User's Manual

AQ7270 Series OTDR

fiberXplorer™

YOKOGAWA
Yokogawa Meters & Instruments Corporation

IM 735020-01E
9th Edition

Product Registration

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Foreword

Thank you for purchasing the AQ7270 Series (AQ7270/AQ7275) OTDR (Optical Time Domain Reflectometer).
This user's manual contains useful information about the instrument's functions and operating procedures and the handling precautions of the AQ7270 Series OTDR.
To ensure correct use, please read this manual thoroughly before beginning operation.
After reading the manual, keep it in a convenient location for quick reference whenever a question arises during operation.
Three manuals, including this one, are provided as manuals for the AQ7270 Series OTDR. Please read all of them.

Manual Title	Manual No.	Description
AQ7270 Series OTDR User's Manual	IM 735020-01E	This manual. Explains all functions and procedures of the AQ7270/ AQ7275 excluding the remote control functions.
AQ7270 Series OTDR Operation Guide	IM 735020-02E	Explains briefly the functions and basic operations.
AQ7270 Series OTDR Communication Interface User's Manual	IM 735020-17E	Explains the functions for controlling the AQ7270/AQ7275 using communication commands.

Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions. The figures given in this manual may differ from those that actually appear on your screen.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
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Revisions

- 1st Edition: December 2006
- 2nd Edition: January 2007
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- 4th Edition: February 2008
- 5th Edition: December 2008
- 6th Edition: June 2009
- 8th Edition: March 2013
- 9th Edition: August 2013

9th Edition : August 2013 (YMI)

Checking the Contents of the Package

Unpack the box and check the contents before operating the instrument.
If some of the contents are not correct or missing or if there is physical damage, contact the dealer from which you purchased them.

AQ7270 Series

MODEL
AQ7270

MODEL	Suffix Code	Description
735020		1550 nm, 32 dB
735021		1650 nm, 30 dB
735022		1310/1550 nm, 34/32 dB
735023		1310/1550 nm, 40/38 dB
735024		1550/1625 nm, 38/35 dB
735025		1310/1490/1550 nm, 34/30/32 dB
735026		1310/1550/1625 nm, 34/32/28 dB
735027		1310/1550/1650 nm, 34/32/30 dB
735028		1310/1550/1625 nm, 40/38/35 dB
735029		850/1300 nm, 22.5/24 dB (GI (62.5/125μm))
735030		850/1300 nm, 22.5/24 dB (GI (62.5/125μm))
		1310/1550 nm, 34/32 dB

AQ7275

MODEL	Suffix Code	Description
735031		1650 nm, 30 dB
		(15dB if the suffix code is /PN)
735032		1310/1550 nm, 34/32 dB
		(36/34 dB if the suffix code is /DR)
735033		1310/1550 nm, 40/38 dB
		(23/21dB if the suffix code is /PN)
735034		1310/1550 nm, 43/41 dB
735035		1310/1490/1550 nm, 34/30/32 dB
735036		1310/1550/1625 nm, 40/38/33 dB
		(23/21/16dB if the suffix code is /PN)
735037		1310/1550/1650 nm, 40/38/30 dB
735038		1310/1550/1625 nm, 40/38/36 dB
		(23/21/16dB if the suffix code is /PN)
735040		850/1300 nm, 22.5/24 dB (GI (62.5/125μm))
		1310/1550 nm, 40/38 dB
735041		850/1300 nm, 22.5/24 dB (GI (62.5/125μm))
		21.5/23 dB (GI (50/125μm))
		1310/1550 nm, 40/38 dB

AQ7270/AQ7275

MODEL	Suffix Code	Description	
Optical connector	-SCC	SC connector (fixed)	
	-FCC	FC Connector (fixed)	
	-ASC	Angled PC SC Connector *1	
	-NON	No universal adapter	
	-USC	SC universal adapter	
	-UFC	FC universal adapter	
Language	-HE	English	
	-HC	Chinese/English	
	-HK	Korean/English	
	-HR	Russian/English	
Power cord*9	-D	UL/CSA standard	Max. rated voltage: 125 V
	-F	VDE standard	Max. rated votlage: 250 V
	-R	AS standard	Max. rated votlage: 250 V
	-Q	BS standard	Max. rated votlage: 250 V
	-H	GB standard	Max. rated votlage: 250 V
	-P	EK standard	Max. rated votlage: 250 V
Options	/PM	Optical power monitor function *2	
	/SLS	Stability Light source function *3	
	/LS	Light source function *4	
	/VLS	Visible Light source function *5	
	/PL	Internal printer and LAN (Ethernet interface)	
	/DF	Dummy fiber (SMF) *6	
	/SB	Shoulder belt	
	/DR	Dynamic range expansion (2 dB) *7	
	/PN	PON measurement*8 (firmware version 2.07 or later)	

*1 Supported by the SMF port of the 735031 to 735038, 735040 and 735041, or supported by the visible light source output port of the 735031 to 735035 and 735038.

*2 Not supported by 735021, 735029 and 735031, and the MMF of 735030, 735040 and 735041

*3 Not supported by 735020 to 735030, and 735040

*4 Not supported by 735029, 735032, 735033 and 735037, and the MMF of 735030 and 735040

*5 Supported by 735031 to 735035 and 735038

*6 Not supported by 735029, 735030, 735040 and 735041

*7 Supported by 735032

*8 Supported by 735031, 735033, 735036 and 735038

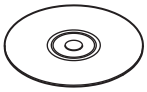
*9 Make sure that the attached power cord meets the designated standards of the country and area that you are using it in.

- **No. (Instrument No.)**
  When contacting the dealer from which you purchased the instrument, please give area that you are using it in.them this number.

Standard Accessories

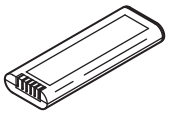
The standard accessories below are supplied with the instrument.

AQ7270 Series OTDR User's Manual B8070TH

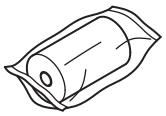


AC adapter 739870-D/F/R/Q/H/P

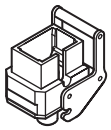
Battery pack 739880



Printer roll paper A9010ZP[*1]

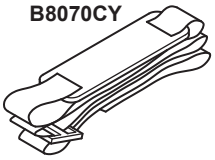


Universal connector (SC) SU2005A-SCC[*2]

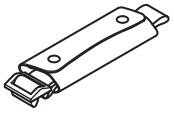


Universal connector (FC) SU2005A-FCC[*3]

Shoulder belt[*4] B8070CY



Hand belt B8070CX



Power cord (one cord that matches the suffix code is included)[*5]

UL/CSA St'd A1068WD

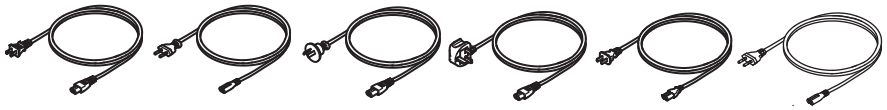
VDE St'd A1071WD

AS St'd A1070WD

BS St'd A1069WD

GB St'd A1076WD

EK St'd A1078WD



***1 Included if the suffix code is /PL.**

***2 Included if the suffix code is -USC.**

***3 Included if the suffix code is -UFC.**

***4 Included if the suffix code is /SB.**

***5 Make sure that the attached power cord meets the designated standards of the country and area that you are using it in.**

Optional Accessories (Sold Separately)

The optional accessories below are available for purchase separately.

Name	Part Number	Notes
Soft carrying case	738960	Soft case
Emulation software	735070	Waveform analysis application
Printer roll paper	A9010ZP	80 mm width × 25 m roll: 10 rolls per unit
Battery pack(reserve)	739880	
External Large Capacity Battery	739881	Attached Connecting Cord and Battery case
Universal adapter(SC)	SU2005A-SCC	SC type
Universal adapter(FC)	SU2005A-FCC	FC type
Shoulder belt	B8070CY	
AC adapter(reserve)	739870-D	UL/CSA standard
	739870-F	VDE standard
	739870-R	AS standard
	739870-Q	BS standard
	739870-H	GB standard, Complied with CCC
	739870-P	EK standard

Safety Precautions

To use the instrument safely and effectively, be sure to observe the precautions given in the user's manual.

The following symbols are used on this instrument.

Warning: handle with care. Refer to the user's manual or service manual.
This symbol appears on dangerous locations on the instrument which require special instructions for proper handling or use. The same symbol appears in the corresponding place in the manual to identify those instructions.

Hazard, radiation of laser apparatus

Direct current

Stand-by (power)

Recycle

Ni-MH

Double insulation mark (equipment protected throughout by double insulation or reinforced insulation)

Failure to comply with the precautions below could lead to injury or death or damage to the instrument.

WARNING

Use the Instrument Only for Its Intended Purpose

This optical measuring instrument is designed to measure the optical characteristics of light sources and evaluate their performance. Do not use this instrument for anything other than as an optical measuring instrument.

Check the Physical Appearance

Do not use the instrument if there is a problem with its physical appearance.

Use the Correct Power Supply

Before connecting the power cord, ensure that the source voltage matches the rated supply voltage of the AC adapter and that it is within the maximum rated voltage of the provided power cord.

Use the Correct Power Cord

Use only the power cord that comes with the instrument. Do not use it for other devices.

Use the Correct AC Adapter

Use only the AC adapter specified for the instrument. Do not use it for other devices.

Use Only the Designated Battery pack

Use only the battery pack specified for the instrument. Do not use it for other devices.

Use only this instrument or a charger specified by YOKOGAWA to charge the battery pack. If the fast charge does not finish after three hours or more, stop charging the battery pack immediately.

Because the electrolyte solution inside the battery pack is alkaline, harm can be done to the clothes or skin, if the battery pack leaks or explodes and the solution comes in contact. If the electrolyte solution enters the eye, it can cause blindness. In such cases, do not rub the eye. Rinse thoroughly with water and immediately consult your eye doctor.

To prevent the possibility of electric shock and accidents, always turn OFF the power switch and remove the AC adapter power supply from the instrument when replacing the battery pack.

Do not throw the battery pack into fire or apply heat to it. This can cause dangerous explosions or spraying of the electrolytes.

Do Not Look at the Laser Light

Do not look at the laser's direct ray, reflected ray from a mirror, or indirect ray without the proper protective eyewear. In addition, avoid being exposed to the laser light. It can cause blindness or damage to the eye.

Do Not Operate in an Explosive Atmosphere

Do not use the thermocouple in a location where any flammable or explosive gas/vapor is present. Operation in such an environment constitutes a safety hazard.

Do Not Remove the Covers or Disassemble or Alter the Instrument

Only qualified YOKOGAWA personnel may remove the covers and disassemble or alter the instrument.

Carrying and Moving the Instrument

Remove all power cords and connection cables from the main unit before moving the instrument. When carrying the instrument, hold it firmly by the handle.

Also, if storage media is inserted into the instrument, always remove the storage media before carrying or moving the instrument. Never leave the media inserted when carrying or moving. The storage media can become damaged.

Apply Correct Signals to the Optical Connectors (PORT1 and PORT2)
Do not apply light that is —5 dBm or greater to the AQ7270/AQ7275 optical connectors (PORT1 and PORT2).
Doing so may damage the AQ7270/AQ7275.

CAUTION

When Measuring with the Same Wavelength as the Communication Light
Most instrument models use the same wavelength for measurement as is used for communication. If communication light is present in an optical fiber being measured, this has an affect on the communication itself. Take sufficient precautions to avoid interruption of communications. The measurements by the instrument may also be incorrect, therefore the measuring environment (presence or absence of communication light, etc.) should be carefully considered.

When Measuring with a Wavelength Different from the Communication Light (1625/1650 nm)
When there is communication light in the fiber under test, use a wavelength different from the communication light for measurement.
If no cutoff filter of 1625 nm or 1650 nm is installed in an instrument connected to the system under test, or depending on the instrument's lightfastness power rating or characteristics of the cutoff filter such as its attenuation, the pulse light output from the instrument can, in the worst case, damage the instrument. Check that an appropriate cutoff filter is installed and that there is no problem with the instrument' s ratings, then take sufficient caution during use.

When Using the Angled PC SC Connector (Suffix Code:-ASC)
- Use the same type of angled PC SC connector for the connected optical fiber cable as well.
  The ferrule end of the angled PC SC connector is polished to an angle.
  If other types of connectors are used, the end face of the connector may become damaged.
- You can replace the AQ7270/AQ7275 connector, but only with an SC type.

CAUTION

Operating Environment Limitations
This product is a Class A (for industrial environments) product. Operation of this product in a residential area may cause radio interference in which case the user will be required to correct the interference.

Safety Precautions for Laser Products

This instrument uses a laser light source. This instrument is a Class 1M laser product as defined by IEC60825-1 Safety of Laser Products-Part 1: Equipment Classification, Requirements and User's Guide. In addition, the AQ7270/AQ7275 complies with 21 CFR 1040.10 except for the items that deviate from the standard as a result of complying with Laser Notice No.50 dated on June 24, 2007.

Laser Class 1M Label

If the laser output is observed at a distance of 100mm or less from the laser beam emitting part by means of optical method (loupe, magnifying glass, microscope, etc.), this may cause eye injury.

Laser Class 3R Label

Avoid direct eye exposure

MODEL	Class	Center Wavelength	Output Power	
735020	1M	1550 nm	CW:	≤ 5 mW@1550 nm
			PULSE:	≤ 200 mW@1550 nm
			PULSE width:	≤ 20 us@1550 nm (duty cycle: ≤ 2.5%)
735021	1M	1650 nm	CW:	≤ 5 mW@1650 nm
			PULSE:	≤ 32 mW@1650 nm
			PULSE width:	≤ 20 us@1650 nm (duty cycle: ≤ 2.5%)
735022	1M	1310/1550 nm	CW:	≤ 5 mW@1310/1550 nm
			PULSE:	≤ 200 mW@1310/1550 nm
			PULSE width:	≤ 20 us@1310/1550 nm (duty cycle: ≤ 2.5%)
735023	1M	1310/1550 nm	CW:	≤ 5 mW@1310/1550 nm
			PULSE:	≤ 200 mW@1310/1550 nm
			PULSE width:	≤ 20 us@1310/1550 nm (duty cycle: ≤ 2.5%)
735024	1M	1550/1625 nm	CW:	≤ 5 mW@1550/1625 nm
			PULSE:	≤ 200 mW@1550/1625 nm
			PULSE width:	≤ 20 us@1550/1625 nm (duty cycle: ≤ 2.5%)
735025	1M	1310/1490/1550 nm	CW:	≤ 5 mW@1310/1490/1550 nm
			PULSE:	≤ 200 mW@1310/1490/1550 nm
			PULSE width:	≤ 20 us@1310/1490/1550 nm (duty cycle: ≤ 2.5%)
735026	1M	1310/1550/1625 nm	CW:	≤ 5 mW@1310/1550/1625 nm
			PULSE:	≤ 200 mW@1310/1550/1625 nm
			PULSE width:	≤ 20 us@1310/1550/1625 nm (duty cycle: ≤ 2.5%)
735027	1M	1310/1550/1650 nm	CW:	≤ 5 mW@1310/1550/1650 nm
			PULSE:	≤ 200 mW@1310/1550 nm
			PULSE:	≤ 32 mW@1650 nm
			PULSE width:	≤ 20 us@1310/1550/1650 nm (duty cycle: ≤ 2.5%)
735028	1M	1310/1550/1625 nm	CW:	≤ 5 mW@1310/1550/1625 nm
			PULSE:	≤ 200 mW@1310/1550/1625 nm
			PULSE width:	≤ 20 us@1310/1550/1625 nm (duty cycle: ≤ 2.5%)

MODEL	Class	Center Wavelength	Output Power	
735029	1M	850/1300 nm	PULSE:	≤ 50 mW@850 nm
				≤ 100 mW@1300 nm
			PULSE width:	≤ 1 us@850 nm (duty cycle: ≤ 5%)
				≤ 5 us@1300 nm (duty cycle: ≤ 0.6%)
735030	1M	850/1300 nm	PULSE:	≤ 50 mW@850 nm
				≤ 100 mW@1300 nm
			PULSE width:	≤ 1 us@850 nm (duty cycle: ≤ 5%)
				≤ 5 us@1300 nm (duty cycle: ≤ 0.6%)
		1310/1550 nm	CW:	≤ 5 mW@1310/1550 nm
			PULSE:	≤ 200 mW@1310/1550 nm
			PULSE width:	≤ 20 us@1310/1550 nm (duty cycle: ≤ 2.5%)
735031	1M	1650 nm	CW:	≤ 5 mW@1650 nm
			PULSE:	≤ 32 mW@1650 nm
			PULSE width:	≤ 20 us@1650 nm (duty cycle: ≤ 2.5%)
	3R	650 nm	CW:	≤ 5 mW@650 nm
735032	1M	1310/1550 nm	CW:	≤ 5 mW@1310/1550 nm
			PULSE:	≤ 200 mW@1310/1550 nm
			PULSE width:	≤ 20 us@1310/1550 nm (duty cycle: ≤ 2.5%)
	3R	650 nm	CW:	≤ 5 mW@650 nm
735033	1M	1310/1550 nm	CW:	≤ 5 mW@1310/1550 nm
			PULSE:	≤ 200 mW@1310/1550 nm
			PULSE width:	≤ 20 us@1310/1550 nm (duty cycle: ≤ 2.5%)
	3R	650 nm	CW:	≤ 5 mW@650 nm
735034	1M	1310/1550 nm	CW:	≤ 5 mW@1310/1550 nm
			PULSE:	≤ 200 mW@1310/1550 nm
			PULSE width:	≤ 20 us@1310/1550 nm (duty cycle: ≤ 2.5%)
	3R	650 nm	CW:	≤ 5 mW@650 nm
735035	1M	1310/1490/1550 nm	CW:	≤ 5 mW@1310/1490/1550 nm
			PULSE:	≤ 200 mW@1310/1490/1550 nm
			PULSE width:	≤ 20 us@1310/1490/1550 nm (duty cycle: ≤ 2.5%)
	3R	650 nm	CW:	≤ 5 mW@650 nm
735036	1M	1310/1550/1625 nm	CW:	≤ 5 mW@1310/1550/1625 nm
			PULSE:	≤ 200 mW@1310/1550/1625 nm
			PULSE width:	≤ 20 us@1310/1550/1625 nm (duty cycle: ≤ 2.5%)
735037	1M	1310/1550/1650 nm	CW:	≤ 5 mW@1310/1550/1650 nm
			PULSE:	≤ 200 mW@1310/1550 nm
			PULSE:	≤ 32 mW@1650 nm
			PULSE width:	≤ 20 us@1310/1550/1650 nm (duty cycle: ≤ 2.5%)
735038	1M	1310/1550/1625 nm	CW:	≤ 5 mW@1310/1550/1625 nm
			PULSE:	≤ 200 mW@1310/1550/1625 nm
			PULSE width:	≤ 20 us@1310/1550/1625 nm (duty cycle: ≤ 2.5%)
	3R	650 nm	CW:	≤ 5 mW@650 nm
735040	1M	850/1300 nm	PULSE:	≤ 50 mW@850 nm,PULSE: ≤ 100 mW@1300 nm
			PULSE width:	≤ 1 us@850 nm (duty cycle: ≤ 5%)
				≤ 5 us@1300 nm (duty cycle: ≤ 0.6%)
		1310/1550 nm	CW:	≤ 5 mW@1310/1550 nm
			PULSE:	≤ 200 mW@1310/1550 nm
			PULSE width:	≤ 20 us@1310/1550 nm (duty cycle: ≤ 2.5%)
735041	1M	850/1300 nm	PULSE:	≤ 50 mW@850 nm,PULSE: ≤ 100 mW@1300 nm
			PULSE width:	≤ 1 us@850 nm (duty cycle: ≤ 5%)
				≤ 5 us@1300 nm (duty cycle: ≤ 0.6%)
		1310/1550 nm	CW:	≤ 5 mW@1310/1550 nm
			PULSE:	≤ 200 mW@1310/1550 nm
			PULSE width:	≤ 20 us@1310/1550 nm (duty cycle: ≤ 2.5%)

If the instrument is used in a manner not specified in this manual, the protection provided by the instrument may be impaired. Yokogawa Electric Corporation assumes no liability for the customer's failure to comply with these requirements.

Waste Electrical and Electronic Equipment

Waste Electrical and Electronic Equipment (WEEE), Directive 2002/96/EC
(This directive is only valid in the EU.)
This product complies with the WEEE Directive (2002/96/EC) marking requirement. This marking indicates that you must not discard this electrical/ electronic product in domestic household waste.

Product Category
With reference to the equipment types in the WEEE directive Annex 1, this product is classified as a “Monitoring and Control instrumentation” product.

Do not dispose in domestic household waste. When disposing products in the EU, contact your local Yokogawa Europe B. V. office.

New EU Battery Directive, DIRECTIVE 2006/66/EC

New EU Battery Directive, DIRECTIVE 2006/66/EC
(This directive is valid in the EU only.)
Batteries are included in this product. This marking indicates they shall be sorted out and collected as ordained in ANNEX II in DIRECTIVE 2006/66/EC.

Battery type:

1. Lithium battery
   You cannot replace batteries by yourself. When you need to replace batteries, contact your local Yokogawa Europe B.V.office.
2. Nickel-metal-hydride battery
   When you remove batteries from this product and dispose them, discard them in accordance with domestic law concerning disposal.
   Take a right action on waste batteries, because the collection system in the EU on waste batteries are regulated.
   For instructions on how to remove the battery pack, see section 20.7 in the user’s manual (File Name: Features & Operation Manual.pdf).

Symbols and Notation Used in This Manual

Safety Markings

The following markings are used in this manual.

Improper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the users manual for special instructions. The same symbol appears in the corresponding place in the user' s manual to identify those instructions. In the manual, the symbol is used in conjunction with the word "WARNING" or "CAUTION."

WARNING Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

CAUTION Calls attention to actions or conditions that could cause light injury to the user or damage to the instrument or the user's data, and precautions that can be taken to prevent such occurrences.

Note Calls attention to information that is important for proper operation of the instrument.

Notations Used on Pages Describing Operating Procedures

On pages that describe the operating procedures in chapters 4 through 19, the following displayed characters, and terminology are used to distinguish the procedures from their explanations.

Procedure Carry out the procedure according to the step numbers. All procedures are written with inexperienced users in mind; experienced users may not need to carry out all the steps.

Explanation This section describes the setup items and the limitations regarding the procedures. It may not give a detailed explanation of the function. For a detailed explanation of the function, see chapter 2.

Displayed Characters and Terminology Used in the Procedural Explanations

Panel Keys and Soft keys

Bold characters used in the procedural explanations indicate characters that are marked on the panel keys or the characters of the soft keys or menus displayed on the screen.

Unit

k	Denotes 1000. Example: 12 kg, 100 kHz

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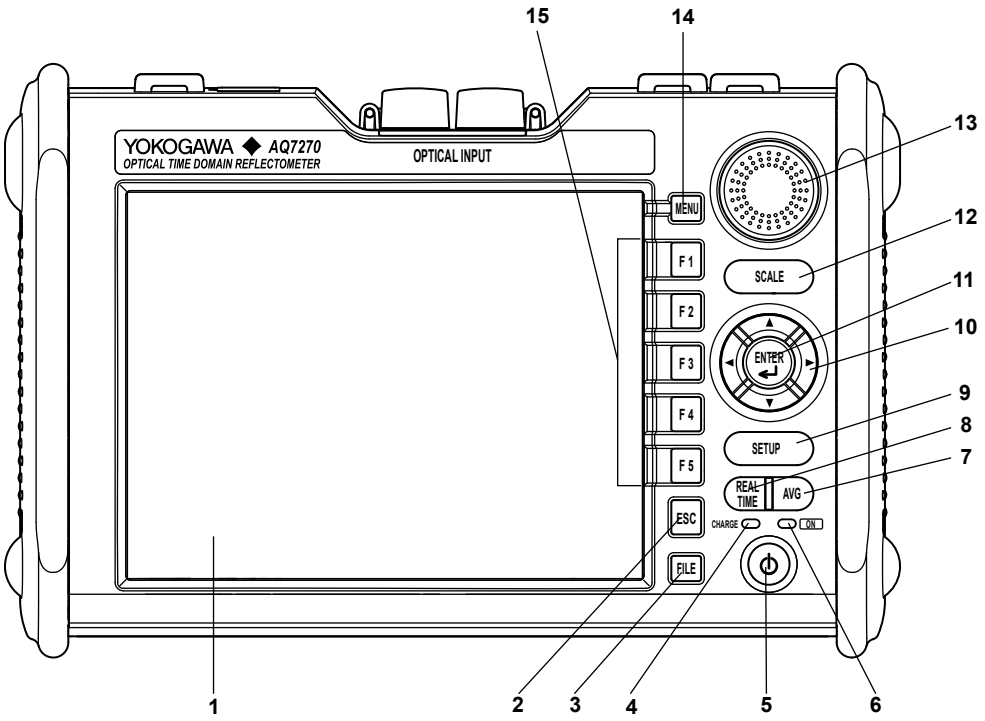
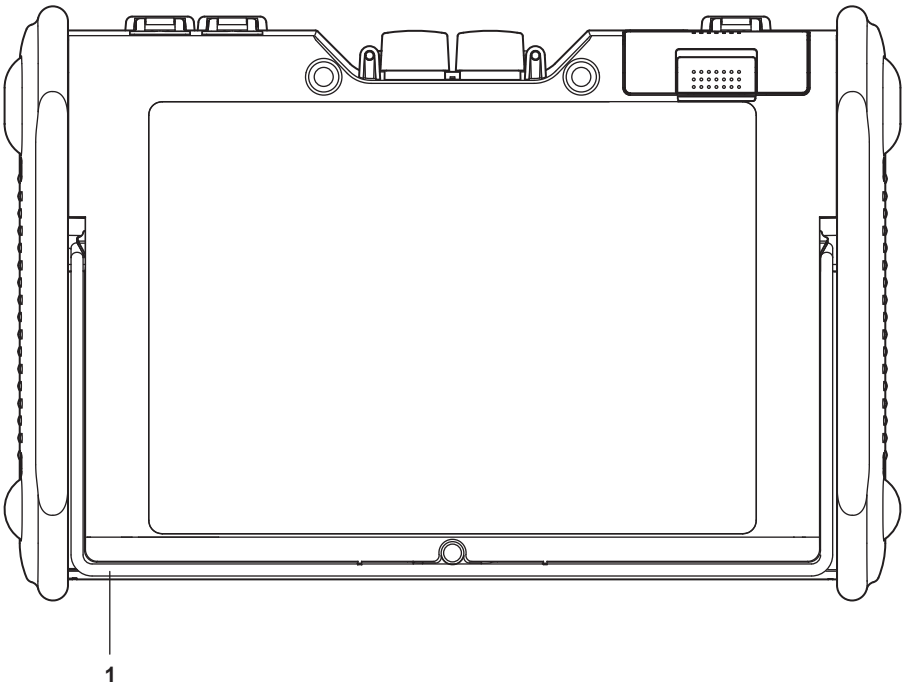
1.1 Front Panel



Number	Name	Function
1	LCD	Displays the measured waveforms, measurement conditions, etc.
2	ESC key	Cancels an operation or returns to the previous display.
3	FILE key	Operate files and print waveforms. Some also used as soft keys.
4	CHARGE lamp	Lights (green) while the battery pack is fast charging. Turns OFF when the battery pack is finished fast charging. Blinks (green) if the battery pack cannot be fast charged.
5	POWER switch	Turns the instrument on/off
6	POWER lamp	Illuminates while the instrument is turned on (green). When the battery level is low (red).
7	AVERAGE key	Starts or stop the averaging measurement.
8	REALTIME key	Starts or stop the realtime measurement.
9	SETUP key	Sets measurement conditions and system configuration. Also used to change the event detection conditions for event analysis.
10	Arrow keys	Moves, expands, and reduces waveforms, moves cursors, etc.
11	ENTER key	Confirms the operation
12	SCALE key	Expands, reduces, and moves waveforms.
13	Rotary knob	Moves cursors and markers, sets values, etc.
14	MENU key	Returns to the initial screen at startup. (Selects OTDR, optical power monitor, light source, and one-button measurement.)
15	Soft keys	Executes functions that are assigned to the soft keys displayed at the right edge of the LCD.

1.2 Rear Panel



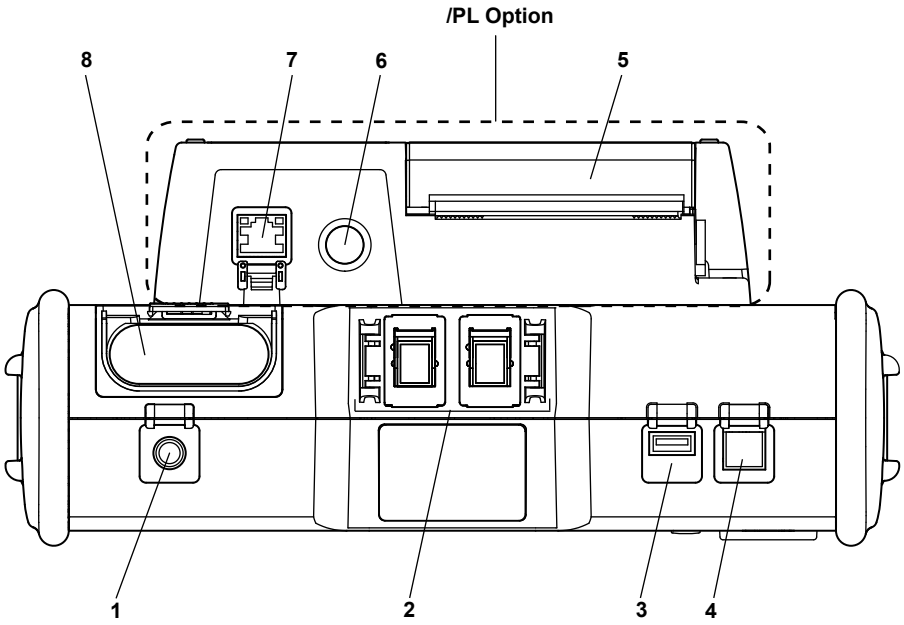
Number	Name	Function
1	Stand	Tilts the instrument.

Note

- The /PL option does not come with a stand.
- Do not use the stand as a handle to carry the AQ7270/AQ7275.
- Use the stand only to tilt the AQ7270/AQ7275.
- If you are tilting the AQ7270/AQ7275, check that the stand is fixed in place.

1.3 Side Panel

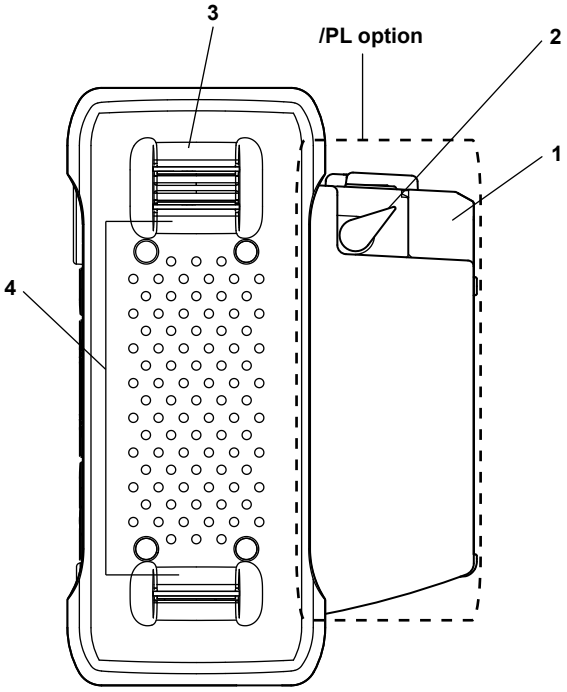
Top View



Number	Name	Function
1	DC power connector	Connects the AC adapter.
2	Optical connector	Connects the optical fiber cable. *1
3	USB 1.1 connector (Type A)	Connects a USB memory, USB printer, the USB104 keyboard etc.
4	USB 1.1 connector (Type B)	Used for remote control, storage, etc.
5	Internal printer	Prints waveforms and event lists.(/PL option)
6	Printer paper feed button	Feeds the paper.(/PL option)
7	Ethernet connector	Used for remote control.(/PL option)
8	Battery pack storage	Stores the battery pack.

*1 The /PM option supports only PORT1. PORT2 (MMF) and 1650-nm wavelength are not supported.

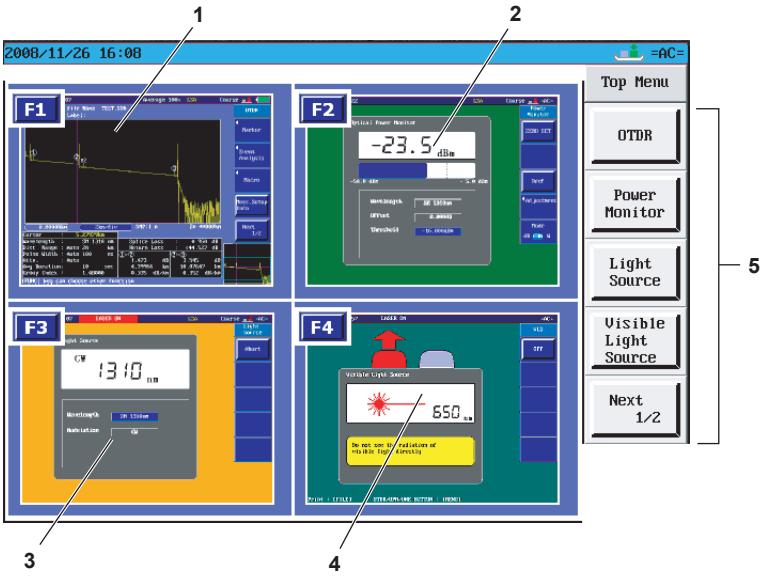
Right View

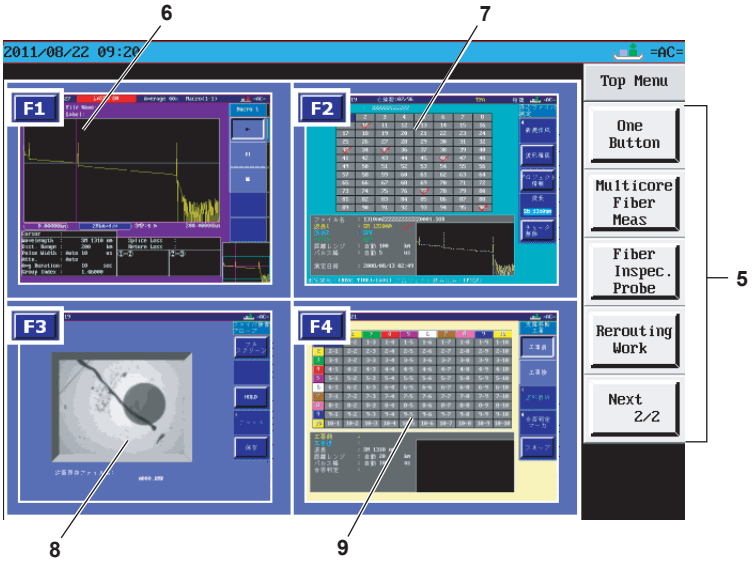


Number	Name	Function
1	Printer cover	Stores the paper.
2	Lock lever	Fixes the printer cover in place.
3	Shoulder belt bracket	Attaches the shoulder belt.
4	Hand belt bracket	Attaches the hand belt.

1.4 Display

Top Menu

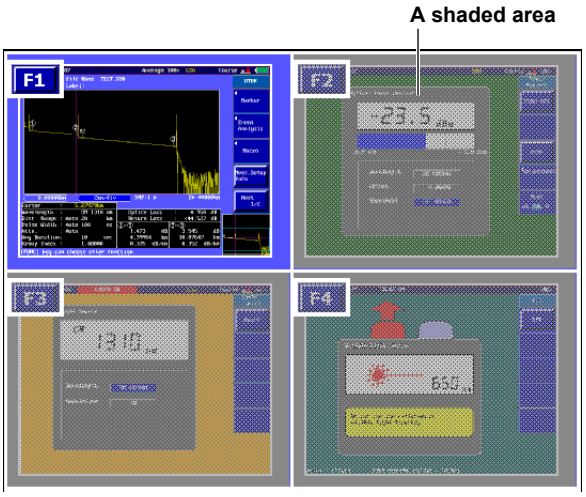




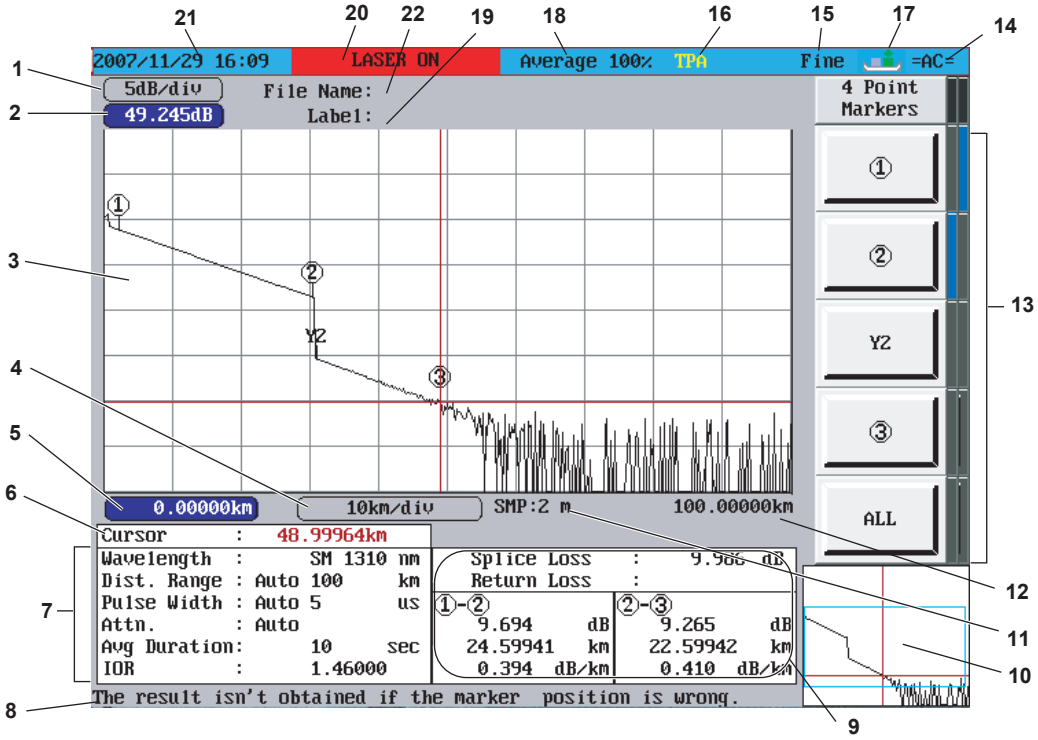
Number	Function
1	Optical pulse measurement (OTDR) screen.
2	Optical power monitor screen (/PM option).
3	Light source screen (/LS /SLS option).
4	Visible Light source screen (/VLS option).
5	Displays the soft key menu.
6	One-button measurement screen.
7	multicore fiber measurement (main view display) screen.
8	Displays the fiber inspection probe screen.
9	Displays the Multi Core Trace Comparison (main view) screen (firmware versions 3.01 and later).

Note

Displays a shaded area when the option is not installed (firmware version 3.01 or later).

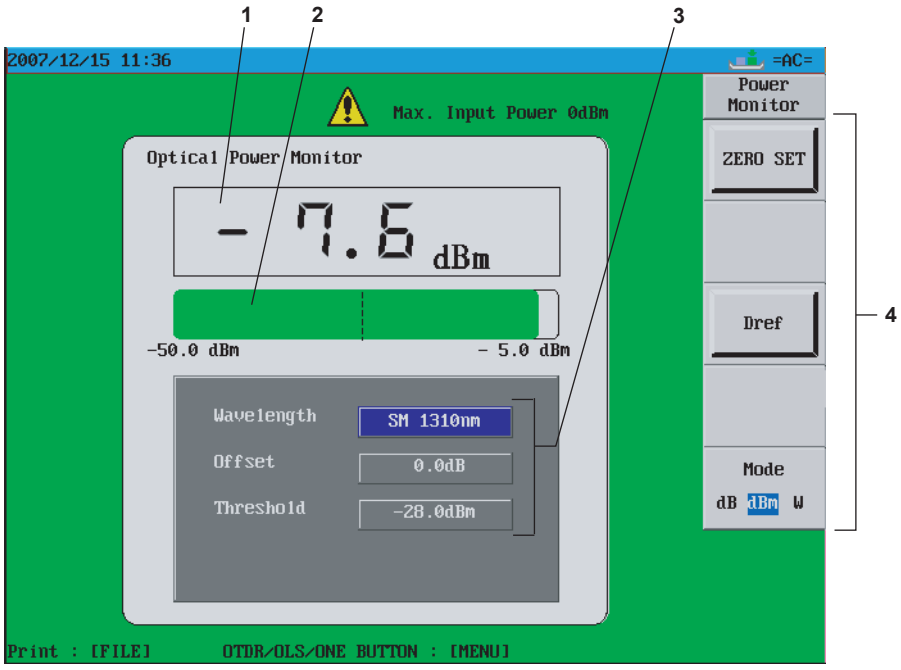


Optical Pulse Measurement (OTDR)



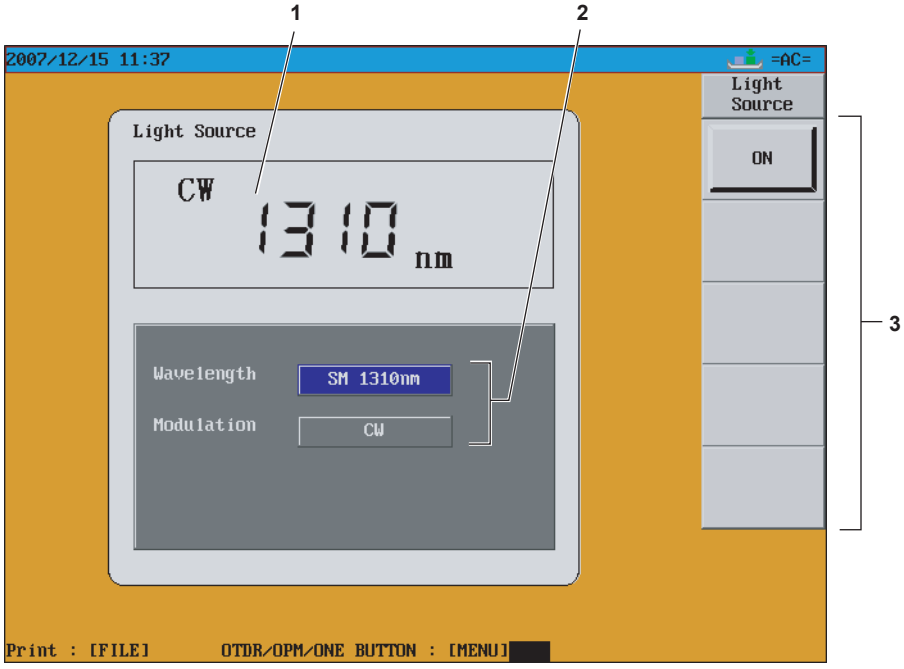
Number	Function
1	Displays the value per scale mark on the vertical axis.
2	Shows the display start level of the vertical axis (top edge of the waveform display area)
3	Waveform display area
4	Displays the value per scale mark on the horizontal axis.
5	Shows the display start distance of the horizontal axis (left edge of the waveform display area)
6	Displays the distance from the measurement reference point of the horizontal axis to the cursor position.
7	Displays the measurement conditions.
8	Displays an explanation of the function
9	Displays the computed result of the measured data.
10	Displays the full screen of the waveform display area. The section displayed in the waveform display area is indicated with a frame (overview).When adjusting the scale using Zoom or Shift, the color of the frame is different. When you press Shift, the word "SHIFT" is displayed at the upper right of the overview screen.
11	Displays the sampling resolution.
12	Shows the display end distance of the horizontal axis (right edge of the waveform display area)
13	Displays the soft key menu.
14	Displays the type of power in use (battery pack or AC adapter)
15	Displays the cursor movement setting.
16	Displays the approximation method.
17	Displays in red the connector in which the optical pulse is output.
18	Displays the progress of the averaging measurement (AVE).Displays a bar graph indicating the progress in the text background.
19	Label area. The name of the next file to be saved blinks if auto save is turned ON.
20	Displays the operating status of the instrument. While the optical pulse output is ON: "LASER ON" is indicated and the text ckground blinks. While the optical pulse output is OFF: Operation mode (Simple (Full Auto), measurement_Wizard, Detail, or Multi WL)
21	Displays the year, month, day, and time.
22	FILE name area

Optical Power Monitor(/PM option)



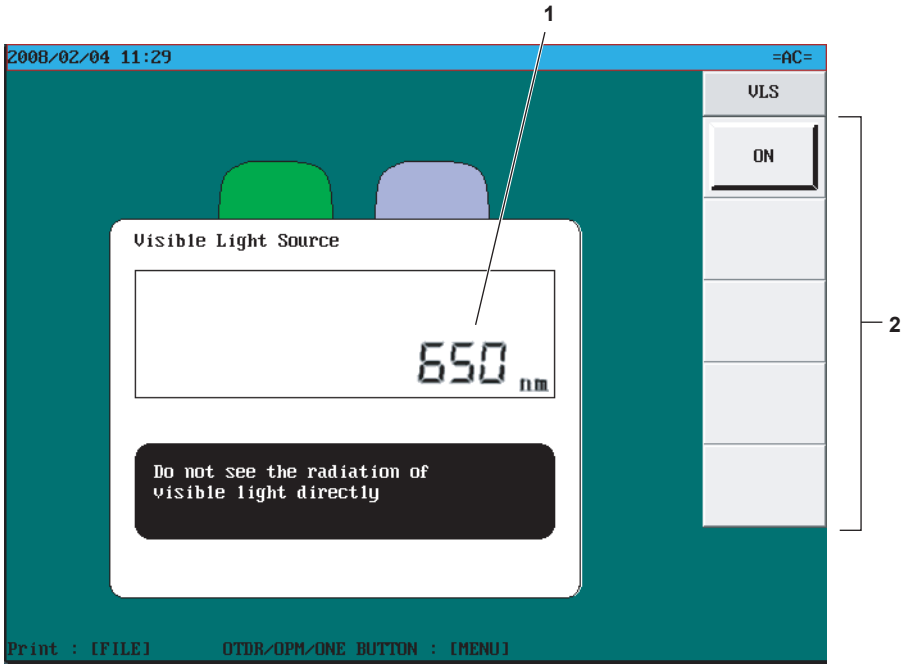
Number	Function
1	Displays numerically the optical input power value.
2	Displays a graph of the optical input power value.
3	Measurement condition display area
4	Soft key menu

Light Source(/LS, /SLS option)



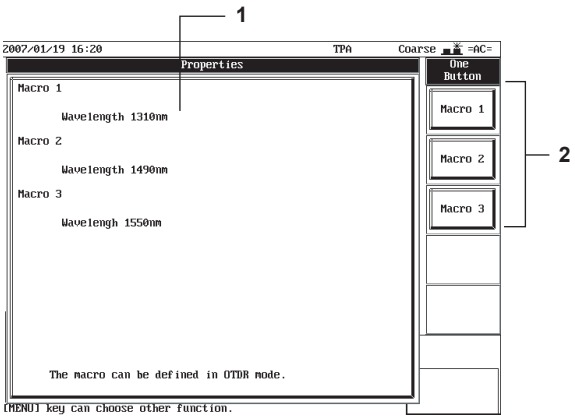
Number	Function
1	Displays the wavelength value.
2	Measurement condition display area
3	Soft key menu

Visible Light source (/VLS option)



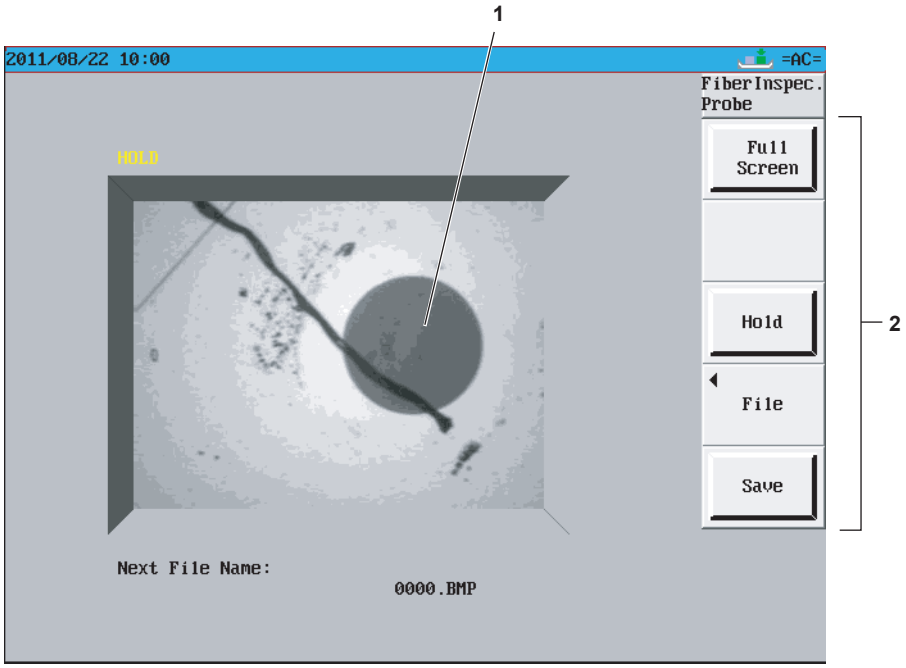
Number	Function
1	Displays the wavelength value.
2	Soft key menu

One-Button Measurement



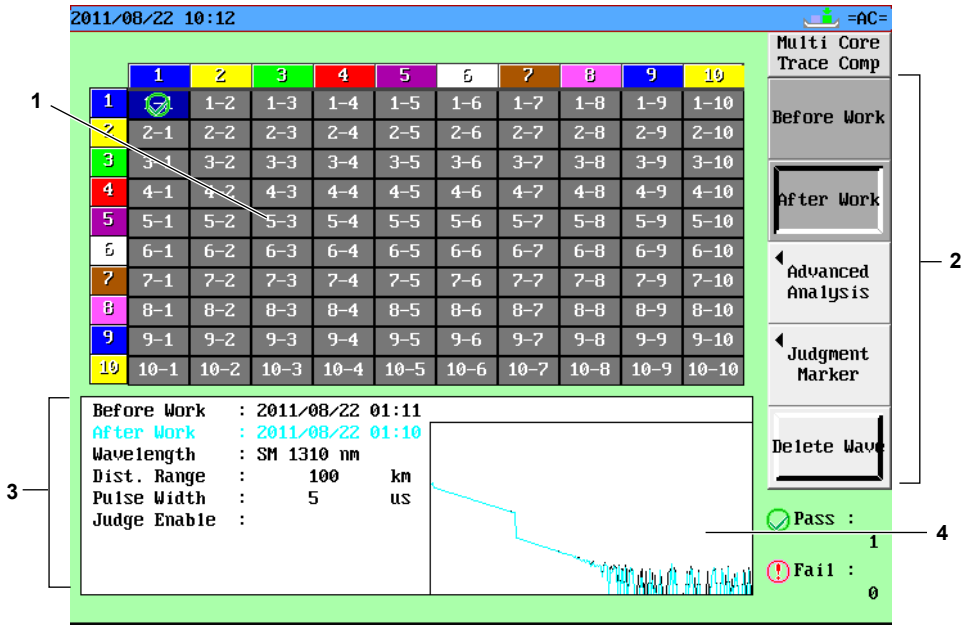
Number	Function
1	Displays the contents of the macro that is being defined (used to enter the macro while viewing the contents).
2	Soft key menu

Fiber Inspection Probe



Number	Function
1	Displays the fiber inspection probe screen.
2	Soft key menu

Multi Core Trace Comparison (Firmware Versions 3.01 and Later)

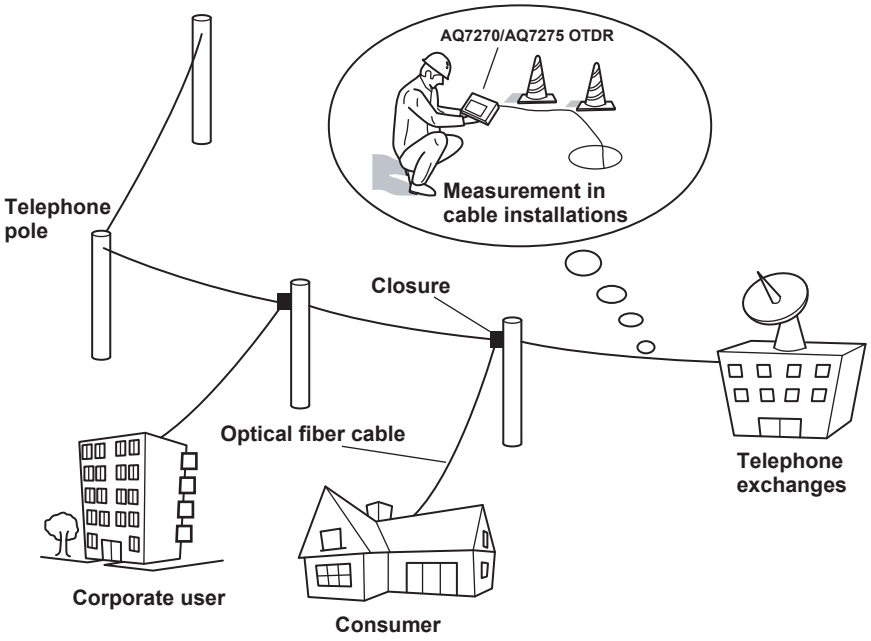


Number	Function
1	Displays the number of the core of the optical fiber cable under measurement.
2	Displays the soft key menu.
3	Displays the information of the cell that the cursor is at.
4	Displays the waveform before work and the waveform after work at the same time.

2.1 Measurement Configuration

Overview of the AQ7270/AQ7275

The AQ7270/AQ7275 is an optical time domain reflectometer that measures optical fiber lengths and losses and identifies failure locations. It is mainly used in the optical fiber installation and maintenance servicing of access networks (communications links between telephone exchanges and telephone poles) and user networks (communications links between user sites and telephone poles). The light source and optical power monitor functions can also be used as options.



Analysis Using the Emulation Software

The waveform data that is measured by the AQ7270/AQ7275 can be analyzed on your PC using the AQ7932 OTDR emulation software (version 3.0 or later). The software comes with a report creation wizard that is convenient in creating construction reports.

Precautions for Measurement

When Measuring with the Same Wavelength as the Communication Light

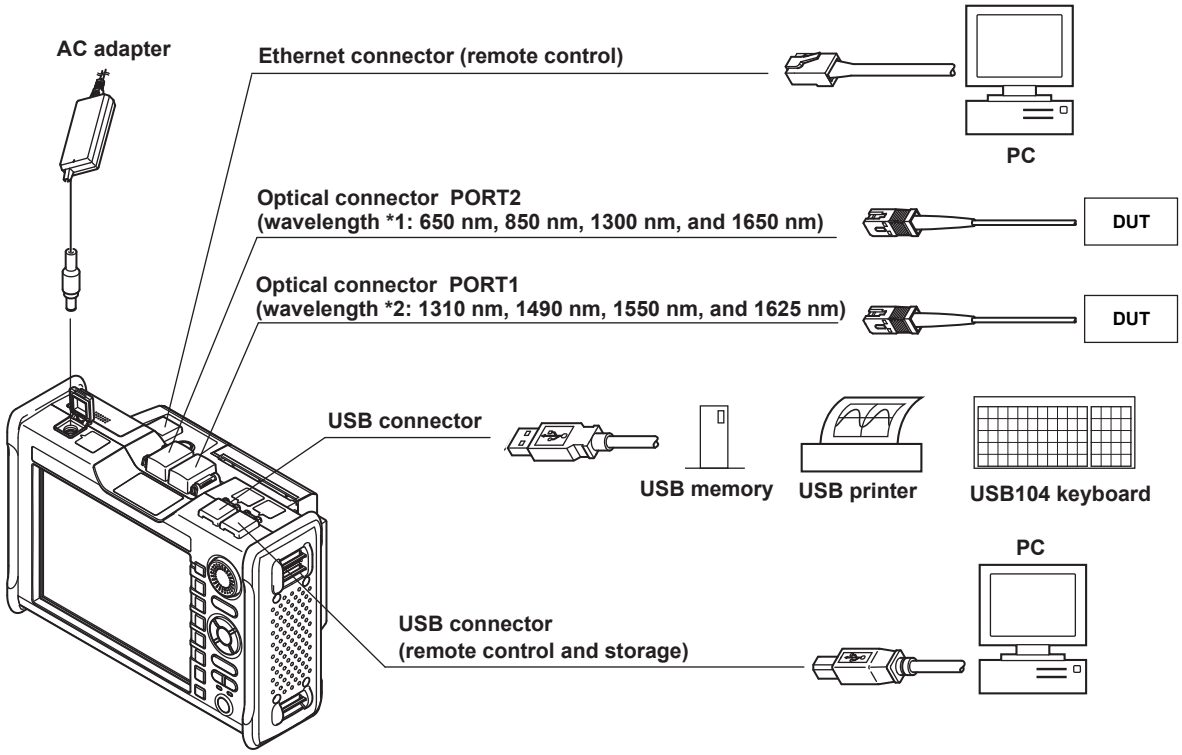
Most instrument models use the same wavelength for measurement as is used for communication. If communication light is present in an optical fiber being measured, this has an affect on the communication itself. Take sufficient precautions to avoid interruption of communications. The measurements by the instrument may also be incorrect, therefore the measuring environment (presence or absence of communication light, etc.) should be carefully considered. For details on fiber-in-use alarm function, see section 6.1.

When Measuring with a Wavelength Different from Communication Light (1625/1650 nm)

When there is communication light in the fiber under test, use a wavelength different from the communication light for measurement.

The instrument is designed to allow measurement that impacts communication as little as possible in such cases, but be sure to install a cutoff filter of 1625 nm or 1650 nm in system under test. If measurements are taken without a cutoff filter installed, communications can be affected and measurements may not be correct. Always check the configuration of the system under test before use (presence or absence of an appropriate cutoff filter, attenuation characteristics, etc.).

Configuration of Peripheral Devices

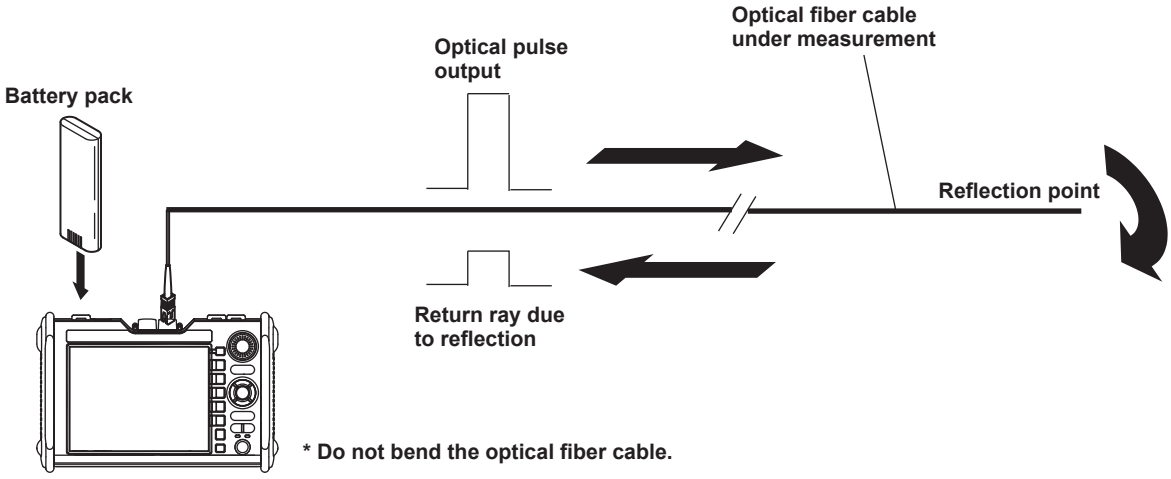


*1 The 735021 and 735031 output 1650 nm from PORT1. The 735029 outputs 850 nm and 1300 nm from PORT1. The /PM option supports only PORT1. PORT2 (MMF) and 1650-nm wavelength are not supported.

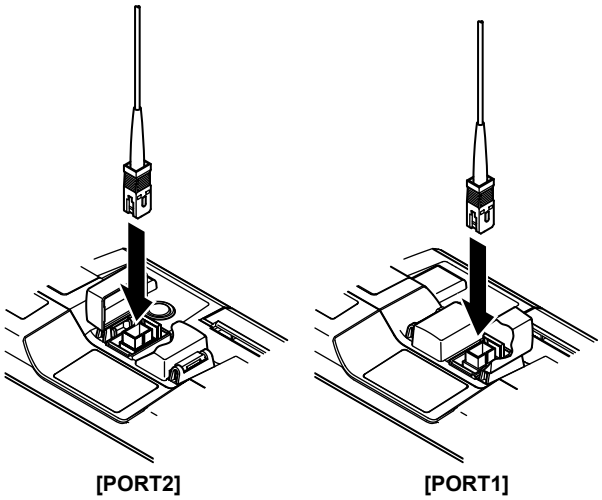
*2 The 735036 outputs 1650 nm from PORT2.

Optical Pulse Measurement (OTDR) Configuration

Install the battery pack and connect the optical fiber cable under measurement.



There are two optical connectors on the top panel of the AQ7270/AQ7275.Because the connector that delivers the optical pulse is fixed depending on the wavelength, connect the cable to the appropriate connector according to the condition of the optical fiber cable to be measured. You can view the indicator shown on the display (see page 1-5) to choose the appropriate connector.



This also applies when using the optional optical power monitor or light source function.

Note

- The 735021 outputs 1650 nm from PORT1.
- The 735029 outputs 850 nm and 1300 nm from PORT1.
- The /PM option supports only PORT1. PORT2 (MMF) and 1650-nm wavelength are not supported.

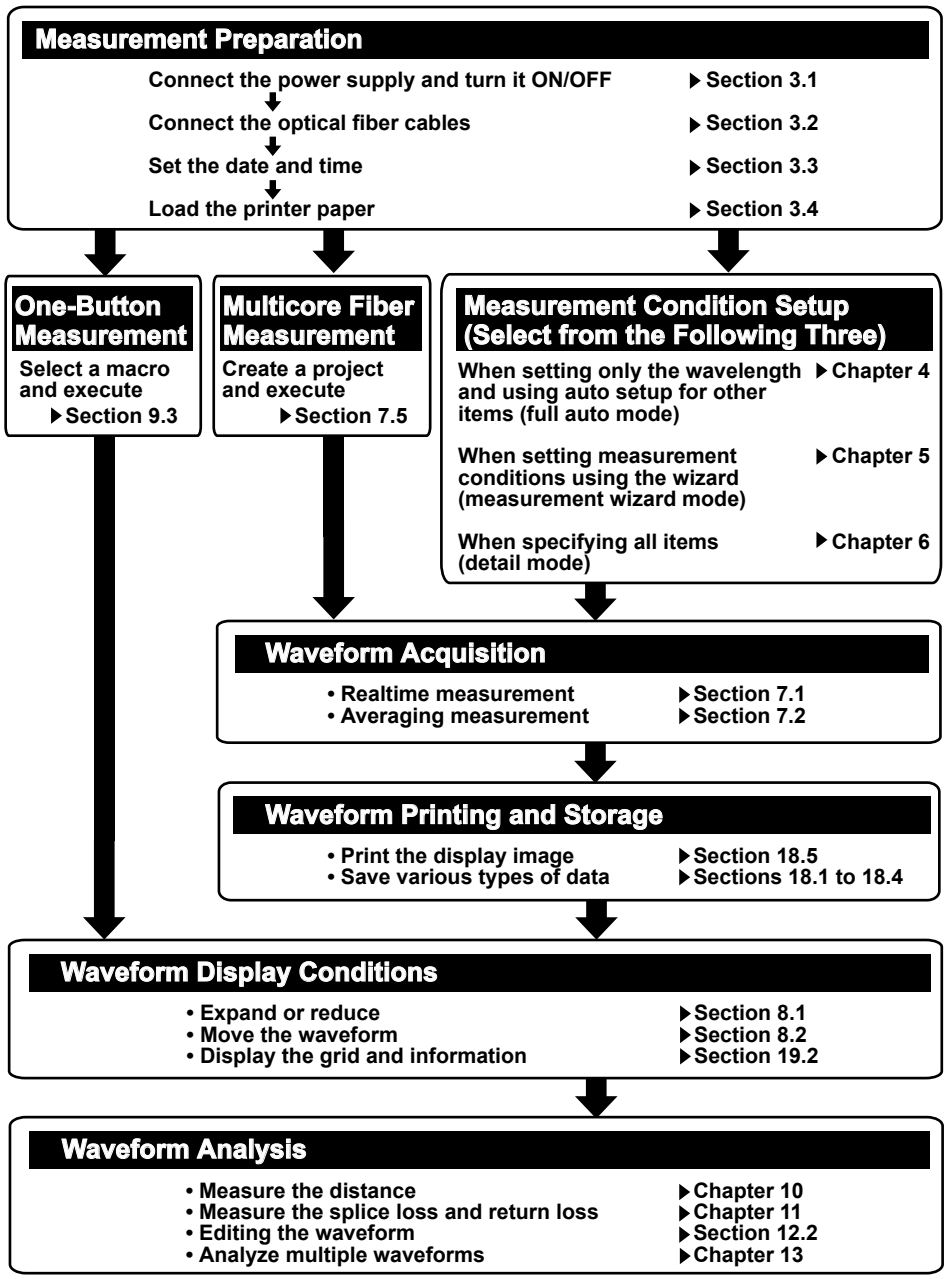
When Using the Angled PC SC Connector (Suffix Code:-ASC)

- Use the same type of angled PC SC connector for the connected optical fiber cable as well.
  The ferrule end of the angled PC SC connector is polished to an angle.
  If other types of connectors are used, the end face of the connector may become damaged.
- You can replace the AQ7270/AQ7275 connector, but only with an SC type.

