

MX907600A
Emulation Software
Operation Manual

Fourth Edition

Read this manual before using the equipment.
Keep this manual with the equipment.

Measurement Solutions
ANRITSU CORPORATION

MX907600A
Emulation Software
Operation Manual

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About This Manual

This operation manual explains the operation of the MX907600A Emulation Software.

This manual assumes that you thoroughly understand the function of the MW9076 Series Optical Time Domain Reflectometer (OTDR) and basic operation of the MS-Windows.

In this manual, “MS-Windows” and “Windows” mean the Microsoft Windows 95, 98, Me, NT, 2000 or XP.

This software involves and uses the following DLL with a license agreed:

UNZIP32.DLL (c)1993-1999 CSD, inc. and Shoda T. based on Info-ZIP group

This equipment can be controlled by a computer which can also analyze the measurement results; refer to the following operation manual for details of the computer interface.

MW9076 Series Operation Manual (M-W1659AE)

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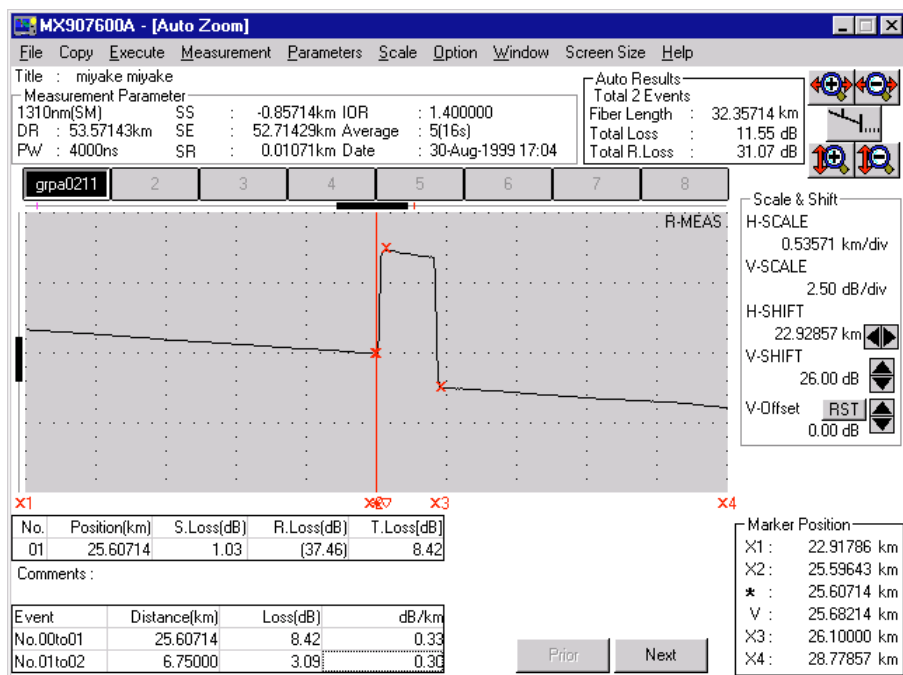
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1.1 What is the MX907600A Emulation Software? 1-2

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1.1 What is the MX907600A Emulation Software?

The MX907600A Emulation Software is software that allows most of the functions of the MW9076 series Optical Time Domain Reflectometer to be emulated using MS-Windows. It enables waveform data saved to a floppy disk by the MW9076 series to be read and analyzed using a personal computer.

After the optical fiber has been scanned, almost the MW9076 series functions can be emulated on a personal computer.

In addition, this software equips Waveform Comparison function which displays the difference between two waveforms as a new waveform and the Both Ends Measurement function which composites and displays a pair of waveforms measured from the each end of the optical fiber.

Up to eight optical fibers with different measurement conditions and refraction indexes can be displayed and compared.

Up to 200 files with the same measurement conditions can be simultaneously read, displayed, calculated, and judged.

The MX907600A Emulation Software can read data files that have been saved in a floppy disk in two modes: the analysis mode, and the print mode, by the MW9076 series.

Also, a data file which is saved in the analysis mode, standard mode or print mode of MW9070 OTDR can be read. However, the functions such as Event Auto Search and Editing Events cannot be used with the data file saved in the standard or print mode of MW9070 OTDR

1.2 Functions

Emulation Function

This mode emulates MW9076 series for the functions such as Event Search, Manual Measurement and Chromatic Dispersion that can be executed to read waveforms.

Waveform Comparison Function

This function displays the difference between two waveforms as a new waveform in another window. This function is useful for investigating the aging characteristics of an optical fiber from the previously-measured waveform and the current waveform.

Both Ends Measurement Function

This function measures a waveform which is composed of two waveforms measured from each end of an optical fiber. This is useful for accurate measurement of the splice losses in a fiber composed of fibers with different mode field diameters.

Multi Fiber Measurement Function

This function can read and display up to 200 waveforms measured under the same conditions. Event search, manual measurement, and GO/NO-GO judgment are available. This mode is convenient for multi fiber measurements, GO/NO-GO judgments, and checking for aging of a specific fiber over time.

Remote File Transfer Function

The data file recorded in the MW9076 series OTDR can be transferred to the personal computer via RS-232C. Thus, huge data stored in the OTDR can be easily copied to the hard disk drive of the personal computer and analyzed by the emulation software.

Use the cross cable recommended in the MW9076 series OTDR as the serial cable for Remote File Transfer.

Report Output

A lot of measured waveform data can be collectively printed at a time.

This function is very convenience as it is possible to composite and output a lot of data measured from both ends of a fiber by the especially easy operation.

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2.1 Operating Environment

This software runs under the following operating environment.

Computer

Pentium 150 MHz or better CPU running Windows 95 SP1, 95 OSR2, 98, Me, NT 4.0 Work Station (Service Pack 5 or more), 2000 Professional, XP

OS

Windows 95 SP1, 95 OSR2, 98, Me, NT 4.0 Work Station (Service Pack 5 or more), 2000 Professional, XP

One of Excel 97 and 2000, 2002 is installed when output the report to Excel files. (64 MB is recommended.)

Memory

At least 32 MB of free memory (64 MB recommended)

When the Multi Fiber Measurement mode is used, up to 32 MB must be added, depending on the number of waveforms to be read.

Additional memories are needed to start MS-Excel and to make files by MS-Excel.

Conditions for the memories vary by the amount of files to be made and the versions of MS-Excel.

Hard disk

At least 20 MB of free space to install

Printer spool may need a large capacity in case of Batch Print and Report Output according to the number of pages to output.

MX907600A may fail to output correctly when running short of vacant capacity.

Disk drive

Disk drive which can read CD-ROM

Display

640 × 480 or better color display

Other

Pointing device (such as mouse able to run under Windows 95 SP1, 95 OSR2, 98, Me, NT 4.0 Work Station (Service Pack 5 or more), 2000 Professional, XP) is required.

CAUTION

Output with MS-Excel may not work properly with a computer which contains more than two MS-Excel of different version.

2.2 Installation Procedure

Installation is simple using the SETUP program provided on the MX907600A CD-ROM.

- (1) Application and permanent residence software in use are ended before installing "Emulation Software".
- (2) Insert MX907600A CD-ROM into the personal computer CD-ROM drive.
- (3) Click on My Computer and select the CD-ROM drive into which the MX907600A disk was inserted. Then open an "English" folder.
- (4) Double click SETUP.EXE from the displayed files.
- (5) The software is installed automatically in accordance with the setup program.

CAUTION

Do not start up simultaneously with another version of the MX907600A.

In addition, when starting this software after starting another version of the MX907600A, there is a possibility that the operation may not be normal due to differences in the DLL version.

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3.1 Starting and Quitting of MX907600A

3.1.1 Starting MX907600A

When the MX907600A icon is clicked, the following Main Window is displayed.

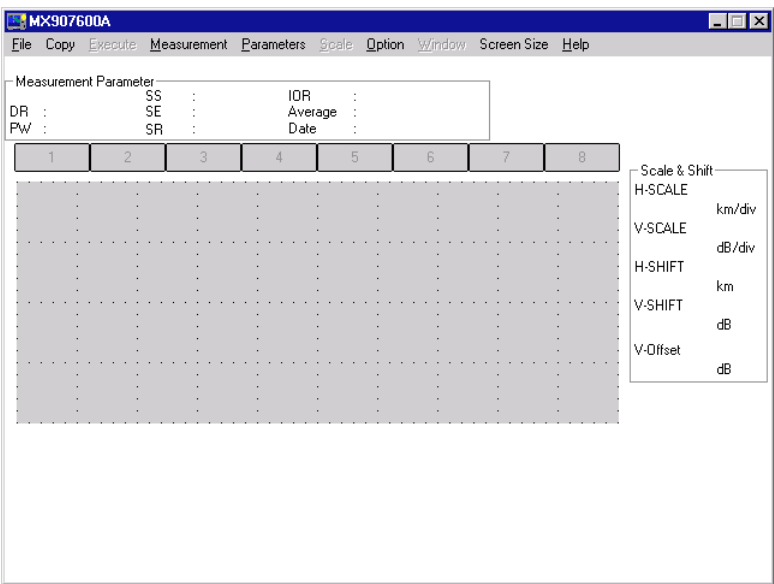


Fig. 3-1 Start-up Screen (Main Window)

Next, click the [File] menu to read a data file. The following dialog box is displayed when "Open" in the displayed menu is clicked.

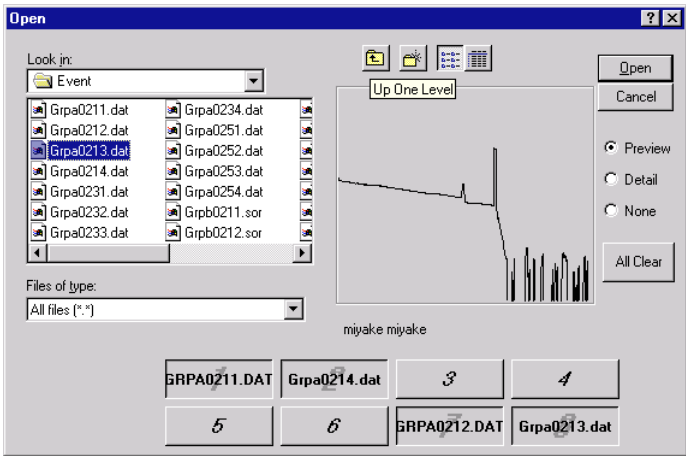


Fig. 3-2 Reading File

Either data that has already been saved by the MW9076 series Optical Time Domain Reflectometer, or data that has been saved by this software can be read. Select files and click [OK] button to start reading the files. Multiple files can be read at a time.

Refer to chapter 4.1 Main Window for more information.

To set the measurement mode, click the [Measurement Mode] at the [Measurement] menu. The following dialog box is displayed.

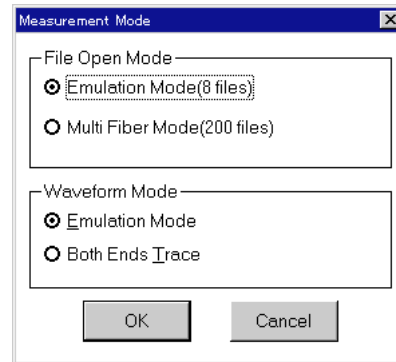


Fig. 3-3 Measurement Mode Display

In the File Open Mode field, select either “Emulation Mode (8 files)” or “Multi Fiber Mode (200 files)” to open the file.

Select either a normal waveform or a both end composite waveform in “Waveform Mode” field to display the waveform. The choice in this field is available only when “Emulation Mode” is selected in the “File Open Mode” field.

When the read waveform was saved in the MW9076B/B1/C/D Event Table screen, the symbol is displayed at Auto Search in the Measurement menu. When the read waveform was saved at the “Manual” screen, the symbol is displayed at “Splice & Return Loss” or “Loss & Total Return Loss” in the Measurement menu.

Select Emulation mode in the File Open Mode field when the file is saved in Chromatic Dispersion Waveform.

3.1.2 Quitting MX907600A

To quit the MX907600A emulation software, select [Exit] button at “File” menu.

3.2 Names and Functions of Each Part

Check the names and functions of each part of the menus. The following diagram shows the screen when reading a waveform saved in the manual mode.

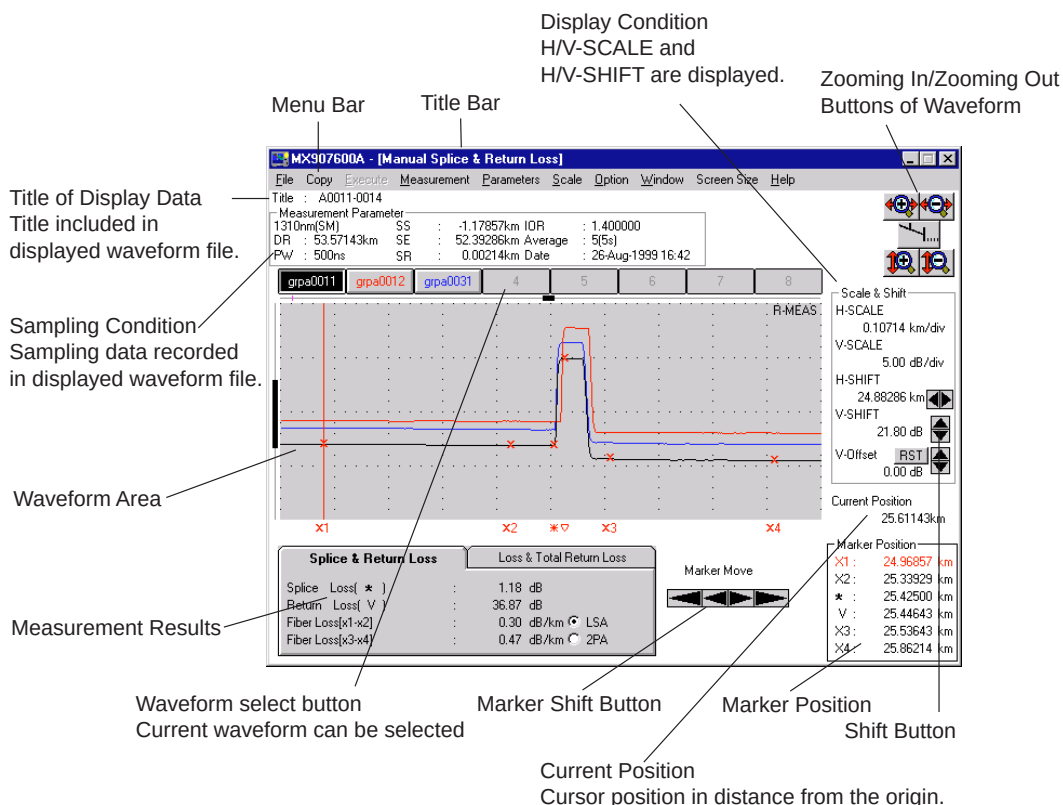
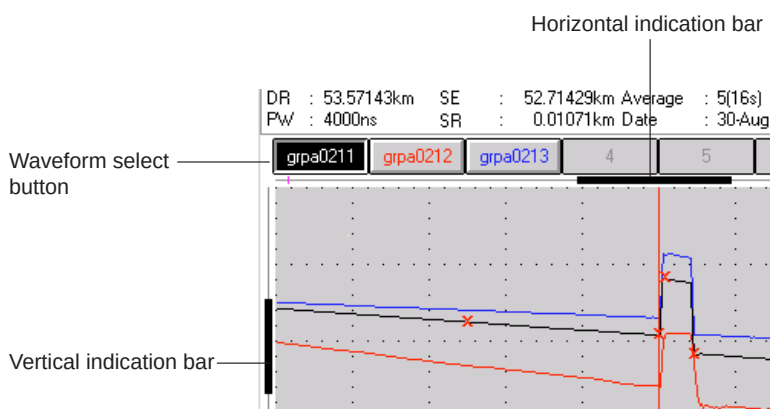


Fig. 3-4 Names and Functions of Each Part



When file is opened, horizontal indication bar and vertical indication bar is displayed on the [Waveform selection] button. The file name is displayed in the same color as the waveform color.

The waveform clicked by the mouse is the selected waveform. The waveform selection button of the selected waveform is highlighted.

The popup menu including the menus such as [Open], [Close], and [Display] (or [Not Display]) is displayed by right-clicking the mouse.

- [Open]: Reads the file to the waveform selection button.
- [Close]: Closes the file read in the waveform selection button.
- [Not Display]: Deletes the waveform displayed in the waveform selection button.
However, since the file contents are stored, the waveform is recovered by right-clicking the waveform selection button and then selecting the [Display] menu.
This function is useful to delete the waveform temporally to make the screen easy to see when the plural waveforms are displayed.

The horizontal display bar is displayed in the upper part of the range to display the waveform, and vertical display bar in the left side. The horizontal indication bar and vertical indication bar indicates the size rate and position of the displayed zoom-in waveform compared to the full waveform. Dragging the bars can move the displayed waveform.

3.3 Basic Operations

(1) Selecting Markers and Events

When the marker to be selected is clicked using the mouse at “Marker Position” at the bottom right of the “Splice & Return Loss”, “Loss & Total Return Loss” screen, the line marker moves and that marker is selected. When the event to be selected from the Event Table or the point near to the event to be selected on the waveform is clicked, the line marker moves and that event is selected.

In addition, when selecting a marker or event to the right of the currently selected marker or event, select Next Event/Marker in the [Measurement] menu. Similarly, select Prior Event/Marker to select the marker or event to the left of the currently-selected marker or event.

(2) Moving Marker

Move the mouse cursor to the position of the marker to be moved on the waveform screen. The position specified by the mouse cursor is displayed at “Current Position” at the bottom right of the screen. When the left mouse button is clicked, the selected marker moves to the position of the mouse cursor. When the right mouse button is clicked on the waveform screen, a pop-up menu appears. When Position in this menu is clicked, a window is opened and the clicked position is confirmed. The marker can then be moved.

In addition, when the required marker position (distance) is input at “Marker Position” in the Measurement menu, the selected marker moves to that position. The [Marker Shift] button displayed in the “Manual Measurement” screen allows precise setting of the marker position.

