapter 3 of this manual.

NOTE

The trace list and graph panes may be sized by grabbing the dividing frame edge with the mouse cursor and dragging it to the left or right. As one pane decreases in size, the other will increase to fill the viewing area.

2.2.2 Graph Header

Select View>Header from the menu bar to view/hide the graph header.

When displayed, the graph header appears above the graph and contains:

- *A and B cursor locations* and the distance between them.
- *Selection of one of the following Loss Modes*: Splice Loss, Two-point Loss, Two-point Loss LSA, Two-point Attenuation Corrected, dB/km Loss, dB/km Loss LSA, or Optical Return Loss (ORL) using a drop-down menu.

  NOTE

  It is necessary to *also* click the ORL button to compute the ORL value for the primary trace. All other loss mode values are automatically computed.

- *Two computed loss values* (for the primary and a second trace, indicated by colored dots) *at the A/B cursor location*s for the current loss mode. If the *second trace is flipped* (See "Flip" on page 49.) and:
  - the *loss mode is Splice Loss,* then the Splice Loss LSA cursors are flipped around the A cursor to compute the second trace loss
  - the *loss mode is 2-Point Loss, 2-Point Loss LSA, 2-Point Attenuation Corrected, dB/km Loss, or dB/km Loss LSA,* the loss calculation is from the B to the A cursors for the second trace.
- The *difference between the primary and second trace loss values* if the second trace is not flipped; or, *the average between the primary and second trace loss values* if the second trace is flipped. The average value is a bi-directional average for the current Loss Mode.
- The *reflectance of the primary trace at the A/B cursor locations* (See "Reflectance Calculations" on page 16. for available reflectance calculations methods.)
- A *thumbnail graph of the full data region.* If the trace graph shows a zoomed-in region, then the thumbnail shows a rectangle indicating the region shown in the trace graph.

2.2.3 Trace Graph

The trace graph is displayed when a trace list is opened. Once a trace(s) is selected for display, the trace waveform(s) is displayed on a grid, along with X & Y axes and A & B cursors.

Trace Waveform

NetWorks/OTDR can display up to eight traces in the trace graph, each as a different color. The displayed traces are identified in the trace list with a check mark of the same color as the displayed trace data.

If the maximum number of traces are displayed, then one must be hidden before another can be displayed.

If the *primary trace is hidden*, NetWorks/OTDR automatically selects the next displayed trace to be the primary.

Grid and Axes Scales

The grid X-axis scale indicates current distance in units (km, mi, etc.) as selected in Preferences>Units.

The grid Y-axis scale indicates dB loss.

A/B Cursors

The NetWorks/OTDR trace graph contains A and B cursors which may be used for manual loss measurements. (Example: If the current Loss Mode is Splice Loss, then the Splice Loss value is computed at the A cursor location.)

The A cursor is displayed as a solid vertical line while the B cursor is dashed and always to the right of the A cursor.

2.2.4 Graph Footer

View/hide the graph footer by selecting View>Footer from the menu bar.

The graph footer shows the value of certain key parameters for the primary trace.

2.2.5 Scroll Bars

After zooming in on a region, use the scroll bars to move the graph view region horizontally left/right or vertically up/down.

2.2.6 Trackbars

Move the slider on the trackbars to magnifying/demagnifying the graph view region.

2.3 Mouse Cursors

When the mouse cursor is in the graph, it conveys information about the usage or mode of the cursor. The cross-hair mouse cursor  is the default cursor. When cursor or event toolbar buttons are selected, the cursor will change to reflect the icon on the button selected. The complete listing can be found in Appendix A-2.

2.4 Shortcut Keys

NetWorks/OTDR contains a comprehensive set of shortcut keys, or special keypresses, in order to enhance the users effectiveness. The complete listing can be found in Appendix A.

2.5 Event Window

The Event window contains information about the event selected on the trace waveform.

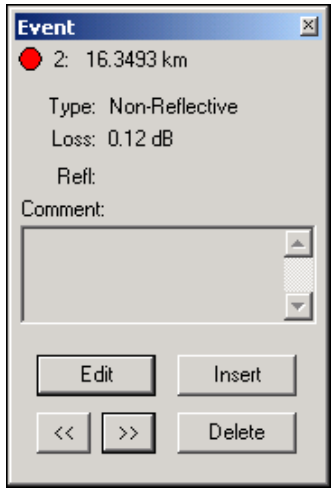


Figure 2-3: Event Window

- Select View>Event to view/hide the Event window.
- The colored dot indicates the displayed trace's color. The number indicates the event number.
- To display an event in the Event window, double-click the *left* mouse button on its *event mark* on the trace graph.

More detailed information on using the Event window see “Event Processing” starting on page 43.

2.6 Modifying Preferences

Preferences defines and stores program display parameters for Analysis, Display, Units, Time/Date, Power Meter, and Language. These parameters can be set prior to trace or power meter display, or modified while traces or power meter information are displayed.

NetWorks/OTDR has a default set of preferences if none are selected.

Setting Preferences other than default:

1. Select **File>Preferences** to access the Preferences dialog box.
2. Click on the tab for the desired category.
3. Modify preferences by option selection and value modification.
4. Click **OK** to save any parameter changes for current and future program execution. If not, all changes will be lost.

2.6.1 Analysis

The Analysis tab contains various analysis parameters:

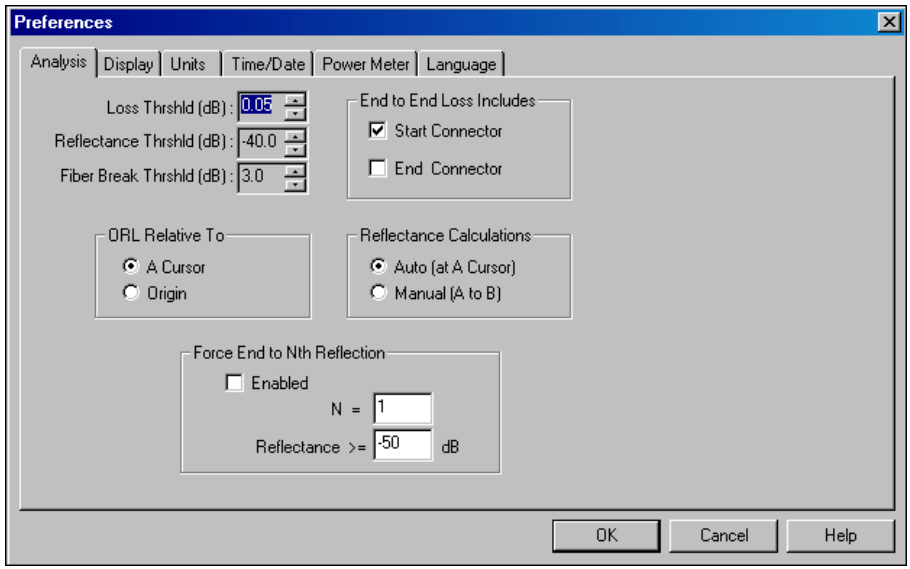


Figure 2-4: Preferences Analysis tab

Threshold

The (Event) Loss Threshold, Reflectance Threshold, and Fiber Break Threshold minimum, maximum, incremental, and initial default values are shown below:

Threshold	Minimum	Maximum	Incremental	Default
Event Loss	0	5.0	0.01	0.05
Reflectance	-10	-70	-1	-40
Fiber Break	0.2	15.0	0.2	3.0

ORL Relative To

The ORL calculation can be selected to be relative to the current A cursor position or the trace origin. This selection applies to the manual ORL calculation.

The default setting is *Relative to A*.

End to End Loss Calculation

The End to End Loss calculation can be set up to include or exclude fiber under test Start and End Connectors.

Reflectance Calculations

Reflectance calculations may be either Auto (at the A cursor position) or Manual (from the A to the B cursor position).

The default setting is *Auto*.

Force End to N^{th} Reflection

With Force End to Nth Reflection enabled, the end event is set to the N^{th} reflective event with reflectance greater than or equal to the specified reflectance dB value, after trace analysis. If there is no such N^{th} reflective event, then the end remains unchanged.

The warning message, "*Force End to Nth reflection is enabled.*", will be displayed the first time (and only the first time) analysis is executed during a NetWorks/OTDR usage session.

2.6.2 Display

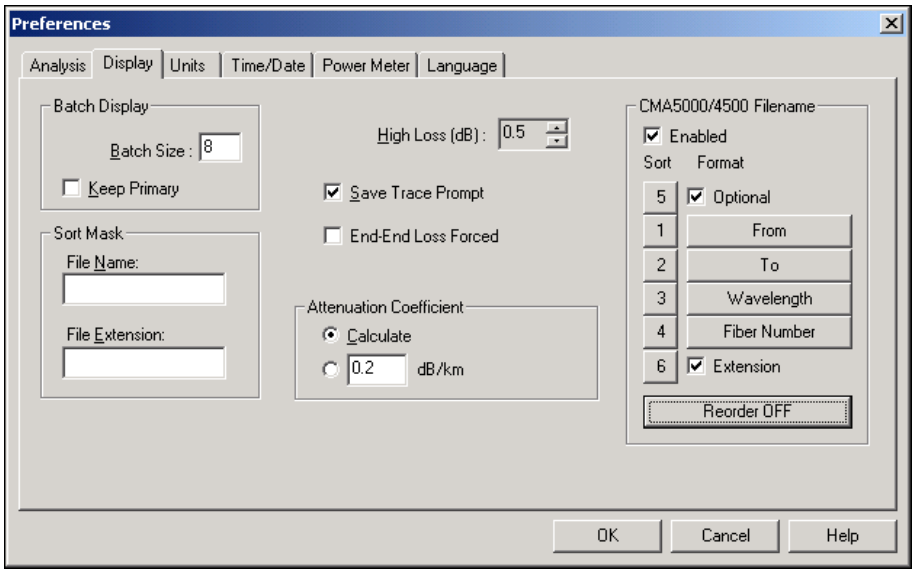


Figure 2-5: Preferences Display Tab

Batch Display Group Box

Batch Display allows sequential display of the next or previous set of traces (up to the Batch Size) from the trace list. Batch Size value must be between 1 and 8.

Select Keep Primary to continue displaying the primary trace while displaying the next or previous trace(s).

EXAMPLE Set **Batch Size** = 2 and select **Keep Primary**; then command NetWorks/OTDR to plot the next batch of traces from the trace list. The primary trace remains displayed, the other trace is removed from the graph, and the next trace is displayed.

Sort Mask Group Box

The Sort Mask controls the order of traces filenames in the trace list when the CMA 5000/4500 Filename format is not enabled. There is a separate file name and file extension mask. The masks may be null or contain a

sequence of digits from 1 through 9. A null mask indicates an alphanumeric sort.

The digit value of 1 in the sort mask indicates the primary sort character position; i.e. filenames with the same characters in these character positions will appear consecutively in the trace list, sorted from low to high.

Each group of filenames with the same characters in the sort mask 1 digits position will be sorted by the 2 digits position, which in turn will be subsorted by the 3 digits position, etc. The displayed trace list is sorted from low to high. Since a trace list may contain 2 trace files with the same filename; in the case of equal filenames, the full device/directory path (sorted alphanumerically) will determine position.

EXAMPLE Assume the trace filenames are:

AAABBB3.001
BBBAAA3.001
AAABBB3.002
BBBAAA3.002
AAABBB5.001
BBBAAA5.001
AAABBB5.002
BBBAAA5.002

To sort first by fiber number, then wavelength, then To Location Code (BBB), then From Location Code (AAA), use a File Name and Extension Sort Mask of 4443332 and 111. If a Batch Size of 2 is specified, and Keep Primary is cleared, then the Batch Display feature will display Fiber 001's 1310 wavelength traces, Fiber 001's 1550 wavelength traces next, Fiber 002's 1310 wavelength traces next, etc. resulting in the indicated displayed order:

BBBAAA3.001
AAABBB3.001
BBBAAA5.001
AAABBB5.001
BBBAAA3.002
AAABBB3.002
BBBAAA5.002
AAABBB5.002

High Loss

Any event with a loss greater than or equal to the set High Loss (dB) parameter value will be highlighted on the trace waveform. By suitably defining this value and using the batch display feature, splices which are "bad" (i.e. have excessively high loss) can be found quickly.

A value of 0 turns this function off (no events will be highlighted, regardless of their loss).

Save Trace Prompt

If selected, the message "Save changes to Trace Filename?" is displayed before a modified trace is closed. If cleared, no reminder is given to save a modified trace.

End - End Loss Forced

If selected, the End to End and first event Span loss values will be calculated and shown, regardless of various detected launch situations (for example; too close to adjacent reflections) which may result in an inaccurate or incorrect value. If cleared and a detrimental launch situation is detected, then the End to End and first event Span Loss are shown as "??".

Attenuation Coefficient Group Box

The Attenuation Coefficient is the attenuation loss estimate, in dB/km, used in the 2-Point Attenuation Corrected loss measurement. (See "Manual Loss Mode Calculation" on page 50.) NetWorks/OTDR can calculate the attenuation coefficient using the trace waveform, or the value from the cable manufacturer's spec sheet can be entered manually.

CMA 5000/4500 Filename Group Box

When working with traces from a CMA 5000/4500 OTDR (T6 format) use the CMA 5000/4500 Filename group box (see Figure 2-5) instead of the Sort Mask to control the order of trace filenames in a trace list.

The CMA 5000/4500 OTDR Auto Filename convention contains up to 6 component fields, separated by ".":

Optional	(optional and first if present)
From	(required)
To	(required)

Wavelength	(required)
Fiber Number	(required)
Extension	(optional and last if present)

The list of filename component fields (Optional, From, To, etc.) in the Format column indicates the sequence of the fields in the CMA 5000/4500 filename.

- Select *Enabled* to use the CMA 5000/4500 OTDR Auto Filename convention (instead of the Sort Mask).
- Select *Optional* if the first filename field is the Optional field.
- Select *Extension* if the last filename field is the Extension field.

To indicate the order of the other filename fields:

1. Click Reorder OFF, the legend changes to Reorder ON.
2. Click the following buttons in the Format column:
   - From
   - To
   - Wavelength
   - Fiber Number
3. Click Reorder ON, the legend changes to Reorder OFF.

To indicate the sort order of the various filename fields displayed in the Trace List:

1. Click Reorder OFF, the legend changes to Reorder ON.
2. Click the numeric button aligned with the first desired sort position in the Format column. The number on the button changes to “1”.
3. Click the numeric button aligned with the second desired sort position in the Format column. The number on the button changes to “2”.

4. Continue until all buttons in the Sort column are aligned with the desired positions in the Format column.
5. Click Reorder ON, the legend changes to Reorder OFF.

2.6.3 Units

Select distance units for all distance values on the Units tab.

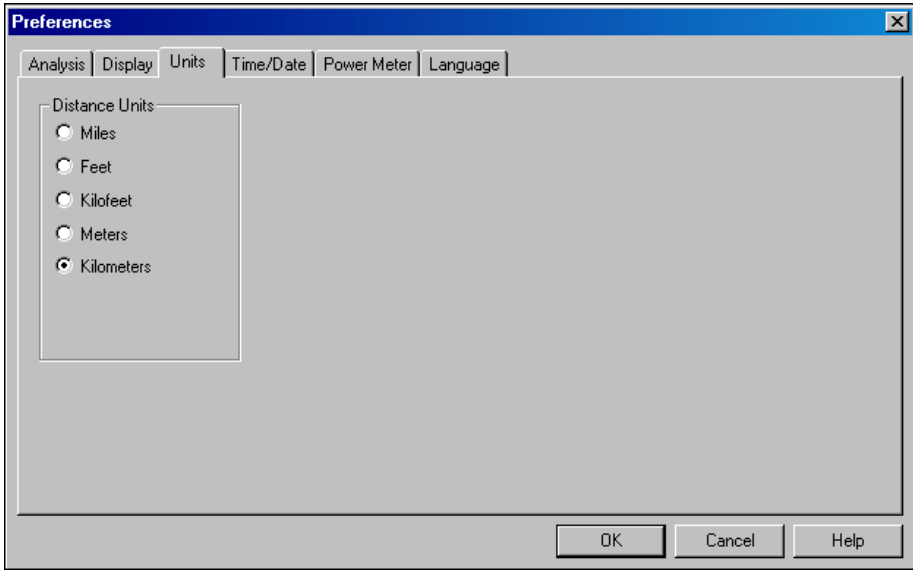


Figure 2-6: Preferences Units Tab

2.6.4 Time/Date

Select the desired Time and Date formats.

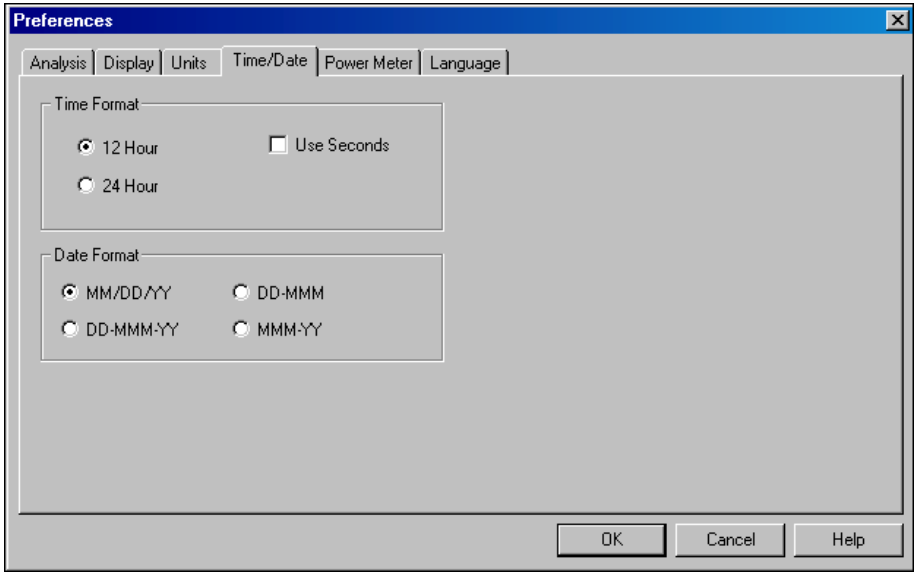


Figure 2-7: Time/Date Preferences Tab

2.6.5 Power Meter

The Power Meter tab contains the Power Meter preferences:

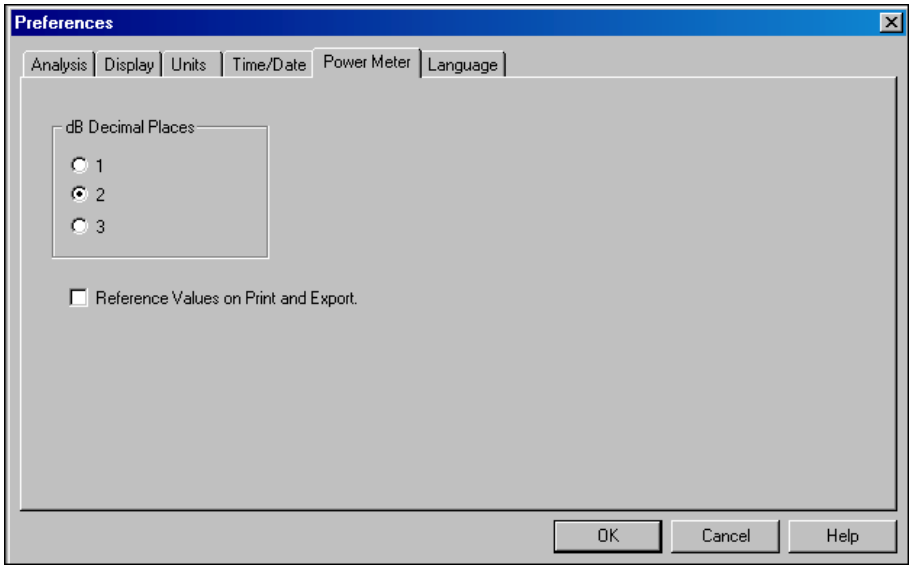


Figure 2-8: Power Meter Preference Tab

dB Decimal Places

All Power Meter related dB values will be shown to the indicated number of decimal places: 1, 2, or 3.

The initial default setting is 2.

Reference Values on Print or Export

If selected, the Reference value for each reading is shown when printed or exported.

The initial default setting is cleared.

2.6.6 Language

NetWorks/OTDR v3.0a supports the following languages: English, Chinese (Traditional), French, German, Russian, and Spanish.

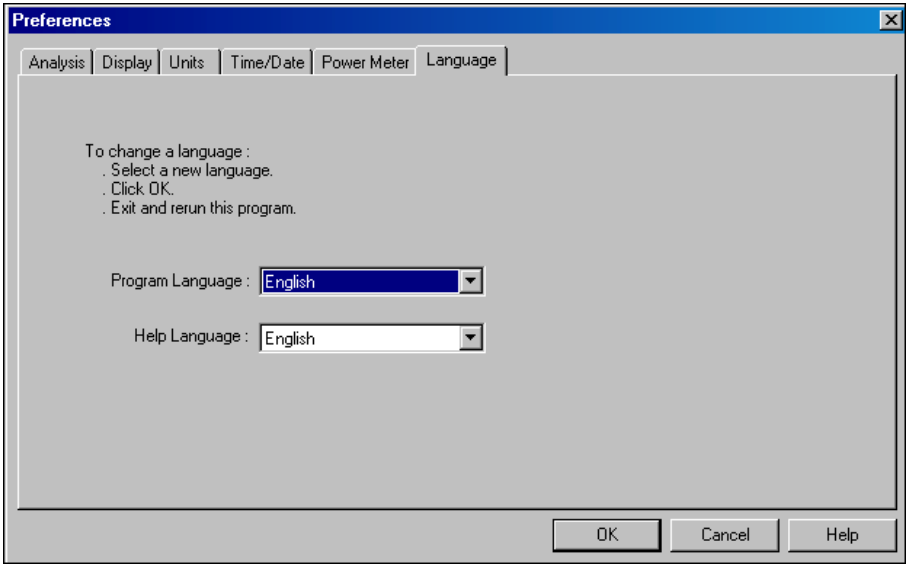


Figure 2-9: Language Preference Tab

To change a language:

1. Select the desired Program and Help languages.
2. Click **OK**.
3. Exit and then return to NetWorks/OTDR to use the selected language.

NOTE

Help sets other than English may not be updated to the current software release level.

3.0 Working with Traces

3.1 Trace File

Optical Time Domain Reflectometers (OTDRs) store a fiber's trace in a *trace file* which contains the trace data, OTDR parameters, user supplied text (such as notes and comments), and trace events.

NetWorks/OTDR can read and display data from the following Trace File formats:

T6	from the CMA 5000 OTDR module and CMA 4500 OTDR.
T5	from the CMA4000/8800 and TD-3000 OTDR.
T4	from the TD-1000 and TD-2000 OTDRs.
GR-196	Bellcore GR-196-CORE Data Standard Description (Issue 1, 9/95)
SR4731	Telcordia Technologies OTDR Data Format SR-4731 (Issue 2, 2/2000)
T3	from the TD-9960 OTDR.
T2	from the TD-9980 OTDR.
T1	from the TD-9950 OTDR.
PK7500	from the PK7500 OTDR.
Anritsu	MW9070A format from the Anritsu OTDR
TEK WFM	106-109 formats from the TEK OTDR.

NetWorks/OTDR can write the following Trace File formats:

T6	for the CMA 5000 OTDR module and CMA 4500 OTDR

T5	for the CMA4000/8800 and TD-3000 OTDR.
T4	for the TD-1000 and TD-2000 OTDRs.
GR-196	Bellcore GR-196-CORE Data Standard Description (Issue 1, 9/95)
SR4731	Telcordia Technologies OTDR Data Format SR-4731 (Issue 2, 2/2000)

3.2 Using CMA 5000/4500 OTDR Trace Files (T6 format)

NetWorks/OTDR uses a T6 trace format for internal processing. Reading a T6 formatted trace involves no conversion, however, all other trace file formats require a conversion to the T6 format.

3.3 Trace Lists

NetWorks/OTDR accesses (reads) a trace file via a *trace lis*t, which contains *trace files* grouped together according to criteria determined by the user. For example, a trace list may be created for all the traces taken on a cable's fiber at a certain wavelength, in one direction, and at initial installation.

When a trace file is added to a trace list, the full path including device, directory, and filename must be identified. For example: X:\CABLE53\INSTALL\AAABBB3.009.

Additionally:

- Trace lists preserve the path to all the traces in the list with one exception. A trace list does not preserve the path for individual trace files residing within the same directory as the trace list file. Therefore, if a trace list is copied to a different directory, the individual trace files in that directory must also be copied to the new directory.
- The same trace file name can occur more than once in a trace list, but the full path must always be unique. For example, Cable 53 on Dec 06, 96 would appear as, X:\CABLE53\961206\AAABBB3.009.
- A trace *file* may be inserted into more than one trace *list*.

- *Individual trace files* may be opened through the File>Open dialog by changing the file type to All Files (*.*), then using standard Windows selection procedures. A *trace list* will be automatically created when the file is opened.

3.3.1 Creating a New Trace List

1. Select **File>New** or Press **Ctrl+N** to display the New selection box.

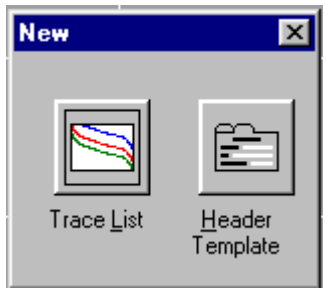


Figure 3-1: New Selection Box

2. Click the **Trace List** button.

3.3.2 Adding Traces to the Trace List

1. With the focus in the trace list pane, press the **Insert** key on the keyboard or select **Trace>Add** (or **Context>Add**).
2. Select the trace files to add in the Add Traces to Trace List dialog box.
3. Click **Open**.

3.3.3 Sorting Traces

NetWorks/OTDR sorts the traces in the trace list pane according to the CMA 5000/4500 Filename format or Sort Mask defined in the Preferences Display tab.

3.3.4 Selecting Traces

Select traces in the trace list using standard Windows list item(s) selection methods.

Select all traces in the trace list by clicking the **Select All** icon on the toolbar or select **Trace>Select All**.

3.3.5 Saving Traces

To save traces which are currently displayed in the trace list:

1. Select the traces to be saved.
2. Select **Trace>Save**.

To save traces which are currently displayed in the trace list *to another file and different format:*

1. Select the trace(s).
2. Select **Trace>Save As**. The Save As dialog box (Figure 3-2) will be displayed.
3. Select a new folder and/or enter a different trace filename. The selected trace's full file specification is shown in the dialog header line.
4. Select the type of file the trace is to be saved as. The default is Original but T6, T5, T4, GR196, or SR4731format may be selected from the pull down list.
5. Click **Save** to save the trace in the specified folder/file.

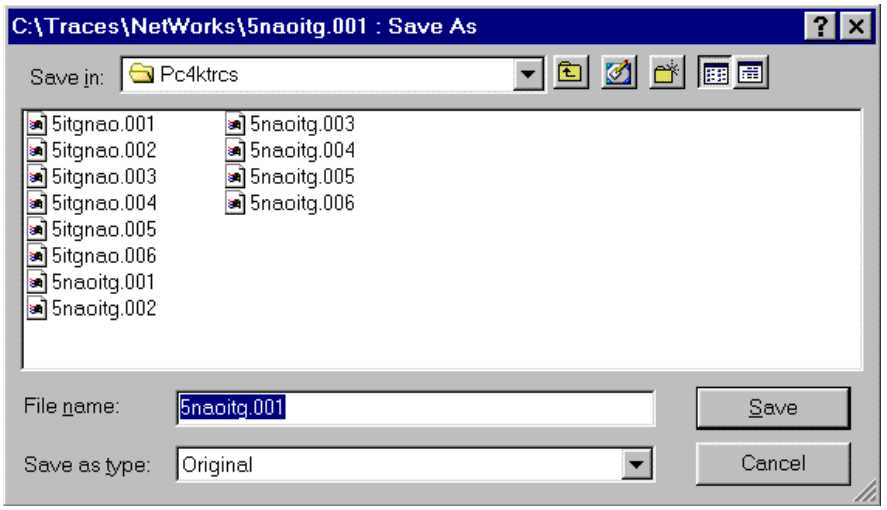


Figure 3-2: Save As Dialog Box

Traces are saved one at a time. If more than one is selected, specify the file name and click Save for each file as it is displayed in the dialog header line.

WARNING

Do not save the trace back into the same file with a different format unless the file is a duplicate of the original or backed up. Format conversions can result in the loss of some parameter information and data!

3.3.6 Removing Traces

This procedure only removes trace files from the trace list; it does not delete them from the disk.

1. Use standard Windows methods to select one or more traces in the trace list pane.
2. Press **Delete** or select **Trace**>**Remove**.

3.3.7 Saving a Trace List

1. Select **File**>**Save** to save the current trace list.

To save the current trace list in a new or separate trace list file:

1. Select **File**>**Save As**.
2. Identify the filename for the newly saved trace list.
3. Click **Save**.

3.4 Trace Property Dialog Box

A trace file contains various parameters, analysis results, and user defined/supplied header information which may be viewed in the Trace Property dialog box.

To access the Trace Property dialog box:

- Use standard Windows methods to select one or more traces in the trace list pane and press **Enter**.

The Trace Property dialog box contains tabs for information on Parameters, Analysis, and Header, which are explained in following sections.

3.4.1 Parameters

The Trace Parameters tab (Figure 3-3) displays information about the currently selected trace.

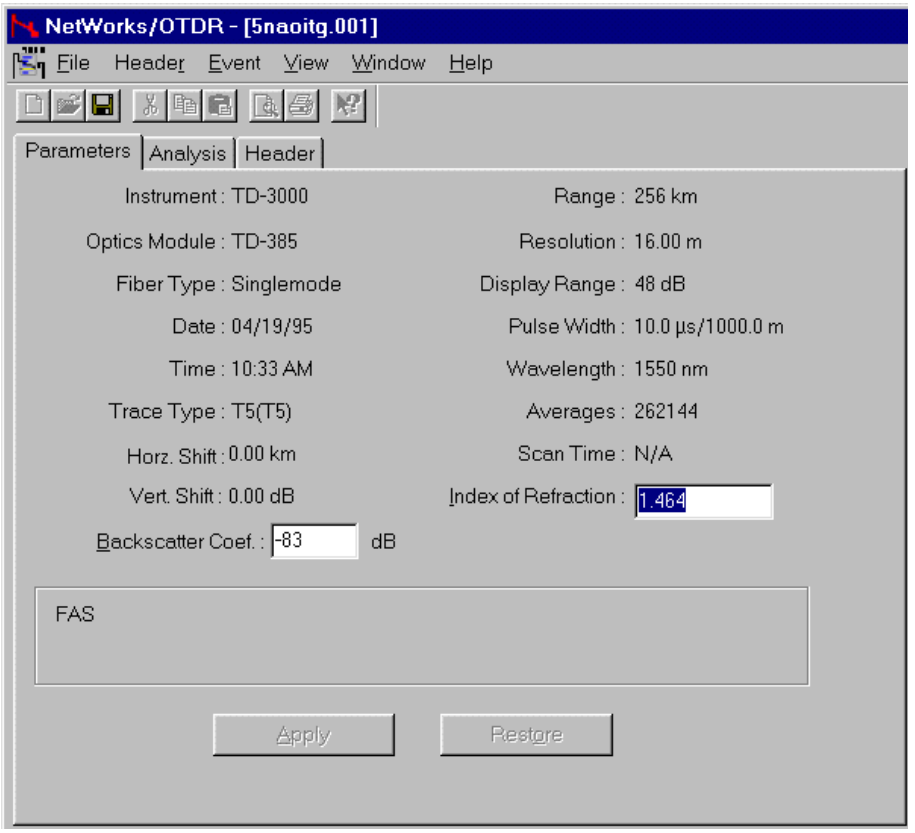


Figure 3-3: Trace Parameters Tab

Most of the parameters are self-explanatory. Only data in the white text fields may be edited.

Additional Parameter field information follows:

Date/Time	Indicate when the trace was originally saved on the OTDR
Trace Type	If the current trace type is T6 or T5, the trace type in () indicates prior trace type. Example: T5(T4) = Current trace type T5, Prior trace type T4
Backscatter Coefficient	A characteristic of the fiber under test; relates the optical backscatter power to laser power and pulse width. If a trace does not contain a backscatter coefficient, the program assumes a default value based on fiber type and wavelength. A backscatter coefficient value is normally supplied with fiber specifications. This value is assumed to be based on a one nanosecond pulse, with a valid range of -40 to -90 dB. If your cable's Fiber Spec Sheet indicates its backscatter coefficient is based on a one micro-second pulse, then enter the specified value minus 30dB. The value affects reflectance and ORL calculations.
Scan Time	The duration of a timed scan in minutes and seconds.
Index of Refraction	A new value may be specified in the range of 1.3 to 1.7
Trace Flag Status Info	The rectangular region at the bottom of the Parameters tab indicates the ON state of various *trace status info flags*: FAS - Trace has been analyzed by FAS Smooth - Trace has been smoothed Template - Trace is a Splice Template trace Attenuated - Trace has been attenuated Abort - Trace has been aborted (averaging stopped) Two-way Average - Trace is a 2-way averaging resultant Delta Compare - Trace is a Delta Compare resultant
Apply Button	Accepts the parameter changes
Restore Button	Restores the parameters to their previous state

3.4.2 Analysis

The Trace Analysis tab (Figure 3-4) contains the Thresholds as set at time of analysis, analysis summary information, and event information (in the white box).

Press Analyze to analyze the trace using the current Analysis parameters.