2.2 Measurement Procedure

Flow of Operation

The figure below is provided to familiarize the first-time user with the general flow of the AQ7270/AQ7275 operation. For details on each item, see the relevant section or chapter.



One-Button Measurement <<For procedures, see section 9.3.>>

If you enter the settings such as the optical pulse measurement conditions, waveform acquisition mode, and data format for storage in advance, you can carry out the measurement and storage through a single-step operation. If you enter multiple sets of settings such as the wavelengths to be measured, you can carry out measurements sequentially using different measurement conditions through one-step operation.

Easy Setting of Measurement Conditions

There are three modes for setting the measurement conditions: Detail, Measurement Wizard, and Full Auto.
In Detail mode, the user sets each measurement condition as in the past.
In Measurement Wizard mode, a wizard is displayed when the user sets each measurement condition. This feature is convenient for users that are not used to the work.
In Full Auto mode, all optical pulse measurement conditions are automatically set when you select the wavelength to be measured, and the measured waveform is displayed. This feature is convenient when you are not sure about the installation conditions of the optical fiber cable.

Waveform Acquisition and Measurement Using Markers and Cursors

The AQ7270/AQ7275 has the following two measurement functions.

- Acquire the waveform
- Position markers or cursors on the acquired waveform and measure the values.

Multi Wavelength Measurement <<For procedures, see section 6.3 and 6.4.>>

The multi wavelength measurement is performed on the following wavelengths: 850nm, 1300nm, 1310 nm, 1490 nm, 1550 nm, and 1625 nm.
Measurement at multiple wavelengths can be carried out continuously.
The number of wavelengths that can be measured and waveforms that can be displayed differs depending on the model (up to 3 waveforms).

Measuring Multicore Fiber <<For procedures, see section 7.5.>>

Specialized screens (Main View Screen) and menus for multicore fiber measurements appear, enabling you to efficiently measure multicore fibers without data loss.

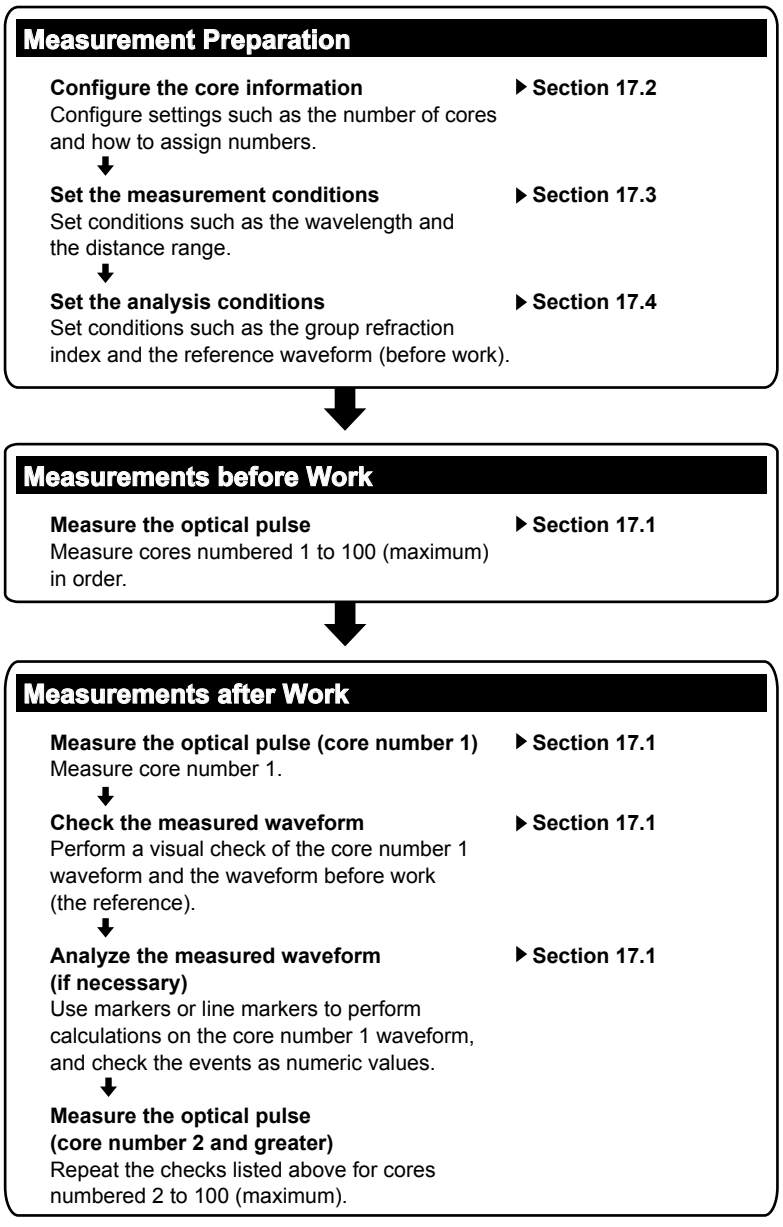
Multi Core Trace Comparison (Firmware Versions 3.01 and Later) <<For procedures, see chapter 17.>>

When installed fibers are moved because of road work or other external factors, you can efficiently perform measurements by using this function.

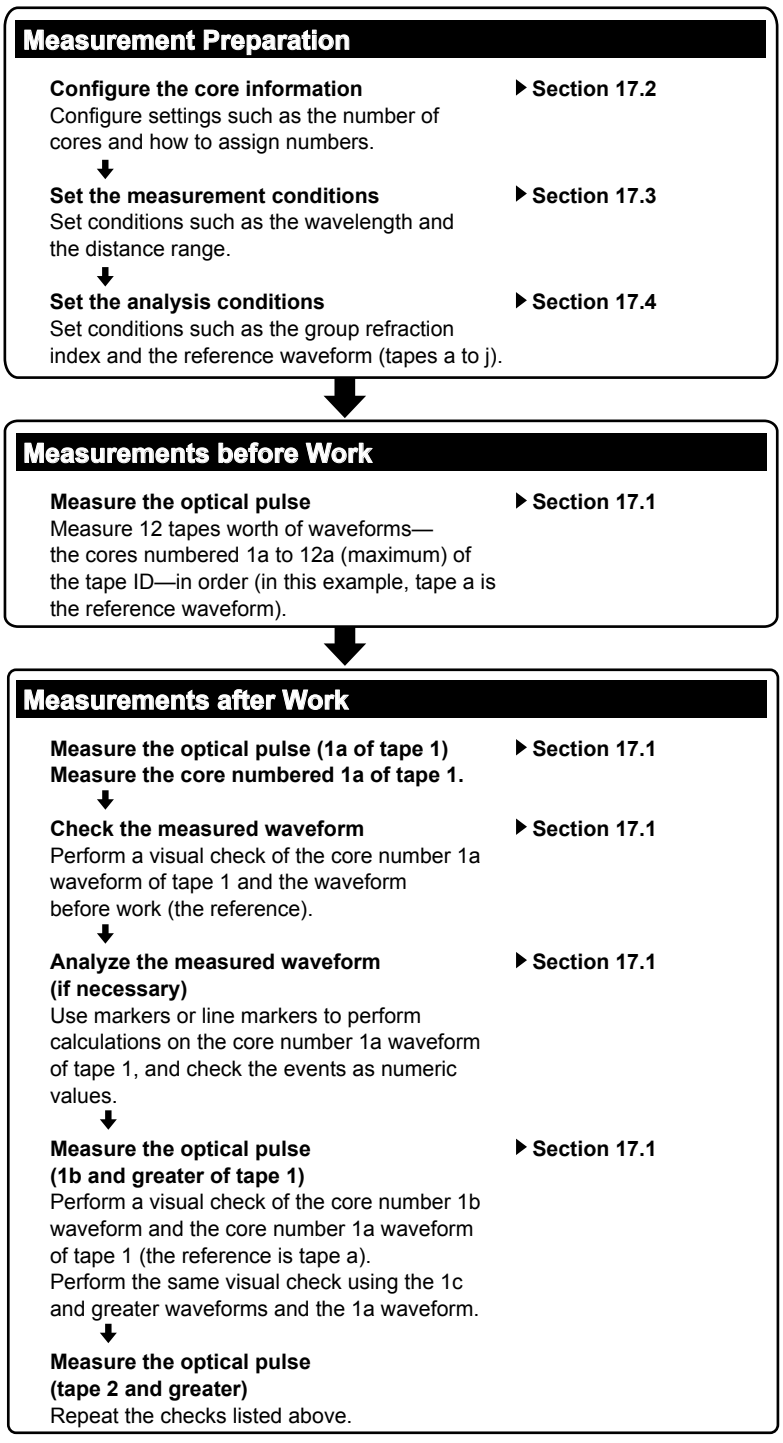
The following three measurement methods are available, each of which checks the quality of the optical pulse measurement waveform after work.

- Visual check of the waveform before work and the waveform after work
- Visual check using a waveform of one fiber within the same tape as the reference
- Automatic pass/fail judgment using pass/fail markers

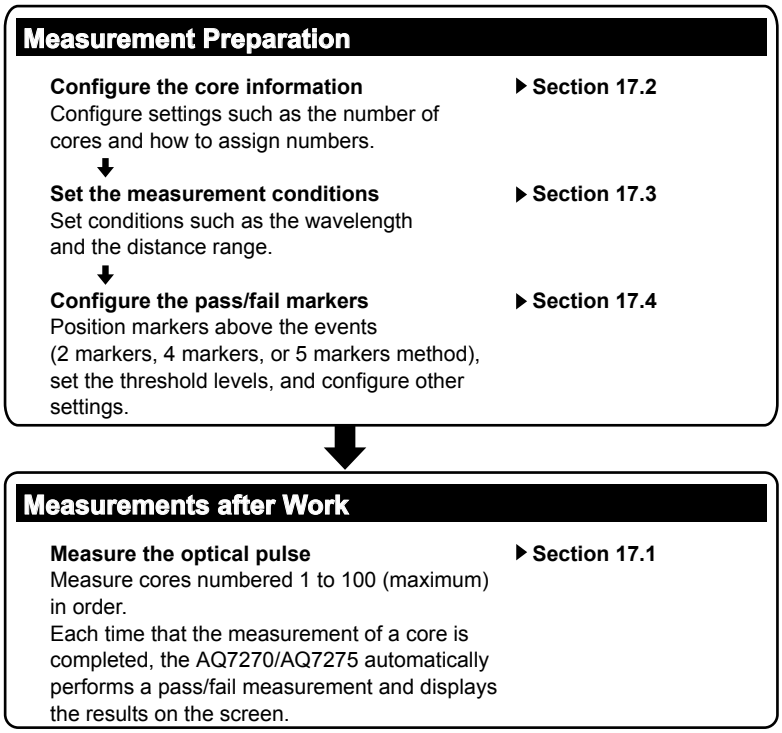
Visual Check of the Waveform before Work and the Waveform after Work



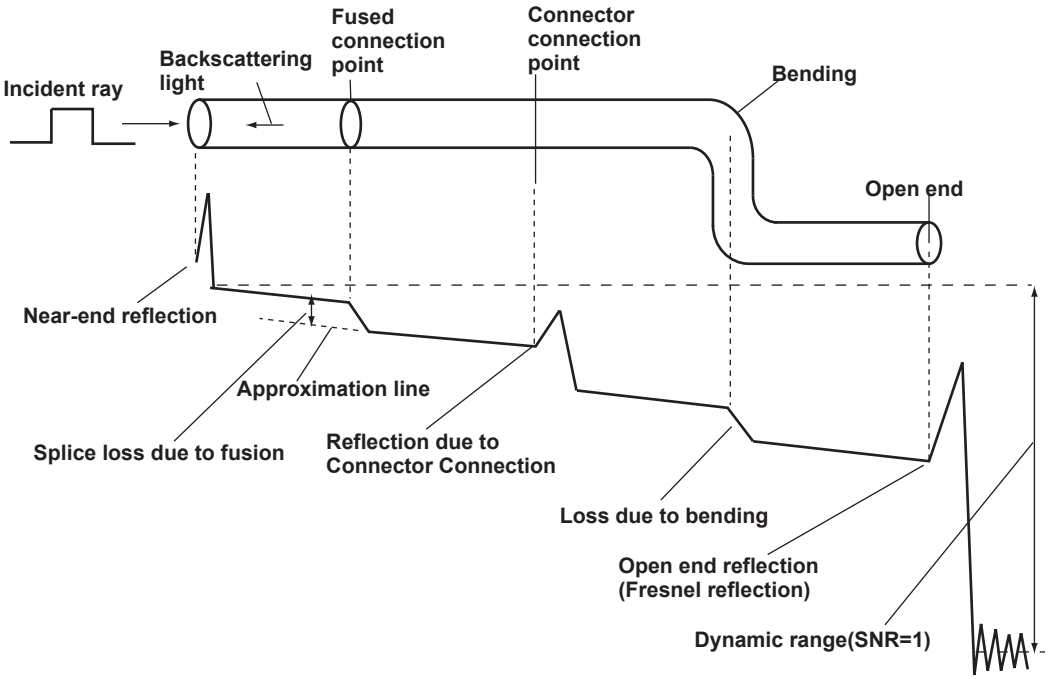
Visual Check Using a Waveform of One Fiber within the Same Tape as the Reference



Automatic pass/fail judgment using pass/fail markers



2.3 Viewing the Optical Pulse Measurement Waveform



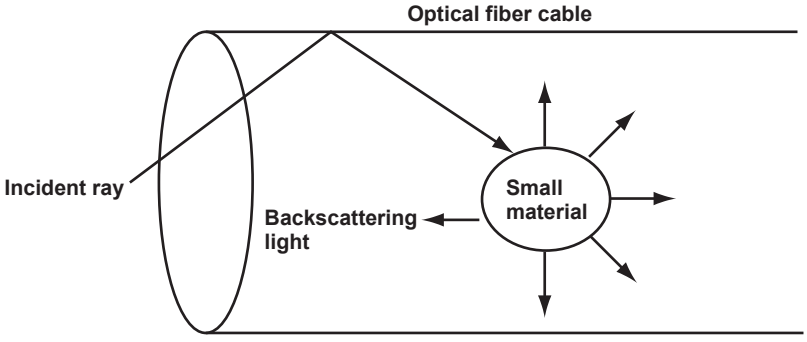
An optical pulse that enters the optical fiber cable incurs loss due to reflection at the connection points, etc. The measured result is displayed with the distance along the horizontal axis and loss level along the vertical axis. Waveform refers to the display of this result on the AQ7270/AQ7275. The losses and reflections detected on the waveform are called events.

Near-End Reflection

A reflection occurs in the connection point between the AQ7270/AQ7275 and the connector for the optical fiber cable. This section also includes the internal reflection of the OTDR. Losses and reflections of the connection points cannot be detected in the section in which this reflection is detected. This section is called a near-end dead zone. If the near-end reflection affects the measurement of a short distance, connect a dummy fiber provided as an option to clear the effects.

Loss by the Optical Fiber Cable due to Rayleigh Scattering

When light propagates through the optical fiber cable, a phenomenon called Rayleigh Scattering occurs due to the nonuniformity of the density or constituents of materials smaller than the wavelength unit. The scattered light that is transmitted opposite to the direction of propagation is called backscattering light.

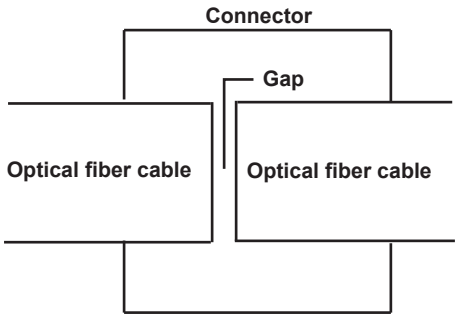


Splice Loss due to Fusion

Because the unevenness in the density or constituents of the materials in the fused section becomes large, the loss due to Rayleigh Scattering increases, and a splice loss occurs.

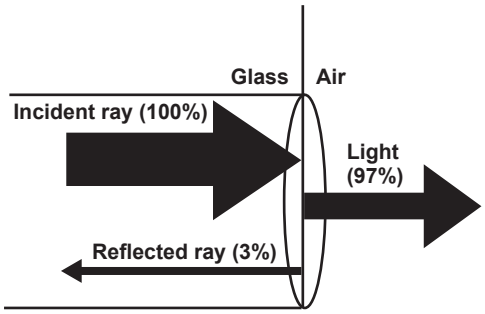
Reflection due to Connector Connection

Unlike the fused section, a slight gap occurs in the connection section of connectors. Because the group refraction index changes in this gap, a reflection occurs causing a loss.



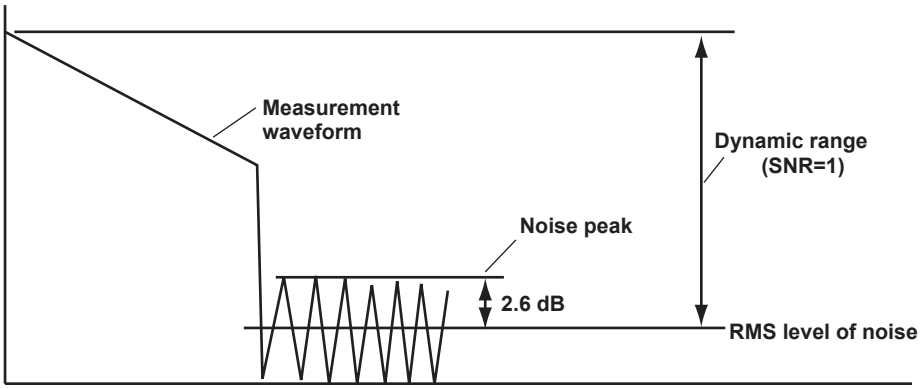
Fresnel Reflection at the Far End of the Optical Fiber Cable

Fresnel reflection occurs at the location where the optical fiber cable is broken or a location where the group refraction index changes such as the far end of the cable (glass and air) when light enters the cable. If the end face of the optical fiber cable is vertical, approximately 3 % (–14.7 dB) of the incident light power is reflected.



Dynamic Range

The backscattering light level that the AQ7270/AQ7275 can measure.



2.4 Distance Measurement

Accuracy

The AQ7270/AQ7275 calculates the distance (L) by measuring the time until the transmitted light pulse returns and using the equation indicated below.

L = C×T/(2N) [m]

C: The speed of light travelling through a vacuum.

T: The time from when the pulse is transmitted until the light returns.

N: Group refraction index

The reason why the equation divides by 2 is because the round-trip time of the optical pulse is measured.

An error will occur in the distance measurement unless an accurate group refraction index is specified.

Group Refraction Index Settings

The following group refraction indexes are assigned according to the wavelength on the AQ7270/AQ7275.

850 nm: 1.46000
1300 nm: 1.46000
1310 nm: 1.46000
1490 nm: 1.46000
1550 nm: 1.46000
1625 nm: 1.46000
1650 nm: 1.46000

The selectable range is 1.30000 to 1.79999.

For the accurate group refraction index, check with the manufacturer of the optical fiber cable.

Optical Fiber Cable Length and Distance Range

Select a distance range that is longer than the optical fiber cable you want to measure. If the distance range is longer, the measurement time also increases accordingly.

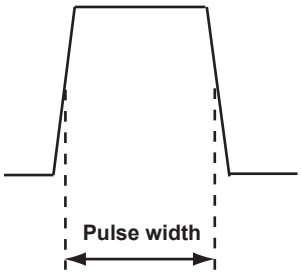
Cable Length	Distance Range
Unknown	Auto
0 to 400 m	500 m
400 m to 800 m	1 km
800 m to 1.6 km	2 km
1.6 km to 4 km	5 km
4 km to 8 km	10 km
8 km to 16 km	20 km
16 km to 40 km	50 km
40 km to 80 km	100 km
80 km to 160 km	200 km
160 km to 240 km	300 km

Selectable Pulse Widths for the Distance Measurement

The pulse width has the following characteristics.

Short pulse width: Allows events (reflection point and loss) that are close together to be measured separately. However, long distance cannot be measured.

Long pulse width: Long distance can be measured. However, multiple events that are close together may appear as a single event.



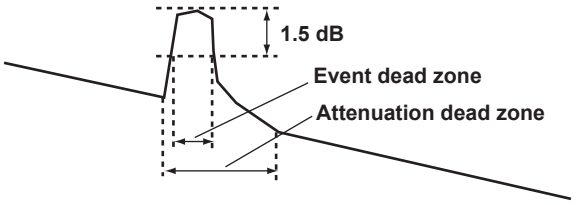
Distance Range	Selectable Pulse Widths
500 m	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns
1 km	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μs
2 km	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μs
5 km	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μs
10 km, 20 km	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μs
50 km or longer	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μs, 2 μs, 5 μs, 10 μs, 20 μs

If the wavelength is 850 nm, you cannot use 3ns, 2 μs, 5 μs, 10 μs, and 20 μs(3 ns is available on the 735041).
If the wavelength is 1300 nm, you cannot use 3ns, 10 μs and 20 μs (3 ns is available on the 735041).

Dead Zone in Which the Distance Cannot Be Measured

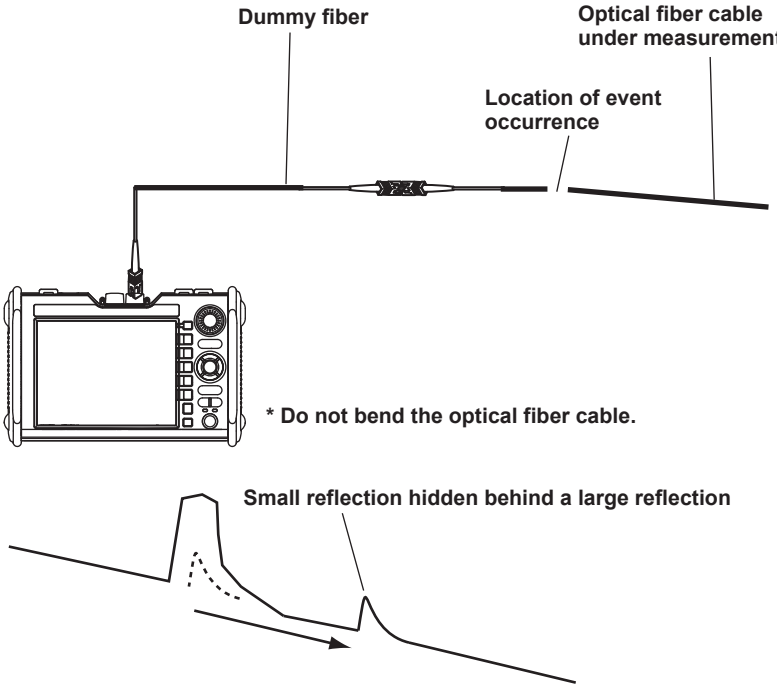
The locations where measurements cannot be made due to the effects of connection point of connectors, etc. The following types of dead zones are available.

- Event dead zone
  Area in which two reflections that are close together cannot be separated. A zone defined by a pulse width whose level is 1.5 dB less than the peak value.
- Attenuation dead zone
  A zone in which the splice loss cannot be measured due to a large reflection nearby.



Circumventing the Near-End Dead Zone Using a Dummy Fiber

Losses and reflections of the connection points cannot be detected in the section in which a near-end reflection is detected. When measuring a short distance, connect the dummy fiber to move the events that are hidden behind the near-end reflection by the length of the dummy fiber.



Note

The AQ7270/AQ7275 OTDR product series allow a 100-m dummy fiber to be built in (/DF option).

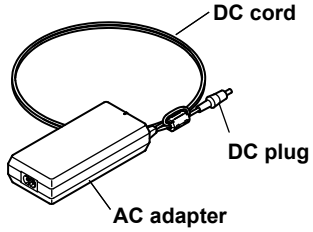
3.1 Connecting the Power Supply

Using the AC Adapter

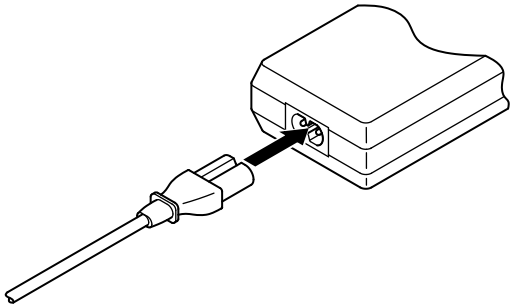
WARNING

Be sure to observe the following points when using the AC adapter. Failure to do so may cause fire or electric shock or damage to the instrument.

- Check that the AQ7270/AQ7275 is turned OFF before connecting the AC adapter.
- Use only the power cord supplied by YOKOGAWA for the instrument.
- Before connecting the power cord, ensure that the source voltage matches the rated supply voltage of the AC adapter and that it is within the maximum rated voltage of the provided power cord.
- Use only the AC adapter specified for the instrument.
- When unplugging the power cord from the outlet, never pull the cord itself. Always hold and pull by the plug. If the power cord is damaged, contact your dealer for replacement.
- Do not plug or unplug the AC adapter while the instrument is turned ON.
- If you are using the instrument for an extended time with the AC adapter connected, remove the battery pack from the instrument.
- If you are not going to use the instrument for an extended time, unplug the power cord of the AC adapter from the outlet.
- Be sure nothing is placed on top of the AC adapter or power cord or let heat generating objects come in contact with them.
- If an AC outlet that matches the power cord provided is unavailable, do not use the instrument.
- Do not bend or twist the power cord or AC adapter's DC cord numerous times.
- Do not bend the base of the AC adapter's DC cord or the base of the DC plug.
- Do not wrap the power cord or the AC adapter's DC cord around the AC adapter.
- Do not bundle the power cord or the AC adapter's DC cord too tightly.
- Do not use the AQ7270/AQ7275 with the power cord or the AC adapter's DC cord in a bundled condition.
- When the power cord or AC adapter's DC cord is connected to the outlet or the AQ7270/AQ7275, do not move the AC adapter or the AQ7270/AQ7275.
- Do not carry the AC adapter while pulling on the power cord or the AC adapter's DC cord.
- Do not allow the power cord or the AC adapter's DC cord to be caught in doors, shelf doors, and so on.
- Do not alter, process, or repair the power cord or the AC adapter's DC cord. If a cord is damaged, contact your nearest YOKOGAWA dealer.
- Do not use the AQ7270/AQ7275 with the AC adapter hanging in the air.

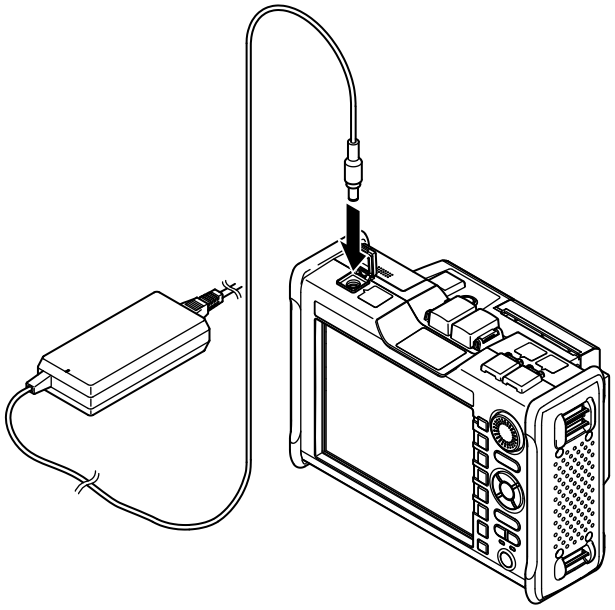


1. Connect the power cord to the AC adapter.



2. Connect the AC adapter plug to the instrument.

3. Connect the power plug to the outlet.

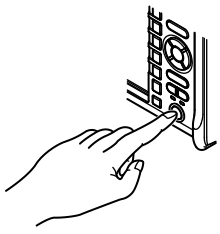


Note

If the DC power connector cover comes off, bend the axis section of the cover and attach it.

Turning the Power ON

4. Press the power switch on the front panel of the instrument. When the AQ7270/AQ7275 starts normally, the POWER lamp illuminates, and the top screen appears. For details on the top screen, see section1.4



POWER lamp
Green: Running
Red: Low battery level

CHARGE lamp
Green: Fast charging in progress
Green(blinking): Fast charging not started

- **The battery pack is not loaded correctly in the AQ7270/AQ7275.**
- **Battery pack temperature not within the allowable range for fast charging.**
- **The battery pack is in the preliminary charging condition because the battery charge is too low for fast charging.**

Check that the battery pack is loaded correctly. If the green lamp does not illuminate even after 2 or 3 hours passes with the AC adapter connected, the battery pack may be broken or reduced life.

When the Power-on Operation Does Not Finish Normally

Turn off the power switch, and check the following items.

- Is the AC adapter connected correctly?
- Is the battery pack loaded correctly? See page 3-3.
- Are you holding down the power switch for at least 2 seconds?

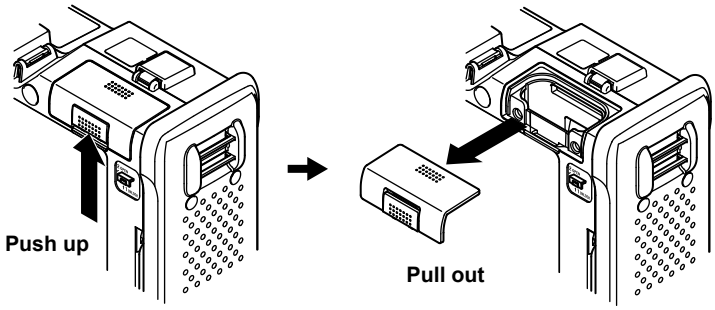
If the AQ7270/AQ7275 still does not work properly after checking these items, contact your nearest YOKOGAWA dealer for repairs.

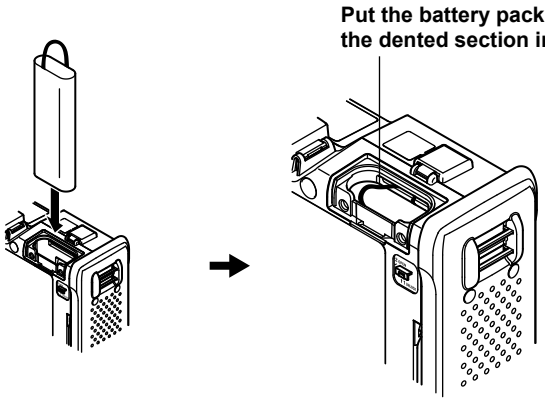
Using the Battery Pack

WARNING

- Do not remove or insert the battery pack while being charged with the AC adapter.
- To prevent problems with the battery pack, periodically check the physical appearance for cracks, deformation, and leaks.
- Charge the battery pack using the instrument. Be sure to observe the environmental conditions when charging the battery pack. Otherwise, leaks, overheating, smoke, explosion, or fire may occur.

1. Push up the battery pack cover lock.
2. Pull out the battery pack cover while pushing the lock up.
3. Insert the battery pack. Pay attention to the direction.
4. Put the battery pack string way in the dented section in the back.
5. Close the battery pack cover and securely lock the battery pack cover.





Note

- Charge the battery pack in advance when using it for the first time or after long periods of non-use. The remaining battery charge may be low due to self-discharging.
- If you attempt to charge a battery pack that is overly discharged, the battery pack enters the preliminary charging condition* and it may take about 2 hours for the fast charging to start.
- The AQ7270/AQ7275 draws minute current even if the power switch is turned OFF. If you do not plan to use the AQ7270/AQ7275 for longer than a week, we recommend that you remove the battery pack from the AQ7270/AQ7275. If you do not use the AQ7270/AQ7275 for a long time with the battery pack loaded, the battery pack may become overdischarged.

* For a description of the preliminary charging condition, see “Charging Conditions of the Battery Pack.”

Explanation

Charging Conditions of the Battery Pack

There are four charging operations

- Preliminary Charging

  This function is designed to reactivate a battery pack that is overly discharged or deactivated due to temperatures lower than the specifications’ allowable range (when engaged, the CHARGE lamp blinks green). If the battery pack is overly discharged, the preliminary charge can take two hours or more. When preliminary charging is complete, fast charging begins automatically.
- Fast Charging

  Normally (under standard operating conditions with a problem-free battery pack), fast charging begins simultaneously when powering with the AC adapter. Fast charging charges the battery pack to up to 80–90% of its full capacity. Fast charging takes approximately two hours, depending on the original battery level and environmental conditions.
- Top-off Charging

  This function engages immediately after fast charging, and runs on a three-hour timer to bring the charge up to 100% (the remaining amount of charge not provided by the fast charging function). When fast charging finishes, the CHARGE lamp goes out and the battery pack will be charged continuously for three hours. Charging of the battery pack is complete after five hours: two hours of fast charging and three hours of top-off charging.
- Maintenance Charging

  This function compensates for the battery pack’s self-discharging. If the battery pack continues to be powered by the AC adapter after top-off charging, maintenance charging will be employed to compensate for self-discharging (when engaged, the CHARGE lamp is turned OFF).

Note

The CHARGE lamp also blinks green if the battery pack is not installed or if the temperature is outside the allowable range for fast charging.

Warm-up

Allow the instrument to warm up for at least 30 minutes after turning ON the power. Sufficient warm-up produces more accurate measurements.

Overdischarging

If you do not use the AQ7270/AQ7275 for a long time with the battery pack loaded, the battery pack may become overdischarged.

Please note that this can lead to reduced life of the battery pack.

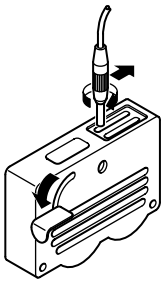
If not using the AQ7270/AQ7275 for one week or more, prevent overdischarging by charging the battery pack, removing it from the AQ7270/AQ7275, then storing it away from sunlight in a 10–30°C environment. When storing the battery pack for one month or more, compensate for self-discharging by charging it with the instrument once a month.

3.2 Connecting the Optical Fiber Cable

Cleaning the Connector End Face of the Optical Fiber Cable

Clean the connector end face of the optical fiber cable under measurement before connecting it to the AQ7270/AQ7275. If dust is adhered to the connector end face, it may damage the optical connector of the AQ7270/AQ7275. If this happens, the AQ7270/AQ7275 will not be able to make correct measurements.

1. Press the connector end face of the optical fiber cable firmly against the cleaning surface of the cleaner.
2. Turn the cable around once with the end face pressed against the cleaner.
3. Rub the end face against the cleaner.
4. Repeat steps 1 to 3.

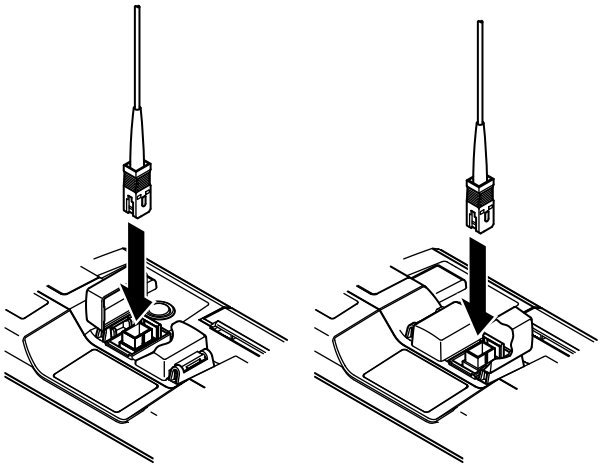


Note

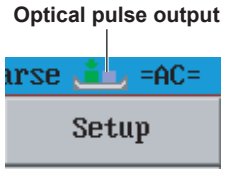
- If you do not press the connector end face of the optical fiber cable firmly against the cleaner, the end face may not be cleaned completely.
- You can purchase an optical fiber connector cleaner from NTT-AT corporation.

Connecting the Optical Fiber Cable to the AQ7270/AQ7275

1. Open the optical connector cover at the top of the AQ7270/AQ7275.
2. Match the direction of the optical fiber cable connector to the optical connector, and insert it.



Good example

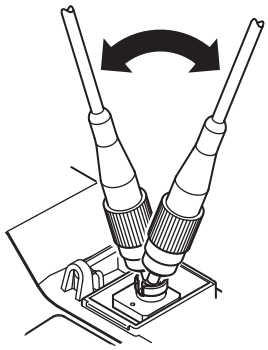


Note

- The connector to which the cable is to be connected varies depending on the wavelength. Connect the cable to the connector that is indicated by the red indicator at the top of the AQ7270/AQ7275 display.
- Power monitor measurement uses only PORT1.

CAUTION

When connecting the optical fiber cable connector, insert it vertically and slowly into the optical connector. If you tilt the connector or insert the connector by force, the optical connector may break.



Bad example

There are many optical connectors that have inferior parts which do not meet standards.
Only use optical connectors that are approved or used by your country or region's communications industry or other authoritative body (e.g. products from NTT technology transfer or their equivalents).

When Using the Angled PC SC Connector (Suffix Code:-ASC)

- Use the same type of angled PC SC connector for the connected optical fiber cable as well.
  The ferrule end of the angled PC SC connector is polished to an angle. If other types of connectors are used, the end face of the connector may become damaged.
- You can replace the AQ7270/AQ7275 connector, but only with an SC type.

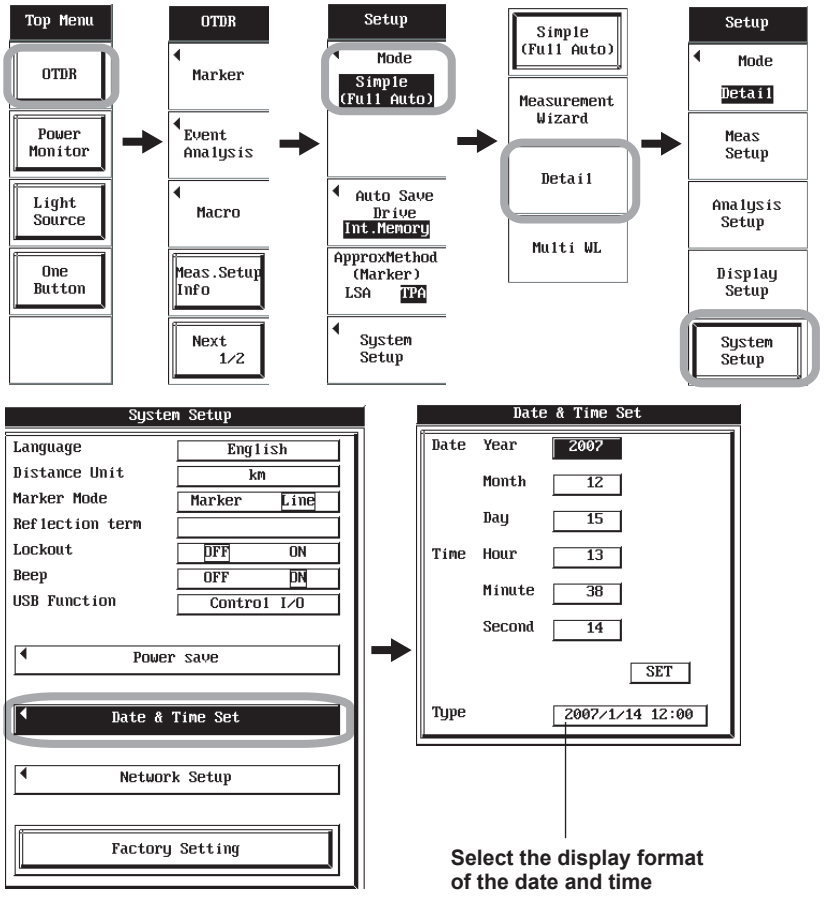
Note

If the suffix code is -NON, -USC, or -UFC, attach the optical universal adapter. For details, see section 20.8.

3.3 Setting the Date and Time

Selecting the Detail Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. Soft keys for the settings appear.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Detail** soft key. Soft keys for the Detail mode appear.
5. Press the **System Setup** soft key. The system setup screen appears.

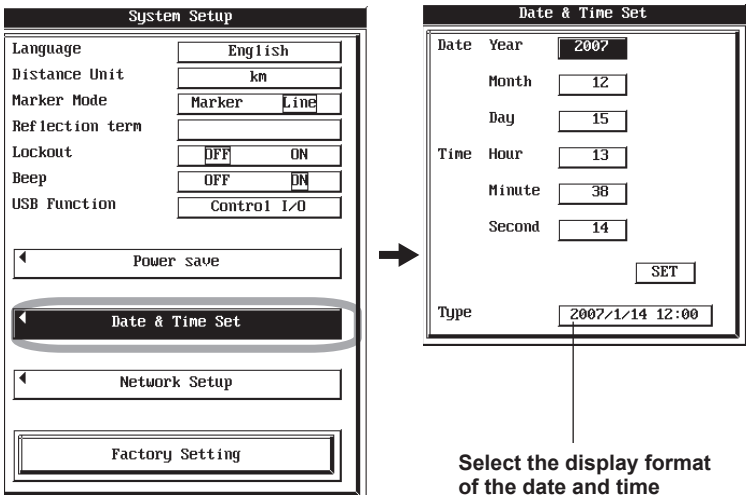


Note

- The setup menu does not appear even if you press SETUP if you press a soft key other than OTDR.
- You can also set the AQ7270/AQ7275 using Simple (Full Auto) mode.

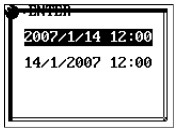
Selecting the Date and Time

6. Move the cursor using the **arrow keys** or the **rotary knob** to highlight Date&Time Set.
7. Press **ENTER**. The screen for setting the date and time appears.
8. Move the cursor to the item you want to set using the **arrow keys** or the **rotary knob**.
9. Press **ENTER**. The screen for setting the value appears.
10. Turn the **rotary knob** to set the date or time value.
11. Press **ENTER**. The screen for setting the value closes.
12. Move the cursor using the **arrow keys** or the **rotary knob** to **SET**.
13. Press **ENTER**. The date and time are set to the AQ7270/AQ7275.



Date and Time Display Format

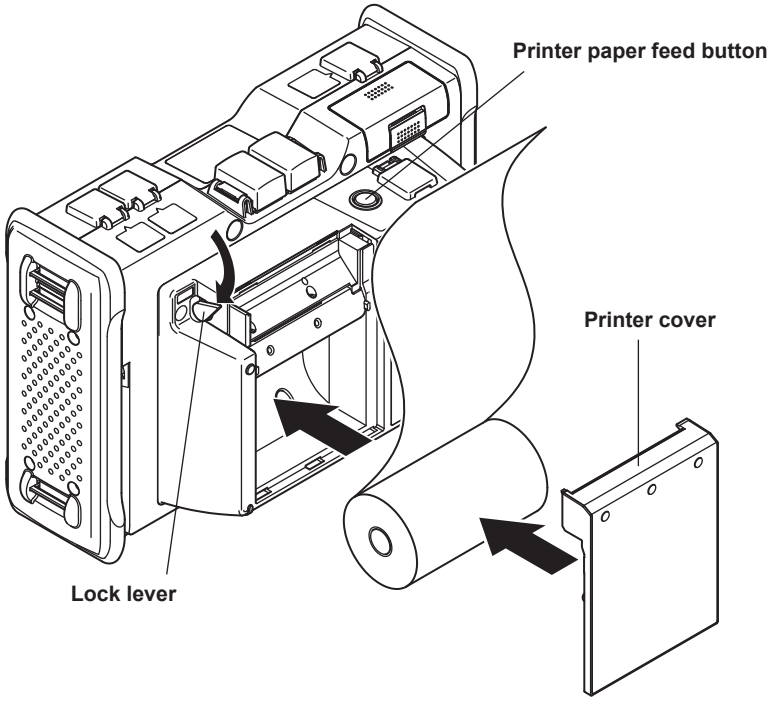
14. Move the cursor using the **arrow keys** or the **rotary knob** to highlight Type.
15. Press **ENTER**. The screen for setting the type appears.
16. Move the cursor using the **arrow keys** or the **rotary knob** to select the type.
17. Press **ENTER**. The screen for setting the type closes.
18. Press **ESC**. The screen for setting the date closes.
19. Press **ESC**. The system setup screen closes.
20. Press **ESC**. The setup screen of the Detail mode closes, and the optical pulse measurement screen appears.



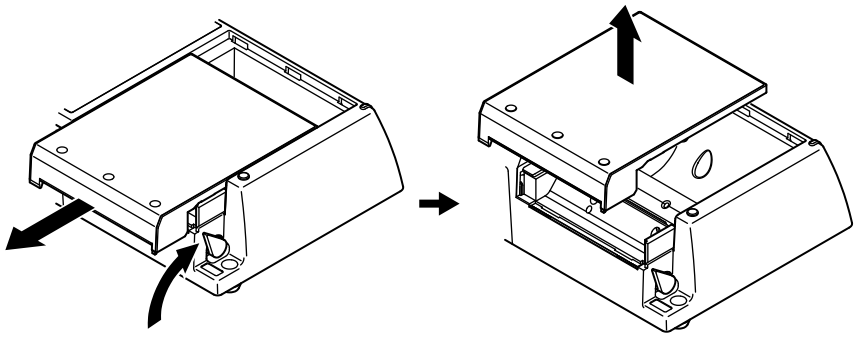
Note

The date and time values displayed in Type are examples. They do not indicate the actual date and time.

3.4 Loading the Printer Roll Paper (Option)



1. Push the lock lever toward the arrow and remove the printer cover.

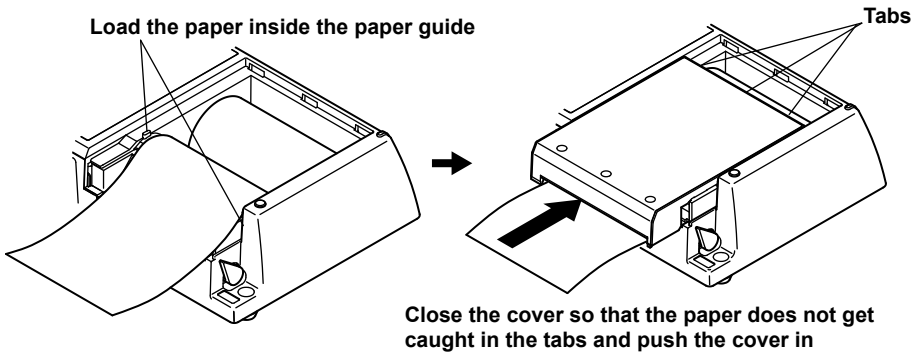


Push the lock toward the arrow and slide the cover

Pick up the cover and remove it

2. Load the printer roll paper. See the figure below for the orientation of the roll paper.

3. Attach the printer cover.



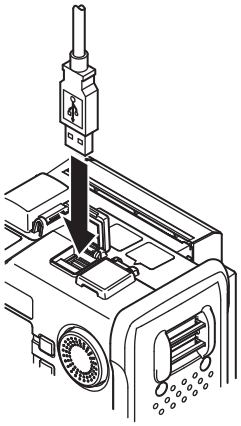
Close the cover so that the paper does not get caught in the tabs and push the cover in

4. Press the printer paper feed button to feed the paper to the appropriate position.

3.5 Connecting the USB Interface

Connecting a USB Printer, USB Memory or USB104 keyboard

1. Open the top cover.
2. Connect a USB cable to the Type A connector.

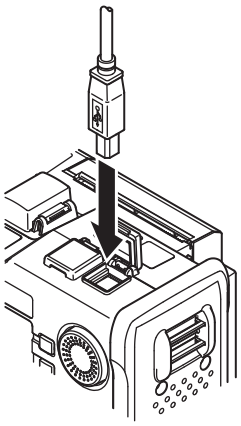


Note

- A single USB printer can be connected. Multiple printers will not be detected.
- You can operate the panel keys by using the USB104 keyboard. See appendix 2 for the correspondence between panel keys and USB keyboard entry keys.

Connecting a USB Cable to Remotely Control the AQ7270/AQ7275 or Accessing the Internal Memory

1. Open the top cover.
2. Connect a USB cable to the Type B connector.



Note

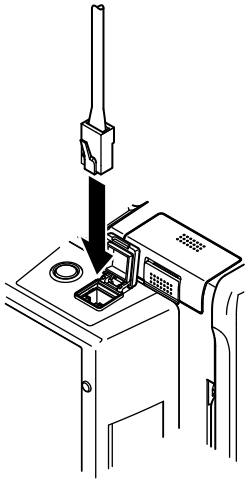
- If the cover comes off, bend the cover axis with your fingers and attach it.
- The system must be configured for operation. See section 19-1.

3.6 Connecting the Ethernet Interface (Option)

You can control the AQ7270/AQ7275 via the Ethernet interface.

Connection Procedure

Connect a UTP (Unshielded Twisted-Pair) cable or an STP (Shielded Twisted-Pair) cable that is connected to a hub, for example, to the AQ7270/AQ7275 connector.



Note

- Be sure to use a straight cable via a hub to connect the AQ7270/AQ7275 to the PC.
- If you are using a UTP cable (straight), use a cable of category 5.
- If the cover comes off, bend the cover axis with your fingers and attach it.
- The system must be configured for operation. See section 19-3.

3.7 Attaching the Belt

A hand belt is supplied as a standard accessory. On models with the /SB option, a shoulder belt is also included. This section explains how to attach the belt.

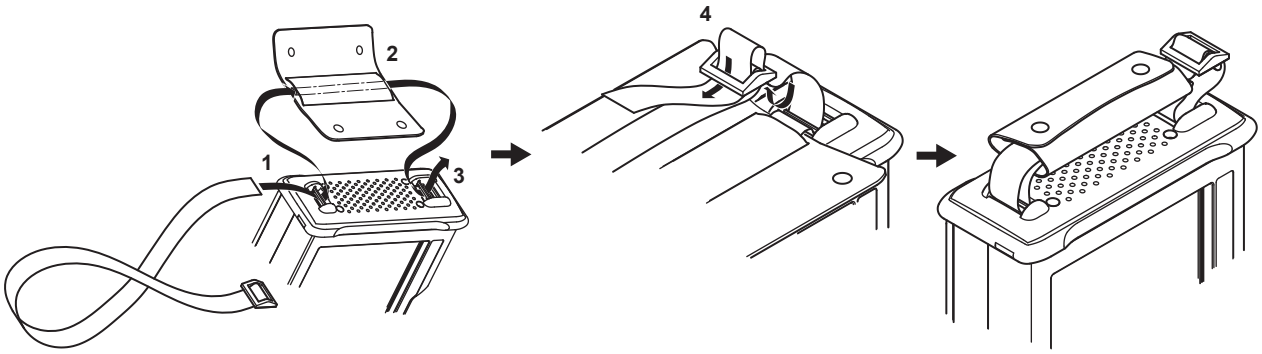
CAUTION

Pass the belt through the buckle and fasten it firmly according to the procedure in this section. If the belt is loose or the belt is passed through only one of the holes in the buckle, the belt may slip off and the instrument may fall.

How to Attach the Hand Belt

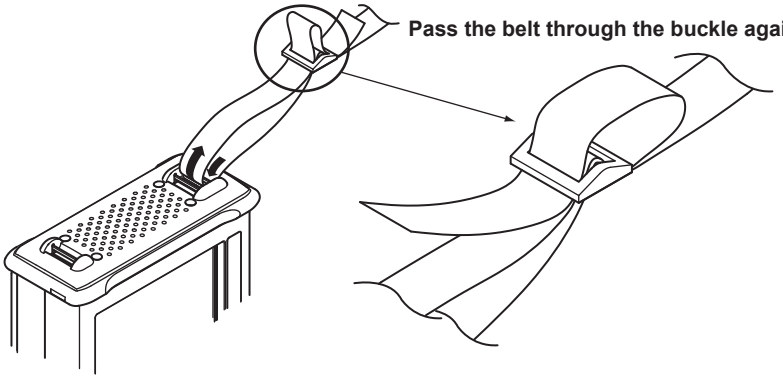
The hand belt can be attached to the left or right side of the instrument. Attach the belt to the desired side. There are two hand belt attachment sections. Securely attach the hand belt at the two sections.

1. Pass the hand belt through the lower hand belt attachment section on the side of the instrument.
2. Pass the hand belt through the hand belt cover.
3. Pass the hand belt through the upper hand belt attachment section (the second attachment section from the top) on the side of the instrument.
4. Pass the hand belt through the buckle.
5. Fasten the buttons of the hand belt cover.



How to Attach the Shoulder Belt

The shoulder belt can be attached to the shoulder belt attachment section on the left and right sides of the AQ7270/AQ7275. As shown in the figure below, securely attach the shoulder belt by passing the belt through the top belt attachment section on each side of the instrument and then pass it through the buckle.



4.1 Selecting the Test Wavelength

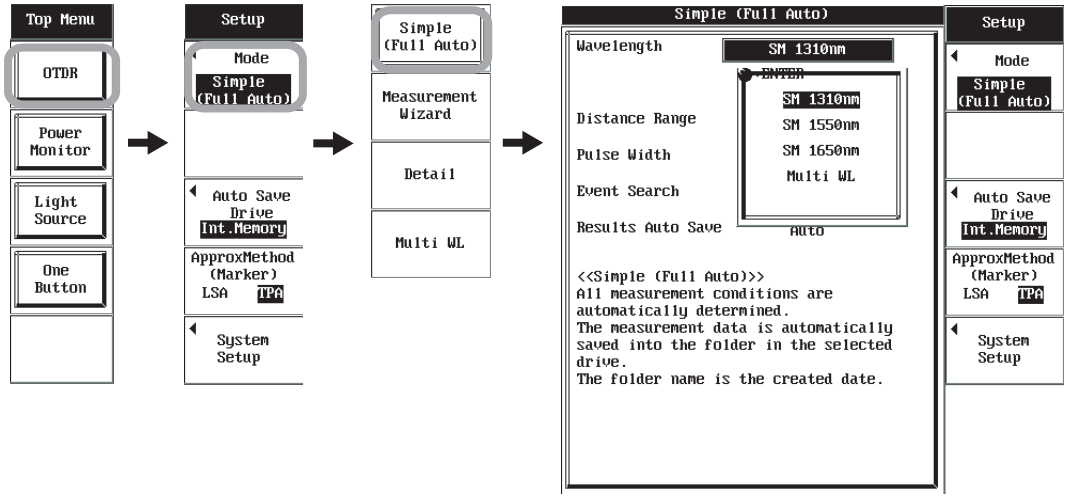
Procedure

Select the Simple Setup Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Simple (Full auto)** soft key. The Simple (Full Auto) setup screen appears.

Selecting the Test Wavelength

5. Press **ENTER**. A screen for selecting the wavelength appears.
6. Move the cursor to the wavelength you want to select using the **arrow keys** or the **rotary knob**.
7. Press **ENTER**. A screen for selecting the wavelength closes.
8. Press **ESC**. The Simple (Full Auto) Setup screen closes, and the optical pulse measurement screen appears.



Note

- The selectable test wavelengths vary depending on the model. For details, see section 21.1.
- The optical pulse output port changes depending on the wavelength.
- The setting is stored in the internal memory. The AQ7270/AQ7275 will start up using the stored settings when the power is turned ON the next time.

Explanation

The following measurement conditions are automatically detected.

- Distance range
- Pulse width
- Event detection
- Measurement result file storage

The list below contains the measurement conditions for the Simple (Full Auto) mode. You can view the following information in the measurement setup information. For details, see section 7.3.

Item	Setting
Distance range	Auto
Pulse width	Auto
Attenuation	Auto
Averaging duration	Auto
Averaging method	High reflection
Averaging unit	Duration
Sampling interval	Normal

4.2 Selecting the Approximation Method

Procedure

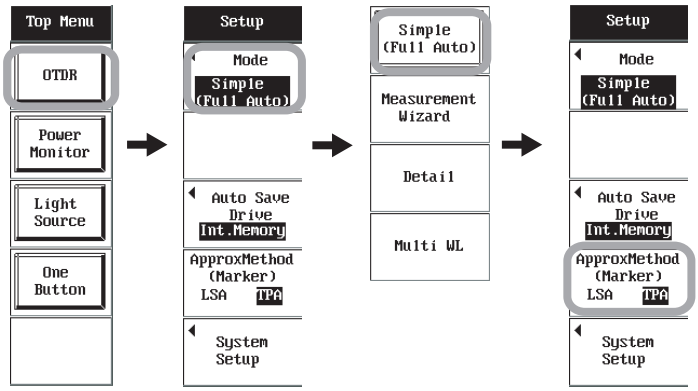
Parameters such as the splice loss and return loss are calculated using linear approximation. There are two linear approximation methods: least square and two point.

Select the Simple Setup Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Simple (Full auto)** soft key. The Simple (Full Auto) setup screen appears.

Selecting the Approximation Method

5. Press the **ApproxMethod (Marker)** soft key. The cursor moves, and the approximation method switches.



Note

- Approximation method (event) is fixed to LSA(least square).
- There are two approximation methods: LSA and TPA (two point). For a detailed explanation, see section 6.2.

4.3 Setting Other Items

Procedure

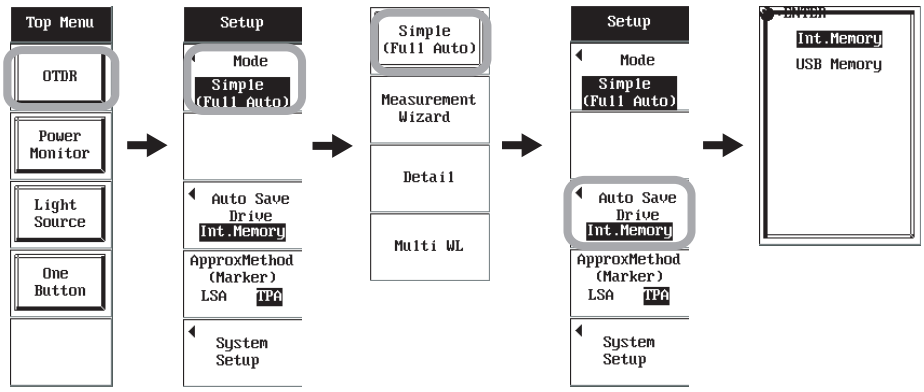
This section describes system settings such as the save destination of the measured result, language setting, and date/time setting in addition to the measurement condition settings.

Select the Simple Setup Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Simple (Full auto)** soft key. The Simple (Full Auto) setup screen appears.

Selecting the Auto Save Destination

5. Press the **Auto Save Drive** soft key.
6. A screen for selecting the save destination appears.
7. Move the cursor to the save destination you want to select using the **arrow keys** or the **rotary knob**.
8. Press **ENTER**. A screen for selecting the save destination closes.
9. Press **ESC**. The Simple (Full Auto) Setup screen closes, and the optical pulse measurement screen appears.



Selecting the Language and Setting the Date and Time

- **Selecting the Language**

  5. Press the **System Setup** soft key. The system setup screen appears.

  6. Move the cursor using the **arrow keys** or the **rotary knob** to highlight Language.

  7. Press **ENTER**. A screen for selecting the language appears.

  8. Move the cursor to the language you want to select using the **arrow keys** or the **rotary knob**.

  9. Press **ENTER**. The language is confirmed.

  10. Press **ESC**. The system setup screen closes.

  11. Press **ESC**. The Simple (Full Auto) Setup screen closes, and the optical pulse measurement screen appears.

- **Selecting the Date and Time**

  5. Press the **System Setup** soft key. The system setup screen appears.

  6. Move the cursor using the **arrow keys** or the **rotary knob** to highlight Date & Time Set.

  7. Press **ENTER**. The screen for setting the date and time appears.

  8. Move the cursor to the item you want to set using the **arrow keys** or the **rotary knob**.

  9. Press **ENTER**. A screen for selecting the value appears.

  10. Turn the **rotary knob** to set the date or time value.

  11. Press **ENTER**. The screen for setting the value closes.

  12. Move the cursor using the **arrow keys** or the **rotary knob** to highlight SET.

  13. Press **ENTER**. The date and time are set to the AQ7270/AQ7275.

- **Date and Time Display Format**

  14. Move the cursor using the **arrow keys** or the **rotary knob** to highlight Type.

  15. Press **ENTER**. The screen for setting the type appears.

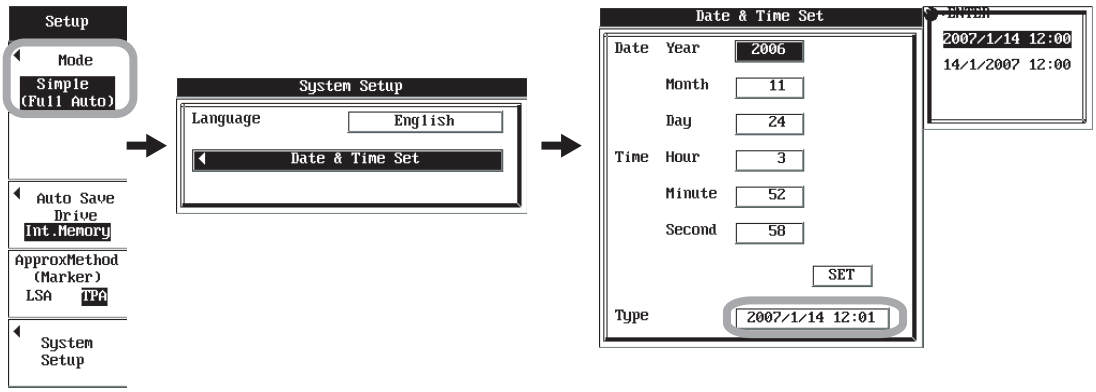
  16. Move the cursor using the **arrow keys** or the **rotary knob** to select the type.

  17. Press **ENTER**. The type is confirmed.

  18. Press **ESC**. The screen for setting the date closes.

  19. Press **ESC**. The system setup screen closes.

  20. Press **ESC**. The Simple (Full Auto) Setup screen closes, and the optical pulse measurement screen appears.



Explanation

Auto Save

The AQ7270/AQ7275 creates folders indicating the date and time in the selected drive and automatically saves the measurement result files.

File type	SOR
File name format	File name format specified in the File menu.