(3) Zooming In/Zooming Out of Waveform

The trace waveform is zoomed so that a selected marker or event is located at the center of the screen.  and  can be performed by either clicking the  and . To display the whole waveform at the maximum vertical and horizontal axis scales, click the  button.



In addition, waveform zooming-in/zooming-out can also be performed by selecting the following items at the Scale menu.

- Horizontal Zoom-IN : Zooms-in horizontal axis
- Horizontal Zoom-OUT : Zooms-out horizontal axis
- Vertical Zoom-IN : Zooms-in vertical axis
- Vertical Zoom-OUT : Zooms-out vertical axis
- Full View : Displays whole waveform at maximum vertical and horizontal axis scales

(4) Horizontal Shifting/Vertical Shifting of Waveform

When the [H-SHIFT] or [V-SHIFT] buttons are clicked, the waveform is moved horizontally or vertically, respectively.

In addition, horizontal shifting and vertical shifting can be performed by selecting [Shift] at the [Scale] menu and then inputting the shift position.

Only the selected waveform can be shifted when the plural waveforms are displayed in the screen.

The vertical-axis offset can shift only the selected waveform. The waveform is shifted to the vertical direction gradually to display in the position to be compared easily.

Use the reset button to return all the waveform to the original position. All the waveform returns to the original position immediately.

(5) Saving and Printing Waveforms

The waveform is saved by selecting [Save] at the [File] menu. When [Save As] is selected, the waveform can be saved under a different file name.

The measurement results and waveform data is printed by selecting [Print] at [File] menu.

The printer can be selected and setup by [Print Setup] at the [File] menu.

(6) Measurement

Auto Search, Auto Zoom and Manual measurement can be applied to current waveform.

In the “Multi Fiber Measurement” mode, Auto Search is executed for the current file and the detected event position can be applied to the remaining files. To execute Auto Search for a another file, make the required file to the current file.

(7) Clearing Waveform

Select the [Waveform Clear] at the [File] menu to clear the waveform.

Or, move the mouse to the waveform selection button and right-click to select [Close] from the popup menu.

Select “All Clear” in the “Open File” dialogue box to clear whole waveform.

3.4 Convenient Operation Method

3.4.1 Changing Display Range

The horizontal axis shift and vertical axis shift can be changed using the following method, in addition to clicking the [H-SHIFT] and [V-SHIFT] buttons or inputting a numeric value using [Shift] of the [Scale] menu.

- (1) Display the “Full Waveform” window using [Full Waveform] of the [Window] menu. Part of the “Full Waveform” window is displayed with a yellow box. This box indicates the range of the waveform currently displayed in the “Main” window. When you drag this yellow box, the display range of the waveform in the “Main” window also changes.
- (2) There is a black horizontal axis bar and a black vertical axis bar at the top and left sides of the “Main” window waveform area, respectively. These bars indicate which part of all the current waveform is being displayed. When you drag these black bars, the display area of the waveform displayed in the main window also changes.



3.2 Names and Functions of Each Part

(Horizontal axis bar and vertical axis bar)

3.4.2 Calling Any Function with Ease Using Mouse

Function direct-calling methods without using the menu-bar menus are available, as shown below:

- (1) Using clickable label
When the mouse cursor is moved to “Title” in the “Main” window, the mouse cursor changes to the characters “Title”. If the left mouse button is clicked in this state, a screen to input a title is displayed.
IOR, title, fiber end, and LSA/2PA are also clickable labels.
- (2) Using Pop-up menu
Click the right mouse button in the waveform area of the main window. When a waveform is read, a pop-up menu containing a “Position” menu, a “Copy to clipboard” and “Adjust” menu is displayed.
In addition, a pop-up menu that has the “Adjust,” “Position,” “Delay,” “Dispersion,” “Slope,” and “Copy to Clipboard” options will be displayed by clicking the right button while a chromatic dispersion waveform is displayed.

When the right mouse button is clicked in the event table, loss-calculation results, or other measured-result display area, a pop-up menu with “Event Table”, “Auto Zoom”, “Splice & Return Loss”, “Loss & Total Return Loss” menus is displayed. The measurement mode can be quickly changed using this menu.

The popup menu including the three menus, [Open], [Close], and [Display] (or [Not Display]), is displayed by right clicking on the waveform tag.

Example: Performs Both Ends Measurement, and summarizes the results in a report.

1. Two files for Both Ends Measurement from Explorer to MX907600A, and then read them.
2. Choose [Measurement] – [Measurement mode] to select “Both Ends Measurement in the waveform” mode.
3. Move the cursor to the position where the fiber end is desired to be specified, and click the right mouse button. Select “Set Fiber End” on the displayed pop-up menu to set the fiber end.
4. Select “Both” on the waveform selection tab.
5. Click the right mouse button in the measurement result display area, and select “Event Table” on the displayed pop-up menu.
6. Click the right mouse button in the waveform display area, and select “Copy to Clipboard” on the displayed pop-up menu. Paste the waveform from the clipboard to a document of a word processor.
7. Select “Event Table” from [Copy] menu to transfer the contents of the event table to the clipboard.

3.5 Emulation

3.5.1 Event Auto Search Function

This function searches for events automatically and displays the Event Table.

First, set the threshold level at [Measurement Parameters] of the [Parameter] menu. Next, select [Event table] at the [Measurement] menu, and the “Event table” is displayed. To execute the event auto search, select [Execute] at the [Execute] menu, and a new event table is displayed.

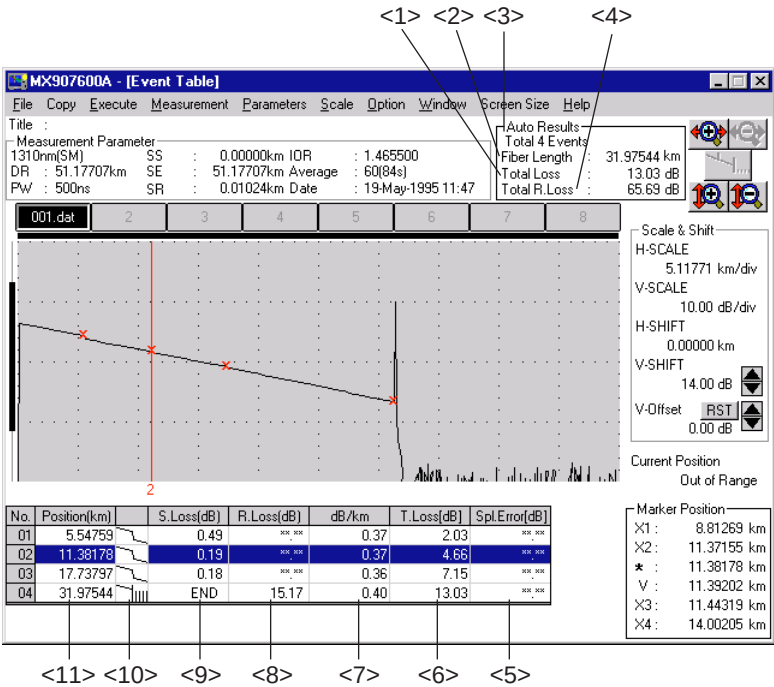


Fig. 3-5 Event Screen

- <1> Total Loss Loss from near end or measurement start to far end of fiber
- <2> Fiber length Out of range is displayed when the fiber length cannot be measured
- <3> Total 4 events Total number of events (4 in this case)
- <4> Total Return Loss Total return loss from near end or measurement start to measurement end
- <5> Spl.Error [dB] Splice error
- <6> T. Loss [dB] Loss from near end or measurement start of cable to event
- <7> dB/km Attenuation coefficient
- <8> R. Loss [dB] Return loss
- <9> S. Loss [dB] Splice loss
- <10> Event Type Event type
- <11> Position (km) Event position

The numeric value in () at the “S. Loss” and “R. Loss” displays indicates items below the threshold value. Example: (–0.11) or (46.82)

The < symbol attached to the left of the numeric value at the “R. Loss” display indicates that the event is saturated by Fresnel reflection. Example: < 43.42

When **, *** is displayed at “S. Loss” or “R. Loss”, it indicates the presence of a nearby event that cannot be measured precisely.

When ! mark is displayed in No. column, it indicates that there are measurement items which exceed the set threshold level. This is only indicated when files saved with the fixed event function is opened.

Items with the ? symbol appended in the No. column are ghost events.

This symbol is displayed only at files that were measured and saved with the MW9070B ghost detection function set to ON, or files that were edited events as ghost by this software.

Items with the * symbol appended in the No. column are events that have been edited after auto detection using the Event Table function.

(1) Setting Threshold Value

Select [Measurement Parameters] on the [Parameter] menu.

Set the threshold values of the following items for event detection in the displayed dialog box:

Splice Loss
Return Loss
Fiber End

Of the events with a splice loss greater than the value set in the fiber-end threshold value, the event closest to the near end is made the far end of the fiber.

(2) Selecting Events

An event can be selected by clicking the event in the “Event Table”, or by clicking the nearest point to the event on the waveform. Also, pressing the Tab key several times by and then press the return key after selecting an event by using the [up]/[down] or [left]/[right] keys.

In addition, the event with the next number after the currently-selected event can be selected by clicking [Next Event/Marker] in the [Measurement] menu. Likewise, selecting [Prior Event/Marker] selects the event with the previous number.

(3) Inputting Event Comment

Select [Event Comments] in [Measurement] menu to set the comment for each event.

(4) Displaying Event Information Window

Selecting [Event Information] at the [Window] menu opens a new window to display the event information.

Notes:

1. When the threshold or back scatter level is changed, event search is repeated automatically and the event table is updated.
2. The positions of virtual markers for the selected event are displayed at “Marker Position”. However, markers cannot be selected or moved.
3. “LSA/2PA” cannot be selected.

3.5.2 Fixed Function

The Fixed function is a function of MW9076B/B1/C/D OTDR and MX907600A Emulation Software can open the files saved when the Fixed function is ON.

The Fixed function fixes the contents of the “Event Table” and recalculates the splice loss, return loss and total return loss, etc.

The fixed contents are:

- 1) Position of Event Markers, and
- 2) Event Comments.

The recalculation is performed:

- 1) When the threshold for the splice loss, return loss and fiber end is changed,
- 2) When the horizontal offset is changed, and
- 3) When the backscatter level is changed.

The Fixed function is released when [Event Table] or [Auto Zoom] is selected from the [Measurement] menu and then [Execute] of the [Execute] menu is selected. This emulation software does not offer a method for setting the Fixed function, so if the Fixed function must be set to ON again, the file must be re-loaded.

When the Fixed function is ON, the following items differ from the condition at the Fixed function OFF.

- An exclamation symbol (!) is displayed in the No. column of the event table when either of measurement items exceeds the threshold value.
- Events are not searched when the recalculation is performed.

3.5.3 Auto Zoom

This function centers the selected event on the screen and automatically sets the best values for the zoom-in/zoom-out scales and the horizontal and vertical shift. Select an event from the [Event Table] and then use [Auto Zoom] of the [Measurement] menu.

<1> Displays position of selected event and measurement results

<2> Comments:

Displays comments of selected event

<3> Distance:

Displays distance to events before and after selected event

<4> Loss:

Displays Loss between events before and after selected event

<5> dB/km:

Displays fiber loss between events before and after selected event

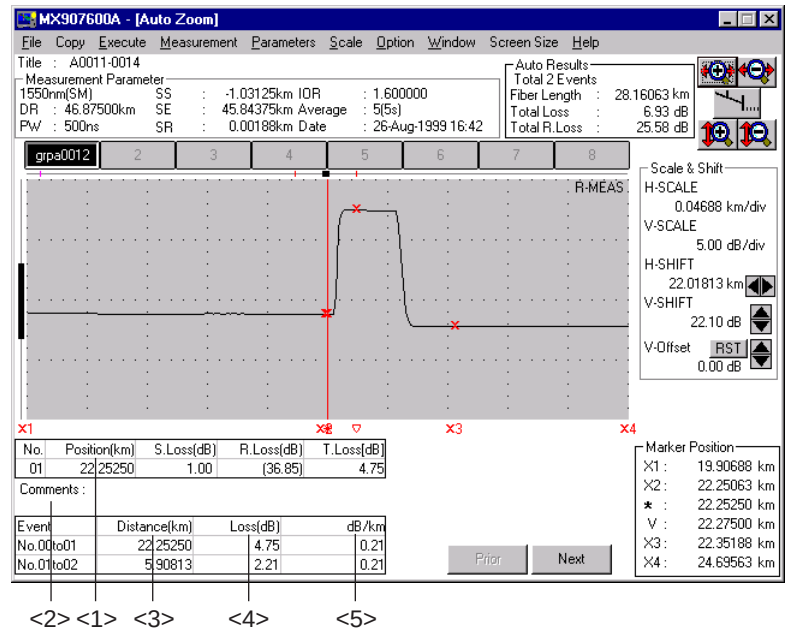


Fig. 3-6 Auto Zoom Screen

- Zooming Next Event or Prior Event**

Click the [Next] or [Prior] button, or press the Tab key several times, select [Next] or [Prior] button and press the Enter key. [Prior] auto zooms to the prior event and [Next] auto zooms to the next event.

In addition, the next event can be zoomed using [Next Event/Marker] of the [Measurement] menu. The prior event is zoomed using [Prior Event/Marker].

- Returning to Event Table**

When [Event Table] is selected at the [Measurement] menu, the "Event Table" screen is returned. The contents of the "Event Table" are not changed at this time because "Re-searching Events" is not executed.

Notes:

1. When changing the threshold or back scatter level, event search is repeated automatically and the display returns to the "Event Table" screen.
2. When changing the event display order, the event table is updated and the event table screen is returned.
3. Markers cannot be selected or moved.
4. "LSA/2PA" cannot be selected.

3.5.4 Editing Events

New events to be registered in, and selected events can be moved in or deleted from the “Event Table”. In addition, event type can be changed.

The following dialog box is displayed when [Editing Events] is selected in the [Measurement] menu.



Fig. 3-7 Specifying Event Editing Method

(1) Add

This adds a new event to the “Event Table”. When Add is selected and [OK] button is clicked, the six markers on the waveform are displayed. When a point on the waveform to be added to the “Event Table” is clicked, the six markers move.

Click the [Execute] button at the bottom right corner of the screen to execute the settings and to add the event. Click the [Return] button to cancel the editing.

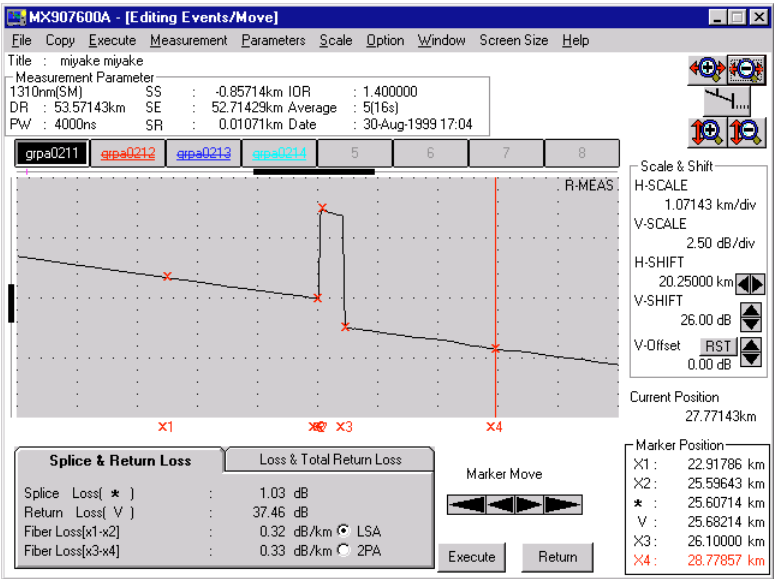


Fig. 3-8 Editing Events Screen

This operation can be executed with the [Execute] menu. When the [Execute] menu on the menu bar is clicked, the following menu can be selected.

(a) Undo

“Undo” sets the scale, shift position, and marker positions to the values at the start of editing.

(b) Execute

[Execute] button executes the settings and adds the event.

(c) Return

[Return] button cancels editing and returns to the “Event Table” or the “Auto Zoom” screen.

(2) Move

“Move” moves a selected event. An event to be moved must be selected before “Move” is clicked on Fig. 3-7. When “Move” is selected and [OK] button is clicked, the zoomed waveform of the selected event is displayed. At this screen, when a point to be moved on the waveform is clicked, the marker moves to the clicked point. Click the [Execute] button at the bottom right corner of the screen to execute the settings and to move the event. Click the [Return] button to cancel the editing as shown in the left page. This operation can be performed with the “Execute” menu.

(a) Undo

“Undo” sets the scale, shift position, and marker position to the values at the start of editing.

(b) Execute

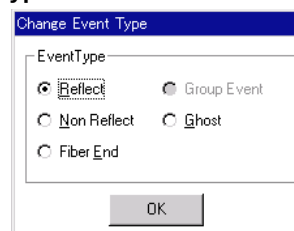
[Execute] button executes the settings and moves the event.

(c) Return

[Return] button cancels editing and returns to the Event Table or the Auto Zoom screen.

(3) Delete

“Delete” deletes the selected event from the “Event Table”. An event to be deleted must be selected before [Delete] button is clicked. When [Delete] button is selected and [OK] button is clicked, the confirmation message box is displayed to confirm whether or not to execute the deletion.

(4) Change Event Type

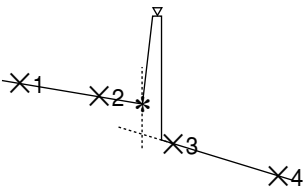
“Change” changes the type of the selected event. An event to be changed must be selected before [Change] button is clicked. When [Change] button is selected and [OK] button is clicked, “Change Event Type” window appears, select the type to change and click [OK] to confirm the type.

3.5.5 Manual Measurement

Splice Loss, Return Loss, Loss, Loss dB/km, and Total Return Loss can be measured manually.
Select either [Splice & Return Loss] or [Loss & Total Return Loss] in the “Measurement” menu.

(1) Splice & Return Loss Measurement

This function measures the event splice loss or the return loss. The following six markers can be used.