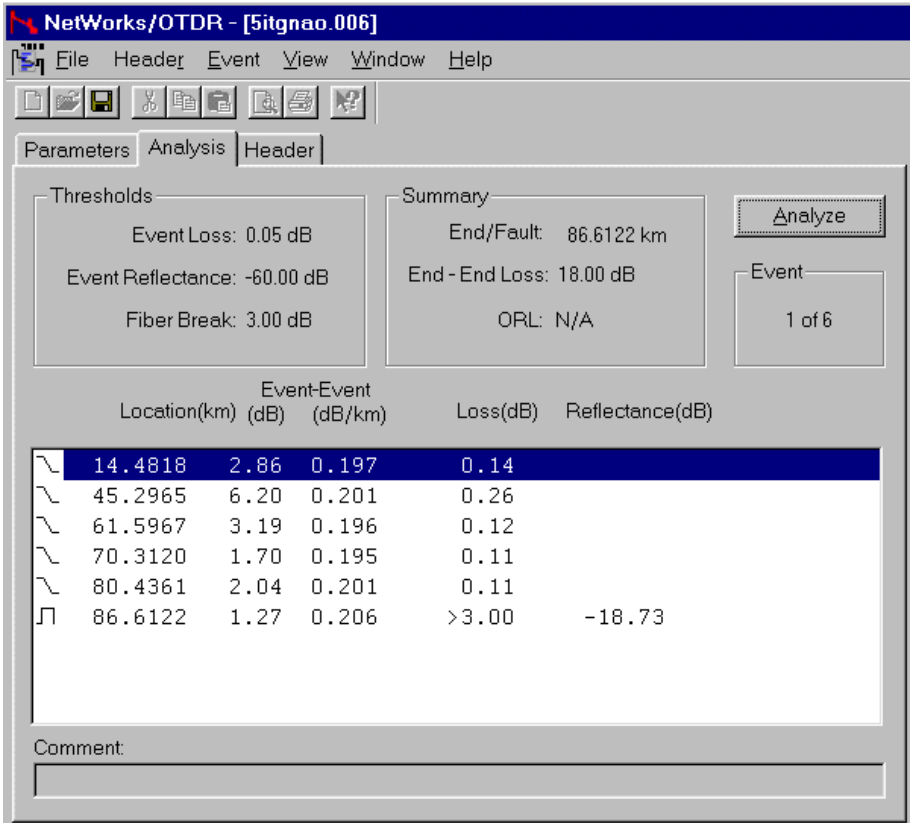


Figure 3-4: Trace Analysis Tab

3.4.3 Trace Headers

A trace header contains valuable, user-specified information about the trace file. For example, when recalling a trace for comparison with a new trace acquired for fault location, information such as the type of OTDR used, the serial number of the unit, the patchcord length used, and any other pertinent data, could save hours in determining the exact location of the fiber break.

When collecting a trace, an OTDR allows selection of a *standard* or *custom* header.

Standard Header

Figure 3-5 shows an example of the Header tab for a CMA 5000/4500 OTDR standard header. Text may be entered or edited in the text fields.

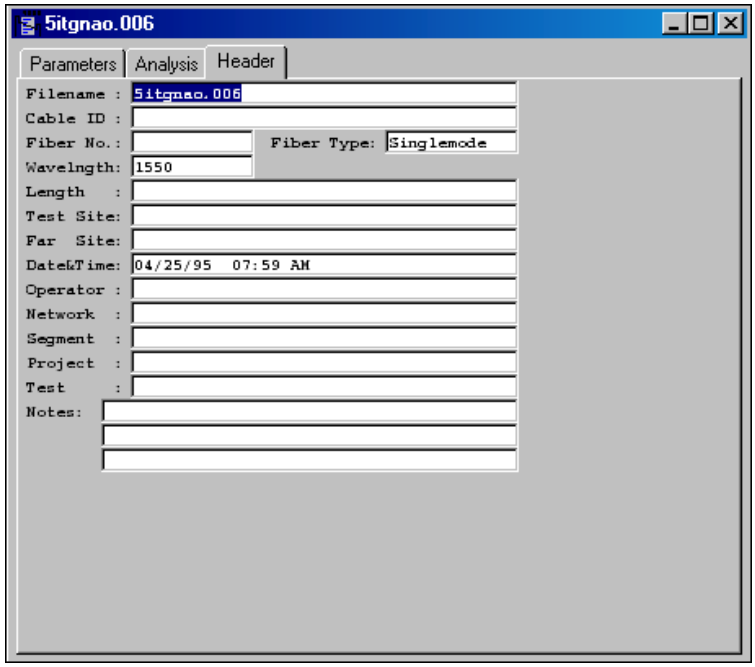


Figure 3-5: Standard Header Dialog Box

When collecting a trace with a standard header, the CMA 5000/4500 OTDR automatically updates the Filename, Fiber Number, Fiber Type, Wavelength, and Date & Time fields.

Custom Headers

A CMA 5000/4500 OTDR (T6) custom header can be created using any text editor or NetWorks/OTDR.

Using a text editor to create a Custom Header:

1. Start your text editing application.
2. Enter the T6 custom header template text using the following guidelines:
   - Line length limited to 50 characters
   - Maximum of 19 lines of text per page
   - Maximum of 20 pages
   - The text ".P" forces a new page
   - Any text entered appears on screen each time the header is used and can not be edited.
   - The symbol "@" creates an editable field in the header template. Once edited the text is retained from trace to trace during the collection process.
   - The symbol "$" creates an editable text field in the header template which is replaced by blank spaces for each new collected trace.
   - The symbols "<" and ">" indicate the start (<) and end (>) of an Auto Field (see Figure 3-6 on page 36).

     Auto Fields are used to auto-populate specific information about a trace into a custom header. For example auto fields can be used to automatically insert the filename, test wavelength, and fiber type into the header.

Each auto field has a 3 letter code which is entered after the "<". The following is a list of the available auto fields for use when creating a custom header.

Field name	Auto field code
Filename	FLE
Cable ID	CID
Fiber No.	FNO
Fiber Type	FTP
Wavelength	WAV
Test Site	TSI
Far Site	FSI
Date & Time	MDY

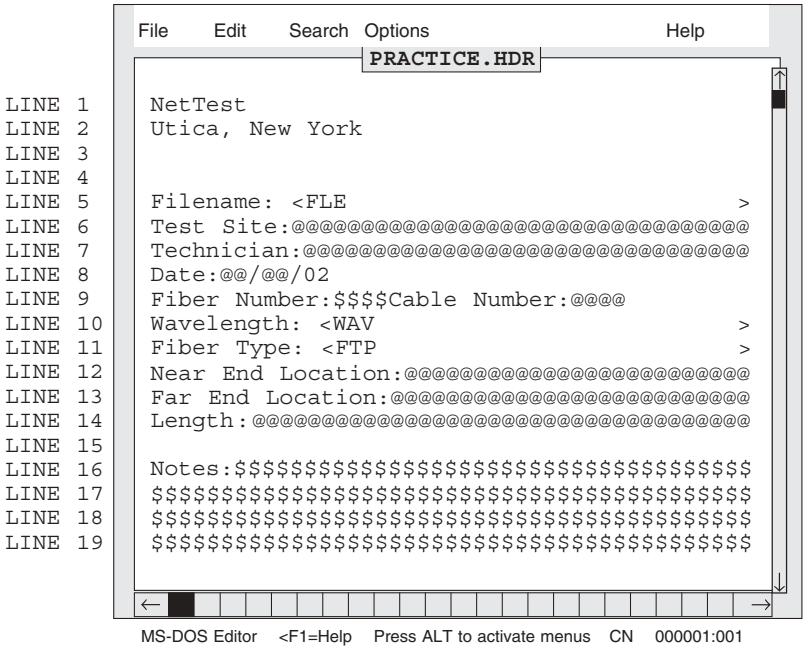


Figure 3-6: Custom Header Template Screen

3. Save the new header template to a disk. File names must contain a three character extension (.HDR) so the filename will be recognizable to the NetWorks/OTDR or CMA 5000/4500 OTDR.

   To use a custom header on the CMA 4000 or earlier model NetTest OTDR name the header file using the DOS 8.3 file naming convention (up to eight characters for the filename plus the three character “HDR” file extension.

Using NetWorks/OTDR to create a Custom Header:
Select File>New or press Ctrl+N and then click the Header Template button (See Figure 3-1: New Selection Box). A new header template will open and custom header information can be entered.

Opening a Custom Header:
Select **File**>**Open** or press **Ctrl**+**O**. Find and select the *custom header file* in the standard Windows Open dialog box.

With focus in the Trace Property dialog box, the trace's current header can be replaced with a standard, custom, or the current primary trace's header. Note that when the primary Trace's Header is copied, all field definitions and text will be copied with the exception of the Filename (FLE), Fiber Type (FTP), Wavelength (WAV), and Date & Time (MDY) auto fields which will be updated from the current trace.

Replacing the current Header from the Trace Property Sheet:
1. Click the right mouse button to bring up the context menu or select Header from the menu bar.
2. Select the desired replacement header style.

If a Custom Header is selected, then the standard Windows Open dialog box will appear for identifying the custom header template file.

3.5 Viewing Trace Data on the Trace Graph

3.5.1 Displaying and Hiding Traces
Trace file waveform data can be displayed on the trace graph.

There are two methods for displaying and hiding traces:

- Double-click a trace filename in the trace list to display its waveform on the trace graph. If a trace is already displayed, double-clicking the trace filename hides the waveform.
- Highlight one or more filenames in the trace list and click either the *display* icon  or the *hide* icon  in the toolbar to display/hide the traces.

3.5.2 Primary Trace

The first trace selected for display is by default the *primary* trace and identified by red trace data and a double red check mark.

The primary trace is unique in that:

- Its parameter values appear in the graph footer.
- It defines the LSA cursors.
- The A/B cursor positions, axis scale, saved views, zoom stack, and LSA cursor positions are dependent on its Index of Refraction (IOR). However, if the primary trace's IOR is modified, the A/B cursor positions (and other related settings) will be automatically adjusted so that they retain their position relative to the data points.
- Manual loss measurements can be performed on it.
- It can be shifted horizontally or vertically.
- It can be permanently displayed during batch display. (See “Batch Display” on page 47.)
- Some features require a primary trace (e.g. Smart Splice Template).

Changing the Primary Trace

Select a new primary trace in the trace list and press **Ctrl**+**R**; or, select **Primary** from the Trace or context menu.

NOTE

If the primary trace is hidden, NetWorks/OTDR automatically selects the next displayed trace to be the primary.

3.5.3 Viewing Modes

Four View Modes are available for viewing the graph of a trace: Display from A, Display from B, Display from Origin, and Display from Anywhere.

Each of the modes have individual locations and magnifications which may be saved to the primary trace or loaded from it. The Display from Anywhere view is not available on the CMA4000/8800 OTDRs but can be restored on NetWorks/OTDR.

Set the view mode using the toolbar icons shown in Table 3-1:View Modes or from the View menu on the menu bar.

Table 3-1: View Modes

View Mode	Toolbar Icon	Description
Display from A		Always displays the A (or B) cursor intercept with the *primary* trace data in the center of the graph view region. As operations are performed that move the A (or B) cursor, the intercept point remains in the center of the graph view region and the displayed data, event markers, and axes change.
Display from B		
Display from Origin		Keeps the origin (0 distance and 0 dB) in the upper left corner of the graph.
Display from Anywhere	*Deselect* all view mode toolbar icons.	Allows zooming in on any region of the trace; regardless of the A/B cursor location or origin.

NOTE

CMA4000/8800 OTDRs magnify/demagnify in powers of two and NetWorks/OTDR has an analog magnification. Therefore, when these files are saved in T5 format, NetWorks/OTDR will decrease the magnification to the largest power of two greater than the current magnification.

EXAMPLE Using Display from A:

1. Select and display a *primary* trace which has events.
2. Set the A cursor location at an event location.
3. Set the view mode to Display from A.
4. Zoom in on the event using the trackbars.
5. Set the loss mode to Splice Loss; the Splice Loss LSA cursors appear.
6. Press **Ctrl**+**A** to move Cursor A via the keyboard.
7. Press and hold the right/left arrow keys to shift the A cursor, noting the graph view region movement.

3.5.4 Loading View from Primary

To load the view from the *primary* trace, click the toolbar icon  , or select View>Load from Primary.

This feature will update the graph pane with the following settings from the primary trace:

- Display From A/B/Origin/Anywhere views
- A and B cursor locations
- Loss Mode

NOTE

Making a new trace primary does not affect the current graph views; View>Load from Primary must be selected.

3.5.5 Saving View to Primary

To update the primary trace with the current view, select View>Save to Primary.

When a view is saved, the following trace information is updated:

- Display From A/B/Origin/Anywhere views
- A and B cursor locations
- Loss Mode

3.6 Changing A and B Cursor location

Moving the A and B cursors:

- Grab the A or B cursor with the mouse cursor and drag it to the desired location.
- Click the A or B toolbar icon, and move the mouse cursor to the location on the graph where the A (or B) cursor is to be placed, and click the *left* mouse button.
- Put the mouse cursor at the graph location where you want the A or B cursor and select from the context menu, Set A cursor or Set B cursor.
- Press **Ctrl** + **A** (or **B**) then use the left/right arrows to move the A (or B) cursor 10 display pixels and use the **Ctrl** + **left/right arrows** to move the A (or B) cursor one display pixel.

Moving the Cursors and keeping the same distance apart:

- Select **Lock A&B Cursors** from the context or Cursor menu or press **Ctrl**+**K** (toggles cursor lock). Then:
  - Drag the B cursor to move both.
  - Drag the A cursor to move just the A cursor.

Moving the Graph viewing area to the A or B Cursor location

- While in Display from Anywhere, select **Cursor**>**Go to A** (or **B**).

3.7 Zoom

Zoom toolbar icons allow zooming in and out on a graph region.

- Click one of the following icons to activate its zoom feature. The icon remains active until deselected with a second click.

NOTE

The first three icons are available only in Display From Anywhere mode.

Magnifies a region. Once activated:

- Move the mouse cursor to one of the rectangle's corners and hold down the *left* mouse button, then drag the rectangle to the opposite corner location. Release the left button; the graph view will change to the selected rectangle's view.
- Move the mouse cursor to the center of the area to be magnified and *left-click* to *zoom in* (magnify).
- Move the mouse cursor to the center of the area to be demagnified and *right-click* to *zoom out* (demagnify).

Zooms out to the previous zoom view.

Centers the zoom region on an event.

- Click this icon and then click an event marker to zoom in on an event. The zoom region will be centered on the event and will be sized to encompass the currently defined *splice loss LSA intervals* used for *splice loss measurement*.

Sets graph view region to enclose all currently displayed trace data.

Sets graph view region from 0 to 60 dB Loss and 0 to 400 km. (Available only in Display from Origin or Anywhere View Modes.)

3.8 Event Processing

3.8.1 Event Marks

Event marks appear at the event location for each trace displayed on the graph. A triangle indicates the location of the event on the data points; one of the following symbols below the triangle indicates the type of event.


Non-reflective Loss


Non-reflective Gain


Reflective Loss


Reflective Gain

Grouped

End


Questionable End

If an event is selected (e.g. displayed in the Event window) a rectangle encompasses its event mark on the graph. Any events with a loss or gain greater than or equal to the High Loss value (selected on the Preferences Display tab) will be shaded with a rectangle.

3.8.2 Displaying/hiding Event Marks

- Select **View**>**Event Marks**>**None** to inhibit the display of any event marks.
- Select **View**>**Event Marks**>**Primary** to display event marks for the primary trace only.
- Select **View**>**Event Marks**>**All** to display event marks for all traces.
- Double-click the *left* mouse button on an event mark on the graph to display the event in the Event window (see Figure 3-7).

More detailed information on using the Event window is contained in the following sections.

3.8.3 Deleting an Event

Click **Delete** in the Event window to delete the event currently displayed in the window.

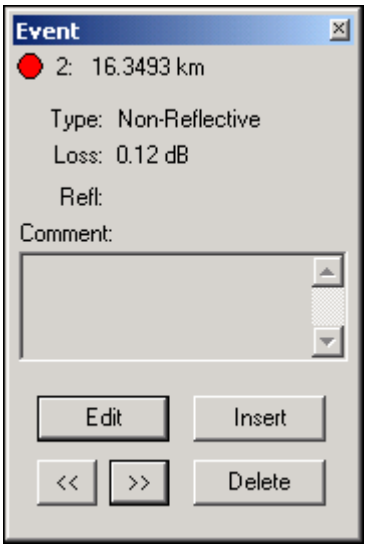


Figure 3-7: Event Window

NOTE

A trace with events must always have an end event. A warning is displayed if an attempt is made to delete an end event.

3.8.4 Editing an Event

Click **Edit** in the Event window to display the Edit Event dialog box (Figure 3-8: Edit Event Dialog Box) and edit information for the event currently displayed in the Event window.

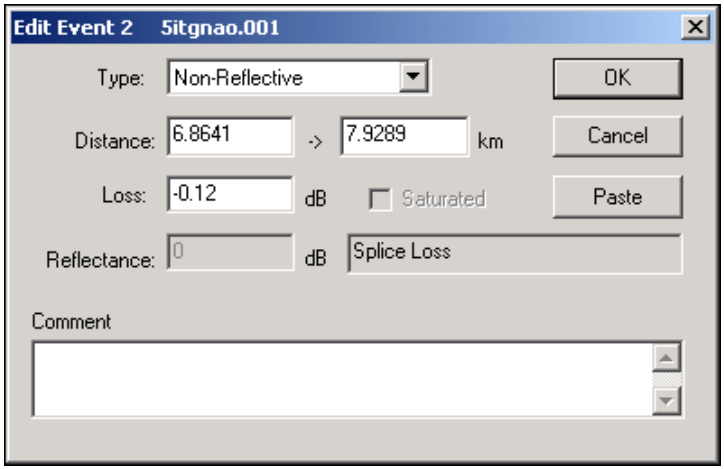


Figure 3-8: Edit Event Dialog Box

Edit Event Dialog Box Fields

Type	End and Questionable (End Events only); Group, Non-Reflective, and Reflective.
Distance	The start and end distances of the event
Loss	User defined loss values may be entered.
Reflectance	Event Reflectance (**NOTE**: Field to the right contains non-editable Event Loss information.)
Saturated	Toggles the saturation state for a reflective event on or off.
Comments	User specified comment field.
Paste	Use to replace Splice Loss and 2-Point Attenuation Corrected measurements only. Edits the event as follows: • Sets the Start Distance to the current A Cursor position. • Sets the End Distance = current B Cursor position for a 2-Point Attenuation Corrected or = Start Distance + Pulse Width for Splice Loss measurement. • Sets the Loss to the Graph Header Loss value. • Sets the Reflectance to the Graph Header Reflectance value.

3.8.5 Inserting an Event

Click Insert to insert an event into the Event Table. The Insert Event dialog box will pop-up with the event parameters set to a Paste of the current measurement (refer to prior section). The Insert Event dialog box follows

the same procedure as the Edit Event dialog box (“Editing an Event” on page 44).

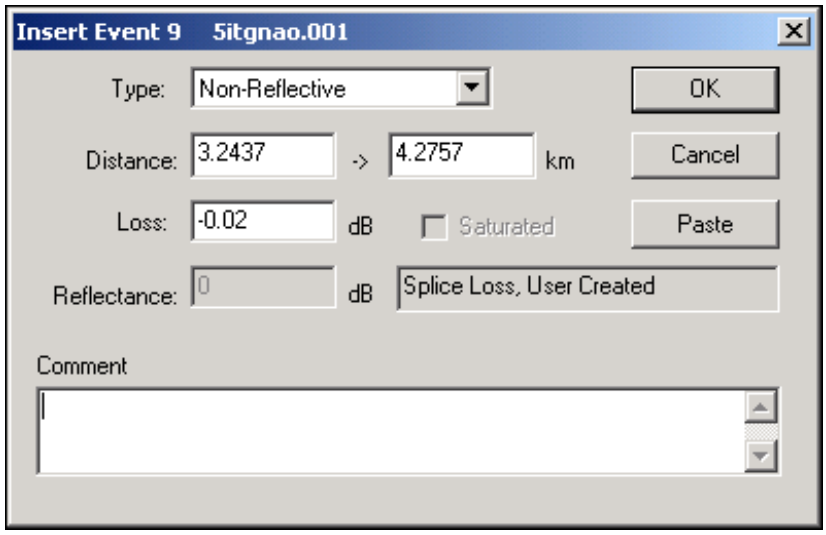


Figure 3-9: Insert Event Dialog Box

3.8.6 Next/Prior Event

Click the **>>** (or **<<**) button in the Event window to view the next (or prior) event on the trace in the Event window.

3.8.7 Zoom to Next/Prior Event

Use the >> or << button to zoom to the next or prior event as follows:

1. Select and display a *primary* trace which has events.
2. Set the A cursor location at an event location.
3. Set the view mode to Display from A (or B).
4. Zoom in on the event (use the trackbars).
5. Display the Event window.

6. Click the >> (or <<) button to view the next (or prior) event on the trace in the Event window and zoom to the next (or prior) event.

3.9 Batch Display

The Batch Display feature allows sequential display of the next or previous Batch (group) of up to eight traces from the trace list.

Batch size is determined by the number of traces displayed. If no traces are displayed, Batch size is determined by the Batch Size setting in the Preferences Display tab.

If the Keep Primary checkbox is selected in the Preferences Display tab, the current primary trace will always remain displayed and is included as one of the batch.

Batch Display is a loop function and cycles through the trace list, returning to the beginning/end of the list to fulfill a batch size requirement. For example; if a trace list contains twelve traces, Batch Size is eight, and the first eight traces are displayed, when the Next Batch icon is clicked, the last four traces and the first four traces in the list will be displayed.

The Batch Display starting point is determined by the status of the trace display and the trace list as follows:

Trace List/Trace Graph Status	Start of Next/Previous Group
Traces *displayed in graph*, but *none selected in the trace list*	First *undisplayed* trace in list, *after/prior to* displayed traces.
Traces selected in trace list	First trace selected
No traces displayed in graph window, and *no traces selected* from trace list	First trace in the trace list

3.9.1 Displaying the Next/ Previous batch

Click the toolbar *next batch* icon  or *previous batch* icon  .
An alternative method is to select **Next Batch** or **Previous Batch** from the Trace or context menu.

Example

1. Set **Batch Size** = 6 and select **Keep Primary** in Preferences>Display.
2. With no traces selected in the trace list or displayed, click the next batch icon. Six traces will be displayed with one as primary.
3. Click **Next Batch** again to plot the next batch of traces. The *primary trace will remain displayed*, the *other five traces removed* from the graph, and the *next five traces from the list displayed*.

3.10 Shift

Primary trace data can be horizontally or vertically shifted to adjust the view and event location.

3.10.1 Shifting the Primary Trace

To enable/disable shifting of the primary trace, press **Ctrl**+**t** or select **Shift** from the Trace menu. Once enabled:

- Use left/right/up/down arrow keys to shift the primary trace 10 pixels.
- Use **Ctrl**+**left/right/up/down arrow** keys to shift the primary trace one pixel.
- To reset the primary trace shift value to zero, select **Trace**>**Reset Shifts** and then:
  - Select **Horizontal** to set the horizontal shift to zero.
  - Select **Vertical** to set the vertical shift to zero.
  - Select **Both** to set the horizontal and vertical shifts to zero.

NOTE

Horizontal and Vertical Shift values are displayed in the graph footer.

3.11 Stack

Trace lists typically contain traces of fibers from the same cable; therefore, data from multiple traces will frequently overlap and be difficult to view. The Stack feature displays the *primary trace* at its true distance and loss

location, but displays *non-primary traces* offset (by a fixed number of pixels) downward on the graph.

- To toggle the stack feature, select **View>Stack Traces**, or, place the cursor in the trace graph, right-click the mouse and select **Stack Traces** from the context menu.

3.12 Align

The Align feature displays each non-primary trace with a vertical offset so that the trace waveform intersects the A cursor at the same point as the primary trace waveform.

- To toggle the Align feature ON and OFF, click the Align icon  or select **View>Align Traces**.

Align ON temporarily shuts the Stack feature OFF and Align OFF restores the Stack feature state.

NOTE

Flipped traces may be aligned to facilitate waveform/cursor positioning for *bi-directional splice loss* measurements.

3.13 Flip

The Flip feature flips the trace waveform of each displayed non-primary trace containing an end event. The flipped waveform is drawn with the end event data point at location 0 and preceding data drawn in reverse order.

- To toggle the Flip feature ON and OFF, click the Flip icon  or select **View>Flip Traces**.

Flip ON temporarily shuts the Stack feature OFF and Flip OFF restores the previously shut off Stack feature state.

Flip ON affects the loss measurements in the graph header as a bi-directional average is computed (See “Graph Header” on page 11.).

Flipped traces may be aligned to facilitate waveform/cursor positioning for bi-directional splice loss measurements.

In the Event and Edit Event windows, a flipped trace event location value is identical to the event location value if the trace wasn't flipped.

3.14 Manual Loss Mode Calculation

NetWorks/OTDR allows seven types of *manual loss mode* measurements on the *primary* trace data:

Table 3-2: Manual Loss Modes

Loss Mode	Measures
Splice (Figure 3-10)	(Splice Loss Left LSA Interval line projected to A cursor) - (Splice Loss Right LSA Interval Line projected to A cursor)
2-Point	(Loss at cursor A intercept with data) - (Loss at cursor B intercept with data)
2-Point LSA (Figure 3-11)	(2-Point Loss Left LSA Interval line projected to A cursor)- (2-Point Loss Right LSA Interval line projected to B cursor)
2-Point Attenuation Corrected	2-Point Loss - (distance in km from A to B cursor) * Attenuation Coefficient
dB/km	(2-Point) / (distance in km from A to B cursor)
dB/km LSA	[(dB/km Loss Left LSA Interval line projected to A cursor)- (dB/km Loss Right LSA Interval line projected to B cursor)] / (distance in km from A to B cursor)
ORL	Optical Return Loss from the A cursor to the B cursor, relative to the A cursor or the origin (see "ORL Relative To" on page 16). **NOTE:** The only way to compute and display the ORL value is to click the ORL button in the Graph Header

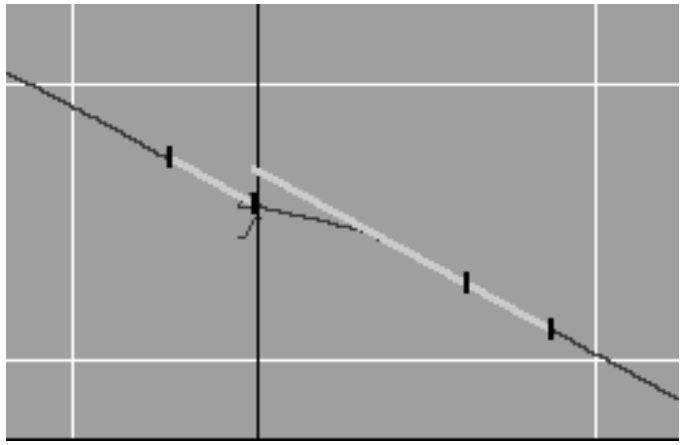


Figure 3-10: Splice Loss Measurement

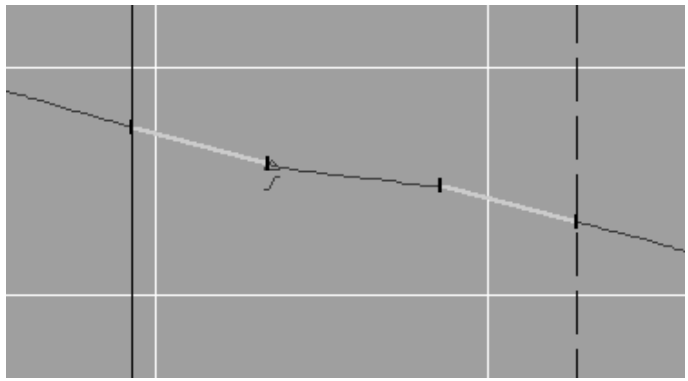


Figure 3-11: 2-Point LSA Measurement

NOTE

2-Point Attenuation Corrected Loss provides a good estimate of the splice loss (without the use of LSA cursors) if the A cursor is positioned just before a splice point and the B cursor positioned just after the splice deadzone.

3.15 LSA Cursor Sets

There are three sets of LSA (Least Squares Analysis) cursors defined by the primary trace: one set each for the Splice, 2-Point LSA, and dB/km LSA Loss Mode calculations.

Each LSA cursor set consists of two pairs of locations. NetWorks/OTDR optimally fits the trace data between the locations in each pair with a straight line. Projecting the line to either the A or B cursor, an estimate of the data is obtained at the cursor location from the linear extrapolation of the data within the LSA Interval between the two locations.

3.15.1 Splice Loss Cursor Set

One LSA interval is to the left of the A cursor; the other to the right. NetWorks/OTDR projects the two LSA lines to the A cursor position to obtain a splice loss estimate. By suitably placing the A cursor and Splice Loss LSA cursors, an excellent loss estimate can be computed.

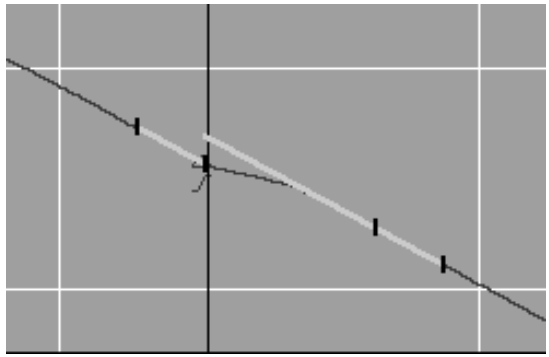


Figure 3-12: Splice Loss Cursor Setup with A Cursor at the Splice

In Figure 3-12, the two black tick marks to the left of the A cursor enclose the data used to compute the left LSA line which is projected to the A cursor. The two black tick marks to the right of the A cursor enclose the data used to compute the right LSA line which is projected to the A cursor.

The difference between the two cursor intercept points provides an estimate of the splice loss.

NOTE

If splices are so close together that the splice loss measurement is inaccurate, use the 2-Point Attenuation Corrected loss measurement to obtain an estimate of the splice Loss, rather than the LSA cursors.

3.15.2 2-Point LSA Loss Cursor Sets

One LSA cursor is associated with the A cursor; the other with the B cursor. NetWorks/OTDR projects each LSA line to its associated A/B cursor and the dB loss difference is an estimate of the loss between the A and B cursors.

3.15.3 dB/km LSA Loss Cursor Sets

LSA cursor association, usage and loss computation is equivalent to 2-Point LSA, except the resultant loss is divided by the distance (in km) between the A and B cursors.

3.15.4 Adjusting The LSA Cursor limits

To move an LSA cursor or an LSA cursor end point, click the appropriate icon, position the mouse cursor where you want to relocate it, and click the *left* mouse button.

Cursor Icon	Function
	new left end of wholly shifted Left LSA cursor
	new left end of wholly shifted Right LSA cursor
	new left end of Left LSA cursor
	new right end of Left LSA cursor
	new left end of Right LSA cursor
	new right end of Right LSA cursor

Moving the LSA Cursor

1. Position the mouse cursor over an LSA cursor line. The mouse cursor will change to: 
2. Click and drag the LSA cursor along the trace.

Resizing the LSA Cursor

1. Position the mouse cursor over an LSA tick mark. The mouse cursor will change to: 
2. Click and drag to resize the LSA cursor.

To initialize the LSA cursors to a computed value based on pulsewidth and resolution, select **Cursor**>**Set LSA Defaults** from the menu bar.

3.16 Trace Analysis

NetWorks/OTDR has built-in trace analysis capabilities designed to locate, classify, and measure events on an OTDR trace. Thresholds may be set (Select **File**>**Preferences**>**Analysis**) so that only events having a loss or reflectance above these threshold settings will be reported.

When analysis is enabled for selected traces, the current events are discarded and the algorithm locates, classifies, and measures features, storing the threshold results as new events. The Parameters tab of the Properties dialog box will indicate if analysis has been applied to a trace.

To analyze a selected set of traces:

- Click the **Analyze** icon or **Select Trace**>**Analyze**.

Analysis results are placed in the trace event table which may be viewed by selecting **Trace**>**Properties**>**Analysis**.

A trace's individual events can be displayed in the Event window.

CAUTION

Once a trace is analyzed, the previous memory copy of the events is destroyed. If the trace is saved back into its file, the previous events in the file are overwritten and only recoverable from a backup file.

3.17 Smooth

The Smooth function alters the data by applying a digital filter to a trace. This digital filtering may help to reduce the random noise on the trace.

3.17.1 Smoothing a Selected Trace

To smooth a selected trace:

- Select **Trace**>**Smooth**.

The Parameters tab of the Trace Properties dialog box indicates whether smoothing has been performed (See "Parameters" on page 31).

CAUTION

Saving a trace that has been smoothed overwrites the original (noisy) data in the trace file. The original data can only be restored from a backup file

Figure 3-13 and Figure 3-14 show a trace waveform before and after smoothing has been applied.