5.1 Setting the Measurement Conditions

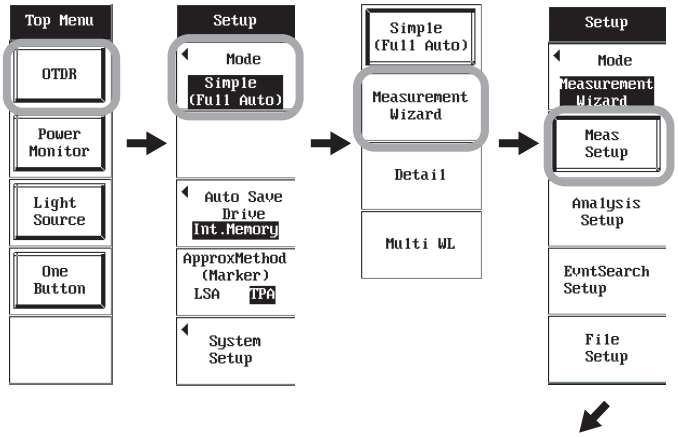
Procedure

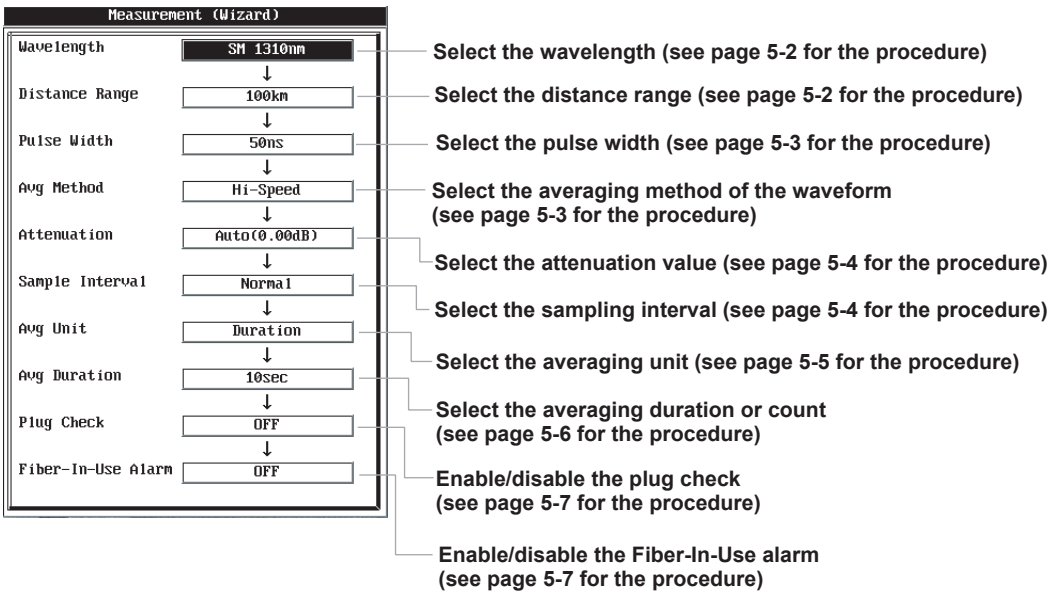
Selecting the Measurement Wizard Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Measurement Wizard** soft key. A soft key menu for the measurement setup (wizard) appears.

Setting the Measurement Conditions

5. Press the **Meas Setup** soft key. The Measurement (Wizard) screen appears.





- **Selecting the Wavelength**

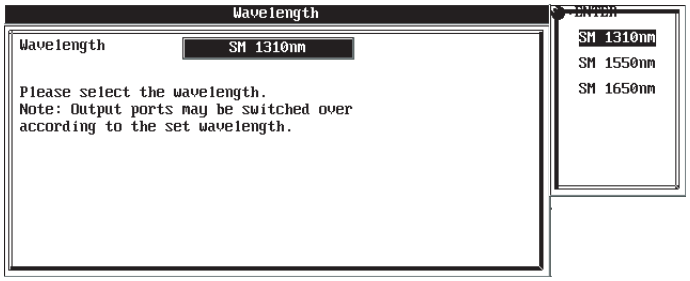
  6. Move the cursor to Wavelength using the **arrow keys** or the **rotary knob**.

  7. Press **ENTER**. A wizard screen for selecting the wavelength appears.

  8. Press **ENTER**. A screen for selecting the wavelength appears.

  9. Move the cursor to the wavelength you want to select using the **arrow keys** or the **rotary knob**.

  10. Press **ENTER**. The wavelength is confirmed.



Note

- The selectable test wavelengths vary depending on the model. For details, see section 21.1.
- The optical pulse output port changes depending on the wavelength.
- The setting is stored in the internal memory. The AQ7270/AQ7275 will start up using the stored settings when the power is turned ON the next time.

- **Select the Distance Range**

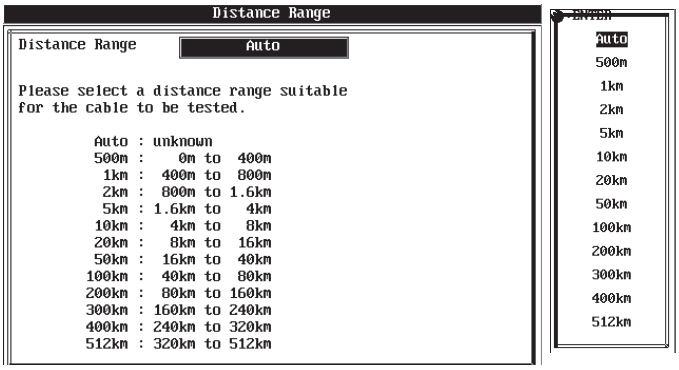
  11. Move the cursor to Distance Range using the **arrow keys** or the **rotary knob**.

  12. Press **ENTER**. A wizard screen for selecting the distance range appears.

  13. Press **ENTER**. A screen for selecting the distance range appears.

  14. Move the cursor to the distance range you want to select using the **arrow keys** or the **rotary knob**.

  15. Press **ENTER**. The distance range is confirmed.



Note

For a detailed explanation, see section 6.1.

- **Selecting the Pulse Width**

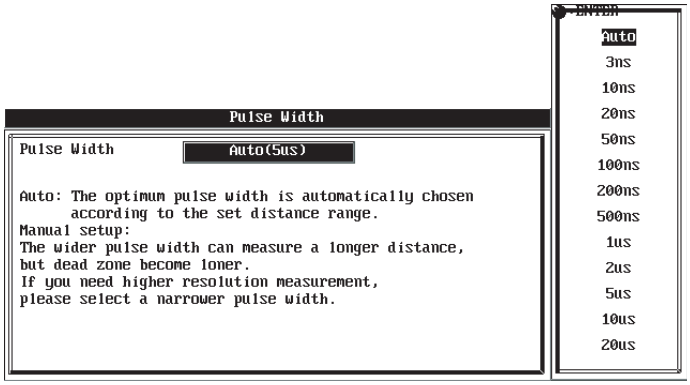
  16. Move the cursor to Pulse Width using the **arrow keys** or the **rotary knob**.

  17. Press **ENTER**. A wizard screen for selecting the pulse width appears.

  18. Press **ENTER**. A screen for selecting the pulse width appears.

  19. Move the cursor to the pulse width you want to select using the **arrow keys** or the **rotary knob**.

  20. Press **ENTER**. The pulse width is confirmed.



Note

- You cannot select the pulse width if the distance range is set to auto.
- For a detailed explanation, see section 6.1.

- **Selecting the Averaging Method**

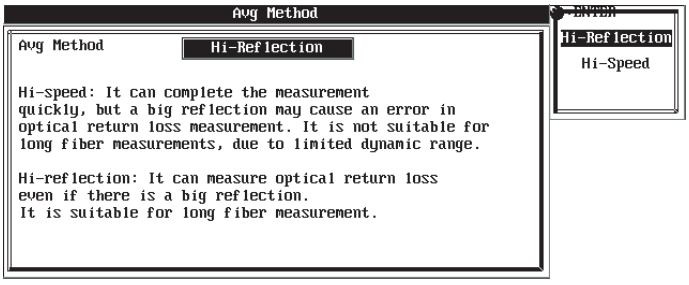
  21. Move the cursor to Avg Method using the **arrow keys** or the **rotary knob**.

  22. Press **ENTER**. A wizard screen for selecting the averaging method appears.

  23. Press **ENTER**. A screen for selecting the averaging method appears.

  24. Move the cursor to the averaging method you want to select using the **arrow keys** or the **rotary knob**.

  25. Press **ENTER**. The averaging method is confirmed.



Note

For a detailed explanation, see section 6.1.

- **Setting the Attenuation**

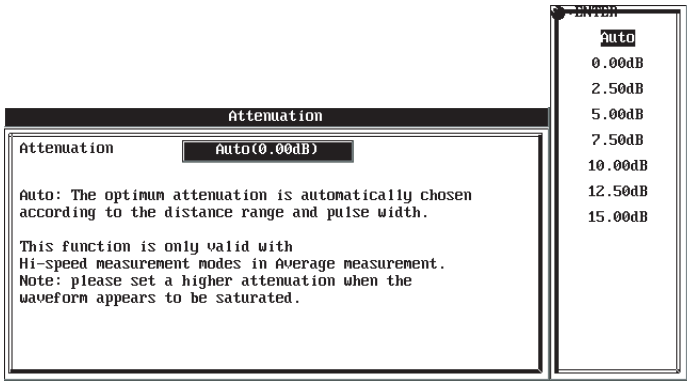
  26. Move the cursor to Attenuation using the **arrow keys** or the **rotary knob**.

  27. Press **ENTER**. A wizard screen for setting the attenuation appears.

  28. Press **ENTER**. The screen for setting the attenuation appears.

  29. Move the cursor to the attenuation value you want to select using the **arrow keys** or the **rotary knob**.

  30. Press **ENTER**. The attenuation is confirmed.



Note

- For a detailed explanation, see section 6.1.
- You cannot select the attenuation if the averaging method is set to high reflection.

- **Selecting the Sampling Interval**

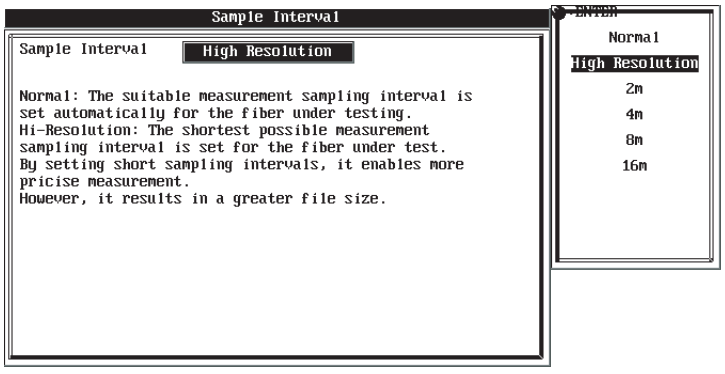
  31. Move the cursor to Sample Interval using the **arrow keys** or the **rotary knob**.

  32. Press **ENTER**. A wizard screen for selecting the sampling interval appears.

  33. Press **ENTER**. A screen for selecting the sampling interval appears.

  34. Move the cursor to the sampling interval you want to select using the **arrow keys** or the **rotary knob**.

  35. Press **ENTER**. The sampling interval is confirmed.



Note

For a detailed explanation, see section 6.1.

- **Selecting the Averaging Unit**

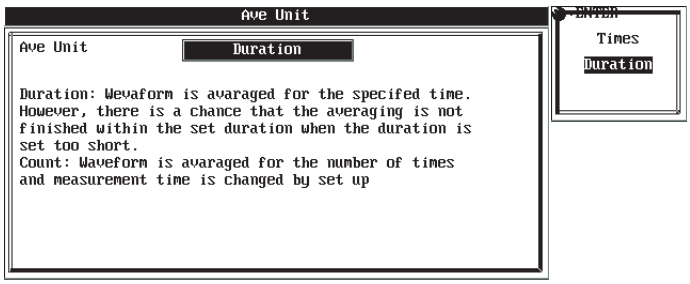
36. Move the cursor to Avg Unit using the **arrow keys** or the **rotary knob**.

37. Press **ENTER**. A wizard screen for selecting the averaging unit appears.

38. Press **ENTER**. A screen for selecting the averaging unit appears.

39. Move the cursor to the averaging unit you want to select using the **arrow keys** or the **rotary knob**.

40. Press **ENTER**. The averaging unit is confirmed.



Note

For a detailed explanation, see section 6.1.

- **Selecting the Averaging Duration or Count**

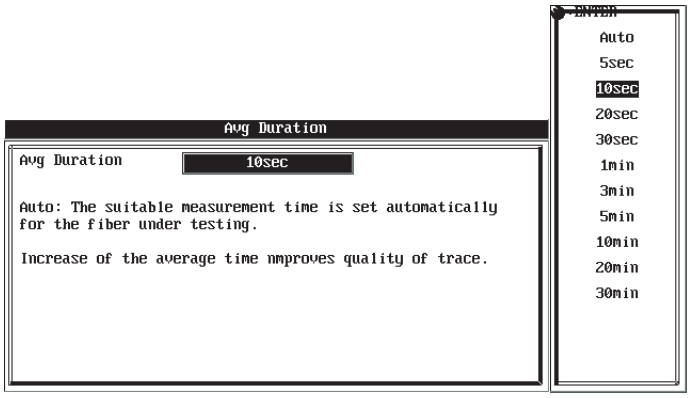
  41. Move the cursor to Avg Duration/Times using the **arrow keys** or the **rotary knob**.

  42. Press **ENTER**. A wizard screen for selecting the averaging duration or count appears.

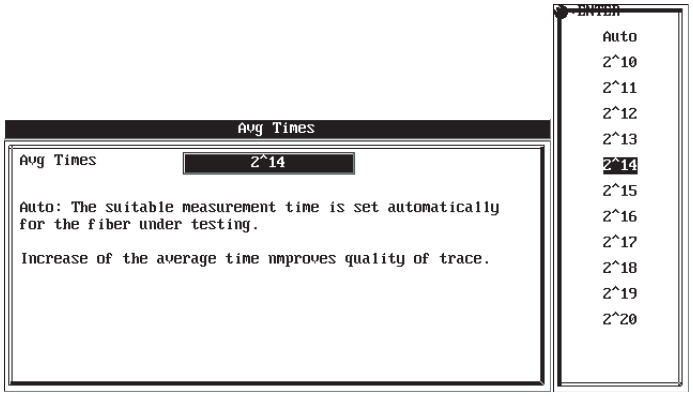
  43. Press **ENTER**. A screen for selecting the averaging duration or count appears.

  44. Move the cursor to the averaging duration or count you want to select using the **arrow keys** or the **rotary knob**.

  45. Press **ENTER**. The averaging duration or count is confirmed.



If averaging unit is set to Duration



If averaging unit is set to Times

Note

For a detailed explanation, see section 6.1.

- **Selecting the Plug Check Mode**

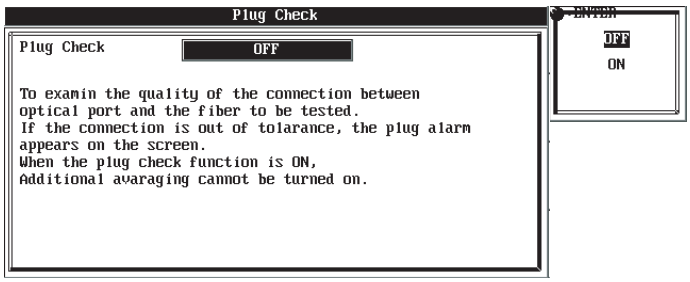
  46. Move the cursor to Plug Check using the **arrow keys** or the **rotary knob**.

  47. Press **ENTER**. A wizard screen for selecting the plug check mode appears.

  48. Press **ENTER**. A screen for selecting the plug check mode appears.

  49. Move the cursor to the plug check mode you want to select using the **arrow keys** or the **rotary knob**.

  50. Press **ENTER**. The plug check mode is confirmed.



Note

For a detailed explanation, see section 6.1.

- **Selecting the Fiber-In-Use Alarm**

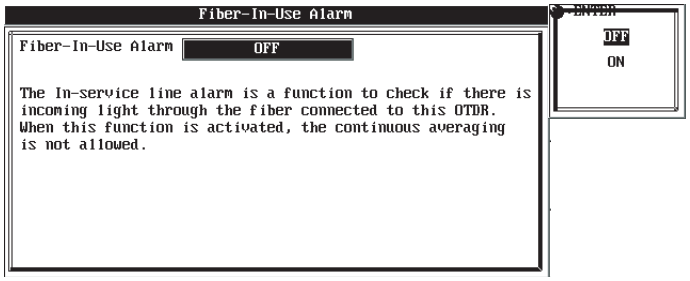
  51. Move the cursor to Fiber-In-Use Alarm using the **arrow keys** or the **rotary knob**.

  52. Press **ENTER**. A wizard screen for selecting the fiber-in-use alarm appears.

  53. Press **ENTER**. A screen for selecting the fiber-in-use alarm appears.

  54. Move the cursor to the fiber-in-use alarm mode you want to select using the **arrow keys** or the **rotary knob**.

  55. Press **ENTER**. The fiber-in-use alarm mode is confirmed.



Note

For a detailed explanation, see section 6.1.

5.2 Setting the Analysis Conditions

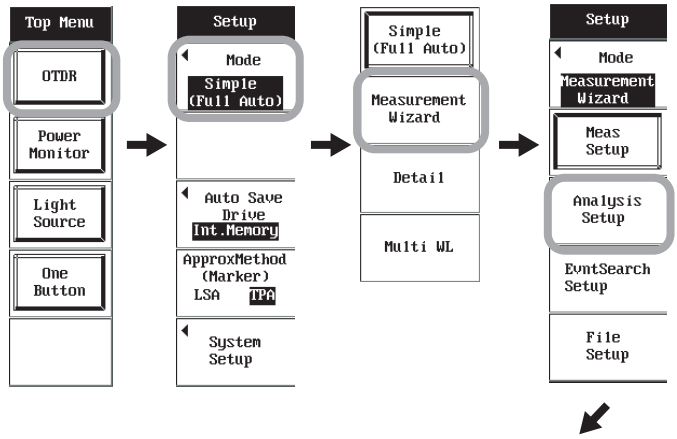
Procedure

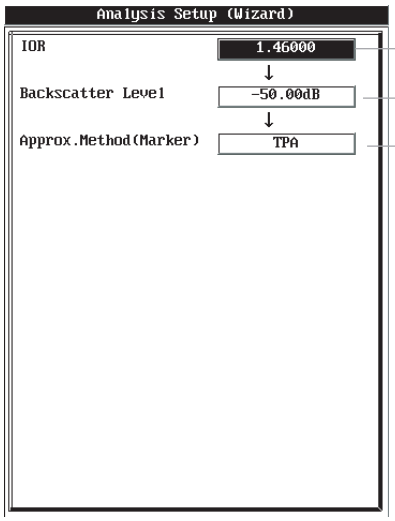
Selecting the Measurement Wizard Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Measurement Wizard** soft key. A soft key menu for the measurement setup (wizard) appears.

Setting the Analysis Conditions

5. Press the **Analysis Setup** soft key. The Analysis Setup (Wizard) screen appears.





Select the group refraction index (see page 5-9 for the procedure)

Select the backscattering light level (see page 5-9 for the procedure)

Select the approximation method of the marker (see page 5-10 for the procedure)

- **Setting the Group Refraction Index**

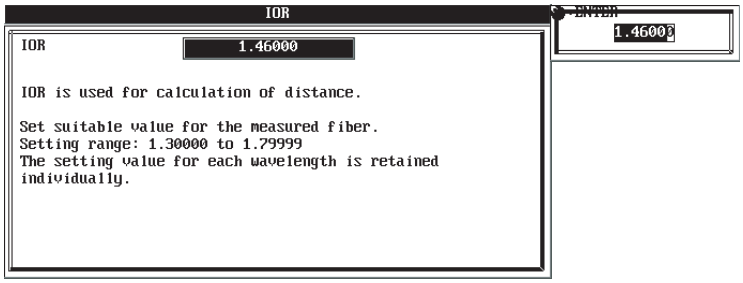
  6. Move the cursor to IOR using the **arrow keys** or the **rotary knob**.

  7. Press **ENTER**. A wizard screen for setting the group refraction index appears.

  8. Press **ENTER**. The screen for setting the group refraction index appears.

  9. Turn the **rotary knob** to set the group refraction index.

  10. Press **ENTER**. The group refraction index is confirmed.



Note

For a detailed explanation, see section 6.2.

- **Setting the Backscattering Light Level**

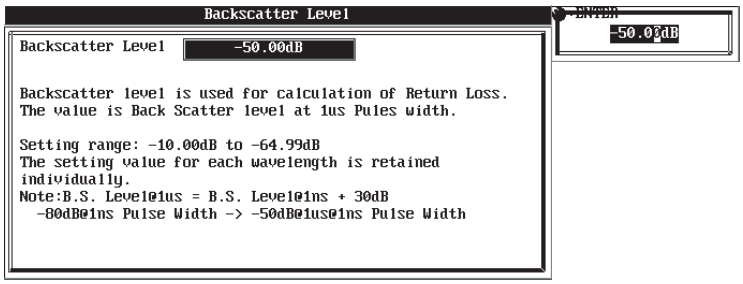
  11. Move the cursor to Backscatter Level using the **arrow keys** or the **rotary knob**.

  12. Press **ENTER**. A wizard screen for setting the backscattering light level appears.

  13. Press **ENTER**. The screen for setting the backscattering light level appears.

  14. Turn the **rotary knob** to set the backscattering light level.

  15. Press **ENTER**. The backscattering light level is confirmed.



Note

For a detailed explanation, see section 6.2.

- **Selecting the Marker Approximation Method**

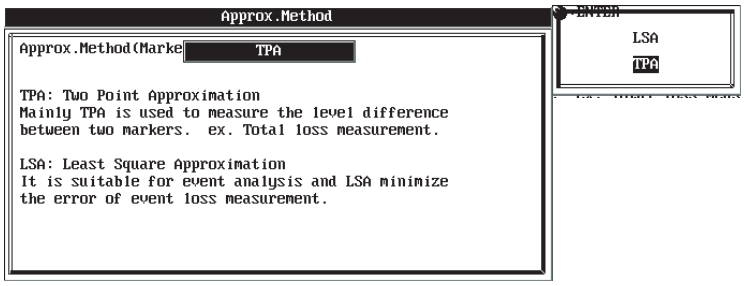
  16. Move the cursor to Approx.Method (Marker) using the **arrow keys** or the **rotary knob**.

  17. Press **ENTER**. A wizard screen for selecting the marker approximation method appears.

  18. Press **ENTER**. A screen for selecting the marker approximation method appears.

  19. Move the cursor to marker approximation method you want to select using the **arrow keys** or the **rotary knob**.

  20. Press **ENTER**. The marker approximation method is confirmed.



Note

For a detailed explanation, see section 6.2.

5.3 Setting the Detection Conditions of Reflection and Loss Waveforms

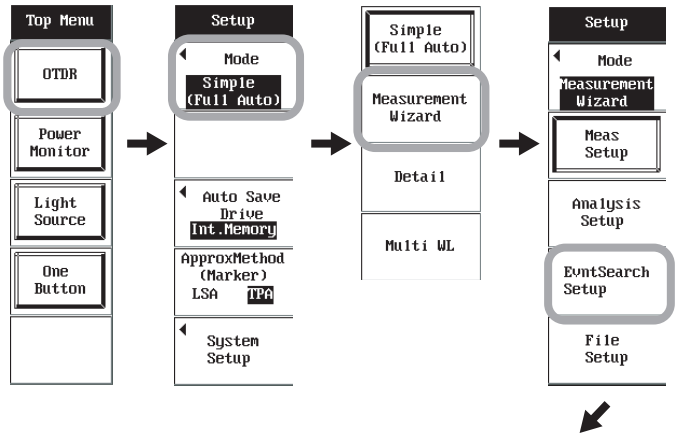
Procedure

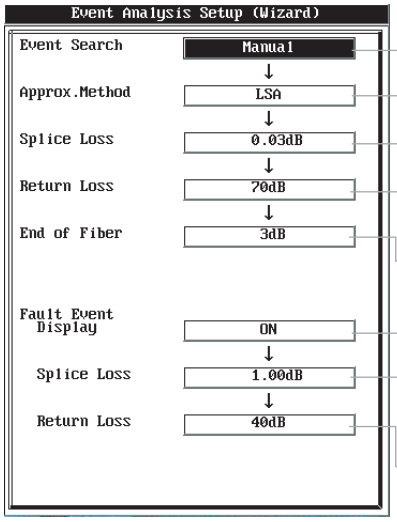
Selecting the Measurement Wizard Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Measurement Wizard** soft key. A soft key menu for the measurement setup (wizard) appears.

Setting the Event Conditions

5. Press the **EvntSearch Setup** soft key. The Event Analysis Setup (Wizard) screen appears.





Select the event detection method (see page 5-12 for the procedure)

Select the approximation method of the event detection (see page 5-12 for the procedure)

Select the threshold level of the splice loss (see page 5-13 for the procedure)

Select the threshold level of the return loss (see page 5-13 for the procedure)

Select the threshold level of the end of the fiber (see page 5-14 for the procedure)

Show/hide the fault event display (see page 5-14 for the procedure)

Select the threshold level of the splice loss to be detected as a fault event (see page 5-15 for the procedure)

Select the threshold level of the return loss to be detected as a fault event (see page 5-15 for the procedure)

- **Selecting the Event Detection Method**

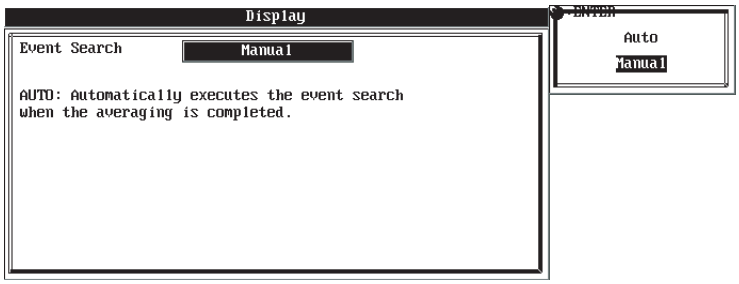
  6. Move the cursor to Event Search using the **arrow keys** or the **rotary knob**.

  7. Press **ENTER**. A wizard screen for selecting the event detection method appears.

  8. Press **ENTER**. A screen for selecting the event detection method appears.

  9. Move the cursor to the event detection method you want to select using the **arrow keys** or the **rotary knob**.

  10. Press **ENTER**. The event detection method is confirmed.



- **Selecting the Approximation Method**

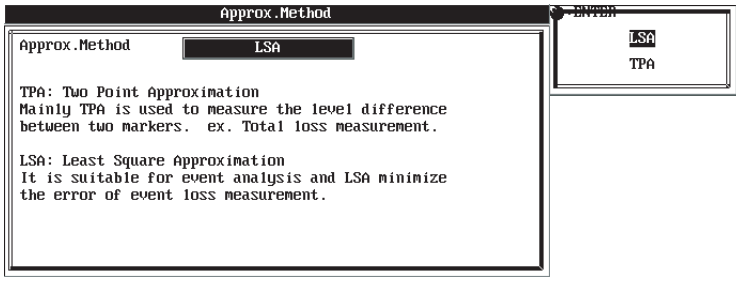
  11. Move the cursor to Approx.Method using the **arrow keys** or the **rotary knob**.

  12. Press **ENTER**. A wizard screen for selecting the approximation method appears.

  13. Press **ENTER**. A screen for selecting the approximation method appears.

  14. Move the cursor to approximation method you want to select using the **arrow keys** or the **rotary knob**.

  15. Press **ENTER**. The approximation method is confirmed.



Note

For a detailed explanation, see section 6.2.

- **Setting the Threshold Level of the Splice Loss Detection Level**

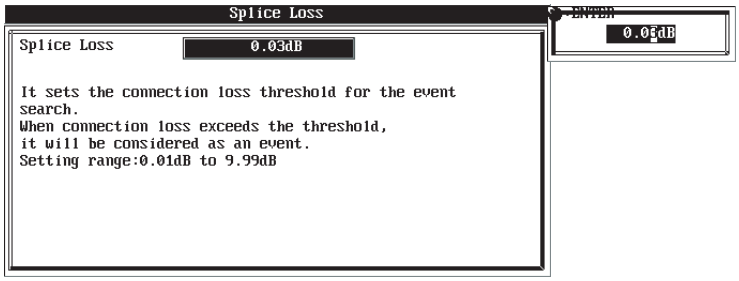
  16. Move the cursor to Splice Loss using the **arrow keys** or the **rotary knob**.

  17. Press **ENTER**. A wizard screen for setting the splice loss appears.

  18. Press **ENTER**. The screen for setting the splice loss appears.

  19. Turn the **rotary knob** to set the splice loss value.

  20. Press **ENTER**. The splice loss is confirmed.



- **Setting the Threshold Level of the Return Loss Detection Level**

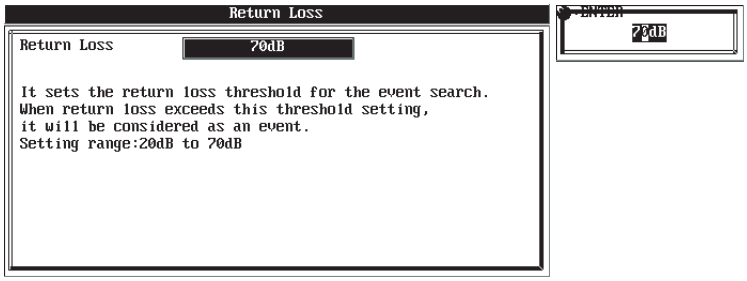
  21. Move the cursor to Return Loss using the **arrow keys** or the **rotary knob**.

  22. Press **ENTER**. A wizard screen for setting the return loss appears.

  23. Press **ENTER**. The screen for setting the return loss appears.

  24. Turn the **rotary knob** to set the return loss value.

  25. Press **ENTER**. The return loss is confirmed.



- **Setting the Threshold Level of the End of the Fiber (Fresnel Reflection)**

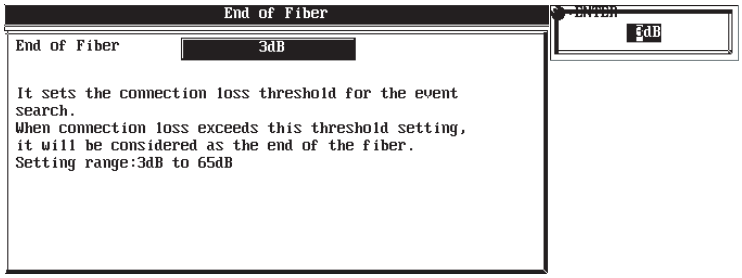
  26. Move the cursor to End of Fiber using the **arrow keys** or the **rotary knob**.

  27. Press **ENTER**. A wizard screen for setting the end-of-fiber value appears.

  28. Press **ENTER**. The screen for setting the end-of-fiber value appears.

  29. Turn the **rotary knob** to set the end-of-fiber value.

  30. Press **ENTER**. The end-of-fiber value is confirmed.



- **Selecting the Fault Event Display**

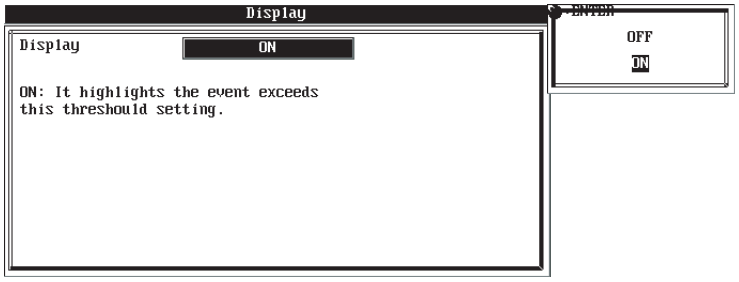
  31. Move the cursor to Fault Event Display using the **arrow keys** or the **rotary knob**.

  32. Press **ENTER**. A wizard screen for selecting the fault event display appears.

  33. Press **ENTER**. A screen for selecting the fault event display appears.

  34. Move the cursor to ON or OFF using the **arrow keys** or the **rotary knob**.

  35. Press **ENTER**. The fault event display mode is confirmed.



- **Setting the Threshold Level of the Splice Loss Detection Level of the Fault Event**

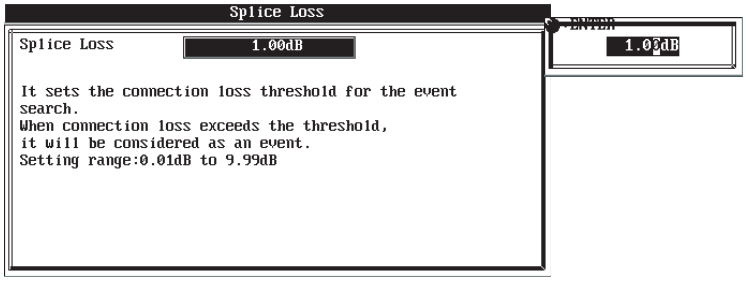
  36. Move the cursor to Splice Loss using the **arrow keys** or the **rotary knob**.

  37. Press **ENTER**. A wizard screen for setting the splice loss appears.

  38. Press **ENTER**. The screen for setting the splice loss appears.

  39. Turn the **rotary knob** to set the splice loss value.

  40. Press **ENTER**. The splice loss is confirmed.



Note

You cannot select this item if the fault event display is turned OFF.

- **Setting the Threshold Level of the Return Loss Detection Level of the Fault Event**

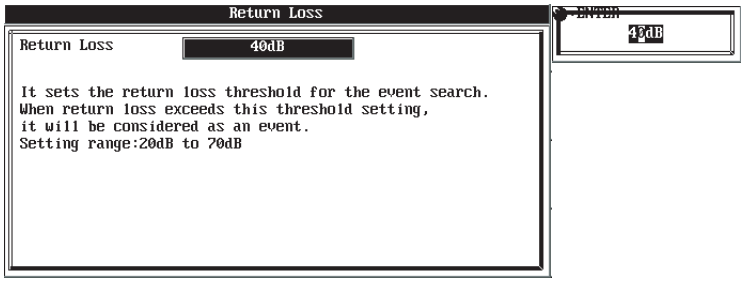
  41. Move the cursor to Return Loss using the **arrow keys** or the **rotary knob**.

  42. Press **ENTER**. A wizard screen for setting the return loss appears.

  43. Press **ENTER**. The screen for setting the return loss appears.

  44. Turn the **rotary knob** to set the return loss value.

  45. Press **ENTER**. The return loss is confirmed.



Note

You cannot select this item if the fault event display is turned OFF.

5.4 Setting the File

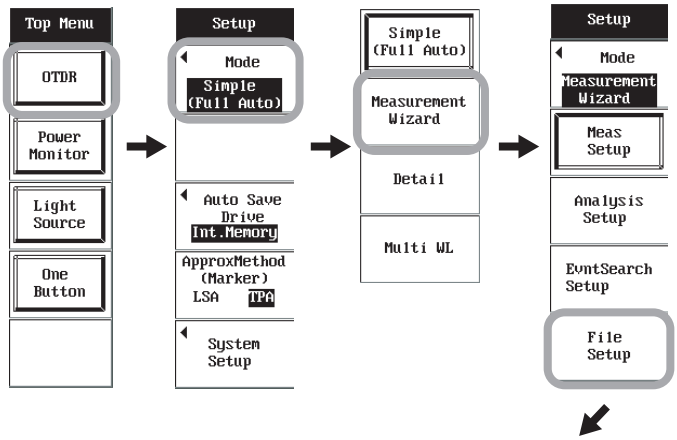
Procedure

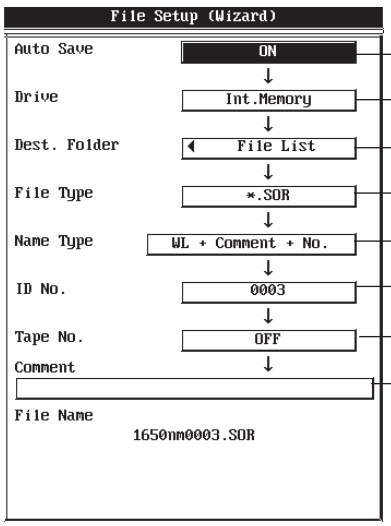
Selecting the Measurement Wizard Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Measurement Wizard** soft key. A soft key menu for the measurement setup (wizard) appears.

Setting the Storage Conditions of Measurement Results

5. Press the **File Setup** soft key. The File Setup (Wizard) screen appears.





Enable/disable the auto save operation (see page 5-17 for the procedure)

Select the auto save destination drive (see page 5-17 for the procedure)

Select the auto save destination folder (see page 5-18 for the procedure)

Select the file type for auto saving (see page 5-18 for the procedure)

Select the file name type (see page 5-19 for the procedure)

Select the number to be attached to the file name (see page 5-19 for the procedure)

Select the tape ID number (see page 5-20 for the procedure)

Enter the file name (see page 5-20 for the procedure)

- **Selecting the Auto Save Mode**

  6. Move the cursor to Auto Save using the **arrow keys** or the **rotary knob**.

  7. Press **ENTER**. A wizard screen for selecting the auto save mode appears.

  8. Press **ENTER**. A screen for selecting the auto save mode appears.

  9. Move the cursor to ON or OFF using the* arrow keys *or the* rotary knob*.

  10. Press **ENTER**. The auto save mode is confirmed.

- **Selecting the Save Destination Media Type**

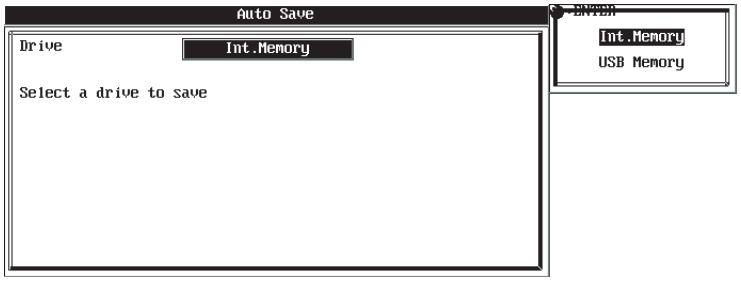
  11. Move the cursor to Drive using the **arrow keys** or the **rotary knob**.

  12. Press **ENTER**. A wizard screen for selecting the save destination drive appears.

  13. Press **ENTER**. A screen for selecting the save destination drive appears.

  14. Move the cursor to the save destination drive you want to select using the **arrow keys** or the **rotary knob**.

  15. Press **ENTER**. The save destination drive is confirmed.



Note

You cannot select this item if the auto save mode is turned OFF.

- **Selecting the Save Destination Folder**

  16. Move the cursor to Dest. Folder using the **arrow keys** or the **rotary knob**.

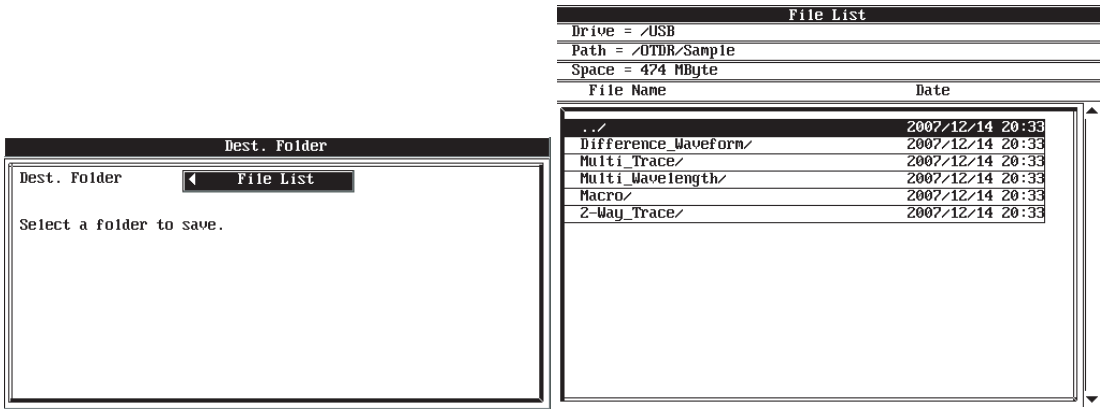
  17. Press **ENTER**. A wizard screen for selecting the save destination folder appears.

  18. Press **ENTER**. The File List screen for selecting the save destination folder appears.

  19. Move the cursor to the save destination folder using the **arrow keys** or the **rotary knob**.

  20. Press **ENTER**. The contents in the save destination folder are displayed.

  21. Press **ESC**. The save destination folder is confirmed.



Note

You cannot select this item if the auto save mode is turned OFF.

- **Selecting the Storage Data Type**

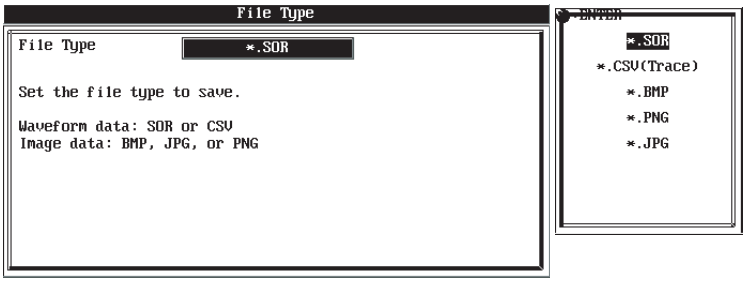
  22. Move the cursor to File Type using the **arrow keys** or the **rotary knob**.

  23. Press **ENTER**. A wizard screen for selecting the file type appears.

  24. Press **ENTER**. A screen for selecting the file type appears.

  25. Move the cursor to file type you want to select using the **arrow keys** or the **rotary knob**.

  26. Press **ENTER**. The file type is confirmed.



Note

You cannot select this item if the auto save mode is turned OFF.

- **Selecting the File Name Type**

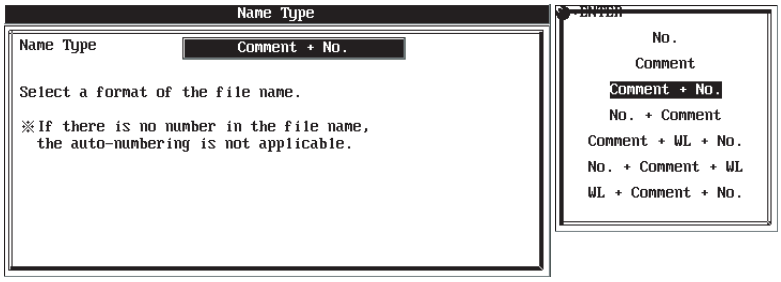
  27. Move the cursor to Name Type using the **arrow keys** or the **rotary knob**.

  28. Press **ENTER**. A wizard screen for selecting the file name type appears.

  29. Press **ENTER**. A screen for selecting the file name type appears.

  30. Move the cursor to file name type you want to select using the **arrow keys** or the **rotary knob**.

  31. Press **ENTER**. The file name type is confirmed.



Note

You cannot select this item if the auto save mode is turned OFF.

- **Setting the File ID Number**

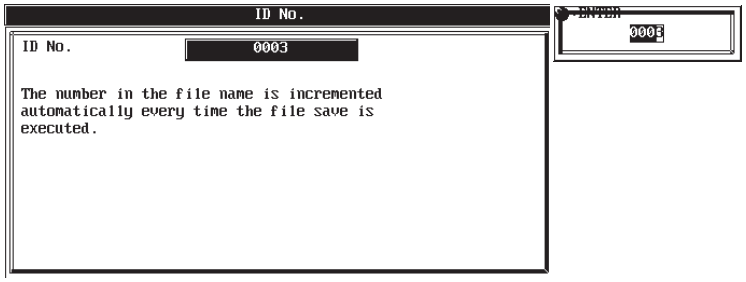
  32. Move the cursor to ID No. using the **arrow keys** or the **rotary knob**.

  33. Press **ENTER**. A wizard screen for setting the ID number appears.

  34. Press **ENTER**. The screen for setting the ID number appears.

  35. Turn the **rotary knob** to set the ID number.

  36. Press **ENTER**. The ID number is confirmed.



Note

You cannot select this item if the auto save mode is turned OFF.

- **Setting the ID Number for the Tape Fiber and the Like**

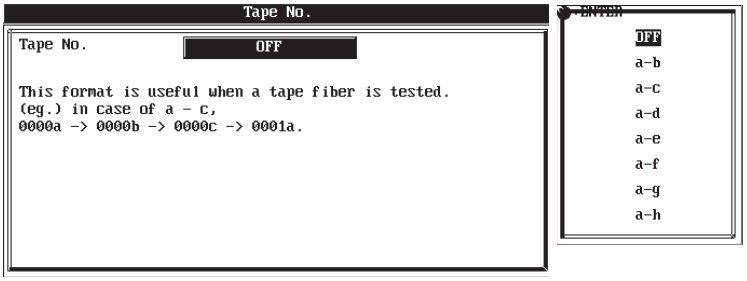
  37. Move the cursor to Tape ID using the **arrow keys** or the **rotary knob**.

  38. Press **ENTER**. A wizard screen for selecting the tape ID appears.

  39. Press **ENTER**. A screen for selecting the tape ID appears.

  40. Move the cursor to tape ID you want to select using the **arrow keys** or the **rotary knob**.

  41. Press **ENTER**. The tape ID is confirmed.



Note

You cannot select this item if the auto save mode is turned OFF.

- **Attaching a Comment to the File Name**

  42. Move the cursor to Comment using the **arrow keys** or the **rotary knob**.

  43. Press **ENTER**. A wizard screen for entering the comment appears.

  44. Press **ENTER**. The character input screen for entering the comment appears.

  45.Enter the comment using the **arrow keys, rotary knob** ***and*** **ENTER.**

  46. Press the **OK** soft key. The character input screen closes.

  47. Press **ESC**. The wizard screen for entering the comment closes.

  48. Press **ESC**. The File Setup screen closes, and the optical pulse measurement screen appears.

Note

- You cannot select this item if the auto save mode is turned OFF.
- For the procedures to enter characters, see section 18.6.

6.1 Setting the Measurement Conditions

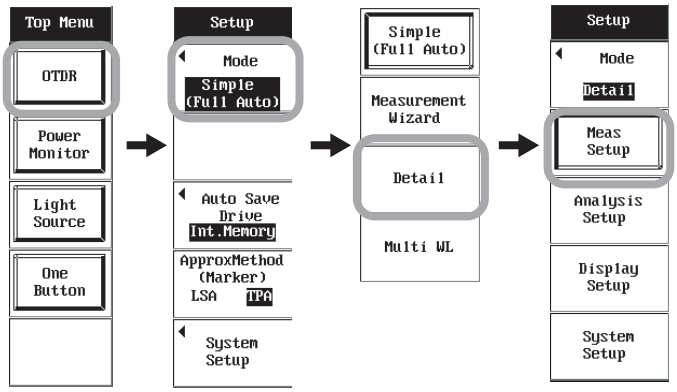
Procedure

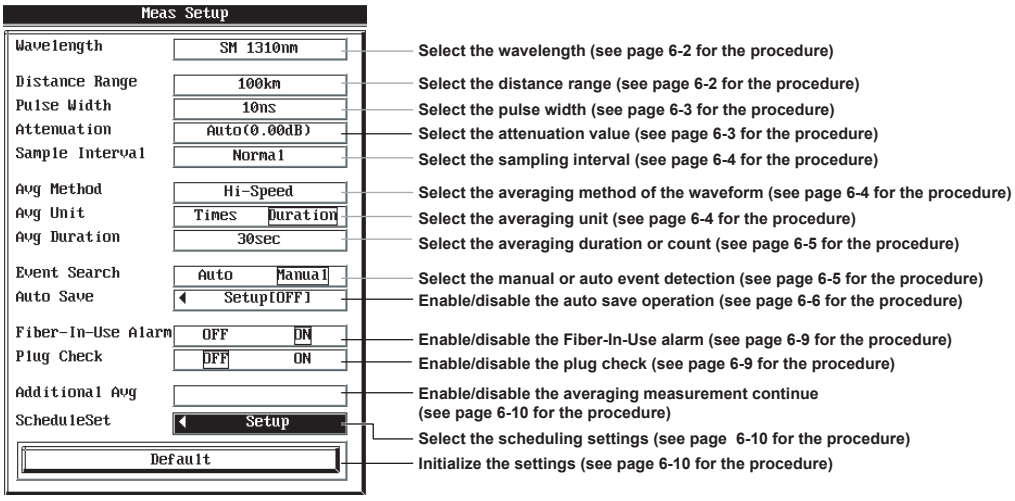
Selecting the Detail Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Detail** soft key. A soft key menu for the Detail mode appears.

Setting the Measurement Conditions

5. Press the **Meas Setup** soft key. The Meas Setup screen appears.





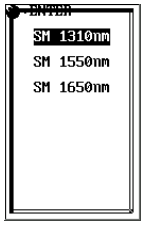
- **Selecting the Wavelength**

  6. Move the cursor to wavelength using the **arrow keys** or the **rotary knob**.

  7. Press **ENTER**. A screen for selecting the wavelength appears.

  8. Move the cursor to the wavelength you want to select using the **arrow keys** or the **rotary knob**.

  9. Press **ENTER**. The wavelength is confirmed.



Note

- The selectable test wavelengths vary depending on the model. For details, see section 21.1.
- The optical pulse output port changes depending on the wavelength.
- The setting is stored in the internal memory. The AQ7270/AQ7275 will start up using the stored settings when the power is turned ON the next time.

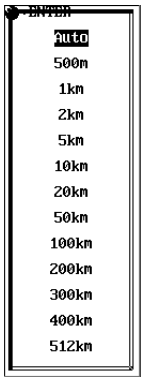
- **Select the Distance Range**

  10. Move the cursor to Distance Range using the **arrow keys** or the **rotary knob**.

  11. Press **ENTER**. A screen for selecting the distance range appears.

  12. Move the cursor to the distance range you want to select using the **arrow keys** or the **rotary knob**.

  13. Press **ENTER**. The distance range is confirmed.



Note

- Set the distance range to a value longer than the length of the optical fiber cable to be measured.
  Otherwise, correct measurements cannot be made.
- The longer the distance range, the longer the measurement time will be.
- If you set the distance range, the pulse width and attenuation are automatically set to optimal values.
- Firmware versions 3.01 and later support the 512 km distance range.

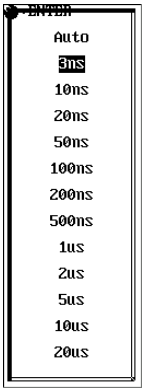
- **Selecting the Pulse Width**

  14. Move the cursor to Pulse Width using the **arrow keys** or the **rotary knob**.

  15. Press **ENTER**. A screen for selecting the pulse width appears.

  16. Move the cursor to the pulse width you want to select using the **arrow keys** or the **rotary knob**.

  17. Press **ENTER**. The pulse width is confirmed.



Note

- You cannot select the pulse width if the distance range is set to auto.
- If you set the pulse width, the attenuation is automatically set to the optimal value.

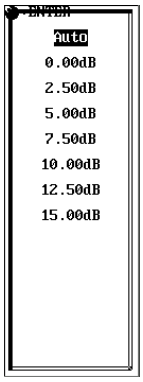
- **Selecting the Attenuation**

  18. Move the cursor to Attenuation using the **arrow keys** or the **rotary knob**.

  19. Press **ENTER**. The screen for setting the attenuation appears.

  20. Move the cursor to the attenuation value you want to select using the **arrow keys** or the **rotary knob**.

  21. Press **ENTER**. The attenuation is confirmed.



Note

- You cannot select the attenuation if the distance range or pulse width is set to auto or the averaging method is set to high reflection.
- Measurements cannot be performed at high resolution if the waveform is saturated. If this is the case, increase the value.
- The attenuation setting is valid in realtime measurement or when the averaging method is averaging measurement in high-speed measurement.

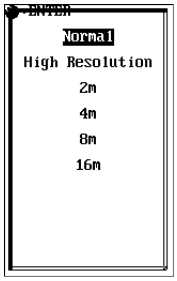
- **Selecting the Sampling Interval**

  22. Move the cursor to Sample Interval using the **arrow keys** or the **rotary knob**.

  23. Press **ENTER**. A screen for selecting the sampling interval appears.

  24. Move the cursor to the sampling interval you want to select using the **arrow keys** or the **rotary knob**.

  25. Press **ENTER**. The sampling interval is confirmed.



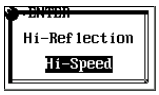
- **Selecting the Averaging Method**

  26. Move the cursor to Avg Method using the **arrow keys** or the **rotary knob**.

  27. Press **ENTER**. A screen for selecting the averaging method appears.

  28. Move the cursor to the averaging method you want to select using the **arrow keys** or the **rotary knob**.

  29. Press **ENTER**. The averaging method is confirmed.



Note

We recommend that you make measurements with the averaging method set to high speed only if the optical fiber cable is short and there is no reflection.

- **Selecting the Averaging Unit**

  30. Move the cursor to Avg Unit using the **arrow keys** or the **rotary knob**.

  31. Press **ENTER**. The cursor moves to Duration or Times by Avg Unit.

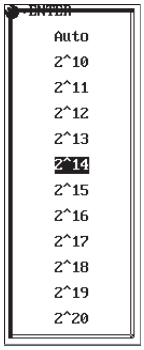
- **Selecting the Averaging Count or Duration**

  32. Move the cursor to Avg Duration/Times using the **arrow keys** or the **rotary knob**.

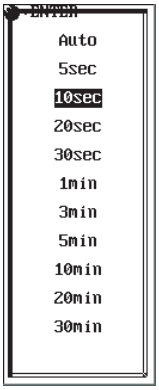
  33. Press **ENTER**. A screen for selecting the averaging duration or count appears.

  34. Move the cursor to the averaging duration or count you want to select using the **arrow keys** or the **rotary knob**.

  35. Press **ENTER**. The averaging duration or count is confirmed.



The averaging unit is count



The averaging unit is duration

Note

- The measurement time may be shorter or longer than the specified time due to the effects of other measurement conditions.
- Increasing the count or duration value results in highly accurate measurements, but the measurement takes longer.
  Set the value by taking into consideration the dynamic range of the AQ7270/AQ7275 and the loss in the optical fiber cable.
- The duration or count display depends on the setting specified for the averaging unit.

- **Selecting the Event Detection Method**

  36. Move the cursor to Event Search using the **arrow keys** or the **rotary knob**.

  37. Press **ENTER**. The cursor moves to Auto or Manual by Event Search.

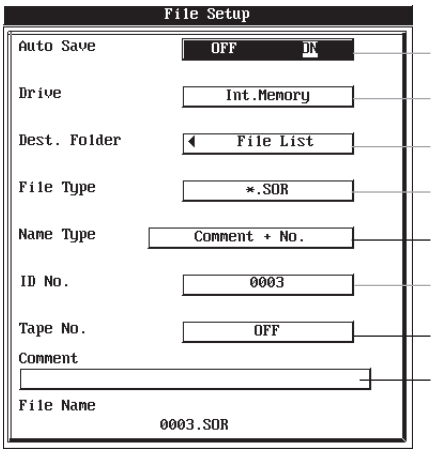
Note

If you set the auto save mode to ON, be sure to set the save destination folder before starting the measurement, because the measured data is saved automatically after the averaging measurement.

- **Enabling or Disabling the Auto Save Function**

38. Move the cursor to Auto Save using the **arrow keys** or the **rotary knob**.

39. Press **ENTER**. The File Setup screen appears.



Enable/disable the auto save operation (see page 6-6 for the procedure)

Select the auto save destination drive (see page 6-6 for the procedure)

Select the auto save destination folder (see page 6-7 for the procedure)

Select the file type for auto saving (see page 6-7 for the procedure)

Select the file name type (see page 6-8 for the procedure)

Select the number to be attached to the file name (see page 6-8 for the procedure)

Select the tape ID number (see page 6-8 for the procedure)

Enter the file name (see page 6-9 for the procedure)

40. Press **ENTER**. The cursor moves to ON or OFF by Auto Save.

- **Selecting the Save Destination Media Type**

  41. Move the cursor to Drive using the **arrow keys** or the **rotary knob**.

  42. Press **ENTER**. A screen for selecting the save destination drive appears.

  43. Move the cursor to the save destination drive you want to select using the **arrow keys** or the **rotary knob**.

  44. Press **ENTER**. The save destination drive is confirmed.

Note

You cannot select this item if the auto save mode is turned OFF.

- **Selecting the Save Destination Folder**

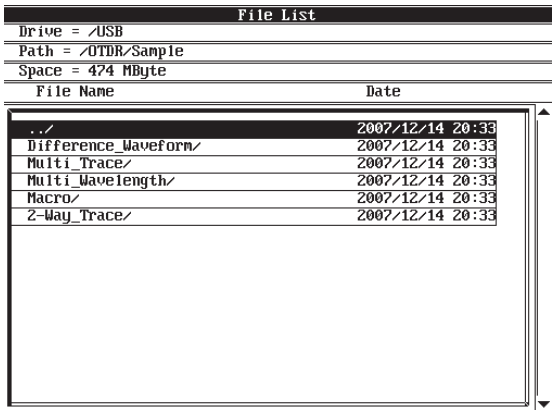
  45. Move the cursor to Dest. Folder using the **arrow keys** or the **rotary knob**.

  46. Press **ENTER**. The File List screen for selecting the save destination folder appears.

  47. Move the cursor to the save destination folder using the **arrow keys** or the **rotary knob**.

  48. Press **ENTER**. The contents in the save destination folder are displayed.

  49. Press **ESC**. The File List screen for selecting the save destination folder closes.



Note

You cannot select this item if the auto save mode is turned OFF.

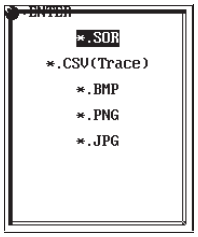
- **Selecting the File Type**

  50. Move the cursor to File Type using the **arrow keys** or the **rotary knob**.

  51. Press **ENTER**. A screen for selecting the file type appears.

  52. Move the cursor to file type you want to select using the **arrow keys** or the **rotary knob**.

  53. Press **ENTER**. The file type is confirmed.



Note

You cannot select this item if the auto save mode is turned OFF.

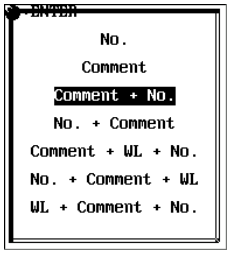
- **Selecting the File Name Type**

  54. Move the cursor to Name Type using the **arrow keys** or the **rotary knob**.

  55. Press **ENTER**. A screen for selecting the file name type appears.

  56. Move the cursor to file name type you want to select using the **arrow keys** or the **rotary knob**.

  57. Press **ENTER**. The file name type is confirmed.



Note

You cannot select this item if the auto save mode is turned OFF.

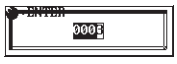
- **Setting the File ID Number**

  58. Move the cursor to ID No. using the **arrow keys** or the **rotary knob**.

  59. Press **ENTER**. The screen for setting the ID number appears.

  60. Turn the **rotary knob** to set the ID number.

  61. Press **ENTER**. The ID number is confirmed.



Note

You cannot select this item if the auto save mode is turned OFF.

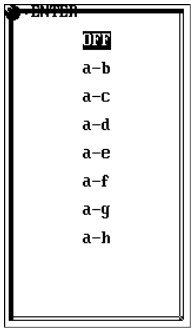
- **Setting the ID Number for the Tape Fiber and the Like**

  62. Move the cursor to Tape ID using the **arrow keys** or the **rotary knob**.

  63. Press **ENTER**. A screen for selecting the tape ID appears.

  64. Move the cursor to tape ID you want to select using the **arrow keys** or the **rotary knob**.

  65. Press **ENTER**. The tape ID is confirmed.



Note

You cannot select this item if the auto save mode is turned OFF.

- **Attaching a Comment to the File Name**

  66. Move the cursor to Comment using the **arrow keys** or the **rotary knob**.

  67. Press **ENTER**. The character input screen for entering the comment appears.

  68. Enter the comment using the **arrow keys**, **rotary knob** and **ENTER**.

  69. Press the **OK** soft key. The characters are confirmed.

  70. Press **ESC**. The File Setup screen closes, and the optical pulse measurement screen appears.

Note

- You cannot select this item if the auto save mode is turned OFF.
- For the procedures to enter characters, see section 18.6.

- **Selecting the Fiber-In-Use Alarm**

  71. Move the cursor to Fiber-In-Use Alarm using the **arrow keys** or the **rotary knob**.

  72. Press **ENTER**. The cursor moves to ON or OFF by Fiber-In-Use Alarm.

Note

- The Fiber-In-Use Alarm cannot be selected if the measured wavelength is 850 nm, 1300 nm, or 1650 nm; or on the 735036, 1625 nm.
- You cannot select averaging measurement continue if you turn fiber-in-use alarm ON.

- **Selecting the Plug Check Mode**

  73. Move the cursor to Plug Check using the **arrow keys** or the **rotary knob**.

  74. Press **ENTER**. The cursor moves to ON or OFF by Plug Check.

Note

- If the averaging measurement continue was turned ON, it is turned OFF.
- You can select whether to continue or discontinue measurement when an error is displayed for the plug check.

- **Selecting the Averaging Measurement Continue**

  75. Move the cursor to Additional Avg using the **arrow keys** or the **rotary knob**.

  76. Press **ENTER**. The cursor moves to ON or OFF by Additional Avg.

Note

You cannot select averaging measurement continue if the distance range is set to auto, if the plug check is turned ON, or if the fiber-in-use alarm is turned ON.

- **Initializing the Measurement Conditions**

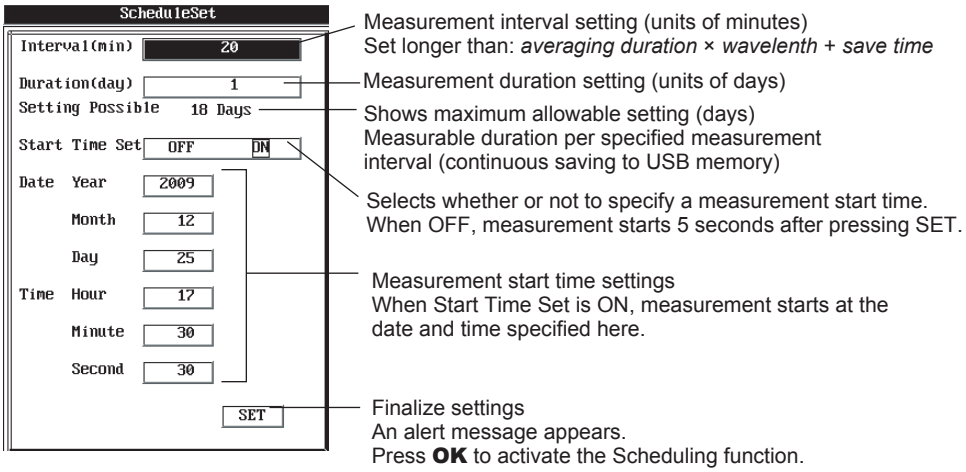
  77. Move the cursor to Default using the **arrow keys** or the **rotary knob**.

  78. Press **ENTER**. The measurement conditions are initialized to factory default settings.

- **Schedule Setting**

  79. Move the cursor to Schedule Set using the arrow keys or the rotary knob.

  80. Press ENTER. The Scheduling settings screen below is displayed.



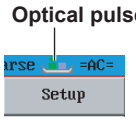
Note

When a scheduled measurement is being performed, you cannot change the schedule.

Explanation

Selecting the Wavelength

The optical pulse output port changes depending on the specified wavelength. Check the optical pulse output port indicator on the AQ7270/AQ7275, and connect the optical fiber cable to the output port.



Selecting the Distance Range

Set the distance range to match the cable length. The selectable distance range varies depending on the wavelength.

Cable Length	Distance Range
Unknown	Auto
0 to 400 m	500 m
400 m to 800 m	1 km
800 m to 1.6 km	2 km
1.6 km to 4 km	5 km
4 km to 8 km	10 km
8 km to 16 km	20 km
16 km to 40 km	50 km
40 km to 80 km	100 km
80 km to 160 km	200 km
160 km to 240 km	300 km
240 km to 400 km	400 km

* Firmware versions 3.01 and later support this distance range.

Selecting the Pulse Width

The pulse width has the following characteristics.

- A short pulse width allows measurements in high resolution but cannot measure long distances.
- A long pulse width allows long-distance measurements but cannot measure in high resolution.

The selectable pulse width varies depending on the wavelength and distance range. See the table below.

Distance Range	Selectable Pulse Widths
500 m	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns
1 km	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μs
2 km	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μs
5 km	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μs
10 km, 20 km	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μs
50 km or longer	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μs, 2 μs, 5 μs, 10 μs, 20 μs

If the wavelength is 850 nm, you cannot use 3ns, 2 μs, 5 μs, 10 μs, and 20 μs(3 ns is available on the 735041).
If the wavelength is 1300 nm, you cannot use 3ns, 10 μs and 20 μs(3 ns is available on the 735041).

Selecting the Attenuation

If a large reflection occurs at a connection point of the optical connector or at the point where the optical fiber cable is broken, the waveform may saturate. Attenuation is used to prevent saturation.

The selectable attenuation values vary depending on the pulse width. See the table below.

Pulse Width	Selectable Attenuation Values
3 ns to 50 ns	0 dB, 2.50 dB, 5.00 dB, 7.50 dB, 10.00 dB, 12.50 dB, 15.00 dB
100 ns to 1 µs	0 dB, 2.50 dB, 5.00 dB, 7.50 dB, 10.00 dB, 12.50 dB, 15.00 dB, 17.50 dB, 20.00 dB
2 µs to 5 µs	0 dB, 2.50 dB, 5.00 dB, 7.50 dB, 10.00 dB, 12.50 dB, 15.00 dB, 17.50 dB, 20.00 dB, 22.50 dB, 25.00 dB
10 µs to 20 µs	0 dB, 2.50 dB, 5.00 dB, 7.50 dB, 10.00 dB, 12.50 dB, 15.00 dB, 17.50 dB, 20.00 dB, 22.50 dB, 25.00 dB, 27.50 dB, 30.00dB*

* AQ7275 only

If the wavelength is 850 nm or 1300 nm (excluding the 735041)

Pulse Width	Selectable Attenuation Values
10 ns to 50 ns	0 dB, 2.5 dB, 5.0 dB, 7.5 dB, 10.0 dB, 12.5 dB
100 ns or longer	0 dB, 2.5 dB, 5.0 dB, 7.5 dB, 10.0 dB, 12.5 dB, 15.0 dB, 17.5 dB

If the wavelength is 850 nm or 1300 nm (for the 735041)

Pulse Width	Selectable Attenuation Values
3 ns to 50 ns	0 dB, 2.5 dB, 5.0 dB, 7.5 dB, 10.0 dB, 12.5 dB, 15.0 dB
100 ns or longer	0 dB, 2.5 dB, 5.0 dB, 7.5 dB, 10.0 dB, 12.5 dB, 15.0 dB, 17.5 dB, 20.0 dB

Selecting the Sampling Interval

The maximum number of sampling data points is 50000. The number of sampling data points is 128000 only when the distance range is set to 512km and the sampling interval is set to 4 km. The shortest sampling interval is determined by the distance range.