- * marker Matched to event position
- ∇ marker Matched to Fresnel reflection
- x1, x2, x3, x4 markers Set x1/x2 and x3/x4 with the more possible separate interval before and after * markers, respectively.

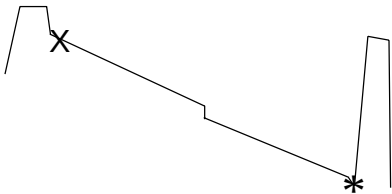
The measurement results are shown in the following diagram.

Splice & Return Loss		Loss & Total Return Loss	
Splice	Loss[*]	:	-42.33 dB
Return	Loss[∇]	:	37.75 dB
Fiber Loss	[x1-x2]	:	0.34 dB/km ☒ LSA
Fiber Loss	[x3-x4]	:	7.15 dB/km ☐ 2PA

- Splice loss at * marker position
- Return loss from * marker to ∇ marker
- x1 to x2 Loss per unit distance
- x3 to x4 Loss per unit distance

(2) Loss & Total Return Loss Measurement

The loss per unit distance (dB/km) between two points is measured. Two markers can be used as follows:



- x marker: Left side of measured interval
- * marker: Right side of measured interval

The measurement results are shown in the following diagram.

Splice & Return Loss		Loss & Total Return Loss	
Loss	(X- *):	3.57 dB	
Fiber Loss	(X- *):	0.33 dB/km	
Total Return Loss	(X- *):	32.97 dB	☐ LSA
Distance	(X- *):	10.71429 km	☒ 2PA

- x marker to * marker loss
- x marker to * marker Loss dB/km
- x marker to Total Return Loss
- x marker to * marker interval

(3) Linear Approximation Method (LSA/2PA)

Either the “LSA” or “2PA” linear approximation method can be set as the method for processing the waveform data between the x1 and x2, and the x3 and x4 markers at “Splice & Return Loss” measurement, or between the x and * marker at “Loss & Total Return Loss” measurement.

“2PA” uses only the data where markers are set. “LSA” uses all data between markers, so it is very effective for sections with large amounts of noise.

3.6 Difference Waveform

This function is useful in investigating aging changes in cables.

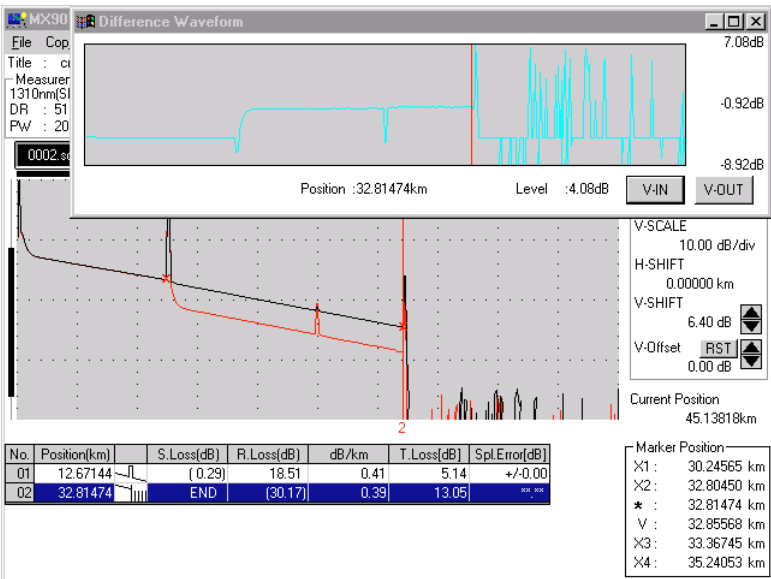


Fig. 3-9 Difference Waveform

When choosing [Window] – [Difference Waveform] at the menu, a dialogue box to select two waveforms is displayed. A difference waveform is created from the selected two waveforms and is displayed on the new window.

Note:

The difference waveform cannot be displayed when there are no sections that overlap in the two waveforms.

3.7 Both Ends Measurement

When several fibers are connected with one cable system, sometimes there may be a difference in the results measured from each end. In particular, the measured splice loss may be different. The difference is caused by differences in the mode field of the connected fibers. As a result, more accurate measurements can be made in this circumstance by combining the waveforms measured from each end of the fiber. The Both Ends Measurement mode combines the two waveforms measured from each end of the fiber as a composite waveform. The “Event Table”, “Auto Zoom”, and “Manual measurement”, etc., functions can be executed in the same way as the MW9076B/B1/C/D. In addition, the composite waveform can be saved as waveform data in the “Print” mode.

Note:

The objective files are OTDR waveform data (“Analysis”, “Standard” and “Standard V.2”) measured by MW9076 and MW9070 (Analysis only for MW9070). “Print” and “Standard” types of files made by MW9070 and MX3607, and files of the other companies can't be used in this function. When sampling Start isn't 0 km in the analysis form for MW9070, this function can't be operated.

Both Ends Measurement cannot be executed when the distance range, pulse width, wavelength Data Points and fiber unit type of the two files are not the same, and when the both files are not saved with MW9076 or MW9070 Analysis Mode.

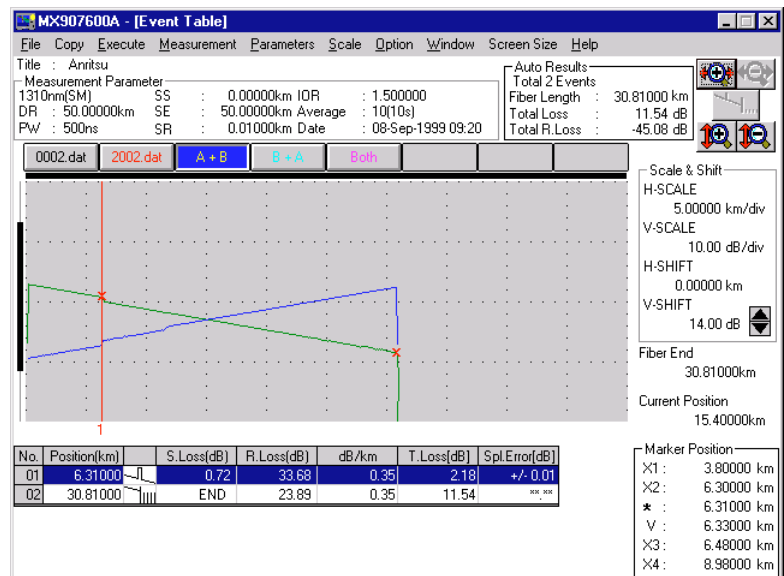


Fig. 3-10 Both Ends Measurement

Composite both ends measurement waveform

- (1) Open the files that are desired to be composed.
- (2) Choose [Measurement] – [Measurements Mode], and then select “Both Ends Trace” in the “Waveform Mode” field.
- (3) Select two Waveforms in the displayed dialogue box. This dialogue box is not displayed if the number of the opened files is two.
- (4) Select waveform on waveform selection tab button, and set fiber end to correct position. To set the fiber end, right-click to choose from the pop up menu or choose [Parameters] – [Fiber End].
- (5) By pressing “Both” of waveform selection tab button, both ends composite waveform is displayed.

Note:

It is impossible to compose a correct composite waveform without setting fiber end correctly.

Measurement

If “A+B” is selected on [Trace select] button, the measurements are applied to waveform A. On the other hand, the measurements are applied to waveform B if “B+A” is selected.

When dummy fiber attached to measured fiber at both ends measurement

When a dummy fiber is attached at the OTDR end of the measured fiber, set the zero cursor to the connection point between the dummy fiber and the measured fiber using the [Horizontal Offset] command of the [Measurement] menu. The calculation is performed as if no dummy fiber is attached.

When a dummy fiber is attached to both waveform A and waveform B, set the zero cursor for both waveform A and waveform B.

3.8 Multi Fiber Measurement

Use the Multi Fiber Measurement mode when performing the same operation and the comparison for many files with the same measurement conditions. For example, use this mode for constructing multi fibers and checking the aging rate in a fiber.

In this measurement mode, up to 200 waveforms can be displayed, simultaneously. Under the same conditions; loss, fiber loss, splice loss, return loss, and total return loss can also be calculated for all the waveforms. Also, in this mode an event table can be displayed and the GO/NO-GO judgment of the splice loss and return loss can be made.

Any operation performed on a selected waveform is reflected in all the remaining files. Therefore, IOR change, screen zoom-in and zoom-out, measurement item change, marker position movement, event-comment input, and other operations can be performed using only one waveform.

3.8.1 Event Table

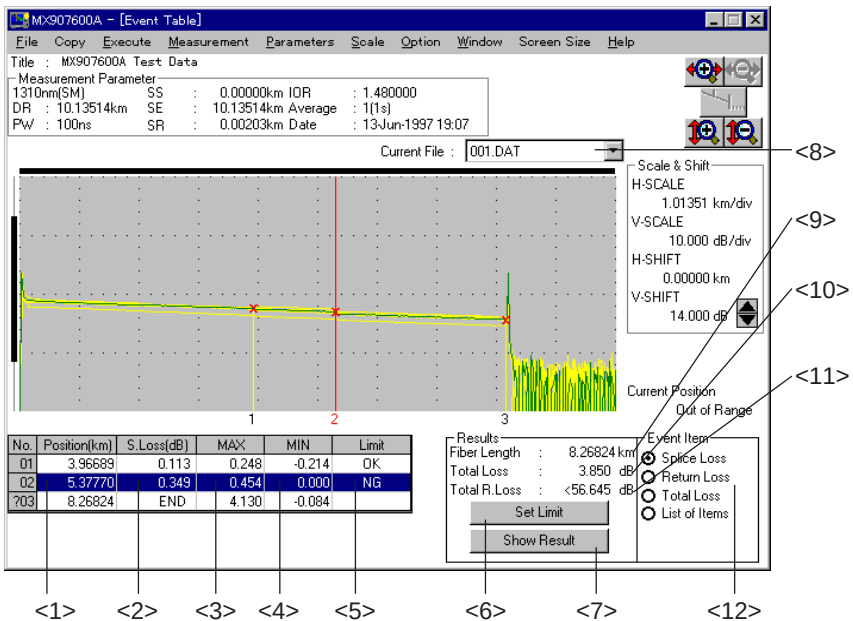


Fig. 3-11 Multi Fiber Measurement Screen (Event Window)

- <1> Position (km) Event position
- <2> S.Loss[dB] Displays the item selected with <12>.
- <3> Max Displays the maximum measurable value in all the files.
- <4> Min Displays the minimum measurable value in all the files.
- <5> Limit GO/NO-GO judgment for limit value set by <6>.
- <6> Set Limit Sets the limit value.
- <7> Show Result Displays the results of GO/NO-GO judgment.
- <8> Current File Selects the file to be operated.
- <9> Fiber Length Distance from near end or horizontal offset to fiber end event.

- <10> Total Loss Loss from near end or horizontal offset to fiber end event.
- <11> Total Return Loss Total return loss from near end or horizontal offset to fiber end event.
- <12> Event Item Selects the item to be displayed in the event table.

Calculation using the same event positions and conditions for up to 200 waveforms can be performed at this window. The limit values at each event and the entire fiber can also be set for GO/NO-GO judgment that displays only the NO-GO items outside the limits.

When the read waveform is saved, the following items are recorded using the same contents:

IOR, event position, event comment, event display order, Auto Search threshold value, selected event No., event table display item, measurement mode, horizontal offset set position, fiber end, display scale, horizontal axis shift position, vertical axis shift position (when Adjust function is not used)

The following items are recorded as unique to each waveform:

Title, waveform, measurement conditions, calculated value of each event point, back scatter level, vertical shift position (when Adjust function is used)

Example:

1. Read the objective file group using the [File] – [Open] menu.
2. Display the “Event Table” screen using the [Measurement] – [Event Table] menu.
3. Make the most typical waveform to the current file using <8> “Current File”.
4. Execute “Event Table” using the [Execute]-[Execute] menu.
5. Correct the marker position using “Move” of the [Measurement] – [Editing Events] menu so that all the objective waveforms can be calculated for the detected events.

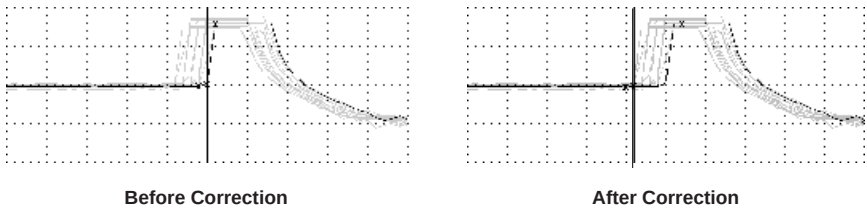


Fig. 3-12 Event Editing

If there were undetected events, add the events using Add of the [Measurement] – [Editing Events] menu.

6. Press the <6> [Set Limit] button to set each limit value. For unused setup items, clear the check box before the number.

 **Fig. 3-13**

When connecting a dummy fiber after the far end of the fiber, set Fiber End at the far-end position of the original fiber using Fiber End of the [Measurement] – [Editing Event] menu. Then, when “Apply for Fiber End Event” is checked in the “Set Limit” dialog, GO/NO-GO judgment including the fiber end event can be performed.

When connecting a dummy fiber before the near end of the fiber, set the zero cursor at the connection point between the dummy fiber and the fiber under test using the [Measurement] – [Horizontal Offset] menu.

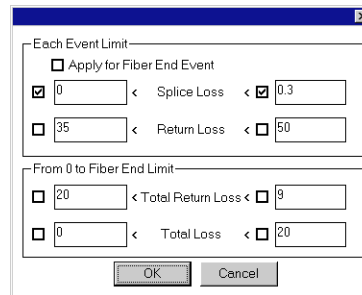


Fig. 3-13 Limit Value Input Screen

The “Each Event Limit” item is judged for each event.

When “Apply for Fiber End Event” is checked, judgment is also performed for Fiber End events.

The From 0 to Fiber End Limit item is judged for the entire fiber.

The objective zone is from the measurement start point or the horizontal offset setup point to the Fiber End event. If there is no Fiber End event, the range up to the measurement end point is judged.

7. When the <7> [Show Result] button is pressed, the GO/NO-GO judgment result dialog is displayed.

When the judgment result is clicked in the GO/NO-GO judgment result dialog, it is selected in the main window.

8. To view an arbitrary calculation item, select the item using <12> “Event Item”.

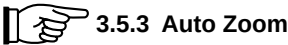
When the waveforms are shifted in the vertical axis direction, and are difficult to read:

Click the right mouse button in the waveform area. Select “Adjust” on the displayed pop-up menu.

Then, the vertical axis direction display position is adjusted at the selected marker position, and the waveforms become easier to read.

3.8.2 Auto Zoom

Operation is identical to para. 3.5.3 Auto Zoom of section.



3.5.3 Auto Zoom

3.8.3 Manual Measurement

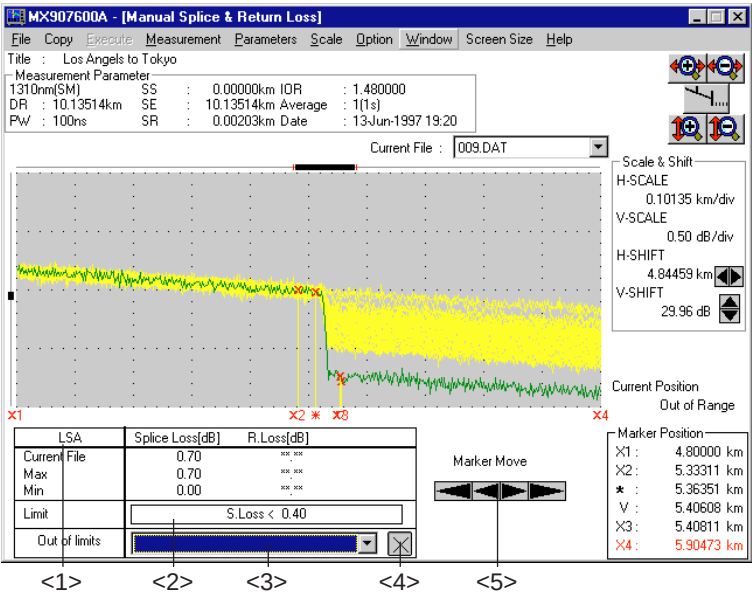


Fig. 3-14 Multi Fiber Measurement Window (Manual Window)

- <1> LSA/2PA Switches between LSA and 2PA.
- <2> Threshold setting Sets the threshold of the file displayed at <3>.
- <3> GO/NO-GO judgment Displays the files that satisfy the conditions set by <2> and <4> in [filename calculated value] format. The files are sequentially displayed, beginning from the file with the lowest calculated value.
- <4> GO/NO-GO switching Switches the display at <3> between those of only files out of the threshold and those of only files within the threshold value.
- <5> Marker move Moves the currently selected marker.

Calculation at the same marker position can be performed for up to 200 waveforms. The maximum/minimum values and calculated result list are displayed in this window. The displayed values of the calculated result list can be restricted according to the specified limitation value; files whose values are equal-to/ greater-than a specified value or lower than a specified value can be searched.

When the read waveforms are saved, the following items are recorded using the same contents:

IOR, marker position, selected marker No., measurement mode, horizontal offset set position, display scale, horizontal axis shift position, vertical axis shift position (When Adjust function is not used.)

The following items are recorded as unique to each waveform:

Title, waveform, measurement conditions, each manual calculation value, back scattered level, vertical axis shift position (when Adjust function is used.)

Example: Search for fibers with a splice loss of 0.4 dB or greater at a splice 5 km among the 14 fibers measured under the same conditions.

1. Start the MX907600A.
2. Select the [Measurement] – [Measurement Mode] menu.
3. Select the “Multi Fiber Mode” from “Measurement Mode” menu in the displayed “File Open Mode” dialog, and click the [OK] button.
4. Read the 14 objective files using the [File] – [Open] menu.



3.8 Multi Fiber Measurement

5. Select the [Measurement] – [Splice&Return Loss] menu.
“The Splice&Return Loss measurement” screen appears.
6. Set the six markers around the splice point as shown in Fig. 3-14



3.8.3 Manual Measurement

7. Since the waveforms are difficult to read, adjust the vertical-direction display position, as shown below:

First, select the * marker and click the right mouse button where the waveforms are displayed.