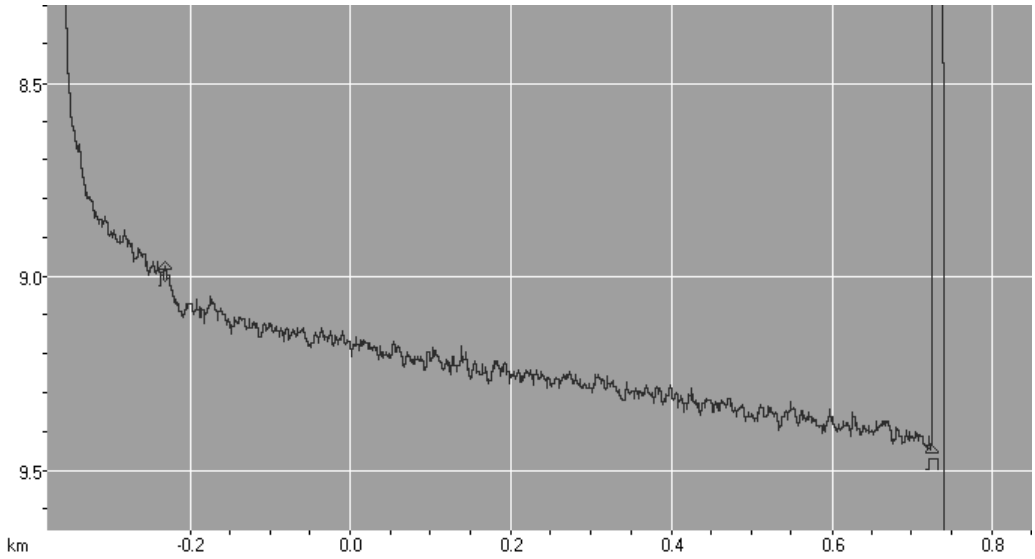


Figure 3-13: Trace before Smoothing

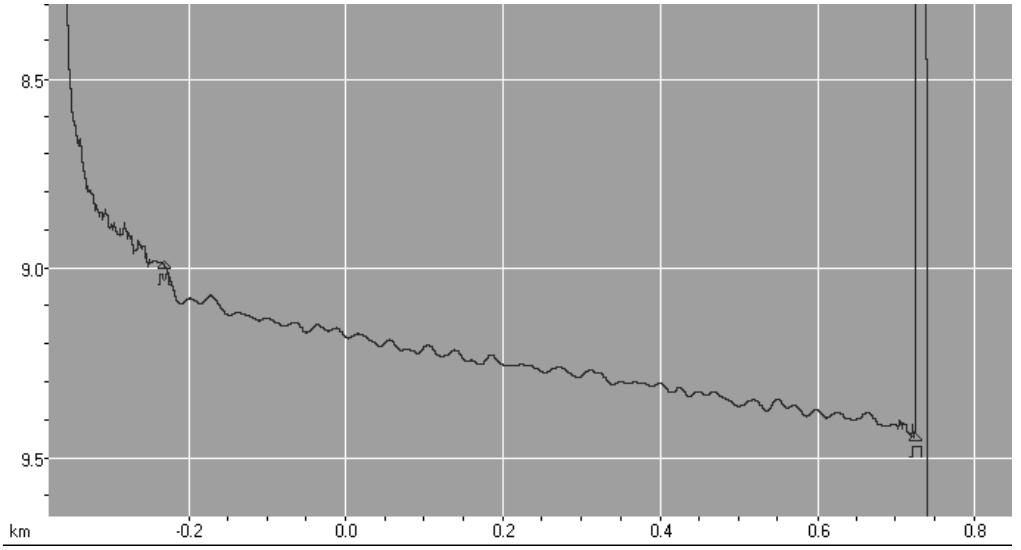


Figure 3-14: Trace with Smoothing Applied

4.0 Printing Options

NetWorks/OTDR printing options are accessed from the File menu as shown in Figure 4-1.

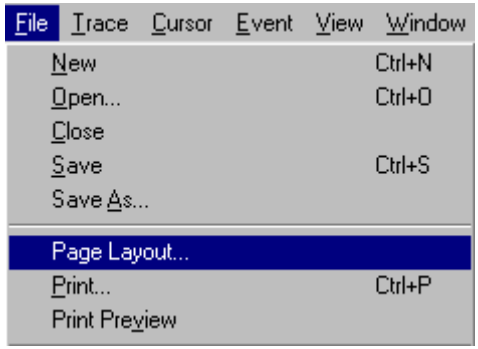


Figure 4-1: File Menu Options

4.1 Page Layout

Page Layout allows selection of options, format and information to be included in each type of printout: View (current), Batch, Frame and Bi-Directional.

To select printout options:

1. Select **File**>**Page Layout**.
2. Click on the tab for the desired printout type and select the desired options.
3. Click **OK** to save the changes and return to the graph view screen.

Information on selections for each printout type is detailed in the following sections.

4.1.1 Current View

The View printout is based on the traces *currently* displayed on the trace graph.

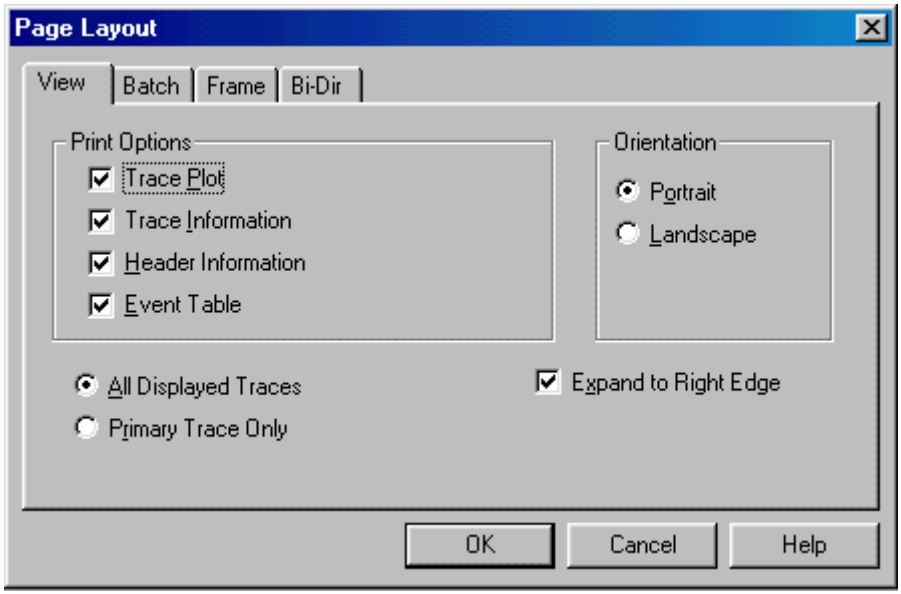


Figure 4-2: View Printout Page Layout Dialog

Select View printout options as desired:

- Select the desired print selections in the Print Options group box.
- Select the **All Displayed Traces** option button to show all displayed traces in the printout or select **Primary Trace Only** to printout only the primary trace.
- Select **Expand to the Right Edge** to expand the trace plot to use the full paper width.

4.1.2 Batch

The Batch printout prints selected trace information for the currently selected trace(s). Refer to the Batch printout example in Appendix B.

HINT By suitably setting up the trace list and defining the Sort Mask, two traces of the same fiber taken at different wavelengths, directions, dates, etc. can be printed on one page.

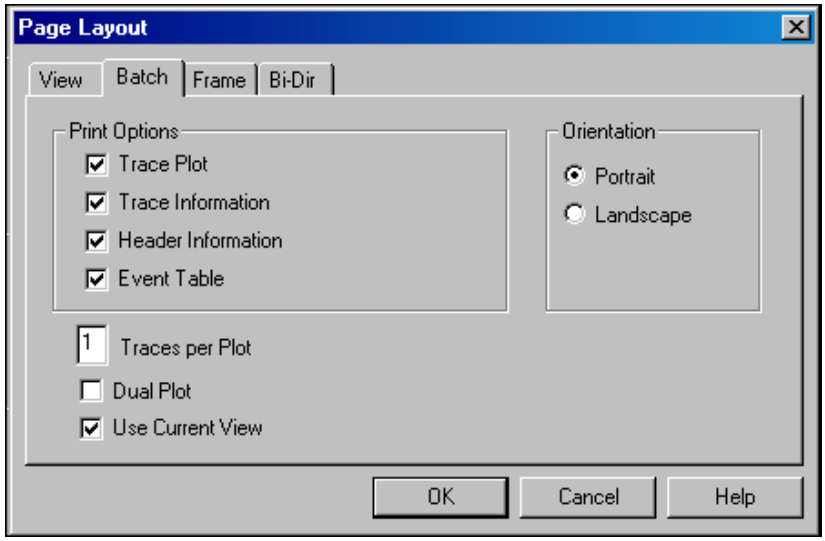


Figure 4-3: Page Layout Dialog - Batch Report

Select Batch printout options as desired:

- Select the desired print selections in the Print Options group box.
- Enter the number of traces to be shown in each plot (up to 8).
- Select **Dual Plot** to show two trace plots per page, rather than one.
- Select **Use Current View** to use the current graph view region (including Stack, Align and Flip state) on all trace plots; otherwise, the first trace file in each plot will define the view.

4.1.3 Frame

The Frame printout contains a separate trace plot with an optional *primary trace* parameter summary for the currently selected traces. The plots can be printed in an N column by M row format, for a total of NxM plots per page (16 plots per page). Refer to the Frame printout example in Appendix B.

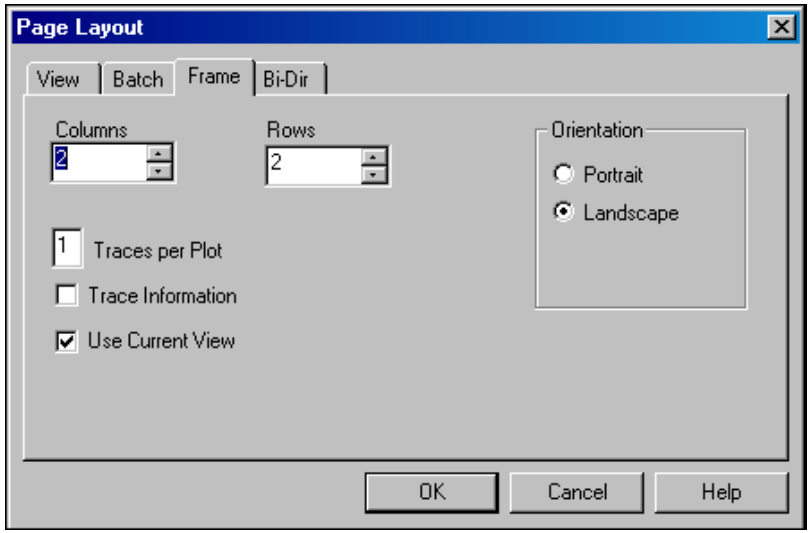


Figure 4-4: Page Layout Dialog Box - Frame Printout

Set the Frame printout generation options as desired:

- Set the number of columns (usually 1 or 2) to a maximum of 4.
- Set the number of rows from 1 - 4.
- Enter the number of traces to be shown in each plot (from 1-8).
- Select **Trace Information** to print primary trace and view parameters.
- Select **Use Current View** to use the current graph view region (including Stack, Align and Flip state) on *all* trace plots; otherwise, the first trace file in each plot will define the view.

4.1.4 Bi-Directional

The Bi-Directional printout assumes that pairs of selected traces are bi-directional traces taken on the same fiber. The printout format (refer to Appendix B-4) is similar to the Batch Print except for:

- Traces are graphed two per plot, with the second trace flipped, and a reverse distance scale for the second trace drawn at the top of the graph.
- One graph is drawn per page.
- The printed Event Table is a bi-directional table showing pairs of events from the two traces that correspond to the same fiber location (normally a splice) on one line.

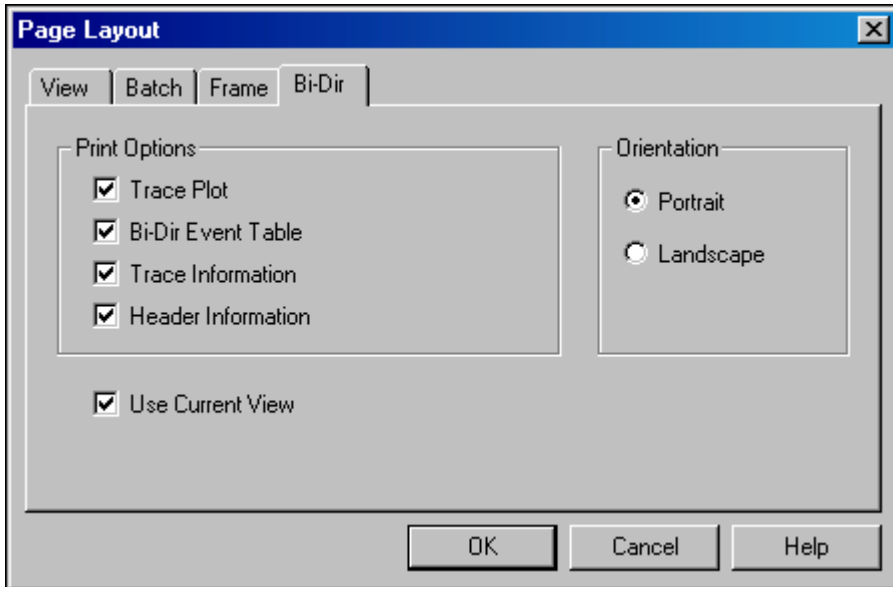


Figure 4-5: Bi-Directional Printout Page Layout Dialog Box

4.2 Print/Print Preview Options

1. Select File>Print or **Print Preview** to display the Select Print Preview dialog box.

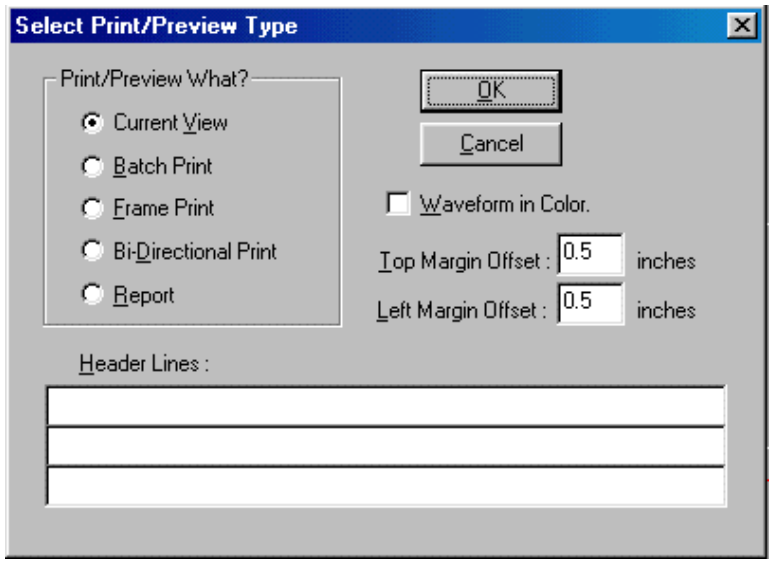


Figure 4-6: Select Print/Preview Type Dialog Box

2. Select the type of printout: *Current View, Batch Print, Frame Print, Bi-Directional Print* or *Report*.
3. Enter up to three **Header Lines** of text to be printed on the printouts or report.
4. Select **Waveform in Color** to print trace waveforms in color.
5. Set **Top** and **Left Margin Offset**. The default is 0.5 inches.
6. Click **OK** to either display the preview or send the printout to the printer, depending on the selection made in the File menu.

NOTE

If Bi-Directional Print (see "Bi-Directional Print Specification Dialog Box" on page 63) is selected, an additional dialog box is displayed before the preview or printing.

4.2.1 Print Preview

If Print Preview was selected from the File menu, a preview of the printout is displayed. Menu bar buttons allow printing and zooming from this screen. Press Close to return to the NetWorks/OTDR graph view window.

4.3 Bi-Directional Print Specification Dialog Box

If Bi-Directional Print is selected in the Select Print/Preview Type dialog box, a Bi-Directional Print Specification dialog box is displayed following the Print dialog box.

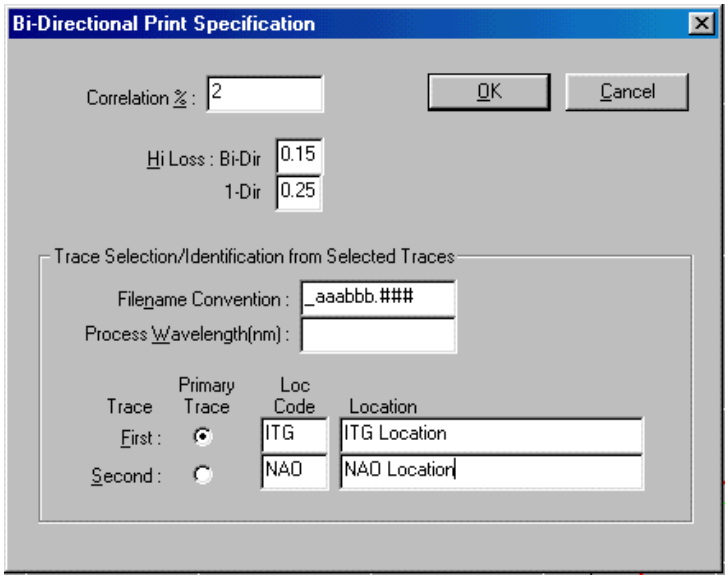


Figure 4-7: Bi-Directional Print Specification Dialog Box

The Bi-Directional printout requires the bi-directional correlation of two traces events. Two events are said to “correlate” if the sum of the locations of the *primary trace* event and a *secondary trace* event are within the *correlation window* of the primary trace end event location.

The width of the correlation window is defined to be the primary trace end event location multiplied by the Correlation % set in the dialog box.

EXAMPLE A Correlation % of 2 and a primary trace end event location of 100 km result in a correlation window of 2 km. If a primary trace event exists at 10 km, and a secondary trace event at 89.9 km, the sum of the two is 99.9 km. This falls within 2 km of 100 km; therefore, the two are said to correlate.

The Bi-Directional printout table shows all primary and secondary trace events. For each primary trace event, the closest correlating secondary trace event is assumed to be the same event (usually a splice) seen from the other direction and is printed on the same line.

Correlation %

The default setting is 2. This provides excellent splice event correlation for practically all bi-directional traces. However, if two bi-directional splice events do not correlate, then increase the correlation %. If bi-directional splice events incorrectly correlate then decrease the %.

In the case of non-correlation or incorrect correlation of splice events, a splice event location may be incorrect and require adjustment.

Hi Loss : Bi-Dir, 1-Dir

In the various printouts, if a bi-directional event loss is greater than or equal to the Hi Loss : Bi-Dir value, then the loss is shown with a bold font. Also, if a 1-directional event loss is greater than or equal to the Hi Loss : 1-Dir value, then the loss is shown with a bold font.

Filename Convention

This field is required if the CMA5000 Filename is not Enabled on the Preferences Display tab (See “CMA 5000/4500 Filename Group Box” on page 19 for details).

Enter text identical in format to the trace filename, using the following characters:

A indicates a From location code character
B indicates a To location code character
_ indicates a Wavelength character
# indicates a Fiber Number character
All other characters in this field will be ignored.

EXAMPLE For trace filename 5ITGNAO.001, enter _AAABBB.### in the Filename Convention field.

Process Wavelength(nm)

The Process Wavelength(nm) field value indicates the wavelength of the traces to be processed for the Bi-Directional printout. If the value is not specified then only the first selected trace wavelength will be processed.

Reference Trace Option Buttons

For the Bi-Directional printout, the selected Reference Trace option button indicates whether the first or second trace of each pair of bi-directional traces is to be graphed as the primary trace with the other trace flipped.

The Location Code and Location indicate the near location information for the first and second traces of each pair of bi-directional traces.

5.0 Power Meter File Processing

5.1 Power Meter File

A Power Meter File is created when a set of power meter readings is saved in the Loss Test Set mode on a CMA 5000/4500. Each reading is indexed by an item number, one or more wavelengths, and the direction of the test. The value for each reading is expressed in either dB units relative to a reference value, or absolute dBm units if there is no reference. The file also contains user supplied header information and reading date/time.

Although not necessary, power meter filenames usually have a “pmt” extension to allow easy identification.

5.2 Viewing a Power Meter File

1. Select **File>Open** to view a power meter file.
2. Select Power Meter (*.pmt) from the *Files of type* field in the Open dialog box to find power meter files with a .pmt extension, or All Files (*.*) to find files with a different extension.

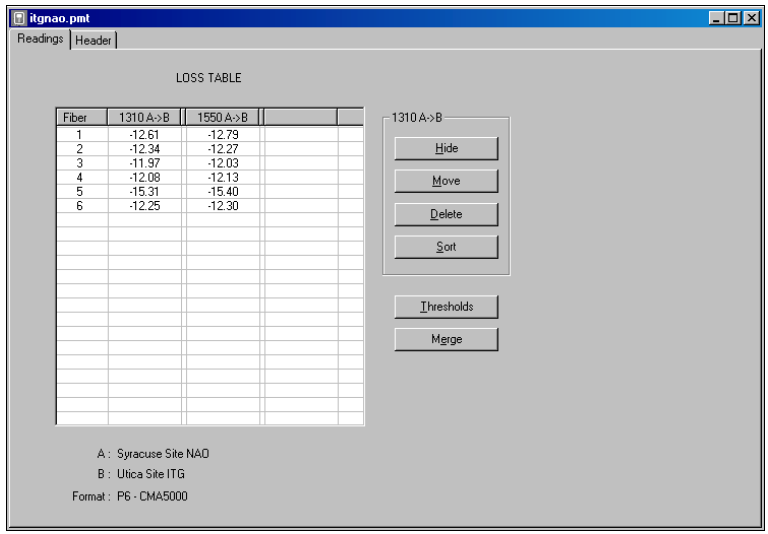


Figure 5-1: Power Meter Window - Readings Tab

The Power Meter Window contains 2 tabs: Readings and Header.

5.2.1 Readings Tab

The Readings tab (Figure 5-1) contains the Loss Table, several buttons for selecting operations to be performed, the A and B location names, and the file format.

Loss Table

The Loss Table contains 3 types of columns:

Fiber	indicates the Fiber Number of each line.
Wavelength/ Direction	indicates the wavelength and direction of the columns of readings; initially sorted by wavelength with a subsort on A->B, B->A, and A<->B directions. The A<->B direction (or bi-directional direction) is only present if both the A->B and B->A directions exist.
Reference	indicates the reference value column for the wavelength/direction to the left. Initially, each reference column is very narrow and looks like a null column (see Figure 5-1). The column can be widened to view the reference values by grabbing the right edge of the column header and dragging it to the right (see Figure 5-2).

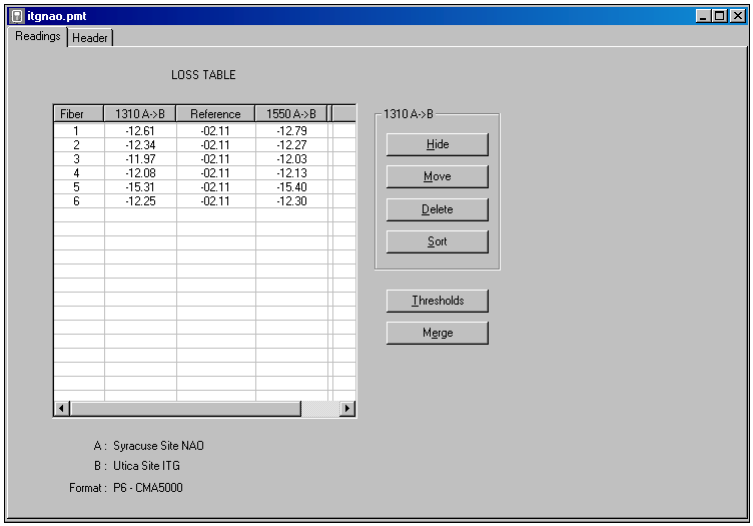


Figure 5-2: Power Meter Window - Reading Tab with References

Select Wavelength/Direction

To select a Wavelength/Direction column, click the mouse cursor on the appropriate column header. Once the column header is clicked, the Wavelength/Direction Group Box to the right of the Loss Table will indicate the selection. The buttons inside this box indicate the operations that may be performed on the selected Wavelength/Direction (Hide, Move, Delete, and Sort). The other buttons (Thresholds and Merge) invoke general operations.

Hide Button

Click the Hide Button to hide the selected Wavelength/Direction reading and reference column. The hidden information is still in the internal memory data but just not in the Power Meter Window.

Move Button

To move a Wavelength/Direction reading and reference column:

1. Select the Wavelength/Direction to be moved.

2. Click the **Move** Button.
3. Find and select the Wavelength/Direction that the current Wavelength/Direction is to be moved in front of. If the Wavelength/Direction is to be moved after all others then select the last empty column.

Delete Button

Click the Delete Button to delete the selected Wavelength/Direction reading and reference information from both the window and the internal memory data. To permanently update the Power Meter File, select File>Save.

WARNING

Be sure of your changes before saving data to the file – the update is permanent and the original data can not be recovered.

Sort Button

Click the Sort Button to sort the selected Wavelength/Direction readings from low to high. All the data on each line will be kept together.

To sort by Fiber Number, click the Fiber Number Column header.

Thresholds Button

To modify the Wavelength/Direction Thresholds:

1. Click the **Thresholds** Button.
2. In the Failure Thresholds Dialog, modify the thresholds to the required value. A threshold value of 0 indicates no threshold.

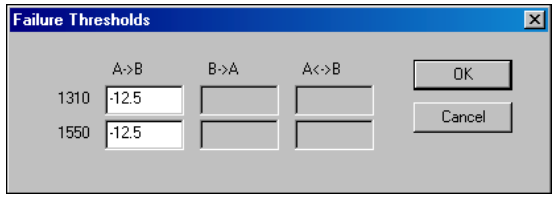


Figure 5-3: Failure Threshold Dialog

3. Click **OK** to save the thresholds into the internal memory data.

To save threshold updates into the Power Meter File, select File>Save.

Merge Button

To merge another Power Meter File into the current Power Meter data:

1. Click the **Merge** Button.
2. From the standard Open File (to Merge) Dialog, select the Power Meter File to merge and click **Open**.

The opened file readings and header information will now be merged into the current Power Meter readings and header. Each null current reading and header field will be replaced by the corresponding opened Power Meter File reading and header field.

For a merge to occur, the current and opened Power Meter Files must have exactly the same location names.

To save the merge updates into the current Power Meter File, select **File**>**Save**.

5.2.2 Header Tab

The Header tab (Figure 5-4) shows the various CMA 5000/4500 LTS Power Meter Header fields, allowing edits, and the data collection date and time.

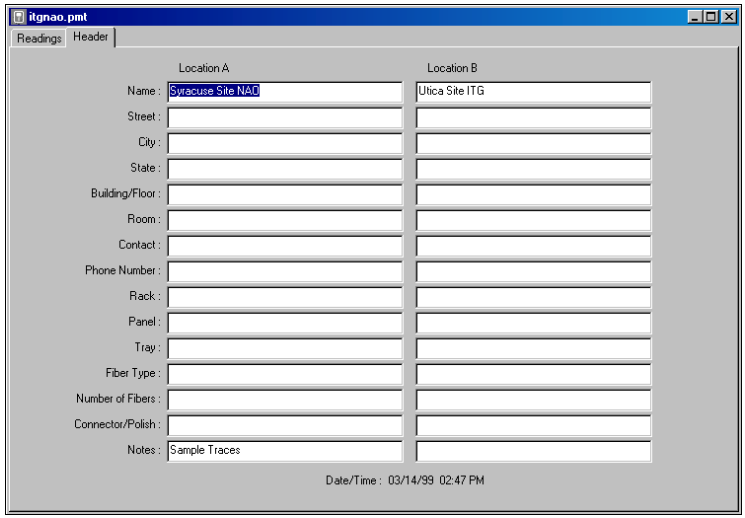


Figure 5-4: Power Meter Window - Header Tab

5.3 Working with CMA 5000/4500 LTS Power Meter Files (P6 Format)

A CMA 5000/4500 LTS Power Meter File (P6 Format) may contain several wavelengths, readings for 2 directions, and a reference value for each reading. A CMA-4000 Power Meter File (P5 Format) may contain up to 4 wavelengths, readings for only one direction, and one reference value for each wavelength/direction. Also, the headers of the P6 and P5 formats are quite different.

NetWorks/OTDR can read both P6 and P5 formatted files. However, in reading a P5 file, a P6 formatted database is created for internal processing. NetWorks/OTDR can write both P6 and P5 formatted files. To save P6 data in P5 format, the restrictions of the P5 format must be met: a maximum of 4 wavelengths in only 1 direction. The Power Meter Window Delete button may be used to delete wavelengths and a direction to meet the P5 format restrictions.

5.4 Printing a Power Meter File

When the power meter window has focus, the power meter file can be printed or previewed:

- Select **File**>**Print** or **File**>**Print Preview**.

The failure threshold values are printed in the Loss Table header. Readings at or below the appropriate failure threshold will be printed in bold. The minimum, maximum, and average readings for each wavelength and direction are printed at the end of the Loss Table. If specified in the Power Meter Preferences (see page 23) the reference value for each reading will be printed to the right of the reading..

Appendix C contains a Power Meter Report example.

5.5 Exporting a Power Meter Report

A Power Meter Report can be exported to an ASCII text file, with comma delimited fields, that can then be imported into a spreadsheet.

1. Select **File**>**Export**
2. Specify the File name in the Enter/select Export File dialog box.

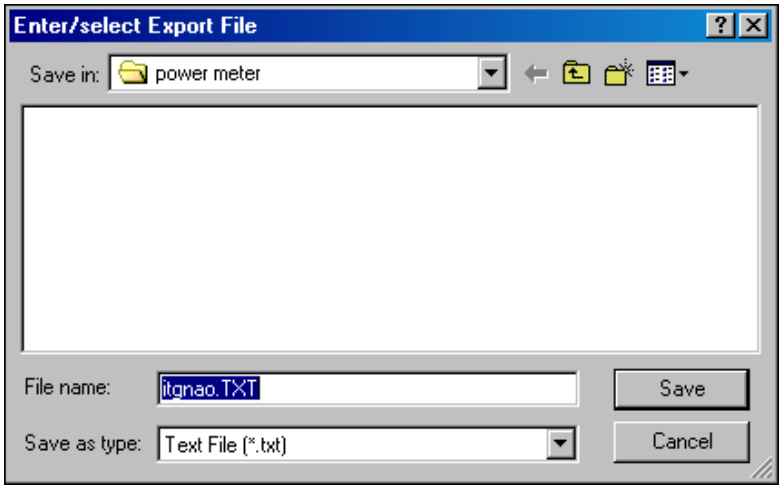


Figure 5-5: Enter/select Export File Dialog Box

NOTE

The default filename is the same filename as the power meter file or the previously specified filename (if a previous export occurred). If no extension is specified, a “txt” extension will be added.

The export file format contains the same header information, readings (1 set per line), and min/max/average readings as found in the printed report. If specified in the Power Meter Preferences (see page 23) the reference value for each reading will be printed to the right of the reading.

Sample Power Meter Export File

```
"Power Meter Report"
"NetTest  NetWorks/OTDR - Version 3.0a"
"X:\Traces\power meter\itgnao.pmt"
" 04/13/04"
;;;"    Location A";;;;;"    Location B"
"Name :";;;"Syracuse Site NAO";;;;;"Utica Site ITG"
"Street :";;;"";;;;;""
"City :";;;"";;;;;""
"State :";;;"";;;;;""
"Building/Floor :";;;"";;;;;""
"Room :";;;"";;;;;""
"Contact :";;;"";;;;;""
"Phone Number :";;;"";;;;;""
"Rack :";;;"";;;;;""
"Panel :";;;"";;;;;""
"Tray :";;;"";;;;;""
"Fiber Type :";;;"";;;;;""
"Number of Fibers :";;;"";;;;;""
"Connector/Polish :";;;"";;;;;""
"Notes :";;;"Sample Traces";;;;;""
"Date/Time : 03/14/99  02:47 PM"
"Format : P6 - CMA5000"
;1310;;1550;
;"A->B";"Ref";"A->B";"Ref"
```

Thres;-12.50;;-12.50;
1;-12.61;-02.11;-12.79;-02.24
2;-12.34;-02.11;-12.27;-02.24
3;-11.97;-02.11;-12.03;-02.24
4;-12.08;-02.11;-12.13;-02.24
5;-15.31;-02.11;-15.40;-02.24
6;-12.25;-02.11;-12.30;-02.24
Min;-15.31;;-15.40;
Max;-11.97;;-12.03;
Avg;-12.76;;-12.82;

6.0 Batch Process

Batch Processing allows modification of selected traces according to options selected in the Batch Trace Processing dialog box. It can also generate two different types of trace event ASCII report files: NetWorks/OTDR and PC-3000 (see Appendix D: Report File Formats). These report files may be imported into a spreadsheet program and viewed with text editors or word processing software.

NOTE

The ASCII text lines in a report file may be quite long; 200 or more characters in a single line may be generated for each event.

6.1 Executing Batch Process

1. Select the traces that are to be processed from the trace list pane according to standard Windows procedure.
2. Select **Trace>Batch Process**. The Batch Process dialog box is displayed.

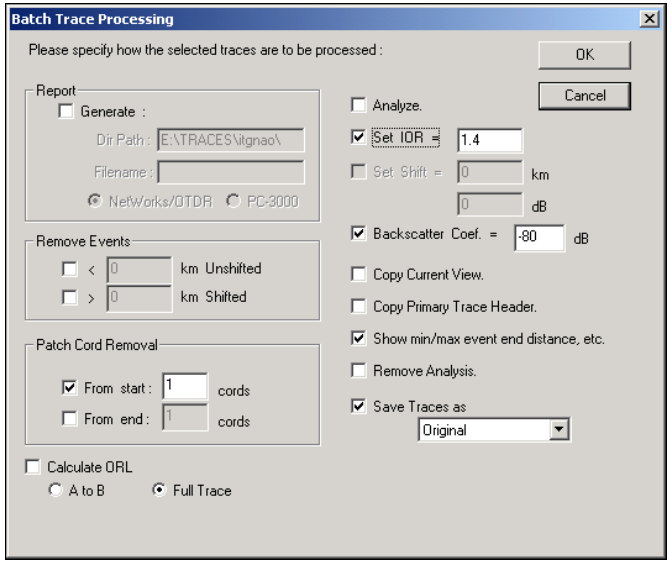


Figure 6-1: Batch Trace Processing Dialog Box

3. Select the desired check boxes and enter any required parameters for selected options. As check boxes for the various options are selected, different option buttons and text fields become available/unavailable for selection and editing.