Normal: Measures at the optimal sampling interval.
High resolution: Measures at the shortest sampling interval.

Changes can be measured in more detail by setting the sampling interval short. However, the data size of the measured results become large. For the sampling intervals that are selectable depending on the distance range, see below.

Distance Range	Selectable Sampling Interval
500 m	5 cm, 10 cm, 20 cm, 50 cm, 1 m
1 km	5 cm, 10 cm, 20 cm, 50 cm, 1 m, 2 m
2 km	5 cm, 10 cm, 20 cm, 50 cm, 1 m, 2 m, 4 m
5 km	10 cm, 20 cm, 50 cm, 1 m, 2 m, 4 m, 8 m
10 km	20 cm, 50 cm, 1 m, 2 m, 4 m, 8 m
20 km	50 cm, 1 m, 2 m, 4 m, 8 m, 16 m
50 km	1 m, 2 m, 4 m, 8 m, 16 m
100 km	2 m, 4 m, 8 m, 16 m
200 km	4 m, 8 m, 16 m, 32 m
300 km	8 m, 16 m, 32 m
400 km	8 m, 16 m, 32 m

* Firmware versions 3.01 and later support this distance range.

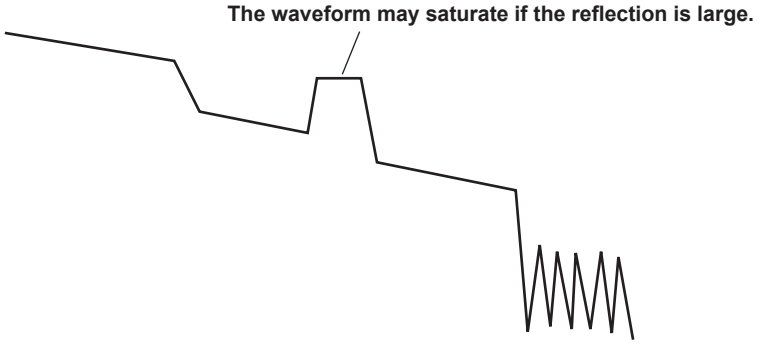
Note

When performing high resolution measurement in realtime, you can set the sampling interval to 5 cm to the upper interval limit in all distance ranges. For details, see section 7.4.

Selecting the Averaging Method

High Speed

The high speed mode is used to measure all sections using the specified attenuation. If the attenuation is not appropriate and a large reflection occurs, the corresponding section of waveform may saturate.



High Reflection

The high reflection mode allows accurate measurements even if there are large reflections (excluding extremely large reflections such as those caused by an open end). In high reflection mode, the optimal attenuation is set according to the backscattering light level for each section to make the measurements. Consequently, the measurement takes longer than the high speed mode. The division of sections and optimal attenuation values are automatically set.

Selecting the Averaging Unit

Duration: Measures for the specified duration. If you set a short duration, the measurement may not complete within the specified duration depending on the measurement conditions.

Times: Measures for the specified number of times.

Selecting the Averaging Count or Duration

The selectable values are as follows:

Duration: 5 sec, 10 sec, 20 sec, 30 sec, 1 min, 3 min, 5 min, 10 min, 20 min, and 30 min

The units sec and min represent seconds and minutes, respectively.

Times: 2^10 (1024 times), 2^11 (2048 times), 2^12 (4096 times), 2^13 (8192 times), 2^14 (16384 times), 2^15 (32768 times), 2^16 (65536 times), 2^17 (131072 times),
2^18 (262144 times), 2^19 (524288 times), 2^20 (1048576 times)
2~10 represents 2 to the power of 10 (1024 times).

Note

Because the maximum averaging count is 2^20, measurement will stop before the specified averaging duration elapses if you set the averaging duration greater than this maximum.

Selecting the Event Detection

The event detection function automatically detects events from the acquired data after the averaging measurement.

Auto: Automatically detects events after the averaging measurement, creates a list, and shows the event analysis menu.

Manual: Displays the waveform after the averaging measurement but does not detect events.

Automatic Storage of Measured Results

The measured data acquired after the averaging measurement can be saved automatically to a specified destination folder.

OFF: Does not save the measured data after the averaging measurement.

ON: Automatically saves the measured data after the averaging measurement.

Selecting the Plug Check Mode

The plug check function verifies the connection between the AQ7270/AQ7275 and the optical fiber cable. If this function is turned ON and the optical fiber cable is not connected to the AQ7270/AQ7275 or the connection is not appropriate, the AQ7270/AQ7275 does not transmit light from the optical pulse output port.

OFF: Does not perform a plug check.

ON: Perform a plug check.

Selecting the Fiber-In-Use Alarm

The wavelength of the optical pulse used by the AQ7270/AQ7275 is the same as that used in optical communications. If optical communication is ongoing in the optical fiber cable, applying the light from the AQ7270/AQ7275 will affect the communication. This communication light is called in-service light. The fiber-in-use alarm checks whether communication light is passing through the optical fiber cable that you are trying to measure. If an in-service light is detected, an alert is displayed asking whether you want to continue with the measurement. If the input level of the in-service light is -20 to 0 dBm, an alert message is displayed repeatedly to prevent damage to the AQ7270/AQ7275. If this message appears, stop the measurement. For details on starting/stopping the measurement, see chapter 7.For details on the message, see section 20.2.

Selecting the Averaging Measurement Continue

The averaging measurement continue function continues the averaging measurement on an already acquired waveform if the waveforms are acquired repetitively.

OFF: Does not perform averaging measurement continue.

ON: Performs averaging measurement continue.

Averaging measurement is performed up to 2^{20} times.

The averaging measurement continue is invalid if any of the following settings is ON.

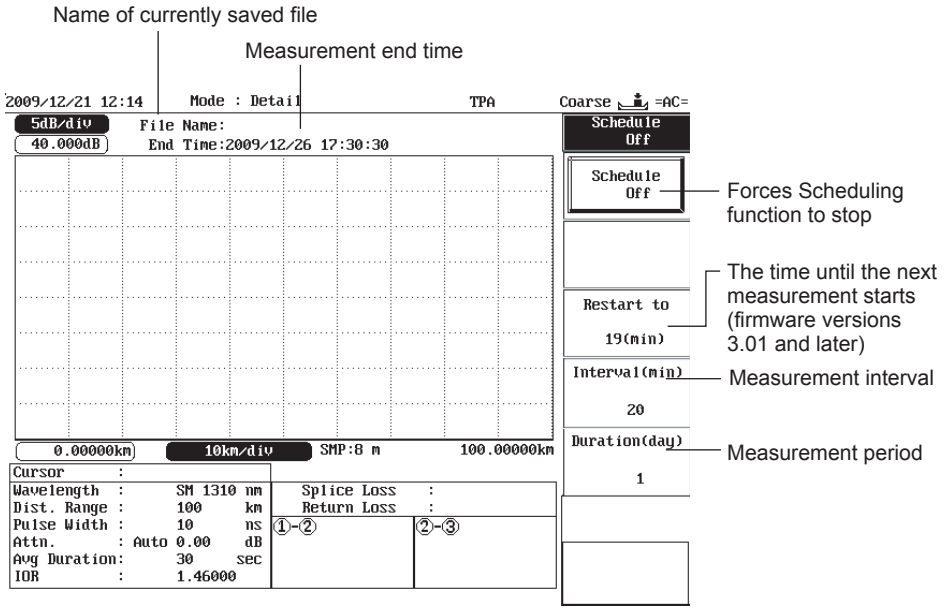
- The distance range is set to auto.
- Plug check.
- Fiber-in-use alarm

Scheduleing Settings (firmware version 2.07 or later)

When a previously specified time is reaced, this function performs measurement at a specified interval and saves the measured results to USB memory. This function can be used when in Detail or Multi WL setup mode.

Screen during Execution of Scheduling Function

When the Scheduling function measurement start time is reached, the measurement screen appears as follows.



File Name

Data saved by the Scheduling function is saved in the following structure.

USB memory root directory
- 09_12 (yy_mm)
  - 12_15 (mm_dd)
    - 00*
      - Measured data file

＊: 1 wavelength: File name with multiples of 100 (00, 100, 200, 300...)
2 wavelengths: File name with multiples of 50 (00, 50, 100, 150...)
3 wavelengths: File name with multiples of 30 (00, 30, 60, 90, 120...)

The example above shows the save directory for files saved on December 15th, 2009.

The file name is:

wavelength_IDnumber.SOR

The file name for 1310 nm, ID number 001 would be:

1310_001.SOR

6.2 Setting the Analysis Conditions

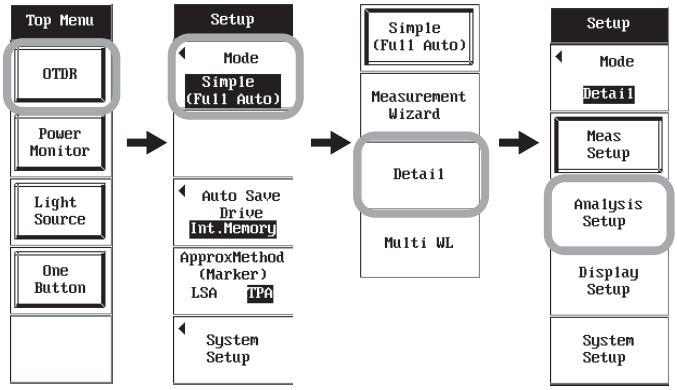
Procedure

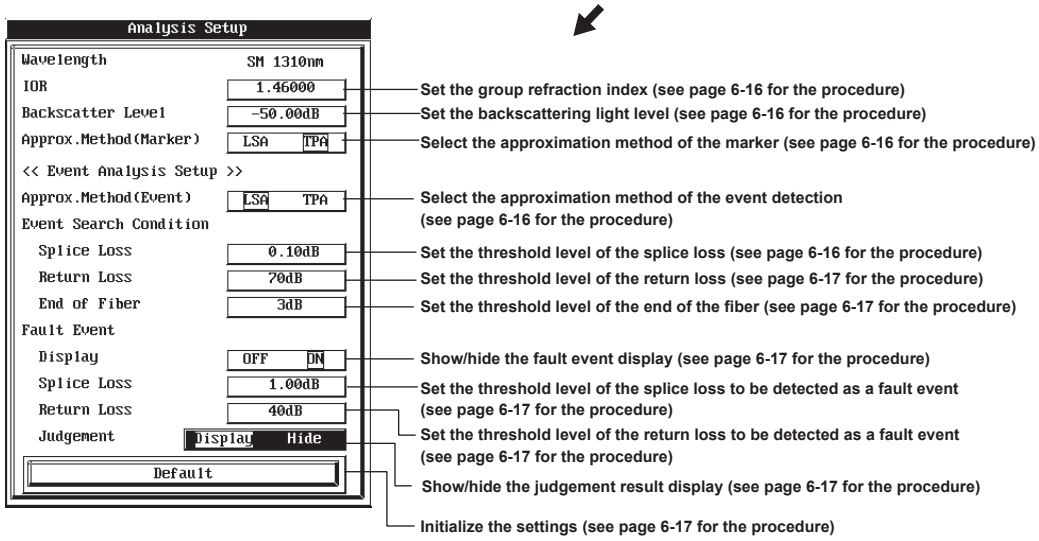
Selecting the Detail Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Detail** soft key. A soft key menu for the Detail mode appears.

Setting the Analysis Conditions

5. Press the **Analysis Setup** soft key. The Analysis Setup screen appears.





- **Setting the Group Refraction Index**

  6. Move the cursor to IOR using the **arrow keys** or the **rotary knob**.

  7. Press **ENTER**. The screen for setting the group refraction index appears.

  8. Set the group refraction index value using the **arrow keys** or the **rotary knob**.

  9. Press **ENTER**. The group refraction index is confirmed.

Note

- The AQ7270/AQ7275 measures the distance using the group refraction index. If you do not set the group refraction index correctly, an error will occur in the measured distance.
- The group refraction index varies depending on the wavelength. The default value indicates the group refraction index corresponding to each wavelength.
- The selectable range is between 1.30000 and 1.79999.

- **Setting the Backscattering Light Level**

  10. Move the cursor to Backscatter Level using the **arrow keys** or the **rotary knob**.

  11. Press **ENTER**. The screen for setting the backscattering light level appears.

  12. Set the backscattering light level using the **arrow keys** or the **rotary knob**.

  13. Press **ENTER**. The backscattering light level is confirmed.

Note

- If you do not set the backscattering light level correctly, an error will occur in the measured return loss and total return loss.
- The default value varies depending on the wavelength. The default value indicates the backscattering level corresponding to each wavelength.
- The selectable range is –10.00 to –64.99.

- **Selecting the Marker Approximation Method**

  14. Move the cursor to Approx.Method (Marker) using the **arrow keys** or the **rotary knob**.

  15. Press **ENTER**. The cursor moves to LSA or TPA by Approx.Method (Marker).

- **Selecting the Event Approximation Method**

  16. Move the cursor to Approx.Method (Event) using the **arrow keys** or the **rotary knob**.

  17. Press **ENTER**. The cursor moves to LSA or TPA by Approx.Method (Event).

- **Setting the Threshold Level of the Splice Loss Detection Level**

  18. Move the cursor to Splice Loss using the **arrow keys** or the **rotary knob**.

  19. Press **ENTER**. The screen for setting the splice loss appears.

  20. Set the splice loss using the **arrow keys** or the **rotary knob**.

  21. Press **ENTER**. The splice loss is confirmed.

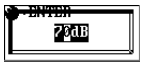
- **Setting the Threshold Level of the Return Loss Detection Level**

  22. Move the cursor to Return Loss using the **arrow keys** or the **rotary knob**.

  23. Press **ENTER**. The screen for setting the return loss appears.

  24. Set the return loss using the **arrow keys** or the **rotary knob**.

  25. Press **ENTER**. The return loss is confirmed.



- **Setting the Threshold Level of the End of the Fiber (Fresnel Reflection)**

  26. Move the cursor to End of Fiber using the **arrow keys** or the **rotary knob**.

  27. Press **ENTER**. The screen for setting the end-of-fiber value appears.

  28. Set the end-of-fiber value using the **arrow keys** or the **rotary knob**.

  29. Press **ENTER**. The end-of-fiber value is confirmed.

- **Selecting the Fault Event Display**

  30. Move the cursor to Fault Event Display using the **arrow keys** or the **rotary knob**.

  31. Press **ENTER**. The cursor moves to ON or OFF by Fault Event Display.

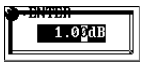
- **Setting the Threshold Level of the Splice Loss Detection Level of the Fault Event**

  32. Move the cursor to Splice Loss using the **arrow keys** or the **rotary knob**.

  33. Press **ENTER**. The screen for setting the splice loss appears.

  34. Set the splice loss using the **arrow keys** or the **rotary knob**.

  35. Press **ENTER**. The splice loss is confirmed.



- **Setting the Threshold Level of the Return Loss Detection Level of the Fault Event**

  36. Move the cursor to Return Loss using the **arrow keys** or the **rotary knob**.

  37. Press **ENTER**. The screen for setting the return loss appears.

  38. Set the return loss using the **arrow keys** or the **rotary knob**.

  39. Press **ENTER**. The return loss is confirmed.

- **Selecting the Judgement Result Display**

  40. Move the cursor to Judgement using the **arrow keys** or the **rotary knob**.

  41. Press **ENTER**. The cursor moves to Display or Hide.

- **Initializing the Analysis Conditions**

  42. Move the cursor to Default using the **arrow keys** or the **rotary knob**.

  43. Press **ENTER**. The analysis conditions are initialized to factory default settings.

Explanation

Setting the Group Refraction Index

The following group refraction indexes are assigned according to the wavelength on the AQ7270/AQ7275.

850 nm:	1.46000
1300 nm:	1.46000
1310 nm:	1.46000
1490 nm:	1.46000
1550 nm:	1.46000
1625 nm:	1.46000
1650 nm:	1.46000

The selectable range is 1.30000 to 1.79999.

Setting the Backscattering Light Level

A phenomenon called Rayleigh scattering occurs in the light that traverse through an optical fiber cable. Within the Rayleigh scattering, the portion of the light that scatters in the direction opposite to the propagation direction of light is called backscattering. The backscattering light level setting is used to calculate the return loss and total return loss. The following backscattering light levels are assigned according to the wavelength on the AQ7270/AQ7275.

850 nm:	–32 dB
1300 nm:	–41 dB
1310 nm:	–50 dB
1490 nm:	–52 dB
1550 nm:	–52 dB
1625 nm:	–53 dB
1650 nm:	–53 dB

The selectable range is -10.00 to -64.99.

Approximation Method

A line is assumed when calculating the splice loss. This line is the approximation line.
The following two types of linear approximations are available.

- Least squares approximation (LSA)
- Two point approximation (TPA)

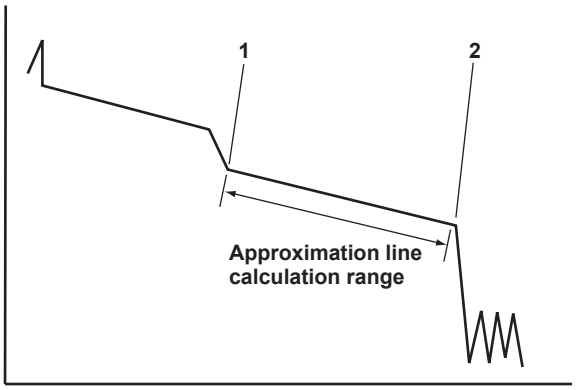
LSA

The loss between two points (between 1 and 2 in the figure below) is calculated using the least squares method.
This method has the following characteristics.

Advantage: The calculation error is small, because all the data between the two points are used.
Variation in the calculated value decreases, and the reproducibility of the calculated value improves.

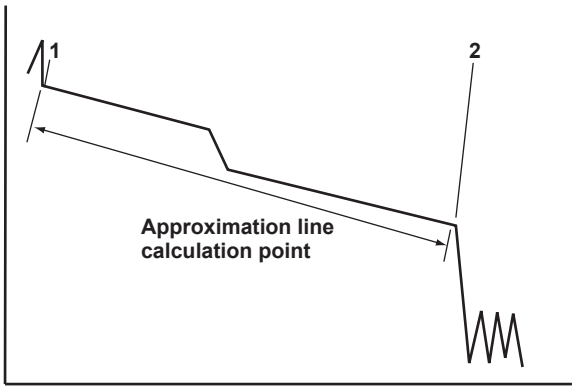
Disadvantage: If a large reflection or splice loss is present in the section in which the loss is calculated, the error becomes large because this value is also included.

LSA allows calculation with less error than TPA if there are no return or splice loss events.



TPA

Calculates the loss using the difference in the levels of the specified two points. The calculated value may vary greatly, and the reproducibility may be poor. TPA allows calculation with less error than LSA if there are return or splice loss events.



Event Detection Conditions

Splice Loss

If a splice loss that is greater than or equal to the specified threshold level occurs, it is detected as an event.
The selectable range is 0.01 dB to 9.99 dB.

Return Loss

If a return loss that is less than or equal to the specified threshold level occurs, it is detected as an event.
Because the return loss is smaller as the reflection increases, the event (reflection) is detected when the return loss is less than or equal to the threshold level.
The selectable range is 20 dB to 70 dB.

End of Fiber (Fresnel Reflection)

If a reflection that is greater than or equal to the specified threshold level occurs, it is detected as an end of fiber.
The selectable range is 3 dB to 65 dB.

Displaying Fault Events

Display

An event that is greater than or equal to the specified threshold level (less than or equal to the specified threshold level for reflections) is displayed as a fault event.

OFF: Even if there is an event greater than the threshold level, the * mark is not displayed.
ON: Events greater than the threshold level are indicated by the * mark.

Splice Loss, Return Loss

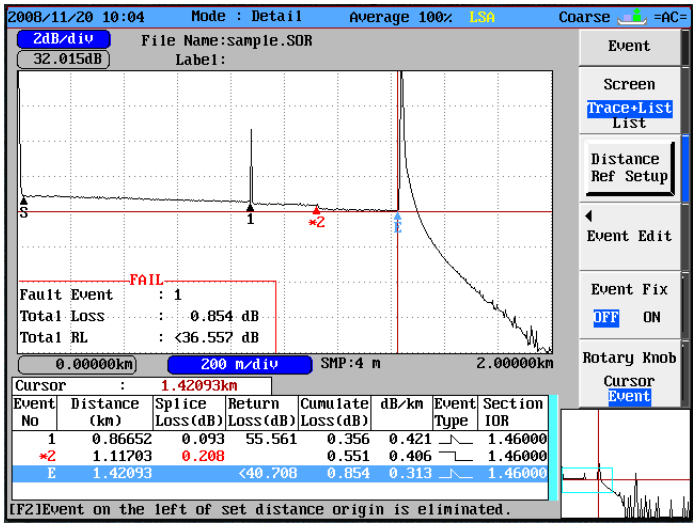
Set the threshold levels used to display splice loss and return loss as fault events.

Splice loss: The selectable range is 0.01 dB to 9.99 dB.
Return loss: The selectable range is 20 dB to 70 dB.

Because the end of fiber is handled as a splice loss or reflection, there is no fault event solely for the end of fiber.

Judgement

If the Fault Event Display is turned ON, NG or OK is displayed along with the number of fault events.



6.3 Setting the Multi Wavelength Measurement Conditions

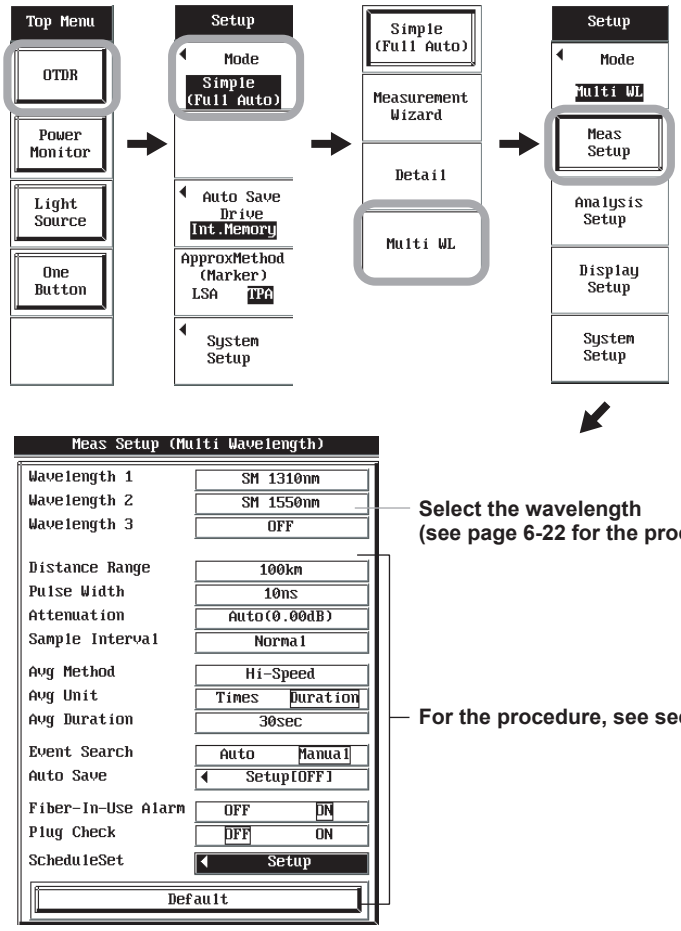
Procedure

Selecting the Multi Wavelength Measurement Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Multi WL** soft key. A soft key menu for the multi wavelength measurement appears.

Setting the Measurement Conditions

5. Press the **Meas Setup** soft key. The Meas Setup (Multi Wavelength) screen appears.



- **Selecting the Wavelength**

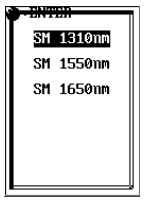
  6. Move the cursor to any wavelength between Wavelength 1 and Wavelength 3 using the **arrow keys** or the **rotary knob**.

  7. Press **ENTER**. A screen for selecting the wavelength appears.

  8. Move the cursor to the wavelength you want to select using the **arrow keys** or the **rotary knob**.

  9. Press **ENTER**. A screen for selecting the wavelength closes.

  10. Repeat steps 6 to 9 to set the wavelengths to be measured.

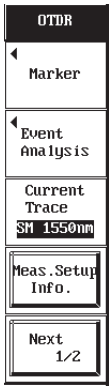


Note

- If multi wavelength measurement is selected, measurement is performed on the following wavelengths: 850nm, 1300nm, 1310 nm, 1490 nm, 1550 nm, and 1625 nm.
- The conditions that are common among the selected wavelengths are selectable for the following items.
  - Distance range
  - Pulse width
  - Attenuation
- For details on the settings other than the wavelengths, see section 6.1.

Switching the reference waveform

11. Press the **Current Trace** soft key. The reference waveform changes.



Note

With multi wavelength measurement, the OTDR menu is different.

- The Macro soft key is on page 2/2.
- There is a Current Trace soft key.
- There is no Trace Fix soft key. The Trace Fix function cannot be used.

Explanation

Waveform display after measurement stop

Waveforms are displayed in different colors: not only the waveforms currently under test, but also ones finished being measured.

The number of wavelengths that can be measured and waveforms that can be displayed differs depending on the model (up to 3 waveforms).

Switching the reference waveform

Only the reference waveform can be analyzed using markers and cursors. Switch the reference waveform to the one having the wavelength to be analyzed.

Limitations of the multiwavelength waveform display

If you move to the event analysis menu, only the reference waveform is displayed. The multiwavelength waveform display is restored when you close the event analysis screen.

Disabling the multiwavelength waveform display

Waveform data from multiwavelength measurements are deleted except the reference waveform in the following circumstances.

- When loading waveform data from a saved file.
- When a waveform analysis function (multi trace analysis, 2-waveform synthesis, or subtract trace analysis) is executed.
- When leaving multiwavelength measurement mode. (the reference waveform is displayed)

6.4 Setting the Multi Wavelength Analysis Conditions

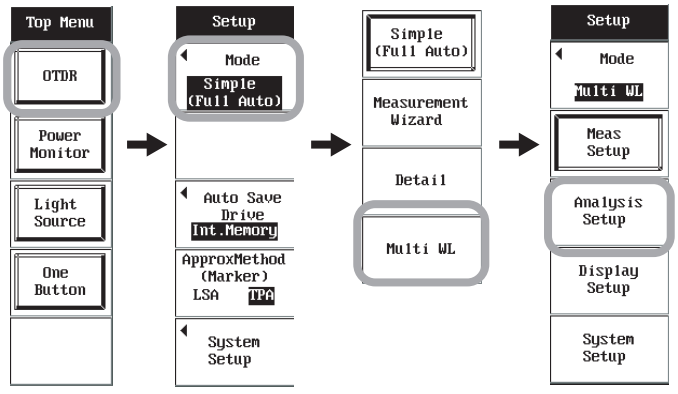
Procedure

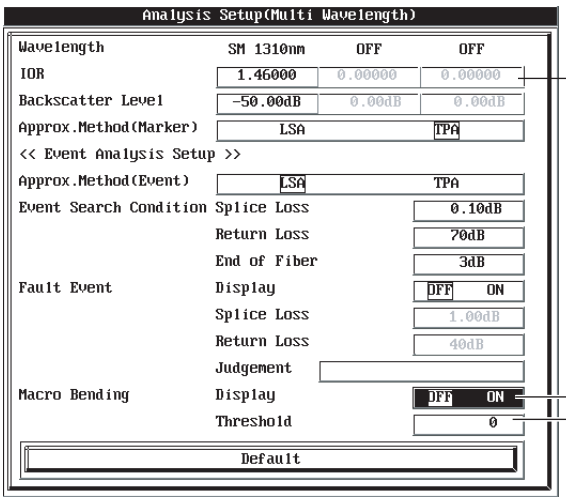
Selecting the Multi Wavelength Measurement Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Multi WL** soft key. A soft key menu for the multi wavelength measurement appears.

Setting the Analysis Conditions

5. Press the **Analysis Setup** soft key. The Analysis Setup (Multi Wavelength) screen appears.





Select the conditions for the selected wavelength

Set the conditions for detecting bending loss (see page 6-26 for the procedure) Firmware versions 3.01 and later support this function.

Note

For details on settings other than the wavelength and macro bending, see section 6.2.

- **Selecting the Macro Bending (Bending Loss) Display (Firmware Versions 3.01 and Later)**

  6. Move the cursor to Display next to Macro Bending using the **arrow keys** or the **rotary knob**.

  7. Press **ENTER**. The cursor moves to the ON or OFF setting for Display next to Macro Bending.

- **Setting the Macro Bending Threshold Level (Firmware Versions 3.01 and Later)**

  8. Move the cursor to Threshold next to Macro Bending using the **arrow keys** or the **rotary knob**.

  9. Press **ENTER**. The screen for setting the threshold level appears.

  10. Set the threshold level using the **arrow keys** or the **rotary knob**.

  11. Press **ENTER**. The threshold level is confirmed.

Explanation

Macro Bending (Bending Loss; Firmware Versions 3.01 and Later)

On the AQ7270/AQ7275, when an optical pulse measurement is performed in multi wavelength measurement mode, you can compare the difference between the splice losses at wavelengths of 1310 nm and 1550 nm and display on the screen bending loss events that are caused by bends in the fiber.

- **Display**

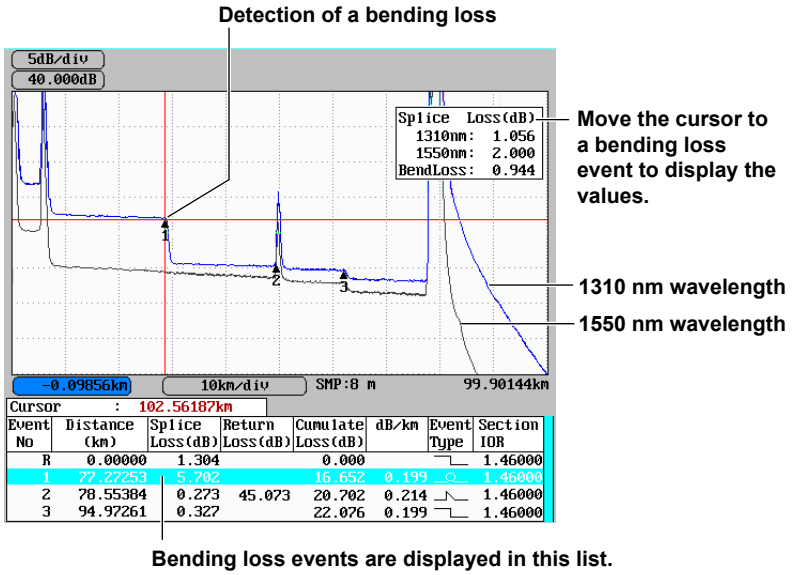
  This function displays the detected bending losses in the event list during optical pulse measurements.

  OFF: The bending losses are not displayed in the event list.

  ON: The bending losses are displayed in the event list.

- **Threshold**

  This is the threshold of the difference between the splice losses of the 1310 nm wavelength and the 1550 nm wavelength during optical pulse measurements. When the difference between the splice losses of the two waveforms for the same event is larger than this value, the event is detected as a bending loss.



In this example, the reference waveform has been set to the waveform of the 1550 nm wavelength.
The waveform of the 1310 nm wavelength, which is the waveform being compared, is displayed in gray.
If you set the reference waveform to the waveform of the 1310 nm wavelength, the waveform of the 1550 nm wavelength, which is the waveform being compared, will be displayed in gray.

Note

- If the waveforms of the two wavelengths are not being acquired, bending losses are not detected.
- The waveform being compared (displayed in gray) is not displayed when Display next to Macro Bending is set to OFF.
- For details on the event list, see chapter 12.
- For details on switching the reference waveform, see page 6-23.

7.1 Realtime Measurement

Procedure

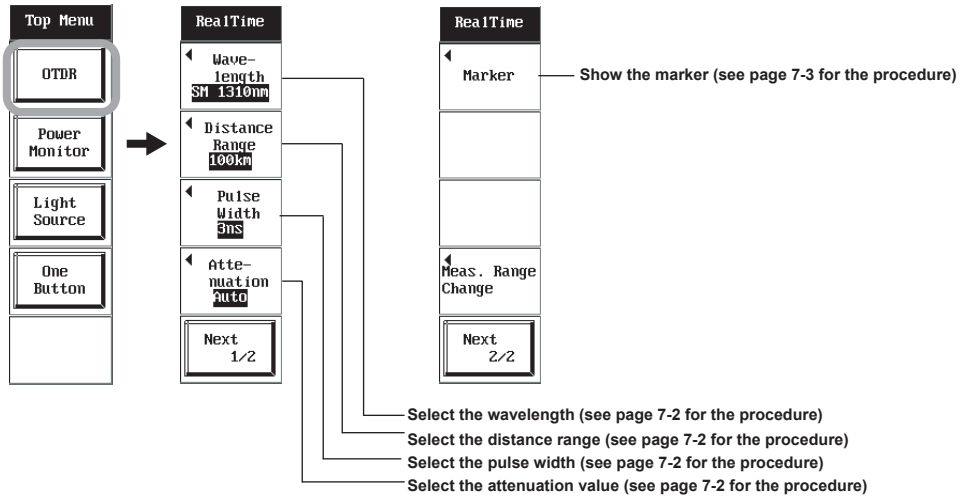
In realtime measurement, measurement is performed using the averaging count specified in advance. Because you can change the conditions while the measurement is in progress, you can view the waveform changes in realtime.

WARNING

Do not remove the optical fiber cable, because light is emitted from the optical pulse output port of the AQ7270/AQ7275 while the measurement is in progress. Visual impairment may occur if the light enters the eye.

Starting the Realtime Measurement

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **REALTIME**. The words LASER ON and the measured waveform are indicated on the screen, and the measurement starts. In addition, a soft key menu for the realtime measurement appears.



Note

You set the measurement conditions before the measurement. However, you can change the measurement conditions and make adjustments to the markers, cursors, cursor movement interval, and the like while the realtime measurement is in progress. The screen returns to the original display if you stop the measurement.

Changing the Measurement Conditions

- **Selecting the Wavelength**

  3. Press the **Wavelength** soft key. A screen for selecting the wavelength appears.

  4. Move the cursor to the wavelength you want to select using the **arrow keys** or the **rotary knob**.

  5. Press **ENTER**. The wavelength is confirmed.

- **Select the Distance Range**

  6. Press the **Distance Range** soft key. A screen for selecting the distance range appears.

  7. Move the cursor to the distance range you want to select using the **arrow keys** or the **rotary knob**.

  8. Press **ENTER**. The distance range is confirmed.

Note

Auto is not available for the distance range.

- **Selecting the Pulse Width**

  9. Press the **Pulse Width** soft key. A screen for selecting the pulse width appears.

  10. Move the cursor to the pulse width you want to select using the **arrow keys** or the **rotary knob**.

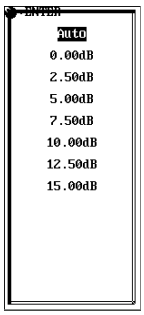
  11. Press **ENTER**. The pulse width is confirmed.

- **Selecting the Attenuation**

  12. Press the **Attenuation** soft key. The screen for selecting the attenuation appears.

  13 Move the cursor to the attenuation you want to select using the **arrow keys** or the **rotary knob**.

  14. Press **ENTER**. The attenuation is confirmed.



Note

- You can only change the wavelength in Simple (Full Auto) mode.
- You cannot change the attenuation if the averaging method is set to high reflection.
- For details, see section 6.1.
- The measurement conditions that you can change in multi wavelength measurement mode are those that can be set in common for the specified wavelengths.
- The first waveform length that is specified in the measurement conditions of the multi wavelength measurement mode becomes the default wavelength in the realtime measurement.
- Wavelengths not specified for the multiwavelength mode measuring conditions cannot be selected for real time measurement.

Use the Cursor

- **Displaying the Cursor**

  3. Turn the **rotary knob**. A cursor is displayed on the screen.

- **Selecting the Cursor Movement Interval**
  You can select whether to move the cursor at fine or coarse intervals.

  3. Press the **Meas. Range Change** soft key. A soft key menu for the measurement range appears.

  4. Press the **CursorOperate** soft key. The cursor moves to Coarse or Fine.

- **Deleting the Cursor**

  3. Press the **Marker** soft key. A soft key menu for the marker appears.

  4. Press the **More** soft key. The auxiliary function soft key menu appears.

  5. Press the **Delete Cursor** soft key. The cursor on the screen disappears.

  6. Press **ESC** to return to the soft key menu for the marker.

  7. Press **ESC** to return to the realtime measurement display.

Note

For details on the cursor, see section 11.1.

- **Marker and Cursor Operation**
  See section 11.1.

Stopping the Realtime Measurement

3. Press **REALTIME** again. The measurement stops, and the LASER ON indication on the screen disappears.

Setting the Work Completion Point (firmware version 3.01 or later)

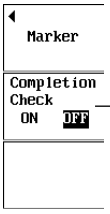
3. Move the cursor to a position that is a little after the installation point.

4. Press the **Completion Check** soft key. A message confirming whether you have moved the cursor to the work completion point is displayed. (The message is displayed when Confirmation is set to “Check only once” or “Check everytime.”)

5. Press the **OK** soft key to start real-time measurement. If the fiber end moves the distance indicated by the cursor position, the AQ1200 displays a message or sounds an alarm. Press REAL TIME to clear the message or turn off the alarm.

Note

The Completion Check soft key is only displayed when work completion notification is turned on. For the setup procedure, see section 19.5. Work completion confirmation is turned off automatically when measurement is stopped.



Set the work completion confirmation

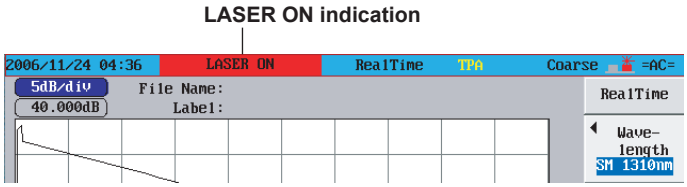
Explanation

Realtime Measurement

Measurement conditions are set before the actual measurement takes place, but during real-time measurement you can change the measurement conditions and adjust markers and the cursor. When you stop the measurement, the AQ7270/7275 returns to the previous screen.

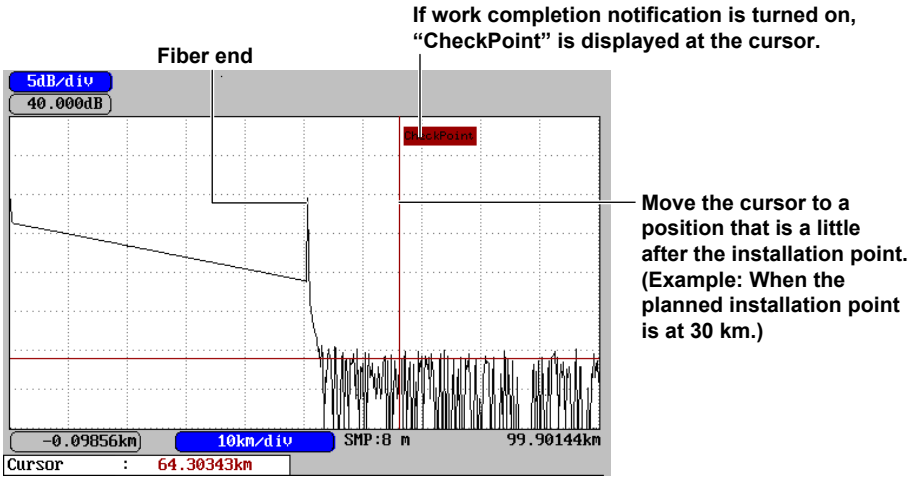
- In Simple (Full-Auto) mode, you can only change the wavelength.
- You cannot change the attenuation if the averaging mode is set to Hi-Reflection. For details, see section 6.1.

The LASER ON indication is displayed on the screen while the measurement is in progress.



Installation Completion Notification (firmware version 3.01 or later)

Move the cursor to a position a little after the installation point before you perform real-time measurement. If the fiber end detection position is the same as the cursor position when you perform real-time measurement, the AQ7270/7275 displays a message on the screen or sounds an alarm. For details, see section 19.5.



You can perform measurements efficiently by moving the cursor to a position a little after the installation point (depending on how fast fiber will be installed). This is because the AQ7270/7275 notifies you of the work completion, which is your sign to measure the connection loss at that point (splice, connection, etc.).

7.2 Averaging Measurement

Procedure

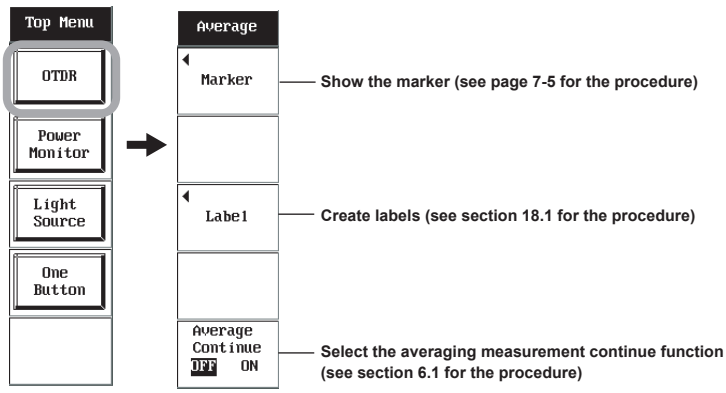
In averaging measurement, the AQ7270/AQ7275 acquires the data for each pulse, takes an average of the data acquired for each pulse, and displays the result. The averaging measurement improves the signal-to-noise ratio (S/N ratio). It is useful when detecting minute events that are buried in the noise.

WARNING

Do not remove the optical fiber cable, because light is emitted from the optical pulse output port of the AQ7270/AQ7275 while the measurement is in progress. Visual impairment may occur if the light enters the eye.

Starting the Averaging Measurement

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **AVG**. The words LASER ON and the measured waveform are indicated on the screen, and the measurement starts. A value indicating the progress of the averaging operation is displayed while the measurement is in progress. If the averaging measurement completes at the specified condition, the measurement automatically stops.



Note

- A soft key menu for the averaging measurement appears while the measurement is in progress.
- Press AVG again while the measurement is in progress to stop the measurement.
- The time it takes to complete the measurement varies depending on the measurement conditions such as the distance range and averaging count.
- If you operate the marker while the measurement is in progress, the marker screen automatically closes when the measurement is complete.
- If you are creating or editing a label, the edit screen does not close when the measurement is complete.

Use the Cursor

- **Displaying the Cursor**

  3. Turn the **rotary knob**. A cursor is displayed on the screen.

- **Deleting the Cursor**

  3. Press the **Marker** soft key. A soft key menu for the marker appears.

  4. Press the **More** soft key. The auxiliary function soft key menu appears.

  5. Press the **Delete Cursor** soft key. The cursor on the screen disappears.

  6. Press **ESC** to return to the soft key menu for the marker.

  7. Press **ESC** to return to the realtime measurement display.

Note

For details on the marker and cursor, see section 8.2 and 11.1.

Changing the Label

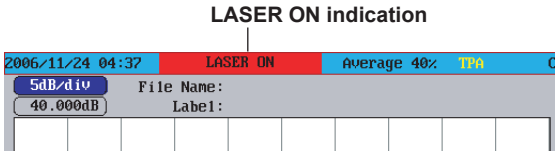
See section 18.1.

Changing the Averaging Measurement Continue Mode

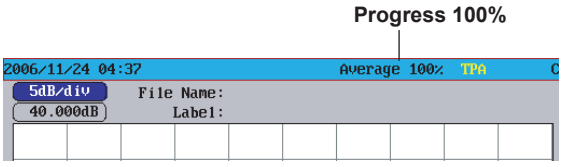
See section 6.1.

Explanation

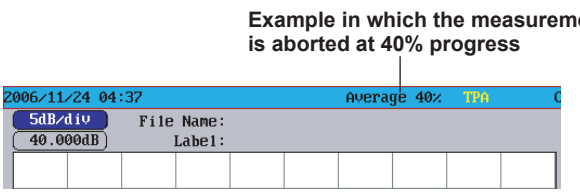
The LASER ON indication is displayed on the screen while the measurement is in progress.



The averaging measurement automatically stops when the measurement is completed. A progress dialog box is displayed during measurement. If the measurement completes normally, 100% is indicated. If you were making measurements with a marker while the averaging measurement was in progress, the operation screen used to make measurements with the marker closes when the measurement completes normally (100%). If the event detection is set to AUTO, the event detection screen is displayed when the measurement completes normally.



Measurement stops if you press AVE again while the averaging measurement is in progress. The progress of the averaging measurement until the measurement was stopped is indicated.

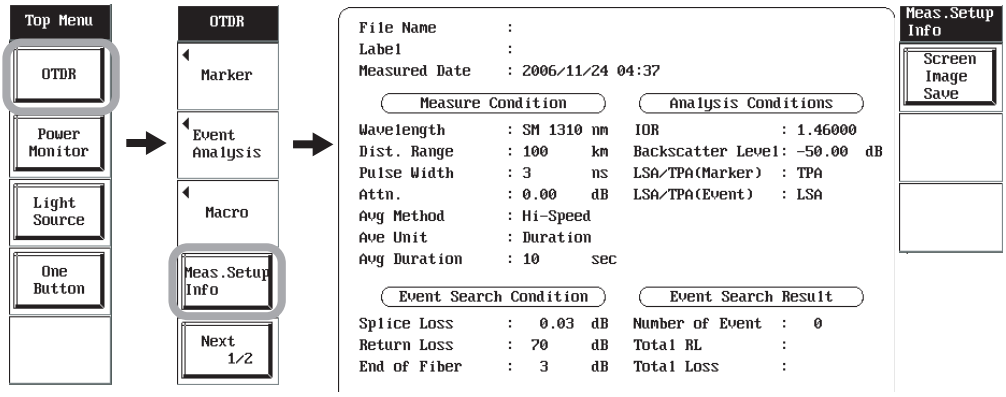


7.3 Displaying the Measurement Conditions

Procedure

If you set the measurement conditions to auto, the settings are determined at the time of measurement. This function is used to view the settings. The values set manually are also displayed.

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press the **Meas. Setup Info** soft key. The measurement condition list and a soft key menu for the measurement setup information are displayed.



Saving the List Screen

3. Press the **Screen Image Save** soft key. The screen image is saved to the root folder of the internal memory with the file name MeasureInfo.BMP.

Note

- The colors of the saved screen image are the same as the colors of the displayed screen. To select other colors, see section 19.2.
- When the measurement condition list screen is displayed, the SETUP and FILE keys are enabled. These keys can be used to change measurement conditions.

7.4 High Resolution Measurement of the Selected Location

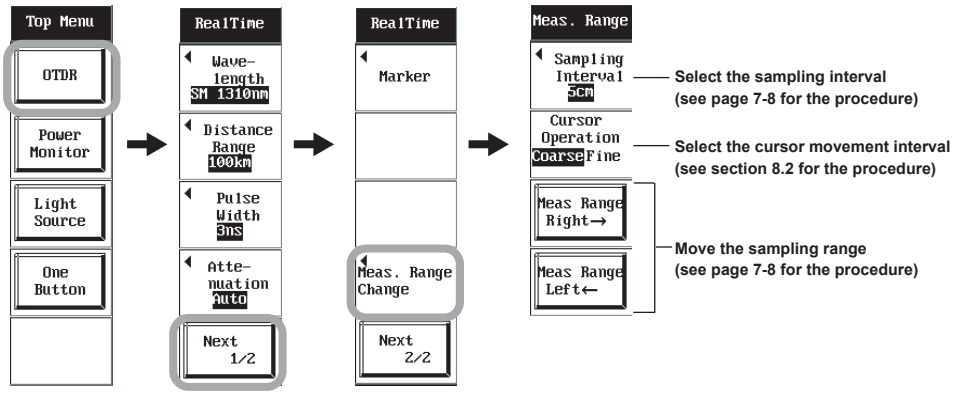
Procedure

You can limit the location for making measurements in high resolution.

1. Press the **OTDR** soft key. The optical pulse measurement display appears.

High Resolution Measurement in Realtime

2. Press **REALTIME**. The words LASER ON and the measured waveform are indicated on the screen, and the measurement starts. In addition, a soft key menu for the realtime measurement appears.
3. Press the **Next 1/2** soft key.
4. Press the **Meas. Range Change** soft key. A soft key menu for the measurement range appears.



Setting the Location to Be Analyzed in Detail

- **Displaying the Cursor**

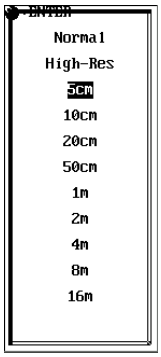
5. Turn the **rotary knob**. A cursor is displayed on the screen.
6. Turn the **rotary knob** to move the cursor to the section on the waveform you want to analyze.

Note

You can adjust the interval for moving the cursor using the CursorOperate soft key. For the procedure, see section 8.2.

Selecting the Sampling Interval

7. Press the **Sampling Interval** soft key. A screen for selecting the sampling interval appears.



8. Move the cursor to the sampling interval you want to select using the **arrow keys** or the **rotary knob**.

9. Press **ENTER**. The sampling interval is confirmed, and the waveform in a limited range according to the sampling interval is displayed around the cursor position.

Moving the Measurement Range

10. Press the **Meas. Range Right** → soft key. The limited range moves to the right.

11. Press the **Meas. Range Left** → soft key. The limited range moves to the left.

Note

- The overview screen at the lower right of the display shows the location of the limited range with respect to the entire measurement range.
- The Meas. Range Right and Meas. Range Left soft keys are valid only when the measurement range is limited. The movement interval depends on the coarse/fine setting.

High Resolution Measurement through Averaging

If you set the high resolution measurement conditions in realtime measurement, you can perform the averaging measurement using the same settings.

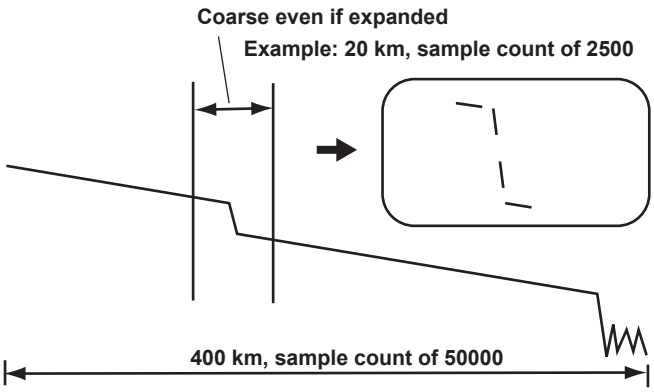
10. Press **AVG**. The averaging measurement is performed using the high resolution conditions.

Note

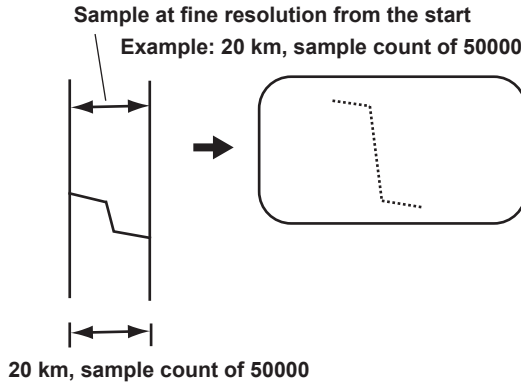
- The waveform range is displayed using the distance corresponding to the selected sampling interval around the cursor position.
- To reset the display, set the sampling interval of the measurement conditions again. For the procedure, see section 6.1.

Explanation

In normal measurement, the interval is set so that the data is sampled over the entire distance according to the specified distance range. The maximum number of data samples is 50000 on the AQ7270/AQ7275. The number of sampling data points is 128000 only when the distance range is set to 512 km and the sampling interval is set to 4 m (firmware versions 3.01 and later). Therefore, if the distance range is large such as 400 km, the interval between each data sample becomes large, and events that occur between samples cannot be analyzed in detail. The waveform zoom function explained in chapter 8 only magnifies the result measured at the sampling resolution specified for each distance range. It does not increase the resolution.



In high resolution measurement, you move the cursor to the location you want to analyze in detail and select the sampling resolution. Here, you can select any sampling interval regardless of the distance range. The measurement range is determined by the sampling resolution with the cursor at the center of the range. If there is no cursor, the left end of the current measurement range becomes the reference.



Example when the distance range is 400 km
The highest resolution that you can select in the measurement conditions in detail mode corresponds to a sampling interval of 8 m as calculated by 400 km/50000. Using the high resolution measurement function, you can select the smallest interval of 5 cm. In this case, the distance range that can be displayed is 2.5 km as calculated by 5 cm × 50000. You can display a range of 2.5 km around the cursor.
You can zoom or shift the limited measurement range. For the procedure, see sections 8.1 and 8.2.
To reset the measurement range, set the distance range again.

7.5 Measuring Multicore Fiber

Procedure

Specialized screens and menus for multicore fiber measurements appear, enabling you to efficiently measure multicore fibers without data loss.

WARNING

Do not remove the optical fiber cable, because light is emitted from the optical pulse output port of the AQ7270/AQ7275 while the measurement is in progress. Visual impairment may occur if the light enters the eye.

Note

Communication commands cannot be used when measuring multicore fibers.

Creating New Projects

Measurement conditions for multicore fibers are created with a wizard.

1. Press the **Next 1/2** soft key. (when the visible light source option is installed)
2. Press the **Multicore Fiber Meas** soft key. The menu for multicore fiber measurement appears.

Project Settings

• Entering a Project Name

3. Press the **New Project** soft key. The project setting screen is displayed.

4. Move the cursor to Project Name using the **arrow keys** or **rotary knob**.

5. Press **ENTER**. The character entry screen is displayed.
For information on entering characters, see section 18.6, “Entering Characters.”

• Specifying a Project Save Destination

6. Move the cursor to Drive using the **arrow keys** or **rotary knob**.

7. Press **ENTER**. A screen for selecting the save destination drive appears.

8. Move the cursor to the save destination drive you want to select using the **arrow keys** or **rotary knob**.

9. Press **ENTER**. The save destination drive is confirmed.

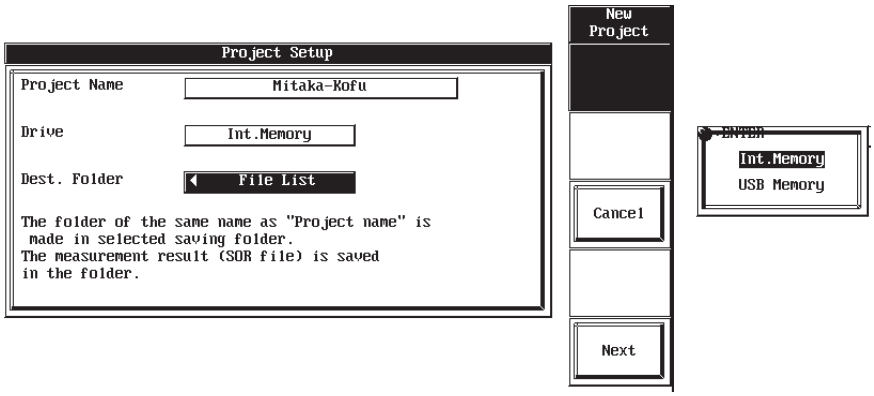
10. Move the cursor to Dest. Folder using the **arrow keys** or **rotary knob**.

11. Press **ENTER**. The File List screen for selecting the save destination folder appears.

12. Move the cursor to the save destination folder using the **arrow keys** or **rotary knob**.

13. Press the **OK** soft key or **ESC key**. The save destination folder is confirmed. And the File List screen closes.

14. Press **Next**. A screen for setting the fiber information appears.



Note

- The entered project name will be used for the folder name in which the measured results file name and measured results file are saved.
- A folder (with the same name as the project) for saving project files (*.mpj) and measured results is created in the specified folder.
- If you do not specify a destination folder, the save destination will be the folder, "folder nameMPJ."
- The following characters cannot be used in project names.
  \, /, : , *, ?, “, <, >, |
- The following cannot be used for project names.
  AUX, CON, PRN, NUL, CLOCK, CLOCK$, LPT0, LPT1, LPT2, LPT3, LPT4, LPT5, LPT6, LPT7, LPT8, LPT9, COM0, COM1, COM2, COM3, COM4, COM5, COM6, COM7, COM8, COM9
- You can enter the project name using up to 19 characters.

Specifying the Cores to be Measured

Enter a range of multicore fiber numbers using the measurement start number and number of cores to be measured.

- **Measurement start number setting**

  15. Continuing on from step 14, move the cursor to Start NO. using the **arrow keys** or **rotary knob**.

  16. Press **ENTER**. The screen for setting the start number appears.

  17. Turn the **arrow keys** or **rotary knob** to set the start number.

  18. Press **ENTER**. The start number is confirmed.

- **Number of measured cores setting**

  19. Move the cursor to NumOfFibers using the **arrow keys** or **rotary knob**.

  20. Press **ENTER**. The screen for setting the number of measured cores appears.

  21. Turn the **arrow keys** or **rotary knob** to set the number of measured cores.

  22. Press **ENTER**. The number of measured cores is confirmed.

- **Setting the ID Number for the Tape Fiber**

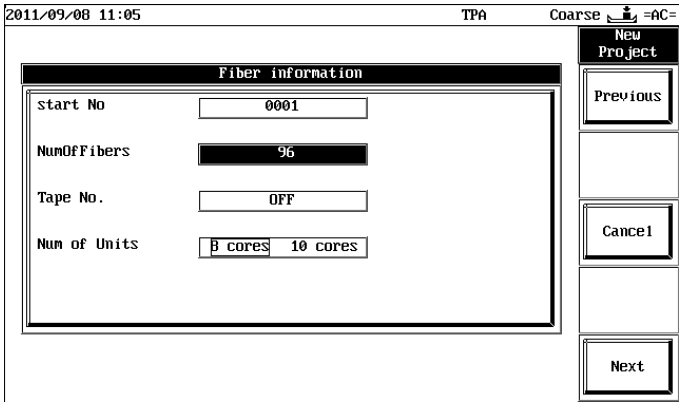
  23. Move the cursor to Tape NO. using the **arrow keys** or **rotary knob**.

  24. Press **ENTER**. The screen for selecting the ID number appears.

  25. Move the cursor to the ID number you want to select using the **arrow keys** or **rotary knob**.

  26. Press **ENTER**. The ID number is confirmed.

  27. Press **Next**. A screen for setting the measurement wavelength appears.



- **Setting the Number of Cores per Unit**

  28. Move the cursor to Num of Units using the **arrow keys** or the **rotary knob**.

  29. Press **ENTER** to move the cursor to 8 cores or 10 cores.

Note

The allowable setting ranges for the multicore fiber measurement start number and number of measured cores are as follows.

- Firmware versions 3.01 and later
  When tape ID is OFF: Start number = 0001 to 9999; no. of cores = 10 to 100
  When tape ID is not OFF: Start number = 0001 to 9999; no. of cores = 1 to 50
- Firmware versions other than those listed above
  When tape ID is OFF: Start number = 0001 to 9992; no. of cores = 8 to 96
  When tape ID is not OFF: Start number = 0001 to 9999; no. of cores = 1 to 48

If you will set the number of cores to 97 or higher, first set Num of Units to 10 cores.

Setting the Measurement wavelengths

Specify at which wavelength to measure the fiber under test.
The specified wavelength is used for measurement of all cores.
If two wavelengths (such as 1310 nm, 1550 nm) are selected, each core can be measured at each of the two wavelengths (multiwavelength measurement).

30. Continuing on from step 27, move the cursor to wavelength 1 using the **arrow keys** or **rotary knob**.

31. Press **ENTER**. The screen for setting the measurement wavelength appears.

32. Move the cursor to the wavelength you want to select using the **arrow keys** or **rotary knob**.

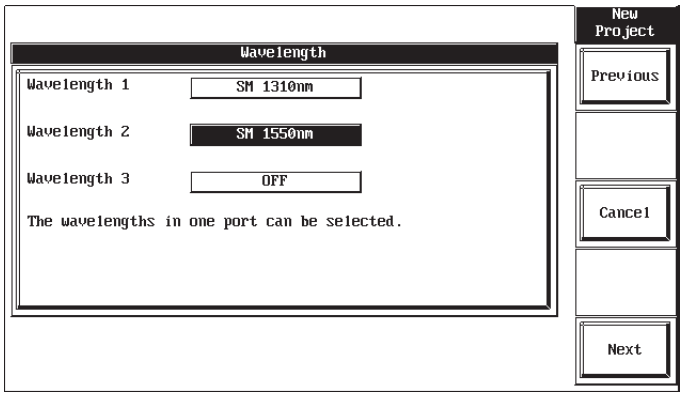
33. Press **ENTER**. The measurement wavelength is confirmed.

Multiwavelength Measurement

34. Continuing on from step 31, move the cursor to wavelength 2 using the **arrow keys** or **rotary knob**.

35. Next, perform the same procedure as with wavelength 1.

36. Press the **Next** soft key. The file setting screen is displayed.

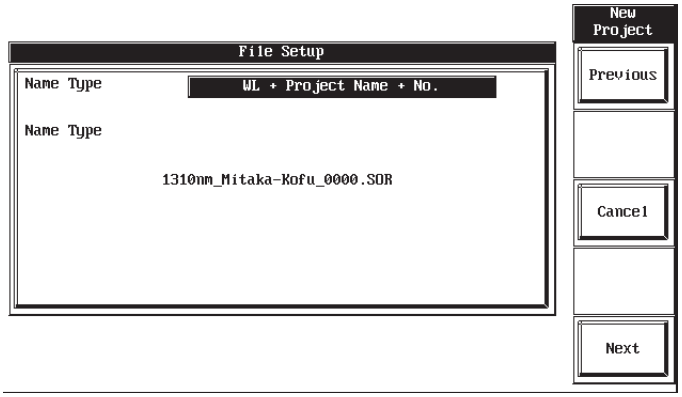


Selecting the Save File Name Format

37. Continuing on from step 34, Press **ENTER**. A screen for selecting the file name type appears.

38. Move the cursor to file name type you want to select using the **arrow keys** or the **rotary knob**.

39. Press **ENTER**. The file name type is confirmed.



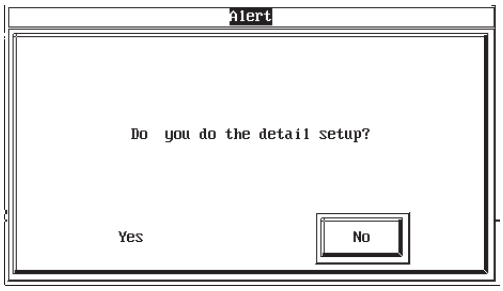
Note

The project name defined in the project settings is used for the project name portion of the file name.

Setting Measurement Conditions

You can set the distance range, pulse width, attenuation, sampling interval, and other parameters.

40. Continuing on from step 37, press the **Next** soft key. A screen for selecting detailed measurement conditions is displayed.

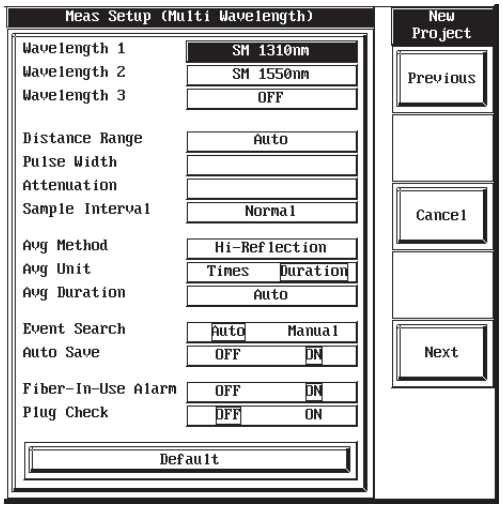


When Entering Detailed Measurement Conditions

41. Move the cursor to Yes using the **arrow keys** or **rotary knob**. A screen for selecting detailed measurement conditions is displayed.