A pop-up menu appears. Select the “Adjust” on this menu. The waveforms scattered in the vertical direction are grouped at the marker position so that the splice loss at the splice point can be seen at a glance.

8. Click the <2> [Limit] button to display the threshold setup dialog.
9. Set the threshold, as below.

Since we want to search for fibers with a splice loss of 0.4 dB or greater, set the threshold to the following:

Splice Loss < 0.400 dB

10. Click the <4> [GO/NO-GO switching] button to select the display of “GO” or “NO-GO” file names in the <3> [GO/NO-GO judgment] button (result file name list).

When an X is displayed in the button, NO-GO files are displayed.

When a check is displayed in the button, GO files are displayed.

Since we want to display files that exceed the threshold, display X in the button.

11. When the <3> [GO/NO-GO judgment] button [result display list] is clicked, files having a splice loss of 0.4 dB or greater are sequentially displayed, beginning from the file with the smallest splice loss.

In this example,

012.dat 0.412

007.dat 0.455

009.dat 0.697

are displayed. The number displayed at the right side of each file name is the splice loss in dB unit.

12. Select the required file from the displayed file names.

Since the file 009.dat has the largest splice loss in this example, select it.

The example is shown in Fig. 3-14.

13. Print the searched result, as below:

Select the [File] – [Print] menu. Then, the splice loss and GO/NO-GO judgment result for each of the 14 files are printed.

When the waveforms is shifted in the vertical direction and are difficult to read:

Click the right mouse button in the waveform area, and select the “Adjust” from the displayed pop-up menu.

The vertical-direction display positions are adjusted at the selected marker position, and the waveforms become easier to read.

3.9 Chromatic Dispersion

The chromatic dispersion waveform mode is the function of measuring chromatic dispersion by utilizing differences among the positions of the far end of a fiber at each wavelength. Event positions need to be set manually.

- (1) Set the file read mode to emulation to read a file whose extension is “CD?” or “CDM”. The screen as the one shown below is displayed when the file read has been completed:

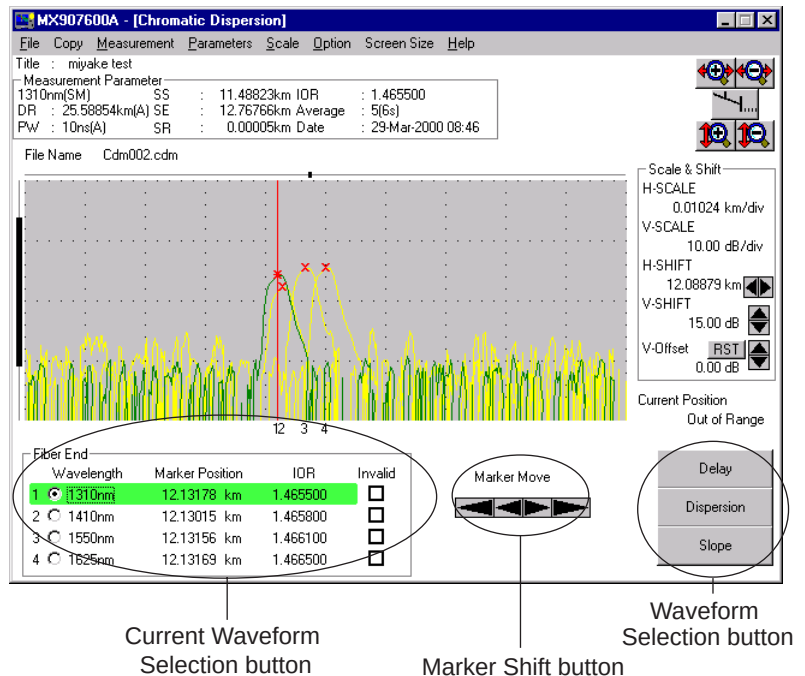


Fig. 3-15 Chromatic Dispersion

- (2) Move the marker onto the far end of the fiber with the [Marker Shift] button or by dragging the mouse.
- (3) When selecting the wavelength with the “Current Waveform Selection”, the end of the fiber is set up at the position.
- (4) Repeat Tasks 2 and 3 for all wavelength.
- (5) Select one of the following three chromatic waveforms by using the [Measurement] menu or with the [Waveform Selection] button:
 - Delay waveform
 - Chromatic dispersion waveform
 - Slope waveform

(6) The Chromatic Dispersion Waveform screen is displayed.

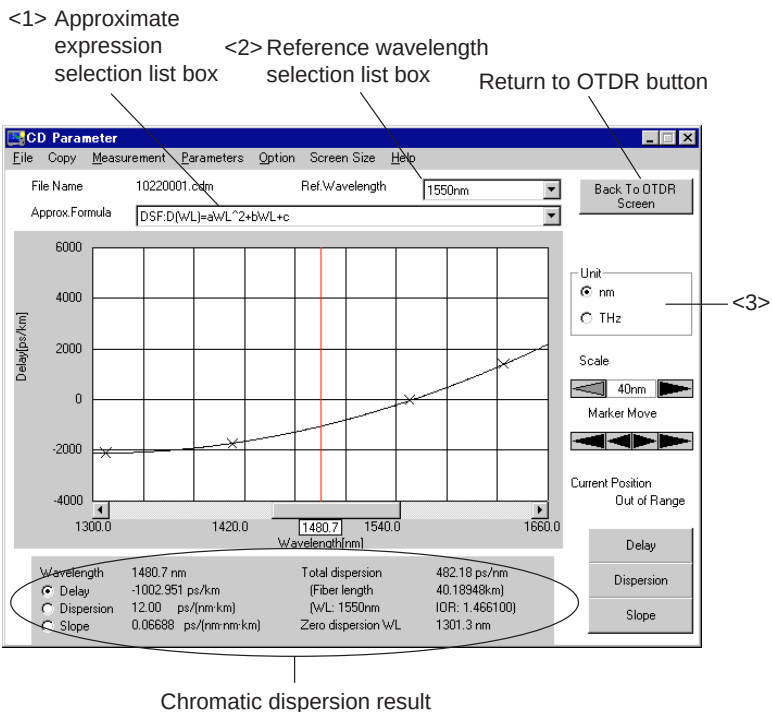


Fig. 3-16 Chromatic Dispersion Screen

(7) Select the <1> approximate expression and <2> reference wavelength from the list box on the upper part of the screen.

Approx. Formula

Select an approximate formula to perform delay calculation in CD calculation.

An approximate formula can be selected from the three types listed below, depending on the type of fiber.

Select SMF and DSF when you are using a single mode fiber and a dispersion-shifted fiber, respectively.

Five-term Sellmeier (Any) can also be selected as another option.

SMF $D(\lambda) = a + b\lambda^2 + c\lambda^{-2}$ (Sellmeier)

DSF $D(\lambda) = a\lambda^2 + b\lambda + c$ (Quadric)

Any $D(\lambda) = a\lambda^4 + b\lambda^2 + c + d\lambda^{-2} + e\lambda^{-4}$ (Five-term Sellmeier)

Ref. Wavelength

Select a reference wavelength from the four wavelengths.

A reference wavelength here refers to a wavelength which is set as a reference for delay calculation. More specifically, calculation is performed in such a way that the delay equal to zero at this wavelength. In addition, the distance to be used for calculation is determined by this wavelength. Normally, select a wavelength where IOR of the fiber is already known.

- (8) Moving the marker updates the measured results being displayed in the lower section of the screen. Select wavelength (nm) or frequency (THz) with <3> for an unit of horizontal axis. Clicking “Waveform Selection” button will display other waveforms.

Result table of CD measurement

The result of the Chromatic Dispersion (CD) measurement is listed in a table. Select the specific frequency spacing (Grid frequency) which is set by ITU-T G.692, or input any desired frequency spacing.

(1) ITU-T Grid frequency display

Select [Measurement]-[Result Table] on the menu of the Chromatic Dispersion window to display the result table dialog.

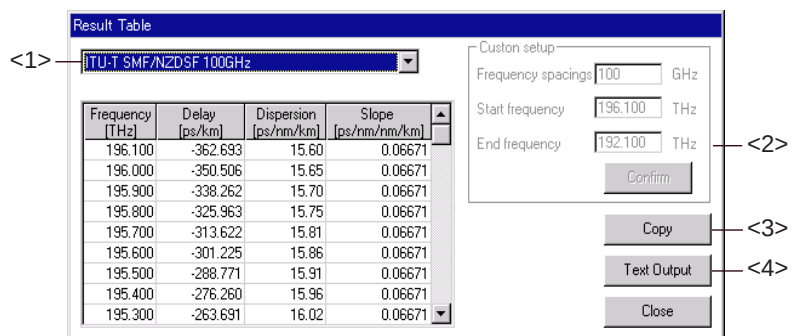


Fig. 3-17

Select the Grid frequency using <1>.

See “Appendix A List of ITU-T Grid frequency” for more information.

When setting Grid frequency to any desired one; select “Custom” at <1>, then input “Frequency spacing”, “Start frequency” and “End frequency” at <2>. Press [OK] to list the corresponding result in the table.

1001 lines can be listed in the table.

Available range of the “Start frequency” and “End frequency” is 240.000 to 180.000 THz.

Available range of the Frequency spacing is 1 to 999 GHz in 1 GHz steps.

(2) Copy

Press the [copy] button <3> to copy the contents of the table to the clipboard.

(3) Text output

For outputting the contents of the table to a file, press the [Text output] button <4>, then specify the file name and the save destination at the displayed dialog box. The file extension becomes “.CSV”.

3.10 Remote File Transfer

Remote File Transfer Function of the emulation software can remote control the OTDR and bring the data file stored in the OTDR to the PC. It also can transfer the date in the PC to the OTDR. The OTDR that can execute this Remote File Transfer Function is only the software after version 2.0 of the MW9076 series. The main body of the MW9070 cannot execute this function. The PC and the OTDR are connected with the RS-232C cable. “The Remote File Transfer” Screen below is displayed by selecting [Remote File Transfer] in [File] menu.

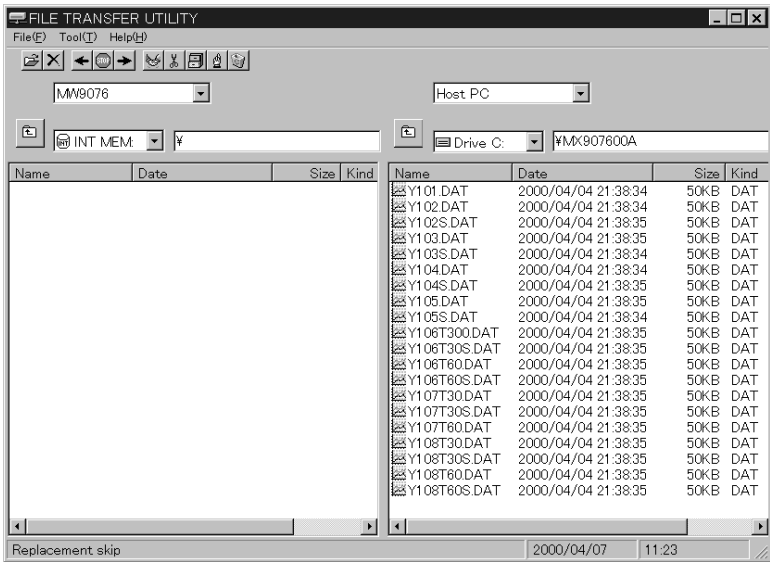


Fig. 3-18 File Transfer Utility Screen

3.10.1 Connection

(1) Connect the serial interface cable.

Connect the RS-232C connector of the PC in which the emulation software is installed and the RS-232C-1 (9-pin connector) of the MW9076 series OTDR with the RS-232C cable. Use the cross cable recommended in the MW9076 series OTDR as the RS-232C cable (serial cable).

(2) Set the RS-232C of the PC.

The following RS-232C setting screen is displayed by selecting [Option] in [Tool] menu in the “Remote File Transfer” Screen.

Select the port number to which the RS-232C cable is connected, and set the same setting as the setting of the OTDR to connect.

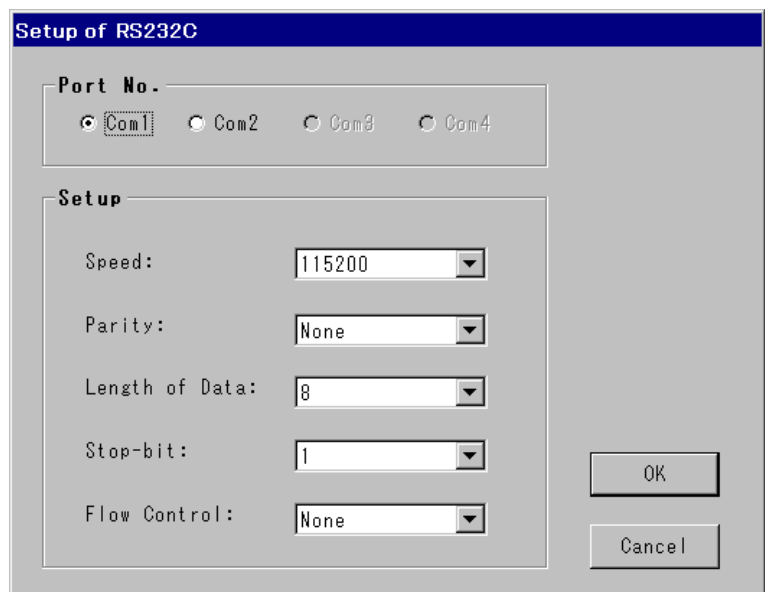


Fig. 3-19 RS-232C Setting Screen

The larger the communication speed, the faster the transfer.

When the transfer becomes faulty, decrease the speed step by step.

(3) Set the RS-232C of the OTDR.

Set the serial port of the OTDR, RS-232C-1, to the same as setting of the PC. Set the connection to “Ack & Nack.”

Refer to “MW9076 Series Operation Manual” for the details.

(4) Connection

Click the [connection] button at Fig. 3-20 <18> of the “Remote File Transfer” Screen to set the one drive box to MW9076. The file names recorded in the file list box are listed when it is connected correctly. If it is not connected correctly, check the setting of “RS-232C” again.

Perform the file operation on OTDR side and connection at the time when the OTDR does not perform a measurement.

3.10.2 File Operation

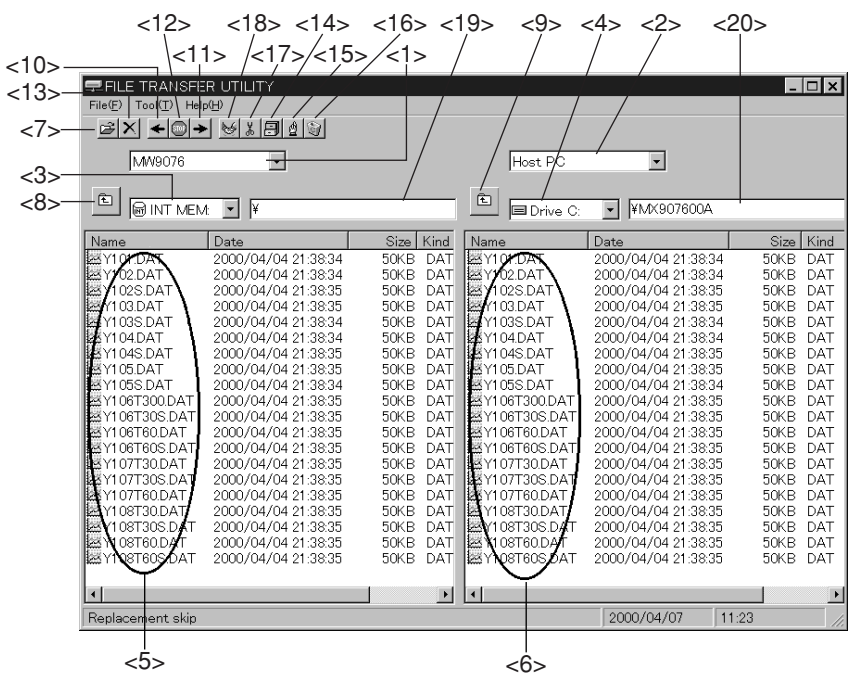


Fig. 3-20 FILE TRANSFER UTILITY

- (1) Specify from and to where to transfer.
Specify from and to where to transfer using <1> and <2> above.
The parameter to be selected is MW9076 or Host PC.

Specify the media of the OTDR and the drive of Host PC using <3> and <4> in the figure above.

The files or the directories in each media or drive are listed in <5> and <6>. The directory moves to the lower folder by double-clicking and updates the file list. Click <7> to move to the selected folder.

Moves to the upper folder using <8> and <9>.
Displays the current directory in <19> and <20>.

(2) Select the file.

Click the file name to select the file displayed in <5> and <6>.

To select the plural files, to press the Shift key and click the file names, or the Ctrl key and click them.

- To sort the files by the item, double-click the tabs such as Name, Date, Size, Kind. However, the folder name and file name are not distinguished in Name.
- The date of the system file is not displayed.
- The display format of the date is fixed in YYYY/MM/DD HH:MM:SS.
- The file whose size is under 1 k byte is displayed as 1 k byte.

(3) Execute the transfer.

Execute the transfer of the files selected using <10> and <11>.

Clicking <10> moves the file selected in the left box to the right box.

Clicking <11> moves the file selected in the right box to the left box.

Clicking <12> cancels the transfer.

The file transfer progress bar increases with each completion of one file transfer.

When only one file is transferred, the progress bar may not appear depending on the PC used.

- The maximum numbers of the directories and files to prepare in one directory are 1,100.
- The stop of the file transfer is done in file unit. The current file transfer is done to the end of the file, and is not interrupted intermediately.

(4) Prepare a new folder.

Click [New Folder Preparation] in [File] menu to prepare the new folder in the folder currently pointed by the cursor.

(5) Delete the file.

Clicking <13> deletes the currently selected file.

(6) Update the latest information.

Clicking <14> updates the latest file information.

(7) Change the file name.

Clicking <15> changes the name of the file currently selected.

(8) Format the drive of the OTDR.

Clicking <16> executes format of the drive of the OTDR.