NOTE

The Copy Current View and Copy Primary Trace Header controls will only be available for selection if a primary trace is displayed.

4. Click **OK** to complete the selected functions.

6.2 Remove Events

The Remove Events group box automatically removes events from the selected traces.

Select "<" and enter a distance value to remove all events (except an end event) located less than the specified distance. Each event location is calculated in unshifted distance units (i.e. without taking into consideration the horizontal shift). This feature is normally used to remove events found on a patch cord. For example, for a 1 km patch cord, a value of 950 meters would remove any unwanted patch cord events which could affect the patch cord removal (see "Patch Cord Removal" on page 79).

Select ">" and enter a distance value to remove all events (including an end event) located greater than the specified distance. If an end event is removed then the last event less than or equal to the specified distance will be classified as an end event. Each event location is calculated taking the horizontal shift into consideration. This feature is normally used to remove events past the end of fiber (which the analysis algorithm may find due to unusual waveform patterns after the end of fiber).

6.3 Calculate ORL

Select **Calculate ORL** to calculate the ORL from A to B or over the Full Trace and save the result in the memory copy of the trace. The

Preferences>Analysis tab ORL Relative To group box controls whether the ORL is calculated relative to the A Cursor or the Origin.

6.4 Show min/max event end distance

1. Select Show min/max event end distance, etc. to determine which traces have the minimum and maximum end distance and number of events.
2. Click **OK** to display the results in a pop-up window.

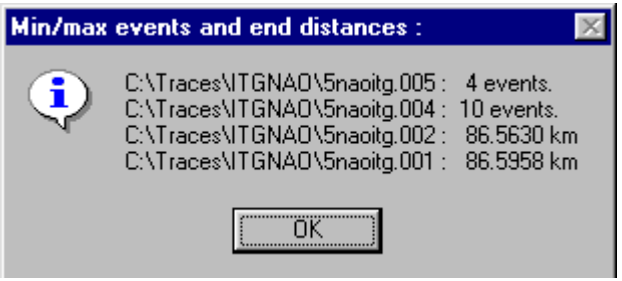


Figure 6-2: Min/max Events Window

3. Click **OK** to close the window.

6.5 Patch Cord Removal

The Patch Cord Removal group box automatically removes *start patch cords* (or launch cords and pulse suppressors) and *end patch cords* from the selected traces.

Remove Patch Cords by selecting the appropriate remove box(es) and specifying the number of patch cords to remove.

Batch Process removes N *start* patch cords by horizontally shifting the selected traces so that the Nth event location is slightly greater than 0. The start connector event is visible.

Batch Process removes N *end* patch cords by deleting the last N Events and identifying the last remaining event as an end event leaving the event data (loss, reflectance, etc.) intact.

6.6 Saving Traces

Changes made to the selected trace files can be saved to the file by selecting the Save Traces As box. Many traces can be updated; therefore, when the Save Traces check box is selected, the pop-up dialog box in Figure 6-3 appears prompting verification of the save.

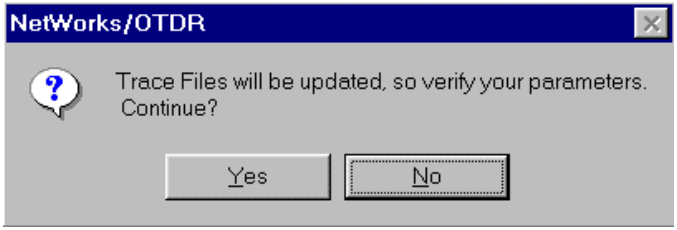


Figure 6-3: Save Trace File Verification Box

NetWorks/OTDR can currently write traces in T6 (CMA 5000/4500 OTDR), T5 (CMA 4000 and TD-3000), T4 (TD-1000 and TD-2000), Bellcore GR-196, and Telcordia SR4731formats. If “Save Traces as Original” is specified, each trace will be saved in its original format if possible.

NOTE

It is important to backup traces prior to updating or update only a working version as the selected traces will be overwritten.

7.0 Smart Splice Template

A *Smart Splice Template Trace* is a specially generated trace that contains an event at each splice (or connector) location on a cable that can be applied (See Chapter 9.0) to all cable fiber traces in the same direction to obtain an estimate of the loss at each splice (or connector) in each trace.

Where the NetWorks/OTDR "Build Template" feature (See Chapter 8.0) requires user-selection and analysis of a single trace suitable for use as a template trace, *smart splice template* automatically builds a splice template based on a set of traces from a cable. The more traces available to analyze, the better the process works, and the more complete and accurate the resultant Splice Template.

The Smart Splice Template function combines event information from all the traces in the set so that any event found on any fiber may qualify to be included as an event in the template.

The combined event information at a given distance on the cable (or set of traces) is termed a *cable event* and is represented by a vertical bar on the *smart splice template trace waveform*. The height of a cable event indicates the number of traces that include a detectable event at that location. The flat areas between the cable events indicate backscatter signal which is suitable for LSA cursor placement, required to make splice loss measurements.

NOTE

The term *cable event* will be used throughout this section when referring to the combined event information at a given distance.

Figure 7-1 is a graphic representation of a smart splice template trace generated from the traces of three (3) fibers within a cable containing three (3) splice points. The representative trace for Fiber001 has one detectable event at splice point 2; Fiber002 has detectable events at splice points 1 and 2; and Fiber003 includes events at all three splice points. The resultant smart splice template shows three cable events. Note that the height of each

is representative of the frequency of the number of traces that have a detectable event at that location.

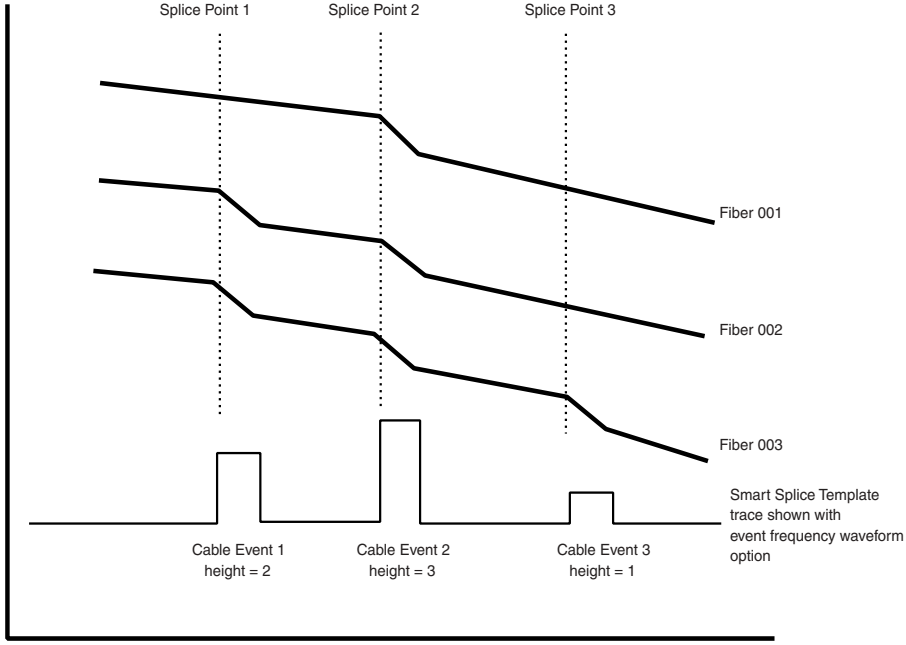


Figure 7-1: Smart Splice Template Trace

Smart splice template is the preferred method for obtaining a splice template. However, this process is not recommended for data sets containing less than 6 traces. Also, knowledge of the *build template* feature is still required as some templates may require event or LSA cursor modification.

The Smart Splice Template feature performs the following functions:

- Removes all events (except the end event) from the current primary trace.
- Estimates splice (connector) locations from the cable event information contained in the selected traces.
- Inserts an event for each estimated splice location into the primary trace.
- For each inserted event, sets the event start and end location, optimal LSA cursors for loss measurements, type (non-reflective, reflective, or grouped), loss, and loss mode (Splice Loss or 2-Point).
- Optionally replaces the *primary trace waveform* with a *cable event waveform*. The cable events shown are computed from the analysis tables stored in the individual traces, and the Number of Splices, Loss Threshold, and Min Frequency settings currently selected in the Smart Splice Template dialog box.
- Optionally prints a report with tabulated cable event information.
- Allows operator control over processing parameters and options.

CAUTION

Before beginning the smart splice template procedure, it is important to have a thorough understanding of the information in Appendix F.

7.1 Executing Smart Splice Template

1. Select a trace in the required direction and copy it, using Trace > Save As, into a new file that will become the smart splice template trace. It is recommended to give it an .sst extension.
2. Select **Trace**>**Add** to add the smart splice template trace to the trace list.
   a. In the Open dialog box it will be necessary to select All Files (*.*) in the *Files of type* field to view files with .sst extensions.
   b. Select the smart template trace and click **Open**. The trace will be added to the trace list.
3. Display the smart splice template trace as the *primary trace*.
4. Verify that the end event is positioned correctly. If not, set it to the correct location.
5. Select the cable's traces at the same wavelength and in the same direction to be processed to create the smart splice template trace (normally all such traces should be used).
6. Select **Trace**>**Smart Template** to display the Smart Splice Template dialog box shown in Figure 7-2.
7. Select the various options and set parameters as described in the following sections.
8. Click **OK** to run this feature.

NOTE

A splice template trace is required for each direction; therefore, *two* smart splice template traces must be created based on the traces in each direction.

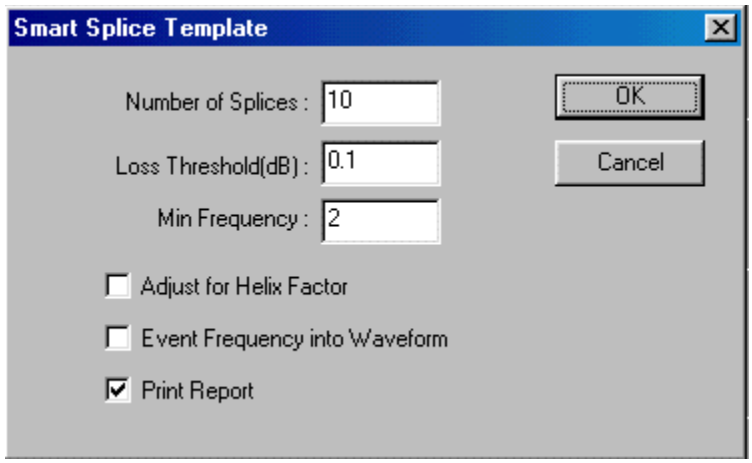


Figure 7-2: Smart Splice Template Dialog Box

7.2 Smart Splice Template Dialog Box

Number of Splices

This is the maximum number of events to be inserted into the primary trace. If the number of splices in the cable is known, enter the value; otherwise, enter a number greater than the possible number of splice points (20 or 25).

Loss Threshold(dB)

Only selected trace events with an absolute loss greater than or equal to this value will be processed. A value greater than the Analysis Loss Threshold is recommended as a larger loss reduces the probability that the event corresponds to noise. A value of 0.1 dB works well in most cases, as most splice points will have some splices that are 0.1 or greater.

Min Frequency

The minimum height (frequency) required for a cable event to be included in the smart template trace. Only events that occur with a frequency greater than or equal to the Min Frequency will qualify as an event in the splice template.

If the number of cable events that qualify is greater than N (Number of Splices set in the dialog box), NetWorks/OTDR will use the N cable events with the largest frequencies above the Min Frequency setting to create splice events and the rest will be discarded.

Adjust for Helix Factor

Select to automatically adjust event positions on each selected trace to compensate for the helix factor (See "Distance Helix Factor Adjustment Group Box" on page 102). When selected, event positions on each selected trace are automatically adjusted relative to where they would occur using the end of fiber distance from the template trace. In other words, as each trace is processed, it is expanded or contracted in proportion to the template trace.

Event Frequency into Waveform

Select to replace the primary trace waveform with an *event frequency waveform* (See Figure 7-3) which indicates the selected traces event distribution and frequency. (Refer to "Event Frequency Waveform"below for more information.)

NOTE

The event frequency waveform does not look like a fiber trace.

Print Report

Select to print a report which tabulates information on each cable event. (Refer to "Report Description" on page 89 for more information.)

7.3 Event Frequency Waveform

The Event Frequency Waveform is a waveform which indicates the selected traces' event distribution and frequency through the use of vertical bars called *cable events*. Each cable event also doubles as a template event so the smart template can be applied directly to the traces that were used to generate it.

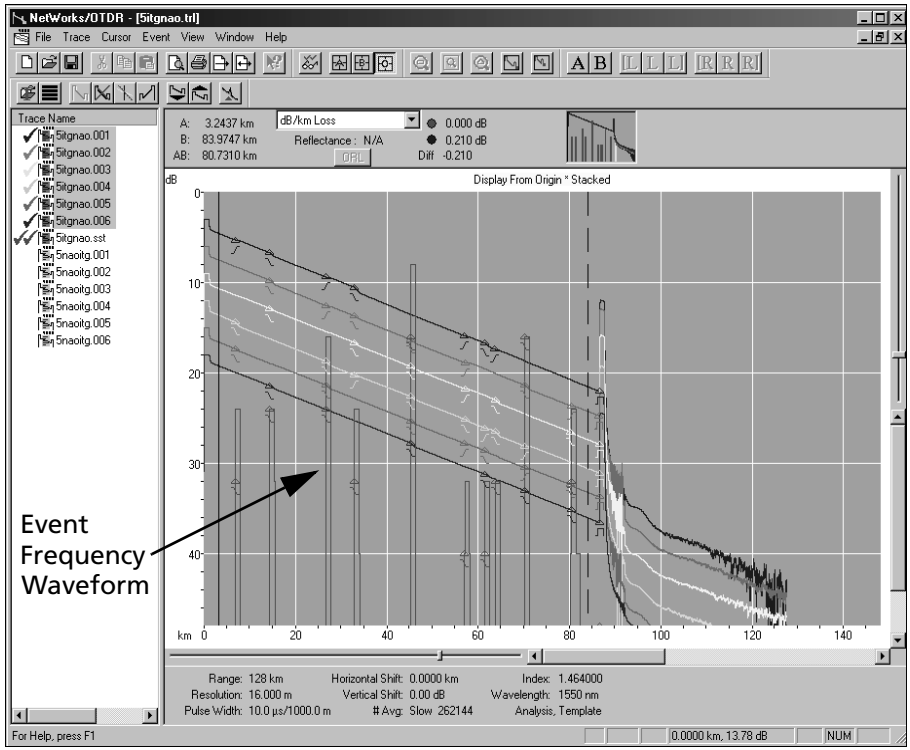


Figure 7-3: Trace Graph with Event Frequency Waveform Displayed

Each data point within a cable event represents the relative frequency of the occurrence of that data point in the selected traces' events. Only selected trace events with an absolute loss greater than or equal to the Loss Threshold are considered. Visually this representation appears as a vertical bar above the waveform base. A data point at base value indicates that no selected trace events above the threshold occur at that data point.

A higher cable event implies more traces in the set contain qualifying events at that relative position. A very low cable event might indicate a set of false events. Also, an extremely spread out (in distance) cable event can indicate two close but overlapping sets of events or a non-splice event overlapping a group of splice events.

The *cable event frequency* is the maximum data point frequency of all data points in the cable event. A cable event with no event symbol may be a missed splice or a false event which should be inspected (refer to "Report Description" on page 89).

Visual inspection of the event frequency waveform provides valuable information to validate the smart splice template trace event setup.

If a splice was missed, regenerate the smart splice template with either a lower Min Frequency or higher Number of Splices. Another alternative is to manually insert the splice event. (See "Updating Events" on page 95.)

After an acceptable smart splice template is generated, run the feature again with the original waveform and the *Event Frequency into Waveform* option *OFF*.

7.3.1 Event Insertion

Events (up to the Number of Splices set in the Smart Template dialog box) are inserted into the template for the cable events with the largest frequency above the Loss Threshold.

For each inserted event:

- The event start location is set to a location slightly inside the cable event, to more closely correspond to the actual splice location.
- The event end location is set to the end of the cable event.
- The LSA Cursors are calculated slightly offset and not overlapping any cable events with frequency at or above the Min Frequency.
- If there is insufficient data between two adjacent event to accurately calculate the splice loss then both event loss modes will be 2-Point Loss (which will result in a 2-Point Attenuation Corrected Loss Measurement in the *apply splice template* process).
- The event loss times 500 indicates the percentage of selected traces which have events at the cable event. (This is used for diagnostic purposes only.)

- If any of the events comprising a cable event is a reflective event, then the inserted event is reflective.
- If any of the events comprising a cable event is a grouped event, then the inserted event is grouped.

7.4 Report Description

The *Smart Splice Template Report* (Appendix C-8, "Smart Splice Template Report") contains extremely useful information for validating the generated *smart splice template trace*.

CAUTION

Never accept a smart splice template trace without reviewing this report.

The report contains 3 sections: Header, Cable Event Table, and Shortest/Longest Trace Table.

The Header Section shows the smart splice template trace filename, date, time, and Smart Splice Template dialog box settings.

The Cable Event Table shows the following information, reading from left to right, for each cable event:

- The Event Number (if an event was created) or NONE.
- Event Loss Mode (if an event was created): Splice Loss or 2-Point.
- Event Type (if an event was created) non-reflective, reflective, or grouped.
- Cable Event Location and Width in distance units.
- Cable Event Frequency.
- 3 sets of selected trace events that are part of the cable event:
  - Up to 3 trace events at the closest location.
  - Up to 3 trace events with the highest loss.
  - Up to 3 trace events at the farthest location.

If no event was created from a cable event then these trace events should be inspected to determine if the cable events correspond to a splice or a group of false events.

The Shortest/Longest Trace Table shows the length of the 10 shortest and 10 longest traces. The difference between the shortest and longest traces indicates the Helix Factor and also whether a fiber is broken or has an incorrect end event.

See “Generating a Smart Splice Template Trace” on page 136 for an example of the smart splice template feature.

7.5 Saving the Smart Splice Template Trace

After the smart splice template trace has been created in memory, *save the trace* into the smart splice template trace file. A smart splice template trace should be saved in T6 (CMA 5000/4500 OTDR) or T5 (CMA 4000/8800, TD-3000) format since T6 and T5 are the only formats that retains each events’ LSA cursor information.

8.0 Building a Splice Template Trace

NOTE

This chapter details the steps for manually building a Splice Template Trace. This process can be automated using the Smart Template feature described in “Smart Splice Template” on page 81.

A Splice Template Trace contains an event for each splice location and associates each with a unique set of LSA cursors.

Splices with low loss may not be detected in some fibers; therefore, if trace data from the fibers in a spliced cable is displayed, some traces will not have events at some splice locations.

To get an estimate of the loss of every splice in a cable's traces:

1. *Build* a Splice Template Trace.
2. *Apply* the Splice Template Trace (Chapter 9.0) to all traces taken in the same direction.

This procedure inserts events which are at splice locations into the target traces. If an event is added to a target trace, then a loss estimate is calculated using the event's unique LSA cursors.

NOTE

If splice losses are required for all splices in a set of bi-directional traces, then two separate splice template traces must be generated, one for each direction.

8.1 Selecting a Trace

The splice template trace should be a modified copy of a trace taken in the required direction. Ideally, the trace file with the most events should be used to build the template, and can be determined as follows:

NOTE

Setting up the Preferences>Display>Sort Mask to have these traces listed consecutively before doing this will make selection easier.

1. Select all a cable's traces taken in the same direction from the trace list pane.
2. Select **Trace>Batch Process**. The Batch Process dialog box will be displayed.
3. Select only "Show min/max event end distance, etc." then click **OK**. The Min/max events dialog box will indicate the traces with the minimum and maximum number of events and event end distances.

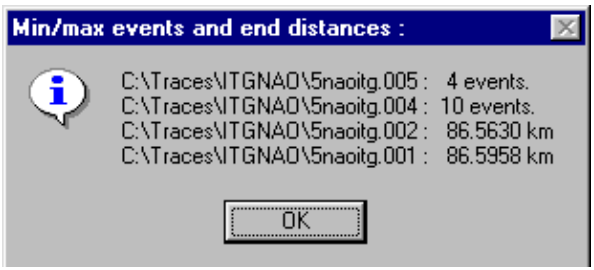


Figure 8-1: Min/max events and end distances Dialog Box

4. Note the minimum and maximum end distances. If these values are not close to the optical cable distance, there may be a fiber break or an incorrectly determined end. Also, if the cable has N splices, there should be at most, N+1 events, one for each splice, plus the end event. If a problem is suspected, inspect the trace(s), take the appropriate corrective action, and repeat this process.

   If the minimum and maximum end distances are "good", then the difference shows the effect of fiber coiling within the cable. The difference between the minimum and maximum fiber length could be as much as 2-3%. The difference in length between the straight and coiled cables is referred to as the Helix Factor.

5. Click **OK** to close the dialog box.
6. Copy the trace with the most events into a new trace file designated as the Splice Template Trace.

NOTE

Use a consistent DOS 8.3 or CMA 5000/4500 filename convention for Splice Template Traces. For example: STAAABBB.TRC indicates a Splice Template (ST) Trace from the AAA to BBB direction.

7. Add the newly created Splice Template Trace to the Trace List.

8.2 Splice Locations

After the Splice Template Trace has been created, it is important to set the location of all splices on this trace.

1. Generate a list of splice locations using one of the following methods:
   - Use Batch Display to sequentially graph up to 8 traces in the required direction, noting the unique event locations. Stacking the traces on the graph improves readability and the A cursor can be positioned to determine proper event alignment.

NOTE

Because of the Helix Factor, the same splice detected on different traces will be at approximately, but not exactly, the same location.

   - Use Batch Process to generate a report in ASCII format. This file contains event information for all the selected traces, one event per line. The event start distance value begins at character position 48 so the following DOS command may be used to sort the events by distance:

```
D:\> SORT /+48 <IN_FILE > OT_FILE
```

   - If the length of each cable span or section is known, then the optical distance for each splice can be estimated based on the Helix Factor.

2. Using the list of splice locations, reduce each location by a “slight” amount to improve span loss estimation. If the location of a Splice Template event occurs within the target trace knee, then the span loss estimate will be offset by the amount of loss from the start of the target event to the knee intercept location.

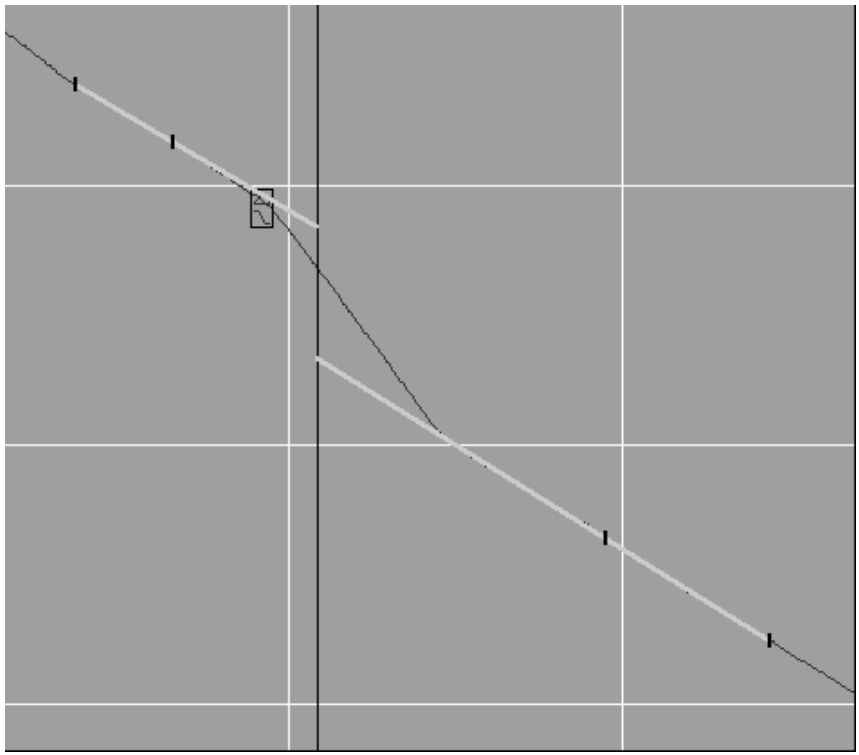


Figure 8-2

NOTE

Later, each Splice Template event's LSA cursors will be offset from the start and end of the event; therefore, the Splice Template event may be located within the knee of the target trace splice, but the LSA cursor offset will allow correct event loss estimation. This is shown in Figure 8-2.

Assume that the event start location in the above graph is at the interception of the A cursor with the trace. Since the LSA cursors are offset from the event, as long as the LSA cursors remain outside the knee, the Splice Loss estimate will still be accurate. The A cursor can be moved back and forth within the event knee and obtain about the same Splice Loss reading. However, if the span loss is computed from the intercept point to the start of the next event, the dB value at the start of the intercept point is not the same as the true start of the event, resulting in an incorrect span loss estimate.

8.3 Modifying the Splice Template Trace

Prior to modifying the Splice Template Trace events, it is necessary to:

1. Display only the splice template trace (which makes it the primary trace).
2. Select **Trace**>**Build Splice Template**. In the graph footer, the primary trace is now identified as a *template* trace.

Internally, a template trace is different from a non-template trace as each event has its own set of LSA cursors; this is crucial to the *Apply* Splice Template process. Also, when the template trace's new internal format is created, the Left and Right Splice Loss LSA cursors associated with each event are offset to the left and right, respectively.

8.3.1 Updating Events

The events in the splice template need to be updated to have one event at each splice location.

To update the events:

1. Delete any events which do not correspond to splice locations.
2. Move the events which are at splice points slightly to the left (decreased distance) as follows:
   a. Set the Loss Mode to **Splice Loss**.

b. Hold the mouse cursor over the first event symbol and double click the left mouse button. The Event window is displayed showing the first event.

c. Set the display Mode to **Display from A** and do not lock the A & B cursors.

d. In the Event window, click >>, then <<. This forces the A cursor to the first event location and displays the event's LSA cursor.

e. Using the horizontal and vertical trackbars, zoom in on the event.

f. In the Event window, click **Edit**.

g. In the Edit window slightly decrease the Start Distance and click **OK**.

3. Perform the following steps for each non-end event:

a. In the Event window, click **>>** (moves to the next event), and then **Edit**.

b. In the Edit Event window, slightly decrease the Start Distance and click **OK**.

4. Insert events into the trace for the missing splices as follows:

a. Move the A cursor to the approximate splice location.

b. Adjust the LSA cursors offset from the start and end event location, if required.

c. In the Event window, click **Insert**.

d. In the Edit Event window, slightly decrease the Start Distance and click **OK**.

NOTE

The end event location should be left unchanged if the “merge with trace priority” and “snap to trace end” options will be selected in the Apply Splice Template Dialog Box. (These options are only appropriate when the traces have low noise and the fibers' splices and ends are correctly detected.)

5. If the Splice Template end location is to be inserted into the target traces in the Apply Splice Template Dialog Box, decrease the end event location to less than the minimum trace end event location (so that the target end will not reside in the noise tail).

8.3.2 LSA Cursors

Inspect each event's LSA cursors:

1. In the Event window, repeatedly click **>>** until the first event is shown. Inspect the LSA cursors for this event, which should be positioned as follows:
   - The left LSA cursor is offset to the left of the start of the event.
   - The Right LSA cursor is offset to the right of the end of the event.
   - If the trace data has a high level of noise, lengthen the LSA cursors to obtain a better loss estimate (on application to the target traces).
   - LSA cursors should not overlap and should not be close to adjacent events.
2. If it is necessary to adjust and save an event's LSA cursors, continue with the following steps:
   a. Adjust the length and location of the LSA cursors by dragging the LSA cursor end tick mark or line segment with the mouse cursor.
   b. In the event window, click **Edit**.
   c. In the Edit Event window, click **Paste**, then click **OK**.

NOTE

Be sure to save the modified Splice Template trace back into its original file.

8.4 Saving the Template Trace

When a modified copy of the trace has been created in memory, save the modified trace into the Splice Template Trace File. A splice template trace should be saved in T6 (CMA 5000/4500 OTDR) or T5 (CMA 4000/8800, TD-3000) format as T6 and T5 are the only formats that retains each event's LSA cursor information.

If generating a Bi-Directional Report, a Splice Template Trace must be built for each direction. Because of the offset of the event start locations and the LSA cursors, Bi-Directional Splice Loss Traces will not be symmetrical.

9.0 Applying a Splice Template Trace

To get an estimate of the loss at each splice in each trace, the *splice template trace* must be applied to all the traces in the same direction, and the results saved back into each target trace. The trace event tables will be modified; therefore, it is advisable to backup the traces before starting.

For *bi-directional* traces, each of the two splice template traces must be applied to the traces in the same direction.

1. Display only the splice template trace as the primary trace.
2. Set up the **Preferences**>**Display** tab>**Sort Mask** to list the traces in the same direction consecutively.
3. In the trace list, select all traces in the same direction as the displayed splice template trace.
4. Select **Trace**>**Apply Splice Template**. The Apply Splice Template dialog box (Figure 9-1) is displayed

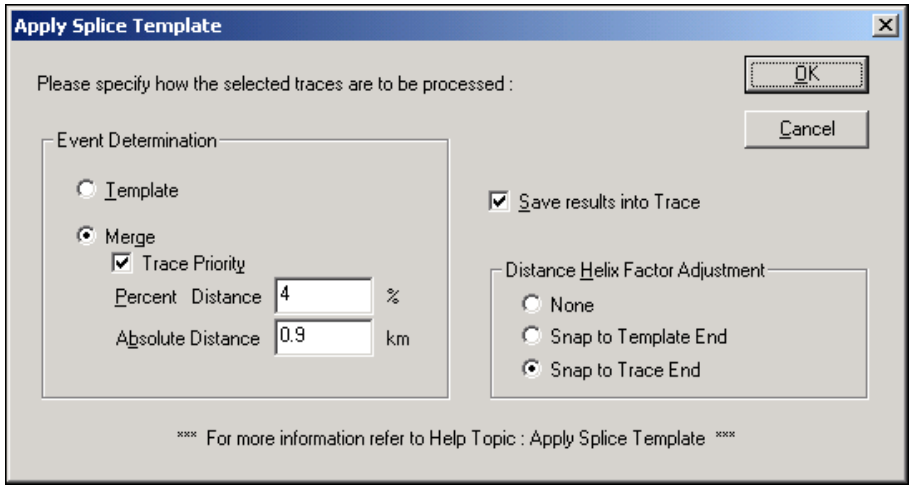


Figure 9-1: Apply Splice Template Dialog Box

5. Set the desired parameters in the Apply Splice Template dialog box and click OK. (See the following section, "Apply Splice Template Dialog Box", for an explanation of the options and controls within the dialog box.)

9.1 Apply Splice Template Dialog Box

The Apply Splice Template dialog box (Figure 9-1) allows selection of various settings and parameters that determine how traces are to be processed.

9.1.1 Save Results into Trace

Selecting "Save results into trace" will save the resultant target trace into the target trace file. This function ***permanently*** updates the trace file.

CAUTION

The apply splice template function has many warning messages. To view the warnings and take any corrective action necessary, it is recommended that results are not saved until after an apply with no save is performed.

9.1.2 Event Determination Group Box

The Event Determination group box controls how the splice template trace events will be applied to the original target trace.

Template Option Button

The Template option button *copies* the template trace events to the target trace, discarding the original target trace events.

Merge Option Button

The Merge option button *merges* the splice template and target trace events. This process merges correlated target trace events with the splice template events, inserts non-correlated splice template events, and leaves non-correlated target trace events unchanged.

Trace Priority Check Box

The Trace Priority check box gives the target trace event location priority over correlated events from the splice template when Merge is

selected. If selected, only non-correlated splice template events are inserted into the target trace, all other events are left unchanged.

If cleared, non-correlated splice template events are inserted into the target trace, correlated splice template events replace the correlating target trace events, and all other target trace events are left unchanged.

NOTE

Correlation of events is determined by the *correlation window* which is based on the Percent Distance and Absolute Distance settings. If more than one target trace Event falls within the correlation window of a splice template event, the closest event is considered correlated.

For each template non-end event that is propagated to the target trace, the target trace event's loss value is computed using the adjusted *template* event distance and LSA cursors.

"Table 9-1 Resultant Target Trace Events" shows examples of resultant target trace events for the three merge/priority states: Template On/Merge Off, Merge On/Trace Priority Off, Merge On/Trace Priority On.

Table 9-1 Resultant Target Trace Events

Template Trace Event Location	Target Trace Event Location	|<----------result----------\>|		
		Template=On	Merge=On Trace Priority = Off	Merge=On Trace Priority = On
10.0	NONE	10.0	10.0	10.0
20.0	20.1	20.0	20.0	20.1
NONE	30.1	NONE	30.1	30.1
40.0	40.1	40.0	40.0	40.1 <--------end event

Percent Distance and Absolute Distance

The Percent Distance and Absolute Distance define the size of the correlation window which determines how close together events must be to correlate.

The size of the window is defined to be:

MINIMUM (Percent ∗ Splice Template Event Distance, Absolute Distance).

9.1.3 Distance Helix Factor Adjustment Group Box

Events in the *splice template* trace and the *target* trace may not align perfectly due to the differences in length of the fibers within a single cable. Distance Helix Factor Adjust options compensate for the difference in length and also obtain improved splice location and loss estimation.

Select one of the three options:

None

The splice template and target trace event locations will be used as is, without Distance Helix Factor Adjustment.