42. Press **ENTER**. The measurement setting (multiwavelength) screen is displayed.

Perform the procedure described in section 6.3, “Setting the Multi Wavelength Measurement Conditions.”

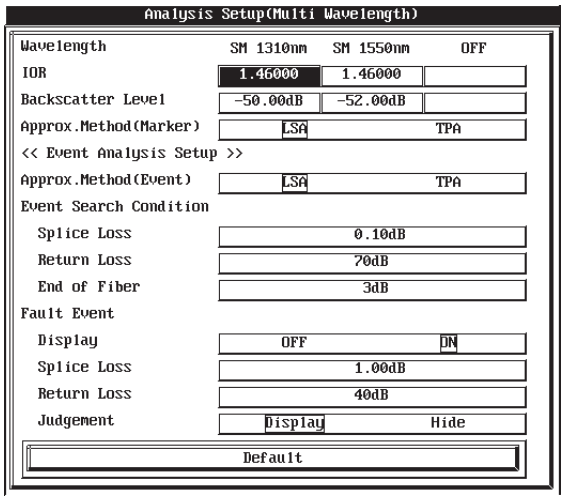


Note

- For multiwavelength measurement, set the measurement wavelength for wavelength 2 and wavelength 3. Only wavelengths emitted from the same port can be selected.
- When automatic file saving is ON, the instrument returns to the main view screen after measurement is finished. When OFF, you can continue on to analysis after measurement.

43. Press the **Next** soft key. The analysis setting (multiwavelength) screen is displayed.

Perform the procedure described in section 6.4, “Setting the Multi Wavelength Analysis Conditions.”



44. Press the **Next** soft key. The information list screen for the project to create appears.

When Not Entering Detailed Measurement Conditions

45. Confirm that the cursor is on “No,” then press **ENTER**. The information list screen for the project to create appears.

Note

The settings used when not entering detailed settings are as follows.

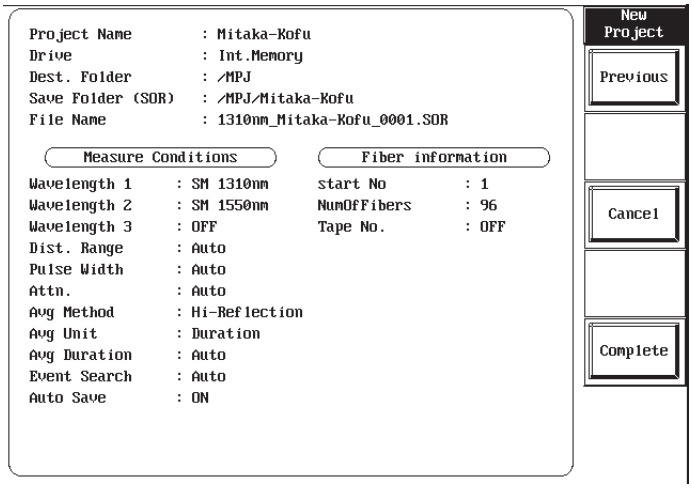
Distance range: Auto, Pulse width: Auto, Attenuation: Auto, Avg Method: Hi-Reflection, Avg Unit: Duration, Avg Duration: Auto, Event Search: Auto, Auto Save: ON, Plug Check: OFF, Fiber-In-Use Alarm: ON

Confirming the Settings

45. Check the settings in the project information list screen.

46. To change the measurement conditions, press the **Previous** soft key. The instrument returns to the measurement conditions setting screen.

Example project information list screen

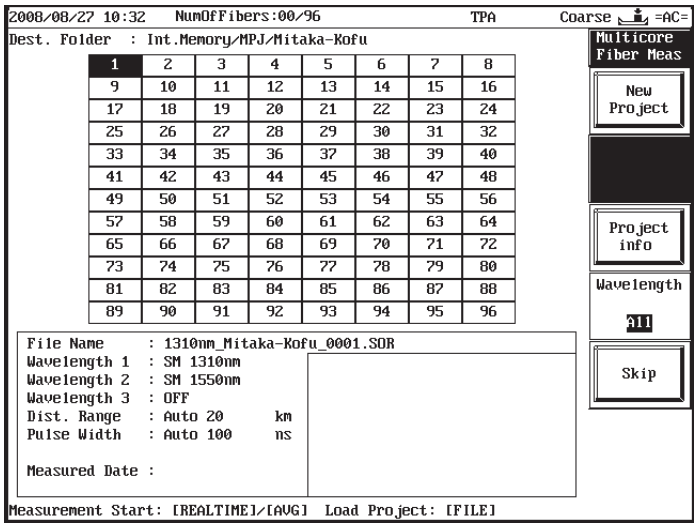


Finishing Creation of a Project

47. Press the **Complete** soft key. The project is created, and the project files are saved. The main view is displayed.

Preparations to start multi core fiber measurement are completed.

Example of the main view display screen

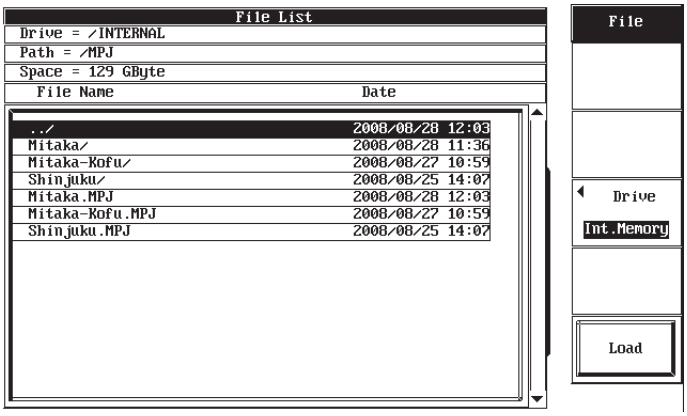


Loading the Previous Project File

1. Press the **Next 1/2** soft key. (when the visible light source option is installed)
2. Press the **Multicore Fiber Meas** soft key. The menu for multicore fiber measurement appears.
3. Press the **Previous Project** soft key. The main view screen of the most recently used project is displayed.

Loading the Project File

1. Press the **Next 1/2** soft key. (when the visible light source option is installed)
2. Press the **Multicore Fiber Meas** soft key. The menu for multicore fiber measurement appears.
3. Press **FILE**. The file list screen appears.
4. Move the cursor to the project file (*.mpj) you want to load using the **arrow keys** or the **rotary knob**.
5. Press the **Load** soft key. The main view screen in the project file appears.



Note

All project files created by AQ7270 series models can be loaded by AQ7270/AQ7275s that are using firmware versions 3.01 and later.

However, if not even a single core can be measured due to the conditions that have been set in a project file, it will not be possible to load the project file.

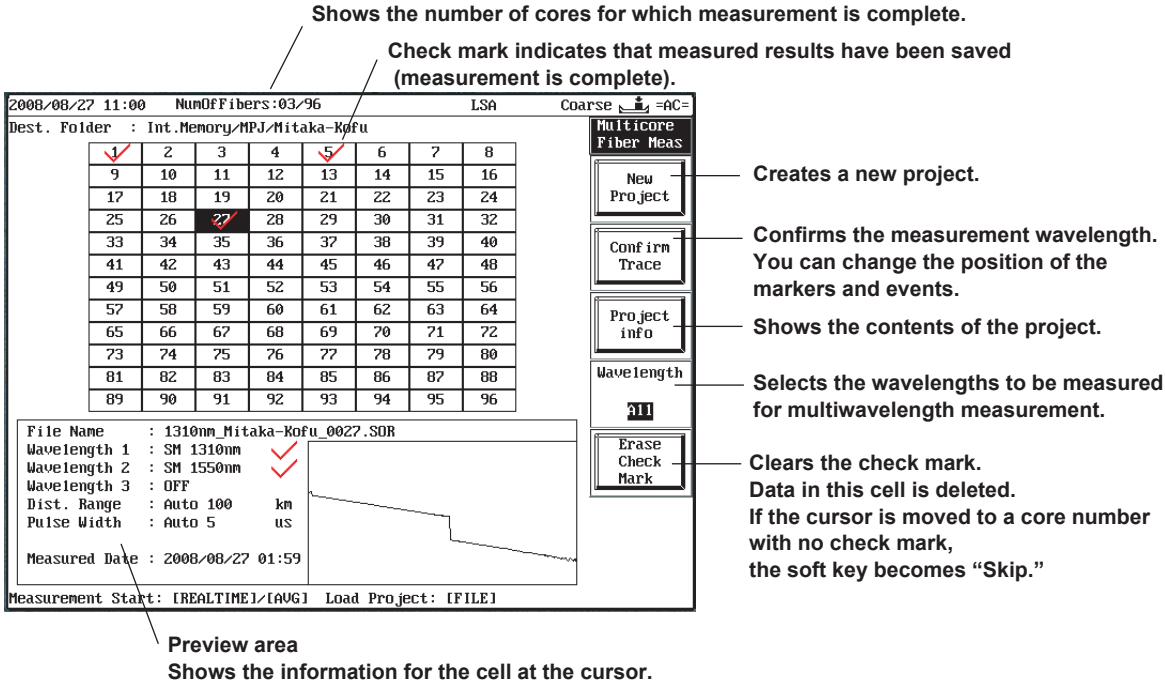
In this situation, an error message will be displayed.

AQ7270/AQ7275s that are using firmware versions other than those listed above cannot load project files that have been made on models that are different from their own model.

Managing Multicore Fibers in the Main View

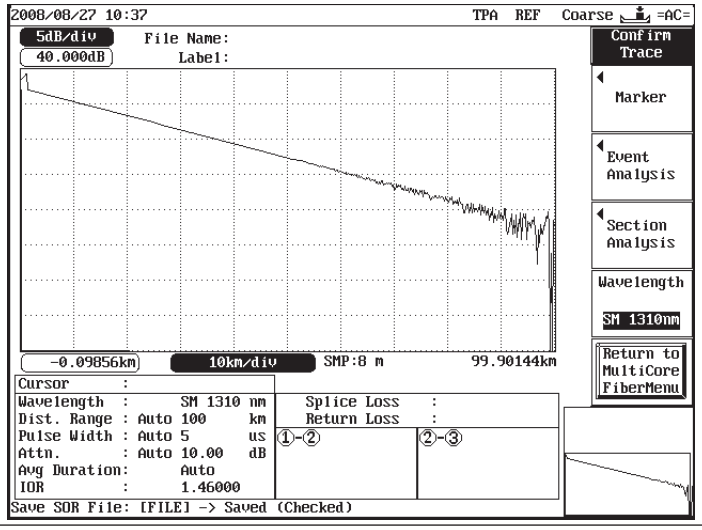
The main view screen is where the contents of a project are listed.
You can easily determine whether or not a core has been measured and saved by the presence or absence of a check mark with the cell number.
Because the measurement wavelength of each core is shown, it is not necessary to open files to check the wavelength. It is also not necessary to rename files.

Main View Screen



Real Time Measurement

1. Move the cursor to the cell of the core number in the main view screen you wish to measure using the **arrow keys** or **rotary knob**.
2. Press the **Wavelength** soft key and select the measurement wavelength. Press the soft key repeatedly to scroll through different measurement wavelengths.
3. Press the **REAL TIME** key. Measurement of wavelength 1 begins. The laser light emission message appears on screen, and the measurement wavelength is displayed.
4. Press the **REAL TIME** key. Measurement of wavelength 1 finishes.



Note

Automatic saving is not available for real time measurement. Be sure to save data manually after measurement.

With multiwavelength measurement, only wavelength 1 is measured even if you select “All” for the measurement wavelength. You must switch wavelengths in order to measure wavelength 2 and subsequent wavelengths.

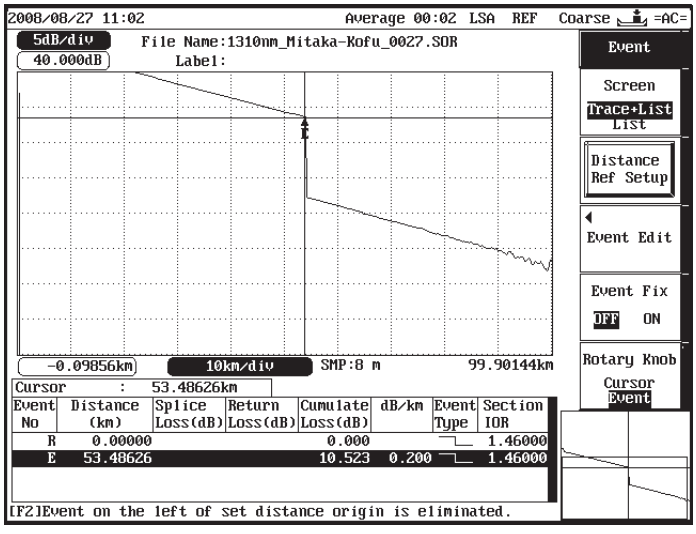
Averaging Measurement

1. Move the cursor to the cell of the core number in the main view screen you wish to measure using the **arrow keys** or **rotary knob**.
2. Press the **Wavelength** soft key and select the measurement wavelength. Press the soft key repeatedly to scroll through different measurement wavelengths.
3. Press the **AVE** key. Averaged measurement executes.

- **When Selecting Auto Save ON in the Project Measurement Conditions**
  Measured results are saved automatically after measurement is finished. The main view screen is displayed, and a check mark is added to the cell number at the cursor.

- **When Selecting Auto Save OFF in the Project Measurement Conditions**
  The event analysis screen is displayed after measurement is finished. Next, you can perform analysis. Measured results are automatically saved.
  For multiwavelength measurement, the event analysis screen for the most recently measured wavelength is displayed.

Example of screen after measurement is complete (when event detection is set to Auto)



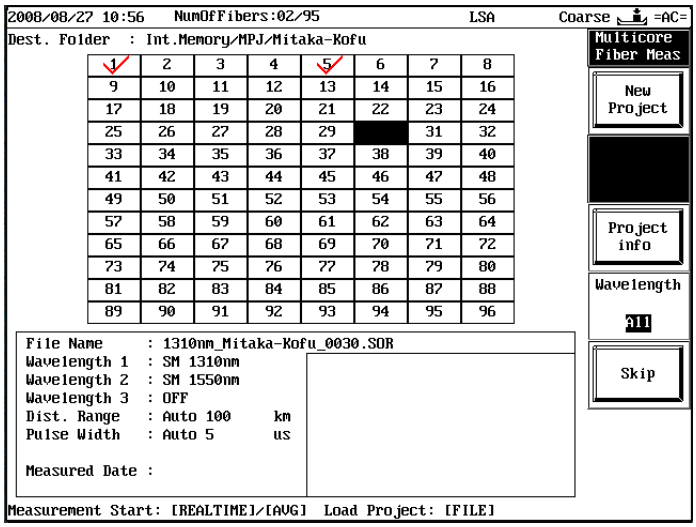
Note

- The OTDR measurement screen is displayed during measurement.
- As with normal OTDR mode, you can continue on from real time measurement to perform averaged measurement.
- You can perform multiwavelength measurement if wavelengths 2 and 3 are set in addition to wavelength 1 in the measurement conditions settings. If “All” is selected for the measurement wavelengths, measurement of multiple wavelengths is carried out for each core.
- If automatic file saving is not set, you can continue on to analysis after measurement.

Setting Unmeasured Core Numbers

This setting can be used if there are cores that must not be measured.

1. Move the cursor to the cell of the core number in the main view screen you wish to not measure using the **arrow keys** or **rotary knob**.
2. Press the **Skip** soft key. The cell display changes, and the core number disappears.
3. If you press the **Skip** soft key again, the setting is cleared, and the core number is displayed.



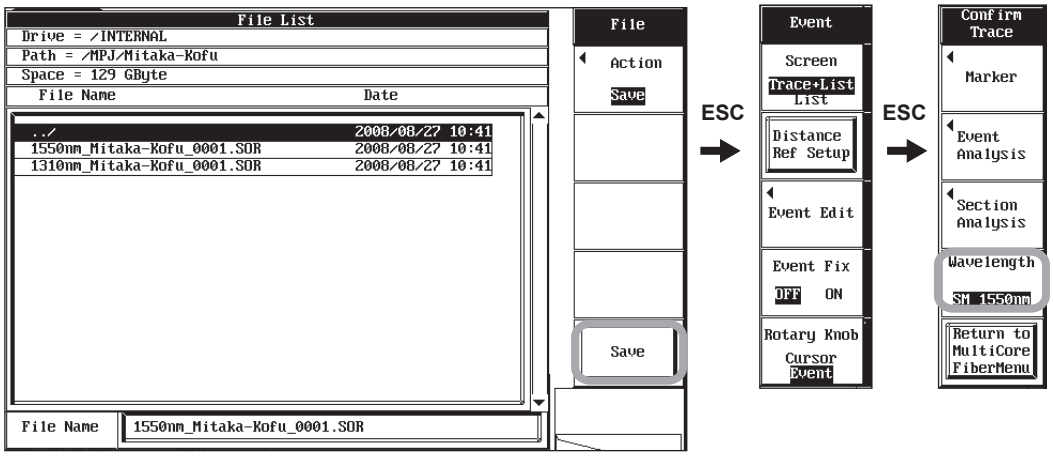
Saving Measured Results

Perform the following procedure in the project measurement condition settings if you selected OFF for Auto Save.

1. Press the **FILE** key. The file list is displayed.
2. Press the **Save** soft key. The measured results are saved.

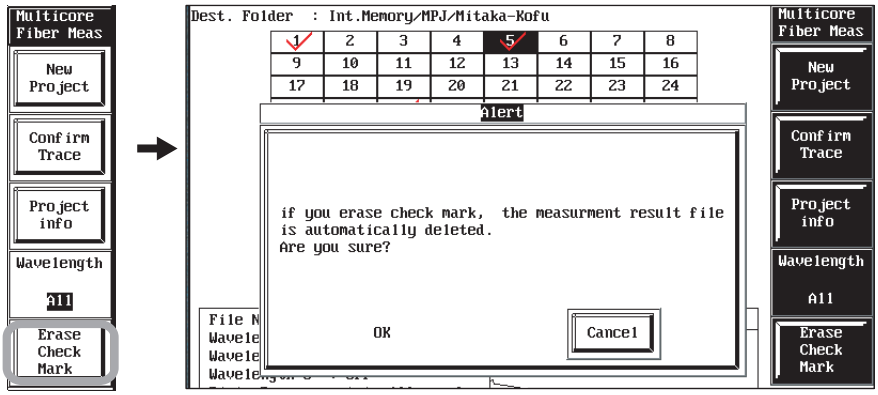
Multiwavelength Measurement

3. Press the **ESC** key (when event detection is set to Auto). The event soft key menu is displayed.
4. Press the **ESC** key. The waveform confirmation soft key menu is displayed.
5. Press the **Wavelength** soft key. The soft key menu wavelength display switches.
6. Press the **FILE** key. The file list is displayed.
7. Press the **Save** soft key. The measured results for the new wavelength are saved.



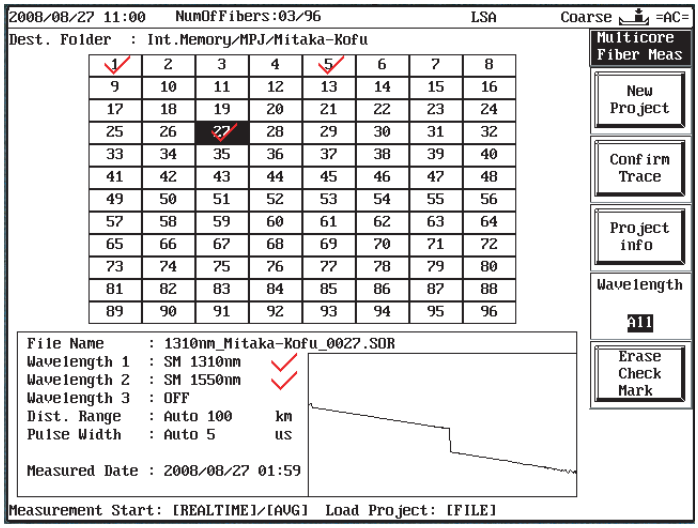
Deleting Measured Results

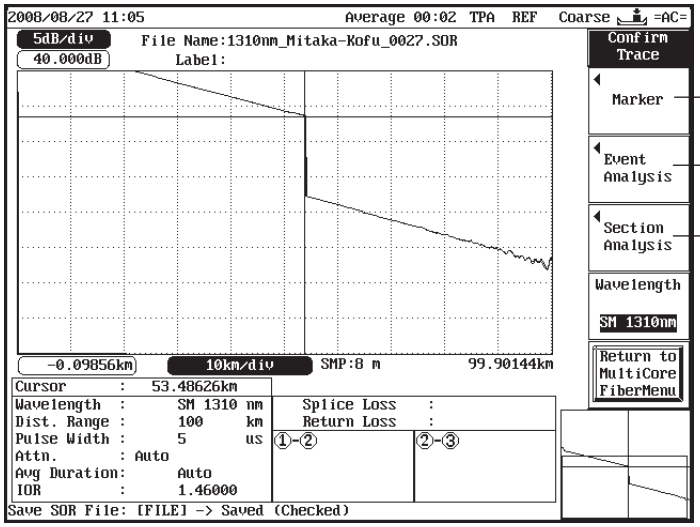
1. Move the cursor to the cell of the core number in the main view screen you wish to delete using the **arrow keys** or **rotary knob**.
2. Press the **Erase Check Mark** soft key. A deletion confirmation message appears.
3. Move the cursor to OK using the **arrow keys** or **rotary knob**.
4. Press **ENTER**. The measured results files are cleared, and the cell's check mark disappears.



Checking and Analyzing Waveforms

1. Move the cursor to the cell of the core number in the main view screen with the check mark using the **arrow keys** or **rotary knob**. The measurement conditions, measurement date/time, and measured result waveforms of the specified core number are displayed in the preview area at the bottom of the screen.
2. Press the **Confirm Trace** soft key. The waveform of the core number specified by the cursor is displayed.
3. Press the **Wavelength** soft key. The waveform of another measurement wavelength is displayed.
4. Press the soft key of the item you wish to analyze. The analysis soft key menu for the selected item appears.





For the procedure, see section 10.1.

For the procedure, see section 12.2.

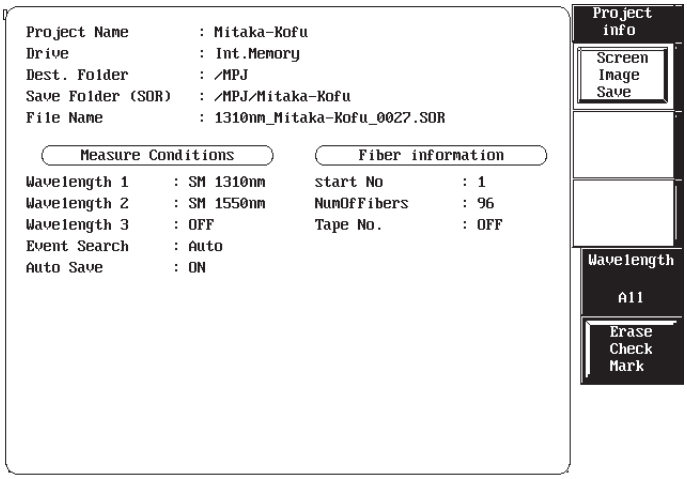
For the procedure, see section 13.4.

Saving Analysis Results

5. Press the **FILE** key. The file list is displayed.
6. Press the **Save** soft key. The analysis results are saved, and the project file is overwritten.

Displaying and Saving Project Information

1. Press the **Project info** soft key in the main view screen. The contents of the project are displayed.
2. Press the **Screen Image Save** soft key. The screen image is saved to the root folder of the internal memory with the file name MultiFiberProjectInfo.BMP.

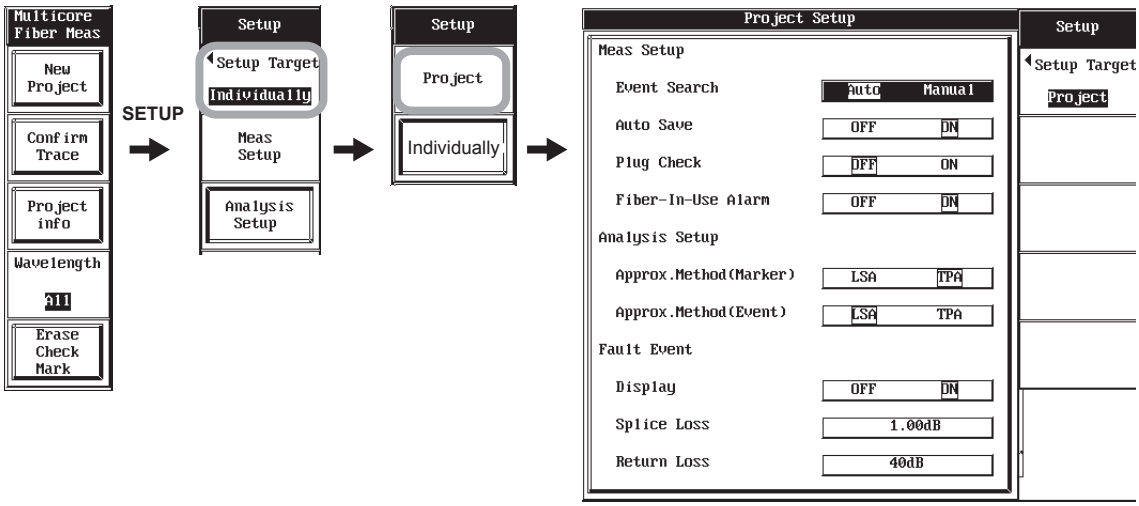


Changing Project Settings

You can change settings for the project as a whole or for individual cores.

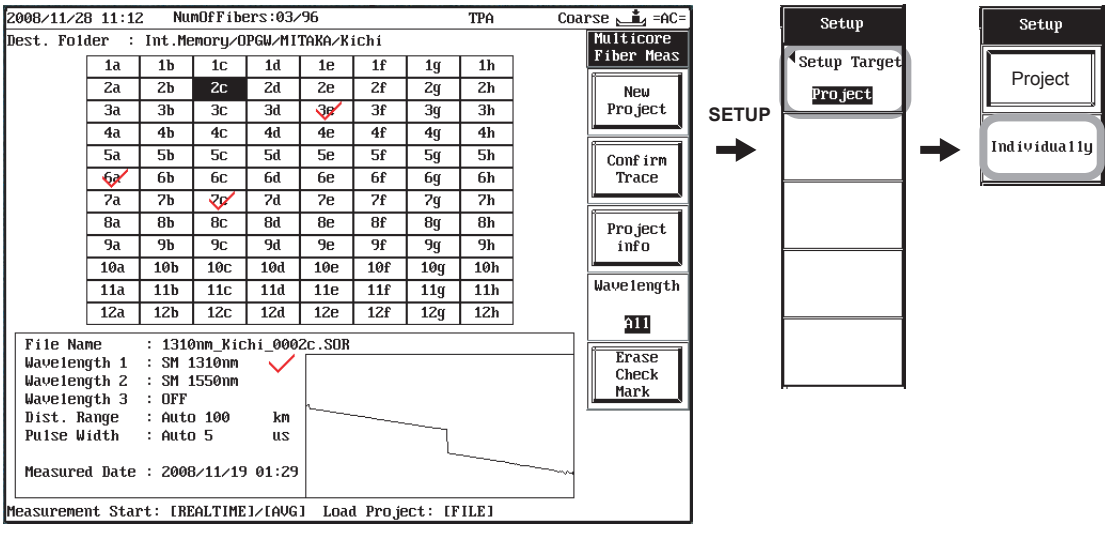
Changing Global Project Settings

1. With the main view screen for Multicore Fiber Measurement displayed, press **SETUP**.
2. Press the **Setup Target** soft key.
3. Press the **Project** soft key.
4. Using the **arrow keys** or the **rotary knob**, move the cursor to the item you wish to change.
5. Perform the procedures described below in either 6.1, “Setting the Measurement Conditions,” or 6.2, “Setting the Analysis Conditions.”



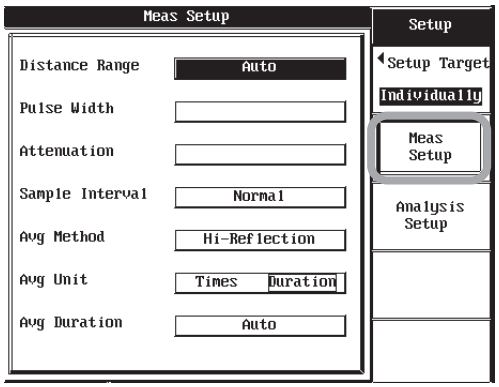
Changing Individual Core Settings

1. Using the **arrow keys** or the **rotary knob**, move the cursor to the cell of the core number you wish to change in the main view screen.
2. Press **SETUP**.
3. Press the **Setup Target** soft key.
4. Press the **Individually** soft key.



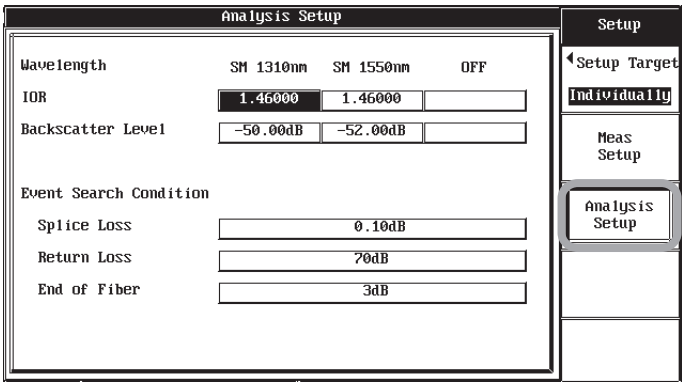
When Changing the Measurement Conditions

5. Press the **Meas Setup** soft key.
6. Perform the procedures described below in 6.1, “Setting the Measurement Conditions,”



When Changing the Analysis Conditions

7. Press the **Analysis Setup** soft key.
8. Perform the procedures described below in 6.2, “Setting the Analysis Conditions.”



Note

Settings of core numbers that have already been measured cannot be changed. Delete the measured results before changing the settings.

Explanation

Project

A project is a collection of items used for measurement of multicore fibers. It includes measurement conditions, the number of measured fiber cores, and the save destination for measured results.

Measurement Type

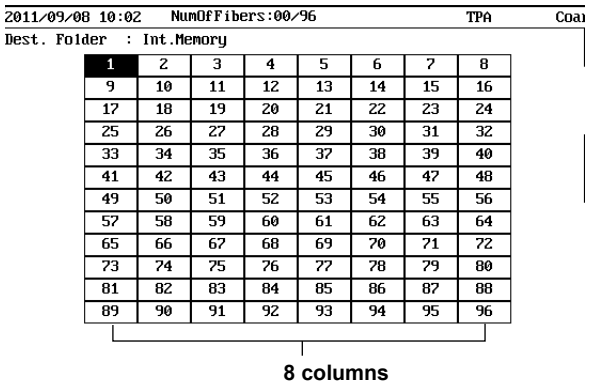
- **Single wavelength measurement**
  Measurement in which only 1 wavelength is specified.

- **Multiwavelength measurement**
  Measurement in which wavelength 2 and/or wavelength 3 are specified in addition to wavelength 1.

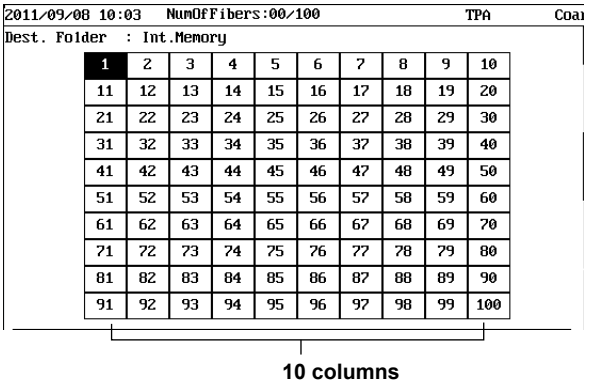
Number of Cores per Unit

You can select the number of columns of cells (8 cores or 10 cores) that are displayed on the main view screen.

8 cores



10 cores

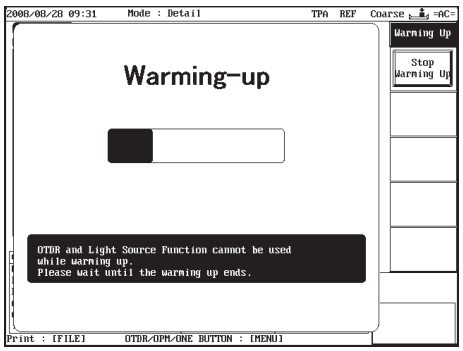


7.6 Warm-up Measurement

If the internal temperature of the instrument drops below 0 (outside of the operating temperature) when measurement is started, measurement automatically stops and the warm-up is executed.
When the internal temperature falls within the operating temperature range, the warm-up finishes.

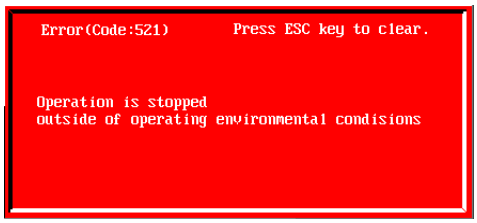
If the Internal Temperature is 0 or Less When Measurement Starts

Measurement cannot be performed. The following screen is displayed, and the warm-up begins.



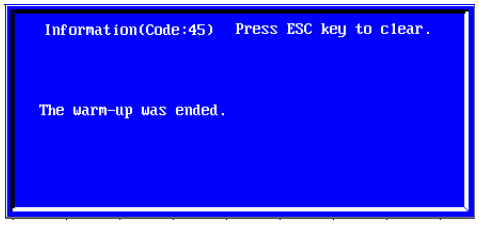
If the Internal Temperature is 0 or Less during Measurement

Measurement stops because measurement specifications are no longer met. The following message screen appears.



When Warm-up Measurement Finishes

The following message screen appears.



Explanation

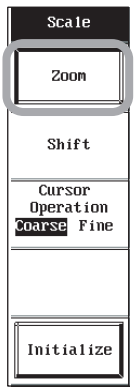
Purpose and Necessity of Warm-up Measurement

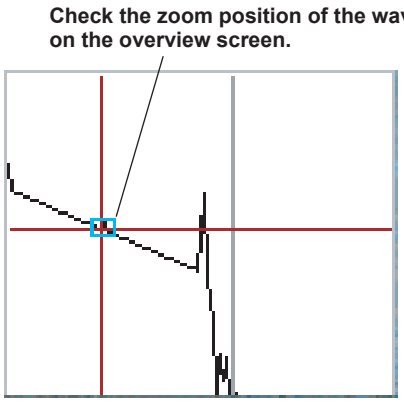
If the instrument's internal temperature falls below its operating temperature range due to a low measuring environment temperature, a warm-up measurement is performed to avoid damage to the instrument and to ensure that the measurement specifications are satisfied.
Normal measurement can proceed when the warm-up measurement is complete. Start measurement again. If the temperature is still 0 or lower after the warm-up measurement, warm-up measurement starts again.
The screen saver does not function during warm-up measurement. If the battery becomes low during warm-up measurement, a warning message is displayed. If the battery runs too low, warm-up measurement is cancelled and the instrument shuts down.

8.1 Zooming the Display

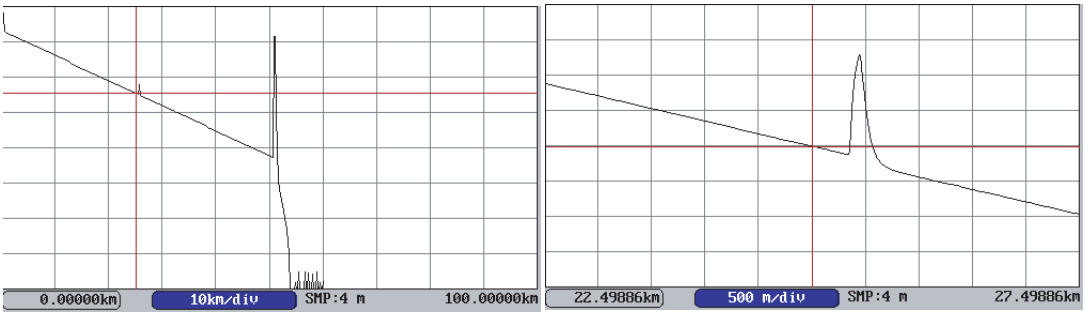
Procedure

1. Press **SCALE**. A soft key menu for the scale appears.
2. Turn the **rotary knob** to move the cursor to the waveform you want to zoom.
3. Press the **Zoom** soft key.
4. Press the **arrow keys**. The waveform is zoomed around the cursor.





Overview screen



Normal scale　　Zoom scale

Explanation

↓: The waveform is expanded vertically.
↑: The waveform is reduced vertically.
←: The waveform is expanded horizontally.
→: The waveform is reduced horizontally.

You can check the location of the current display in the overview screen at the lower right of the display.

8.2 Moving the Waveform

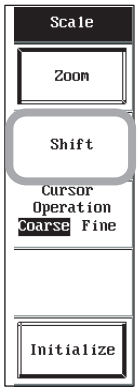
Procedure

Scrolling the Screen

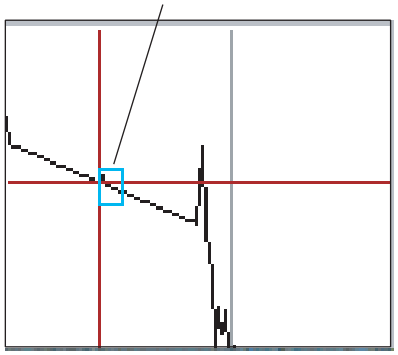
1. Press **SCALE**. A soft key menu for the scale appears.
2. Press the **Shift** soft key.
3. Press the **arrow keys**. The waveform moves.

- **Selecting the Cursor Movement Interval**
  You can select whether to move the cursor at fine or coarse intervals.

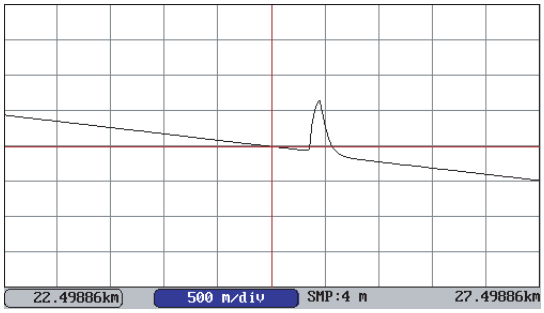
4. Press the **Cursor Operation** soft key to select Coarse or Fine.



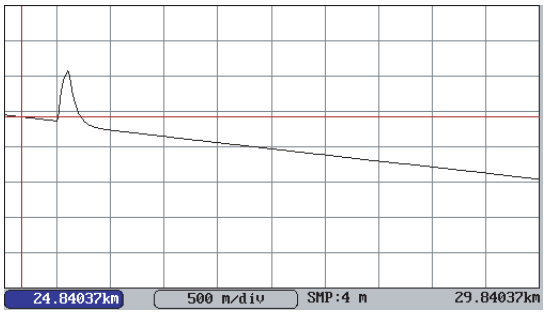
The waveform display area (the section enclosed in a square) within the entire screen moves.



Overview screen



Before moving the waveform display area



Move the waveform display area to the right

Note

- You can also select the cursor movement interval by pressing the rotary knob.
- The shift interval depends on the cursor movement interval setting.

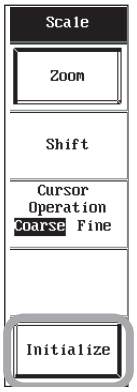
Explanation

↓: Moves the waveform display area down.
↑: Moves the waveform display area up.
←: Moves the waveform display area to the left.
→: Moves the waveform display area to the right.

8.3 Initializing the Waveform Display

Procedure

1. Press **SCALE**. A soft key menu for the scale appears.
2. Press the **Initialize** soft key. The waveform display returns to the original size and position.



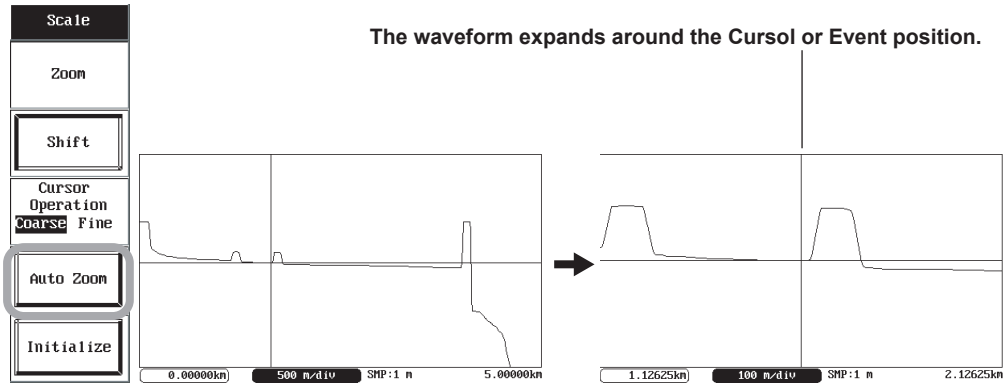
Note

In high resolution measurement, the scale within the limited range is initialized.

8.4 Auto Zoom the Waveform Display

Procedure

1. Press **SCALE**. A soft key menu for the scale appears.
2. Press the **Auto Zoom** soft key. The waveform display is expanded at a given ratio.



Explanation

Auto zoom expands the display in the following two ways.

- Zoom around the cursol
  The display expands around the cursol in the waveform display screen.
- Zoom around the event
  If an event is detected in the event analysis, the selected event is displayed expanded.

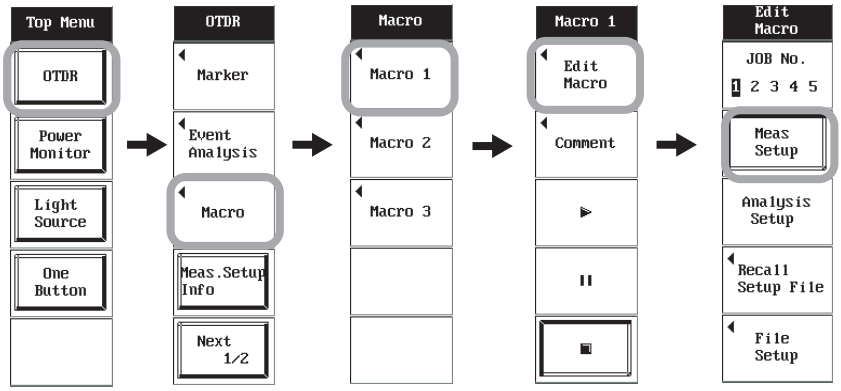
9.1 Creating the Measurement Conditions (Defining the Macro Conditions)

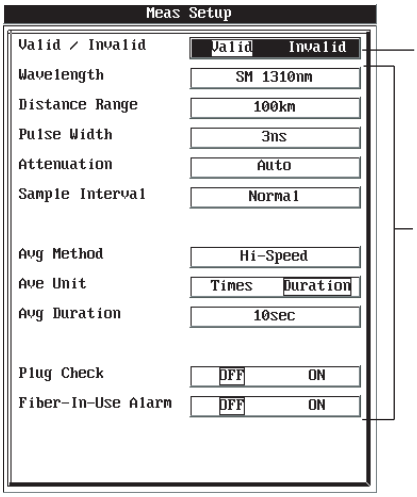
Procedure

Define the macro before performing one-button measurement.

Displaying the Macro Definition Screen

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press the **Macro** soft key. The soft key menu for Macro 1 to 3 appears.
3. Press the soft key corresponding to the macro you want to create from Macro 1 to 3. The soft key menu for executing the macro appears.
4. Press the **Edit Macro** soft key. A soft key menu for defining the macro appears.





Enable/disable the macro definition (see page 9-2 for the procedure)

See section 6.1 for the procedure

Creating the First Macro

5. Press the **JOB No.** soft key to move the cursor to 1.

- **Setting the Measurement Conditions**

6. Press the **Meas Setup** soft key. The Meas Setup screen appears.
7. Move the cursor to Valid or Invalid using the **arrow keys** or the **rotary knob**.
8. Press **ENTER**. The cursor moves to Valid or Invalid by Valid/Invalid.

- **Setting the Analysis Conditions**

9. Press the **Analysis Setup** soft key. The Analysis Setup screen appears.
10. Move the cursor to Valid or Invalid using the **arrow keys** or the **rotary knob**.
11. Press **ENTER**. The cursor switches to Valid or Invalid by Valid/Invalid.

Creating Subsequent Macros

12. Press the **JOB No.** soft key to move the cursor to a number greater than 1.
13. Repeat steps 6 to 11.

Note

For the settings other than Valid and Invalid, see section 6.1.

Adding a Comment to the Defined Macro

Add a comment to identify the macro when a list of macros that you want to execute using the one-button function is displayed. You can view the comment in the properties of the one-button measurement screen.

4. Press the **Comment** soft key. The character input screen appears.
5. Enter a comment for identification.

Note

For details on entering characters, see section 18.1.

Explanation

For Macro 1 to 3, you can define up to 5 macros in each macro definition. The macros are executed in order from 1. Macros set to invalid in the definition are not executed.

9.2 Saving the Macro Measurement Results

Procedure

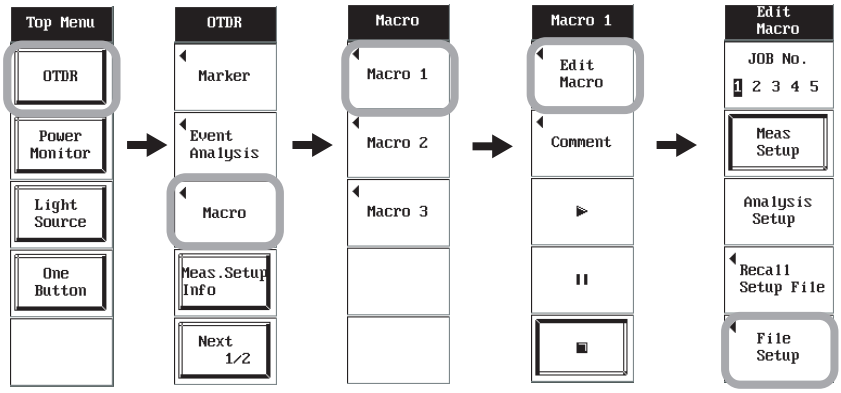
Set the method for saving the waveforms measured by executing macros. A folder indicating the date and time is created automatically in the MACRO folder in the internal memory, and the waveforms are stored in the folder.

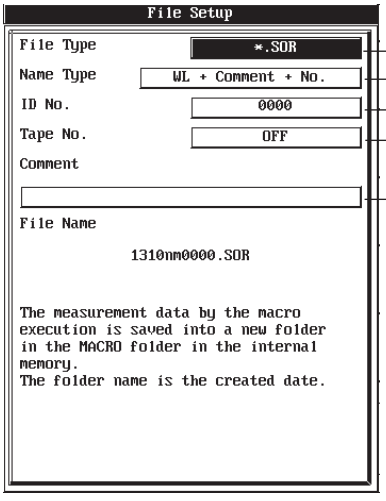
Displaying the Macro Definition Screen

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press the **Macro** soft key. The soft key menu for Macro 1 to 3 appears.
3. Press the soft key corresponding to the macro you want to create from Macro 1 to 3. The soft key menu for executing the macro appears.
4. Press the **Edit Macro** soft key. A soft key menu for defining the macro appears.

Storage Format of Measurement Conditions

5. Press the **File Setup** soft key. The File Setup screen appears.





Select the file type (see page 9-4 for the procedure)
Select the file name type (see page 9-5 for the procedure)
Enter the number to be attached to the file name (see page 9-6 for the procedure)
Select the ID number for the tape fiber, etc. (see page 9-7 for the procedure)
Enter the comment section of the file name (see page 9-8 for the procedure)

- **Selecting the Storage Data Type**

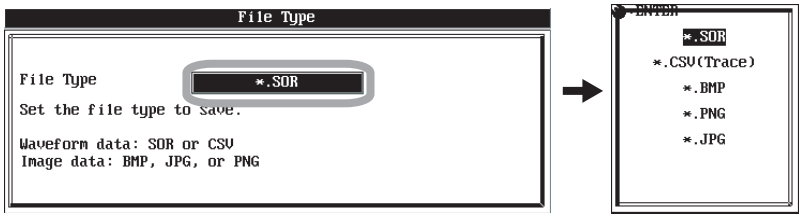
  6. Move the cursor to File Type using the **arrow keys** or the **rotary knob**.

  7. Press **ENTER**. A wizard screen for selecting the file type appears.

  8. Press **ENTER**. A screen for selecting the file type appears.

  9. Move the cursor to file type you want to select using the **arrow keys** or the **rotary knob**.

  10. Press **ENTER**. The file type is confirmed.



- **Selecting the File Name Type**

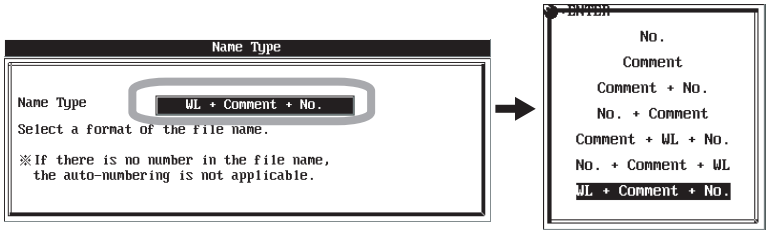
  11. Move the cursor to Name Type using the **arrow keys** or the **rotary knob**.

  12. Press **ENTER**. A wizard screen for selecting the file name type appears.

  13. Press **ENTER**. A screen for selecting the file name type appears.

  14. Move the cursor to file name type you want to select using the **arrow keys** or the **rotary knob**.

  15. Press **ENTER**. The file name type is confirmed.



Note

Auto numbering is not performed for types that does not include a number.

- **Setting the File ID Number**

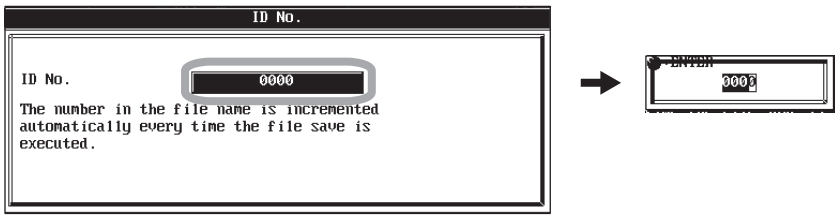
  16. Move the cursor to ID No. using the **arrow keys** or the **rotary knob**.

  17. Press **ENTER**. A wizard screen for setting the ID number appears.

  18. Press **ENTER**. The screen for setting the ID number appears.

  19. Turn the **rotary knob** to set the ID number.

  20. Press **ENTER**. The ID number is confirmed.



Note

The number is incremented each time a file is saved.

- **Setting the ID Number for the Tape Fiber and the Like**

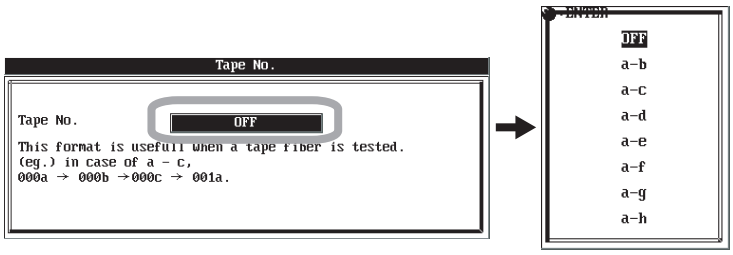
  21. Move the cursor to Tape ID using the **arrow keys** or the **rotary knob**.

  22. Press **ENTER**. A wizard screen for selecting the tape ID appears.

  23. Press **ENTER**. A screen for selecting the tape ID appears.

  24. Move the cursor to tape ID you want to select using the **arrow keys** or the **rotary knob**.

  25. Press **ENTER**. The tape ID is confirmed.



Note

Example if a-c is specified: 0000a → 0000b → 0000c → 0001a → 0001b → 0001c...

- **Attaching a Comment to the File Name**

  26. Move the cursor to Comment using the **arrow keys** or the **rotary knob**.

  27. Press **ENTER**. A wizard screen for entering the comment appears.

  28. Press **ENTER**. The character input screen for entering the comment appears.

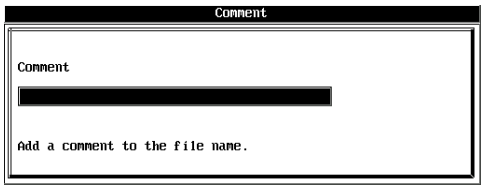
  29. Enter the comment using the **arrow keys**, **rotary knob** and **ENTER**.

  30. Press the **OK** soft key. The characters are confirmed.

  31. Press **ESC**. The wizard screen for entering the comment closes.

  32. Press **ESC**. The File Setup screen closes, and the Measurement Setup or Analysis Setup screen of the macro definition appears.

  33. Press **ESC**. The Measurement Setup or Analysis Setup screen closes, and the optical pulse measurement screen appears.



Note

For details on entering characters, see section 18.6.

9.3 Loading the Measurement Conditions

Procedure

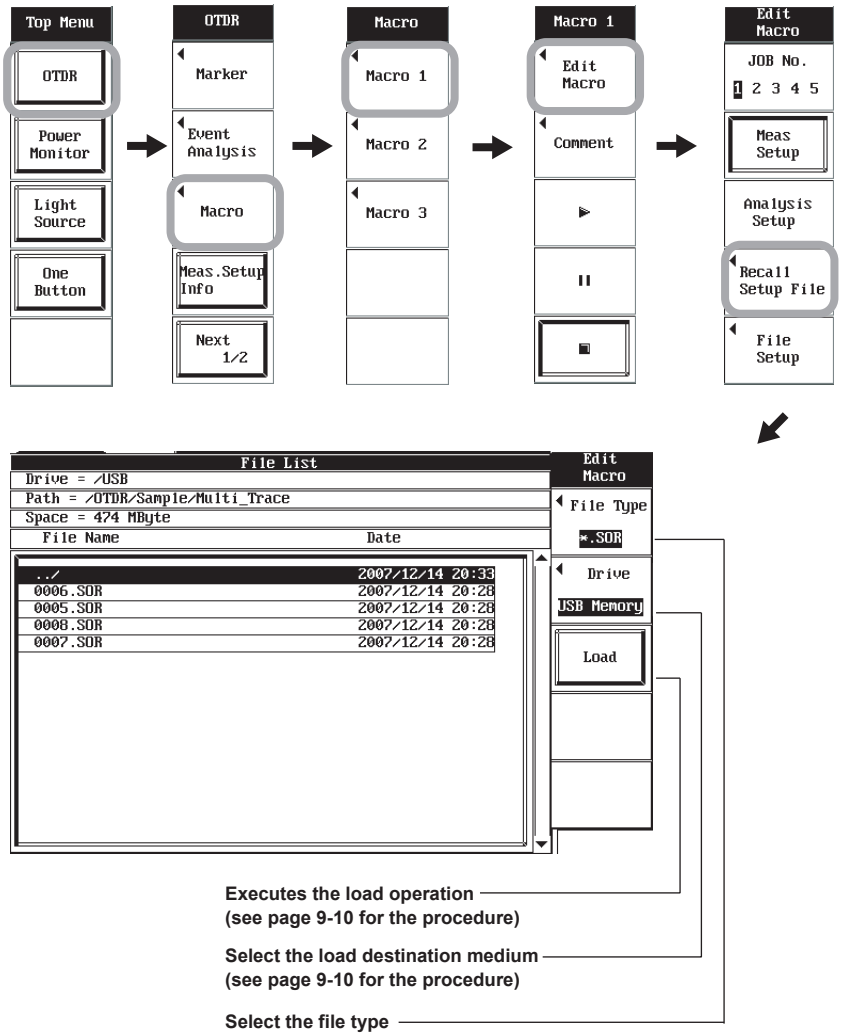
The settings can be reused to define macro conditions. You can reuse the settings by loading an existing measurement result.

Displaying the Macro Definition Screen

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press the **Macro** soft key. The soft key menu for Macro 1 to 3 appears.
3. Press the soft key corresponding to the macro you want to create from Macro 1 to 3. The soft key menu for executing the macro appears.
4. Press the **Edit Macro** soft key. A soft key menu for defining the macro appears.

Loading the Measurement Conditions

5. **JOB No.** soft key to move the cursor to any job number from 1 to 5.
6. Press the **Recall Setup File** soft key. A soft key menu for loading the conditions and a file list screen appear.

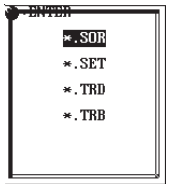


Selecting the File Type

7. Press the **File Type** soft key. A screen for selecting the file type appears.

8. Move the cursor to file type you want to select using the **arrow keys** or the **rotary knob**.

9. Press **ENTER**. The file type is confirmed.



Note

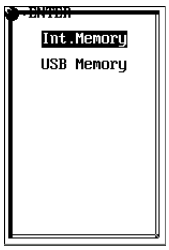
- If the loaded file contains information of the marker, cursor, display scale, and distance reference, those items are also loaded.
- For details on the file types, see section 18.1.

Selecting the Medium

10. Press the **Drive** soft key. A screen for selecting the load source drive appears.

11. Move the cursor to the load source drive you want to select using the **arrow keys** or the **rotary knob**.

12. Press **ENTER**. The load source drive is confirmed.



Loading a File

13. Move the cursor to the file you want to load using the **arrow keys** or the **rotary knob**.

14. Press the **Load** soft key. The file is loaded.

15. Press **ESC** to return to the soft key menu screen for the macro definition.

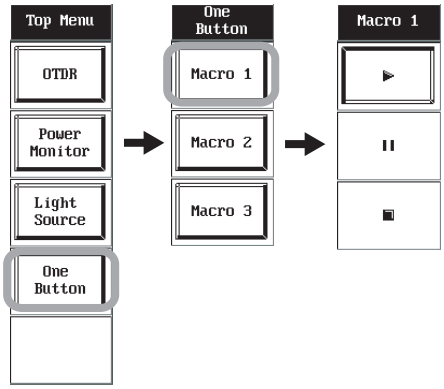
9.4 Executing the Macro

Procedure

There are two ways to execute a macro. One way is to execute a macro as a one-button measurement function when using the AQ7270/AQ7275. The other is to play the defined macro for verification.

One-Button Measurement

1. Press the **One Button** soft key. The macro execution screen appears.
2. Press the soft key corresponding to the macro you want to execute from Macro 1 to 3. The optical pulse measurement display appears, and the measurement starts. In addition, the soft key menu for executing the macro appears.



- **Pausing the Macro Execution**

3. Press the || soft key. The measurement pauses.

- **Starting the Macro Execution**

4. Press the ▶ soft key. The measurement starts or resumes.

- **Stopping the Macro Execution**

5. Press the ■ soft key. The measurement stops.

Note

- If you press the Pause soft key, the macro pauses when the job number currently in progress is completed (up to the saving of the measured results).
- If you press the Stop soft key, the measurement stops if the measurement is in progress. In this case, the measured results are not saved.

Checking the Macro Definition

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press the **Macro** soft key. The soft key menu for Macro 1 to 3 appears.
3. Press the soft key corresponding to the macro you want to check from Macro 1 to 3. The soft key menu for executing the macro appears.

- **Starting the Macro Execution**

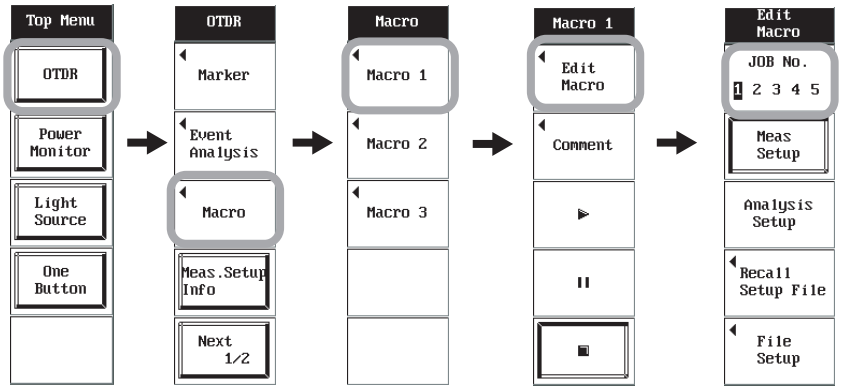
4. Press the ▶ soft key. The measurement starts or resumes.

- **Pausing the Macro Execution**

5. Press the || soft key. The measurement pauses.

- **Stopping the Macro Execution**

6. Press the ■ soft key. The measurement stops.



Note

- If you press the Pause soft key, the macro pauses when the job number currently in progress is completed (up to the saving of the measured results).
- If you press the Stop soft key, the measurement stops if the measurement is in progress. In this case, the measured results are not saved.

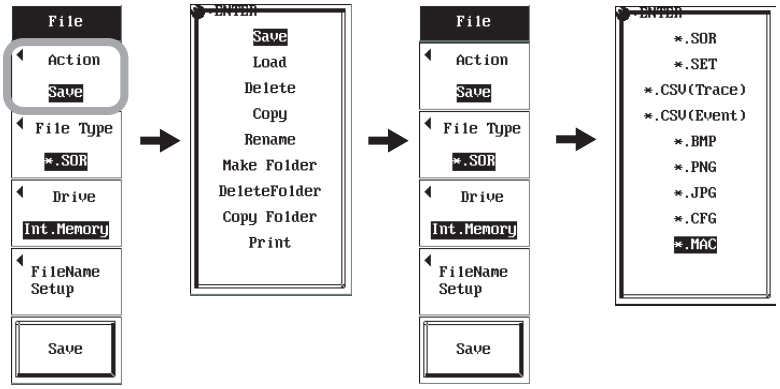
9.5 Saving/Loading Macro Conditions

You can save and load settings of macro operations 1 through 5 to a file. Other AQ7270/AQ7275's can run the macros by loading the saved macro definitions.

Saving

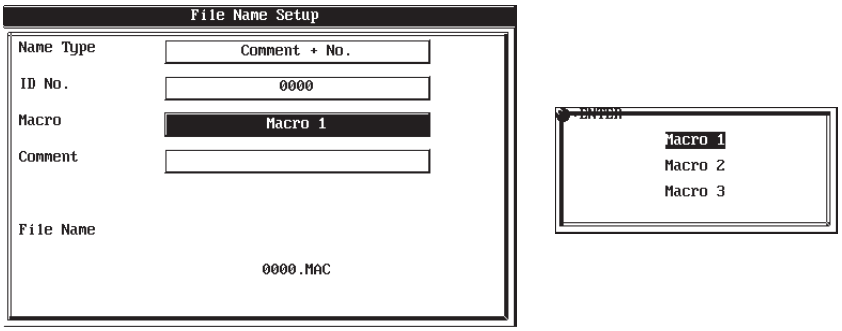
Saving the Produced Macro Definitions

1. Press **FILE**.
2. Press the **Action** soft key. The screen for operating the files appears.
3. Move the cursor to **Save** using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The soft key menu for saving appears.
5. Press the **File Type** soft key. A screen for selecting the file type appears.
6. Move the cursor to **MAC** using the **arrow keys** or the **rotary knob**.
7. Press **ENTER**. The file type is confirmed.



Selecting the Macro Number for Saving

8. Press the **File Name Setup** soft key.
9. Move the cursor to **Macro** using the **arrow keys** or the **rotary knob**.
10. Press **ENTER**. The screen for selecting the **Macro 1** to **3** appears.
11. Move the cursor to macro number you want to select using the **arrow keys** or the **rotary knob**.
12. Press **ENTER**. The macro number is confirmed.
13. Press the **Save** soft key.



Note

- For setting the macro conditions, see section 9.1.
- For details on setting file names, see section 18.1.

Loading

1. Press **FILE**.
2. Press the **Action** soft key. The screen for operating the files appears.
3. Move the cursor to Load using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The soft key menu for loading appears.

Selecting the File Type

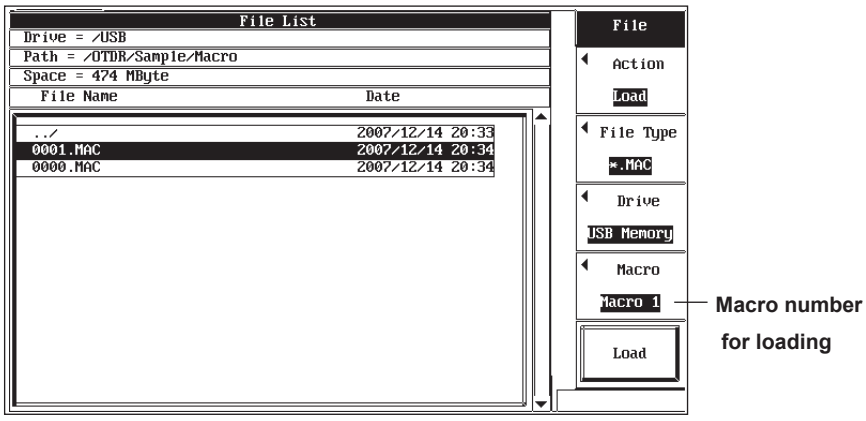
5. Press the **File Type** soft key. A screen for selecting the file type appears.
6. Move the cursor to **MAC** using the **arrow keys** or the **rotary knob**.
7. Press **ENTER**. The file type is confirmed.