3.10.3 Disconnection

Clicking <17> disconnects the connection with the OTDR. Clicking <18> connects it again.

3.11 Report Output

A lot of measured waveform data can be collectively printed at a time. This function is very convenience as it is possible to composite and output a lot of data measured from both ends of a fiber by the especially easy operation.

The report output follows the next procedures. Explanation of each screen is performed by each section.

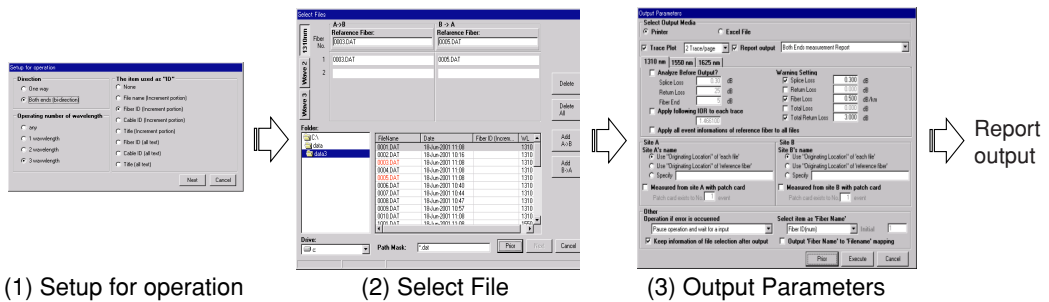


Fig. 3-21

3.11.1 Setup for Operation

Select [Report Output] in [File] menu, then the “Setup For Operation” window appears as follows.

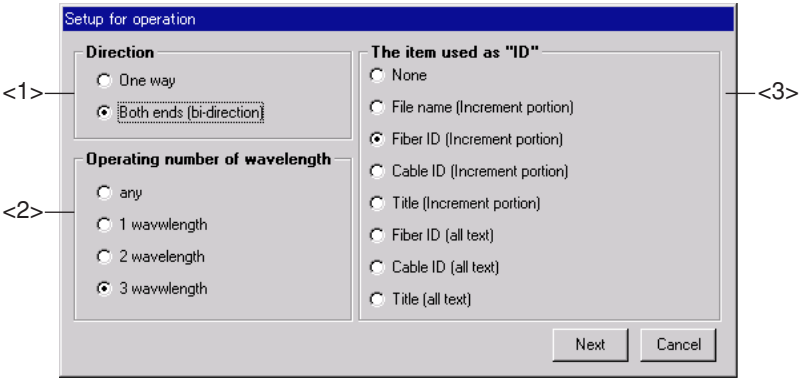


Fig. 3-22

Set up the conditions of waveform data to output before selecting files.

- <1> At first, select the one way or both ends (bi-direction) on “Direction”. When “Both ends” selected, the waveform data of “A to B end” and “B to A end” are combined in the report.
- <2> Choose the number of wavelength used to measure the target fiber on “Op-erating number of wavelength”. When “Any” selected, a selection of files on the next “Select Files” screen can be done independently on the wave-length. At this time, forms of report are “Trace Summary Report” and “Event Table” of one-way measurement only.

<3> Select the ID type from “The item used as ID”. The “ID” means all the information used to identify the fibers.

The selected ID is displayed on the next “Select Files” screen. ID is useful to sort and search for the files of the same fiber. Press the [Next] button after the setup. The next screen “Select Files” appears.

3.11.2 Select Files

Next, select the files to output the reports on this screen. The objective files are OTDR waveform data (“Analysis”, “Standard” and “Standard V2” types) measured by MW9076 and MW9070 (“Analysis” only for MW9070). “Print” and “Standard” types of files made by MW9070 and MX3607, and files of the other companies can’t be used in this function.

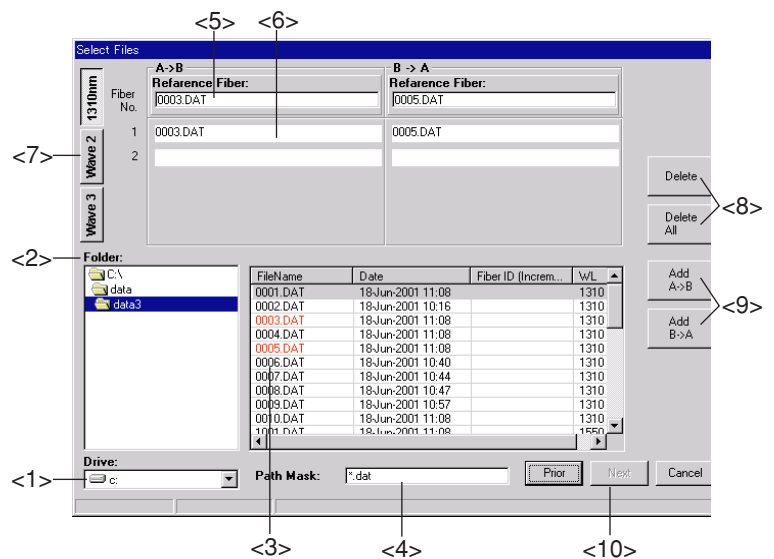


Fig. 3-23

<1> Drive
The available drive names of PC are shown.

<2> Folder
The folders in the selected Drive are shown.

<3> File list
The file list in the selected folder is shown. Listed items are name, updated date, ID which is selected on “Setup for operation” screen, and wavelength. Just files that can be dealt with this function are displayed. And the only files that match to the restriction conditions are displayed when the file name display is restricted by “Path Mask”(<4>). Click the above items (name, updated date etc.) to sort the files in alphanumeric order.

<4> Path Mask

Input the characters to limit the file names displayed on the file list(<3>), then only the file names which contain those characters are displayed. (Default setup is *.dat)

Example: AB???BA.dat, ABC*.sor etc.

<5> Reference Fiber

Drag a file from <3> to <5> to select the reference fiber. When the box “Apply all event information of reference fiber to all file” is checked on the “Output Parameter” screen described in 3.11.3, the event information of reference fiber is used for all the other files. The event positions of “Splice loss summary report”, “Both ends measurement splice loss summary report” and “Both ends measurement splice loss report” are also same as the events of reference fiber. It is possible to add only the measured data to the “Selected File List <6>” when the wavelength is the same as that of the reference fiber. Reselecting the files of different wavelength from that of the reference fiber, delete all the selected files.

<6> Selected file list

Register the files to output report. Press “Add” button(<9>) or drag the files to <6> after selecting files at <3>. Press “Delete” button(<8>) to delete the selected files after choosing the files at <6> to be deleted. It is possible to make 3 lists at maximum, depending on the number of the output wavelength selected at “Operating number of wavelength” on “Setup for operation” screen. The first file that is added to this “Selected file list” becomes the reference fiber, automatically.

Overwrite file: Select an objective file on “File list”(<3>), then drag and drop it over the one of the files to overwrite.

Insert file: Select an objective file on “File list”(<3>), then drag and drop it between the lines to insert it in the dragged place.

<7> Wavelength selection button

Click one of the wavelength buttons to change the wavelength of “Selected file list”(<6>).

When a Reference fiber is set, the name on the button changes to the wavelength of the reference fiber. “When 1 wavelength or Any” are chosen on “Setup for operation”, the button does not appear on the screen.

<8> Delete, Delete All button

After selecting files on “Selected file list”(<6>), press [Delete] button to delete the selected files from the list. The saved files in the folder are not actually deleted even if this [Delete] button is pressed.

Press [Delete All] button to delete all the files displayed on “Selected file list”. It also clears “Reference fiber” at the same time.

- <9> Add A → B (B → A)
After selecting files on “File list”(<3>), press [Add] button to overwrite the selected files to the desired place on “Selected file list”.
- <10>Next
Press [Next] button after the reference fibers of all wavelength are set. However, a warning message comes out and does not show the next screen, if the numbers of the selected files in “A → B” and “B → A” list on “Selected file list” are not the same.

3.11.3 Output Parameters

Set up the report output condition.

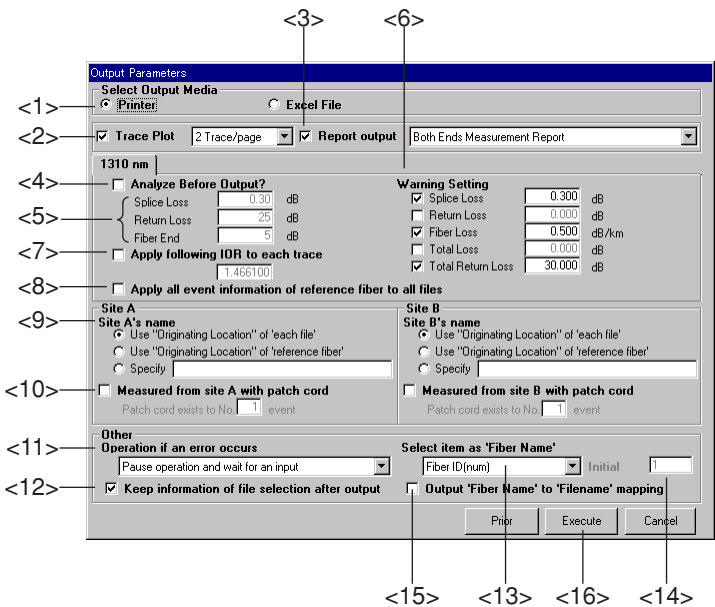


Fig. 3-24

- <1> Select Output Media
Select “Printer” or “Excel File” to output the results.
- <2> Trace Plot
To show traces in a report, check the check box of “Trace Plot”, and select a number of output traces on one page. For example, in case of selecting “3 Trace/Page”, a trace is output in the size of 1/3 page.
- <3> Report output
Check the check box of “Report output” to output the measurement results in a report. Then, select the type of a report.

Report types are described below.

Both Ends Measurement Report:

Outputs the event table and result of the both ends measurement for every fibers.

Trace Summary Report:

Outputs the summary of measurement conditions and results for all files.

Fiber Acceptance Report:

Outputs the list of total loss, fiber length, fiber loss and average loss of the events for every fibers for each wavelength.

Both Ends Measurement Splice Loss Summary Report:

Outputs the summary of the both ends measurement splice loss results for every fibers.

Splice Loss Summary Report:

Outputs the summary of the splice loss result for every fibers. It is only for one way measurement.

Both Ends Measurement Splice Loss Report:

Outputs the list of the splice loss for every fibers.

Event Table:

Outputs the measurement results and the event tables for every fibers.

Refer to Appendix B about the report formats.

<4> Analyze Before Output?

Check the check box of “Analyze Before Output?” to analyze all of the traces at the time of report output. The thresholds of Splice Loss, Return Loss and Fiber End at <5> are used. It is possible to set On or Off for every wavelength. And, the traces are automatically analyzed when the files are the manual measurement traces, even if check mark is not on the check box.

<6> Warning Setting

Check the warning check boxes and enter the thresholds in the boxes to show the warning. The items that exceeded the threshold are displayed with bold letters in the report. It is possible to set the threshold for each wavelength.

<7> Apply following IOR to each trace

Check the check box of “Apply following IOR to each trace” and enter a IOR value to set for all traces. It is possible to set IOR for each wavelength.

- <8> Apply all event information of reference fiber to all files
Check the check box of “Apply all event information of reference fiber to all files”, in order to process all traces with events in the same positions as the reference fiber. This function doesn’t work on Trace Summary Report. It is possible to set On or Off for each wavelength.
- <9> Site name
Describe the Site name to output in a report.
When the site name isn’t specified and the information of site name isn’t in the file, it is named for “Site A” or “Site B”.
- <10> Measured from site A (or B) with patch cord
Check the check box of “Measured from site A (or B) with patch cord”, and enter the event number, when the measurement was done with patch cord. The patch cord is assumed to exist up to the event of the entered number, and excluded from the output results.
- <11> Operation if an error occurs
Select the solution when an error occurs during output.
- Pause operation and wait for an input:
The output is paused if an error occurs. Then, select “Pausing operation”, “Re-try” or “Skip” on the pop up window.
 - Ignore the error. Pop up an error summary:
The output is continued to the end even if the error occurs. The list of errors is shown on the screen at the end of the output.
 - Ignore the error. Output an error summary:
The output is continued to the end even if the error occurs. The list of errors is output at the end of the output.
- <12> Keep Information of file selection after output
Check the check box of “Keep information of file selection after output” to keep the selected file name on “Selected file list” in “Select Files” screen. It is effective till this application (MX907600A) is closed.
When it isn’t checked, “Selected file list” is cleared next time “Report Output” function is executed.

<13>Select item as “Fiber Name”.

Select the fiber name to be output to report.

File name: Uses the file name.

Fiber No.: Uses the order number of selected files as fiber name. Put the number except 1 in <14> “Initial” to change the initial value. When checking <15> “Output ‘Fiber Name’ to ‘Filename’ Mapping”, the correspondent table of fiber number and file name is output at the end of the output.

Fiber ID : Item (used as “ID” on “Setup for operation” screen) is used
(num) as fiber name. The file information on A→B is used in case of both ends measurement. Fiber name becomes blank when the specified ID information isn’t put in the selected files. When checking <15> “Output “Fiber Name” to “Filename” Mapping”, the correspondent table of fiber number and file name is output at the end of the output.

<16>Execute

1. When selecting “Printer” on “Select Output Media”(<1>), press [Execute] button to display “Print” setting window. After the print setup, press [OK] button to start printing report.

2. When selecting “Excel File” on “Select Output Media”(<1>), press [Execute] button to display “Save As” window. Enter the save destination and the file name, and press [OK] button to make the report file at the destination.

“Both Ends Measurement Report” and “Event Table” make files for every fibers.

Each of Trace Summary Report, Fiber Acceptance Report, Both Ends Measurement Splice Loss Summary Report, Splice Loss Summary Report and Both Ends Measurement Splice Loss Report outputs all information to one file. However, when many file data are selected, the number of report file may become two or more. When two or more files are made, the file names will be as follows.

“Original name” _ “File number”.xls

The file numbers are added in order.

3.11.4 Example Use of “Report output”

(1) Setup the trace condition

This section explains how to use the “Report output”. Printer output of the Both Ends Measurement Report is taken for an example.
At first, copy the measured data to HDD in a PC if the data exists in a FD.
Processing data in FD may take the longer time than that in HDD.
Select [Batch]-[Report Output] in [File] menu. Next check the check boxes of “Both ends”, “1 wavelength” and “Fiber ID” on “Setup for operation” screen. Then press [Next] button.

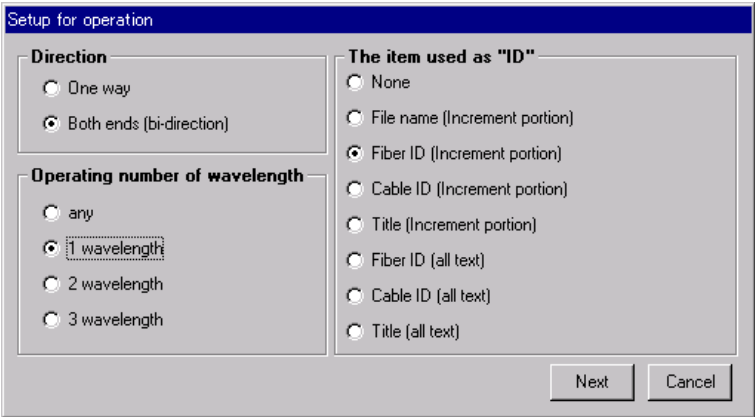


Fig. 3-25

(2) “Select Files” screen

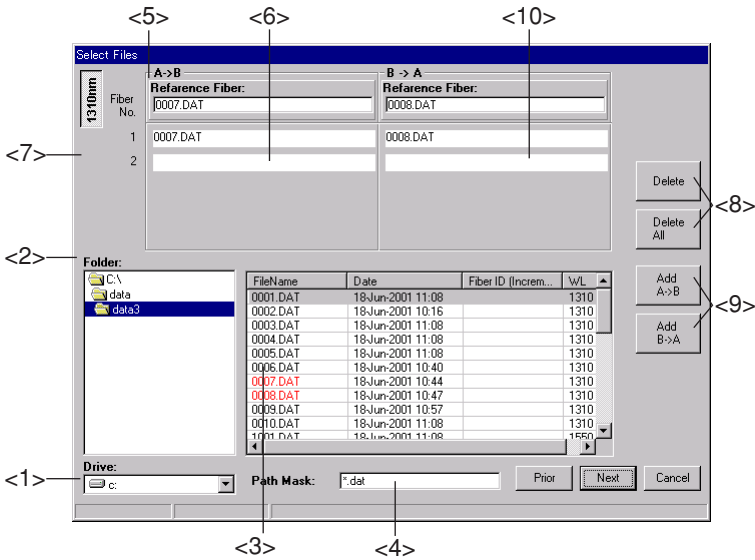


Fig. 3-26

1. Select the objective Drive of the PC from “Drive” box(<1>) where the measured data exist.
2. Select the folder on the “Folder” box(<2>), and the file contents are shown on “File list” (<3>).
Enter the Path mask in “Path Mask”(<4>) to show the objective files on “File list”.
For this example, “*.dat” is entered.

Add files to “Selected file list”.

Add files (measured from A end) to “Selected file list”(<6>). And, also add files (measured from B end) to “Selected file list”(<10>).
Then press [Next] button.

“Output Parameter” screen appears as follows.