Snap to Template End

All template event locations will be converted to proportional (relative to target end) target event locations prior to correlation. For example, if a template event is located at a distance which is 43.21% from the template end event location, then the location will be temporarily converted to a distance 43.21% from the target trace end event. After correlation, all events will be converted to proportional template end locations and stored in the target trace.

Snap to Trace End

All template event locations will be converted to proportional (relative to target end) target event locations prior to correlation and left as is after correlation.

The “Snap to” options should only be used if all traces have correct fiber end events.

9.2 Error Conditions

The Apply Splice Template process tests for and prompts for the following error conditions:

- The target trace is a template trace.
- Target trace number of averages ≤256.
- Template and target traces have different IORs.
- Template and target traces have different Pulse Widths.
- Template and target traces have significantly different (>2%) Horizontal Shifts.
- Merge requested but no target trace events.
- “Snap to” requested but no target trace events.
- Target trace has questionable end.
- Template end event to be inserted into target trace and template end event>target trace end event.
- Template LSA cursor overlaps a target trace event.
- Resultant target trace has no events.

10.0 Reports

NetWorks/OTDR can generate six different Report types:

• Trace Summary	A list of significant trace parameters
• Exception	A list of traces and events which exhibit selected exception criteria (e.g. no events)
• Bi-Directional Splice Loss	Bi-directional event correlation with average loss
• Bi-Directional Splice Loss Summary	A matrix of fibers versus splices with the average bi-directional splice loss shown
• 1-Directional Splice Loss Summary	A matrix of fibers versus splices with the splice loss shown for one direction
• Fiber Acceptance	Shows bi-directional average end-to-end loss, length, average event loss and ORL.

All reports are based on the traces selected in the trace list. Appendix C contains a sample of each of these reports generated from the example outlined in Chapter 12.0.

The Bi/1-Directional reports are generated for one wavelength at a time, either user-specified or at the wavelength of the first selected trace. These reports do not require that the traces have an event at every splice; however, if it is necessary to show the loss at each splice in the reports, then the *smart* or *build* splice template and *apply* splice template processes must be performed to have an event at every splice.

For the Bi-Directional and Fiber Acceptance reports, sort and select traces in the Trace List so that consecutive pairs of traces correspond to sequential fiber numbers.

For the 1-Directional reports, sort and select traces in the Trace List so that consecutive traces correspond to sequential fiber numbers for the same direction.

The Bi/1-Directional Splice Loss Summary Reports use the events in the currently displayed Primary Trace to define the location of each splice, therefore the appropriate splice template trace should be made the primary trace prior to generating these reports.

10.1 Printing or Previewing a Report

To print or print preview a report:

1. For a Bi/1-Directional Splice Loss Summary Report set the primary trace to the appropriate Splice Template Trace .
2. Select the traces to sequentially process from the Trace List. (It is important to select the required fiber number sequence.)
3. Select **File>Prin**t (or **Print Preview**). The Print/Preview dialog box shown in Figure 10-1 will be displayed.
4. Use the Top and Left Margin Offset fields to create blank space for a company header or 3 hole punch, if desired.
5. Select **Waveform in Color** to print trace in color, if desired.
6. Enter information in the Header Lines text box
7. Select the **Report** button, then click **OK**. The Report Specification Dialog Box shown in Figure 10-2 will be displayed.
8. Set the parameters in the Report Specification dialog box (See “Report Specification Dialog Box” on page 108), then click **OK** to print or preview the selected Report.

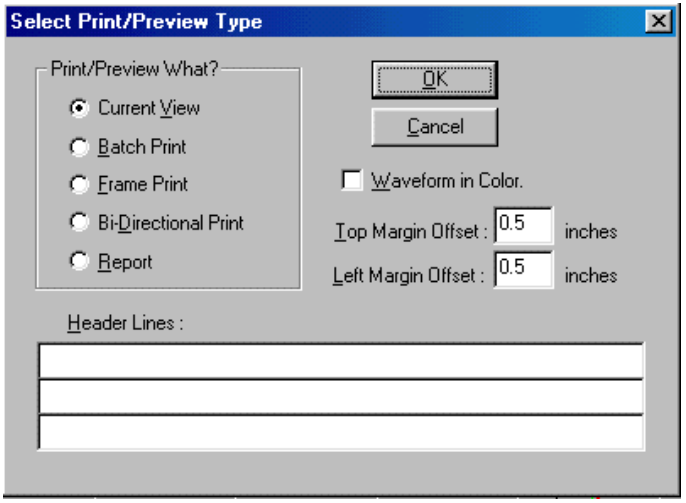


Figure 10-1: Select Print/Preview Type Dialog Box

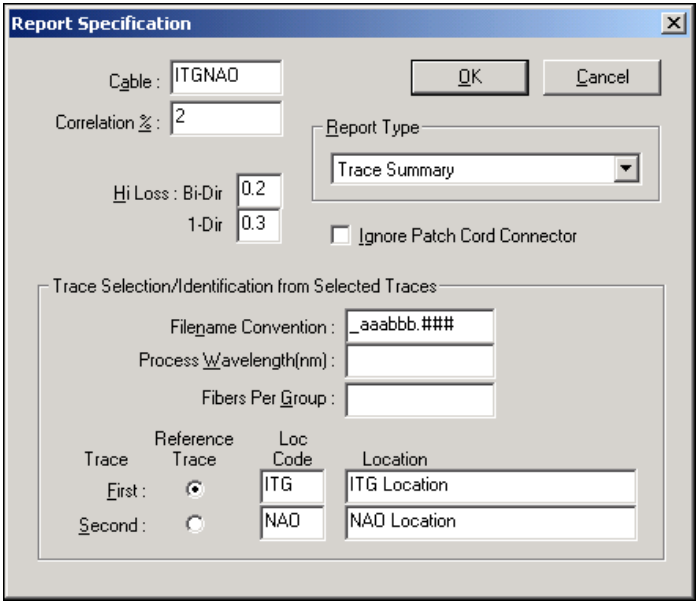


Figure 10-2: Report Specification Dialog Box

10.2 Report Specification Dialog Box

In the Report Specification dialog box, the following fields are copied directly into the various reports for informational purposes only: Cable name, Location Codes, and full Location Names.

Correlation %

In the Bi/1-Directional Splice Loss Summary Reports, the *primary trace* event locations define the *splice* locations. For these two reports, a selected trace event that *correlates* (with the specified %) with a primary trace event is assumed to be at the corresponding splice location and reported as such.

In the Bi-Directional Splice Loss Report, if a second trace event is the closest event within the correlation window distance to a first trace event, then the two events are assumed to be the same splice seen from each direction.

Hi Loss : Bi-Dir, 1-Dir

In the various reports, if a bi-directional event loss is greater than or equal to the Hi Loss : Bi-Dir value then the loss is shown with a bold font. Also, if a 1-directional event loss is greater than or equal to the Hi Loss : 1-Dir value, then the loss is shown with a bold font.

Ignore Patch Cord Connector

Select the **Ignore Patch Cord Corrector** checkbox to inhibit the display of Patch Cord Connector loss in the 1 and Bi-Directional Splice Loss Summary Reports.

10.2.1 Trace Selection/Identification Group Box

Filename Convention

This field is required if the CMA5000 Filename is not Enabled on the Preferences Display tab (See “CMA 5000/4500 Filename Group Box” on page 19 for details).

Enter text identical in format to the trace filename, using the following characters:

A indicates a From location code character
B indicates a To location code character
_ indicates a Wavelength character
# indicates a Fiber Number character

All other characters in this field will be ignored.

EXAMPLE For trace filename 5ITGNAO.001, enter _AAABBB.### in the Filename Convention field.

Process Wavelength(nm)

The Process Wavelength(nm) field value indicates the wavelength of the traces to be processed for Splice Loss Report generation. If the value is not specified then only the first selected trace wavelength will be processed.

Fibers Per Group

Enter a value of N to insert a blank line after fiber number N, 2N, 3N, etc. in the Bi/1-Directional Splice Loss Summary and Fiber Acceptance Reports.

EXAMPLE If N is 12, a blank line appears after fiber numbers 12, 24, 36, etc.

Loc Code and Location

The First Trace Loc Code (and Location) indicate the *from location code* (and *location description*) of the first trace in the trace list to be processed.

The Second Trace Loc Code (and Location) indicate the *to location code* (and *location description*) of the first trace in the trace list to be processed. This is equivalent to the *from location code* (and *location description*) of the traces taken in the opposite direction as the first trace to be processed.

Reference Trace Option Buttons

Select according to the following:

Report Type	Option Button Indicates:
1-Directional Splice Loss Summary	From Location Code of the Reference (primary) trace and all traces to be processed

Report Type	Option Button Indicates:
Bi-Directional Splice Loss Summary	Which trace (first or second) in each bi-directional pair that has the same From Location Code as the Reference (primary) trace.
Bi-Directional Splice Loss and Fiber Acceptance	Which trace (first or second) in each bi-directional pair to print first (reading from left to right) in the report.

10.2.2 Report Type Group Box

Select the Report type using the pull-down menu in the Report Type group box.

10.3 Exception Report Criteria Dialog Box

If the Exception Report type is selected in the Report Specification dialog box, an Exception Report Criteria dialog box (Figure 10-3) is displayed after OK is selected.

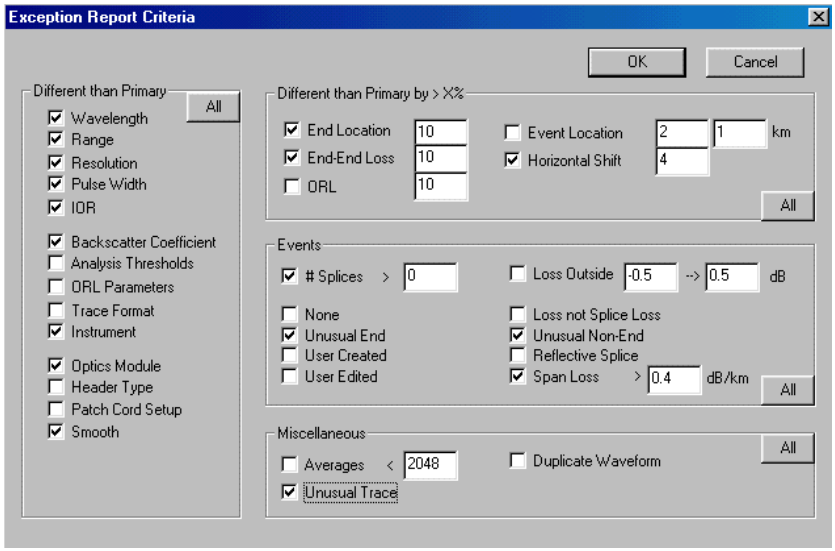


Figure 10-3: Exception Report Criteria Dialog Box

This dialog box contains four group boxes: Different than Primary, Different than Primary by > X%, Events, and Miscellaneous. Each contains several options available for selection; some require entering a parameter value.

NOTE

The Different than Primary and Different than Primary by >X% options are only available if a primary trace is displayed.

1. Select options individually or click **All** to select all options within each group box. When selected, All toggles to None. **None** clears all options.
2. Click **OK** to generate an Exception Report.

If an exception occurs, the trace filename, exception criteria, and complete exception information is printed in the Exception Report. For example, for an event related exception, the event location is printed.

Appendix C-2 contains an Exception Report example.

10.3.1 Different than Primary Group Box

An exception is reported if a selected option is different than that option for the displayed primary trace.

10.3.2 Different than Primary by > X% Group Box

Enter the desired percentage into each selected option to generate and report an exception if the selected trace parameter is different than the primary trace parameter value by more than X%.

The Event Location option also requires a distance value. For example, if the distance is set at Y km, an *event location exception* occurs for an event in a selected trace if the non-connector and non-end event location (which is greater than 0) is not within X% and Y km of any primary trace event location.

10.3.3 Events Group Box

The Events options do not require a primary trace.

An Unusual End exception occurs if a selected trace end event is Out of Range, Out of Distance, non-reflective, at an incorrect location on the waveform (eg., on a Fresnel), or the event loss is a gainer.

A User Edited exception occurs if an event is both User Edited and not User Created.

An Unusual Non-End exception occurs if an event is Grouped, Saturated, a Ghost event, or has a Questionable Loss or Rising Edge.

10.3.4 Miscellaneous Group Box

The Miscellaneous options do not require a primary trace.

An Unusual Trace exception occurs if the trace is Attenuated, Aborted, or resultant of a 2-Way Average or a Delta Compare (performed in the OTDR).

A Duplicate Waveform exception occurs if a trace has an identical waveform to a previously selected trace (in this case, the first trace with a duplicate waveform is reported).

10.4 Processing Start and End Patch Cords

When generating a report, the following information is important to the processing of Start (or Launch) and End Patch Cords and will be reflected in the Report:

- The first event with a location greater than or equal to 0 is assumed to be at a start patch cord if the trace has a horizontal shift less than 0 and the location is less than or equal to the minimum of 200 meters and (2% * end location).
- The end event is assumed to be at an end patch cord if the event loss is less than the fiber break threshold.

- In the Bi/1-Directional Splice Loss Summary Reports, if an event corresponds to a connector then the column of loss values for the event is labeled "CONN". Also, the fiber average, minimum, and maximum splice loss values do not include the connector losses.
- The End to End Loss values include or exclude the Start/End Patch Cord values as specified in the Preferences>Analysis tab.

10.5 Exporting a Report

NetWorks/OTDR can export Trace Summary, Bi/1-Directional Splice Loss Summary, and Fiber Acceptance Reports to an ASCII text file, with comma delimited fields, which can then be imported into a spreadsheet.

1. Display and select traces as if the report were to be printed.
2. Select **File>Export Report** and set up the Report Specification dialog box fields as described in “Report Specification Dialog Box” on page 108.
3. Click **OK** and specify the Export File name, then click Save.

Figure 10-4: Enter/select Export File Dialog Box

The export file format contains the same header information and tabular values as found in the printed report with the following differences:

- All table values corresponding to one trace or fiber will appear on one line, whereas the printed values may appear on two or more lines.
- For reports based on fiber number, the trace name(s) are appended at the end of each line of tabular values.

A Sample Bi-Directional Splice Loss Summary Export File follows:

'Bi-Dir Splice Loss Summary Report"
"NetTest NetWorks/OTDR - Version 3.0a"
"Cable : ITGNAO"
"Trace List : all.trl"
"Sample Traces"
"header line 2"
"header line 3"
"ITG <--> NAO"
"Utica Site ITG <--> Syracuse Site NAO"
"Correlation % : 4.00"
"Reference : stitgano.trc ITG --> NAO"
"Length : 86.6122 km"
"Wavelength(nm) : 1550"
"Splice Number / ITG --> NAO Loc(km) / NAO --> ITG Loc(km)"
".001".".002",".003",".004",".005",".006",".007",".008",".009",".010"
"Fiber",6.80,14.40,26.70,33.00,45.20,57.10,61.50,63.70,70.30,80.40,,,,End-
"Number",79.81,72.21,59.91,53.61,41.41,29.51,25.11,22.91,16.31,6.21,Avg,
Min,Max,End(dB),Trace,Trace
"001",0.05,0.28,0.04,0.10,0.12,0.07,0.06,0.05,0.02,0.01,0.08,0.01,0.28,18.4
7,"5itgnao.001","5naotig.001"
"002",0.01,0.09,0.04,0.04,0.06,0.07,0.04,0.04,0.04,0.11,0.06,0.01,0.11,17.9
8,"5itgnao.002","5naoitg.002"
"003",0,02,0.02,0.02,0.08,0.04,0.04,0.05,0.15,0.09,0.03,0.05,0.02,0.15,17.8
3,"5itgnao.003","5naoitg.003"
"004",0.07,0.24,0.04,0.14,0.04,0.03,0.10,0.10,0.06,0.05,0.09,0.03,0.24,18.1
1,"5itgnao.004","5naoitg.004"
"005",0.04,0.04,0.13,0.04,0.08,0.03,0.10,0.03,0.02,0.03,0.05,0.02,0.13,17,8
3,"5itgnao.005","5naoitg.005"
"006",0.02,0.13,0.02,0.03,0.05,0.02,0.07,0.03,0.12,0.02,0.05,0.02,0.13,17.9
9,"5itgnao.006","5naoitg.006"
"Average",0.04,0.13,0.05,0.07,0.07,0.04,0.07,0.07,0.06,0.04,0.06,,,18.03
"Min",0.01,0.02,0.02,0.03,0.04,0.02.0.04,0.03,0.02,0.01,,0.01,,17.83
"Max",0.07,0.28,0.13,0.14,0.12,0.07,0.10,0.15,0.12,0.11,,,0.28,18.47

10.6 Warning Messages

In generating or exporting any of the three Splice Loss or Fiber Acceptance Reports, a warning message will be displayed for the following conditions:

- No trace to process.
- No visible event.
- Number of averages ≥256.
- Questionable end.
- Different IORs.
- Different Wavelengths.
- Different Ranges.
- Different Resolutions.
- Different Pulse Widths.
- Different Fiber Types.
- Significantly different Horizontal Shifts.
- Significantly different Vertical Shifts.
- Significantly different end locations.

In generating any of the Bi/1-Directional Splice Loss Summary Reports, a warning message will be displayed for the following conditions:

- No second trace for the Bi-Directional Report.
- No splice (event) loss for a splice.
- A selected trace event does not correlate with a splice.

11.0 Automatic Splice Loss Report Wizard

Automatic Bi/1-Directional Splice Loss Summary Report Generation automatically generates a Bi or 1-Directional Splice Loss Summary Report from a set of selected traces. By using a wizard to set the various control and information parameters, one or more of the following optional functions may be performed:

1. Exception Report Print Preview.
2. Build Smart Splice Template for 1 or 2 directions.
3. Apply Smart Splice Template for 1 or 2 directions.
4. Bi or 1-Directional Splice Loss Summary Report Print Preview.

Since the user normally executes the above 4 steps individually to generate a Splice Loss Summary Report, this feature simplifies that process by starting with a set of selected traces (sorted in any order) and doing the following:

- The wizard allows the user to see the big picture and set up controls shared by the various steps, 1 time.
- Consecutively runs thorough the 4 steps, internally sorting the traces and temporarily setting up Primary Traces as required.
- If the required Smart Splice Template trace is not in the Trace List the wizard creates it from a selected trace and inserts it into the Trace List.
- Saves all updated traces from the Build and Apply features.

Also, in the Build Smart Splice Template for a Bi-Directional Report, since the wizard has access to a Smart Splice Template in both directions, any splice event in one direction that is not in the other direction, is inserted (after flipping) into the other direction. This feature results in an improved Template Trace, especially in the low count fiber trace situation.

The following comments apply to the traces to be processed:

- From the same cable, possibly bi-directional

- Same filename convention with a fiber number in the filename
- Shot with the same OTDR parameters
- Analyzed
- If patch cords were used they are either shifted out or automatically removed so the patch cord connector is just after 0 km.
- Remove or reshoot “bad” traces; e.g. corresponding to a broken fiber.

The Batch Process Remove Events feature (see “Remove Events” on page 78) may be used to automatically remove extraneous events located either before the patch cord connector or after the end of fiber. For example, if traces have a 1 km patch cord and the cable is 25 km long then remove events < 900m unshifted and > 26 km shifted.

WARNING

Since the Apply Smart Splice Template feature will automatically update the select trace files, be sure to backup the original trace files since the process may have to be repeated.

11.1 User Interface — Wizard

To execute the wizard, select the traces to be processed then from the toolbar, click one of the following buttons –

 for the Bi-Directional Report

 for the 1-Directional Report

The Automatic Bi/1-Directional Splice Loss Summary Wizard dialog is displayed, containing 4 tabs: General, Exception, Template, and Advanced.

11.1.1 General Tab

The General tab, shown below, contains 4 parameter groups: Required Processing, General Parameters, Printer Parameters, and Location Information.

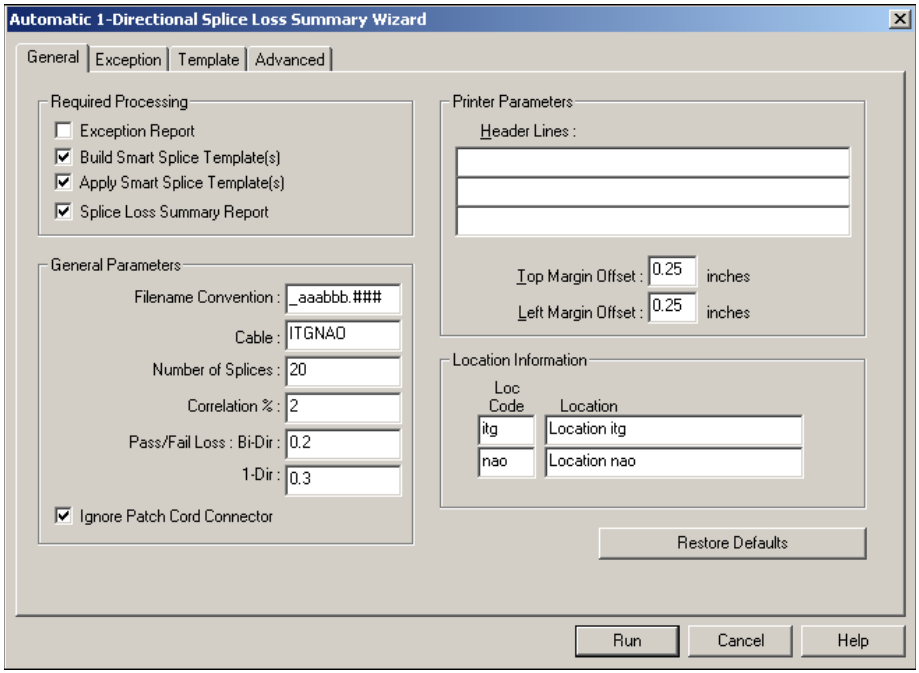


Figure 11-1: General Tab — Report Wizard

The Restore Defaults button sets all controls to a default setting.

11.1.1.1 Required Processing

Select any or all of the 4 processing steps to be performed: Exception Report, Build Smart Splice Template(s), Apply Smart Splice Template(s), and Splice Loss Summary Report. The reports are shown in Print Preview mode.

11.1.1.2 General Parameters

Filename Convention

This field is required if the CMA5000 Filename is not Enabled on the Preferences Display tab (see “CMA 5000/4500 Filename Group Box” on page 19).

Enter text identical in format to the trace filename, using the following characters:

A indicates a From location code character
B indicates a To location code character
_ indicates a Wavelength character
# indicates a Fiber Number character

All other characters in this field will be ignored.

EXAMPLE For trace filename 5ITGNAO.001, enter _AAABBB.### in the Filename Convention field.

Cable

This field identifies the cable and appears on the Splice Loss Summary Report.

Number of Splices

This is the maximum number of events to be inserted into the Smart Splice Template trace. If the number of splices in the cable is known, enter the value; otherwise, enter a number greater than the possible number of splice points.

Correlation %

In the Bi/1-Directional Splice Loss Summary Reports, the template trace event locations define the splice locations. For these two reports, a selected trace event that correlates (within the specified %) with a template trace event is assumed to be at the corresponding splice location and reported as such.

In the Bi-Directional Splice Loss Report, if a second trace event is the closest event within the correlation window distance to a first trace event, then the two events are assumed to be the same splice seen from each direction.

Pass/Fail Loss: Bi-Dir, 1-Dir

In the Splice Loss Summary reports, if a bi-directional event loss is greater than or equal to the Pass/Fail Loss: Bi-Dir value then the loss is shown with a bold font. Also, if a 1-directional event loss is greater than or equal to the Pass/Fail Loss: 1-Dir value, then the loss is shown with a bold font.

Ignore Patch Cord Connector

If selected then in the Splice Loss Summary reports, Patch Cord Connector losses are not shown.

11.1.1.3 Printer Parameters

Header Lines

The specified 3 Header Lines are shown in the header section of the Exception and Splice Loss Summary Reports.

Margins

The specified Top and Left margins define extra top and left page margins in the output reports.

11.1.1.4 Location Information

Loc Code and Location

Each Loc Code and Location line specifies a full Location Identification for the corresponding Filename Location Code. The full Location identifier appears in the output reports.

11.1.2 Exception Tab

The Exception tab contains the controls used to generate an Exception Report, with an added Restore Defaults button.

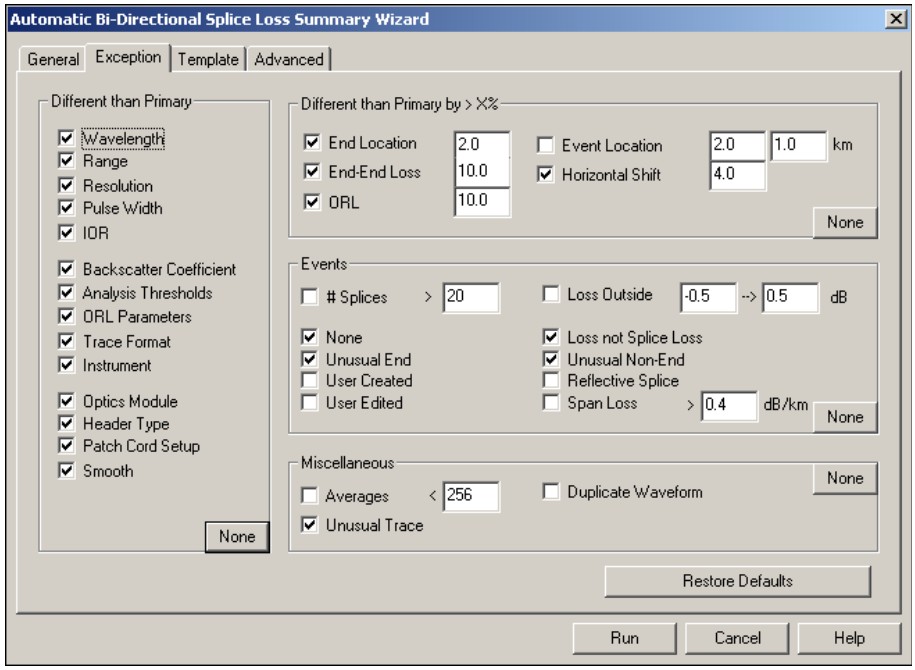


Figure 11-2: Exception Tab — Report Wizard

This dialog box contains four group boxes: Different than Primary, Different than Primary by > X%, Events, and Miscellaneous. Each contains several options available for selection; some require entering a parameter value.

Selected traces are compared to Exception Reference Trace which is the Primary Trace or if none, the first selected trace.

If an exception occurs, the trace filename, exception criteria, and complete exception information is printed in the Exception Report. For example, for an event related exception, the event location is printed.

Appendix C-2 contains an Exception Report example

11.1.2.1 Different than Primary Group Box

An exception is reported if a selected option is different than that option for the Exception Reference Trace.

11.1.2.2 Different than Primary by > X% Group Box

Enter the desired percentage into each selected option to generate and report an exception if the selected trace parameter is different than the Exception Reference Trace parameter value by more than X%.

The Event Location option also requires a distance value. For example, if the distance is set at Y km, an event location exception occurs for an event in a selected trace if the non-connector and non-end event location (which is greater than 0) is not within X% and Y km of any Exception Reference Trace event location.

11.1.2.3 Events Group Box

The Events options do not require an Exception Reference Trace.

An Unusual End exception occurs if a selected trace end event is Out of Range, Out of Distance, non-reflective, at an incorrect location on the waveform (e.g., on a Fresnel), or the event loss is a gainer.

A User Edited exception occurs if an event is both User Edited and not User Created.

An Unusual Non-End exception occurs if an event is Grouped, Saturated, a Ghost event, or has a Questionable Loss or Rising Edge.

11.1.2.4 Miscellaneous Group Box

The Miscellaneous options do not require an Exception Reference Trace.

An Unusual Trace exception occurs if the trace is Attenuated, Aborted, or resultant of a 2-Way Average or a Delta Compare (performed in the OTDR).

A Duplicate Waveform exception occurs if a trace has an identical waveform to a previously selected trace (in this case, the first trace with a duplicate waveform is reported).

11.1.3 Template Tab

The Template tab contains 2 parameter groups: Build Smart Splice Template and Apply Smart Splice Template.

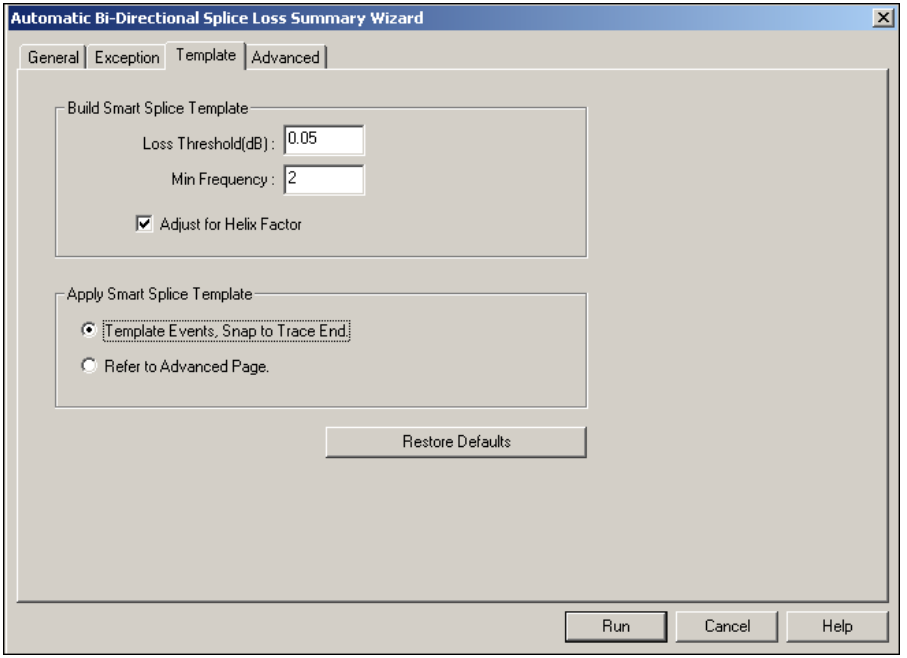


Figure 11-3: Template Tab — Report Wizard

The Restore Defaults button sets all controls to a default setting.

11.1.3.1 Build Smart Splice Template — Template Tab

Loss Threshold(dB)

Only selected trace events with an absolute loss greater than or equal to this value will be processed. A value greater than the Analysis Loss Threshold is recommended as a larger loss reduces the probability that the event corresponds to noise.

Min Frequency

The minimum height (frequency) required for a cable event to be included in the Smart Template Trace. Only events that occur with a frequency greater than or equal to the Min Frequency will qualify as an event in the Smart Splice Template.

If the number of cable events that qualify is greater than N (Number of Splices set in the General tab), NetWorks/OTDR will use the N cable events with the largest frequencies greater than or equal to the Min Frequency setting to create splice events and the rest will be discarded.

Adjust for Helix Factor

Select to automatically adjust event positions on each selected trace to compensate for the helix factor (See "Distance Helix Factor Adjustment Group Box" on page 102.). When selected, event positions on each selected trace are automatically adjusted relative to where they would occur using the end of fiber distance from the template trace. In other words, as each trace is processed, it is expanded or contracted in proportion to the template trace.

11.1.3.2 Apply Smart Splice Template — Template Tab

The Apply Smart Splice Template group allows the selection of either the usage of "Template Events, Snap to Trace End" or the more advanced parameters on the Advanced tab.

11.1.4 Advanced Tab

The Advanced tab contains the more advanced (and less commonly used) Build and Apply Smart Splice Template parameters, along with a Restore Defaults Button.

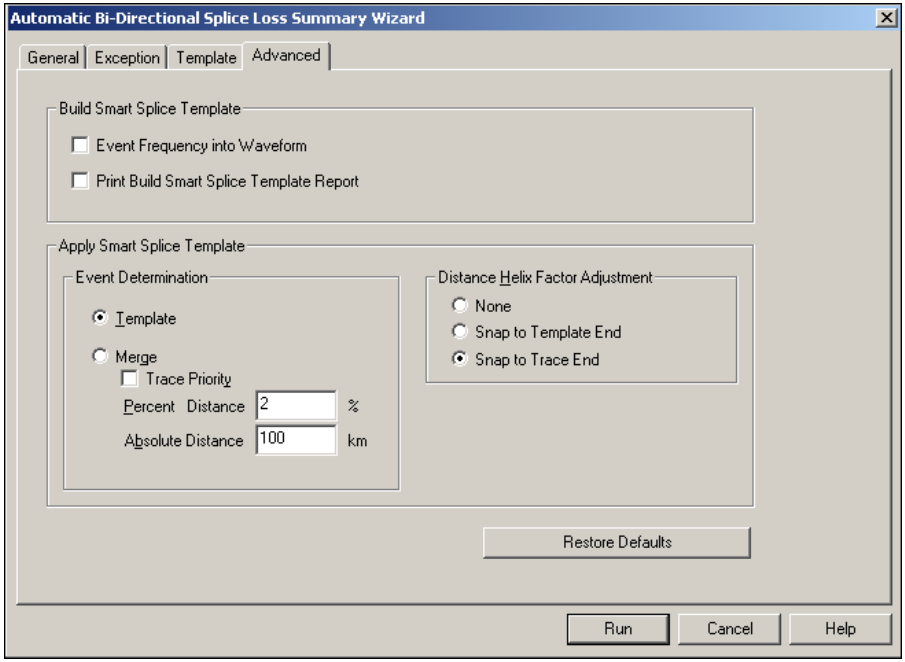


Figure 11-4: Advanced Tab — Report Wizard

11.1.4.1 Build Smart Splice Template — Advanced Tab

Event Frequency into Waveform
Select to replace the primary trace waveform with an event frequency waveform (See Figure 7-3) which indicates the selected traces event distribution and frequency. (Refer to Section 7.3 for more information.)