Selecting the Macro Number for Loading

8. Press the **Macro** soft key. The screen for selecting the **Macro 1** to **3** appears.
9. Move the cursor to macro number you want to select using the **arrow keys** or the **rotary knob**.
10. Press **ENTER**. The macro number is confirmed.

Selecting the Macro File for Loading

11. Move the cursor to the MAC file you want to select using the **arrow keys** or the **rotary knob**.
12. Press the **Load** soft key.



Note

- Macro definitions can be loaded by models of the same fiber type. MMF macro files cannot be loaded by SMF type models. Also, the same wavelengths must be supported.
- An asterisk appearing in the setting condition field indicates an error. Check the items above.

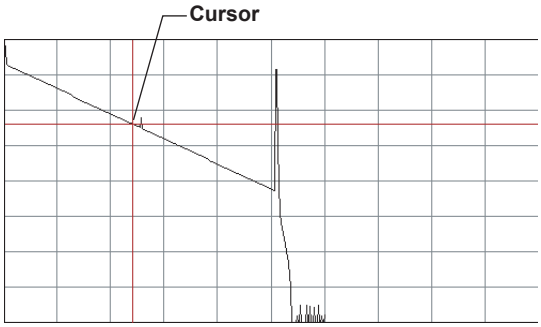
10.1 Marker and Cursor Operation

Procedure

Using markers, you can measure distance between two points, splice loss, and return loss. The following describes operation of cursors and markers. See chapter 11 for a description of splice loss and return loss measurements.

Displaying and Moving the Cursor

1. Turn the **rotary knob** to the right. The cursor appears on screen.
2. Turn the **rotary knob** to the right (left). The cursor moves to the right (left).



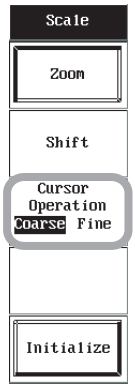
Note

- The direction of cursor movement changes according to the direction you turn the rotary knob.
  Clockwise: The cursor moves to the right.
  Counterclockwise: The cursor moves to the left.
- If you turn the rotary knob counterclockwise and the cursor moves to the left edge of the screen, the cursor disappears. Also, even if you turn the rotary knob clockwise at the measurement stop point, the cursor does not move.

Selecting the Cursor Movement Interval

You can select whether to move the cursor at fine or coarse intervals.

1. Press **SCALE**. A soft key menu for the scale appears.
2. Press the **CursorOperate** soft key. **Coarse** and **Fine** switch each time you press the key.

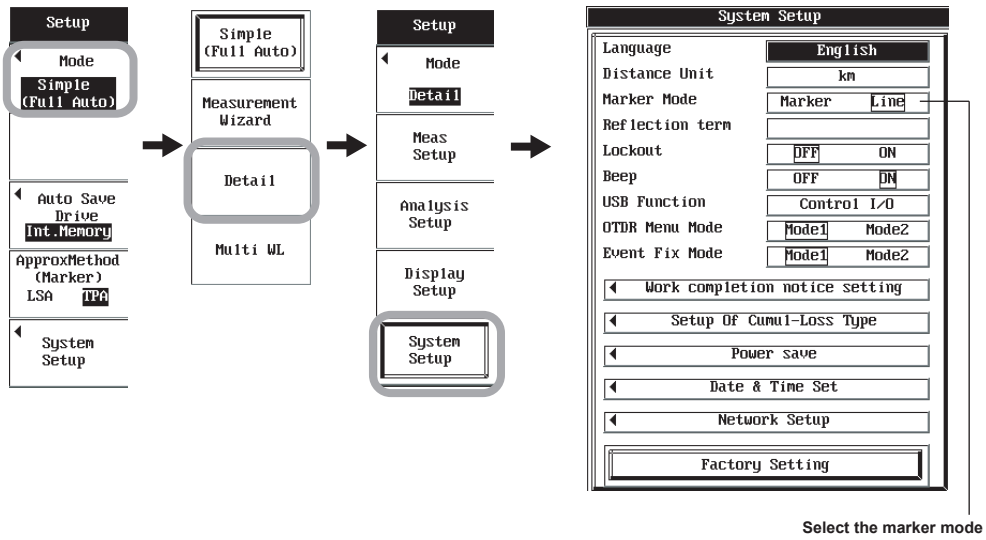


Note

You can select the cursor movement interval by pressing the rotary knob.

Selecting the Marker Mode

1. Press **SETUP**. The soft key menu for the settings appears.
2. Press the **Mode** soft key. The soft key menu for selecting the setting mode appears.
3. Press the **Detail** soft key. The soft key menu for the Detail mode appears.
4. Press the **System Setup** soft key. The **System Setup** screen is displayed.
5. Move the cursor to **Marker Mode** using the **arrow keys** or the **rotary knob**.
6. Press **ENTER**. **Marker** and **Line** switch each time you press the key.
7. Press **ESC**. The **System Setup** screen closes.



Differences between Marker and Line of Marker Mode

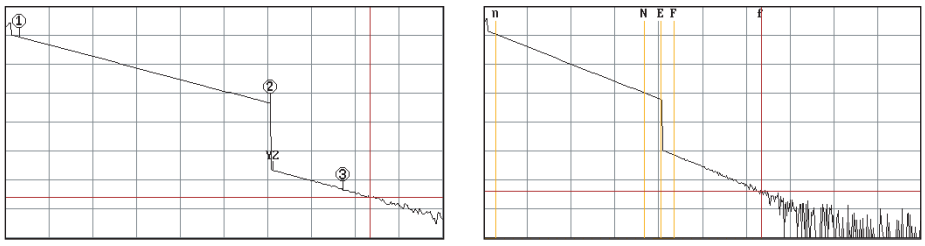
Marker

A marker is set on the waveform. To measure the return loss or splice loss, set the markers as defined by the measurement method. The relevant values are calculated.

Line

Multiple line markers are used to calculate the values in the sections between the line markers and measure the return loss or splice loss. The values are calculated in realtime as you move the line markers.

Marker **Line**



Note

Line markers are often used in countries other than Japan. Markers are often used in Japan, such as with Yokogawa's conventional models.

Marker Operation (Marker)

The following uses an example of the 4 markers method.

Marker Display

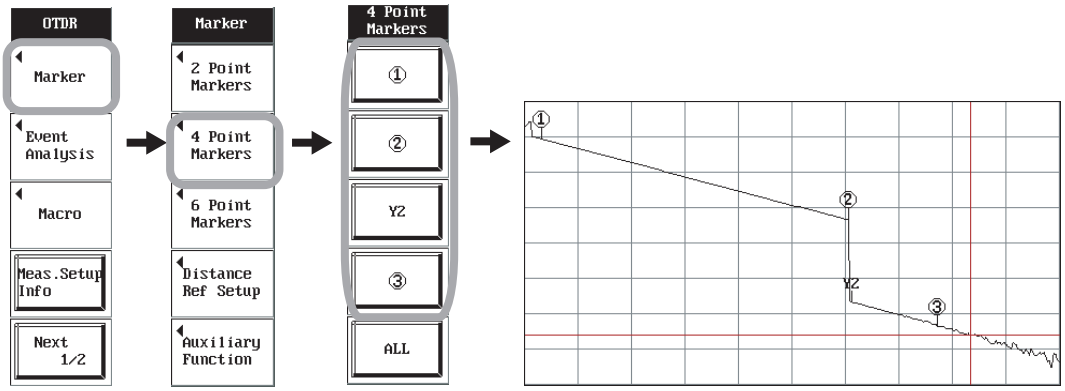
1. Press the **Marker** soft key. The soft key menu regarding markers appears.
2. Press the **4 Point Markers** soft key. The soft key menu for the 4 markers method appears.
3. Turn the **rotary knob** to the right. The cursor appears on screen.

- **Setting the Marker Display Position**

4. Turn the rotary knob, and stop moving the cursor at the position where you want to display the marker..

- **Selecting the Markers to Display**

5. Press the ① soft key. The ① marker appears on screen.
6. Continuing on from step 4, press the ② soft key. The ② marker appears on screen.
7. Again, press the soft key for the marker to display, and so on.



Note

Set the markers in the order ①, ②, Y2, ③ starting from the left. Markers cannot be set in a different order.

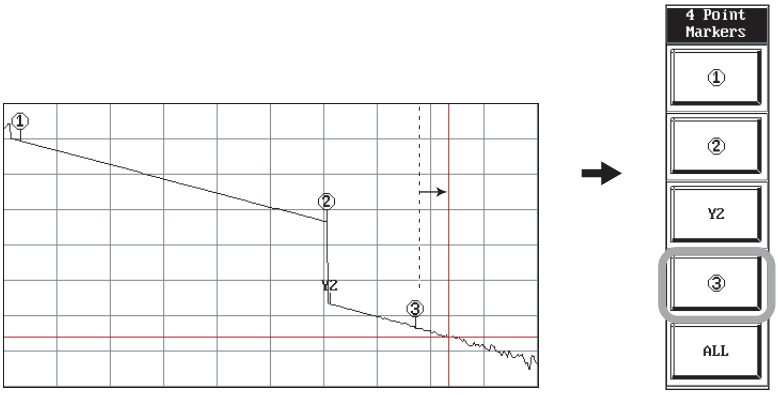
Collective Marker Display

3. Turn the **rotary knob** to the right. The cursor appears on screen.
4. Turn the **rotary knob**, and stop moving the cursor at the position where you want to display the ② marker.
5. Press the **ALL** soft key. All markers appear on screen at once.
6. Press the **ALL** soft key again. The ① and ③ markers come closer to the ② marker.
7. Press the **ALL** soft key repeatedly. The ① and ③ markers come even closer to the ② marker. As they come closer and closer, they finally return to the original position.

Moving Markers

1. Turn the rotary knob, and stop moving the cursor at the position where you want to move the marker.
2. Press the soft key of the marker you want to move.

Example: Moving marker ③



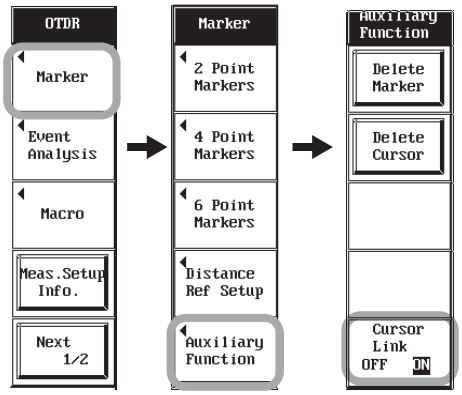
Note

- The markers are arranged in the order ①, ②, Y2, ③ starting from the left. Markers cannot be set in a different order.
- For information on simultaneously moving the ① and ③ markers in which the All soft key was used, see “Collective Marker Display” on the previous page.

Moving Markers Collectively (Cursor Link)

You can move markers while preserving the set distance between them.

1. Press the **Marker** soft key. The soft key menu regarding markers appears.
2. Press the **Auxiliary Function** soft key. The soft key menu regarding the 4 markers method appears.
3. Press the **Cursor Link** soft key. The setting turns **ON** and **OFF** each time you press the key.
4. After confirming that the **Cursor Link** soft key display is **ON**, turn the rotary knob. The cursor and all displayed markers move together.



Marker Delete Operation (Marker)

The following uses an example of the 4 markers method.

Deleting Markers

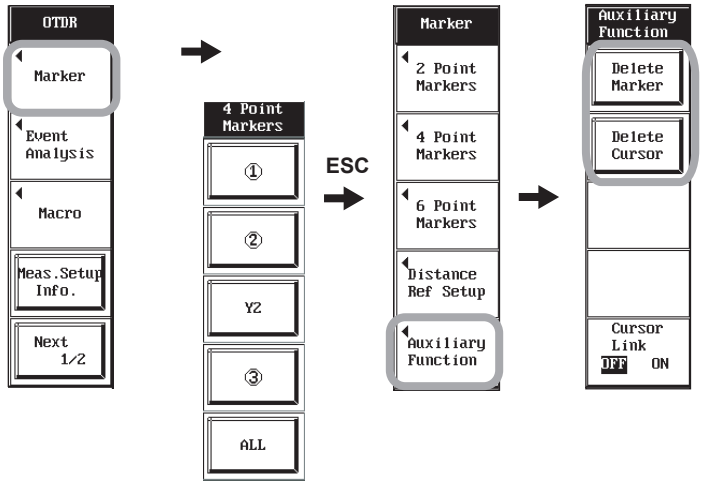
1. Press the **Marker** soft key. The soft key menu regarding markers appears.
2. Press the **Auxiliary function** soft key. The soft key menu regarding deletion appears.
3. Press the **Delete Marker** soft key. All displayed markers are deleted.

- **When Deleting Markers from the Marker Setting Screen**

1. Press the **ESC** key. The soft key menu regarding markers appears.
2. Press the **Auxiliary function** soft key. The soft key menu regarding deletion appears.
3. Press the **Delete Marker** soft key. All displayed markers are deleted.

Deleting the Cursor

3. Press the **Delete Cursor** soft key. The cursor is deleted.



Note

- Individual markers cannot be deleted. All markers are deleted at once.
- The cursor can also be deleted by moving it all the way off to the left side of the screen using the rotary knob.

Marker Operation (Line Markers)

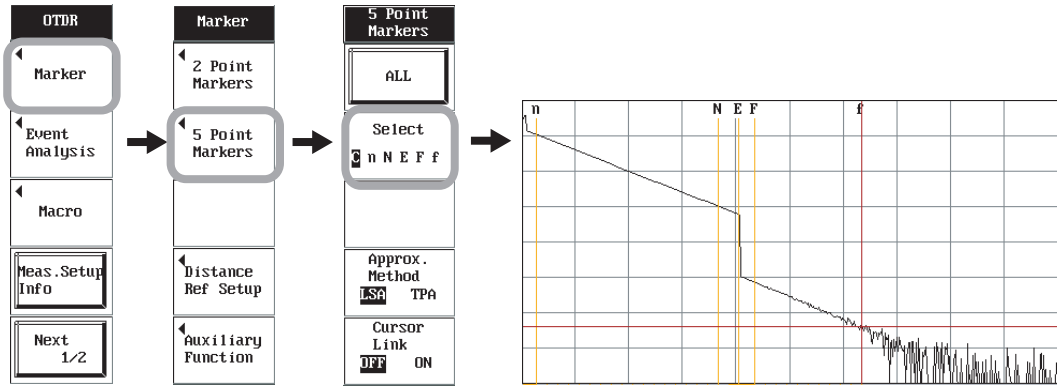
A fixed cursor is a line marker. The following uses an example of the 5 markers method.

Displaying Line Markers

1. Press the **Marker** soft key. The soft key menu regarding markers appears.
2. Press the **5 Point Markers** soft key. The soft key menu for the 5 markers method appears.
3. Turn the **rotary knob** to the right. The cursor appears on screen.

- **Selecting the Cursor**

4. Press the **Select** soft key. The select cursor moves to **n**.
5. Turn the **rotary knob** to the right. The **n** cursor appears on screen.
6. Turn the **rotary knob**, and stop moving the **n** cursor at the position where you want to display the line marker.
7. Press the **Select** soft key. The select cursor moves to **N**.
8. Turn the rotary knob. The **n** cursor is fixed, becoming line marker **n**. At the same time, the **N** cursor appears on screen.
9. Again, use the **Select** soft key and **rotary knob** to display other line markers, and so on.



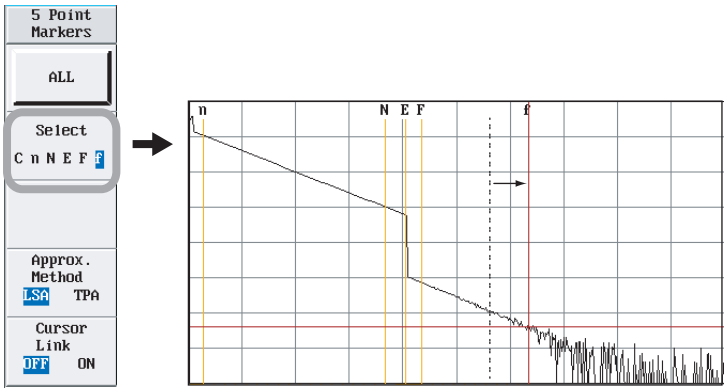
Collective Display of Line Markers

4. Turn the rotary knob, and stop moving the cursor at the position where you want to display the line marker **E**.
5. Press the **ALL** soft key. All markers appear on screen at once.
6. Press the **ALL** soft key again. Line markers **n** and **f** come closer to line marker **E**.
7. Press the **ALL** soft key repeatedly. Line markers **n** and **f** come even closer to line marker **E**. As they come closer and closer, they finally return to the original position.

Moving Line Markers

1. Press the Select soft key, then align the select cursor with the character of the line marker you wish to move. The line marker is selected.
2. Turn the rotary knob. The line marker moves.

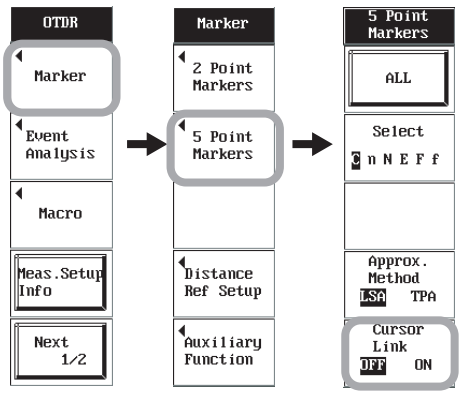
Example: Moving Line Marker f



Moving Line Markers Collectively (Cursor Link)

You can move line markers while preserving the set distance between them.

1. Press the **Marker** soft key. The soft key menu regarding markers appears.
2. Press the **2 Point Markers** or **5 Point Markers** soft key. The soft key menu regarding the 2 markers or 5 markers method appears.
3. Press the **Cursor Link** soft key. The setting turns **ON** and **OFF** each time you press the key.
4. After confirming that the **Cursor Link** soft key display is **ON**, turn the rotary knob. The cursor and all displayed line markers move together.



Note

You can also set the cursor link from the soft key menu for the 2 markers method.

Marker Delete Operation (Line Marker)

The following uses an example of the 4 markers method.

Deleting Line Markers

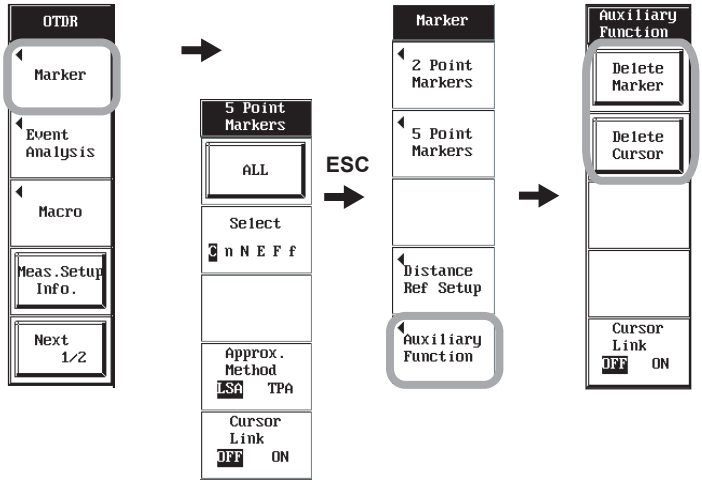
1. Press the **Marker** soft key. The soft key menu regarding markers appears.
2. Press the **Auxiliary function** soft key. The soft key menu regarding deletion appears.
3. Press the **Delete Marker** soft key. All displayed line markers are deleted.

- **When Deleting Line Markers from the Line Marker Setting Screen**

1. Press the **ESC** key. The soft key menu regarding markers appears.
2. Press the **Auxiliary function** soft key. The soft key menu regarding deletion appears.
3. Press the **Delete Marker** soft key. All displayed line markers are deleted.

Deleting the Cursor

3. Press the **Delete Cursor** soft key. The cursor is deleted.



Note

- Individual line markers cannot be deleted. All markers are deleted at once.
- The cursor can also be deleted by moving it all the way off to the left side of the screen using the rotary knob.

10.2 Measuring the Distance

Procedure

Measuring the Distance from the Instrument Using the Cursor

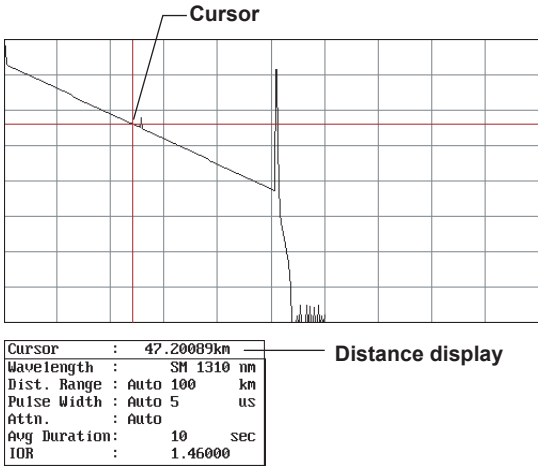
The distance to the event such as reflections and splice loss can be measured by placing the cursor on the acquired waveform.

Displaying the Cursor

1. Turn the **rotary knob** to the right. The cursor appears on screen.

Moving the Cursor

2. Turn the **rotary knob**. The cursor moves and the distance from the measurement reference is displayed on screen.



Note

- For details on the cursor, see section 10.1.
- The point where the optical fiber cable is connected to the AQ7270/AQ7275 is the distance measurement reference. To measure more accurately, zoom the waveform.

Measuring the Distance of a Section Using Markers

2 Markers Method (Marker)

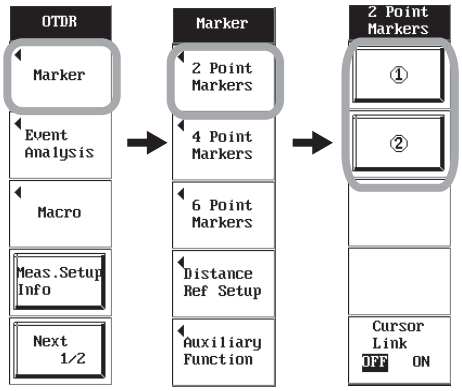
1. Press the **Marker** soft key. A soft key menu for the marker appears.
2. Press the **2 Point Markers** soft key. The soft key menu for the 2 markers method appears.
3. Turn the **rotary knob**. A cursor is displayed on the screen.

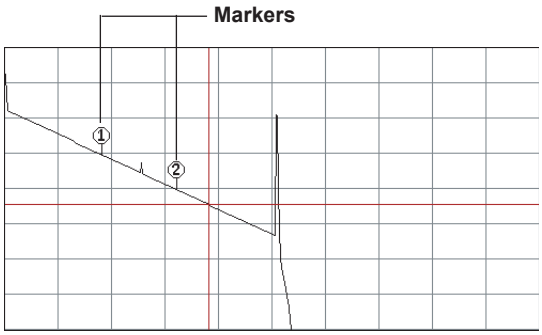
- **Setting the Measurement Start Position**

4. Move the cursor to the start position of the measurement section on the waveform.
5. Press the ① soft key. The ① marker is displayed on the screen.

- **Setting the Measurement End Position**

6. Move the cursor to the end position of the measurement section on the waveform.
7. Press the ② soft key. The ② marker is displayed on the screen, and the distance of the section is displayed in the calculation results screen for the measured data.





Note

For details on the marker and cursor, see section 10.1.

2 Markers Method (Line Marker)

1. Press the **Marker** soft key. A soft key menu for the marker appears.
2. Press the **2 Point Markers** soft key. The soft key menu for the 2 markers method appears.

- **Setting the Measurement Start Position**

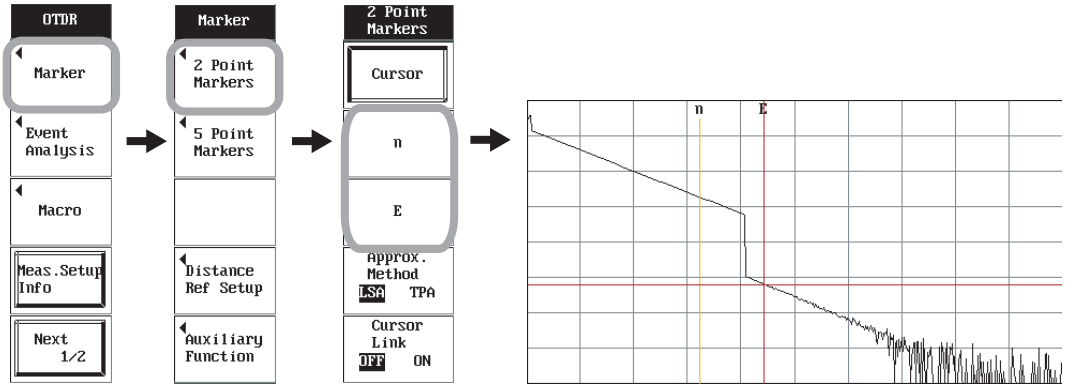
3. Press the **n** soft key.
4. Turn the **rotary knob**. The n cursor is displayed on the screen.
5. Turn the **rotary knob** to move the n cursor to the start position of the measurement section on the waveform.

- **Setting the Measurement End Position**

6. Press the **E** soft key.
7. Turn the **rotary knob**. The E cursor is displayed on the screen.
8. Turn the **rotary knob** to move the E cursor to the end position of the measurement section on the waveform. The values are displayed in the calculation results screen for the measured data.

- **Displaying the Cursor**

9. Press the **Cursor** soft key.
10. Turn the **rotary knob** to the right. A cursor is displayed on the screen.



10.3 Moving the Measurement Reference

Procedure

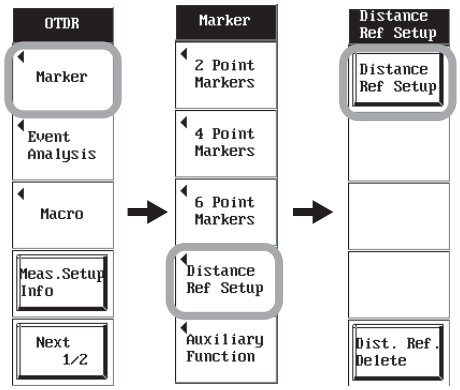
Normally, the point where the optical fiber cable is connected to the AQ7270/AQ7275 is the measurement reference. This point is used as the distance reference to calculate the distance at the cursor and marker positions. If you are making measurements with a dummy fiber connected, the distance reference is moved by the length of the dummy fiber for the measurements.

Moving the Distance Reference

1. Press the **Marker** soft key. A soft key menu for the marker appears.
2. Press the **Distance Ref Setup** soft key. The soft key menu for setting the distance reference appears.
3. Turn the **rotary knob**. A cursor is displayed on the screen.
4. Move the cursor to the point where you want to specify the distance reference on the waveform.
5. Press the **Distance Ref Setup** soft key. A line indicating the distance reference appears.

Resetting the Distance Reference

6. Press the **Dist. Ref. Delete** soft key. The line indicating the distance reference disappears.



You can measure the distance of a section in the middle of the cable (not from the measurement reference) by using markers.

Note

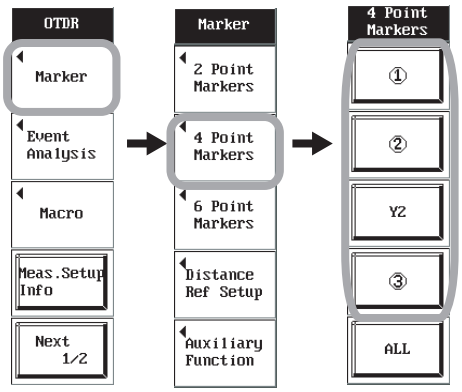
- With the /DF option, the AQ7270/AQ7275 detects the position corresponding to the dummy fiber distance after the measurement is completed and automatically sets the distance reference. However, if the distance reference is specified with the Distance Ref Setup soft key in advance, this function is invalid.
- The waveform in the area left of the specified distance reference is displayed using a different color.

11.1 Measuring the Splice Loss

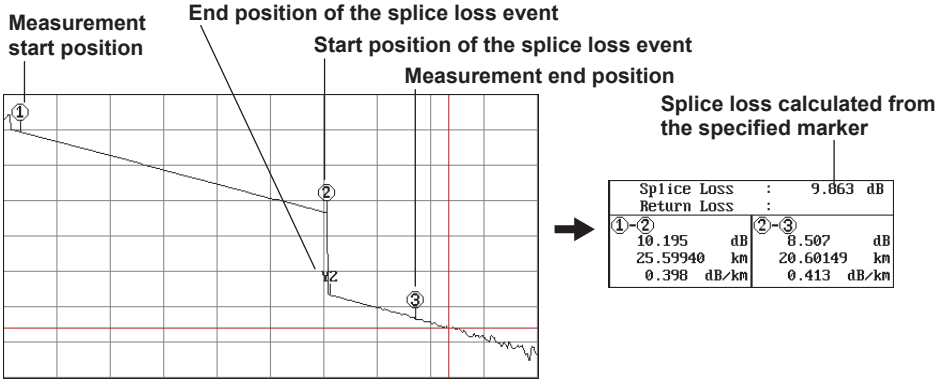
Procedure

If the Marker Mode Is Set to Marker

1. Press the **Marker** soft key. A soft key menu for the marker appears.
2. Press the **4 Point Markers** soft key. The soft key menu for the 4 markers method appears.
3. Turn the **rotary knob**. A cursor is displayed on the screen.



- **Setting the Measurement Start Position**
  4. Move the cursor to the start position of the measurement section on the waveform.
  5. Press the ① soft key. The ① marker is displayed on the screen.
- **Setting the Start Position of the Splice Loss Event**
  6. Move the cursor to the event start position on the waveform.
  7. Press the ② soft key. The ② marker is displayed on the screen.
- **Setting the End Position of the Splice Loss Event**
  8. Move the cursor to the event end position on the waveform.
  9. Press the **Y2** soft key. The Y2 marker is displayed on the screen.
- **Setting the Measurement End Position**
  10. Move the cursor to the end position of the measurement section on the waveform.
  11. Press the ③ soft key. The ③ marker is displayed on the screen, and values are displayed in the calculation results screen for the measured data.



- **Setting the Markers Automatically**

  4. Move the cursor to the event start position on the waveform.

  5. Press the **ALL** soft key. All the markers are set on the screen, and values are displayed in the calculation results screen for the measured data.

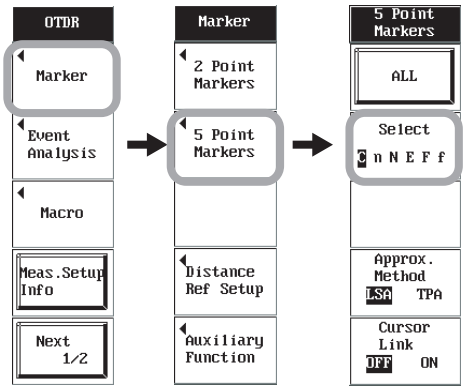
- **Adjusting the Interval of the Markers Set Automatically**

  6. Press the **ALL** soft key. The ① and ③ markers moves in on the ② marker. When they move to the closes position, they return to their original positions.

If the Marker Mode Is Set to Line

1. Press the **Marker** soft key. A soft key menu for the marker appears.

2. Press the **5 Point Markers** soft key. The soft key menu for the 5 markers method appears.



- **Setting the Near-End Point**

  3. Press the **Select** soft key to move the cursor to n.

  4. Turn the **rotary knob**. The n cursor is displayed on the screen.

  5. Turn the **rotary knob** to move the n cursor to the measurement start position (near-end point) on the waveform.

- **Setting the Point Used to Calculate the Approximation Line at the Near End**

  6. Press the **Select** soft key to move the cursor to N.

  7. Turn the **rotary knob**. The N cursor is displayed on the screen.

  8. Turn the **rotary knob** to move the N cursor to end point of the approximate line section on the waveform.

- **Setting the Detection Point of the Splice Loss**

  9. Press the **Select** soft key to move the cursor to E.

  10. Turn the **rotary knob**. The E cursor is displayed on the screen.

  11. Turn the **rotary knob** to move the E cursor on the waveform at the splice loss.

- **Setting the Point Used to Calculate the Approximation Line at the Far End**

  12. Press the **Select** soft key to move the cursor to F.

  13. Turn the **rotary knob**. The F cursor is displayed on the screen.

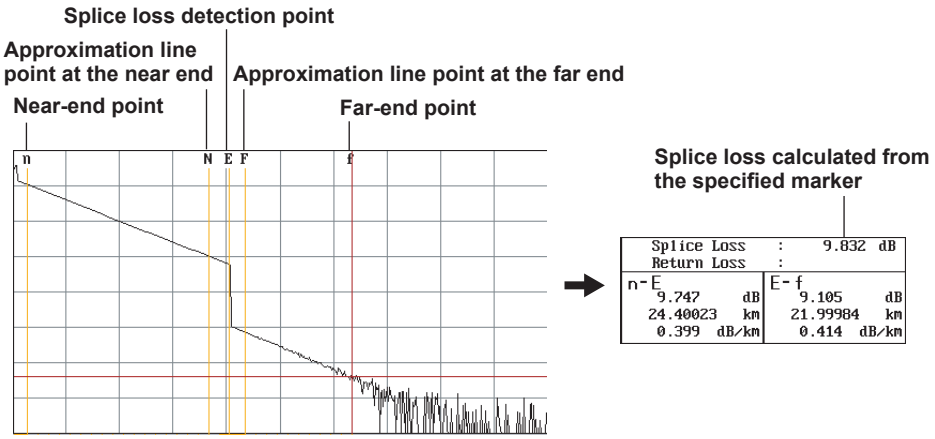
  14. Turn the **rotary knob** to move the F cursor to start point of the approximate line section on the waveform.

- **Setting the Far-End Point**

  15. Press the **Select** soft key to move the cursor to f.

  16. Turn the **rotary knob**. The f cursor is displayed on the screen.

  17. Turn the **rotary knob** to move the f cursor on the waveform at the far end.



- **Setting the Markers Automatically**

  3. Move the cursor to the event start position on the waveform.

  4. Press the **ALL** soft key. All the markers are set on the screen, and values are displayed in the calculation results screen for the measured data.

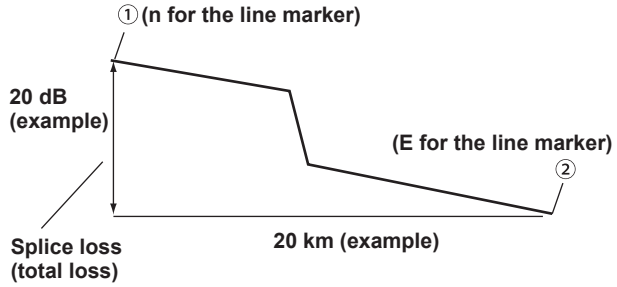
- **Adjusting the Interval of the Markers Set Automatically**

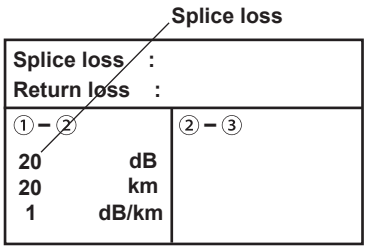
  5. Press the **ALL** soft key. The n and f markers moves in on the E marker. When they move to the closes position, they return to their original positions.

Explanation

2 Markers Method

The distance and loss between two points is measured. If a reflection is detected between the two points, the return loss is also measured.

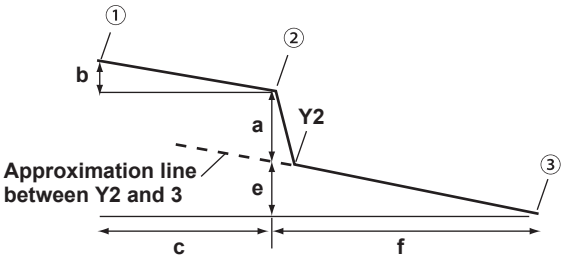


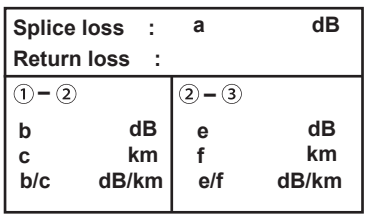


The measured loss value between the markers varies depending on the specified approximation method.

4 Markers Method

Measurements are performed on the following four points: the measurement start point (①), the start point of the splice loss (②), the end point of the splice loss (Y2), and the measurement end point (③). The splice loss is calculated using the level difference at the location of the ② marker between the approximation line ①-② and the approximation line Y2-③.

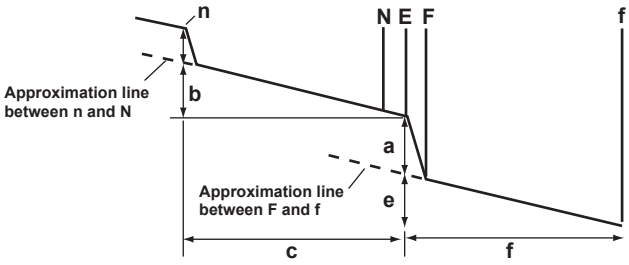




- The measured loss values between the markers vary depending on the specified approximation method.
- Set the ② marker to the accurate position. The splice loss value varies greatly depending on the ② position.

5 Markers Method

This function is available only when the marker mode is set to Line. Measurement is performed on the following five points: the near-end point (n), the point used to calculate the approximation line at the near end (N), the splice loss detection point (E), the point used to calculate the approximation line at the far end (F), and the far-end point (f). The splice loss is calculated using the level difference at the location of the E marker between the approximation line n-N and the approximation line F-f.

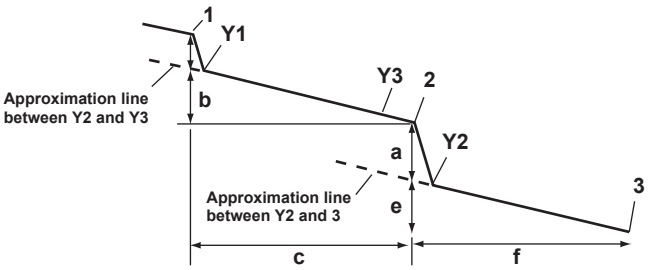


Splice loss : a dB Return loss :	
n-E	E-f
b dB	e dB
c km	f km
b/c dB/km	e/f dB/km

- The measured loss values between the lines vary depending on the specified approximation method.
- Set the E line to the accurate position. The splice loss value varies greatly depending on the E position.

6 Markers Method

The 6 markers method is used if there are two splice loss events. Measurement is performed using the following six points: the start point of the first splice loss (①), the start point used to calculate the approximation line (Y1), the end point used to calculate the approximation line (Y3), the start point of the second splice loss (②), the end point of the second splice loss (Y2), and the measurement end point (③). The splice loss is calculated using the level difference at the location of the ② marker between the approximation line Y1-Y3 and the approximation line Y2-③.



Splice loss : a dB Return loss :	
① – ②	② – ③
b dB c km b/c dB/km	e dB f km e/f dB/km

- The measured loss values between the markers vary depending on the specified approximation method.
- Set the ② marker to the accurate position. The splice loss value varies greatly depending on the ② position.

Cursor Link Function

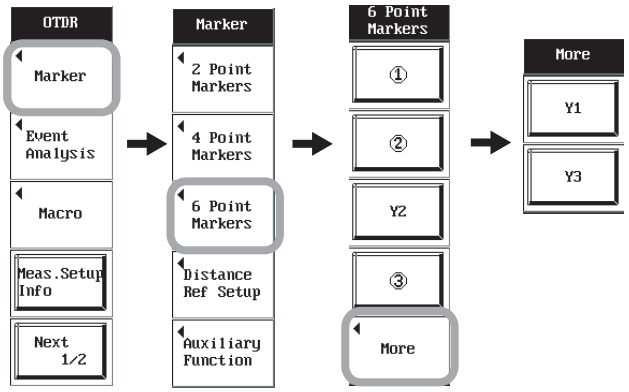
This function keeps the spacing between the markers (① to ③ and Y1 to Y3) constant. If the cursor link is turned ON, the markers move while maintaining the spacing between them when you move the cursor.

11.2 Measurement Taking the Adjacent Splice Loss into Consideration

Procedure

This is the method for eliminating the error from the first neighboring event and measuring the splice loss of the second event. You can measure the distance from the position of the first event and the splice loss in the second event at once.

1. Press the **Marker** soft key. A soft key menu for the marker appears.
2. Press the **6 Point Markers** soft key. The soft key menu for the 6 markers method appears.
3. Turn the **rotary knob** to the right. A cursor is displayed on the screen.



- **Setting the Start Position of the First Event**
  4. Move the cursor to the start position of the first splice loss on the waveform.
  5. Press the ① soft key. The ① marker is displayed on the screen.
- **Setting the Start Point Used to Calculate the Approximation Line**
  6. Move the cursor to the end position or the subsequent linear part of the first splice loss on the waveform.
  7. Press the **More** soft key. The soft key menu for the auxiliary markers appears.
  8. Press the **Y1** soft key. The Y1 marker is displayed on the screen.
- **Setting the End Point Used to Calculate the Approximation Line**
  9. Move the cursor to the end position of the approximate line section on the waveform.
  10. Press the **Y3** soft key. The Y3 marker is displayed on the screen.
- **Setting the Start Position of the Second Event**
  11. Press **ESC**. The auxiliary marker screen closes.
  12. Move the cursor to the start position of the second splice loss on the waveform.
  13. Press the ② soft key. The ② marker is displayed on the screen.

- **Setting the End Position of the Second Event**

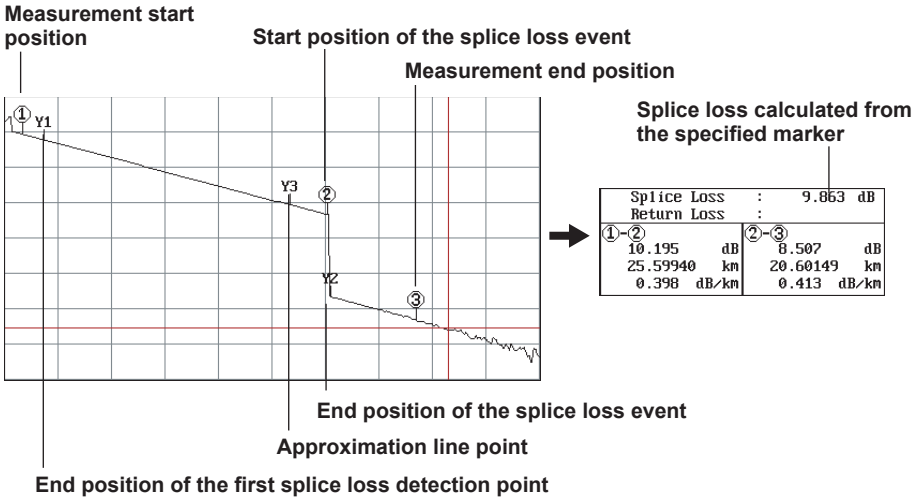
  14. Move the cursor to the end position of the second splice loss on the waveform.

  15. Press the **Y2** soft key. The Y2 marker is displayed on the screen.

- **Setting the Measurement End Position**

  16. Move the cursor to the end position of the measurement section on the waveform.

  17. Press the ③ soft key. The ③ marker is displayed on the screen, and values are displayed in the calculation results screen for the measured data.



Note

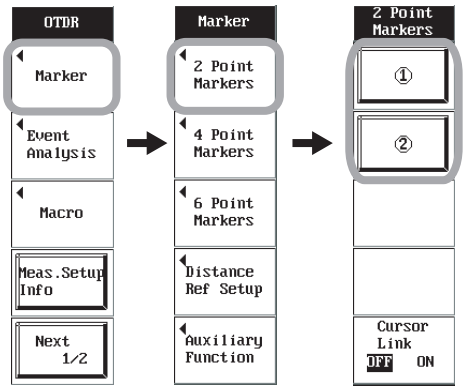
- Use the markers in waveform mode.
- For details on the marker mode and 6 markers method, see section 11.1.

11.3 Measuring the Return Loss and Reflection Level

Procedure

If the Marker Mode Is Set to Marker

1. Press the **Marker** soft key. A soft key menu for the marker appears.
2. Press the **2 Point Markers** soft key. The soft key menu for the 2 markers method appears.
3. Turn the **rotary knob**. A cursor is displayed on the screen.

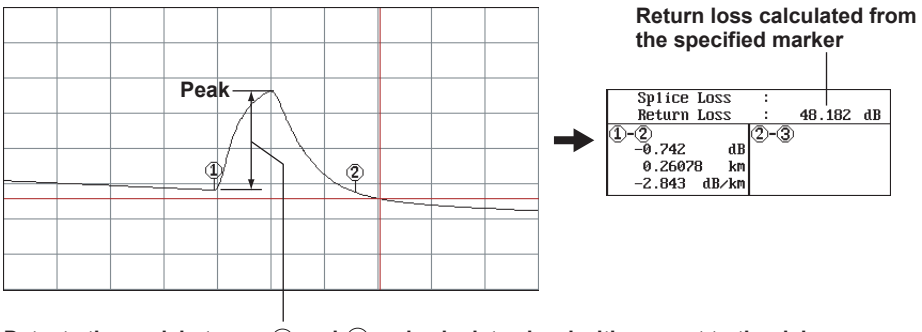


- **Setting the Measurement Start Position**

4. Move the cursor to the detection start position of the event on the waveform.
5. Press the ① soft key. The ① marker is displayed on the screen.

- **Setting the Measurement End Position**

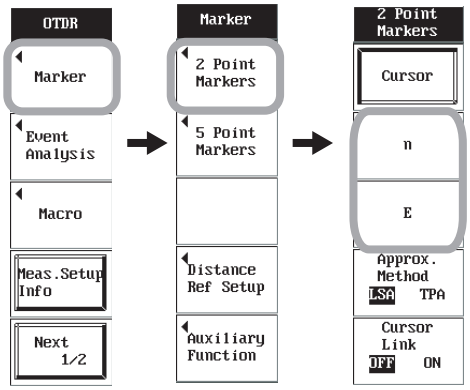
6. Move the cursor to the detection end position of the event on the waveform.
7. Press the ② soft key. The ② marker is displayed on the screen, and values are displayed in the calculation results screen for the measured data.



Detects the peak between ① and ② and calculates level with respect to the rising start point of the event.

If the Marker Mode Is Set to Line

1. Press the **Marker** soft key. A soft key menu for the marker appears.
2. Press the **2 Point Markers** soft key. The soft key menu for the 2 markers method appears.



- **Setting the Measurement Start Position**

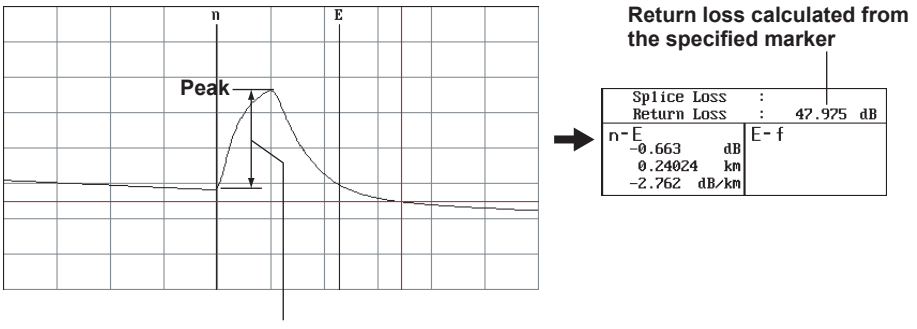
3. Press the **n** soft key.
4. Turn the **rotary knob**. The n cursor is displayed on the screen.
5. Turn the **rotary knob** to move the n cursor to the detection start position of the event on the waveform.

- **Setting the Measurement End Position**

6. Press the **E** soft key.
7. Turn the **rotary knob**. The E cursor is displayed on the screen.
8. Turn the **rotary knob** to move the E cursor to the detection end position of the event on the waveform. The values are displayed in the calculation results screen for the measured data.

- **Displaying the Cursor**

9. Press the **Cursor** soft key.
10. Turn the **rotary knob**. A cursor is displayed on the screen.



Detects the peak between n and E and calculates level with respect to the rising start point of the event.

Note

For details on the marker mode and 6 markers method, see section 11.1.

Explanation

- If you set the language to Japanese, you can select the reflection display method from return loss and reflection level. The selected value is displayed in the calculation results screen. For the operating procedure, see section 19.1.
- If a < mark is displayed in the return loss value display, the measured waveform is saturated. If the waveform is saturated, the actual reflection level is greater than the displayed value. The following methods are available to keep the waveform from saturating.
  - Select a larger attenuation and remeasure.
  - Set the averaging method to high reflection and remeasure.
  - Select a larger pulse width and remeasure.
- If the reflection is small (approximately 0.5 dB or less), the return loss nor the reflection level is displayed.

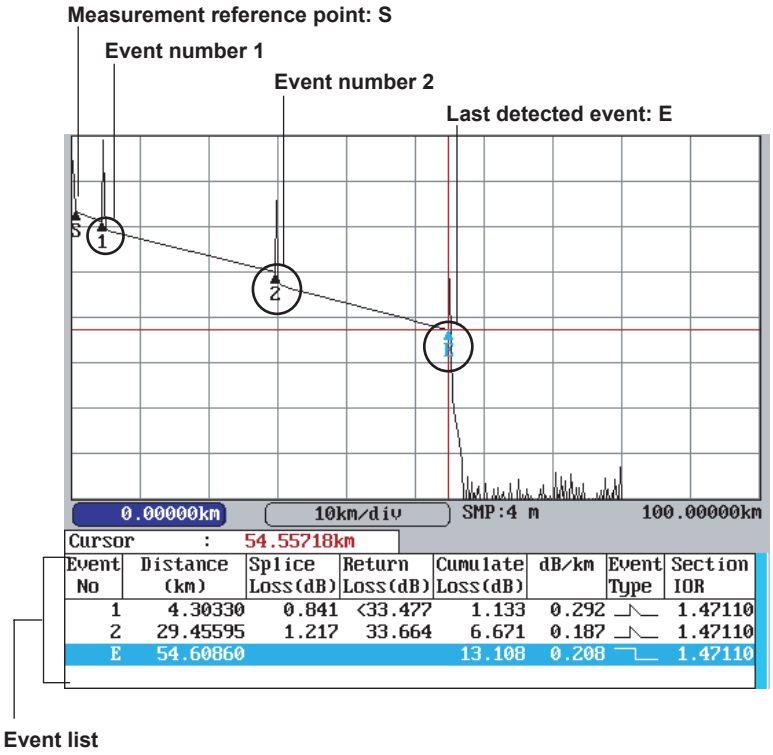
Note

If you set the language to Japanese, the reflection display method can be selected.

12.1 Viewing the Measured Results

The AQ7270/AQ7275 detect events from the acquired waveform and displays the splice or return loss. You can edit the values and insert or delete events in the list of event detection results if you want to make adjustments by taking the actual environment into consideration.

Event List Screen (Waveform and List)



Event Number

A number is displayed near an event on the waveform. The events are numbered in order from the left edge. Events that have an asterisk displayed before the number are fault events.

Distance (km)

The distance from the measurement reference to each event is displayed. If you moved the distance reference, the distance from the distance reference to each event is displayed. For details, see section 12.2.

Splice Loss

The value of each event is displayed. If the fault event display is ON and the value is exceeding the threshold level of the splice loss fault event, it is displayed in red.

Return Loss

The value of each event is displayed. If the fault event display is ON and the value is exceeding the threshold level of the return loss fault event, it is displayed in red.

Cumulative Loss
The cumulative loss from the measurement reference is displayed. For details, see section 12.2.

dB/km
The loss per kilometer between events is displayed.

Event Type
One of the following events is identified and indicated.

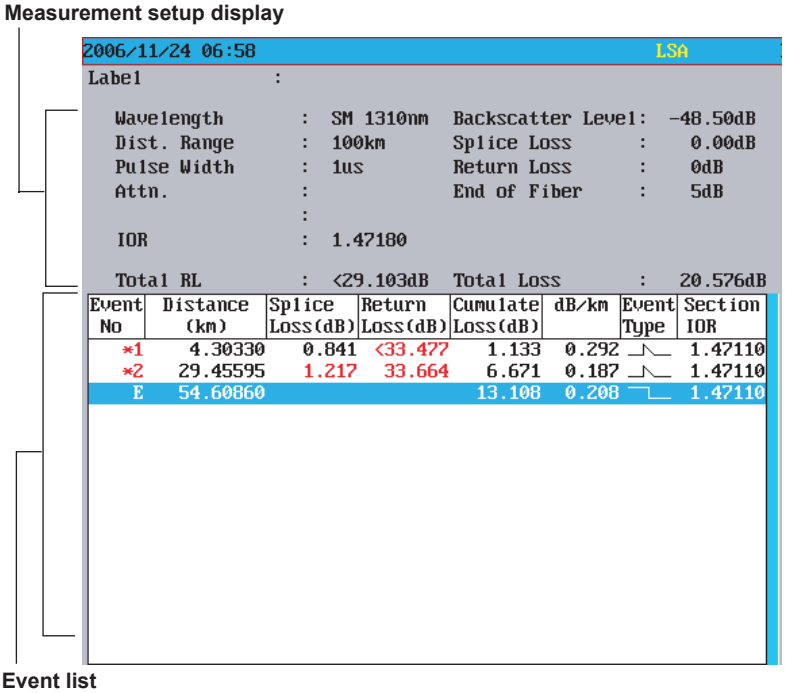
: Indicates a positive splice loss.
: Indicates a negative splice loss.
: Indicates a reflection.
: Indicates a bending loss (firmware versions 3.01 and later).

Section Group Index
The refraction index between events is displayed.

Event Auto Zoom
An arbitrary selected event is displayed expanded. Each time you select an event, the zoom ratio of the vertical and horizontal axes are automatically adjusted. Event auto zoom is invalid in 2-WayTrace mode.

Event List Screen (List)

Measurement setup display



Event list

Note

- Press the soft keys to switch the screen. For details, see section 12.2.
- You can edit the distance, return loss, section group index of events on the list screen. For details, see section 12.3.

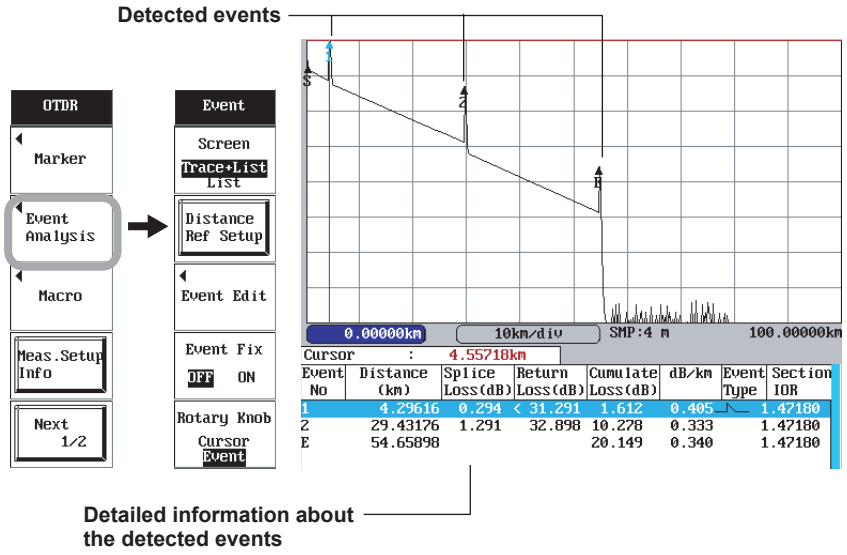
12.2 Editing the Waveform

Procedure

It is possible that an event is not detected because the backscattering light level at the reflection point of the optical fiber cable is too small, or the noise may be detected as an event. If this happens, you can make adjustments by inserting, deleting, and moving events.

Detecting Events (If the Event Detection Method Is Set to Manual)

1. Press the **Event Analysis** soft key. The event is detected, and a soft key menu for the event display appears.

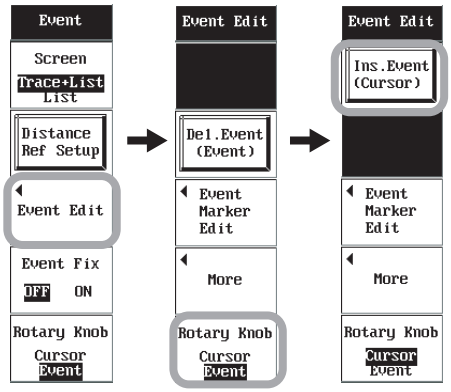


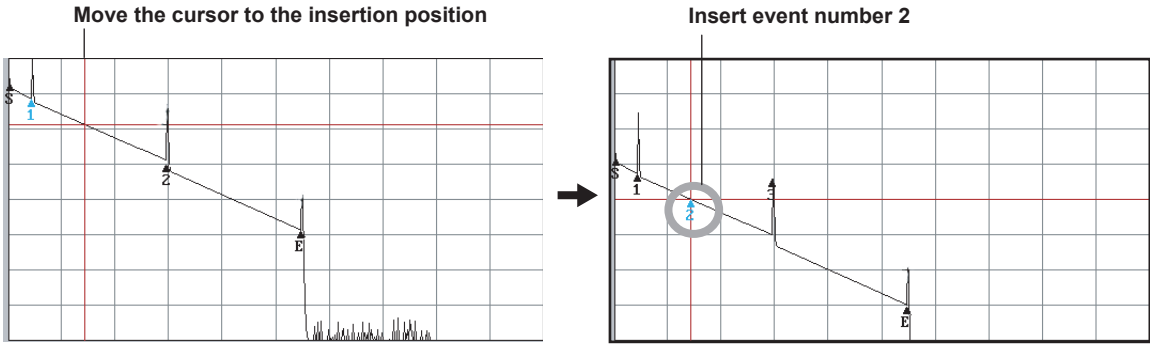
Note

- If the event detection method is set to auto, events are detected after the averaging measurement is completed.
- During event detection, the words “Detecting events” blink.

Inserting an Event

2. Press the **Event Edit** soft key. A soft key menu for editing events appears.
3. Press the **Rotary Knob** soft key to move the cursor to Cursor. The Ins. Event (Cursor) soft key appears in the soft key menu.
4. Turn the **rotary knob** to move the cursor to the position on the waveform you want to insert an event.
5. Press the **Ins. Event (Cursor)** soft key. The inserted event number is displayed on the waveform, and the values of the inserted event are displayed in the list.



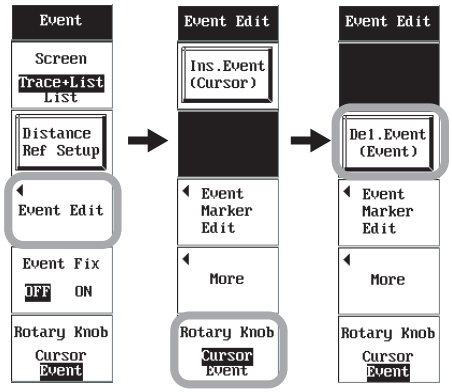


Note

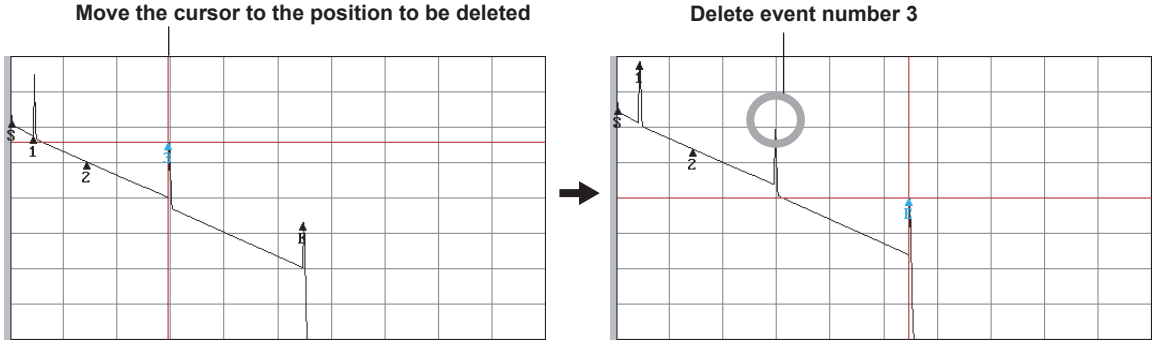
- The maximum number of events that can be displayed in the event list is 100.
- If you insert an event between two displayed events, the event numbers are renumbered in order from the left.
- You cannot insert an event to the left of the S point. You can move the S point using the Set Start Position soft key.
- You cannot insert an event to the left of the distance reference. You can move the distance reference using the Distance Ref Setup soft key.
- If you insert an event to the right of the E event, the inserted event becomes the E event, and a new number is assigned to the original E event.

Deleting an Event

2. Press the **Event Edit** soft key. A soft key menu for editing events appears.
3. Press the **Rotary Knob** soft key to move the cursor to Event. The Del. Event (Event) soft key appears in the soft key menu.
4. Turn the **rotary knob** to move the cursor to the event you want to delete. The color of the event selected with the cursor changes.
5. Press the **Del. Event (Event)** soft key. The event number that was displayed on the waveform disappears, and the event in the list also disappears.



Move the cursor to the position to be deleted **Delete event number 3**



Note

- You cannot delete events if only the S point and the E event are displayed.
- If you delete an event between events, the events are renumbered in order from the left.
- You cannot delete the S point.
- If you set the distance reference (R point), the S point disappears. In this case, the measurement reference is the distance reference. If you delete the distance reference, the S point returns to the original position.
- If you delete the E event, the event with the largest number becomes the E event.

Moving an Event

- **If the Marker Mode Is Marker**

2. Press the **Event Edit** soft key. A soft key menu for editing events appears.

3. Press the **Rotary Knob** soft key to move the cursor to Event.

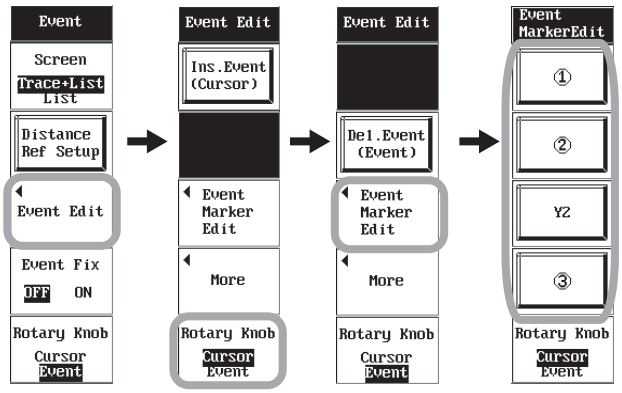
4. Turn the **rotary knob** to move the cursor to the event you want to move The color of the event selected with the cursor changes.

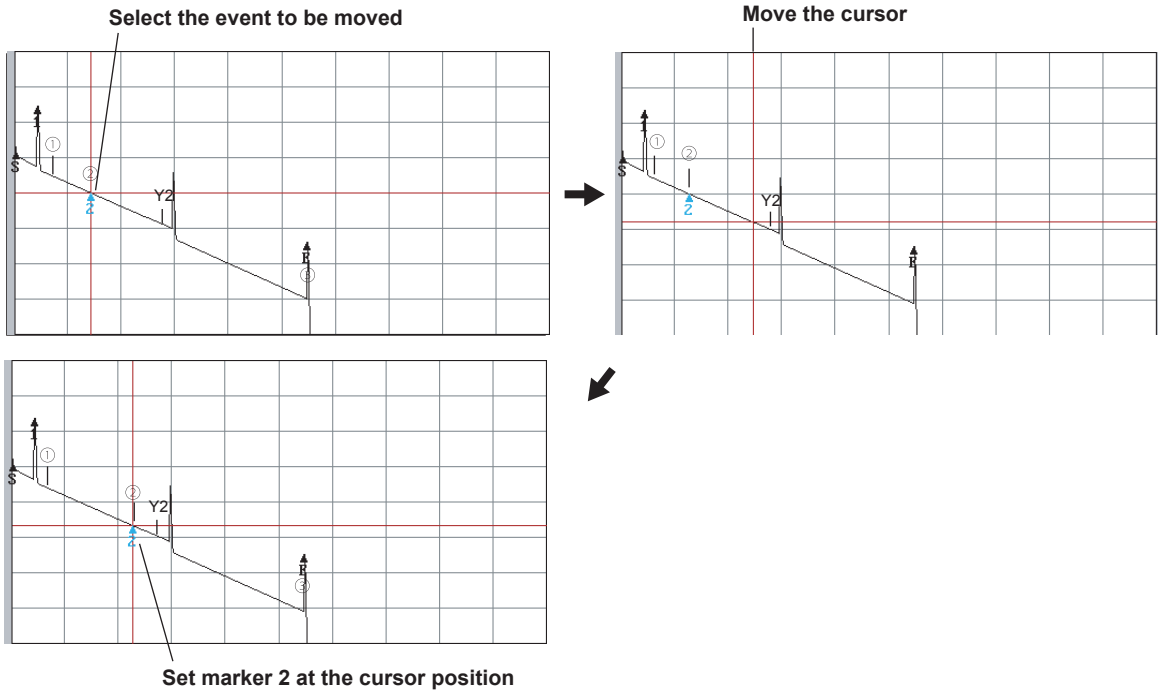
5. Press the **Event Marker** soft key. The soft key menu for editing the event marker appears.