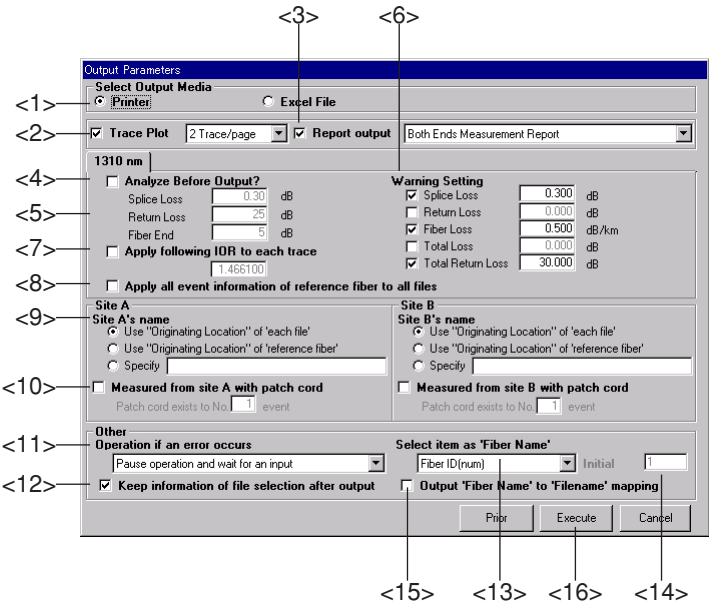


Fig. 3-27

The example of output condition

- <1> Select Output Media: Printer
- <2> Trace Plot: 2 Trace/page
- <3> Report output: Both Ends Measurement Report
- <4> Analyze Before Output: No
- <6> Warning Setting: Slice Loss 0.300 dB,
Fiber Loss 0.500 dB/km,
Total Return Loss: 30.000 dB
- <7> Apply following IOR to each trace: No
- <8> Apply all event information of reference fiber to all files: No
- <9> Site A, B: Using “Originating Location” of each file
- <10> Measured from site A (B) with patch cord: No
- <11> Operation if an error occurs: Pause operation and wait for an input
- <12> Keep information of file selection after output: Yes
- <13> Select item as “Fiber Name”: Fiber ID (num)
- <15> Output “Fiber name” to “Filename” mapping: No

Check and input the information, while referring to “Output Parameters” screen.

3. Print out
- Press [Execute] to show the printer setting screen. Next setup the conditions and output them.

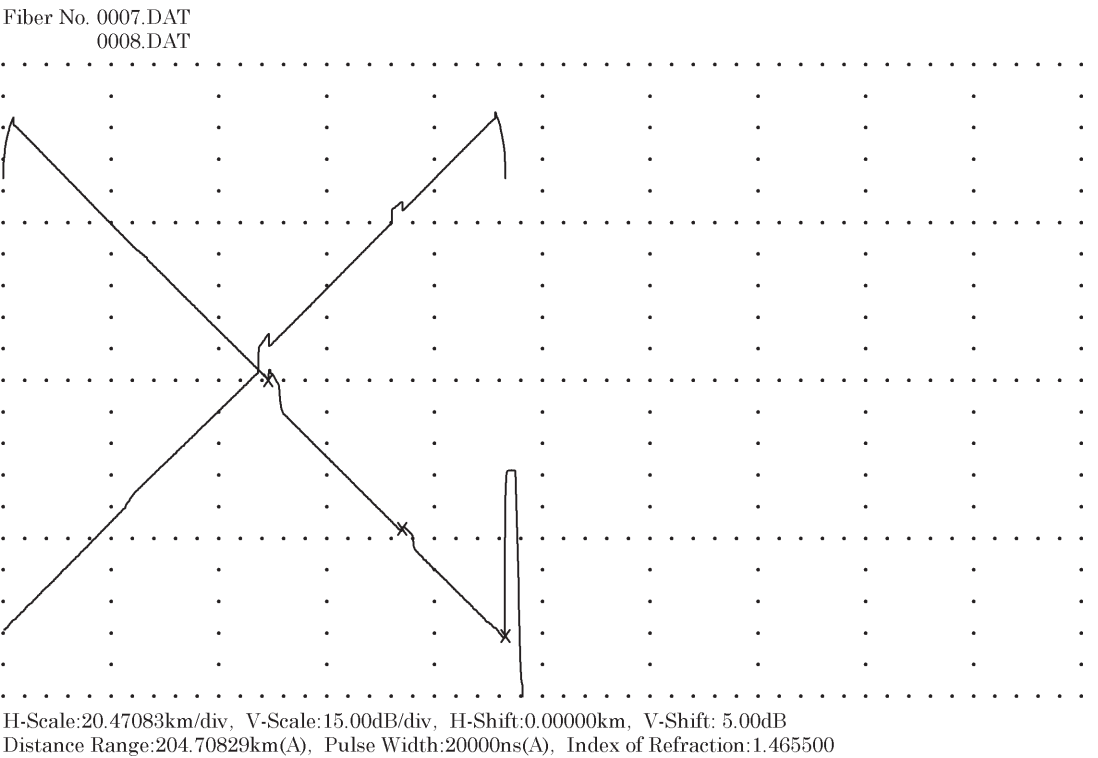


Fig. 3-28

Both Ends Measurement Report

Fiber No.:001

02-Jul-2001

Cable:Site A - Site B

Wavelength:1310nm																
0007.DAT						0008.DAT										
Site A -> Site B						Site B -> Site A										
Event No	Type	Position (km)	Splice Loss(dB)	Fiber Loss (dB/km)	Return Loss(dB)	Type	Position (km)	Splice Loss(dB)	Fiber Loss (dB/km)	Return Loss(dB)	Ave. Spice Loss(dB)					
01						End	95.27124		0.332	16.071						
02	Reflect	50.39918	1.167	0.335	41.571	Connect	70.17400	0.315	0.326	-----	0.157					
03	Reflect	75.74207	0.340	0.341	46.379	Reflect	44.87206	0.953	0.337	40.299	1.060					
04	End	95.27124		0.322	15.943	Reflect	19.57011	0.043	0.337	42.275	0.191					
Column Average			0.754	0.333				0.634	0.332		0.469					
Total Loss			33.194					33.080								
Total Return Loss					27.579					26.770						

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Menu Operations

Using mouse

- (1) Click the Menu bar (File, Execute, etc.) to display the pull-down menu. Refer to the following pages for an explanation of each item in the pull-down menu.
- (2) Select the item to be executed from the pull-down menu and click. Items with ... (for example, Open...) appended to them in the pull-down menu, display a dialog box when clicked. Items with no ... appended (for example, Save) are executed as soon as they are clicked.

Using keyboard 1

- (1) Press the ALT key.
- (2) Use the left and right arrow keys to select the Menu bar (File, Execute, etc.) and press the Enter key. In addition, press the down arrow key to display the pull-down menus.
- (3) Use the up and down arrow keys to select the item to be executed and press the Enter key. Items in the menu and pull-down menu with an underlined character can also be selected by pressing the corresponding character on the keyboard. These keys are called accelerator keys. For example, Help is selected by pressing H, and Exit is selected by pressing x. However, the Menu bar must be made active (all items reverse displayed) by pressing the Alt key once.

Using keyboard 2: Shortcut keys

When a shortcut key is pressed, the pull-down menu item is executed immediately. The shortcut keys are displayed after pull-down menu item name. (For example, "Open... F3" means "Press F3 key.")

Some items do not have shortcut keys allocated to them.



Section 5 List of Short Cut Key

Dialog Operations

Using mouse

Move the mouse cursor to the item to be changed and click it. Some fields require keyboard inputs.

Using keyboard 1

- (1) Make the item to be changed active. The cursor appears at active items, or the color of the item is reversed, or the item is enclosed by a dashed line. To change the active item, press the TAB key or the SHIFT + TAB key.
- (2) Change values and settings with the cursor and numeric keys.

Using keyboard 2: Accelerator keys

When an accelerator key is pressed, the target item becomes active immediately. Depending on the key, the item may execute at the same time. Accelerator keys in dialogs have an underlined character in the item name. Press this character on the keyboard while the Alt key is pressed. (For example, for Splice, press Alt + S; for Return Loss, press Alt + t.)

Common functions

After changing a value in a dialog, the change is reflected when the OK button is pressed. The change can be undone by pressing the Cancel button.

List Box Operations

Using mouse (together with keyboard)

- (1) When selecting items one at a time, click the item to be selected.
- (2) When selecting a group of items, click the first item in the group at first. Then, while holding down the Shift key, click the last item in the group.

Using keyboard

- (1) When selecting one item, move the cursor to the item to be selected and press the Space key.
- (2) When selecting a group of items, move the cursor to the first item in the group and press the Space key. Then, move the cursor to the last item in the group, and while holding down the Shift key, press the Space key.

Others

To copy the screen to other applications, use the clipboard.

To copy a screen to the clipboard, use the Print Screen key. When the Print Screen key is pressed, the entire screen is copied to the clipboard. When the Print Screen key is pressed while the Alt key is pressed, only the currently-active window dialog (reversed title bar) is copied to the clipboard.

Note:

For detailed operating instructions, refer to the help messages, the instruction manuals, and the guidebooks of the Windows.

4.1 Main Window

File

File	
Open...	F3
Save	F2
Save As...	Shift + F2
Waveform Clear	
Uncompress Zip...	
Remote File Transfer...	
Print...	Ctrl + P
Batch	
Print Setup...	
Exit	

(1) Open (Read file) <F3>

For <Emulation mode>, <waveform comparison mode>, <both ends measurement mode>

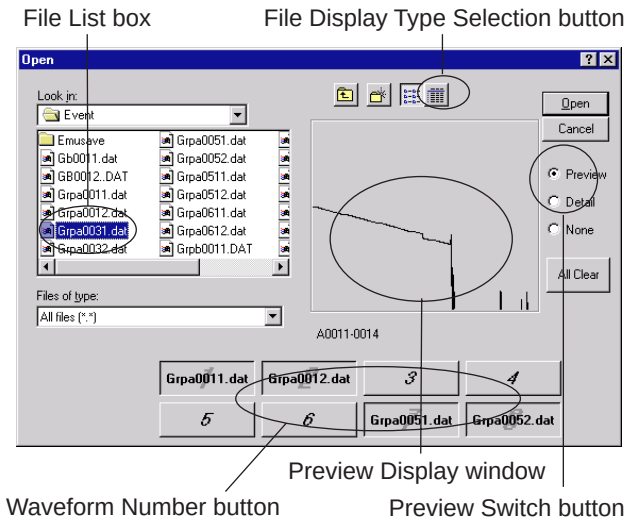


Fig. 4-1 Open File Window (Normal)

Selecting a directory that has a data file(s) from the [Look in] drop-down list box lists a file(s) in a “File List box” below it. Select any file in the list box and press the [Waveform Number] button to read its waveform into the waveform number. In addition, select one file or more and press the [Open] button to read the select file(s) into the waveform numbers one after another starting at 1. The following shows the other functions:

Select the display format for the “Preview Display” window with the [Preview Switch] button.

Preview: Displays the waveform.
 Detail: Displays the measurement parameters.
 None: Displays nothing.

Specify the display format for the “File List box” with the “File Display Type Selection” button.

 : Displays only file names.
 : Displays the size, type, and update date and time of each file, in addition to its name.

Press the [ALL Clear] button to clear the file read into the [Waveform Number] button.

Since the drag & drop function is available, it is possible to read a file directly by dragging & dropping the file into the [Waveform Number] button.

The file type list specifies the type of files to be displayed in the “File list box”. The following 3 type can be selected:

70 File (*.dat), Standard File (*.sor), Chromatic Dispersion(*.cd?) or All files (*.*)

For <Multi Fiber Measurement mode>

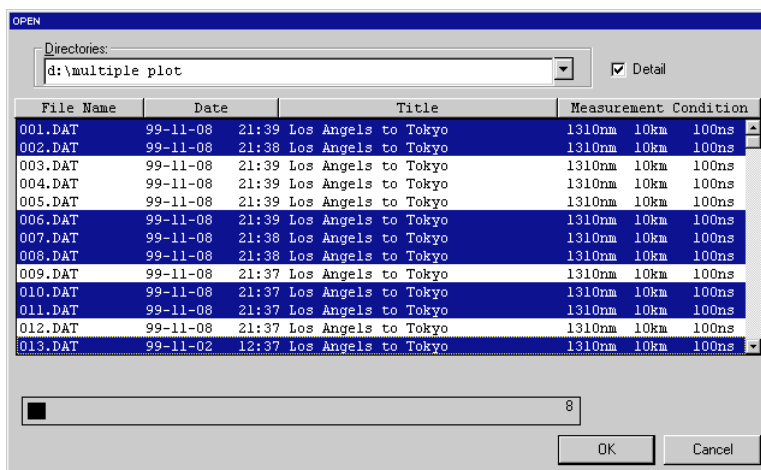


Fig. 4-2 Open File Window (Multi Fiber)

To read a file, select the file in the “File list box” and click the [OK] button.

When using the keyboard, select the file in the “File list box”, then press the Return key or move the focus to the [OK] button using the Tab key and press the Return key.

When the “Detail” check box is checked, the title/wavelength/distance-range/pulse-width are displayed. Since all the files are read at the time, a directory that contains a large number of data files will take some time to be display.

The standard format file does not displays the title.

Click the above items (file name, data etc.) to sort the files in alphanumeric order.

Four sorting items can be selected: file name order, recording time/date order of file, title order, and measurement condition order.

When files are selected, the number of selected files is displayed in the “No. of selected file display bar” using a graph and number.

When the bar is displayed in red, the maximum number of files to be read by this software has been exceeded. The current version can read up to 200 files. When this limit is exceeded, the excess files over the limit are not read.

The following four types of file can be read in this mode.

MW9076 Analysis format

MW9076 Standard format

MW9070 Analysis format

MW9070 Standard format

Up to 1000 files can be displayed in the File name list.

<Supplement>

In the standard format file, all of the information displayed in the OTDR is not always recorded.

- Since some errors may occur in IOR conversion of dB/km value according to the difference of the recording format, the values before Save and after Recall may be different.
- Since the value of the reflection is not recorded in the standard format file recorded by other than the MW9076, the value of the reflection is displayed as **.*** when Recalling.

The print format file recalculates the dB/km of Event Table, and Total Loss. Hence, they may be different from the results of dB/km of Event Table and Total Loss when they ware Saved.

(2) Save (Overwrite File) <F2>

This overwrites the currently-displayed data and saves it.

The file (group file) measured in All-wavelength by the MW9076-series OTDR cannot be saved.

(3) Save As (Write as Specified File Name) <Shift + F2>

Saves data as specified file name. The file name is specified and saved by the same method as the Open method. In addition, a directory can also be created simultaneously.

The file (group file) measured in All-wavelength by the MW9076-series OTDR cannot be saved-as.

To save a waveform in any other format, select the desired format with “File Type” at the bottom right of the dialog.

To output text, click “Text Mode” at “Save Mode” at the bottom right of the dialog.

Note:

A numeric number with parenthesis at both ends (output from this software with a text format) may be changed and displayed as that with a minus sign for a kind of a spread-sheet software.

Multi Fiber Measurement mode

This mode can save a file with overwriting.

(4) Waveform Clear

This deletes the waveform. When this command is executed, the current waveform data is deleted from the computer memory

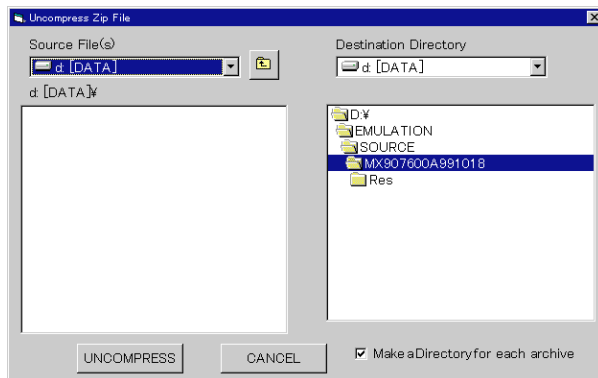
(5) Uncompress Zip

Fig. 4-3 Uncompress Zip Screen

(6) Remote File Transfer

Transfers the data file between the OTDR and the PC.



4.3 Remote File Transfer Window

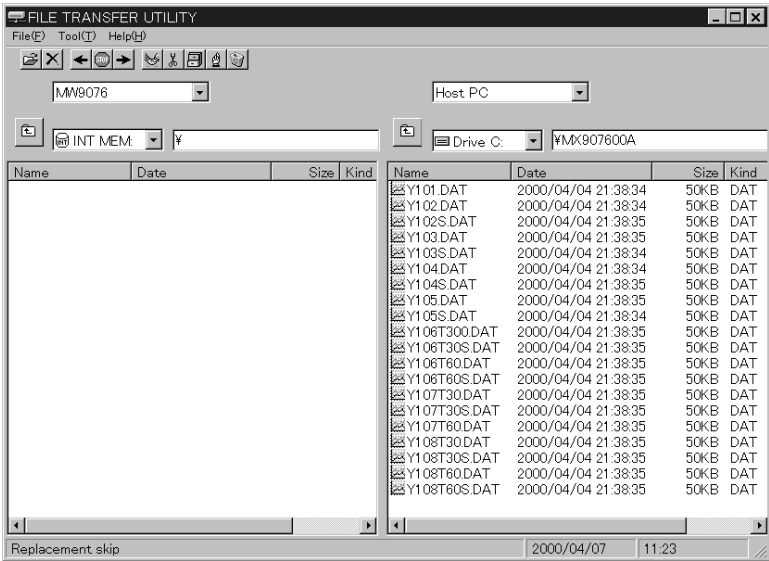


Fig. 4-4 FILE TRANSFER UTILITY

(7) Print (Print waveform data) <Ctrl + P>

The procedure for printing the waveform data is shown below.

- (a) Select Print and set the print out format
 - i) Results and Graphics
 - Prints waveform and measurement results
 - ii) Results
 - Prints measurement results only
 - iii) Graphics
 - Prints waveform only
- (b) When the “Notes” is checked, comments can be printed.
- (c) When the “Header” is checked, the header set at Header of the Parameter menu can be printed.
- (d) When “Event Comments” is checked, the event comment set at “Event Comments of the Measurement” menu can be printed at every event. This printing cannot be selected at the “Splice & Return Loss” screen and “Loss & Total Return Loss” screen or when “Graphics of Print Format” is selected.
- (e) Settings of the waveform to be printed can be changed using the Option setting.



4.1 Main Window
(option)

(8) Batch**(8-1) Batch Print (Continuous Printout of Waveform Data)**

Continuous printout is executed by the following procedure.

- (a) Select Batch Print... and set the print out format; See Steps 1 to 4 of the Print... menu above.
- (b) Select the file in the file list on the left side of the print file selection screen, and register it in the output file list on the right side, as follows:
To register, double-click the file in the file list; or select multiple files and press the Add key, or Drag & Drop the files into the output file list.