NOTE

The event frequency waveform does not look like a fiber trace.

Print Build Smart Splice Template Report
Select to print a report on the default printer which tabulates information on each cable event. (see “Report Description” on page 89 for more information).

11.1.4.2 Apply Smart Splice Template — Advanced Tab

The Apply Smart Splice Template group contains 2 group boxes: Event Determination and Distance Helix Factor Adjustment.

Event Determination Group Box

The Event Determination group box controls how the Splice Template Trace events will be applied to the selected target traces in the same direction.

Template Option Button

The Template option button copies the template trace events to the target trace, discarding the original target trace events.

Merge Option Button

The Merge option button merges the splice template and target trace events. This process merges correlated target trace events with the splice template events, inserts non-correlated splice template events, and leaves non-correlated target trace events unchanged.

Trace Priority Check Box

The Trace Priority check box gives the target trace event location priority over correlated events from the splice template when Merge is selected. If selected, only non-correlated splice template events are inserted into the target trace, all other events are left unchanged.

If cleared, non-correlated splice template events are inserted into the target trace, correlated splice template events replace the correlating target trace events, and all other target trace events are left unchanged.

NOTE

Correlation of events is determined by the correlation window which is based on the Percent Distance and Absolute Distance settings. If more than one target trace Event falls within the correlation window of a splice template event, the closest event is considered correlated.

For each template non-end event that is propagated to the target trace, the target trace event's loss value is computed using the adjusted template event distance and LSA cursors.

"Table 11-1 Resultant Target Trace Events" shows examples of resultant target trace events for the three merge/priority states: Template On/Merge Off, Merge On/Trace Priority Off, Merge On/Trace Priority On.

Table 11-1 Resultant Target Trace Events

Template Trace Event Location	Target Trace Event Location	|<----------result----------\>|		
		Template=On	Merge=On Trace Priority = Off	Merge=On Trace Priority = On
10.0	NONE	10.0	10.0	10.0
20.0	20.1	20.0	20.0	20.1
NONE	30.1	NONE	30.1	30.1
40.0	40.1	40.0	40.0	40.1 <--------end event

Percent Distance and Absolute Distance

The Percent Distance and Absolute Distance define the size of the correlation window which determines how close together events must be to correlate.

The size of the window is defined to be:

MINIMUM (Percent ∗ Splice Template Event Distance, Absolute Distance).

Distance Helix Factor Adjustment Group Box

Events in the splice template trace and the target trace may not align perfectly due to the differences in length of the fibers within a single cable. Distance Helix Factor Adjust options compensate for the difference in length and also obtain improved splice location and loss estimation.

- Select one of the three options:

None
The splice template and target trace event locations will be used as is, without Distance Helix Factor Adjustment.

Snap to Template End
All template event locations will be converted to proportional (relative to target end) target event locations prior to correlation. For example, if a template event is located at a distance which is 43.21% from the template end event location, then the location will be temporarily converted to a distance 43.21% from the target trace end event. After correlation, all events will be converted to proportional template end locations and stored in the target trace.

Snap to Trace End
All template event locations will be converted to proportional (relative to target end) target event locations prior to correlation and left as is after correlation.

The "Snap to" options should only be used if all traces have correct fiber end events.

11.2 Processing

After setting all required parameters, press the Run Button to sequentially run the selected required processing.

11.2.1 Exception Report

The wizard's Exception Report feature will use as a reference trace the Primary Trace or if there is no Primary Trace, the first selected trace. The report is displayed in Print Preview mode, from which it may be printed.

If there are exceptions then the user is given the option of preceding with or cancelling all other required processing.

11.2.2 Build Smart Splice Template

The wizard's Build Smart Splice Template feature is similar to the manual Build Smart Splice Template with the following additions:

- Error checks are performed on the selected traces to ensure filenames are valid and the required (and only the required) directions are present.
- 1 or 2 (for Bi-Directional) Smart Splice Template (SST) trace names are constructed from the selected traces by replacing the fiber number with the characters “SST”.
- If an SST trace is not in the Trace List then:
  - an SST trace file is created as a copy of the first selected trace in the required direction.
  - the SST trace filename is inserted into the Trace List.
- Upon completion of the build, the SST traces are saved.
- If 2 SST traces are built then any splice event from 1 SST trace not in the other SST trace is automatically inserted into the other. This improves the chances of finding all splices and is only available in this feature.

While the build executes, warning messages (such as different IORs) may appear which indicate a potential problem. Each warning type will appear only 1 time over all processed traces.

11.2.3 Apply Smart Splice Template

The wizard’s Apply Smart Splice Template feature is identical to the manual Apply Splice Template and performed in the 1 or 2 required directions. The appropriate SST Traces, which must be present in the Trace List, are used. All updated traces are saved.

While the apply executes, warning messages (such as different IORs) may appear which indicate a potential problem. Each warning type will appear only 1 time over all processed traces.

11.2.4 Splice Loss Summary Report

The wizard’s Bi or 1-Directional Splice Loss Summary Report is identical to the manually generated report (see Appendix C-4 and C-5) and shown

in Print Preview mode, from which it may be printed. The reference trace is the Smart Splice Template Trace for the first direction found.

While the report generation executes, warning messages (such as different IORs) may appear which indicate a potential problem. Each warning type will appear only 1 time over all processed traces.

11.2.5 Process Completion

Regardless of the required processing, the Trace List is in the same state as initially, except that in the Build Splice Template process, 1 or 2 SST traces may be inserted into the Trace List. All displayed trace views are updated.

12.0 Example

This chapter steps through an example of Report Generation using the traces found in the NetWorks/OTDR Sample Traces. The trace files 5ITGNAO.001-006 and 5NAOITG.001-006 are actual traces of six fibers on the Cable ITG-NAO. The example includes:

- Obtaining a Bi-directional Splice Loss Measurement
- Generating a Smart Splice Template Trace
- Building and Applying a Splice Template to target traces
- Generating Trace Summary, Exception, Bi-Directional Splice Loss, Bi-Directional Splice Loss Summary, 1-Directional Splice Loss Summary, and Fiber Acceptance Reports.
- Using the Automatic Splice Loss Report wizard.

NOTE

The procedures in these examples assume familiarity with NetWorks/OTDR program functionality.

Appendix C contains copies of the reports generated by these examples.

Set up for the example:

1. Copy the files from the NetWorks/OTDR sample traces folder into the directory X:\TRACES\ITGNAO.
2. Open NetWorks/OTDR and create a new trace list.
3. Insert the 12 ITGNAO trace files from X:\TRACES\ITGNAO into the new list.
4. Save the list as X:\TRACES\ITGNAO\ALL.TRL.

Approximate splice locations (in km optical distance units) for the cable:

ITG to NAO	NAO to ITG
6.8	79.8
14.4	72.1
26.7	59.9
33.0	53.6
45.2	41.3
57.1	29.4
61.5	24.9
63.7	22.8
70.3	16.3
80.4	6.1
86.5	86.5 <----------ends

12.1 Obtaining Bi-Directional Measurements

Perform the following steps to obtain Bi-Directional Splice Loss and 2-Point Attenuation Loss measurements on a pair of bi-directional traces:

1. Open the cable ITG-NAO Trace List, ALL.TRL, created in the prior section.
2. Display traces 5ITGNAO.001 (as primary trace) and 5NAOITG.001.
3. Set the Loss Mode to **Splice Loss** in the graph header.
4. Move the A cursor to approximately 26.6 km.
5. Click the toolbar icons: **Align**, **Flip**, and **Display from A**.
6. Zoom in.
7. Move the A cursor to 26.6266 km.
8. Set the B cursor at 27.9955 km.
9. Lengthen and offset the *primary trace* LSA cursors.

The NetWorks/OTDR window should now be very similar to Figure 12-1 and show the Splice Loss measurements at approximately:

5ITGNAO.001	-0.124
5NAOITG.001	0.229
Bi-Directional average	0.053

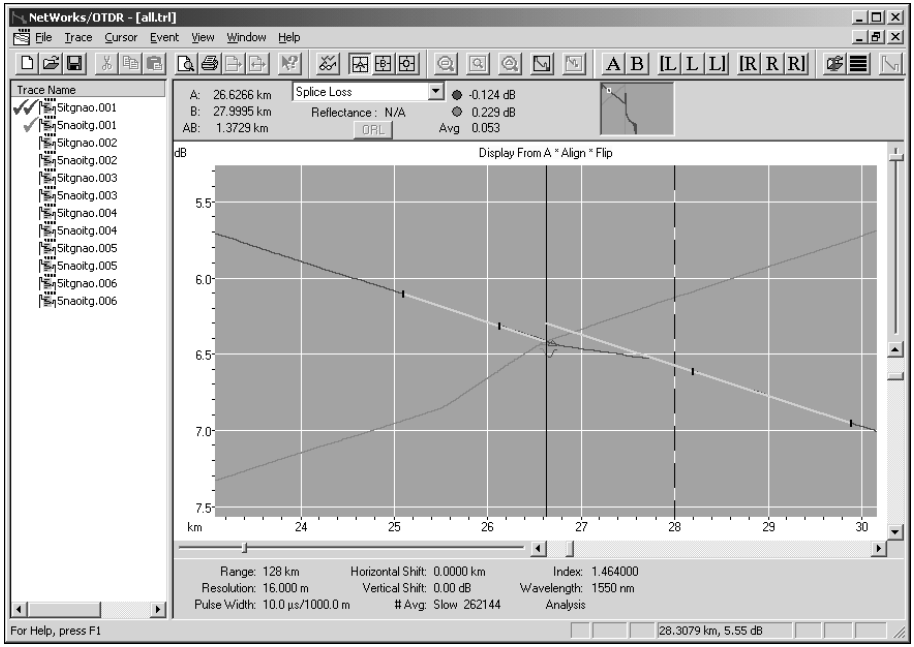


Figure 12-1: Bi-Directional Splice Loss Measurement Set-up

10. Set the Loss Mode to **2-Point Attenuation Corrected**.

11. The measurements should be approximately:

5ITGNAO.001	-0.120
5NAOITG.001	0.205
Bi-Directional average	0.042

The Splice Loss and 2-Point Attenuation Corrected measurements are close in value. A 2-Point Attenuation Corrected measurement should be used in place of splice loss measurement when the LSA cursors cannot be set up with enough data points to obtain an accurate measurement, such as when two splices are extremely close together.

12.2 Generating a Smart Splice Template Trace

Perform the following steps to generate a *smart splice template trace* from the sample traces 5ITGNAO.001 through 5ITGNAO.006.

1. Open the trace list ALL.TRL just created from the sample traces. See "Obtaining Bi-Directional Measurements" on page 134.
2. Select **Preferences**>**Display**, clear the Display tab Sort Mask Filename and Extension fields and click OK. The trace files for each direction will be grouped together.
3. Select trace file 5ITGNAO.001.
4. Select **Trace**>**Save As** and save the trace as 5ITGNAO.SST.
5. Select **Trace**>**Add** and add 5ITGNAO.SST to the trace list.
6. Display 5ITGNAO.SST as the primary trace and also display traces 5ITGNAO.001 through 5ITGNAO.006.
7. Select **Trace**>**Smart Splice Template** to display the Smart Splice Template dialog box.
8. Set up the dialog box as shown in Figure 12-2.

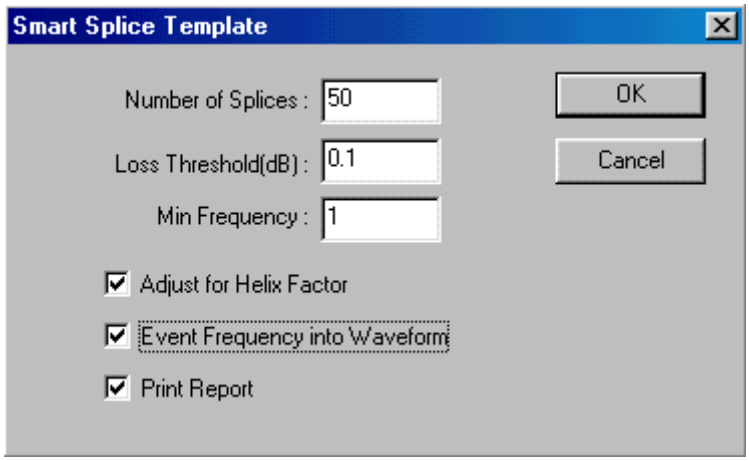


Figure 12-2: Smart Splice Template Dialog Box

NOTE

The minimum frequency is set to 1 as there are only six traces selected. When there is a large number of traces selected, the value should be larger.

9. Click **OK** to create the smart template trace, as shown in Figure 12-3.

The printed report is shown in Appendix C.

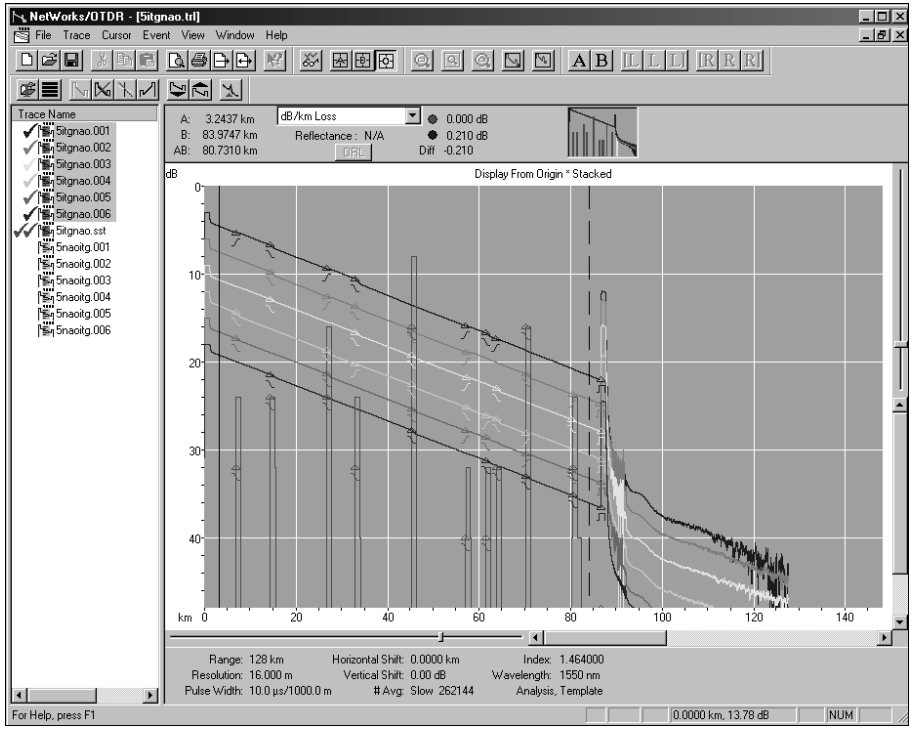


Figure 12-3: Smart Splice Template Trace

12.3 Building A Splice Template Trace

To build a Splice Template Trace, STITGNAO.TRC, for the ITG to NAO traces. with an event at each splice, perform the following procedure:

1. Open the ITGNAO trace list, ALL.TRL.
2. Select **Trace>Preferences>Display**.
3. Clear the Sort Mask and click **OK**. The trace list now shows all the ITG to NAO traces, fibers 1 through 6, followed by the NAO to ITG traces, fibers 1 through 6.
4. Select and plot the first six traces.

5. Select **View>Stack Traces**. Note that each trace has its own unique set of events and no single trace has events for all splices. Drag the A cursor from left to right to determine the detection of each splice over the traces and the absence of any extraneous non-splice events.
6. Set the **Display Mode** to **Anywhere**, then zoom in on the primary trace end. Observe that all fiber ends are correctly detected.
7. Hide the currently displayed traces and repeat the previous steps to plot the next six traces (from the other direction). Again, note that all splices are not detected in any one trace, the absence of non-splice events, and good fiber end detection.
8. Determine which traces for each direction have the most events, as the splice template traces will be created from the traces having the most events to minimize event insertion for splices not detected.
   a. Select the six ITG to NAO traces.
   b. Select **Trace>Batch Process**.
   c. Shut off all options in the Batch Process dialog box, except for "Show min/max event end distance, etc", then click **OK**.

   A pop-up dialog box will be displayed showing trace 5ITGNAO.004 has the most events, nine.

   d. Repeat Steps a-c for the six NAO to ITG traces and the display will show trace 5NAOITG.004 has the most events, ten.
9. Create the splice template files STITGNAO.TRC and STNAOITG.TRC as copies of the traces 5ITGNAO.004 and 5NAOITG.004, respectively. Add these two files to the trace list.
10. Hide all currently displayed traces and display STITGNAO.TRC. Internally, a splice template trace is different from a non-template trace as each event has its own set of LSA cursors. At this point STTGNAO.TRC is not internally a template trace, its just a copy of 5ITGNAO.004.

11. Select **Trace**>**Build Splice Template** to make STITGNAO.TRC a splice template trace. In the graph footer, the *primary trace* is now identified as a *template trace*.
12. Update the events in STITGNAO.TRC so there is one event at each splice. First, the current events which are at splice points must be edited to the splice locations.
    a. Set the loss mode to **Splice Loss** and do not lock the A & B cursors.
    b. Place the cursor over the first event symbol and double click. The Event window is displayed showing the first event.
    c. Set the Display Mode to **Display from A**.
    d. Press **>>** then **<<** in the Event window. This action forces the A cursor to the first event location and displays the event's LSA cursors.
    e. Zoom in on the event using the horizontal and vertical trackbars.
    f. Click **Edit** in the Event window and change the Start Distance from 6.9296 to 6.8 km in the Edit window.
    g. Click **OK**.
13. Perform the following steps for the each splice event at locations 26.7, 33.0, 45.2, 57.1, 61.5, 63.7, and 70.3:
    a. Click **>>** in the Event window, and then Edit.
    b. Change the Start Distance to the appropriate splice location value in the Edit window and click **OK**.
14. Insert 2 events into the template trace for the missing splice events at 14.4 and 80.4 km as follows:
    a. Move the A cursor to approximately 14.4 km.
    b. Click **Insert** in the Event window.
    c. In the Edit Event window, change the Start Distance to 14.4 and click **OK**.

d. Repeat Steps 14 a-c to insert an event at 80.4 km.

The end event location is unchanged because in the Apply Splice Template dialog box the “merge with trace priority” and “snap to trace end” options will be selected (because the traces have low noise and the fibers' splices and ends are correctly detected).

15. Inspect each event's LSA cursors. In the Event window, repeatedly click >> until the first event is shown. Inspect the LSA cursors for this event, which should be positioned as follows:
    - The *left* LSA cursor is offset to the left of the start of the event.
    - The *right* LSA cursor is offset to the right of the end of the event.
    - If the trace data has a high level of noise, you should lengthen the LSA cursors to obtain a better loss estimate (on application to the target traces).
    - Ensure that the LSA cursors do not overlap and are not close to adjacent events.
16. Repeat Step 15 for each event.

NOTE

This process has modified only a memory copy of the trace; it is very important to perform the next two steps to save the modified trace into the trace file, STITGNAO.TRC.

17. Select STITGNAO.TRC in the trace list.
18. Select **Trace**>**Save**.

The setup of STITGNAO.TRC is complete and the trace should be hidden. The setup of STNAOITG.TRC is analogous, so the details will be omitted.

12.4 Applying a Splice Template Trace

To obtain for each trace an estimate of the loss at each splice, you must apply the splice template trace to all the traces in the same direction, saving the results back into each target trace. Since the trace event tables will be modified, it is better to apply the Splice Templates in a working directory or backup the traces before starting.

1. Display only STITGNAO.TRC so that it is the primary trace.
2. In the trace list, select traces 5ITGNAO.001 through 006.
3. Select **Trace**>**Apply Splice Template**.
4. Set up the Apply Splice Template dialog box as shown in Figure 12-4.

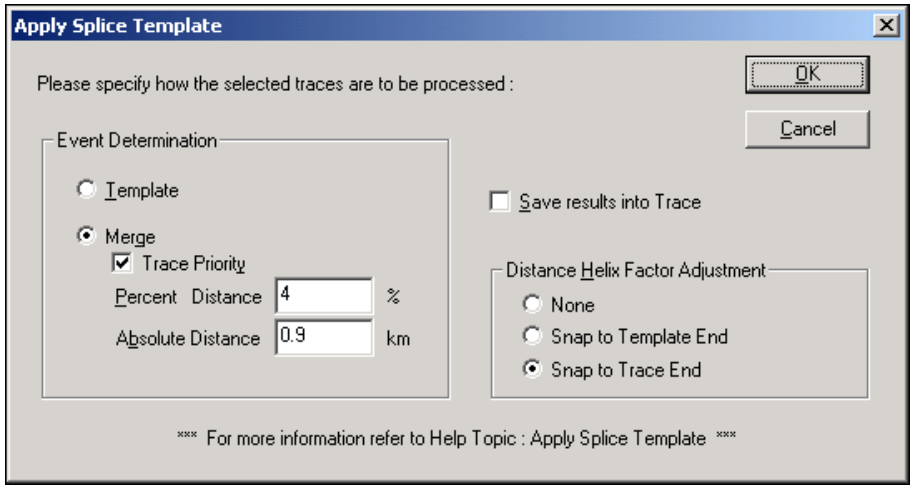


Figure 12-4: Apply Splice Template Dialog Box

The *trace* and *template* events will be merged. Trace Priority is enabled, therefore if a *target* trace event correlates with a *template* event (is within minimum of 4% x distance of the template event and 0.9km), then the trace event will stay intact and the template event discarded.

Also, the s*plice template trace events* will be adjusted to a location the same relative distance from the *trace end*; i.e., if a template event is located 20.15% from the template end event, then prior to correlation its distance will be adjusted to 20.15% from the target trace end event.

NOTE

Apply the splice template initially *without* updating the target traces to determine potential problems.

5. Click **OK** to apply the splice template *without saving the traces*. The warning in Figure 12-5 may now appear indicating that the event at 80.4197 on trace 5ITGNAO.003 overlaps a template LSA cursor.

Figure 12-5: Warning Dialog

6. Look at the *template event* at 80.4 km LSA cursor, while in Display from A mode, using the Event window >> button.
7. Display trace 5ITGNAO.003 and double click its event at 80.4197 to display the event in the Event window.
8. Click **Edit** and note the event end distance is 82.402 km which overlaps the *template right* LSA cursor, then click Cancel.
9. Shift the template right LSA cursor a little to the right, then double click the template event symbol.
10. Click **Edit** in the Event window.

11. Click **Paste**, then **OK**, in the Edit Event window to update the event's LSA cursor.
12. Select the *splice template trace* and save it.
13. Hide 5ITGNAO.003, select the 6 5ITGNAO traces and apply the splice template again (with no save). There should be no warnings.
14. Apply the splice template *with* the "**Save results into Trace**" option *selected*.

Repeat Steps 1-16 above, applying the STNAOITG.TRC Splice Template Trace to the six 5NAOITG Traces.

12.5 Generating Reports

To begin report generation:

1. Select **File**>**Preferences**>**Display** and enter the following:

Sort Mask File Name	2222222
File Extension	111

2. Click **OK**.

   The trace list now displays the traces in fiber number sequence so each pair of traces correspond to a bi-directional pair, e.g. 5ITGNAO.001 and 5NAOITG.001. (Bi-Directional and Fiber Acceptance Report Generation require this pairing sequence.)

3. Display only the trace STITGNAO.TRC (which is required for the Bi/1-Directional Splice Loss Summary Reports).
4. Continue with the following procedures to generate each type of report.

12.5.1 Trace Summary Report

1. Select the 12 traces 5ITGNAO.001 through 5NAOITG.006.
2. Select **File**>**Print Preview**. The Select Print/Preview Type dialog box will be displayed.

3. Select **Report** then click the **OK** button.
4. Set up the Report Specification dialog box as shown in Figure 12-6.

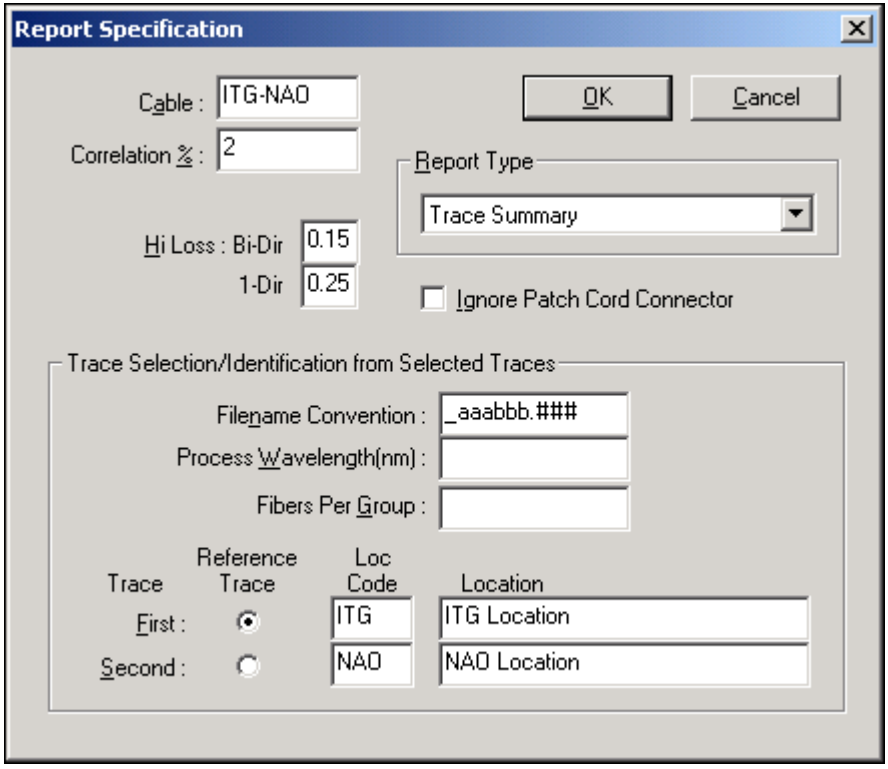


Figure 12-6: Report Specification Dialog Box

5. Click **OK** to preview the Trace Summary Report.
6. Click **Print** in the Preview window to print the report.

12.5.2 Exception Report

1. Display only trace 5ITGNAO.001 so it is the *primary trace*.
2. Select the 12 traces 5ITGNAO.001 through 5NAOITG.006.

3. Select **File>Print Preview**. The Select Print/Preview Type dialog box will be displayed.
4. Select **Report** and click **OK**.
5. Using the same Report Specification dialog box parameters previously shown, select the Exception Report. The Exception Report Criteria dialog box will be displayed.
6. Set up the Exception Report Criteria dialog box as shown in Figure 12-7.

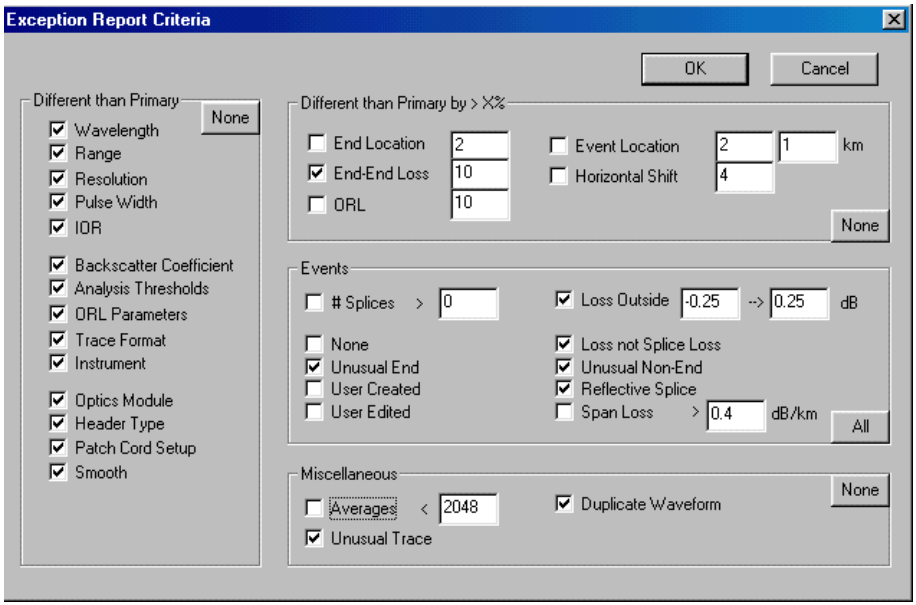


Figure 12-7: Exception Report Criteria Dialog Box

7. Click **OK** to Preview the report (See Appendix C-2).

12.5.3 Bi-Directional Splice Loss Report

1. Select the 12 traces 5ITGNAO.001 through 5NAOITG.006.
2. Select **File**>**Print Preview**. The Select Print/Preview Type dialog box is displayed.
3. Select **Report** then click **OK**.
4. Using the Report Specification dialog box parameters shown in Figure 12-6, select the **Bi-Dir Splice Loss Report**.
5. Click **OK** to preview the report.

Note and ignore the warning message about different ranges.

12.5.4 Bi-Directional Splice Loss Summary Report

1. Display only trace STITGNAO.TRC.
2. Select the 12 traces 5ITGNAO.001 through 5NAOITG.006.
3. Select **File**>**Print Preview**. The Select Print/Preview Type dialog box is displayed.
4. Select **Report** then click **OK**.
5. Using the Report Specification dialog box parameters shown in Figure 12-6, select the **Bi-Dir Splice Loss Summary Report**.
6. Click **OK** to Preview the report.

12.5.5 1-Directional Splice Loss Summary Report

1. Display only trace STITGNAO.TRC.
2. Select the 6 ITG to NAO traces, 5ITGNAO.001 through 5ITGNAO.006.
3. Select **File**>**Print Preview**. The Select Print/Preview Type dialog box is displayed.
4. Select **Report** then click **OK**.
5. Using the same Report Specification dialog box parameters shown in Figure 12-6, select the **1-Dir Splice Loss Summary Report**.

6. Click **OK** to preview the report.

12.5.6 Fiber Acceptance Report

1. Select the 12 traces 5ITGNAO.001 through 5NAOITG.006.
2. Select **File**>**Print Preview**. The Select Print/Preview Type dialog box is displayed.
3. Select **Report** then click **OK**.
4. Using the same Report Specification dialog box parameters shown in Figure 12-6, select the **Fiber Acceptance Report**.
5. Click **OK** to preview the report.

This example used just six fibers from a cable, but the effort and time required for a larger fiber count cable would be about the same.

12.6 Automatic Splice Loss Report Wizard Example

Perform the following steps to generate a Bi-Directional Splice Loss Summary Report from the original sample traces:

1. Open a new Trace List and add the sample traces 5ITGNAO.001-6 and 5NAOITG.001-6.
2. The Trace List may be sorted in any order.
3. Select all 12 traces.
4. Click  to display the Bi-Directional Splice Loss Summary Wizard.
5. Set up the Wizard controls as shown in Figure 12-8 through Figure 12-11.