6. Press the **Rotary Knob** soft key to move the cursor to Event. The event marker soft keys appears in the soft key menu (①, ②, Y2, and ③).

7. Turn the **rotary knob** to move the cursor to the position on the waveform you want to move the event.

8. Press the ② soft key. The event moves along with the ② marker.





- **If the Marker Mode Is Line**

  2. Press the **Event Edit** soft key. A soft key menu for editing events appears.

  3. Press the **Rotary Knob** soft key to move the cursor to Event.

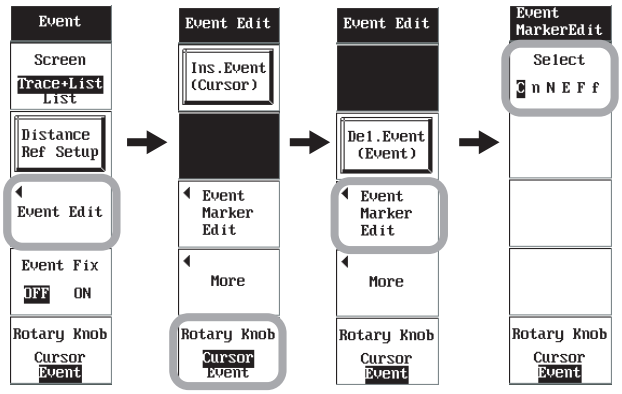
  4. Turn the **rotary knob** to move the cursor to the event you want to move The color of the event selected with the cursor changes.

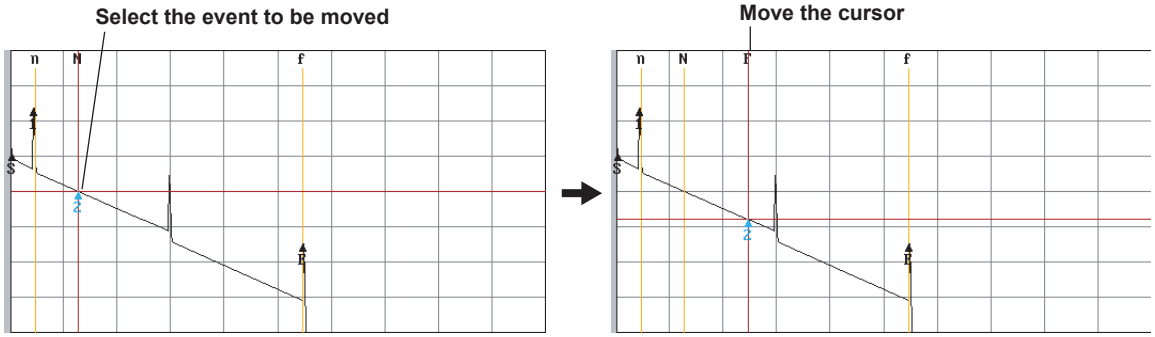
  5. Press the **Event Marker** soft key. The soft key menu for editing the event marker appears.

  6. Press the **Rotary Knob** soft key to move the cursor to Cursor.

  7. Press the **Select** soft key to move the cursor to E.

  8. Turn the **rotary knob** to move the E marker. The event moves along with the E marker.





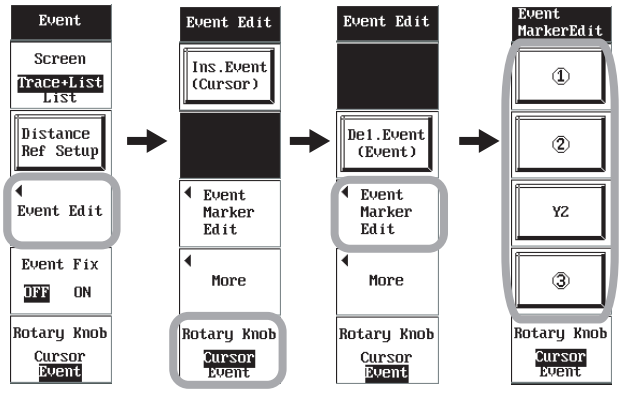
Editing the Event Markers

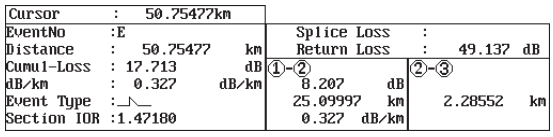
The splice or return loss for detected events are measured with the event marker. The splice loss value varies depending on the event marker position. If an event marker is assigned to a location on the waveform that is not an event (such as noise), you can measure the value correctly by moving the marker to the correct position.

Editing the Return or Splice Loss

- **If the Marker Mode Is Marker**

2. Press the **Event Edit** soft key. A soft key menu for editing events appears.
3. Press the **Rotary Knob** soft key to move the cursor to Event.
4. Turn the **rotary knob** to move the cursor to the event you want to edit. The color of the event selected with the cursor changes.
5. Press the **Event Marker** soft key. The soft key menu for editing the event marker appears.
6. Press the **Rotary Knob** soft key to move the cursor to Cursor. The event marker soft keys appears in the soft key menu (①, ②, Y2, and ③).
7. Turn the **rotary knob** to move the cursor to the position on the waveform you want to move the event.
8. Press the soft key corresponding to the event marker you want to move. The event is moved to the cursor position. The return and splice loss values are recalculated and displayed in the detail information at the bottom section of the screen.

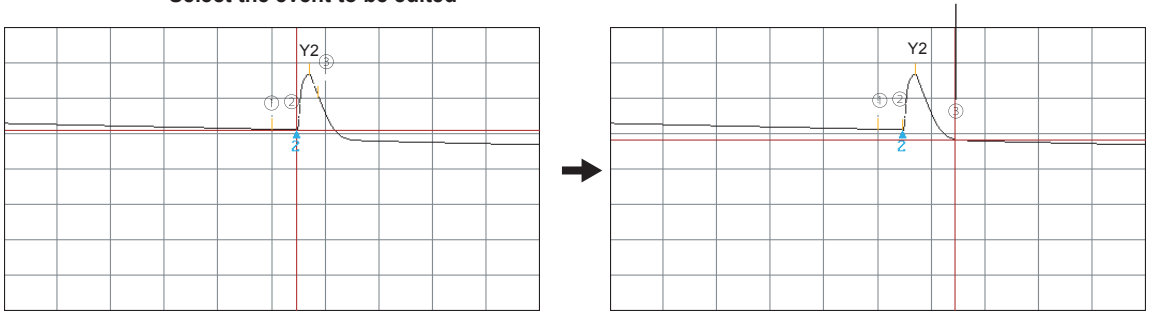




Detail information display at the lower section of the screen

Select the event to be edited

Move the marker



Editing example of a splice loss value

Note

For details on each event marker, see 4 markers method in section 11.1.

- **If the Marker Mode Is Line**

  2. Press the **Event Edit** soft key. A soft key menu for editing events appears.

  3. Press the **Rotary Knob** soft key to move the cursor to Event.

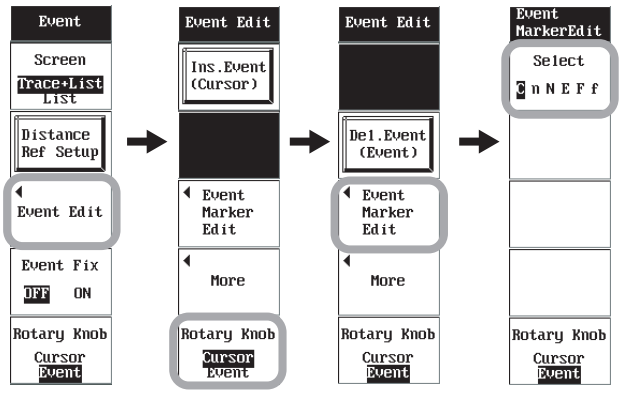
  4. Turn the **rotary knob** to move the cursor to the event you want to edit. The color of the event selected with the cursor changes.

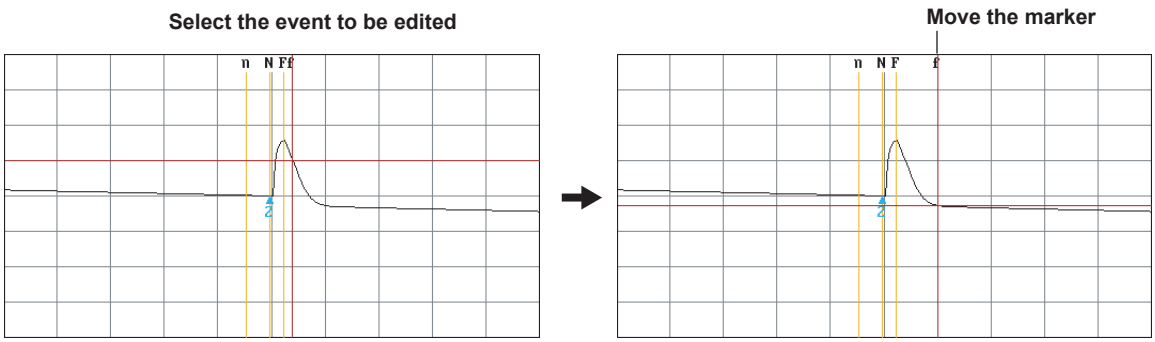
  5. Press the **Event Marker** soft key. The soft key menu for editing the event marker appears.

  6. Press the **Rotary Knob** soft key to move the cursor to Cursor.

  7. Press the **Select** soft key to move the cursor to the event marker you want to move.

  8. Turn the **rotary knob** to move the event marker. The return and splice loss values are recalculated and displayed in the detail information at the bottom section of the screen.





Editing example of a splice loss value

Note

For details on each event marker, see 5 markers method in section 11.1.

Measuring by Moving the Position for Starting the Distance Calculation

Moving the Distance Reference

- **Moving the Cursor to the Start Position**

  2. Press the **Rotary Knob** soft key to move the cursor to Cursor.

  3. Turn the **rotary knob** to move the cursor to the position for starting the distance calculation.

- **Setting the Distance Reference**

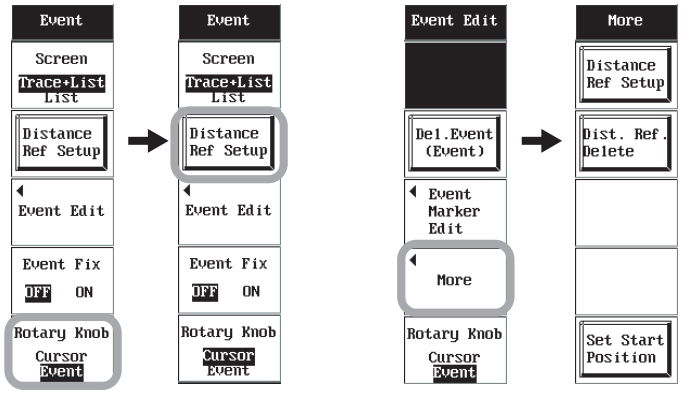
  4. Press the **Distance Ref Setup** soft key. The R line indicating the distance reference is displayed at the position for starting the distance calculation.

- **Clearing the Distance Reference**

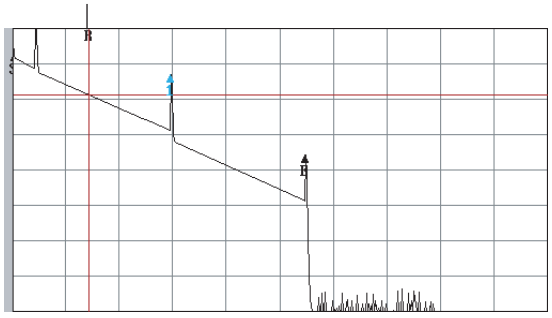
  5. Press the **Event Edit** soft key. A soft key menu for editing events appears.

  6. Press the **More** soft key. The auxiliary function soft key menu appears.

  7. Press the **Dist. Ref. Delete** soft key. The R line display disappears.



Distance reference indication



Note

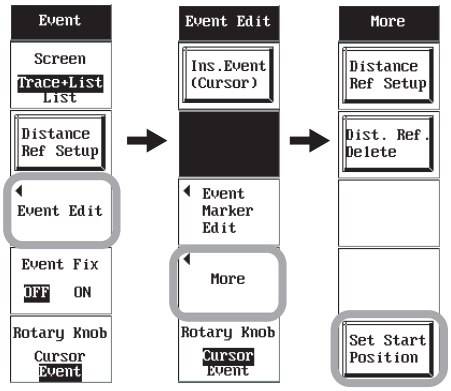
- Because all of the information are measured between the distance reference (R) and the E event, events are displayed after the distance reference.
- If you change the distance reference, the event information is recalculated.

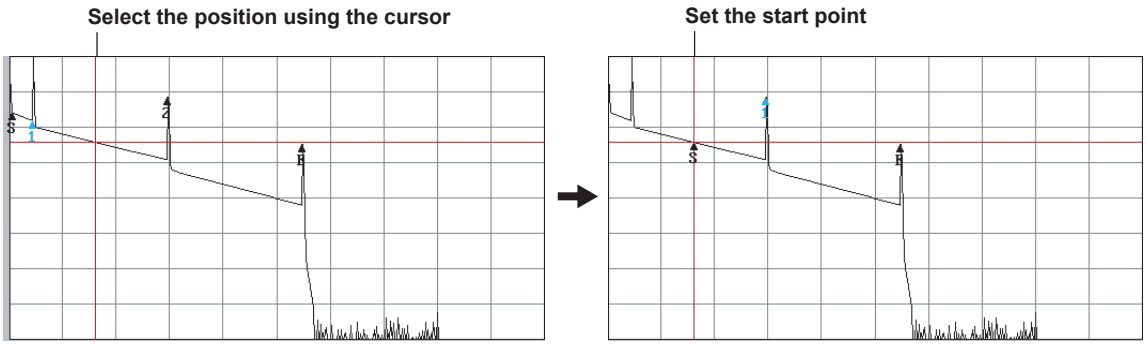
Moving the S Point

2. Press the **Event Edit** soft key. A soft key menu for editing events appears.
3. Press the **Rotary Knob** soft key to move the cursor to Cursor.
4. Turn the **rotary knob** to move the cursor to the position for starting the distance calculation.

- **Setting the Start Position**

5. Press the **More** soft key. The auxiliary function soft key menu appears.
6. Press the **Set Start Position** soft key. The S point moves to the start point.

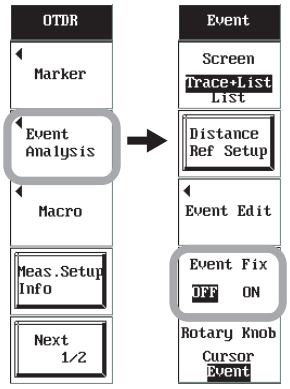




Fixing Events

You can create a template of the event positions and measure the return and splice loss at given positions.

2. Press the **Event Analysis** soft key. The event is detected.
3. Press the **Event Fix** soft key to move the cursor to ON.



Note

The event fix function turns OFF under the following conditions.

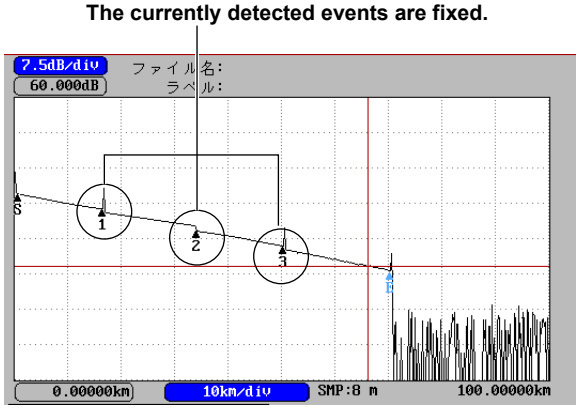
- If the distance range, sampling resolution or pulse width is changed.
- If you change the sampling interval of the measurement range during realtime measurement.
- If the distance range is set to auto, the event fix function turns OFF when you start the measurement.

Explanation

Event Fix Function

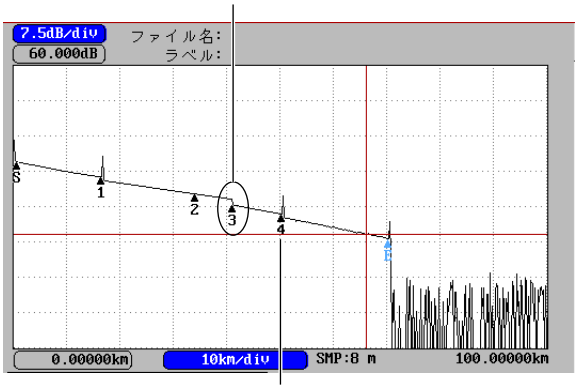
- If Event Fix is turned ON, the event positions displayed at that point are fixed.
- If an E event is detected before or after the E event position on the template, the text “END point by Auto Search” is set in the event note of the newly detected E event.
- If you turn Event Fix ON, the event positions displayed at that point are fixed, and these event positions can be used as a template for the next measurement.
  You can display the return and splice loss of the fixed event positions in the event list.

The currently detected events are fixed.



- The display method of events that are detected at positions other than the template event positions varies depending on the Event Fix Mode setting as shown below.
  - Event Fix Mode Is Set to MODE1
    Events at positions other than the template event positions are also displayed in the event list.

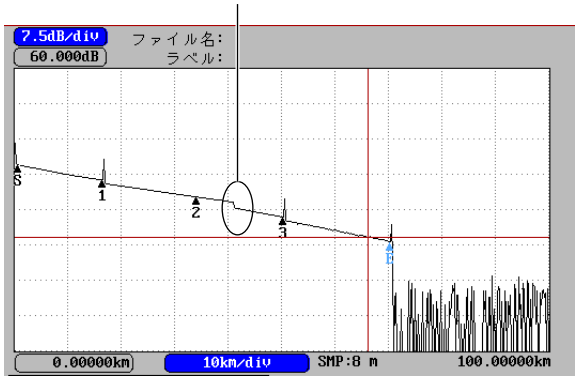
Events other than fixed events are also detected.



An earlier event was detected, so the number of this fixed event was updated (changed from 3 to 4).

  - Event Fix Mode Is Set to MODE2
    Only the events detected at the same positions as the template event positions are displayed in the event list.

Even if an event exists, it is not detected.



Note

- Firmware versions 3.01 and later support the event fix modes.
  For the operating procedure, see section 19.1.
- Firmware versions other than those listed above do not have this mode setting. Events at positions other than the template event positions are also displayed in the event list.

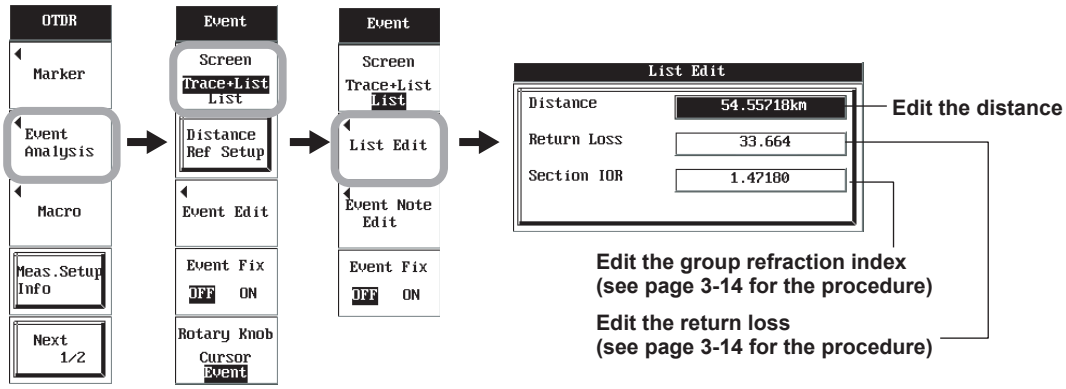
12.3 Editing the List

Procedure

The AQ7270/AQ7275 measures events using the information of the acquired waveform and the optical fiber cable conditions. However, if these conditions are known and you enter the values, you can find out the section group index and the backscattering light level of the optical fiber cable.

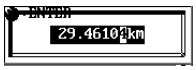
Editing Events

1. Press the **Event Analysis** soft key. The event is detected, and a soft key menu for the event display appears.
2. Press the **Screen** soft key. The list screen is displayed.
3. Move the cursor to the event you want to edit using the **arrow keys** or the **rotary knob**.
4. Press the **List Edit** soft key. The List Edit screen appears.



Editing the Distance

5. Move the cursor to Distance using the **arrow keys** or the **rotary knob**.
6. Press **ENTER**. The screen for setting the distance appears.
7. Select a digit using the **arrow keys** and set the value using the **arrow keys** or **rotary knob**.
8. Press **ENTER**. The distance is confirmed.

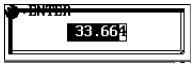


Note

- If you change the distance of an event, the section group index is recalculated.The distance may not exactly match the specified distance.
- Changing the distance of an event affects the values of other events.

Editing the Return Loss

5. Move the cursor to Return Loss using the **arrow keys** or the **rotary knob**.
6. Press **ENTER**. The screen for setting the return loss appears.
7. Select a digit using the **arrow keys** and set the value using the **arrow keys** or **rotary knob**.
8. Press **ENTER**. The return loss is confirmed.



Note

If you change the return loss of an event, the backscattering light level is recalculated. The return loss of other events is measured using the recalculated backscattering light level.

Editing the Section Group Index

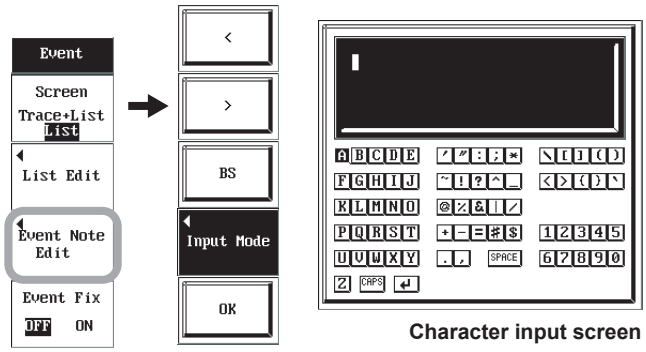
5. Move the cursor to Section IOR using the **arrow keys** or the **rotary knob**.
6. Press **ENTER**. The screen for setting the section group index appears.
7. Select a digit using the **arrow keys** and set the value using the **arrow keys** or **rotary knob**.
8. Press **ENTER**. The section group index is confirmed.

Note

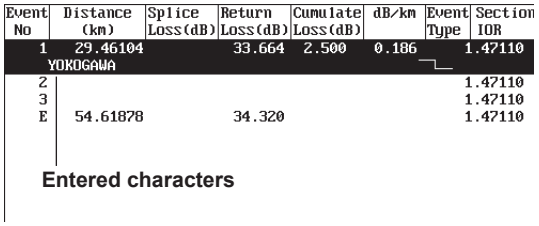
If you change the section group index of an event, the distance is recalculated.

Inserting a Comment

4. Press the **Event Note Edit** soft key. The character input screen appears.
5. Enter a comment for identification.
6. Press **ENTER**. The comment is displayed under the event information display.



Character input screen



Entered characters

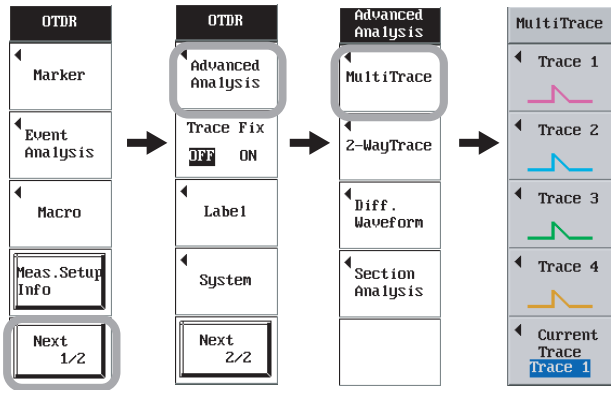
Note

- For details on entering characters, see section 18.6.
- You can enter the comment using up to 36 characters.

13.1 Displaying the Multiple Waveforms

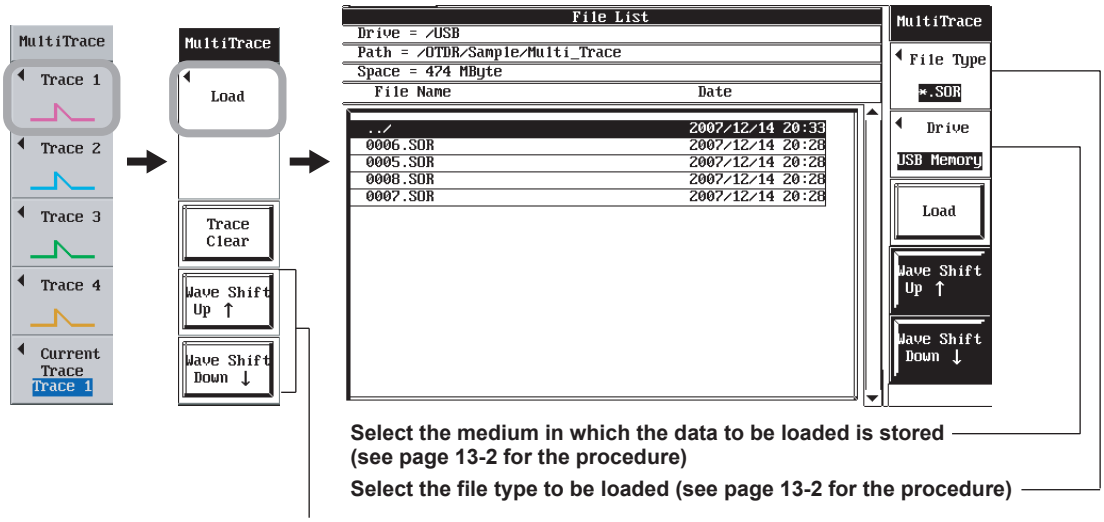
Procedure

1. Press the **Next 1/2** soft key.
2. Press the **Advanced Analysis** soft key. A soft key menu for the waveform analysis appears.
3. Press the **MultiTrace** soft key. A soft key menu for the multiple waveform analysis appears.



Loading the Waveforms

4. Press the **TRACE1 to 4** soft key. A soft key menu for the TRACE conditions appears.
5. Press the **Load** soft key. The soft key menu for loading waveform data and the file list screen appear.



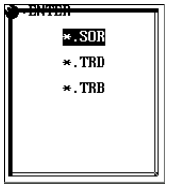
Select the medium in which the data to be loaded is stored (see page 13-2 for the procedure)

Select the file type to be loaded (see page 13-2 for the procedure)

Move the waveform (see page 13-3 for the procedure)

Selecting the File Type

6. Press the **File Type** soft key. A screen for selecting the file type appears.
7. Move the cursor to file type you want to select using the **arrow keys** or the **rotary knob**.
8. Press **ENTER**. The screen for selecting the file type closes.

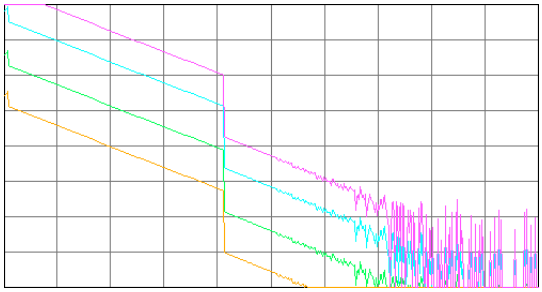


Selecting the Medium

9. Press the **Drive** soft key. A screen for selecting the drive appears.
10. Move the cursor to the drive you want to select using the **arrow keys** or the **rotary knob**.
11. Press **ENTER**. The screen for selecting the drive closes.

Loading a File

12. Move the cursor to the file you want to load using the **arrow keys** or the **rotary knob**.
13. Press the **Load** soft key. The waveform is loaded.



Moving the Waveform

14. Press the **Wave Shift Up** soft key. The display of the loaded waveform moves up.

15. Press the **Wave Shift Down** soft key. The display of the loaded waveform moves down.

Clearing the Waveform Display

16. Press the **Trace Clear** soft key. The waveform display of the screen disappears.

Note

Up to four waveforms can be displayed. Repeat steps 3 to 12.

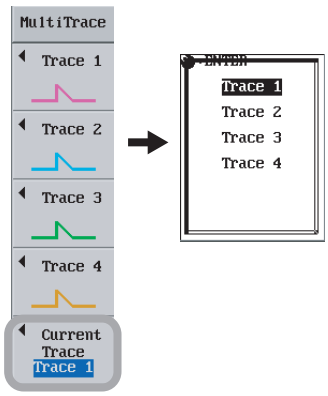
Specifying the Waveform to Be Analyzed

17. Press **ESC**. The multiple trace analysis screen moves back by one screen.

18. Press the **Current Trace** soft key. A screen for selecting TRACE 1 to 4 appears.

19. Move the cursor to the trace you want to select using the **arrow keys** or the **rotary knob**.

20. Press **ENTER**. The screen for selecting the trace closes.



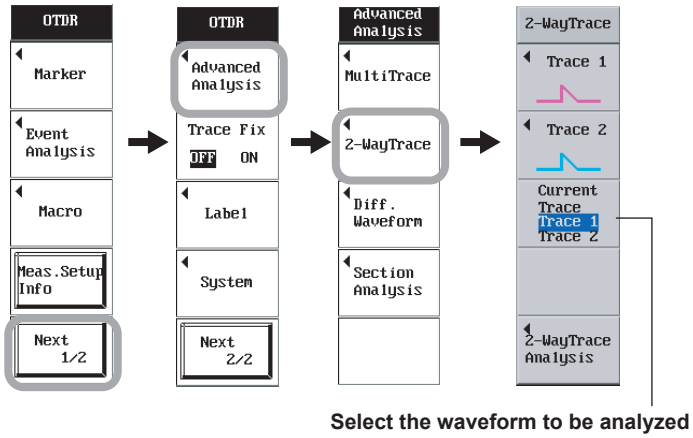
Note

- The cursor is displayed on the waveform of the trace selected by Current Trace.
- The return and splice loss values are displayed for the waveform selected by Current Trace.
- You can save the displayed waveform by pressing FILE. For the procedure, see section 18.1.

13.2 2-Way Trace

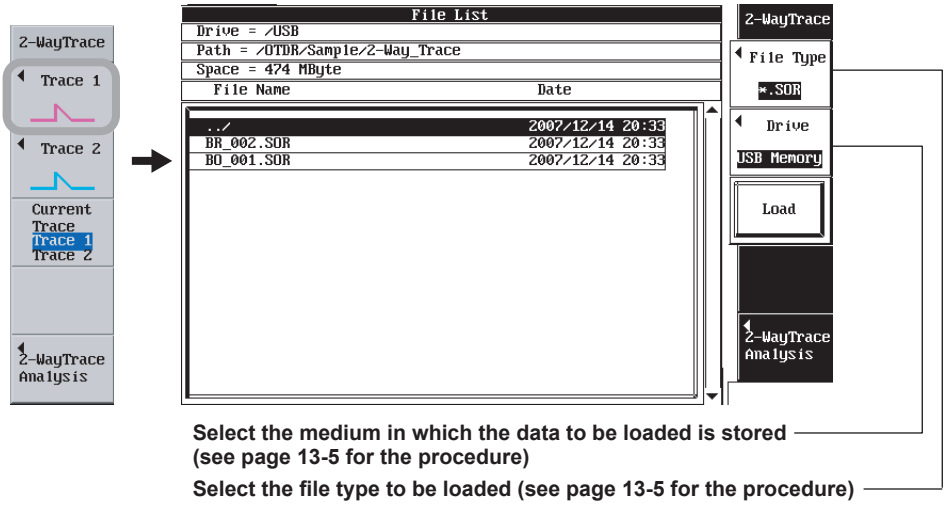
Procedure

1. Press the **Next 1/2** soft key.
2. Press the **Advanced Analysis** soft key. A soft key menu for the waveform analysis appears.
3. Press the **2-WayTrace** soft key. A soft key menu for the 2-way trace appears.



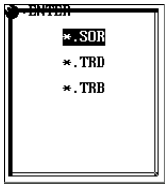
Loading the Waveforms

4. Press the **TRACE1** or **TRACE2** soft key. The soft key menu for loading waveform data and the file list screen appear.



Selecting the File Type

5. Press the **File Type** soft key. A screen for selecting the file type appears.
6. Move the cursor to file type you want to select using the **arrow keys** or the **rotary knob**.
7. Press **ENTER**. The screen for selecting the file type closes.

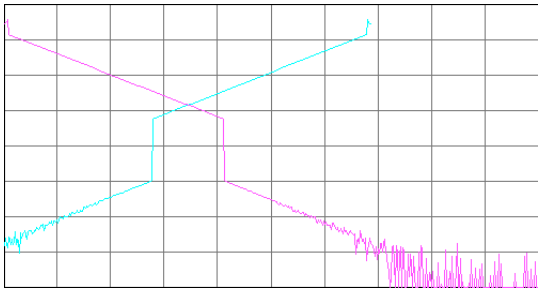


Selecting the Medium

8. Press the **Drive** soft key. A screen for selecting the drive appears.
9. Move the cursor to the drive you want to select using the **arrow keys** or the **rotary knob**.
10. Press **ENTER**. The screen for selecting the drive closes.

Loading a File

11. Move the cursor to the file you want to load using the **arrow keys** or the **rotary knob**.
12. Press the **Load** soft key. The waveform is loaded.



Specifying the Waveform to Be Analyzed

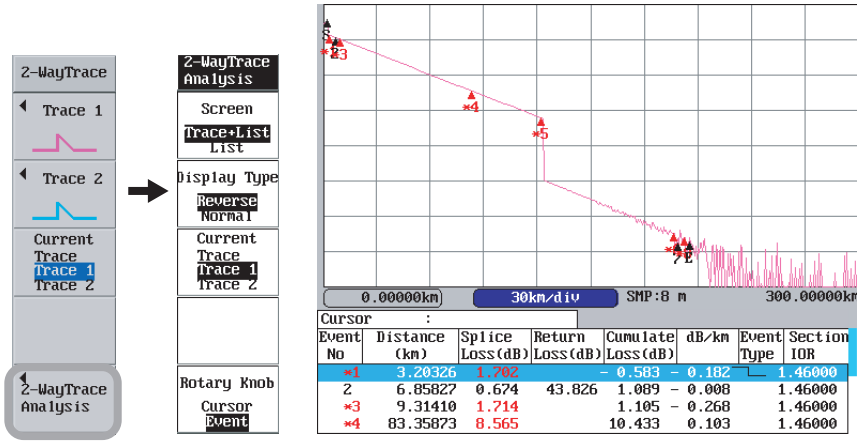
13. Press the **Current Trace** soft key. The cursor moves to TRACE1 or TRACE2.

Note

The cursor is displayed on the waveform of the trace selected by Current Trace.

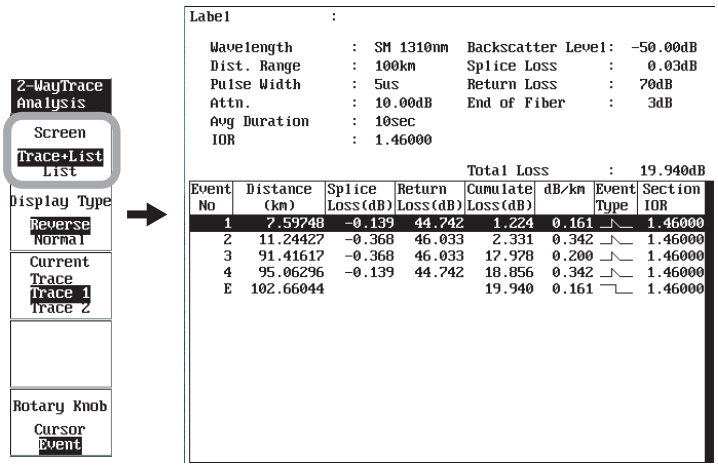
2-Way Trace Analysis of Waveforms

14. Press the **2-WayTrace Analysis** soft key. A soft key menu for the 2-way trace analysis and the event list screen appear.



Switching the Screen

15. Press the **Screen** soft key. The screen switches between Trace+List and List.



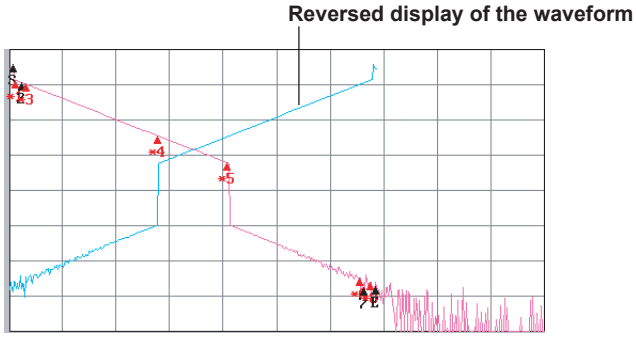
Note

Set the measurement conditions as follows to perform 2-way trace analysis.

- The event list is present.
- The wavelength of the two waveforms is the same.
- The measurement start position has not been changed (see the explanation in section 7.4 for details).
- The distance between the measurement reference (R) and the E event is the same.
- The displayed wavelengths can be saved to an image file.

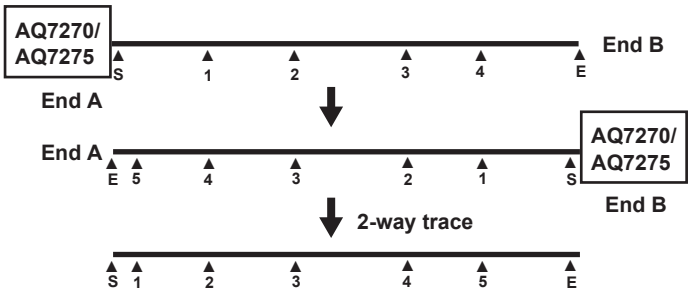
Reversing the Waveform Display

16. Press the **Display Type** soft key. The display direction of the waveform not selected as the Current Waveform is reversed.



Explanation

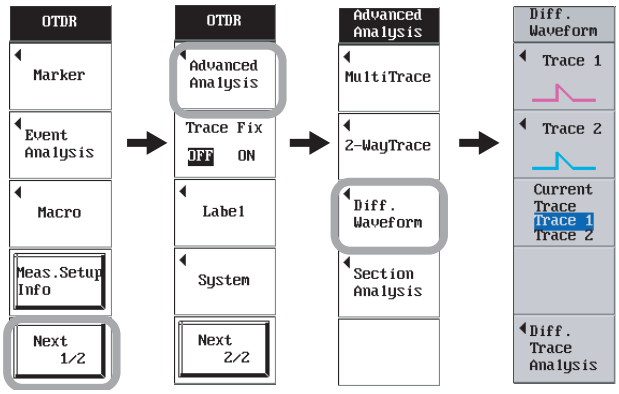
The 2-way trace function combines the events of the waveform measured from end A to end B of the optical fiber cable with the events of the waveform measured from end B to end A. In the figure below, the event that was in the dead zone of the near-end reflection (point S) when measured from end A is detected as event number 5 when measured from end B. In the 2-way trace, this event is displayed as event number 1.



13.3 Difference Waveform

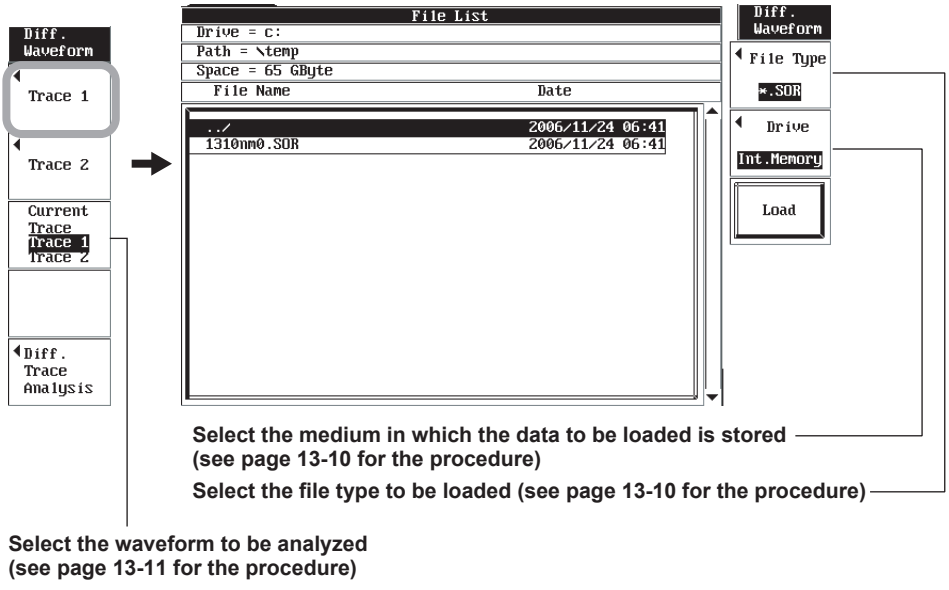
Procedure

1. Press the **Next 1/2** soft key.
2. Press the **Advanced Analysis** soft key. A soft key menu for the waveform analysis appears.
3. Press the **Diff. Waveform** soft key. A soft key menu for the difference waveform appears.



Loading the Waveforms

4. Press the **TRACE1** or **TRACE2** soft key. The soft key menu for loading waveform data and the file list screen appear.

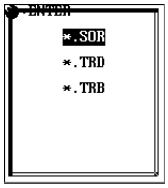


Selecting the File Type

5. Press the **File Type** soft key. A screen for selecting the file type appears.

6. Move the cursor to file type you want to select using the **arrow keys** or the **rotary knob**.

7. Press **ENTER**. The screen for selecting the file type closes.

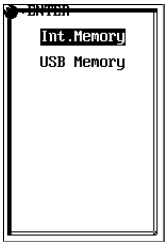


Selecting the Medium

8. Press the **Drive** soft key. A screen for selecting the drive appears.

9. Move the cursor to the drive you want to select using the **arrow keys** or the **rotary knob**.

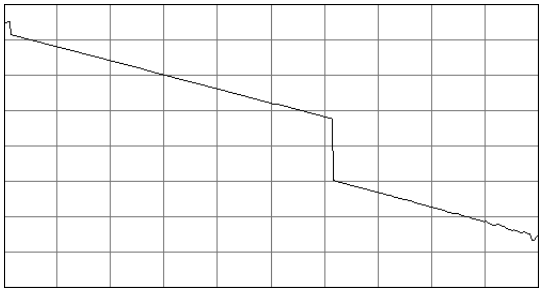
10. Press **ENTER**. The screen for selecting the drive closes.



Loading a File

11. Move the cursor to the file you want to load using the **arrow keys** or the **rotary knob**.

12. Press the **Load** soft key. The waveform is loaded.



Specifying the Current Waveform

13. Press the **Current Trace** soft key. The cursor moves to TRACE1 or TRACE2.

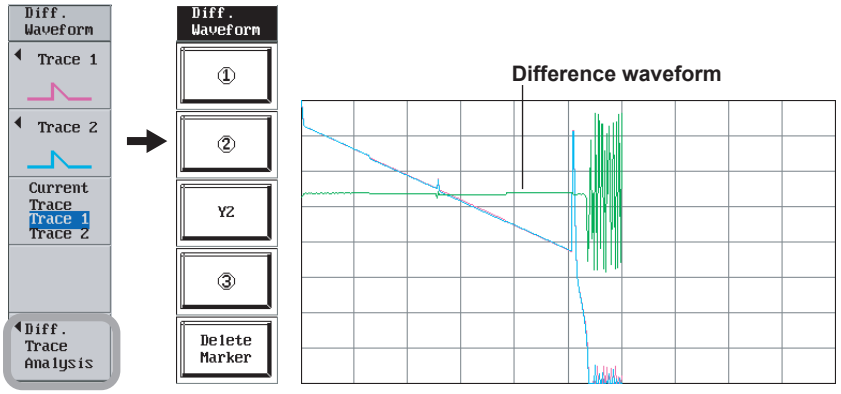
Note

- The cursor is displayed on the waveform of the trace selected by Current Trace.
- The return and splice loss values are displayed for the waveform selected by Current Trace.

Difference Analysis of Waveforms

The return and splice loss of the difference waveform is measured using markers.

14. Press the **Diff. Trace Analysis** soft key. The difference waveform is displayed on the screen, and a soft key menu for the difference waveform analysis appears.



Note

- The difference waveform is obtained by subtracting the values of the waveform selected as the current waveform from the other waveform.
- If the marker mode is marker, see 4 markers method in section 11.1.
- If the marker mode is line, see 5 markers method in section 11.1.
- The return and splice loss values of the difference waveform cannot be saved.
- Set the measurement conditions as follows to perform difference waveform analysis.
  - Sampling resolution
  - Measurement start position
- The displayed wavelengths can be saved to an image file.

13.4 Section Analysis

Procedure

The return and total loss can be measured in a specified section.

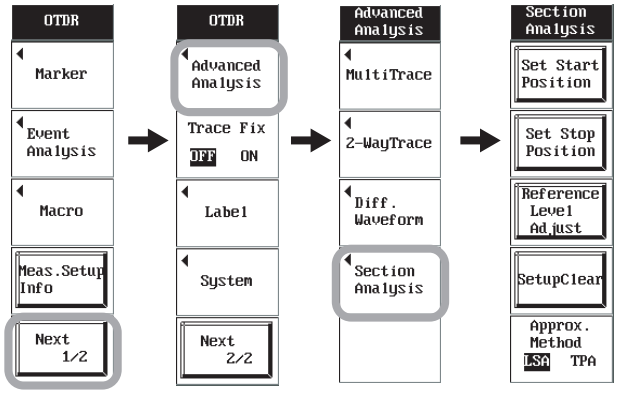
1. Press the **Next 1/2** soft key.
2. Press the **Advanced Analysis** soft key. A soft key menu for the waveform analysis appears.
3. Press the **Section Analysis** soft key. The section analysis soft key menu appears.

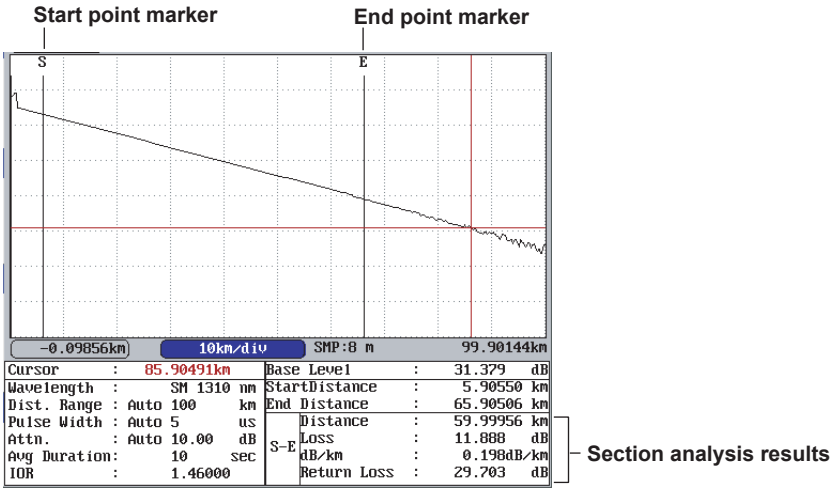
Setting the Start Point

4. Turn the **rotary knob**. A cursor is displayed on the screen.
5. Turn the **rotary knob** to move the cursor to the section start point on the waveform.
6. Press the **Set Start Position** soft key. The S marker appears.

Setting the End Point

7. Turn the **rotary knob** to move the cursor to the section end point on the waveform.
8. Press the **Set Stop Position** soft key. The E marker appears, and the distance between the S and E markers, the return loss, total loss, and Loss per Unit Length (dB/km) are measured and displayed.





Auto Setting of Section Analysis Markers (S, E)

You can automatically set marker ① or line marker n to the start point, and marker ② or line marker E to the stop point.

4. Press the **To be set by Marker** soft key. The **S** and **E** markers are automatically displayed in the specified positions for markers ① and ② or line markers **n** and **E**, respectively.

Note

Valid for waveform data for which markers ① and ② or line markers n and E are already set.

Setting the Reference Point for Return Loss Measurement

If necessary, you can change the reference point.

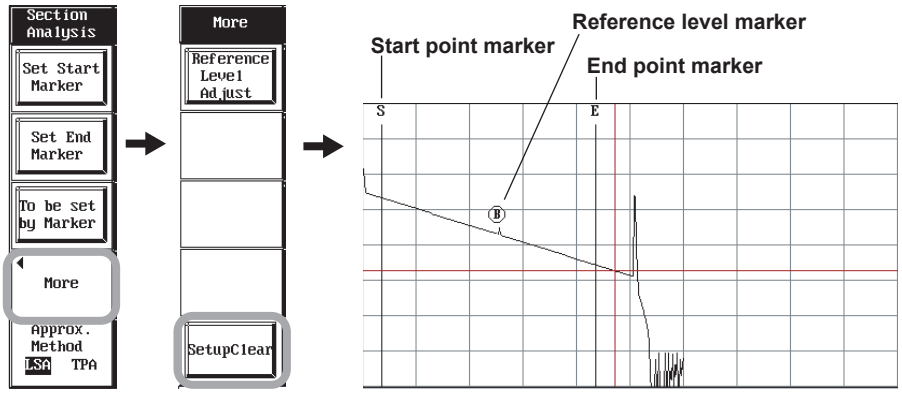
9. Press the **More** soft key.

10. Turn the **rotary knob** to move the cursor to the point where you want to set the reference on the waveform.

11. Press the **Reference Level Adjust** soft key. The B marker that shows the reference point appears, and the return loss is measured and displayed.

Note

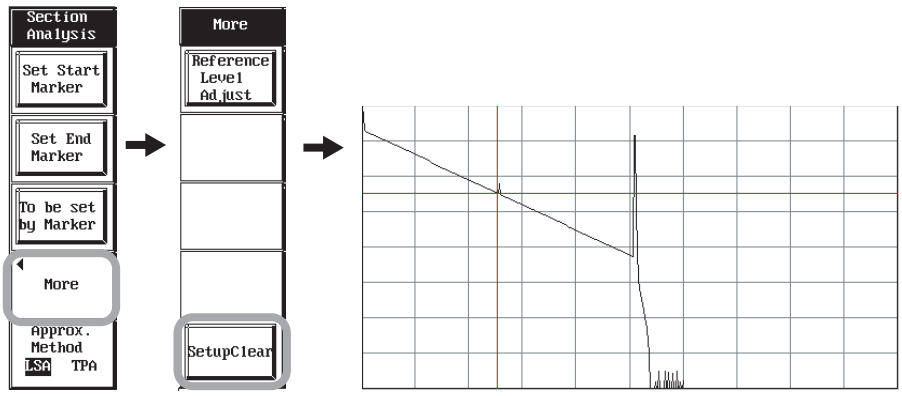
- If no reference point is specified, the start point is used as the reference point.
- The return loss is measured using the backscattering light level at the reference point.



Clearing of the Settings

9. Press the **More** soft key.

10. Press the **SetupClear** soft key. All markers and the measured results of return loss and total loss are cleared.

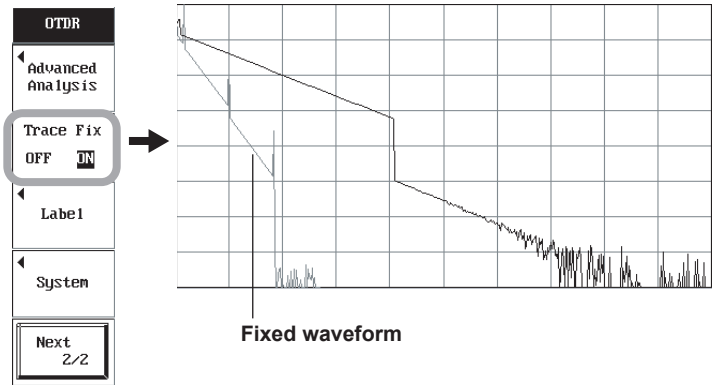


13.5 Fixing the Waveform

Procedure

You can keep a previously displayed waveform on the screen and perform waveform measurement. It is displayed along with the waveform currently being measured.

1. With a waveform displayed on the screen, press the **Trace Fix** soft key. The cursor moves to ON.
2. The previous waveform and the current waveform being measured are displayed simultaneously.



Note

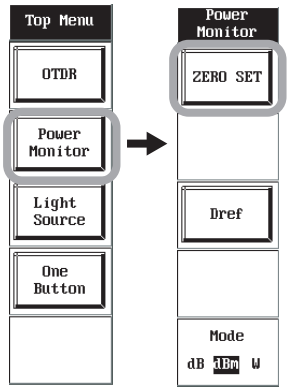
- You can also fix waveforms by loading stored waveform data.
- For the procedure to load waveforms, see section 18.1.
- The fixed waveform is cleared when you perform waveform analysis.
- When the multi wavelength measurement, this function is invalid.

14.1 Calibration before the Measurement

Procedure

Selecting the Power Monitor

1. Close the optical connector cover on the AQ7270/AQ7275 with the optical fiber cable removed from the AQ7270/AQ7275.
2. Press the **Power Monitor** soft key. The screen switches to the optical power monitor display, and a soft key menu for the power monitor appears.
3. Press the **ZERO SET** soft key. The message “Now Zeroing’ appears on the screen. The message disappears when the calibration is completed.



Explanation

By setting the zero level, the offset inside the optical power monitor section is adjusted, and the measurement of accurate absolute values becomes possible.

Note

Power monitor measurement uses only PORT1.

14.2 Setting the Reference

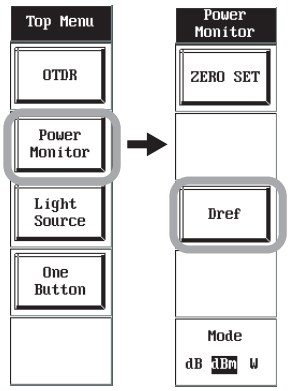
Procedure

1. Press the **Power Monitor** soft key. The screen switches to the optical power monitor display, and a setup screen and soft key menu for the power monitor appear.

Setting the Reference Using a Measured Value

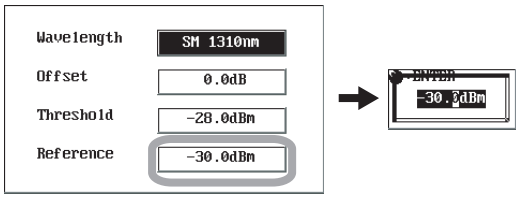
This function sets the reference value to the current displayed value.

2. Press the **Dref** soft key. The reference value of the screen changes.



Entering the Reference Manually

2. Press the **Mode** soft key to move the cursor to dB.
3. Move the cursor to Reference using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The screen for setting the reference appears.
5. Turn the **rotary knob** to set the reference value.
6. Press **ENTER**. The screen for setting the reference closes.



Note

- You cannot set the reference if the display unit is set to dBm or W.
- The display unit automatically changes to dB if you press the Dref soft key.

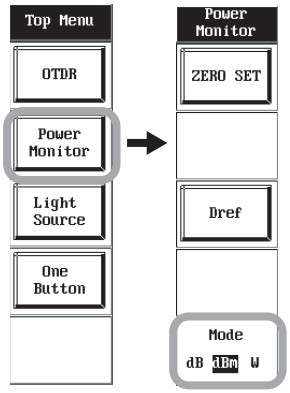
Explanation

The reference of the relative value measurement is set to the measured value at the specified point. The subsequent measurements display relative values with respect to the reference. The reference value is updated each time you set it.

14.3 Selecting the Display Unit

Procedure

1. Press the **Power Monitor** soft key. The screen switches to the optical power monitor display, and a soft key menu for the power monitor appears.
2. Press the **Mode** soft key to move the cursor to dB, dBm, or W.



Explanation

The following power display units are available.

dB	Relative value
dBm	Absolute value
W	Absolute value

The relationship between the different power display units are shown below.

PdBm = 10 × log (Pinput (mW)) or 10 × log (Pinput (W)/10^{-3})

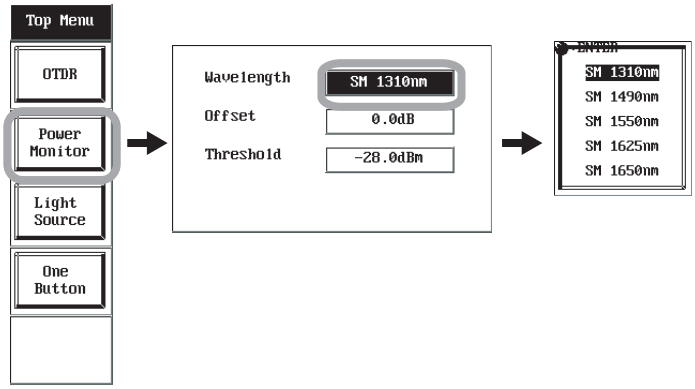
PdBm: Optical input power (dBm)

Pinput: Optical input power (W)

14.4 Selecting the Wavelength

Procedure

1. Press the **Power Monitor** soft key. The screen switches to the optical power monitor display, and a setup screen for the power monitor appears.
2. Move the cursor to Wavelength using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. A screen for selecting the wavelength appears.
5. Move the cursor to the wavelength you want to select using the **arrow keys** or the **rotary knob**.
6. Press **ENTER**. The screen for selecting the wavelength closes.



Note

The selectable test wavelengths vary depending on the model. For details, see section 19.1.

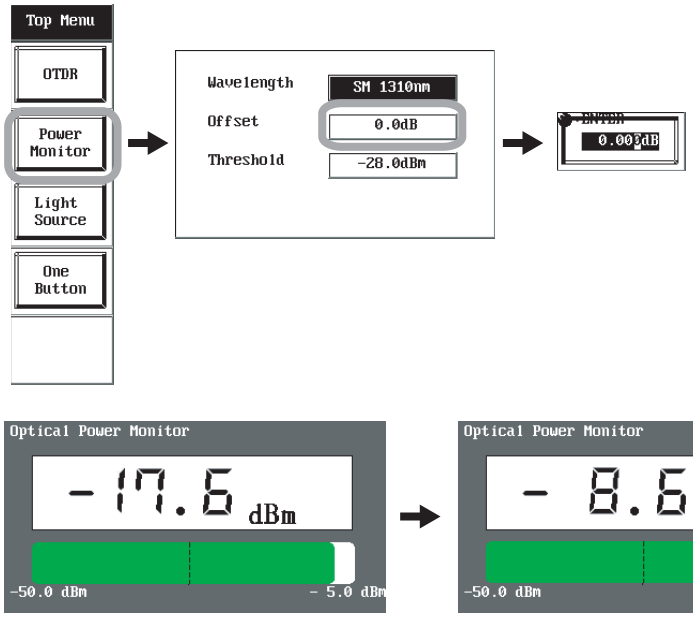
Explanation

The light receiving element of the optical power monitor has a wavelength sensitivity distribution. Because the AQ7270/AQ7275 has a function for correcting the wavelength sensitivity, power can be monitored accurately by setting the optical wavelength.

14.5 Setting the Offset

Procedure

1. Press the **Power Monitor** soft key. The screen switches to the optical power monitor display, and a setup screen for the power monitor appears.
2. Move the cursor to Offset using the **arrow keys** or the **rotary knob**.
3. Press **ENTER**. The screen for setting the offset appears.
4. Select a digit using the **arrow keys** and set the offset value using the **arrow keys** or **rotary knob**.
5. Press **ENTER**. The screen for setting the offset closes.



Note

The selectable range is –9.9 to 9.9 dB.

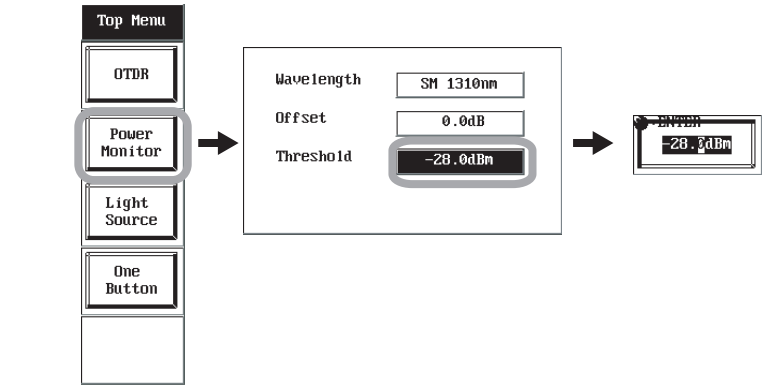
Explanation

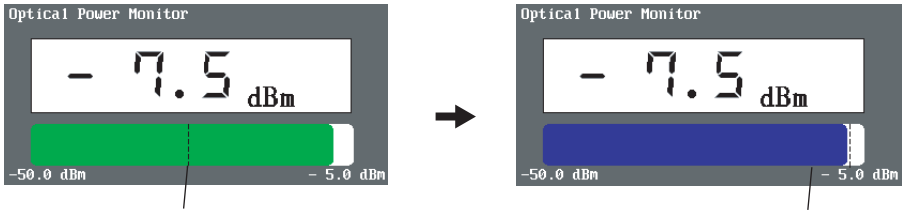
If you set an offset, the optical input power (dBm) is displayed with the offset value added.

14.6 Set the Threshold Level

Procedure

1. Press the **Power Monitor** soft key. The screen switches to the optical power monitor display, and a setup screen for the power monitor appears.
2. Move the cursor to Threshold using the **arrow keys** or the **rotary knob**.
3. Press **ENTER**. The screen for setting the threshold level appears.
4. Select a digit using the **arrow keys** and set the threshold level using the **arrow keys** or **rotary knob**.
5. Press **ENTER**. The screen for setting the threshold level closes.





The threshold level is –25 dB, and the value is exceeding the threshold level

The threshold level is –7 dB, and the value is not exceeding the threshold level

Note

The selectable range is –50.0 dB to –5.0 dB.

Explanation

Set the detection level to monitor the optical pulse during the optical pulse test.
The ratio of the level is displayed in the progress bar on the screen while monitoring the power. If the level is less than the threshold level, the progress bar is displayed in blue. If the level exceeds the threshold level, the progress bar is displayed in green. If an optical input greater than –4.0 dBm is received, an alert message is displayed.
You cannot select other functions (OTDR and Light Source) while the alert message is displayed. Because the AQ7270/AQ7275 may malfunction, remove the optical fiber cable from the AQ7270/AQ7275.

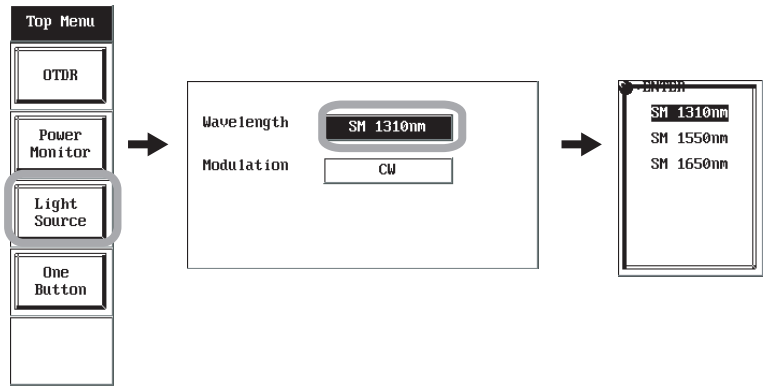
15.1 Light and Stabilized Light Source

Procedure

Selecting the Wavelength

The AQ7270/AQ7275 can be used as a light source.

1. Press the **Light Source** soft key. The screen switches to the light source display, and a setup screen for the light source appears.
2. Move the cursor to Wavelength using the **arrow keys** or the **rotary knob**.
3. Press **ENTER**. A screen for selecting the wavelength appears.
4. Move the cursor to the wavelength you want to select using the **arrow keys** or the **rotary knob**.
5. Press **ENTER**. The screen for selecting the wavelength closes.