**Main Operations**

(List Box Operations)

To release a registered file, double-click the file in the output file list on the right side, or select a file and press the Delete key.

- (c) When file registration has been completed, press the OK key.

Note:

Batch Print automatically repeats reading and printing of the files.
Note that the waveform data under edit on OTDR screen is lost as a consequence.

The Batch Print command is not executed in the “Both Ends Measurement Mode”.

Files can be specified between several directories and up to 1000 files can be registered.

- Extended Batch Print

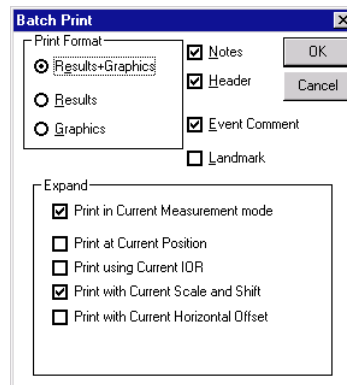


Fig. 4-5 Extended Batch Print Setting

Extended batch print can be executed only when an Analysis Mode file or Standard Mode file measured by MW9076 is read at the trace chosen now (current trace).

The following describes the operation when each “Expand” item is selected. When any item is not selected, printing is based on the information in each file. For simple batch printing, clear all the check boxes.

Expanded items cannot be used for the Standard file measured by other than MW9076.

Printing in Current Measurement Mode:

Printing is performed in the same measurement mode as the current trace the upper figure, all the waveforms are printed in Event Table mode.

Application: This is used when the measurement mode varies depending on the file.

Printing in Current Event position/Marker position:

Printing is performed at the same event position (event table window, Auto Zoom window) or the same marker position (manual measurement window) as the current trace. When this option is selected, “Print in Current Measurement” mode is also selected.

Application: This is used when the measurement mode or marker position depend on the files.

Print using Current IOR:

Printing is performed using the same IOR (Index Of Refraction) as the current trace.

Application: This is used when the IOR depends on the files or when printing is performed with the different IOR value from the IOR recorded in the files.

Printing with Current Scale and Shift:

Printing is performed at the currently displayed waveform display position. This is used only to print Graphics.

Application: This is used when the recorded waveform position varies depending on the files. This is also used to repeat the extended batch printing for all the events by changing the current trace zoom position in order to print sequentially with expanding position near the every events for all the files.

Printing with Current Horizontal Offset:

Printing is performed by applying the horizontal offset of the current trace to all the files. When no horizontal offset is set in the current trace, printing is performed with no horizontal offset.

Application: This is used to print without a horizontal offset and the dummy fiber position is not set in each file.

(8-2) Report output

A report is created and output from two or more selected files.

→ See 3.11 Report Output.

(8-3) Text output

All the two or more selected trace data are collectively converted into text-format data, and saved.

(9) Print Setup (Selects and sets printer)

Selects printer models and set parameters. The contents of the fetched dialog depend on the OS and operating environment.

(10) Exit (Quit MX907600A Emulation Software)

This quits the emulation software.

Copy

Copy
This Window
Event Table
Waveform Only
Full Waveform
Difference Waveform
Event Information
Landmark Information

Copy to Clipboard (Copies each data type to clipboard)
The data copied to the clipboard can also be pasted into another application.
The following items can be copied.

- (1)

This Window
Copies graphic image of the Main Window to clipboard.
- (2)

Event Table
Copies contents of “Event Table” as text to clipboard. Data are separated by Tab code.
The copy contents are affected by the Option dialog setting, described later.
- (3)

Waveform only
Copies only the graphic image of the waveform drawing area to the clipboard.
The settings of the waveform to be copied can be changed by Option setting.
-  **4.1 Main Window**
(option)
- (4)

Full Waveform
Copies graphic image of Full waveform window to clipboard.
- (5)

Difference Waveform
Copies graphic image of Difference waveform to clipboard.
- (6)

Event Information
Copies graphic image of Event information window to clipboard.
- (7)

Landmark Information
Copies graphic image of Landmark information window to clipboard.

Execute

Execute	
Undo	Ctrl + U
Clear	Ctrl + L
Execute	Ctrl + Z
Return	Ctrl + R

(1) Undo <Ctrl + U>

This function returns edited scale, shift position and marker positions to the status when editing was started. This command is only used at Add or Move of the “Event Edit” screen and at the “Horizontal Offset Setting” screen.

(2) Clear <Ctrl + L>

This command sets the zero cursor at the “Horizontal Offset Setting” screen to the 0 km position. It is only used at the “Horizontal Offset Setting” screen.

(3) Execute <Ctrl + Z>

This command executes the settings at event editing. Event “Auto Search” is executed at the “Event Table” and “Auto Zoom” screens. The Event Fixed function is released at this time. This command cannot be used at the “Splice & Return Loss”, “Loss”, and “Total Return Loss” measurement screens.

(4) Return <Ctrl + R>

This command stops execution at event editing and horizontal offset setting and returns to the original screen.

Measurement

Measurement	
Measurement Mode...	Ctrl + O
Event Table	F4
Mix Event Table	
Auto Zoom	F5
Event Edit...	F6
Splice & Return Loss	F7
Loss & Total Return Loss	Shift + F7
Horizontal Offset	Ctrl + J
LSA/2PA	F8
Next Event/Marker	F9
Prior Event/Marker	Shift + F9
Marker Position	Ctrl + K
Adjust	
Event Comments...	Ctrl + N
Landmark...	

(1) Measurement Mode <Ctrl + O>

Select open file mode from following two modes

- (a) Emulation Mode
- (b) Multi Fiber Mode

Auto Search, Auto Zoom, Editing Events, and Manual Measurement, etc., can be executed in the same way as the MW9076 Series OTDR in both “Emulation Mode” and “Multi Fiber Mode”.

In addition, the waveforms displayed on the screen can be selected from following two types.

- (a) Emulation Mode
- (b) Both Ends Trace

However, a waveform cannot be selected if “Multi Fiber Mode” is selected at open file mode

(2) Event Table <F4>

This function searches for events automatically and displays the Event Table.

The threshold value is set at “Measurement Parameters” of the “Parameter” menu. To execute the re-search, use the “Execute” at the “Execute” menu.

(3) Mix Event Table

It is possible to select this function when the file measured by MW9076OTDR whose wavelength was set to ALL.

An event table is created to be composed of all events in the group files.

(4) Auto Zoom <F5>

This function sets the best values for the vertical and horizontal scale, and for the vertical and horizontal shift so that the event selected from the “Event Table” is displayed at the screen center.

(5) Editing Events (Edit events) <F6>

New events to be registered in, and selected events can be moved in or deleted from the “Event Table” using this function. In addition, the far end can be registered.

When “Editing Events” is clicked, the following can be selected.

Add	Adds new event to “Event Table”
Move	Moves selected event position
Delete	Deletes selected event from “Event Table”
Change	Changes type of selected event on “Event Table”

To execute or cancel the selected item, use the [Execute] or [Return] key on the bottom right corner of the screen. Also, use the “Execute” menu from which the following can be selected.

Undo <Ctrl+U> returns the markers and scales to original settings

Execute <Ctrl+X> executes settings for editing waveform

Return <Ctrl+R> cancels editing

(6) Splice & Return Loss <F7>

This function performs splice loss and return loss by using six markers.

(7) Loss & Total Return Loss <Shift+F7>

This function performs total return loss measurement by using two markers.

In this manual, splice & return loss and loss & total return loss are called manual measurement. At the “Event Table Screen” and the Auto Zoom Screen, the Splice Loss, Return Loss, Loss and Loss dB/km are measured automatically. At Manual measurement, they are measured manually.

(8) Horizontal Offset <Ctrl+J>

This function sets the horizontal offset. The current cursor position is regarded as the near end of the optical fiber and indicated by the zero cursor.

(9) LSA/2PA <F8>

The linear approximation method can be set when Splice Loss, Loss and dB/km are measured.

(a) 2PA Two-point approximation

(b) LSA Least squares approximation

(10) Next Event/Marker <F9>

This function selects the next marker on the right at “Manual measurement” and “Editing Events”. The next event can be selected at the “Event Table” and “Auto Zoom” screens.

(11) Prior Event/Marker <Shift+F9>

This function selects the prior marker on the left at “Manual measurement” and “Editing Events”. The prior event can be selected at the “Event Table” and “Auto Zoom” screens.

(12) Marker Position <Ctrl+K>

The position of the selected marker is input from the keyboard.

(13) Event Comments <Ctrl+N>

A comment can be input for each event.
The maximum length of the comment is 60 characters.

(14) Landmark

The following “Landmark” window is displayed.

Landmark

Code: BR: Bridge

Longitude: 0 : 0 : 0.00 (000:00:00.00-359:59:59.99)

Latitude: 0 : 0 : 0.00 (000:00:00.00-359:59:59.99)

Correction Factor: 0.00 % (00.00-99.99)

Sheath Marker

Entering: 0 (0-2147483647)

Leaving: 0 (0-2147483647)

Unit: mt: meter

Diameter: 0.0 um (0.0-99.9)

Comment

OK Cancel

Fig. 4-6 Landmark Input Screen

- (a) “Code” can be selected from the codes listed.
- (b) The range for “Longitude” and “Latitude” is 0 to 359 in degree, 0 to 59 in minute, and 0 to 59.99 in second.
- (c) The range for “Correction Factor” is 0 to 99.99.
- (d) The range for “Entering” and “Leaving” is 0 to 2³²-1.
- (e) “Unit” can be selected from mt (meter) and ft (feet).
- (f) The range for “Diameter” is 0 to 99.9.
- (g) In the “Comment” field, up to 42 characters can be input.

Parameters

Parameters	
Measurement Parameters...	Ctrl + M
Fiber End...	Ctrl + E
Title...	Ctrl + T
Display Conditions...	Ctrl + S
Sampling Information...	Ctrl + I
Header...	
Block Information...	

(1) Measurement Parameters <Ctrl+M>

This function sets the IOR, event threshold for detecting events, display order of event table, backscatter level, and event reflection item selection. The reflection measurement method can be switched between return loss and reflection amount.

Note:

When changing the threshold and backscatter level at the “Event Table” Screen, execute Auto Search to update the “Event Table”.

(2) Fiber End (Set fiber end at Both Ends Measurement) <Ctrl+E>

This function sets the fiber end needed for the composite waveform at “Both Ends Measurement”. For further details, see item 3.7 Both Ends Measurement.

(3) Title (Set title) <Ctrl+T>

This function sets the title of the waveform data displayed at the top left of the screen. The maximum length of the title is 32 characters.

“Display Conditions” (Change display conditions) <Ctrl+S>

(a) Unit of distance (Changes distance units)

Select from km, m, kf, ft, and mile.

(b) Level resolution (Specifies number of digits after decimal point).

Select 0.01 dB to round to the nearest two decimal places, or 0.001 dB to round to the nearest three decimal places

(c) Cursor mode (Sets cursor line)

Choose from “Select Marker” (sets cursor line only at selected marker) or “All Marker” (sets cursor line at all markers).

(d) Date format

Select from D-M-Y, M-D-Y, or Y-M-D.

(4) Sampling Information <Ctrl+I>

This function displays conditions when the read waveform was measured obtained using the MW9076B/B1/C/D.

Optical Unit	Plug-in unit name
Wavelength	Measurement wavelength (fiber type)
Distance Range	Distance Range
Pulse Width	Measurement pulse width
Sampling Start	Sampling start distance (Data Start Distance at Print Mode)
Sampling End	Sampling end distance (Data End Distance at Print Mode)
Sampling Resolution	Sampling resolution
Sampling Mode	Measurement mode Auto/Manual
Number of Averaging	Number of averaging times
Averaging Time	Averaging time
Attenuator	Value of attenuation
Measurement Date	Measurement date and time
Title	Title

(5) Header

Select “Header” and the following window is displayed.

Header

Data Flag: BC as-built condition

Operator: Toro Anritsu

Owner: Jiro Anritsu

Customer: Saburo Anritsu

Org Location: japan

Term Location: us

Cable ID: 1

Fiber ID: 1

Cable Code: 1

Comment:

OK Cancel

Fig. 4-7 Header Input Screen

- (a) In the “Cable ID”, “Fiber ID”, “Location”, “Cable Code”, “Operator”, “Owner”, “Customer” and “Comment” fields, up to 42 characters can be input.
- (b) “Data Flag” can be selected from CC (Current condition), BC (as-built condition), RC (as repaired condition), and OT (other).

(6) Block Information

Displays following information about each block

- General Information
- Supplier Information
- Fixed Information

To switch each block, click the tab at the top of the screen.

Note:

For a file of the analysis format, some information is not displayed.

Scale

Scale	
Horizontal Zoom-IN	F11
Horizontal Zoom-OUT	Shift + F11
Vertical Zoom-IN	F12
Vertical Zoom-OUT	Shift + F12
Full View	Ctrl + F
Shift...	Ctrl + H

(1) Horizontal Zoom-IN <F11>

Magnifies the horizontal axis

(2) Horizontal Zoom-OUT <Shift+F11>

Reduces the horizontal axis

(3) Vertical Zoom-IN <F12>

Magnifies the vertical axis

(4) Vertical Zoom-OUT <Shift+F12>

Reduces the vertical axis

(5) Full View <Ctrl+F>

Displays entire waveform at maximum horizontal axis, 10 dB/div vertical axis, and 14 dB vertical axis shift.

(6) Shift <Ctrl+H>

Sets horizontal and vertical shift

Option

Option

Customizes the settings of the following items:

- Print
- ClipBoard-Graph
- Clipboard-Text
- Text Output
- T.Loss
- Other

Select the item to be set by clicking the tab at the top of the screen.

(1) Print, ClipBoard-Graph

These two items can be set for a waveform to be printed or copied to the clipboard.

Printing is described here.

Color

☐ Print in black and White only

☒ Print in Color

Waveform Back Color

☒ Gray

☐ White

Prints in black and white.

Prints in color.

Selects the waveform background color.

Waveform

☒ Print with marker

☒ Print with "X" marker

☒ Print with Event No

Prints with the marker.

Prints the X displayed at the event position.

Prints the number that indicates the event position.

File Name

With Path Name

Selects print method of file name.

(2) Clipboard-Text, Text Output

These two items can be set for a event table data to be copied to clipboard or output as text.

Copy to clipboard is described here.

Splice Loss Value

☒ with the minus value

☐ without the minus value

For the calculated splice loss value:

Output with a minus value.

Outputs absolute value.

Can't Calc Value

☐ **, ***

☒ Blank

☐ Custom

For the results that cannot be calculated:

Outputs **, *** .

Does not output anything. (Blank)

Outputs the user-defined character string. (Custom)

Fiber End's Value

☐ "END"

☒ Blank

☐ Custom

For the far-end event splice loss item:

Outputs the characters "END".

Does not output anything. (Blank)

Outputs the user-defined character string. (Custom)

Event Mark

☐ On

☒ Off

For the characters *! of the event number and ()< of the calculated value:

Output the characters. (On)

Does not output the characters. (Off)

(3) T.Loss

The value of the total loss displayed in the event table can be changed to a different calculated value.

☒ Total Loss	Outputs the total loss from the near end to each event.
☐ Fiber Loss	Outputs the fiber loss of each event.
☐ Loss of Fiber & both end connections	Outputs the loss of each event, including connector loss of both ends.
☐ Custom Total Loss (dB)	Indicates a setting other than the above. Specifies the display in event table or the item name at printing.
Start ☒ from 0 ☐ from first event ☐ each event	
Specifies the calculation reference point. Calculates using the near end or zero cursor position as the reference. Calculates using the level of the first event as the reference. Calculates using the level of the preceding event as the reference.	
Loss ☒ with front end connector loss ☐ with back end connector loss	
Specifies the calculated value added to the fiber loss. Adds the splice loss of the connector at the front end of the fiber. Adds the splice loss of the connector at the back end of the fiber.	

Note:

The “front first event” is used when attaching a dummy fiber to the near end.
If each Splice Loss is calculated incorrectly, the fiber loss will be incorrect or impossible to calculate.

(4) Other

Set the following items.

- Short cut
Specify the operation of the mouse at clicker label.

Short Cut Action ☒ Single Click ☐ Double Click	Sets the action for clickable label function. Operates when clicked. Operates when double clicked.
--	--



3.4.2 Calls the function more easily using the mouse
(clicker label)

- The point number to be averaged by “Adjust”

When “adjust the waveform”, calculates the level by averaging the data in the entrance side from the marker position by the specified points. When too big value is set, it is affected by the entrance side event from the marker position, and the display positions are not adjusted well.

Average width for Adjust function

1 - 99

Specifies the number of data points used in the calculation when performing Adjust operation during multi fiber measurement.

- Auto Measurement Result

Select “Total Return Loss” or “Average Loss” to display in “Auto Measurement Result”.

The Average Loss is calculated by dividing the Total Loss by the fiber length.

Auto Results

☒ Total Return Loss

☐ Average Loss

Select the output item for Auto Result.

- Output of the Splice Error

Specify the directory to which the Splice Error is outputted.

Output Splice Error

☒ Print Splice Error

☒ Output text with Splice Error

☒ Copy to clipboard with Splice Error

Set whether each the splice error is output or not.

Window

Window	
Full Waveform	Ctrl + A
Difference Waveform	Ctrl + D
Event Information	Ctrl + V
Landmark Information	

- (1)

Full Waveform <Ctrl+A>
Opens subwindow displaying entire waveform on screen
- (2)

Difference Waveform <Ctrl+D>
A subwindow is displayed on screen to display a difference waveform of two waveforms selected at the dialogue box.
- (3)

Event Information <Ctrl+V>
A subwindow is displayed to display the event number, distance and comment.
Event Information can be executed only when the event table screen is displayed.
- (4)

Landmark Information
Opens sub-window displaying landmark information on screen
When reading a Standard Format File, Landmark Information is displayed when more than one landmark is set.

Screen Size

Screen Size
Large
Medium
Small

- (1)

Large
Sets the large. This setting is enabled at next startup.
- (2)

Medium
Sets the medium. This setting is enabled at next startup.
- (3)

Small
Sets the small. This setting is enabled at next startup.

Help

Help
Help
About

(1) Help

This function displays an index-type Help menu for use when the operator does not understand the menu item contents and operation.