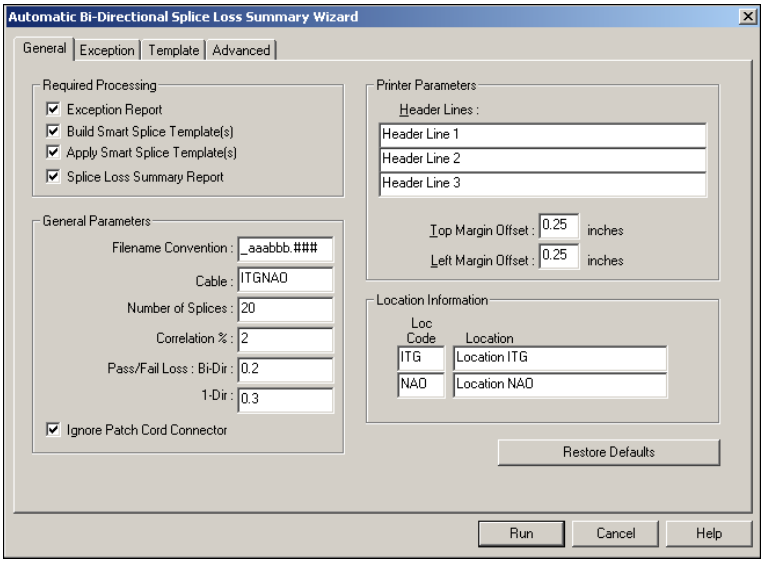


Figure 12-8: Wizard General Tab

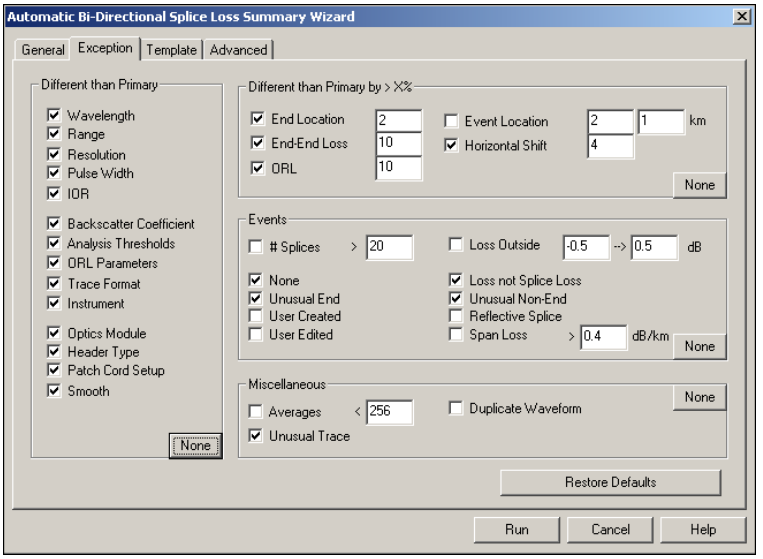


Figure 12-9: Wizard Exception Tab

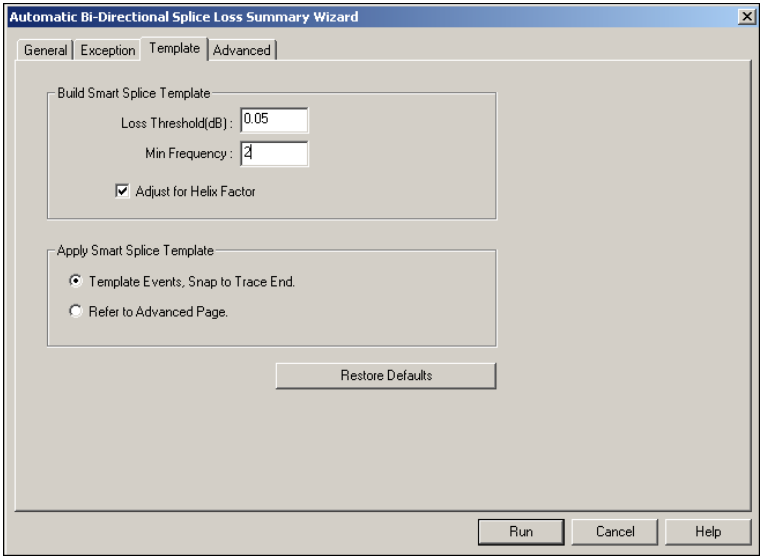


Figure 12-10: Wizard Template Tab

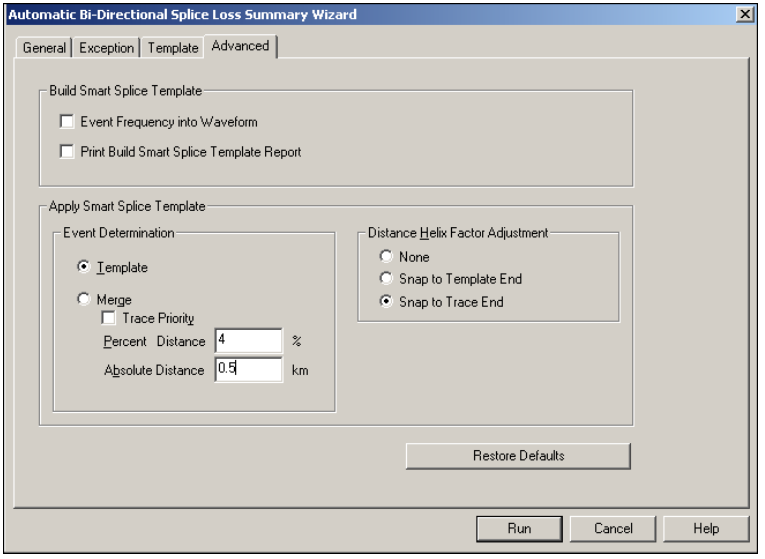
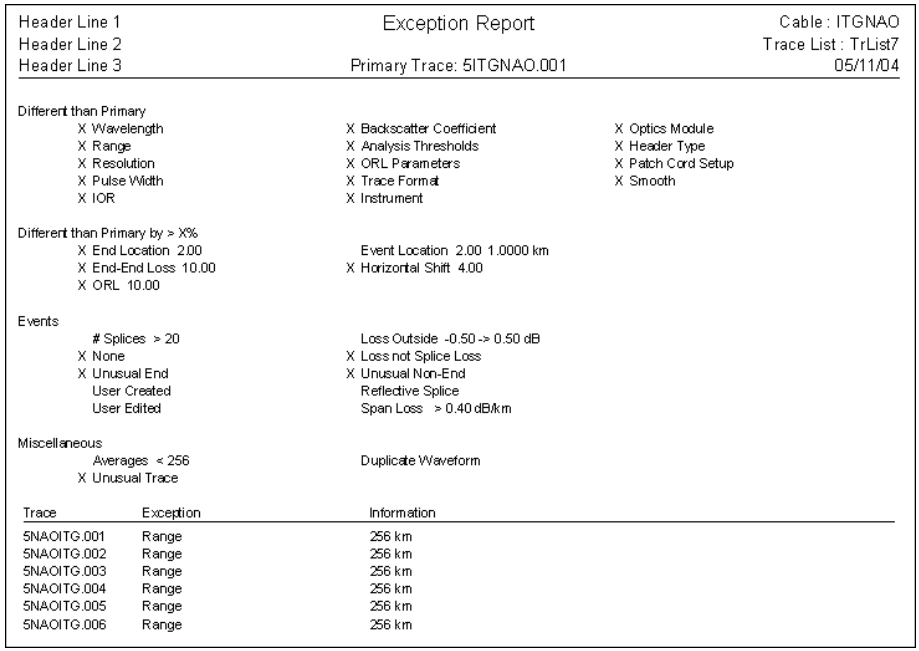


Figure 12-11: Wizard Advanced Tab

6. Click **Run**.
7. The Exception Report will appear as shown in Figure 12-12 in Print Preview mode.



Header Line 1 — Exception Report — Cable : ITGNAO
Header Line 2 — Trace List : TrList7
Header Line 3 — Primary Trace: 5ITGNAO.001 — 05/11/04

Different than Primary
X Wavelength, X Range, X Resolution, X Pulse Width, X IOR
X Backscatter Coefficient, X Analysis Thresholds, X ORL Parameters, X Trace Format, X Instrument
X Optics Module, X Header Type, X Patch Cord Setup, X Smooth

Different than Primary by > X%
X End Location 2.00
X End-End Loss 10.00
X ORL 10.00
Event Location 2.00 1.0000 km
X Horizontal Shift 4.00

Events
Splices > 20
X None
X Unusual End
User Created
User Edited
Loss Outside -0.50 -> 0.50 dB
X Loss not Splice Loss
X Unusual Non-End
Reflective Splice
Span Loss > 0.40 dB/km

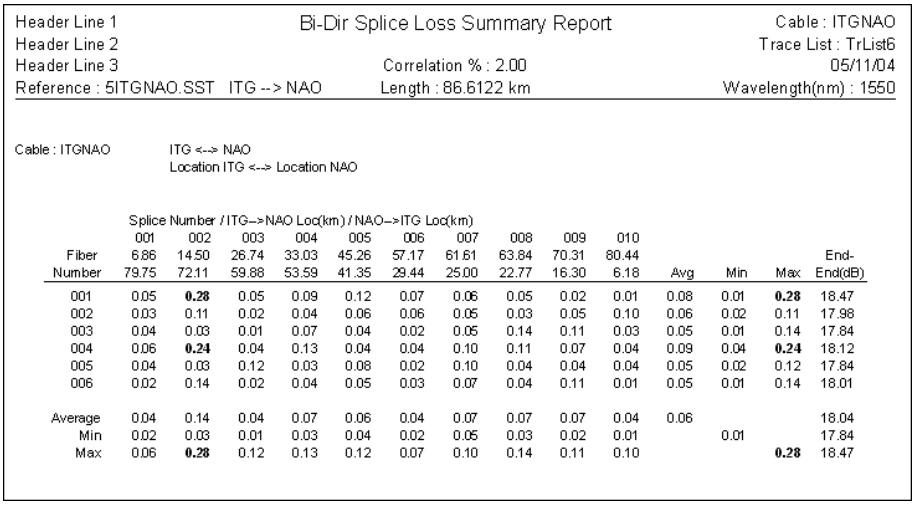
Miscellaneous
Averages < 256
X Unusual Trace
Duplicate Waveform

Trace	Exception	Information
5NAOITG.001	Range	256 km
5NAOITG.002	Range	256 km
5NAOITG.003	Range	256 km
5NAOITG.004	Range	256 km
5NAOITG.005	Range	256 km
5NAOITG.006	Range	256 km

Figure 12-12: Exception Report Example

8. Close the Print Preview window.
9. Select **Yes** to continue.
10. Since the exceptions are minor, when asked whether to proceed, click **OK**. The Smart Splice Template for each direction is built and then applied.
11. The Bi-Directional Splice Loss Summary Report will appear with a Warning dialog.

12. Select **OK** in the Warning dialog. The bi-directional splice loss data is added to the report as shown in Figure 12-13.



Header Line 1 — Bi-Dir Splice Loss Summary Report — Cable : ITGNAO
Header Line 2 — Trace List : TrList6
Header Line 3 — Correlation % : 2.00 — 05/11/04
Reference : 5ITGNAO.SST ITG --> NAO — Length : 86.6122 km — Wavelength(nm) : 1550

Cable : ITGNAO
ITG <--> NAO
Location ITG <--> Location NAO

Splice Number / ITG–>NAO Loc(km) / NAO–>ITG Loc(km)

Fiber Number	001 6.86 79.75	002 14.50 72.11	003 26.74 59.88	004 33.03 53.59	005 45.26 41.35	006 57.17 29.44	007 61.61 25.00	008 63.84 22.77	009 70.31 16.30	010 80.44 6.18	Avg	Min	Max	End-End(dB)
001	0.05	**0.28**	0.05	0.09	0.12	0.07	0.06	0.05	0.02	0.01	0.08	0.01	**0.28**	18.47
002	0.03	0.11	0.02	0.04	0.06	0.06	0.05	0.03	0.05	0.10	0.06	0.02	0.11	17.98
003	0.04	0.03	0.01	0.07	0.04	0.02	0.05	0.14	0.11	0.03	0.05	0.01	0.14	17.84
004	0.06	**0.24**	0.04	0.13	0.04	0.04	0.10	0.11	0.07	0.04	0.09	0.04	**0.24**	18.12
005	0.04	0.03	0.12	0.03	0.08	0.02	0.10	0.04	0.04	0.04	0.05	0.02	0.12	17.84
006	0.02	0.14	0.02	0.04	0.05	0.03	0.07	0.04	0.11	0.01	0.05	0.01	0.14	18.01
Average	0.04	0.14	0.04	0.07	0.06	0.04	0.07	0.07	0.07	0.04	0.06			18.04
Min	0.02	0.03	0.01	0.03	0.04	0.02	0.05	0.03	0.02	0.01		0.01		17.84
Max	0.06	**0.28**	0.12	0.13	0.12	0.07	0.10	0.14	0.11	0.10			**0.28**	18.47

Figure 12-13: Bi-Directional Splice Loss Summary Report

13. Close the Print Preview window.

NOTE

The 2 Smart Splice Template Traces have been added to the Trace List and saved to the Sample Traces folder.

The selected trace files have been updated and saved.

Appendix A: Special Keypresses & Symbols

A-1 Special Keypresses

The following special keyboard presses, or shortcut keys, are available:

Regardless of the Keyboard Focus, the following Shortcut Key applies:

F1	Help Topics

When no Trace List nor Header Template File is opened, the Shortcut Keys are:

Ctrl+N	New File (Trace List or Header Template)
Ctrl+O	Open File

When the Trace List Pane has Keyboard Focus, the Shortcut Keys are:

Insert	Add traces to the Trace List
Delete	Remove selected traces from the Trace List
Enter	Show the Trace Property Sheet Window(s) for the selected trace(s)

When the Trace List Pane or Graph Pane has Keyboard Focus, the Shortcut keys are:

Alt+0	Toggle the display of the Event Window
Alt+1	Toggle for Align
Alt+2	Toggle for Flip
Ctrl+A	Toggle for shift Cursor A
Ctrl+B	Toggle for shift Cursor B
Ctrl+C	Calculate ORL (must be in ORL Loss Mode)
Ctrl+D	Display selected traces
Ctrl+F	Zoom Full
Ctrl+H	Hide selected traces

Ctrl+K	Toggle for Lock A/B Cursors
Ctrl+L	Cycle thru Left LSA Cursor (Left End, Line, Right End) and Right LSA Cursor (Left End, Line, Right End) allowing ←→keypress shifts
Ctrl+M	Next Loss Mode
Ctrl+Shift+M	Previous Loss Mode
Ctrl+N	New File (Trace List or Header template)
Ctrl+O	Open File
Ctrl+P	Print Trace Printouts and Reports
Ctrl+R	Make selected Trace Primary
Ctrl+S	Save Trace List
Ctrl+T	Toggle shift Primary Trace
F4	Next Batch Display
Shift+F4	Previous Batch Display
F6	Next Window Pane
Shift+F6	Previous Window Pane
F8	View next event in the Event Window
Shift+F8	View previous event in the Event Window
Ctrl+Z	Equivalent to clicking the Window (Zoom) Icon

When the Graph Pane has Keyboard Focus:

Alt+→	Horizontal Expand (Zoom-In ,Magnify) 2X
Alt+←	Horizontal Contract (Zoom-Out, DeMagnify) 2X
Alt+↑	Vertical Expand (Zoom-In ,Magnify) 2X
Alt+↓	Vertical Contract (Zoom-Out, DeMagnify) 2X

←	Large Left move for Scroll, Shift A/B, Trace Shift, LSA Shift
→	Large Right move for Scroll, Shift A/B, Trace Shift, LSA Shift
↑	Large Up move for Scroll, Trace Shift, LSA Shift
↓	Large Down move for Scroll, Trace Shift, LSA Shift
Ctrl+←	Small Left move for Scroll, Shift A/B, Trace Shift, LSA Shift
Ctrl+→	Small Right move for Scroll, Shift A/B, Trace Shift, LSA Shift
Ctrl+↑	Small Up move for Scroll, Trace Shift, LSA Shift.
Ctrl+↓	Small Down move for Scroll, Trace Shift, LSA Shift.

When the Trace Window Analysis Tab Event Table has Keyboard Focus, the Shortcut keys are :

Delete	Delete currently selected event
Insert	Insert event

When the Header Template Window has Keyboard Focus, the Shortcut Keys are :

Ctrl+A	Edit: Select All
Ctrl+C	Edit: Copy
Ctrl+F	Edit: Find
Ctrl+H	Edit: Replace
Ctrl+N	New File (Trace List or Header Template)
Ctrl+O	Open File
Ctrl+P	Print

Ctrl+S	Save File
Ctrl+V	Edit: Paste
Alt+Bckspace	Edit: Undo
F3	Edit: Find Next
Ctrl+Insert	Edit: Copy
Shift+Insert	Edit: Paste
Ctrl+X	Edit: Cut
Ctrl+Z	Edit: Undo

When the Power Meter Window has Keyboard Focus, the Shortcut Keys are :

Ctrl+O	Open File
Ctrl+P	Print
Ctrl+S	Save File

A-2 Mouse Cursors

When the mouse cursor is in the graph, it conveys information about the usage or mode of the cursor. The mouse cursor formats are as follows:

Default.

Zoom to Event activated, cursor over event. Can now define selection rectangle, event selection, left-click to zoom-in, right-click to zoom-out.

Zoom to Event activated, but mouse cursor not over an event.

Drag A or B cursor.

Click to define new A cursor location.

Click to define new B cursor location.

Drag LSA cursor tic mark.

Drag LSA cursor line.

Click to shift left LSA cursor line, defines the left tic mark location.

Click to define new left tic mark location for left LSA cursor.

Click to define new right tic mark location for the left LSA Cursor.

Click to shift right LSA cursor line, defines the left tic mark location.

Click to define new left tic mark location for right LSA cursor.

Click to define new right tic mark location for right LSA cursor.

Appendix B: Trace Printout Examples

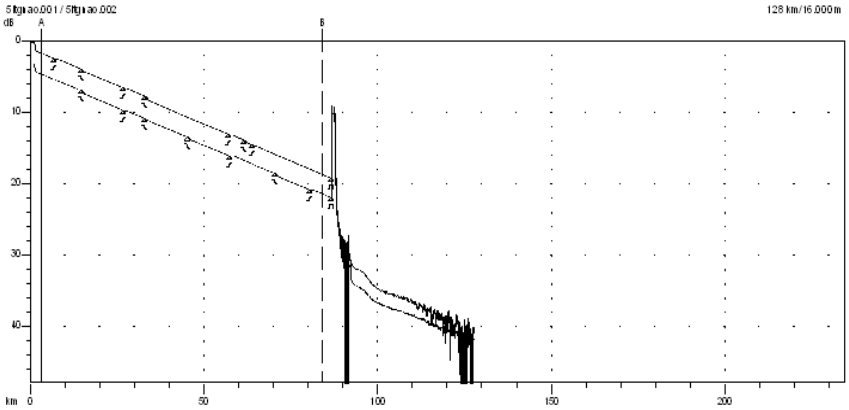
This Appendix illustrates examples, using the sample trace, of the Trace Printouts available from NetWorks/OTDR for the Current View (or View), Batch, Frame, and Bi-Directional options.

Information about the Trace Printout Page Layout and Print functions can be found in Chapter 4.0 “Printing Options”.

APPENDIX B-1 CURRENT VIEW EXAMPLE

The following printout shows the Trace Plot, Trace Information, Header Information, and Event Table Information for two Traces, with the Trace Plot Expanded to the Right Edge for the View Print option:

NetTest NetWorks/OTDR - Version 3.0a
Date: 04/14/04 Time: 10:34 AM



A: 3.2427 km B: 83.9747 km A -> B: 80.7320 km	Index: 1.464000 dB/km Loss: 0.210 dB Reflectance: N/A	[L] 10.0µs / 1000.0m Avg: Slow 262144 TD-385/1550 nm/SM

---------- Page 1 ----------

[Cable I.D.:]
[Fiber No.: Fiber Type:]
[Sheath Length:]
[Test Site:]
[Far Site:]
[Date: - - (mm-dd-yy)]
[Operator:]
[Notes:]
[ ]
[ ]

Primary Trace: 5itgnao.001

Date:	05/08/95	Range:	128 km
Time:	11:06 AM	Resolution:	16.000 m
Product Type:	TD-3000	Pulse Width:	10000 ns
Opt. Module:	TD-385	Index:	1.464000
Fiber Type:	Singlemode	WaveLength:	1550 nm
FAS Thresholds:		Horz. Shift:	0.0000 km
Loss:	0.05 dB	Vert. Shift:	0.00 dB
Reflectance:	-60.00 dB	No. Averages:	262144
Fiber Break:	3.00 dB		
Backscatter:	-83.00	Trace Type:	T5(T5)
Trace Flags:	Analysis		
ORL:	N/A		

Analysis Results -- 5itgnao.001

Feature #/Type	Location (km)	Event-Event (dB)	(dB/Km)	Loss (dB)	Refl (dB)
1/N	5.8641	1.41	0.205	-0.12	
2/N	14.4982	1.55	0.203	0.24	
3/N	25.7028	2.43	0.199	-0.13	
4/N	33.0263	1.29	0.203	0.40	
5/N	57.1080	4.96	0.205	-0.10	
6/N	61.6131	0.91	0.203	0.22	
7/N	63.7264	0.44	0.210	-0.05	
8/E	86.6122	4.71	0.206	>3.00	-22.89

Overall (End-to-End) Loss: 18.15 dB

---------- Page 1 ----------

[Cable I.D.:]
[Fiber No.: Fiber Type:]
[Sheath Length:]
[Test Site:]
[Far Site:]
[Date: - - (mm-dd-yy)]
[Operator:]
[Notes:]
[ ]
[ ]

Overlay Trace: 5itgnao.002

Date:	04/25/95	Range:	128 km
Time:	07:25 AM	Resolution:	16.000 m
Product Type:	TD-3000	Pulse Width:	10000 ns
Opt. Module:	TD-385	Index:	1.464000
Fiber Type:	Singlemode	WaveLength:	1550 nm
FAS Thresholds:		Horz. Shift:	0.0000 km
Loss:	0.05 dB	Vert. Shift:	0.00 dB
Reflectance:	-60.00 dB	No. Averages:	262144
Fiber Break:	3.00 dB		
Backscatter:	-83.00	Trace Type:	T5(T5)
Trace Flags:	Analysis		
ORL:	N/A		

Analysis Results -- 5itgnao.002

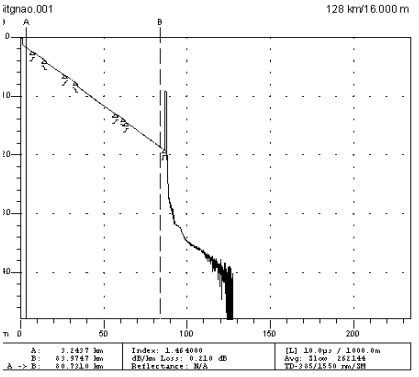
Feature #/Type	Location (km)	Event-Event (dB)	(dB/Km)	Loss (dB)	Refl (dB)
1/N	14.4982	2.89	0.200	0.27	
2/N	25.7684	2.54	0.207	-0.11	
3/N	33.0263	1.25	0.199	0.11	
4/N	45.2638	2.49	0.203	0.24	
5/N	57.1899	2.35	0.197	-0.21	
6/N	70.3120	2.67	0.203	0.29	
7/N	80.4689	2.03	0.200	-0.14	
8/E	86.5958	1.23	0.201	>3.00	-19.34

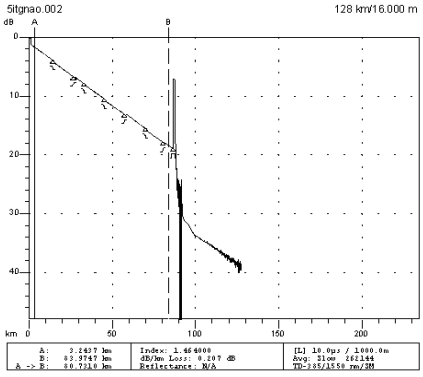
Overall (End-to-End) Loss: 17.90 dB

APPENDIX B-2 BATCH PRINT EXAMPLE

The following printout shows the Trace Plot, Trace Information, Header Information, and Events Table, in Dual Plot mode, for two selected traces, one per plot:

NetTest NetWorks/OTDR - Version 3.0a
Date: 04/14/04 Time: 10:48 AM



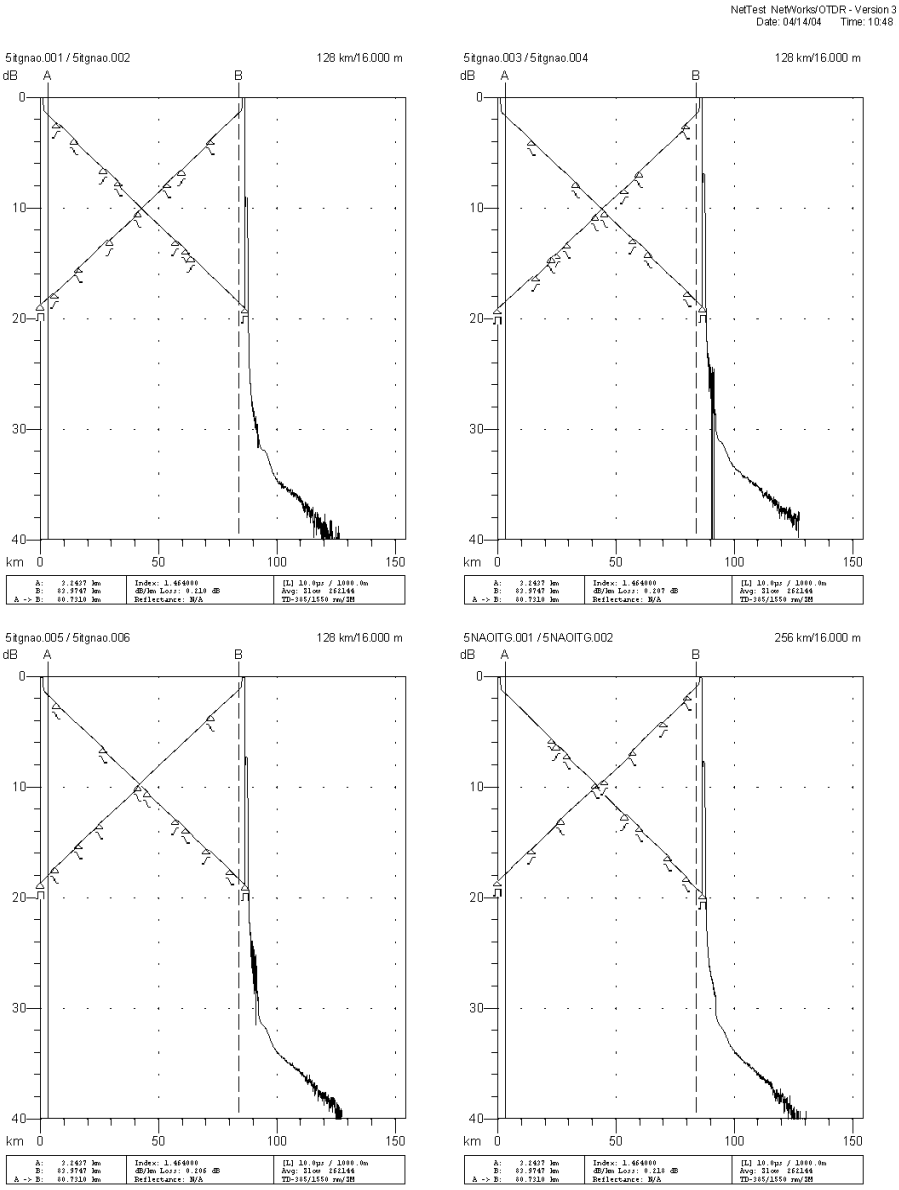



```
---------- Page   1 ----------
[Cable I.D.:                                                  ]
[Fiber No.:                    Fiber Type:                    ]
[Sheath Length:                                               ]
[Test Site:                                                   ]
[Far Site:                                                    ]
[Date:      -  -     (mm-dd-yy)                               ]
[Operator:                                                    ]
[Notes:                                                       ]
[                                                             ]
[                                                             ]
---------------------------------------------------------------

Primary Trace: 5itgnao.001
         Date: 05/08/95          Range:       128 km
         Time: 11:06 AM     Resolution:    16.000 m
 Product Type: TD-3000      Pulse Width:     10000 ns
  Opt. Module: TD-385            Index:  1.464000
   Fiber Type: Singlemode   WaveLength:      1550 nm
FAS Thresholds:            Horz. Shift:    0.0000 km
         Loss:    0.05 dB  Vert. Shift:      0.00 dB
  Reflectance:  -60.00 dB No. Averages:    262144
  Fiber Break:    3.00 dB
  Backscatter:  -83.00      Trace Type: T5(T5)
  Trace Flags: Analysis
          ORL: N/A

Analysis Results -- 5itgnao.001

Feature  Location   Event-Event    Loss       Refl
#/Type      (km)      (dB)(dB/Km)    (dB)       (dB)
-------------------------------------------------------
 1/N       6.8641   1.41  0.206    -0.12
 2/N      14.4982   1.55  0.203     0.24
 3/N      26.7028   2.43  0.199    -0.13
 4/N      33.0263   1.29  0.203     0.40
 5/N      57.1080   4.96  0.206    -0.10
 6/N      61.6131   0.91  0.203     0.22
 7/N      63.7264   0.44  0.210    -0.06
 8/E      86.6122   4.71  0.206    >3.00      -22.89

Overall (End-to-End) Loss: 18.15 dB
```

```
---------- Page   1 ----------
[Cable I.D.:                                                  ]
[Fiber No.:                    Fiber Type:                    ]
[Sheath Length:                                               ]
[Test Site:                                                   ]
[Far Site:                                                    ]
[Date:      -  -     (mm-dd-yy)                               ]
[Operator:                                                    ]
[Notes:                                                       ]
[                                                             ]
[                                                             ]
---------------------------------------------------------------

Primary Trace: 5itgnao.002
         Date: 04/25/95          Range:       128 km
         Time: 07:25 AM     Resolution:    16.000 m
 Product Type: TD-3000      Pulse Width:     10000 ns
  Opt. Module: TD-385            Index:  1.464000
   Fiber Type: Singlemode   WaveLength:      1550 nm
FAS Thresholds:            Horz. Shift:    0.0000 km
         Loss:    0.05 dB  Vert. Shift:      0.00 dB
  Reflectance:  -60.00 dB No. Averages:    262144
  Fiber Break:    3.00 dB
  Backscatter:  -83.00      Trace Type: T5(T5)
  Trace Flags: Analysis
          ORL: N/A

Analysis Results -- 5itgnao.002

Feature  Location   Event-Event    Loss       Refl
#/Type      (km)      (dB)(dB/Km)    (dB)       (dB)
-------------------------------------------------------
 1/N      14.4982   2.89  0.200     0.27
 2/N      26.7684   2.54  0.207    -0.11
 3/N      33.0263   1.25  0.199     0.11
 4/N      45.2638   2.49  0.203     0.24
 5/N      57.1899   2.35  0.197    -0.21
 6/N      70.3120   2.67  0.203     0.29
 7/N      80.4689   2.03  0.200    -0.14
 8/E      86.5958   1.23  0.201    >3.00      -19.34

Overall (End-to-End) Loss: 17.90 dB
```

APPENDIX B-3 FRAME PRINT EXAMPLE

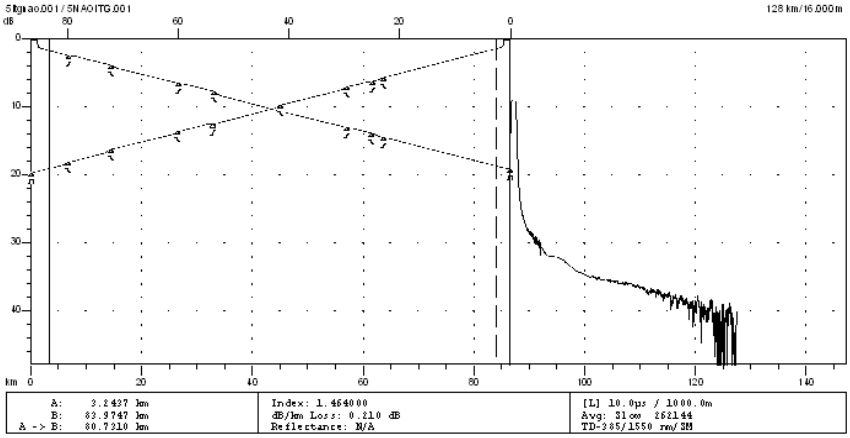
The following printout shows Trace Information, with a 2-Column x 2-Row format in Portrait mode, for 8 selected traces, 2 per plot, current view with Flip ON:



APPENDIX B-4 BI-DIRECTIONAL PRINT EXAMPLE

The following print out shows Trace Plot, Bi-Directional Event Table, and Trace Information for 2 selected sample traces with Use Current View OFF, and the Bi-Directional Print Specification parameter settings shown in Figure 4-7.