(2) About

Displays the version number of MX907600A and copyright notice.

4.2 Chromatic Dispersion Waveform Display

The chromatic dispersion measurement mode has the OTDR screen with its horizontal axis representing distances and the chromatic dispersion waveform screen with its horizontal axis representing wavelengths. Each display screen has different menu items.

4.2.1 OTDR Screen Display

Reading a file whose extension is “cd1/cd2/cd3/cd4” or “cdm” with the file read mode set to the emulation mode (8 waveforms) displays the OTDR screen.

File

File	
Open...	F3
Save	F2
Save as...	Shift + F2
Remote file transfer...	
Print...	Ctrl + P
Print Setup...	
Exit	

- (1) Open <F3>

(a) Select [Measurement] – [Measurement Parameters] from the menu and set the file read mode to the emulation mode.

(b) Set [File of Type] in the File Read dialog box to “cd?.”

(c) Select the file with the extension cd1/cd2/cd3/cd4/cdm which is saved by the MW9076D, and press “Open” button.

(d) The files with the extensions cd1/cd2/cd3/cd4 are read four files, and the file with the extension cdm is read the selected file.
- (2) Save <F2>

Same as the one in the Main window.

This cannot be executed when the file with the extension cd1/cd2/cd3/cd4 is read.
- (3) Save as (Write as Specified File Name) <Shift + F2>

Same as the one in the Main window.

Only the chromatic dispersion format (*.cdm) can be selected for the file format to be saved.
- (4) Remote File Transfer

Same as the main window.

(5) Print <Ctrl + P>

Select an object to print out from the following:

- (a) Results + Graphics
- (b) Results (measurement parameters, approximate equations, and reference wavelengths)
- (c) Graphics

(6) Print Setup

Same as the one in the Main window.

(7) Exit

Same as the one in the Main window.

Copy

Copy
This Window
Waveform Only
Fiber End

(1) This window

Same as the one in the Main window.

(2) Waveform Only

Copies only a waveform window as a graphic image to the clipboard.

(3) Fiber End

Copies the value of a fiber end as text data to the clipboard.

Measurement

Measurement
Measurement Mode... Ctrl + O
Delay
Dispersion
Slope
Marker Position... Ctrl + K

(1) Measurement Mode <Ctrl + O>

Changes the file open mode. Even if the file read mode is set to the emulation mode, the waveform mode cannot be selected when the chromatic dispersion waveform is being displayed.

(2) Delay

Displays a group delay time waveform.

- (3) **Dispersion**
Displays a specific chromatic dispersion waveform.
- (4) **Slope**
Displays a chromatic slope waveform.
- (5) **Marker Position <Ctrl + K>**
Same as the main window.

The measurement result may have the different value from the value of the OTDR main device by the difference of the calculation accuracy of the system.

Parameter

Parameter	
Measurement Parameter	Ctrl + M
Title...	Ctrl + T
Display Conditions...	Ctrl + S
Sampling Information...	Ctrl + I
Header...	
Block Information...	

- (1) **Measurement Parameters <Ctrl + M>**
Sets up an IOR.
- (2) **Title <Ctrl + T>**
Same as the one in the Main window.
- (3) **Display Condition <Ctrl + S>**
Same as the one in the Main window.
- (4) **Waveform Information <Ctrl + I>**
Same as the one in the Main window.
- (5) **Header**
Same as the one in the Main window.
- (6) **Block Information**
Same as the one in the Main window.

[Option], [Scale], [Screen Size], and [Help] are all the same as those in the Main window.

4.2.2 When Displaying Delay, Chromatic Dispersion, and Dispersion Slope Waveform

The menu takes the following form when a delay, chromatic dispersion, and slope waveform are being displayed:

Selecting [Measurement] – [OTDR Screen] switches the screen to the OTDR waveform display screen. The functions of the other menu items are the same as those in the OTDR screen.

File

File	
Open...	F3
Save	F2
Save as...	Shift + F2
Text output...	
Remote file transfer...	
Print...	Ctrl + P
Print Setup...	
Exit	

(1) Open <F3>

Read a file. It displays the OTDR screen immediately after a chromatic dispersion file is opened.

It does not display the delay, chromatic dispersion, and dispersion slope screen.

(2) Save <F2>

Same as the one in the Main window.

(3) Save as (Write as Specified File Name) <Shift + F2>

Save a OTDR wavelength with a name different from the current one.

(4) Text Output

Saving an approximate curve as text data (extension: CSV)

(5) Remote File Transfer

Same as the main window.

(6) Print <Ctrl + P>

Select an object to print out from the following:

- (a) Results + Graphics
- (b) Results (measurement parameters, approximate equation, and reference wavelength)
- (c) Graphics

- (7) **Print Setup**
Same as the one in the Main window.
- (8) **Exit**
Same as the one in the Main window.

Copy

Copy
This Window
Waveform Only
Results

- (1) **This window**
Same as the one in the Main window.
- (2) **Waveform Only**
Same as the one in the Main window.
- (3) **Results**
Copies the values of delay, chromatic dispersion, and dispersion slope at the wavelength indicated by the position of the current marker.

Measurement

Measurement
Measurement Mode Ctrl + O
Result Table
OTDR Screen

- (1) **Measurement Mode**
Same as the one in the Main window.
- (2) **Result Table**
The result table of the value corresponding to ITU-T Grid is carried out.
 **3.9 Chromatic Dispersion**
- (3) **OTDR Screen**
Returns to the OTDR screen.

Parameter

Parameter
Waveform information Ctrl + O
Header

(1) **Waveform information**
Displays the delay, approximate expression, and the factor of the approximate expression of each central wavelength measured by MW9076.

(2) **Header**
Same as the one in the Main window.

[Option], [Screen Size] and [Help] are same as those in the Main window.

4.3 Remote File Transfer Window

File

File
New Folder Preparation
Close

(1) New Folder Preparation

Prepares a new folder in the folder currently selected.
The folder name input screen is displayed by selecting [New Folder Preparation].
Up to 32 characters can be inputted as the folder name, and the characters to be selected are as follows;
When software version of OTDR is under 4.0, it can be input up to 8.
A to Z a to z 0 to 9 . ! # \$ % ' () ^ @ _ { }

(2) Close

Closes the Remote File Transfer Window.

Tool

Tool
Option

(1) Option

Sets the port number of the RS-232C, and RS-232C.

Help

Help
Version Information

(1) Version Information

Displays the version of Remote File Transfer Utility.

Section 5 Limits on functions based on file read-in formats

Based on file read-in format, the functions that are enabled/disabled are indicated by a ○ or × in the table below.

Function	Data record format	MW9076 file				MW9070B file *1		
		Analysis	Standard	Standard V2	Chromatic dispersion	Analysis	Standard	Print
	Waveform display	○	○	○	○	○	○	○
	Manual measurement	○	○	○	×	○	×	○
	Auto search	○	○	○	×	○	○	×
	Auto zoom	○	○	○	×	○	○	×
	Event editing	○	○	○	×	○	○	×
	Print outoutput	○	○	○	○	○	○	○
	Waveform comparison display	○	○	○	×	○	○	○
	Both ends measurement	○	○	○	×	○	×	×
	Multi fiber measurement	○	○	○	×	○	×	×
	Chromatic dispersion measurement	×	×	×	○	×	×	×
	Report output	○	○	○	×	○	×	×

*1 Only files created with MW9070B software version V3.0 or later.

Section 6 List of Short Cut Keys

F1	Display help message
F2	Save file overwrite
Shift+F2	Save file as new name
F3	Open file
F4	Move to Event Table mode
F5	Execute Auto Zoom
F6	Execute event editing
F7	Move to S&RL measurement mode
Shift+F7	Move to loss & total return loss measurement mode
F8	Switch linear approximation
F9	Select next marker/event
Shift+F9	Select prior marker/event
F11	H Zoom-In
Shift+F11	H Zoom-Out
F12	V Zoom-In
Shift+F12	V Zoom-out
Ctrl+A	Display full waveform
Ctrl+D	Display difference waveform
Ctrl+E	Set fiber end
Ctrl+F	Display waveform at full scale
Ctrl+H	Set H-shift and V-shift
Ctrl+I	Display sampling information
Ctrl+J	Set horizontal offset
Ctrl+K	Set marker position
Ctrl+L	Clear horizontal offset
Ctrl+M	Set measurement conditions
Ctrl+N	Set event comment
Ctrl+O	Set measurement mode
Ctrl+P	Execute Print
Ctrl+R	Stop editing event or setting horizontal offset
Ctrl+S	Set display type
Ctrl+T	Set title and header
Ctrl+U	Undo the settings of scale and marker position at event editing and horizontal offset
Ctrl+V	Display event information
Ctrl+Z	Execute event editing or auto search

A list of ITU-T Grid frequency

From ITU-T G.692 APPENDIX III

G.652/G.655 fiber (Corresponds to ITU-T SMF/NZDSF.)

The corresponding frequencies are expressed with * marks.

Frequency in THz	100 GHz spacing	200 GHz spacing	400 GHz spacing -A	400 GHz spacing -B	500/400 GHz spacing	600 GHz spacing	1000 GHz spacing
196.100	*	*					
196.000	*						
195.900	*	*					
195.800	*						
195.700	*	*					
195.600	*						
195.500	*	*				*	*
195.400	*						
195.300	*	*			*		
195.200	*						
195.100	*	*					
195.000	*						
194.900	*	*				*	
194.800	*				*		
194.700	*	*					
194.600	*						
194.500	*	*					*
194.400	*						
194.300	*	*			*	*	
194.200	*						
194.100	*	*					
194.000	*						
193.900	*	*	*		*		
193.800	*						
193.700	*	*		*		*	
193.600	*						
193.500	*	*	*				*
193.400	*				*		
193.300	*	*		*			
193.200	*						
193.100	*	*	*			*	
193.000	*				*		
192.900	*	*		*			
192.800	*						
192.700	*	*	*				
192.600	*						
192.500	*	*		*	*	*	*
192.400	*						
192.300	*	*					
192.200	*						
192.100	*	*			*		

Appendix A

ITU-T G.692-Suggested channel central frequency choices for 4 or 8-channel applications on G.653 fibers.

Frequency in THz	100 GHz spacing	200 GHz spacing	Alternate 200 GHz spacing (4 or 8 channels) 25 GHz offset	Alternate 200 GHz spacing (4 or 8 channels) 50 GHz offset
196.100	*			
196.000	*			
195.900	*	*		
195.800	*			
195.700	*	*		
195.600	*			
195.500	*	*		
195.400	*			
195.300	*	*		
195.200	*			
195.100	*	*		
195.000	*			
194.900	*	*		
194.800	*			
194.700	*	*		
194.600	*			
194.500	*	*		194.45
194.400	*			
194.300	*	*		194.2
194.200	*			
194.100	*	*		
194.000	*			
193.900	*	*	*	
193.800	*			
193.700	*	*	193.675	*
193.600	*			
193.500	*	*	193.525	
193.400	*			
193.300	*	*	193.35	*
193.200	*			
193.100	*	*	*	*
193.000	*			
192.900	*	*	*	
192.800	*			
192.700	*	*	192.625	192.75
192.600	*			
192.500	*	*	*	192.45
192.400	*			
192.300	*	*		*
192.200	*			
192.100	*	*		

1. Both Ends Measurement Report

Both Ends Measurement Report

Fiber No.:001

02-Jul-2001

Cable:Site A - Site B

Wavelength:1310nm

0009.DAT Site A -> Site B						0010.DAT Site B -> Site A					
Event No	Type	Position (km)	Splice Loss(dB)	Fiber Loss (dB/km)	Return Loss(dB)	Type	Position (km)	Splice Loss(dB)	Fiber Loss (dB/km)	Return Loss(dB)	Ave. Splice Loss(dB)
01	Connect	50.72671	0.552	0.335	-----	End	95.27124	0.313	0.323	-----	0.156
02						Connect	70.21494				
03						Connect	45.07677				
04						Reflect	25.26100				
	End	95.27124		0.334	15.955			0.329	0.321	43.811	0.203
Column Average			0.315	0.331				0.217	0.331		0.232
Total Loss			32.525					32.276			
Total Return Loss				27.705					26.407		

2. Trace Summary Report

Trace Summary Report

26-Jul-2001

Cable:Site A - Site B

File Name	Wave-Length (nm)	Distance Range (km)	Pulse Width (nsec)	IOR	Averages num/time (sec)	Date	Fiber Length (km)	Total Loss (dB)	Total Return Loss(dB)
0005.DAT	1310	102.35415	10000	1.465500	10(12s)	18-Jun-2001	75.70113	26.668	33.758
0006.DAT	1310	102.35415	10000	1.465500	10(10s)	18-Jun-2001	75.70113	26.568	33.484
0007.DAT	1310	204.70829	20000	1.465500	40(46s)	18-Jun-2001	95.27124	33.194	27.579
0008.DAT	1310	204.70829	20000	1.465500	40(46s)	18-Jun-2001	95.27124	33.080	26.770
0009.DAT	1310	204.70829	20000	1.465500	40(44s)	18-Jun-2001	95.27124	32.525	27.705
0010.DAT	1310	204.70829	20000	1.465500	40(44s)	18-Jun-2001	95.27124	32.276	26.407

3. Fiber Acceptance Report

Fiber Acceptance Report

Wavelength:1310nm

26-Jul-2001

Cable:Site A - Site B

Site A:Site A

Site B:Site B

Fiber No.	End To End						Non-Connector Event Average		
	Loss Avg (dB)	Loss A->B (dB)	Loss B->A (dB)	Loss Abs Diff (dB)	Avg Length (km)	Avg Loss (dB/km)	Loss Bi Avg (dB)	Loss A->B (dB)	Loss B->A (dB)
0001	26.618	26.668	26.568	0.100	75.70113	0.352	-----	0.338	-----
0002	33.137	33.194	33.080	0.114	95.27124	0.348	-----	-----	0.315
0003	32.401	32.525	32.276	0.249	95.27124	0.340	0.384	0.552	0.217
Average	30.719	30.796	30.641	0.154	88.74787	0.347	0.384	0.445	0.266
Min	26.618	26.668	26.568	0.100	75.70113	0.340	0.384	0.338	0.217
Max	33.137	33.194	33.080	0.249	95.27124	0.352	0.384	0.552	0.315

4. Both Ends Measurement Splice Loss Summary Report

Both Ends Measurement Splice Loss Summary Report						
Wavelength: 1310nm				26-Jul-2001		

Cable:Site A - Site B
Splice No./ Site A -> Site B (km) / Site B - Site A

Fiber ID (num)	01	02	AVG	Min	Max	A<->B (dB)
	25.2814	50.8495				
	50.4196	24.8515				
	1.10	0.17	0.63	0.17	1.10	24.39
	0.16	1.06	0.61	0.16	1.06	31.28
	0.16	0.34	0.25	0.16	0.34	30.71
Average	0.47	0.52	0.50			28.79
Min	0.16	0.17		0.16		24.39
Max	1.10	1.06			1.10	31.28

5. Splice Loss Summary Report

Splice Loss Summary Report						
Wavelength: 1310nm				26-Jul-2001		

Cable:Site A - Site B
Splice No./ Site A -> Site B (km)

Fiber ID (num)	01	02	AVG	Min	Max	A->B (dB)
	25.2814	50.8495				
	1.05	0.34	0.69	0.34	1.05	26.67
		1.17	1.17	1.17	1.17	33.19
		0.55	0.55	0.55	0.55	32.53
Average	1.05	0.69	0.80			30.80
Min	1.05	0.34		0.34		26.67
Max	1.05	1.17			1.17	33.19

6. Both Ends Measurement Splice Loss Report

Both Ends Measurement Splice Loss Report						
Splice No. 01 Wavelength: 1310nm				26-Jul-2001		

Cable:Site A - Site B
Site A:Site A
Site B:Site B
Distance to Splice from Site A 25.2814 km Distance to Splice from Site B 50.4196 km

Fiber ID (num)	Splice Loss(dB)		Average Loss(dB)
	A->B	B->A	
	1.045	1.149	1.097
			0.157
			0.156
Average	1.045	1.149	0.470
Min	1.045	1.149	0.156
Max	1.045	1.149	1.097

7. Event Table

Event Table

02-Jul-2001

Cable:Site A - Site B

File:1005.DAT

Date:18-Jun-2001 Time:10:36
 Wavelength: 1550nm Sampling Strat: 0.0km
 Range:102.31226km Sampling End:102.31226km
 Pulse Width: 10000ns Resolution: 0.02046km
 Thresholds IOR: 1.466100
 Splice Loss: 0.30dB Averages: 10(12s)
 Return Loss: 25.00dB Backscatter: -42.500dB
 Fiber End: 5.00dB Total Loss: 17.260dB
 Total R.Loss: 33.389dB

File:1006.DAT

Date:18-Jun-2001 Time:10:40
 Wavelength: 1550nm Sampling Strat: 0.0km
 Range:102.31226km Sampling End:102.31226km
 Pulse Width: 10000ns Resolution: 0.02046km
 Thresholds IOR: 1.466100
 Splice Loss: 0.30dB Averages: 10(11s)
 Return Loss: 25.00dB Backscatter: -42.500dB
 Fiber End: 5.00dB Total Loss: 3.874dB
 Total R.Loss: 32.323dB

Event No.	Position (km)	Type	Splice Loss(dB)	Return Loss(dB)	dB/km	Total Loss(dB)
01	25.29159	Reflect	1.986	39.606	0.193	4.893
02	50.46041	Connect	0.667	-----	0.182	11.488
03	75.71107	End		14.724	0.197	17.260

Event No.	Position (km)	Type	Splice Loss(dB)	Return Loss(dB)	dB/km	Total Loss(dB)
01	25.33251	Connect	0.337	-----	0.198	5.016
02	50.39902	Reflect	2.228	43.462	0.188	10.139
03	75.83384	End		-----	-0.362	3.874

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MX907600A

Emulation Software

Operation Manual



MX907600A Emulation Software Operation Manual



ANRITSU CORPORATION 5-10-27, Minamiazabu, Minato-ku, Tokyo 106-8570 Japan / Phone: 81-3-3446-1111