NetTest NetWorks/OTDR - Version 3.0a
Date: 04/14/04 Time: 02:54 PM



Fiber Number : 001 Wavelength(nm) : 1550

A = 5itgnao.001 ITG->NA0 ITG Location->NA0 Location
B = 5NA0ITG.001 NA0->ITG NA0 Location->ITG Location

Event #	Type A/B	Location (km) A	Location (km) B	Span (km)	Span Loss (dB/Km) A	Span Loss (dB/Km) B	Span Loss (dB/Km) Avg	Splice Loss(dB) A	Splice Loss(dB) B	Splice Loss(dB) Avg	Reflectance(dB) A	Reflectance(dB) B
	/E	0.0000	86.5958									-19.01
1	N/N	5.8641	79.8464	5.8068	0.206	0.195	0.201	-0.12	0.22	0.05		
2	N/N	14.4982	72.1795	7.6504	0.203	0.207	0.205	0.24	0.32	0.28		
3	N/N	26.7028	59.9913	12.1965	0.199	0.198	0.198	-0.13	0.21	0.04		
4	N/N	33.0263	53.6350	6.3399	0.203	0.203	0.203	0.40	-0.20	0.10		
	/N	45.1491	41.4467	12.1555	0.206	0.211	0.209		0.25			
5	N/N	57.1080	29.4878	11.9589	0.206	0.202	0.204	-0.10	0.23	0.07		
6	N/N	61.5131	24.9336	4.5297	0.203	0.204	0.204	0.22	-0.10	0.06		
7	N/N	63.7264	22.8367	2.1051	0.210	0.196	0.203	-0.06	0.16	0.05		
8	E/	86.5122	0.0000	22.8612	0.206	0.208	0.207				-22.89	
			Min	2.1051	0.199	0.196	0.198	-0.13	-0.20	0.04		
			Max	22.8612	0.210	0.211	0.209	0.40	0.32	0.28		
			Avg		0.205	0.203	0.204	0.06	0.14	0.09		
		End to End Loss			18.15	18.78	18.47					

Primary Trace: 5itgnao.001
Date: 05/08/95 Range: 128 km
Time: 11:06 AM Resolution: 16.000 m
Product Type: TD-3000 Pulse Width: 10000 ns
Opt. Module: TD-385 Index: 1.464000
Fiber Type: Singlemode WaveLength: 1550 nm
PAS Thresholds: Horz. Shift: 0.0000 km
Loss: 0.05 dB Vert. Shift: 0.00 dB
Reflectance: -60.00 dB No. Averages: 262144
Fiber Break: 3.00 dB
Backscatter: -83.00 Trace Type: T5(T5)
Trace Flags: Analysis
ORL: N/A

Overlay Trace: 5NA0ITG.001
Date: 04/19/95 Range: 256 km
Time: 10:33 AM Resolution: 16.000 m
Product Type: TD-3000 Pulse Width: 10000 ns
Opt. Module: TD-385 Index: 1.464000
Fiber Type: Singlemode WaveLength: 1550 nm
PAS Thresholds: Horz. Shift: 0.0000 km
Loss: 0.05 dB Vert. Shift: 0.00 dB
Reflectance: -60.00 dB No. Averages: 262144
Fiber Break: 3.00 dB
Backscatter: -83.00 Trace Type: T5(T5)
Trace Flags: Analysis
ORL: N/A

Appendix C: Report Examples

Sample Traces | Trace Summary Report | Cable : ITG-NAO
Trace List : all.trl
20-Mar-03

Cable : ITG-NAO ITG <—> NAO
Utica Site ITG <—> Syracuse Site NAO

Trace	Wave-length (nm)	Range (km)	Pulse Width (nsec)	Reso (m)	# Avgs	Date	Time	Instrument	Optics Module	Fiber Type
5itgnao.001	1550	128	10000	16.00	242144	08-May-95	11:06:10 AM	TD-3000	TD-385	Singlemode
5naoitg.001	1550	256	10000	16.00	242144	19-Apr-95	10:33:40 AM	TD-3000	TD-385	Singlemode
5itgano.002	1550	128	10000	16.00	242144	25-Apr-95	07:25:41 AM	TD-3000	TD-385	Singlemode
5anoitg.002	1550	256	10000	16.00	242144	19-Apr-95	10:52:32 AM	TD-3000	TD-385	Singlemode
5itgnao.003	1550	128	10000	16.00	242144	25-Apr-95	07:33:30 AM	TD-3000	TD-385	Singlemode
5naoitg.003	1550	256	10000	16.00	242144	19-Apr-95	11:08:31 AM	TD-3000	TD-385	Singlemode
5itgnao.004	1550	128	10000	16.00	242144	25-Apr-95	07:42:34 AM	TD-3000	TD-385	Singlemode
5inaotg.004	1550	256	10000	16.00	242144	19-Apr-95	11:23:57 AM	TD-3000	TD-385	Singlemode
5itgnao.005	1550	128	10000	16.00	242144	25-Apr-95	07:51:54 AM	TD-3000	TD-385	Singlemode
5naoitg.005	1550	256	10000	16.00	242144	19-Apr-95	11:39:24 AM	TD-3000	TD-385	Singlemode
5itgnao.006	1550	128	10000	16.00	242144	25-Apr-95	07:59:51 AM	TD-3000	TD-385	Singlemode
5naoitg.006	1550	256	10000	16.00	242144	19-Apr-95	11:57:04 AM	TD-3000	TD-385	Singlemode

Sample Traces | Trace Summary Report | Cable : ITG-NAO
Trace List : all.trl
20-Mar-03

Cable : ITG-NAO ITG <—> NAO
Utica Site ITG <—> Syracuse Site NAO

Trace	End (km)	End-End Loss(dB)	ORL (dB)	IOR	Horizontal Shift (km)	Vertical Shift (dB)	Back Scatter Coeff(dB)	Trace Flags	Type
5itgnao.001	86.6122	18.15	N/A	1.464000			-83.0	F	T5(T5)
5naoitg.001	86.5958	18.78	N/A	1.464000			-83.0	F	T5(T5)
5itgano.002	86.5958	18.89	N/A	1.464000			-83.0	F	T5(T5)
5anoitg.002	86.5630	18.06	N/A	1.464000			-83.0	F	T5(T5)
5itgnao.003	86.6122	17.90	N/A	1.464000			-83.0	F	T5(T5)
5naoitg.003	86.5794	17.76	N/A	1.464000			-83.0	F	T5(T5)
5itgnao.004	86.6122	18.11	N/A	1.464000			-83.0	F	T5(T5)
5inaotg.004	86.5794	18.11	N/A	1.464000			-83.0	F	T5(T5)
5itgnao.005	86.6122	17.82	N/A	1.464000			-83.0	F	T5(T5)
5naoitg.005	86.5630	17.84	N/A	1.464000			-83.0	F	T5(T5)
5itgnao.006	86.6122	18.00	N/A	1.464000			-83.0	F	T5(T5)
5naoitg.006	86.5794	1799	N/A	1.464000			-83.0	F	T5(T5)

Appendix C-2: Exception Report

Sample Traces | Exception Report | Cable :
Trace List : all.TRL
Primary Trace: 5itgnao.001 | 18-Mar-03

Different than Primary

X Wavelength	X Backscatter Coefficient	X Optics Module
X Range	X Analysis Thresholds	X Header Type
X Resolution	X ORL Parameters	X Patch Cord Setup
X Pulse Width	X Trace Format	X Smooth
X IOR	X Instrument	

Different than Primary by > X%

End Location 2.00	Event Location 2.00 1.0000 km
X End-to-End Loss 10.00	Horizontal Shift 4.00
ORL 10.00	

Events

# Splices >0	X Loss Outside -0.25 -> 0.25 dB
None	X Loss not Splice Loss
X Unusual End	X Unusual Non-End
User Created	X Reflective Splice
User Edited	Span Loss > 0.40 dB/lm

Miscellaneous

Averages <2048	X Duplicate Waveform
X Unusual Traces	

Trace	Exception	Information
5itgnao.001	Events : Loss Outside	33.0263(0.40)
5naoitg.001	Range	256 km
5naoitg.001	Events : Loss Outside	41.4467(0.25)
5naoitg.001	Events : Loss Outside	72.1795(0.32)
5itgnao.002	Events : Loss Outside	14.4982(0.27)
5naoitg.002	Events : Loss Outside	70.3120(0.29)
5itgnao.002	Range	256 km
5naoitg.002	Events : Loss Outside	6.2907(0.36)
5naoitg.002	Events : Loss Outside	29.4550(0.35)
5naoitg.003	Events : Loss Outside	63.8411(0.27)
5itgnao.003	Range	256 km
5naoitg.004	Events : Loss Outside	6.9296(0.34)
5itgnao.004	Events : Loss Outside	26.7356(0.29)
5naoitg.004	Events : Loss Outside	63.8411(0.37)
5itgnao.004	Range	256 km
5naoitg.004	Events : Loss Outside	16.3821(0.35)
5itgnao.004	Events : Loss Outside	25.0482(0.28)
5naoitg.004	Events : Loss Outside	53.6186(0.33)
5itgnao.004	Events : Loss Outside	72.1959(0.49)
5naoitg.005	Range	256 km
5itgnao.006	Events : Loss Outside	45.2965(0.26)
5naoitg.006	Range	256 km

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Sample Traces

Bi-Directional Report

Correlation % : 4.00

Cable : ITG-NAO
Trace List : all.trl
20-Mar-03

Cable : ITG-NAO ITG <—> NAO
Utica Site ITG <—> Syracuse Site NAO

Fiber Number : 001 Wavelength(nm) : 1550

	5ITGNAO.001 ITG —> NAO					5NAOITG.001 NAO —> ITG					
Event #	Event Type	Loc (km)	Splice Loss(dB)	Span Loss (dB/km)	Reflect (dB)	Event Type	Loc (km)	Splice Loss(dB)	Span Loss (dB/km)	Reflect (dB)	Average Splice Loss(dB)
						E	86.5958		0.197	-19.01	
1	N	6.8641	-0.12	0.206		N	79.8464	0.22	0.207		0.05
2	N	14.4982	0.24	0.203		N	72.1795	**0.32**	0.198		0.28
3	N	26.7028	-0.13	0.199		N	59.9913	0.21	0.203		0.04
4	N	33.0263	**0.40**	0.203		N	53.6350	-0.20	0.211		0.10
5	N	45.2000	-0.01	0.213		N	41.4467	**0.25**	0.202		0.12
6	N	57.1080	-0.10	0.200		N	29.4878	0.23	0.204		0.07
7	N	61.6131	0.22	0.203		N	24.9336	-0.10	0.196		0.06
8	N	63.7264	-0.06	0.210		N	22.8367	0.16	0.207		0.05
9	N	70.3000	0.04	0.205		N	16.3031	0.00	0.212		0.02
10	N	80.4000	0.04	0.202		N	6.1012	-0.02	0.204		0.01
11	N	86.6122		0.200	-22.89						
Column Average			0.05					0.11			
End to End Loss			18.15					18.78			0.08
ORL			N/A					N/A			18.47

Fiber Number : 002 Wavelength(nm) : 1550

Event #	Event Type	5ITGNAO.002 ITG —> NAO Loc (km)	Splice Loss(dB)	Span Loss (dB/km)	Reflect (dB)	5NAOITG.002 NAO —> ITG Event Type	Loc (km)	Splice Loss(dB)	Span Loss (dB/km)	Reflect (dB)	Average Splice Loss(dB)
						E	86.5630		0.203	-19.08	
1	N	6.7987	-0.02	0.199		N	79.7849	0.05	0.203		0.01
2	N	14.4982	**0.27**	0.202		N	72.0649	-0.09	0.205		0.09
3	N	26.7684	-0.11	0.207		N	59.9421	0.20	0.199		0.04
4	N	33.0263	0.11	0.199		N	53.5899	-0.02	0.199		0.06
5	N	45.2638	0.24	0.203		N	41.3812	-0.11	0.195		0.07
6	N	57.1899	-0.21	0.197		N	29.4550	**0.35**	0.204		0.04
7	N	61.4884	0.03	0.196		N	24.8953	0.06	0.198		0.04
8	N	63.6880	0.04	0.209		N	22.7957	0.03	0.211		0.04
9	N	70.3120	**0.29**	0.194		N	16.3657	-0.21	0.203		0.04
10	N	80.4689	-0.14	0.200		N	6.2907	**0.36**	0.199		0.11
11	E	86.5958		0.201	-19.34						
Column Average			0.05					0.06			
End to End Loss			17.89					18.06			0.06
ORL			N/A					N/A			17.98

Sample Test Traces — Bi-Dir Splice Loss Summary Report — Cable : ITG-NAO

Trace List : all.trl

Correlation % : 4.00 — 20-Mar-03

Reference : stitgano.trc ITG —> NAO — Length : 86.6122 km — Wavelength(nm) : 1550

Cable : ITG-NAO ITG <—> NAO
Utica Site ITG <—> Syracuse Site NAO

Splice Number / ITG—>NAO Loc(km) / NAO—>ITG Loc(km)

Fiber Number	001 6.80 79.81	002 14.40 72.21	003 26.70 59.91	004 33.00 53.61	005 45.20 41.41	006 57.10 29.51	007 61.50 25.11	008 63.70 22.91	009 70.30 16.31	010 80.40 6.21	Avg	Min	Max	End-End(dB)
001	0.05	**0.28**	0.04	0.10	0.12	0.07	0.06	0.05	0.02	0.01	0.08	0.01	**0.28**	18.47
002	0.01	0.09	0.04	0.04	0.06	0.07	0.04	0.04	0.04	0.11	0.06	0.01	0.11	17.98
003	0.02	0.02	0.02	0.08	0.04	0.04	0.05	**0.15**	0.09	0.03	0.05	0.02	**0.15**	17.83
004	0.07	**0.24**	0.04	0.14	0.04	0.03	0.10	0.10	0.06	0.05	0.09	0.03	**0.24**	18.11
005	0.04	0.04	0.13	0.04	0.08	0.03	0.10	0.03	0.02	0.03	0.05	0.02	0.13	17.83
006	0.02	0.13	0.02	0.03	0.05	0.02	0.07	0.03	0.12	0.02	0.05	0.02	0.13	17.99
Average	0.04	0.13	0.05	0.07	0.07	0.04	0.07	0.07	0.06	0.04	0.06			18.03
Min	0.01	0.02	0.02	0.03	0.04	0.02	0.04	0.03	0.02	0.01		0.01		17.83
Max	0.07	**0.28**	0.13	0.14	0.12	0.07	0.10	**0.15**	0.12	0.11			**0.28**	18.47

Sample Test Traces | Bi-Dir Splice Loss Summary Report | Cable : ITG-NAO

Trace List : all.trl

Correlation % : 4.00 | 20-Mar-03

Reference : stitgano.trc ITG —> NAO | Length : 86.6122 km | Wavelength(nm) : 1550

Fiber Number to Trace File Mapping

001 : 5itgnao.001
5naoitg.001
002 : 5itgnao.002
5naoitg.002
003 : 5itgnao.003
5naoitg.003
004 : 5itgnao.004
5naoitg.004
005 : 5itgnao.005
5naoitg.005
006 : 5itgnao.006
5naoitg.006

Sample Test Traces — 1-Dir Splice Loss Summary Report — Cable : ITG-NAO

Trace List : all.trl

Correlation % : 4.00 — 20-Mar-03

Reference : stitgano.trc ITG —> NAO — Length : 86.6122 km — Wavelength(nm) : 1550

Cable : ITG-NAO ITG <—> NAO
Utica Site ITG <—> Syracuse Site NAO

Splice Number / ITG—>NAO Loc(km)

Fiber Number	001 6.80	002 14.40	003 26.70	004 33.00	005 45.20	006 57.10	007 61.50	008 63.70	009 70.30	010 80.40	Avg	Min	Max	End-End(dB)
001	-0.12	0.24	-0.13	**0.40**	-0.01	-0.10	0.06	-0.06	0.04	0.04	0.05	-0.13	**0.40**	18.15
002	-0.02	**0.27**	-0.11	0.11	0.24	-0.21	0.04	0.04	**0.29**	-0.14	0.05	-0.21	**0.29**	17.89
003	-0.06	0.06	-0.04	0.21	0.11	-0.10	0.05	**0.27**	0.03	0.11	0.06	-0.10	**0.27**	17.90
004	**0.34**	-0.01	**0.29**	-0.05	0.15	0.09	0.10	**0.37**	-0.23	-0.03	0.08	-0.23	**0.37**	18.11
005	0.10	-0.01	0.23	0.03	0.14	-0.08	0.10	0.05	-0.16	0.09	0.05	-0.16	0.23	17.82
006	-0.01	0.14	0.01	-0.04	**0.26**	-0.04	0.07	-0.07	0.11	0.11	0.06	-0.07	**0.26**	18.00
Average	0.04	0.11	0.04	0.11	0.15	-0.07	0.07	0.10	0.01	0.03	0.06			17.98
Min	-0.12	-0.01	-0.13	-0.05	-0.01	-0.21	0.04	-0.07	-0.23	-0.14		-0.23		17.82
Max	**0.34**	**0.27**	**0.29**	**0.40**	**0.26**	0.09	0.10	**0.37**	**0.29**	0.11			**0.40**	18.15

Sample Test Traces | 1-Dir Splice Loss Summary Report | Cable : ITG-NAO

Trace List : all.trl

Correlation % : 4.00 | 20-Mar-03

Reference : stitgano.trc ITG —> NAO | Length : 86.6122 km | Wavelength(nm) : 1550

Fiber Number to Trace File Mapping

001 : 5itgnao.001
002 : 5itgnao.002
003 : 5itgnao.003
004 : 5itgnao.004
005 : 5itgnao.005
006 : 5itgnao.006

Sample Traces

Fiber Acceptance Report

Wavelength(nm) : 1550

Cable : ITG-NAO
Trace List : all.trl
20-Mar-03

Cable : ITG-NAO ITG <—> NAO
Utica Site ITG <—> Syracuse Site NAO

A=ITG B=NAO

Fiber Number	End-to-End Loss Avg	Loss A->B	Loss B->A	Loss Abs Diff	Avg Length (km)	Avg Loss dB/km	Non-Connector Event Average Loss A->B	Loss B->A	Loss Bi Avg	ORL A->B	ORL B->A
001	18.46	18.15	18.78	0.64	86.6040	0.213	0.05	0.11	0.08	N/A	N/A
002	17.98	17.89	18.06	0.17	86.5794	0.208	0.05	0.06	0.06	N/A	N/A
003	17.83	17.90	17.76	0.14	86.5958	0.206	0.06	0.05	0.05	N/A	N/A
004	18.11	18.11	18.11	0.00	86.5958	0.209	0.08	0.09	0.09	N/A	N/A
005	17.83	17.82	17.84	0.02	86.5876	0.206	0.05	0.06	0.05	N/A	N/A
006	18.00	18.00	17.99	0.01	86.5958	0.208	0.06	0.05	0.05	N/A	N/A
Average	18.04	17.98	18.09	0.16	86.5931	0.208	0.06	0.07	0.06		
Min	17.83	17.82	17.76	0.00	86.5794	0.206	0.05	0.04	0.05		
Max	18.46	18.15	18.78	0.64	86.6040	0.213	0.08	0.11	0.09		

Sample Traces

Fiber Acceptance Report

Wavelength(nm) : 1550

Cable : ITG-NAO
Trace List : all.trl
20-Mar-03

Fiber Number to Trace File Mapping

001 : 5itgnao.001
5naoitg.001
002 : 5itgnao.002
5naoitg.002
003 : 5itgnao.003
5naoitg.003
004 : 5itgnao.004
5naoitg.004
005 : 5itgnao.005
5naoitg.005
006 : 5itgnao.006
5naoitg.006

Appendix C-7: Power Meter Report

Power Meter Report

E:\pmtfiles\P6\itgnao.pmt 01/23/04

	Location A	Location B
Name :	Syracuse Site NAO	Utica Site ITG
Street :		
City :		
State :		
Building/Floor :		
Room :		
Contact :		
Phone Number :		
Rack :		
Panel :		
Tray :		
Fiber Type :		
Number of Fibers :		
Connection/Polish :		
Notes :	Sample Traces	

Date/Time : 03/14/99 02:47:00 PM Format : P6 - CMA5000

	1310		1550	
	A->B	Ref	A->B	Ref
Thres	-12.50		-12.50	
1	-12.61	-02.11	-12.79	-02.24
2	-12.34	-02.11	-12.27	-02.24
3	-11.97	-02.11	-12.03	-02.24
4	-12.08	-02.11	-12.13	-02.24
5	**-15.31**	-02.11	**-15.40**	-02.24
6	-12.25	-02.11	-12.30	-02.24
Min	**-15.31**		**-15.40**	
Max	-11.97		-12.03	
Avg	**-12.76**		**-12.82**	

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Appendix C-8: Smart Splice Template Report

Smart Splice Template Report

NetTest NetWorks/OTDR - Version 3.0a
Date: 25-Mar-03 Time: 07:50:44 AM

Smart Splice Template Trace : C:\ITGNAO\5itgnao.sst

Number of Splices : 50
Loss Threshold(dB) : 0.100
Min Frequency : 1

X Adjust for Helix Factor
X Event Frequency into Waveform

Event Number	Loss Mode	Event Type	Cable Event Location (km)	Cable Event Width (km)	Frequency	Trace	Location (km)	Width (km)	Loss (dB)
1	Splice Loss	Non-Reflectice	6.8313	1.1631	3	5itgnao.005	6.8313	1.0648	0.10
						5itgnao.001	6.8641	1.0648	-0.12
						5itgnao.004	6.9296	1.0648	0.34
2	Splice Loss	Non-Reflective	14.4818	1.0812	3	5itgnao.006	14.4818	1.0648	0.14
						5itgnao.001	14.4982	1.0648	0.24
						5itgnao.002	14.5009	1.0650	0.27
3	Splice Loss	Non-Reflective	26.7028	1.1304	4	5itgnao.001	26.7028	1.0648	-0.13
						5itgnao.005	26.7356	1.0648	0.23
						5itgnao.004	26.6356	1.0648	0.29
						5itgnao.002	26.7734	1.0650	-0.11
4	Splice Loss	Non-Reflective	33.0263	1.0976	3	5itgnao.001	33.0263	1.0648	0.40
						5itgnao.002	33.0326	1.0650	0.11
						5itgnao.003	33.0591	1.0648	0.21
5	Splice Loss	Non-Reflective	45.2310	1.1304	5	5itgnao.005	45.2310	1.0648	0.14
						5itgnao.003	45.2474	1.0648	0.11
						5itgnao.004	45.2638	1.0648	0.15
						5itgnao.002	45.2723	1.0650	0.24
						5itgnao.006	45.2965	1.0648	0.26
6	Splice Loss	Non-Reflective	57.1080	1.1467	2	5itgnao.001	57.1080	1.0648	-0.10
						5itgnao.002	57.2007	1.0650	-0.21
7	Splice Loss	Non-Reflective	61.5967	1.0812	2	5itgnao.006	61.5967	1.0648	0.12
						5itgnao.001	61.6131	1.0648	0.22
8	Splice Loss	Non-Reflective	63.8411	1.0648	2	5itgnao.003	63.8411	1.0648	0.27
						5itgnao.004	63.8411	1.0648	0.37
9	Splice Loss	Non-Reflective	70.2956	1.0812	4	5itgnao.004	70.2956	1.0648	-0.23
						5itgnao.005	70.2956	1.0648	-0.16
						5itgnao.006	70.3120	1.0648	0.11
						5itgnao.002	70.3253	1.0650	0.29
10	Splice Loss	Non-Reflective	80.4197	1.9822	3	5itgnao.003	80.4197	1.9822	0.11
						5itgnao.006	80.4361	1.0648	0.11
						5itgnao.002	80.4841	1.0650	-0.14

10 Shortest and 10 Longest Traces

End Location	Trace
86.5958	5itgnao.002
86.6122	5itgnao.001
86.6122	5itgnao.003
86.6122	5itgnao.004
86.6122	5itgnao.005
86.6122	5itgnao.006

Appendix D: Report File Formats

Appendix D-1: Batch Process PC-3000 Report File

The PC-3000 Report File, generated by the Batch Process feature is an ASCII file that you can import into a spreadsheet. It contains an identification header on the first line followed by information for each trace event, one line per event (which may be extremely long) :

Trace Filename	
Date	Date the trace was taken.
Time	Time the trace was taken.
Event Number	1,2,3...
Event Type	"N" for Non-reflective.
	"R" for Reflective.
	"G" for Group.
	"E" for End.
Start Distance	in Km.
End Distance	in Km (= 0 for a non-grouped event).
Attenuation Loss	Loss of the fiber section, up to the event, in dB.
Attenuation Loss per Km	Loss of the fiber section, up to the event, in dB/Km.
Splice Loss	Loss of the event, in dB.
Reflectance	Reflectance of the event, in dB.
Cumulative Loss	Total Loss up to the event, in dB.
Flags	">S" for saturated reflectance.
	">" for potentially inaccurate or clamped reflectance.
	"?" for end of fiber out of distance or dynamic range.
	"2" for 2-Point loss.
Comment	

A 3 line sample from a PC-3000 Report File is shown below (with line wrap) :

```
"Trace Name","Date","Time","No","Type","Start","End","Atten Loss","
A L dB/Km","Splice Loss","Refl","Cum Loss","Flags","Comments"
"5itgnao.001","05/08/95","11:06 AM", 1,"N",   6.8800,   0.0000,1.40,0.20,
-0.12,0.00,1.40,"","",""
"5itgnao.001","05/08/95","11:06 AM", 2,"N",  14.4500,  0.0000,1.54,0.20,
0.23,0.00,2.82,"","",""
```

Appendix D-2: Batch Process NetWorks/OTDR Report File

The Batch Process NetWorks/OTDR Report File is an ASCII file that can be imported to a spreadsheet. It contains the following information for each trace event, one line per event (which may be extremely long) :

Trace Filename	
Date	Date the trace was taken.
Time	Time the trace was taken.
Event Number	1,2,3...
Event Type	"N" for Non-reflective. "R" for Reflective. "G" for Group. "E" for End.
Start Distance	in Km.
End Distance	in Km (= 0 for a non-grouped event).
Attenuation Loss	Loss of the fiber section, up to the event, in dB.
Attenuation Loss per Km	Loss of the fiber section, up to the event, in dB/Km.
Splice Loss	Loss of the event, in dB.
Reflectance	Reflectance of the event, in dB.
Cumulative Loss	Total Loss up to the event, in dB.
Flags	">S" for saturated reflectance. ">" for potentially inaccurate or clamped reflectance. "?" for end of fiber out of distance or dynamic range. "2" for 2-Point loss.
Comment	
Latitude	
Longitude	
Range	OTDR range setting, in Km.
Resolution	OTDR resolution setting, in meters.
Pulse Width	in nanoseconds.
Wavelength	in nanometers.

Index of Refraction

Averages Number of samples averaged.

A 3 line sample from a Batch Process NetWorks/OTDR Report File is shown below

```
"5itgnao.001","05/08/95","11:06 AM", 1,"N",  6.8641,  0.0000,1.40,0.20,
- 0.12,0.00,1.40,"","","","",128.0,16.0000,10000,1550,1.464000,262144
"5itgnao.001","05/08/95","11:06 AM", 2,"N",  14.4982,  0.0000,1.55,0.20,
0.23,0.00,2.83,"","","","",128.0,16.0000,10000,1550,1.464000,262144
"5itgnao.001","05/08/95","11:06 AM", 3,"N",  26.7028,  0.0000,2.43,0.20,
-0.13,0.00,5.49,"","","","",128.0,16.0000,10000,1550,1.464000,262144
```

Appendix E: Collecting Traces

The accuracy of various splice loss reports depends on the selection of OTDR (e.g. CMA5000/4000/8800) parameters which provide low noise and good analysis results. It is also important to use the same “optimal” OTDR settings for all the traces taken on a cable's fibers.

Prior to taking any traces, it is recommended that you do the following:

- Use a consistent CMA 5000/4500 or CMA4000/8800 DOS base 8.3 filename convention such that the filename includes from/to location codes, wavelength, and fiber number. The fiber number should always have the same number of decimal characters (use leading 0s). Fiber numbering should begin with 1 and increase by 1 for each additional fiber. For example, 5ITGNAO.005 indicates a trace taken at 1550 wavelength from ITG to NAO, on fiber number 5.
- Look up and use the correct index of refraction and backscatter coefficient for the cable.
- If known, record the cable's splice locations.
- Make sure all connectors are clean.
- If you want to report connector losses or detect close in events, then consider using a start and/or end patch cord.

To begin the trace collection process, do the following:

1. Determine the optimal test parameters for the cable, relative to your goals. Reduce trace noise as much as possible. Find the range, resolution, pulse width, and number of averages that work the best for your requirements. Set up your analysis parameters to provide good event and end detection.
2. Set up the view, A/B cursor locations, and loss mode to be saved. Ideally, save traces with the view at display from origin, showing the full trace, the A cursor just after the launch, the B cursor just before the fiber end, and the loss mode set to Splice or 2 Point Loss.

3. If you use a start patch cord, be sure to horizontally shift it out. If you want to view the connector loss, then shift the trace so that the connector event is close to, but greater than, 0 distance. Otherwise, shift the connector event to just below 0 distance.

NOTE

Use the same parameter settings for all traces on fibers of the same type in a cable, including wavelength, range, resolution, pulse width, index of refraction, horizontal/vertical shift, view, A/B cursor locations, loss mode, analysis parameters, backscatter coefficient, filename convention, and header.

Some trace parameters, such as IOR and horizontal shift, may be modified using the NetWorks/OTDR batch process function. However, if traces are shot with an inappropriate wavelength, pulse width, range, resolution, or patch cord setup, then the only option is to reshoot the traces.

Appendix F: Data Preparation

Data Consistency and the Exception Report

Data used in any batch or automated process (such as Bi-Directional Splice Loss Summary Report generation) must be consistent. Traces taken at different settings, using different patch cord lengths, etc. can adversely affect the process.

CAUTION

Mixing wavelengths and direction causes unpredictable results.

It is very important to perform *visual inspection* and run an Exception Report (both detailed in this appendix) before proceeding with the smart template or any other batch analysis function. This insures that the data used is complete and consistent.

Visual Inspection

Visual inspection of each and every trace in a trace list is an easy process with NetWorks/OTDR.

1. Select **File**>**Preferences**>**Display**.
2. Set the batch size to 8, select Keep Primary, and click **OK**.
3. With no traces displayed, click the **Next Batch** icon. The first 8 traces will be displayed and traces 2-8 can be visually compared to the Primary trace (which is assumed to be a “golden” trace).
4. Click the **Next Batch** icon again to see the next 7 seven traces and visually compare them to the Primary.
5. Repeat this process until all traces have been inspected. Remove or replace any traces that have obvious problems from the trace list by using the Trace/Remove menu item.

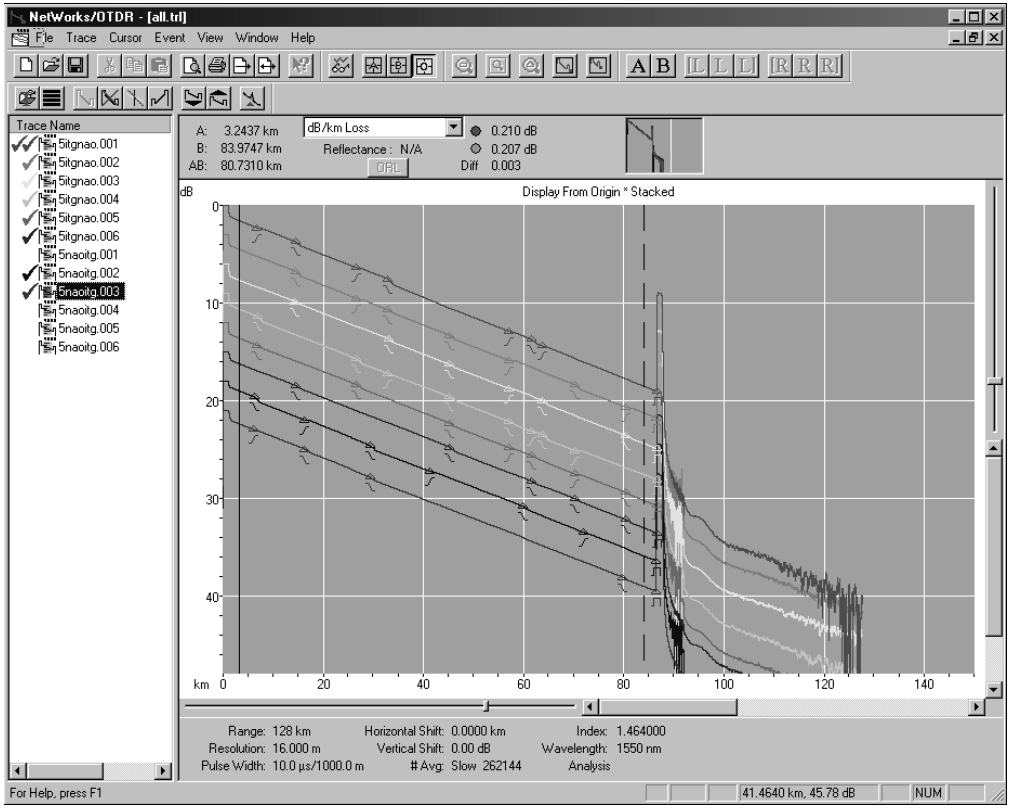

Figure F-1: Visual Inspection of Traces in a Trace List

Visual inspection of trace data is very important - traces shown are "stacked" to show individual detail. Viewing traces without the “stack” option is also useful when comparing the launch level of each trace to a “golden” trace.

Exception Report

The NetWorks/OTDR Exception Report (see Section 10.3) should be run on all traces and any traces reported as exceptions can be removed from the list of selected files.

1. Make the first trace in the list the *primary* trace.
2. Verify that this trace is representative of the cable and that it was obtained with the proper OTDR settings as this trace will be used as the basis of comparison for all other selected traces.
3. Click the **Select All** icon to select (highlight) all traces.
4. Select **File**>**Print** (or **Print Preview**).
5. Select **Report** and click **OK**.
6. Select **Exception Report** and click **OK**.
7. Select the desired criteria in the Exception Report dialog box (Figure F-2) and click **OK**.

NOTE

For some tests, the Exception Report assumes the current primary trace is a "golden" trace and all other traces are compared to the primary trace. Other tests, such as span loss are compared to an absolute number and do not make use of the primary trace.

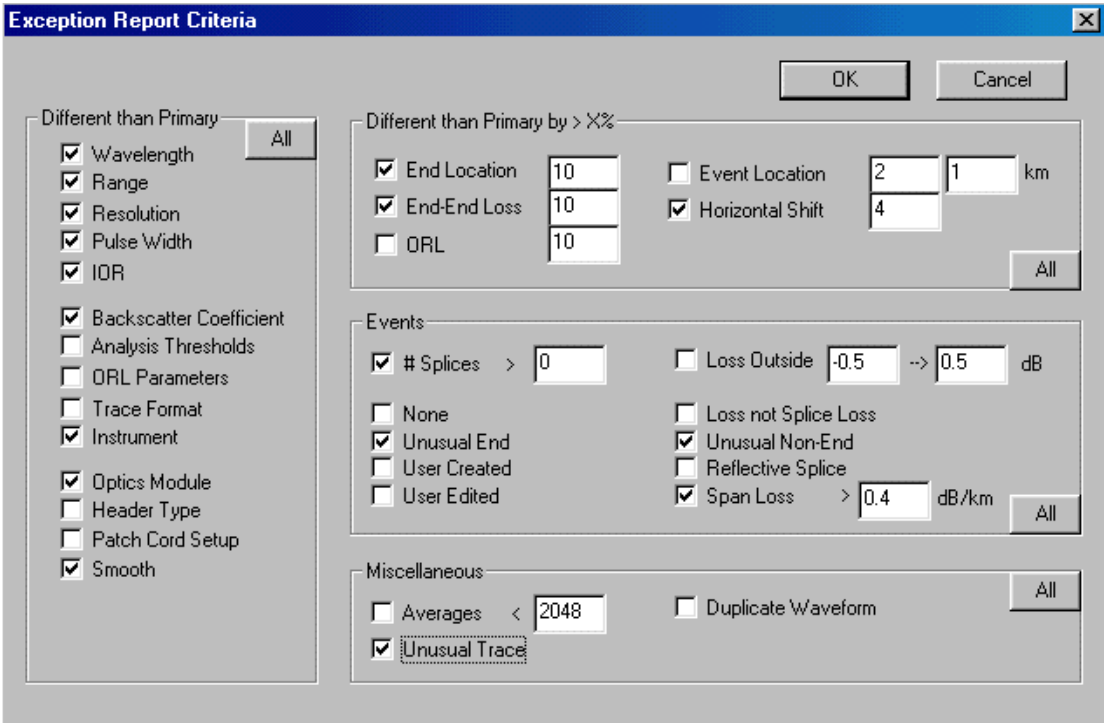

Figure F-2: Exception Report dialog box

CAUTION

Any traces reported by the Exception Report as exceptions should be reviewed and can be removed from the trace list before proceeding with automated processing.

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