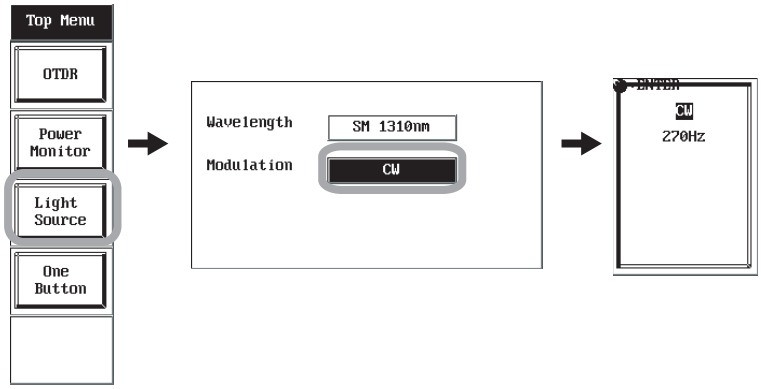
Note

The selectable test wavelengths vary depending on the model. For details, see section 21.1.

Selecting the Modulation Light

The optical output can be modulated.

1. Press the **Light Source** soft key. The screen switches to the light source display, and a setup screen for the light source appears.
2. Move the cursor to Modulation using the **arrow keys** or the **rotary knob**.
3. Press **ENTER**. A screen for selecting the modulation appears.
4. Move the cursor to the modulation you want to select using the **arrow keys** or the **rotary knob**.
5. Press **ENTER**. The screen for selecting the modulation closes.



Executing the Optical Output

WARNING

Do not remove the optical fiber cable, because light is emitted from the optical pulse output port of the AQ7270/AQ7275 while the measurement is in progress. Visual impairment may occur if the light enters the eye.

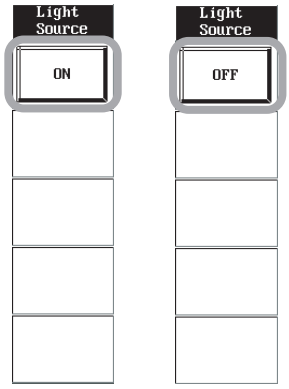
1. Press the **Light Source** soft key. The screen switches to the light source display, and a soft key menu for the light source appears.

Turning ON the Output

2. Press the **ON** soft key. The soft key changes to OFF, and LASER ON indicator appears on the screen.

Stopping the Output

3. Press the **OFF** soft key. The LASER ON indicator on the screen disappears.



Explanation

Selecting the Modulation Light

You can select the frequency of the modulation light that will be used as the light source for the optical fiber identifier.

- CW (continuous light)
- 270 Hz

15.2 Visible Light Source

Procedure

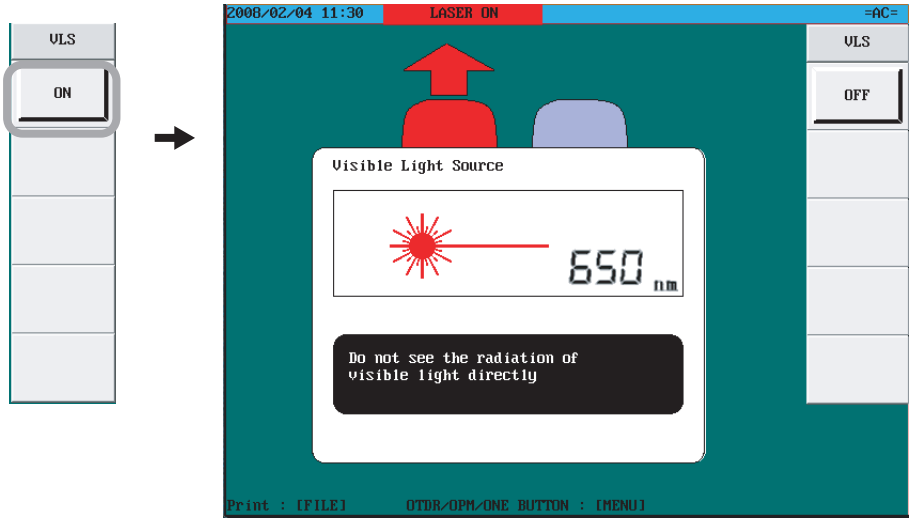
WARNING

When laser light is being emitted, do not look directly at the laser beams. Laser light entering the eyes can cause severe injury and loss of vision.

1. Press the **Visible Light Source** soft key. The screen changes to the visible light source screen, and the soft key menu regarding visible light sources appears.

Output

2. Press the **ON** soft key. The laser lights. The laser light emission message appears on screen, and the marker blinks.



Stopping Output

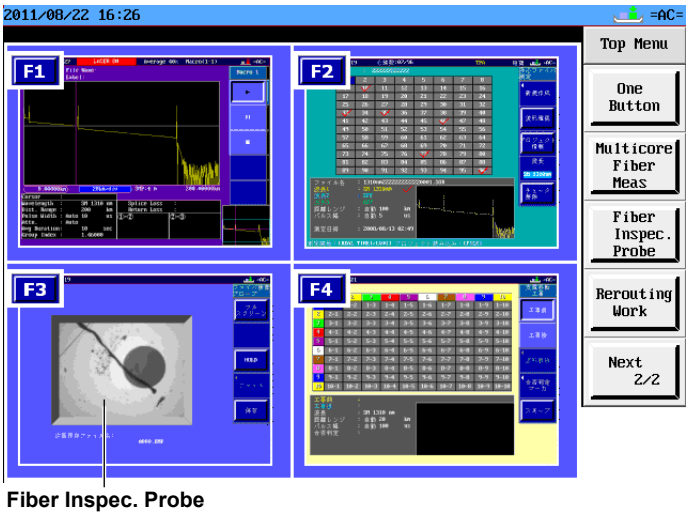
3. Press the **OFF** soft key. The laser emission stops. The laser light emission message and markers disappear from the screen.

16.1 Using Fiber Inspection Probes to View the Status of Optional Fiber End Faces.

Fiber End Face Checking (firmware version 2.08 or later)

By connecting a commercially available fiber inspection probe that has a USB interface, to an AQ7270/AQ7275 USB port, you can show photographs of optical fiber end faces on the AQ7270/AQ7275 display. These pictures can be saved as data.

TOP screen (When you mount an optional visible ray).

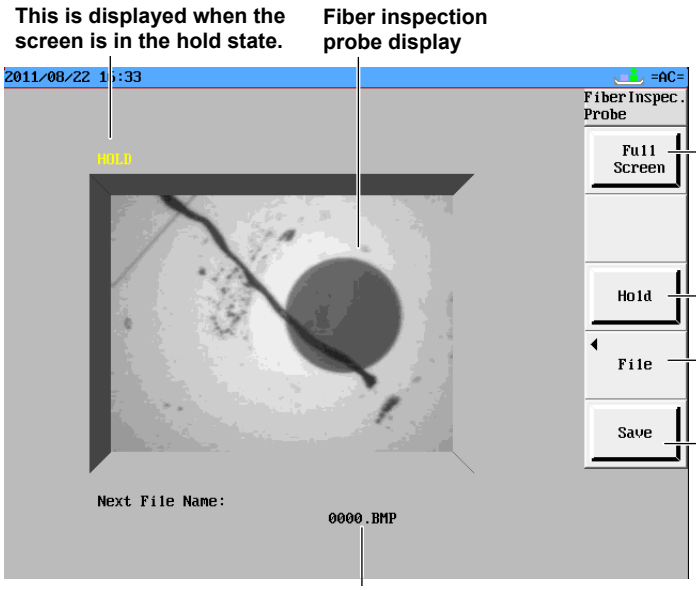


Procedure

Fiber End Face Checking Screen

1. Using the rotary knob and ENTER, select Fiber Inspection Probe to display the following screen.
2. Connect the fiber inspection probe's USB cable to the USB Type A port on the AQ7270/AQ7275.

   Just connecting the probe to the AQ7270/AQ7275 will display the picture on the screen. If you disconnect the USB cable, the picture will disappear.



Switches the full-screen display
Press this soft key to switch to the full-screen display. Press a soft key or an operation key to return to the previous screen.

Holds the screen
Press this soft key to put the screen into the hold state. When in the hold state, "HOLD" is displayed at the top of the screen. If you press this soft key again, the hold state will be cleared.

File
See section 18.1. The only file operation that you can perform is saving files. You can save the file as one of the following three file types.
- BMP
- PNG
- JPG

You can set the file type when the screen is in the hold state.

Starts saving
Press this soft key to save the screen that is displayed.

Explanation

Connecting Fiber Inspection Probes

Hot-plugging is supported; you can connect or disconnect the USB device at any time, regardless of whether the AQ7270/AQ7275 is on or off. If you connect the USB fiber inspection probe while the AQ7270/AQ7275 is on, the AQ7270/AQ7275 will automatically recognize the probe.

For cautions regarding connecting the probe, see Note in section 18.1.

For information about compatible fiber inspection probes, contact your nearest YOKOGAWA dealer.

17.1 Measuring Optical Pulses before Work and after Work

Firmware versions 3.01 and later support this function.

Procedure

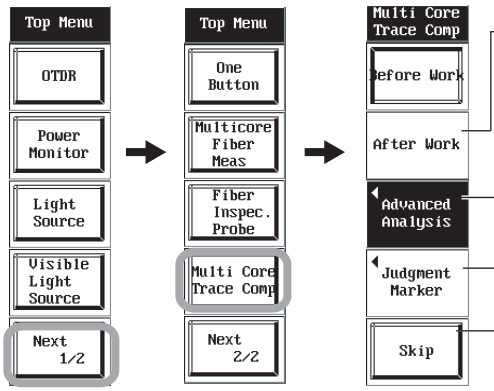
When installed fibers are moved because of road work or other external factors, you can efficiently perform measurements by using this function.

WARNING

During measurement, the AQ7270/AQ7275 optical pulse output port transmits light, so do not remove the optical fiber cable that is connected to this port. Visual impairment may occur if the light enters the eye.

Selecting the Multi Core Trace Comparison

1. Press the **Next 1/2** soft key.
2. Press the **Multi Core Trace Comp.** soft key. The multi core trace comparison display and a soft key menu for multi core trace comparison appear.



Measure the optical pulse after work (see page 17-2 for the procedure)

Compare the waveform before work and the waveform after work (see page 17-3 for the procedure)

The AQ7270/AQ7270 can perform pass/fail judgments automatically when measurements are completed (see page 17-6 for the procedure)

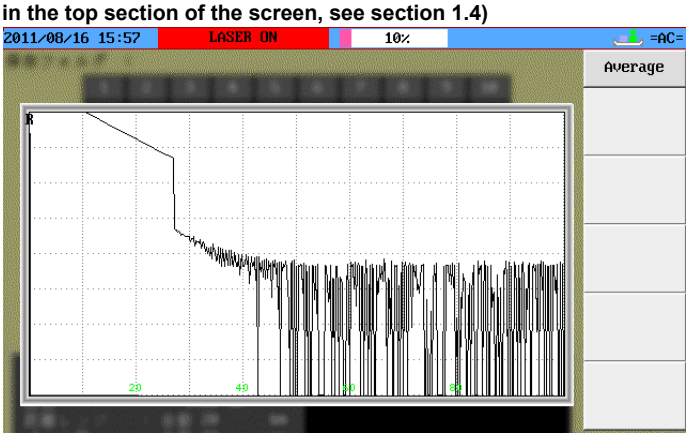
Skip: specify a core that you do not want to measure (see page 17-7 for the procedure)

Delete Wave: delete a measured file (see page 17-7 for the procedure)

Measuring the Optical Pulse before Work

3. Press the **Before Work** soft key.
4. Press **REALTIME** or **AVG**. The optical pulse measurement display appears, and the measurement starts. When the measurement is finished, the AQ7270/AQ7275 returns to the previous display.

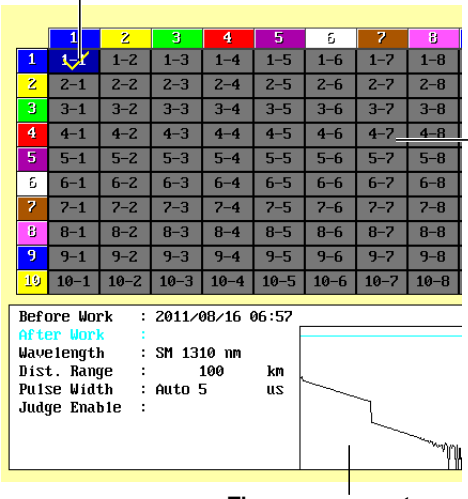
Display during measurement (for information on the contents displayed in the top section of the screen, see section 1.4)



- **Main View Screen**

Display after measurements are complete

Check marks are displayed for the cores whose measurements are complete.



This is the core list.
For details on how the number of cores and core numbers are displayed, see section 17.2.

The measurement waveform of the core selected in the core list is displayed. You can select the core using the arrow keys.

Note

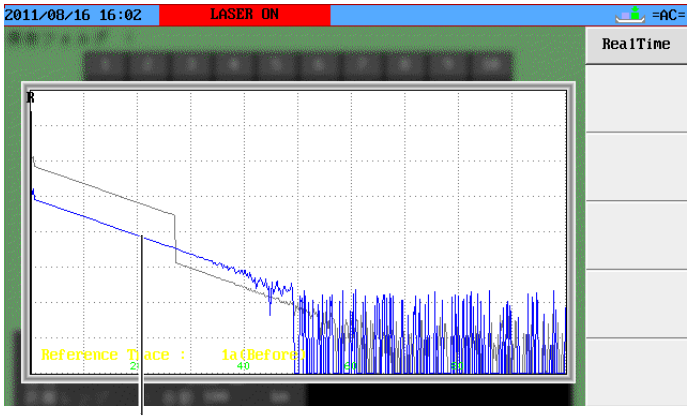
- During real-time measurement, press REALTIME again to finish measuring.
- During averaging measurement, the measurement stops automatically when it has completed. You can finish measuring by pressing AVG during measurement. The time that the measurement takes to complete varies depending on settings such as the distance range and the average count. For details, see the explanation in section 7.2.
- For details on the measurement conditions such as the wavelength and the distance range, see section 17.3.
- If you change the measurement conditions, the existing measurement waveforms will be deleted. A message will be displayed to confirm that you want to carry out the deletion.
- If you start measurements again, the existing measured results will be deleted. A message will be displayed to confirm that you want to carry out the deletion.

Measuring the Optical Pulse after Work

5. Press the **After Work** soft key.

6. Press **REALTIME** or **AVG**. The optical pulse measurement display appears, and the measurement starts. When the measurement is finished, the AQ7270/AQ7275 returns to the main view display.

Display during measurement (for information on the contents displayed in the top section of the screen, see section 1.4)



The waveform before work and the waveform after work are displayed on top of each other with different colors.

Note

The operating conditions are the same as those listed under Note in the section “Measuring Optical Pulses before Work.”

Waveform Analysis

You can use markers or line markers to calculate the splice loss and return loss. By comparing two waveforms, you can check whether work has been completed correctly. You can use the Marker Mode setting to specify markers or line markers.

Note

- For details on the marker modes, see section 10.1.
- Set the marker mode on the optical pulse measurement (OTDR) screen. On the top screen, press the OTDR soft key. For the rest of the procedure to select the marker mode, see "Selecting the Marker Mode" in section 10.1.

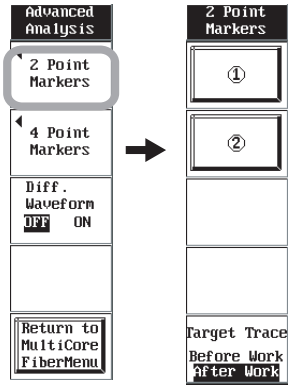
1. Press the **Advanced Analysis** soft key. A soft key menu for the waveform analysis appears. If there is no measurement waveform, you cannot perform any operations.
2. Press the **Target Trace** soft key. Select the waveform before work or the waveform after work to analyze.

Note

Markers or line markers can only be set on the waveform before work or the waveform after work. Reset the markers or line markers when you want to analyze the other waveform.

- **2 Markers Method (Markers)**

3. Press the **2 Point Markers** soft key. A soft key menu for the 2 markers method appears.

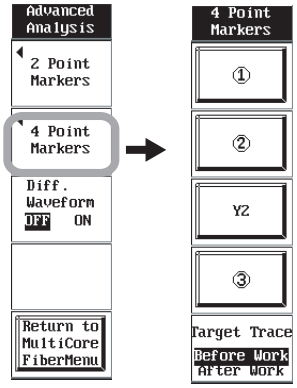


Note

- For the operating procedure of the 2 markers method (markers) and how to view the return loss, see step 4 and the subsequent steps in the procedure under "If the Marker Mode Is Set to Marker" in section 11.3.
- For how to view the splice loss, see "2 Markers Method" in the explanation in section 11.1.
- For how to operate markers and cursors, see section 10.1.

- **4 Markers Method (Markers)**

3. Press the **4 Point Markers** soft key. A soft key menu for the 4 markers method appears.

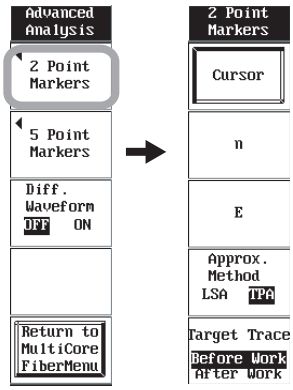


Note

- For the operating procedure of the 4 markers method (markers) and how to view the splice loss, see step 4 and the subsequent steps in the procedure under “If the Marker Mode Is Set to Marker” and the explanation in section 11.1.
- For how to operate markers and cursors, see section 10.1.

- **2 Markers Method (Line Markers)**

3. Press the **2 Point Markers** soft key. A soft key menu for the 2 markers method appears.

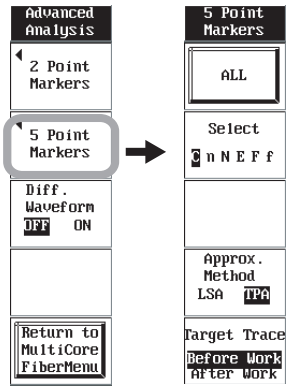


Note

- For the operating procedure of the 2 markers method (line markers) and how to view the return loss, see step 4 and the subsequent steps in the procedure under “If the Marker Mode Is Set to Line” in section 11.3.
- For how to view the splice loss, see “2 Markers Method” in the explanation in section 11.1.
- For how to operate markers and cursors, see section 10.1.

- **5 Markers Method (Line Markers)**

  3. Press the **5 Point Markers** soft key. A soft key menu for the 5 markers method appears.



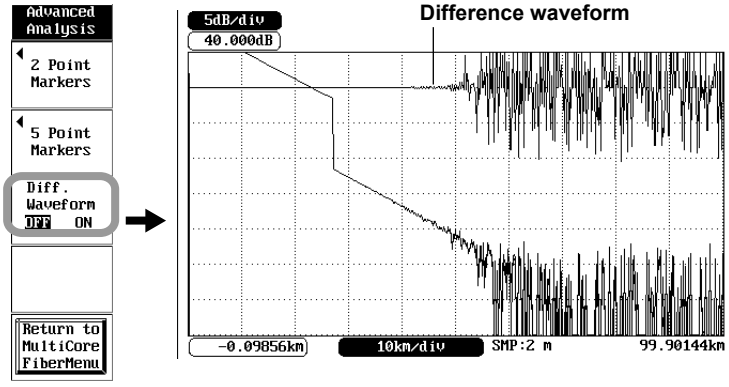
Note

- For the operating procedure of the 5 markers method (line markers) and how to view the splice loss, see step 3 and the subsequent steps in the procedure under “If the Marker Mode Is Set to Line” and the explanation in section 11.1.
- For the cursor link operating procedure, see “Collective Display of Line Markers” in section 10.1.

- **Displaying the Difference Waveform of the Waveforms before and after Work**

  You can compare the measured waveform of the core after work is completed with the measured waveform of another core or the waveform before work to display the difference waveform. Set the measured waveform that will be used as the reference in advance.

  4. Press the **Diff. Waveform** soft key to move the cursor to ON.



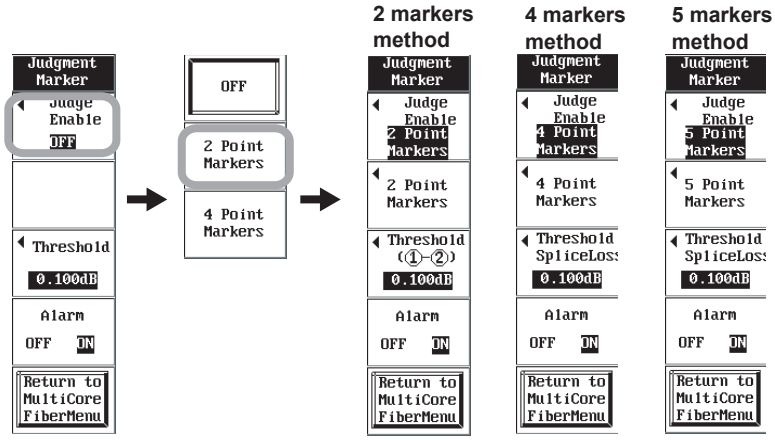
Note

For the reference setup procedure, see section 17.4.

Performing Pass/Fail Judgments after Work

You can set a threshold level to judge whether the splice losses at fiber splices are within a specified range after the movement work is completed. During optical pulse measurements after work is completed, the judgment is performed automatically, and the result is displayed on the screen.

1. Press the **Judge Marker** soft key. A soft key menu for the pass/fail judgment markers appears.
2. Press the **Judge Enable** soft key. A soft key menu for selecting the markers or line markers to use in calculating the splice loss appears.
3. Select markers or line markers. A soft key menu for pass/fail judgment markers appears.



- **Setting Markers on the Measured Waveform before Work at the Splice Loss Locations Caused by Splices**

4. Press the markers or line markers (2 Point Markers, 4 Point Markers, or 5 Point Markers) soft key.
5. Set the markers or line markers.
6. Press the Target Trace soft key to move the cursor to Before Work.

Note

For details on operating the markers or line markers, see step 3 on pages 17-3 to 17-5.

- **Setting the Threshold Level**

7. Press the **Threshold** soft key. The screen for setting the threshold level appears.
8. Set the threshold level using the **arrow keys** or the **rotary knob**.
9. Press **ENTER**. The threshold level is confirmed.

Note

Pass/fail judgment is performed automatically during measurement. However, if marker or line marker settings are changed when you leave the soft key menu for pass/fail judgment markers and return to the main view screen, pass/fail judgment will be performed again on all the cores. In this situation, a message asking you to confirm whether you want to perform pass/fail judgment will be displayed. If you return to the main view screen without performing pass/fail judgment, the conditions of the set markers or line markers will be disabled.

- **Selecting Whether an Alarm Is Sounded**

The AQ7270/AQ7275 can sound an alarm when a pass/fail judgment results in a pass.

10. Move the cursor to Alarm using the **arrow keys** or the **rotary knob**.
11. Press **ENTER** to move the cursor to ON or OFF.

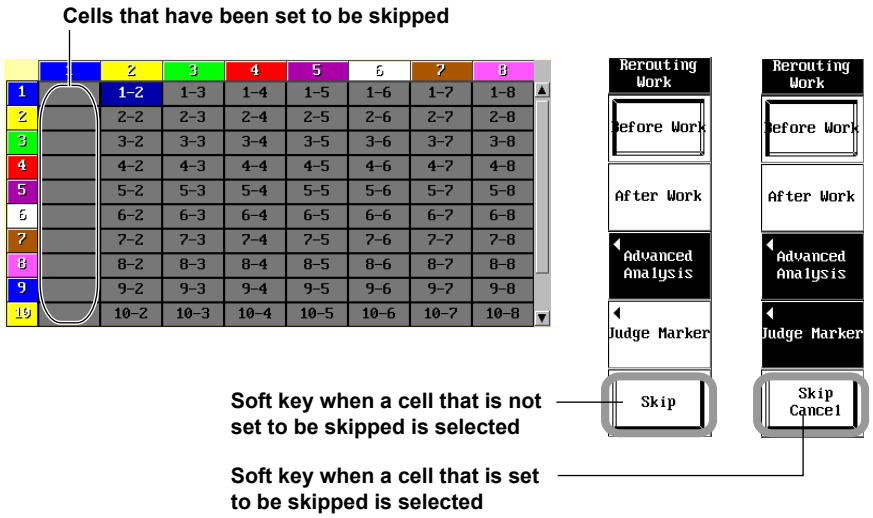
Note

The alarm is enabled during realtime measurement. You cannot use the alarm during averaging measurement.

Setting Core Numbers That Will Not Be Measured

If there are cores that are not used or that you will not measure, you can use this function to exclude them from the measurement.

1. On the main view screen, move the cursor to a cell that has the number of a core that you do not want to measure using the **arrow keys** or the **rotary knob**.
2. Press the **Skip** soft key. The core number disappears from the cell.
3. Press the **Skip Cancel** soft key to clear this setting and display the core number.

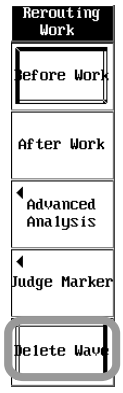


Note

When measured waveforms are displayed in the cells of the main view screen, the Skip soft key is not displayed.

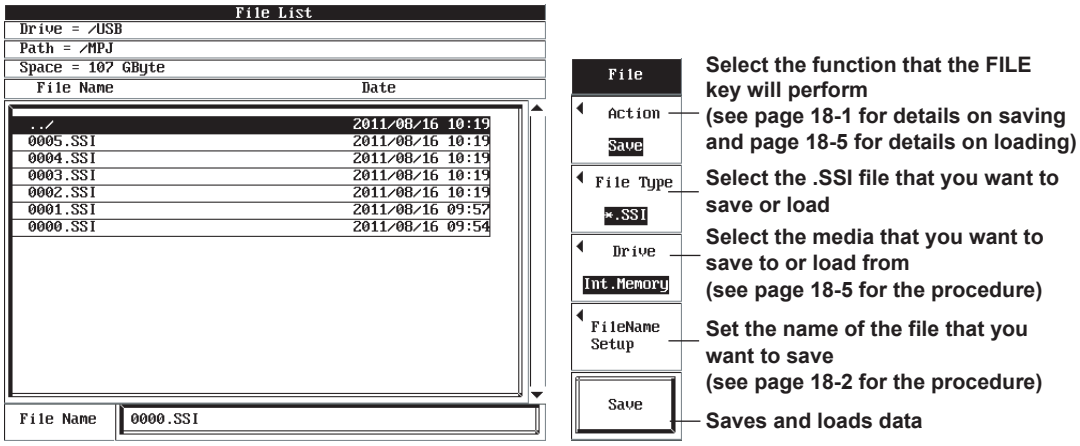
Deleting Measured Results

1. On the main view screen, move the cursor to a cell that has the number of a core that you want to delete using the **arrow keys** or the **rotary knob**.
2. Press the **Delete Wave** soft key. The measured results file is deleted, and the check mark that is displayed in the cell changes.
   If the results from before work and the results from after work are both deleted, the check mark disappears. If one set of results remains, the check mark is displayed in yellow or blue.



Saving and Loading Measured Results

1. Press **FILE**. The soft key menu for operating the waveform data and the file list screen appear.



- **Saving**

2. Press the **Action** soft key. The screen for operating files appears.
3. Move the cursor to Save using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The soft key menu for saving the waveform appears.
5. Press the **Save** soft key. The waveform data is saved.

- **Loading**

2. Press the **Action** soft key. The screen for operating files appears.
3. Move the cursor to Load using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The soft key menu for loading the waveform appears.
5. On the file list screen, move the cursor to the file that you want to load using the **arrow keys** or the **rotary knob**.
6. Press the **Load** soft key. The file is loaded.

Note

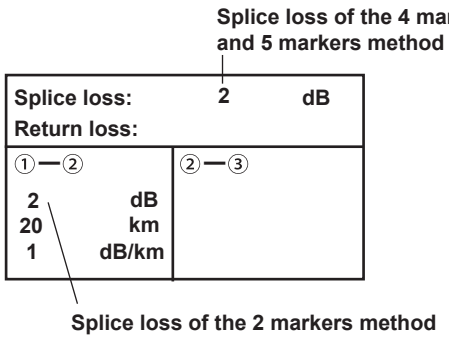
- You can only save and load .SSI files.
- The multi core trace comparison function requires 100 kB of memory space for each core measurement. If there are 100 cores, a total of 200 temporary files (100 before work and 100 after work) will be created, so a maximum of 20 MB of memory space is required. When measurements are finished, the measured results are saved automatically. If there is not enough free memory space to save all the results, an error message is displayed. Check that there is sufficient space to save the results before you perform measurements. The free space is indicated by “space” on the file list screen.

Explanation

Performing Pass/Fail Judgments after Work

- **Threshold**

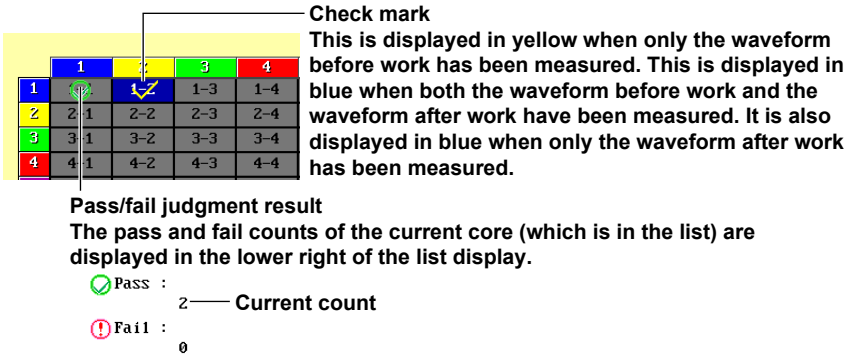
  This value indicates how high of a splice loss will be allowed after work is completed. This is the threshold level of splice losses in the 4 markers method and the 5 markers method. It is the threshold level of ① – ② of the calculated results of the measured data in the 2 markers method.



- **Pass/Fail Judgment**

  The AQ7270/AQ7275 judges the value of the splice loss after work as a pass if the value is less than or equal to the threshold level and as a fail if the value is greater than the threshold level. The results are displayed on the core list screen.

  Example Threshold level: 2.5 dB
  Splice loss after work: 2.5 dB →Pass
  2.6 dB →Fail



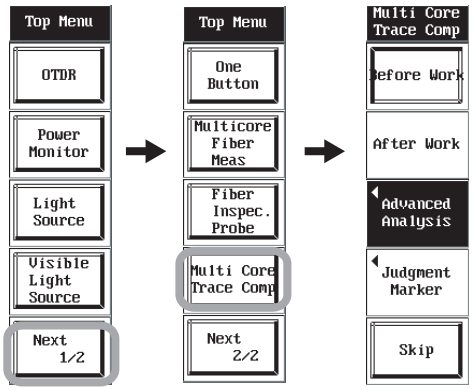
17.2 Configuring the Core Information

Firmware versions 3.01 and later support this function.

You can configure the information of multicore fibers. You can perform measurements with the factory default settings, but the cells on the main view screen will be easier to view if you set the core information so that it matches the cores that you are working on.

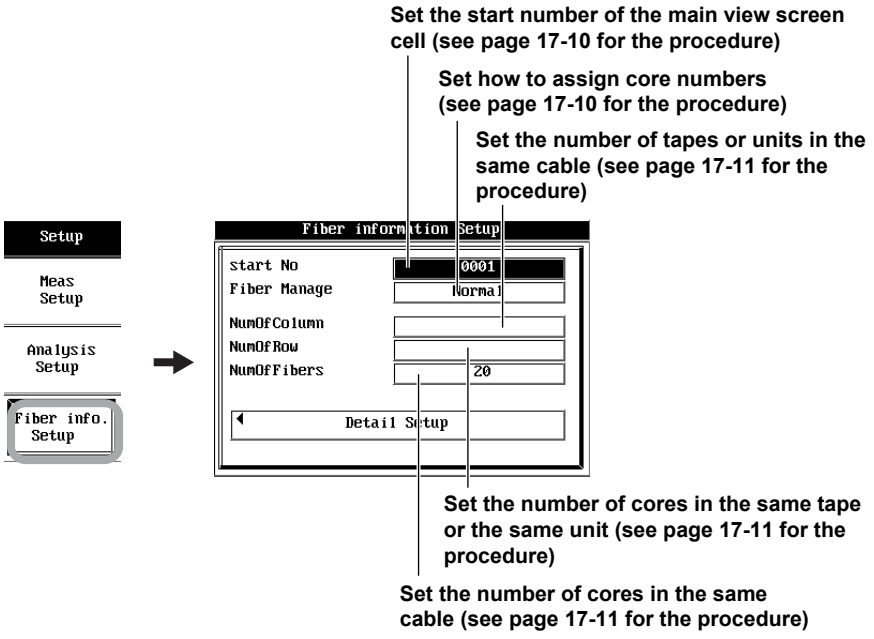
Selecting the Multi Core Trace Comparison

1. Press the **Next 1/2** soft key.
2. Press the **Multi Core Trace comp.** soft key. The multi core trace comparison display and a soft key menu for multi core trace comparison appear.



Selecting Fiber Information Setup

3. Press **SETUP**. A soft key menu for the settings appears.
4. Press the **Fiber info. Setup** soft key. The Fiber information Setup screen appears.



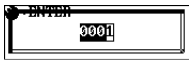
- **Setting a Cell's Start Number**

  5. Move the cursor to Start Number using the **arrow keys** or the **rotary knob**.

  6. Press **ENTER**. The screen for setting the start number appears.

  7. Set the start number using the **rotary knob**.

  8. Press **ENTER**. The start number is confirmed.



Note

- If you set the start number to a large value, an error message will be displayed if there are not enough numbers that you can assign to all the cores.
  Example: If the start number is 9901, for a cable that has 100 cores, you cannot assign a number to core number 100, so an error message is displayed.
- If you change the start number of a cell, the existing measurement waveforms will be deleted. A message will be displayed to confirm that you want to carry out the deletion.

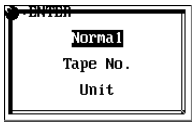
- **Setting How to Assign Core Numbers**

  5. Move the cursor to Fiber Manage using the **arrow keys** or the **rotary knob**.

  6. Press **ENTER**. The screen for setting how to assign core numbers appears.

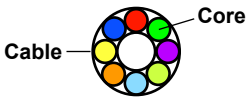
  7. Move the cursor to the method that you want to use to assign core numbers using the **arrow keys** or the **rotary knob**.

  8. Press **ENTER**. The method to use to assign core numbers is confirmed.

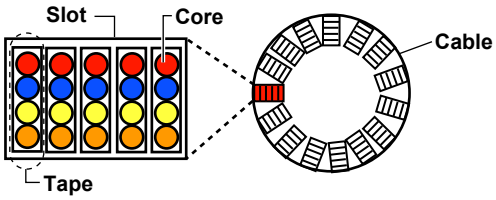


Note

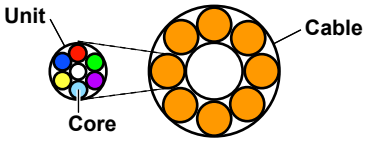
- Normal cores



- Tape ID cores



- Unit cores



- If you change the method to use to assign core numbers, the existing measurement waveforms will be deleted. A message will be displayed to confirm that you want to carry out the deletion.

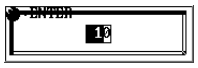
- **Setting the Number of Tapes or Units**

  5. Move the cursor to NumOfRow using the **arrow keys** or the **rotary knob**.

  6. Press **ENTER**. The screen for setting the number of rows appears.

  7. Set the number of rows (the number of tapes or units) using the **rotary knob**.

  8. Press **ENTER**. The number of rows is confirmed.



Note

- This can be set when Fiber Manage is set to “Tape No.” or “Unit.”
- If you change the number of tapes or units, the existing measurement waveforms will be deleted. A message will be displayed to confirm that you want to carry out the deletion.

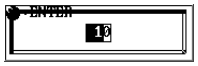
- **Setting the Number of Cores in the Same Tape or the Same Unit**

  5. Move the cursor to NumOfColumn using the **arrow keys** or the **rotary knob**.

  6. Press **ENTER**. The screen for setting the number of columns appears.

  7. Set the number of columns (the number of cores) using the **rotary knob**.

  8. Press **ENTER**. The number of columns is confirmed.



Note

- This can be set when Fiber Manage is set to “Tape No.” or “Unit.”
- If you change the number of cores, the existing measurement waveforms will be deleted. A message will be displayed to confirm that you want to carry out the deletion.

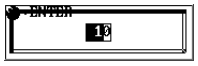
- **Setting the Number of Cores in the Same Cable**

  5. Move the cursor to NumOfFibers using the **arrow keys** or the **rotary knob**.

  6. Press **ENTER**. The screen for setting the number of cores appears.

  7. Set the number of cores using the **rotary knob**.

  8. Press **ENTER**. The number of cores is confirmed.

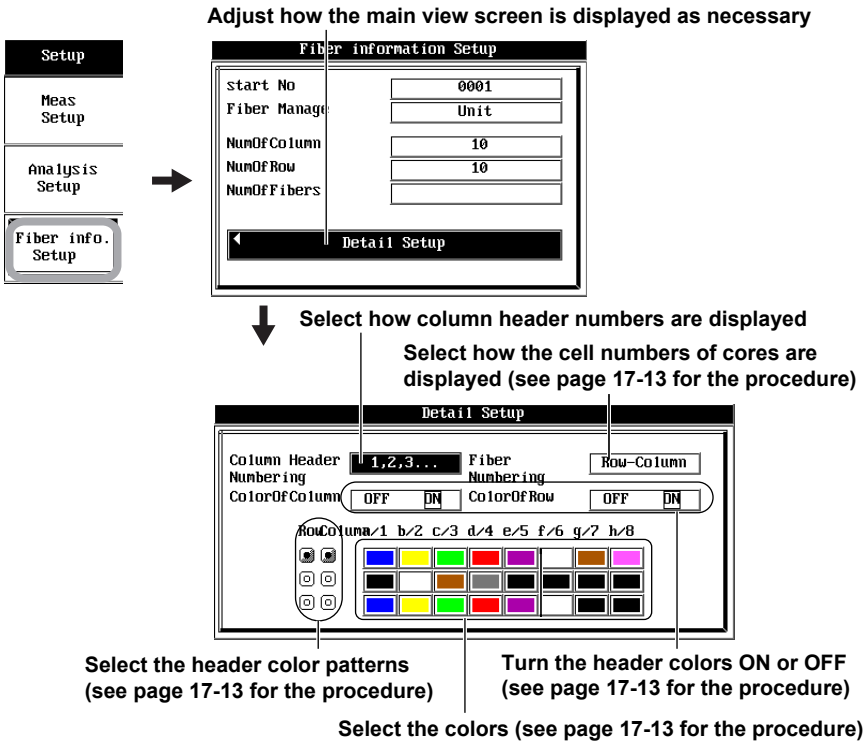


Note

- This can be set when Fiber Manage is set to “Normal.”
- If you change the number of cores, the existing measurement waveforms will be deleted. A message will be displayed to confirm that you want to carry out the deletion.

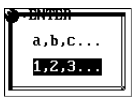
Adjusting How the Main View Screen Is Displayed

1. Press **SETUP**. A soft key menu for the settings appears.
2. Press the **Fiber info. Setup** soft key. The Fiber information Setup screen appears.
3. Move the cursor to Detail Setup using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The Detail Setup screen appears.



- **Selecting How Column Header Numbers Are Displayed**

5. Move the cursor to Column Header Numbering using the **arrow keys** or the **rotary knob**.
6. Press **ENTER**. The screen for selecting how the column header numbers are displayed appears.
7. Move the cursor to the method that you want to use to display column header numbers using the **arrow keys** or the **rotary knob**.
8. Press **ENTER**. The method to use to display column header numbers is confirmed.



Note

Headers are displayed on the Main view screen when Fiber Manage is set to “Tape No.” or “Unit.”

When “1, 2, 3 . . .” is selected

	1	2	3	4	5	6	7	8
1	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8
2	2-1	2-2	2-3	2-4	2-5	2-6	2-7	2-8
3	3-1	3-2	3-3	3-4	3-5	3-6	3-7	3-8

Column headers

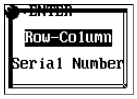
When “a, b, c . . .” is selected

	a	b	c	d	e	f	g	h
1	1a	1b	1c	1d	1e	1f	1g	1h
2	2a	2b	2c	2d	2e	2f	2g	2h
3	3a	3b	3c	3d	3e	3f	3g	3h

- **Selecting How Cell Numbers of Cores Are Displayed**

  5. Move the cursor to Fiber Numbering using the **arrow keys** or the **rotary knob**.

  6. Press **ENTER**. The screen for selecting how cell numbers of cores are displayed appears.



Note

When "Row-Column" is selected

	1	2	3	4	5	6	7	8	9	10
1	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9	1-10
2	2-1	2-2	2-3	2-4	2-5	2-6	2-7	2-8	2-9	2-10
3	3-1	3-2	3-3	3-4	3-5	3-6	3-7	3-8	3-9	3-10

When "Serial Number" is selected

	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	11	12	13	14	15	16	17	18	19	20
3	21	22	23	24	25	26	27	28	29	30

Cell numbers of cores

- **Turning Header Colors ON or OFF**

  5. Move the cursor to ColorOfColumn or ColorOfRow using the **arrow keys** or the **rotary knob**.

  6. Press **ENTER** to turn colors ON or OFF.

- **Selecting the Header's Color Pattern**

  5. Move the cursor to the Row or Column button next to the color pattern that you want to select using the **arrow keys** or the **rotary knob**.

  6. Press **ENTER** to select the color pattern.

Note

- The color pattern—in the order shown from left to right—is mapped to the rows starting at the top and proceeding to the bottom.
- You can display eight colors with a single color pattern. If there are more than nine rows or columns, the AQ7270/AQ7275 repeats the same color pattern to display the additional rows or columns.

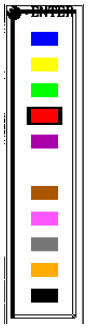
- **Selecting Colors**

  5. Move the cursor to the cell whose color you want to change using the **arrow keys** or the **rotary knob**.

  6. Press **ENTER**. The screen for selecting the color appears.

  7. Move the cursor to the color that you want to select using the **arrow keys** or the **rotary knob**.

  8. Press **ENTER**. The color is confirmed.



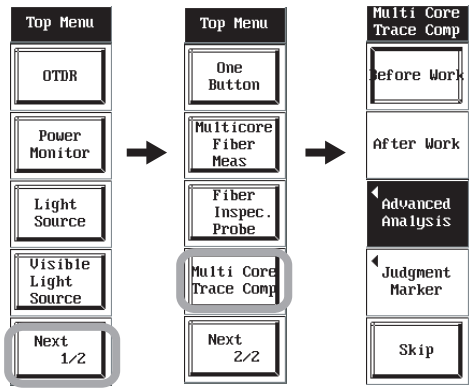
17.3 Setting Measurement Conditions

Firmware versions 3.01 and later support this function.

You can configure settings such as the wavelength and the distance range. These settings are required for measuring optical pulses.

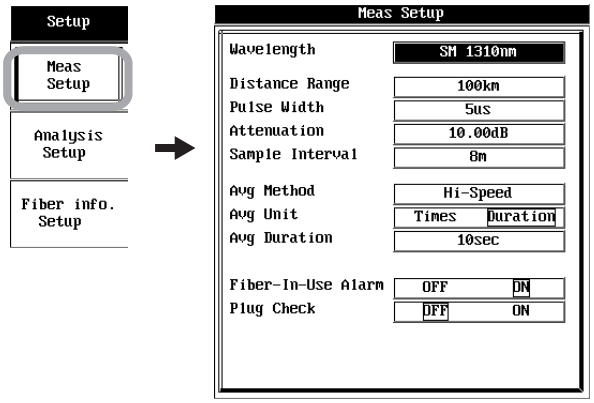
Selecting the Multi Core Trace Comparison

1. Press the **Next 1/2** soft key.
2. Press the **Multi Core Trace Comp.** soft key. The multi core trace comparison display and a soft key menu for multi core trace comparison appear.



Selecting Measurement Setup

3. Press **SETUP**. A soft key menu for the settings appears.
4. Press the **Meas Setup** soft key. The Meas Setup screen appears.



Note

- See section 6.1 for the procedure.
- If you change the measurement conditions, the optical pulse measurement waveforms and the result data of pass/fail judgments up to that point will be deleted.

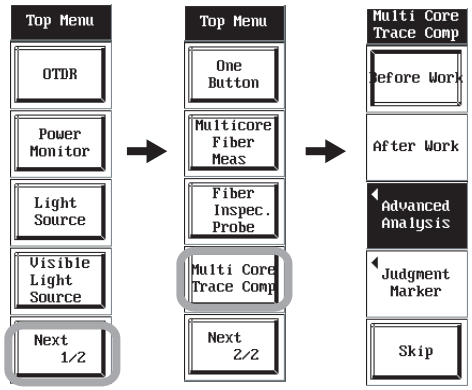
17.4 Setting Analysis Conditions

Firmware versions 3.01 and later support this function.

You can configure settings such as the wavelength and the group refraction index. These settings are required for analyzing optical pulse measurement waveforms.

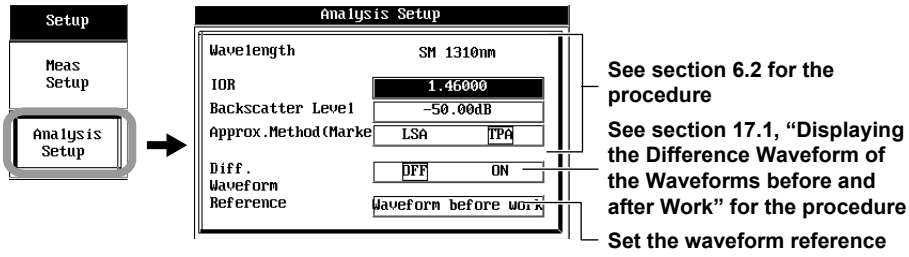
Selecting the Multi Core Trace Comparison

1. Press the **Next 1/2** soft key.
2. Press the **Multi Core Trace Comp.** soft key. The multi core trace comparison display and a soft key menu for multi core trace comparison appear.



Selecting Analysis Setup

3. Press **SETUP**. A soft key menu for the settings appears.
4. Press the **Analysis Setup** soft key. The Analysis Setup screen appears.



See section 6.2 for the procedure

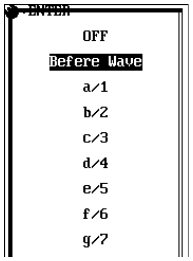
See section 17.1, "Displaying the Difference Waveform of the Waveforms before and after Work" for the procedure

Set the waveform reference

- **Setting the Waveform Reference**

  Set the reference waveform that will be compared against to display the difference waveform of the waveforms before and after work as shown in section 17.1.

5. Move the cursor to Waveform Reference using the **arrow keys** or the **rotary knob**.
6. Press **ENTER**. The screen for selecting the waveform reference appears.
7. Move the cursor to the waveform reference that you want to select using the **arrow keys** or the **rotary knob**.
8. Press **ENTER**. The waveform reference is confirmed.



Note

If you are performing work on normal cores or unit cores, select the waveform before work if you have finished measuring all the cores prior to starting work.
If you are performing work on tape ID cores, when you are measuring only one core in a tape ID, select the tape ID that was measured prior to starting work.
Tape IDs: a/1, b/2, c/3, d/4, e/5, f/6, and g/7

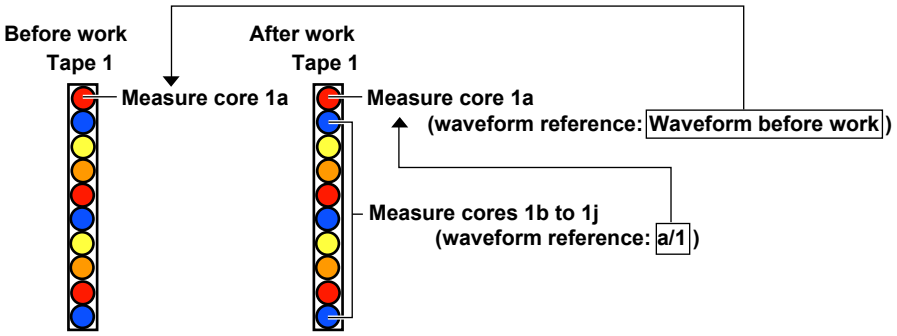
Explanation

Waveform Reference

In multi core trace comparison measurements, the waveform reference selection varies depending on how the quality of the optical pulse measurement waveform after work is checked. For an overview of the methods used to check the quality of the optical pulse measurement waveform, see section 2.2.

- **Visual Check of the Waveform before Work and the Waveform after Work**
  For normal cores or unit cores, the quality of each core is checked with the waveform before work as the reference. In this situation, set the waveform reference to “Waveform before work.”
- **Visual Check Using a Waveform of One Fiber within the Same Tape as the Reference**
  For tape ID cores, the quality is checked with the waveform of a specific core in the same tape as the reference. In this situation, set the waveform reference to a value from “a/1” to “j/10.”

  Example: If the waveform reference is set to “a/1”
  Among the cores (1a to 1j) of tape 1, core 1a is the specific core.
  The waveform reference value that is used to measure this specific core is “Waveform before work.”
  The waveform reference value that is used to measure all the other cores (1b to 1j) is “a/1.”



Tape 2 and later are the same.
Among the cores (2a to 2j) of tape 2, core 2a is the specific core.

18.1 Loading and Saving Files

CAUTION

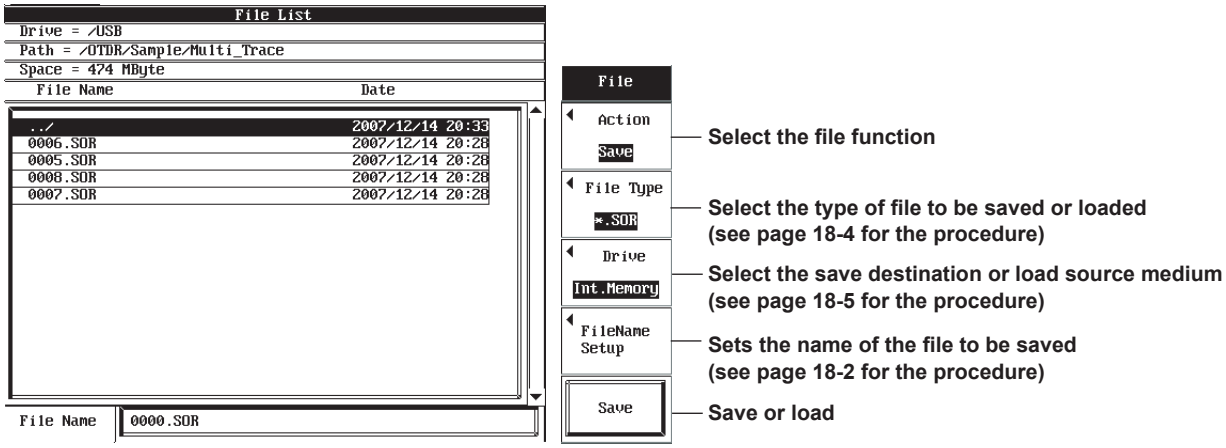
Comply with the following precautions when the USB memory access indicator is illuminated or when the operating status display indicates that data is being saved. Failure to do so may damage the storage medium (USB memory device or internal memory), may lead to loss of data, or may cause the AQ7270/AQ7275 to operate incorrectly.

- Do not turn the power off (do not remove the battery).
- Do not remove the USB memory device.
- Do not disconnect the USB cable.

Procedure

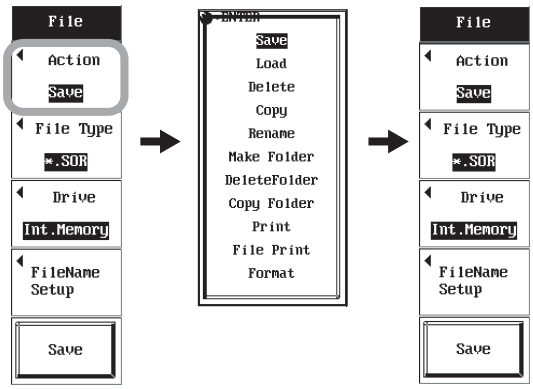
Carry out the steps below to save measured waveforms or load waveforms saved in the past to be displayed.

1. Press **FILE**. The soft key menu for operating the waveform data and the file list screen appear.



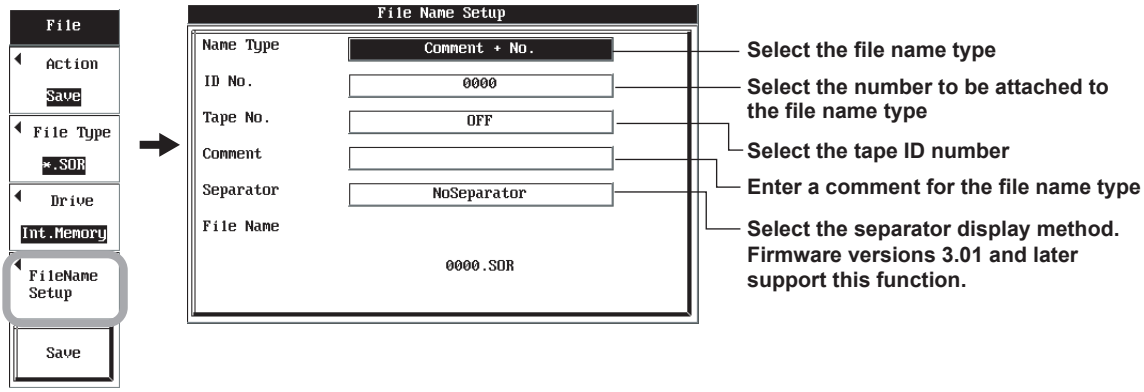
Saving the Waveform

2. Press the **Action** soft key. The screen for operating the files appears.
3. Move the cursor to Save using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The soft key menu for saving the waveform appears.



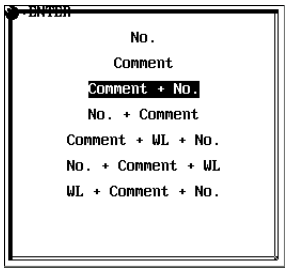
Selecting the File Name Type

5. Press the **FileName Setup** soft key. The screen for entering the file name appears.



6. Move the cursor to Name Type using the **arrow keys** or the **rotary knob**.

7. Press **ENTER**. A screen for selecting the file name type appears.



8. Move the the cursor to file name type you want to select using the **arrow keys** or the **rotary knob**.

9. Press **ENTER**. The file name type is confirmed.

Note

Auto numbering is not performed for types that does not include a number.

Setting the File ID Number

10. Move the cursor to ID No. using the **arrow keys** or the **rotary knob**.

11. Press **ENTER**. The screen for setting the ID number appears.

12. Set the ID number using the **arrow keys** or the **rotary knob**.

13. Press **ENTER**. The ID number is confirmed.

Note

- The number is incremented each time a file is saved.
- You cannot set the ID number if the file name type to Comment.
- The ID number has 4 digits. Up to 1000 in the range from 0000–9999 can be used.

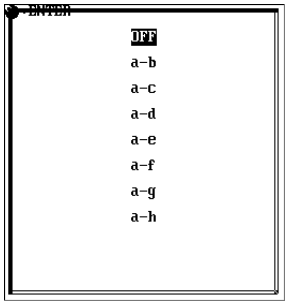
Setting the ID Number for the Tape Fiber and the Like

14. Move the cursor to Tape ID using the **arrow keys** or the **rotary knob**.

15. Press **ENTER**. A screen for selecting the tape ID appears.

16. Move the cursor to tape ID you want to select using the **arrow keys** or the **rotary knob**.

17. Press **ENTER**. The tape ID is confirmed.



Note

Example: If a-c is specified when the ID number and tape ID are combined: 0000a → 0000b → 0000c → 0001a → 0001b → 0001c...

Entering the Comment Section of the File Name

18. Move the cursor to Comment using the **arrow keys** or the **rotary knob**.

19. Press **ENTER**. The character input screen for entering the comment appears.

20. Enter the comment using the **arrow keys**, **rotary knob** and **ENTER**.

21. Press the **OK** soft key. The characters are confirmed.

Note

For details on entering characters, see section 18.6. The file name is set to comment + tape ID.

Saving the Waveform

22. Press the **Save** soft key. The waveform is saved.

23. Press **ESC**. The file list screen closes, and the optical pulse measurement screen appears.

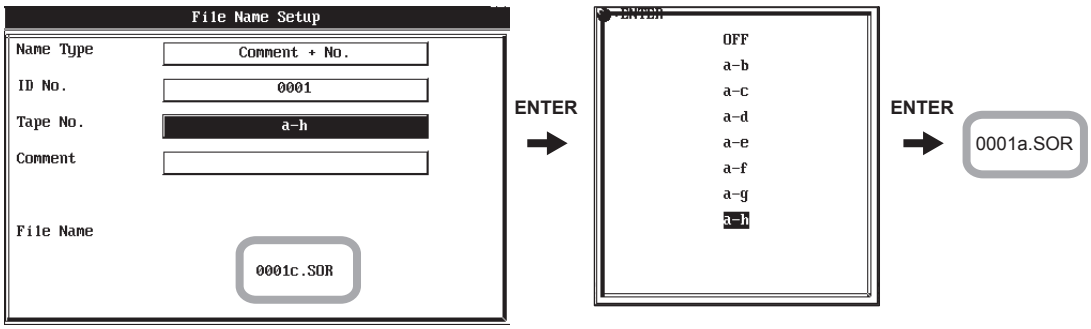
Initializing the Tape Number

If the tape number of the saved file name is something other than a, it is restored to a. The following is an example of a procedure when the tape number is set between a and h to change the saved file name from 0001c to 0002a.

24. Continuing on from step 5, use the **arrow keys** or the **rotary knob** to move the cursor to Tape No.

25. Press **ENTER**. A screens appears with the cursor at Tape No. with a – h selected.

26. Press **ENTER**. The tape number of the saved file name is restored to a.



27. Follow steps 10 to 13 to change the ID No. to 0002.

Selecting the Separator (Firmware Versions 3.01 and Later)

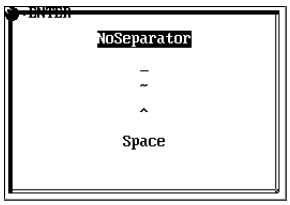
Select the separator that will be used in file names.

28. From step 5, move the cursor to Separator using the **arrow keys** or the **rotary knob**.

29. Press **ENTER**. The screen for selecting the separator appears.

30. Move the cursor to the separator that you want to select using the **arrow keys** or the **rotary knob**.

31. Press **ENTER**. The separator is confirmed.



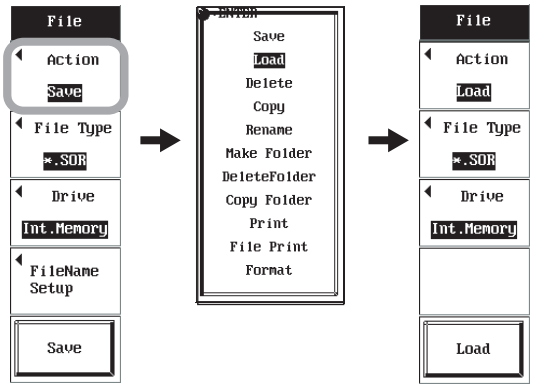
Note

If the comment is set to “YOKOGAWA” and the ID number is 0001, one of the following file names is produced according to the separator that has been selected.

NoSeparator:	YOKOGAWA0001.SOR
_:	YOKOGAWA_0001.SOR
~:	YOKOGAWA~0001.SOR
^:	YOKOGAWA^0001.SOR
Space:	YOKOGAWA 0001.SOR

Loading the File

2. Press the **Action** soft key. The screen for operating the files appears.
3. Move the cursor to Load using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The soft key menu for loading the waveform appears.

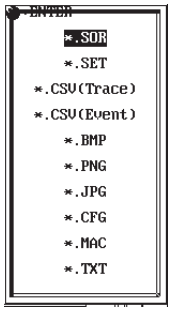


Loading the Waveform

5. Move the cursor to the file you want to load in the file list screen using the **arrow keys** or the **rotary knob**.
6. Press the **Load** soft key. The file is loaded.

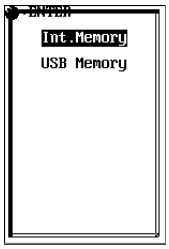
Selecting the File Type

2. Press the **File Type** soft key. A screen for selecting the file type appears.
3. Move the cursor to file type you want to select using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The file type is confirmed.



Selecting the Medium

2. Press the **Drive** soft key. The screen for selecting the load source drive appears.
3. Move the cursor to the save destination or load source drive you want to select using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The save destination or load source drive is confirmed.



Explanation

Selecting the Medium

You can select the following medium types for saving or loading the waveform.

- Internal memory: The memory inside the AQ7270/AQ7275.
- USB memory: An external USB memory.

Note

Do not specify the media root folder as the save destination folder. (Only 256 files can be saved to the root folder of the media used in the AQ7270/AQ7275.)

File Type

You can select the following file types when saving the waveform.

SOR(Telcordia)	A file conforming to Telcordia SR-4731.
SET	A measurement condition file.
CSV (waveform)	A CSV file.
CSV (event)	A CSV file.
BMP	A BMP file.
PNG	A PNG file.
JPG	A JPG file.
CFG	A Display Setup, Setup Mode and System Setup condition file.
MAC	A macro file created by YOKOGAWA's AQ7270/AQ7275 OTDR.
TXT	A user-defined string file.
SSI	A file measured during the multi core trace comparison. This is supported by firmware versions 3.01 and later.
MPJ	A file measured during the measurement of a multicore fiber.

You can select the following file types when loading a file.

SOR	A file conforming to Telcordia SR-4731 and Bellcore GR-196-CORE.
SET	A measurement condition file created by YOKOGAWA's AQ7270/AQ7275 OTDR.
TRD	A file type created by YOKOGAWA's AQ7260 OTDR.
TRB	A file type created by YOKOGAWA's AQ7250 OTDR.
CFG	A Display Setup, Setup Mode and System Setup condition file.
MAC	A macro file created by YOKOGAWA's AQ7270/AQ7275 OTDR.
TXT	A user-defined string file.
SSI	A file measured during the multi core trace comparison. This is supported by firmware versions 3.01 and later.
MPJ	A file measured during the measurement of a multicore fiber.

File Name Type

You can select the following file name types when saving the waveform.

Type	File Name
Number	****.$$$
Comment	@@@@.$$$
Comment+number	@@@@****.$$$
Number+comment	****@@@@.$$$
Comment+wavelength+number	@@@@####****.$$$
Number+comment+wavelength	***@@@@####.$$$
Wavelength+comment+number	####@@@@****.$$$

*: number, @: comment, #: wavelength, and $: extension

The value of the measurement condition is displayed for the wavelength.

Setting the File ID Number

The selectable range is 0 to 9999 (in 1 steps).

Entering the File Name

The structure of the file name is given below. The maximum number of characters is 36.

Comment	30 characters
Number	4 characters
Wavelength	6 characters
Tape ID	1 character
Extension	4 characters

If the file name exceeds 36 characters, a section of the comment is deleted.

Setting the File Name

The number of characters that can be used for a file or directory name is up to 64 characters from the beginning of the entered characters. However, the following conditions apply.

- The types of characters that can be used are 0 to 9, A to Z, a to z, _, -, =, (,), {, }, [,], #, $, %, &, ~, !, ’, and @ on the keyboard that appears on screen.
  † Multiple @ characters cannot be entered consecutively.
- The following character strings cannot be used due to the limitation of MS-DOS.
  AUX, CON, PRN, NUL, CLOCK, CLOCK$, LPT0, LPT1, LPT2, LPT3, LPT4, LPT5, LPT6, LPT7, LPT8, LPT9, COM0, COM1, COM2, COM3, COM4, COM5, COM6, COM7, COM8, and COM9.
- Make sure that the full path name (absolute path name from the root directory) is within 260 characters. If 260 characters is exceeded, an error occurs when you execute a file operation (save, copy, rename, create directory, etc.).
  Full path name: If you are operating a directory, specify up to the directory name.
  If you are operating a file, specify up to the file name.

User-Defined Strings

You can load user defined strings (TXT files) using the Load command in the File menu.
Text file format. It reads a maximum of 50 strings containing up to 36 characters per line.
The strings in the text file for reading are separated with carriage returns.
The strings can be used as a history when entering strings such as labels or comments for file names.

Note

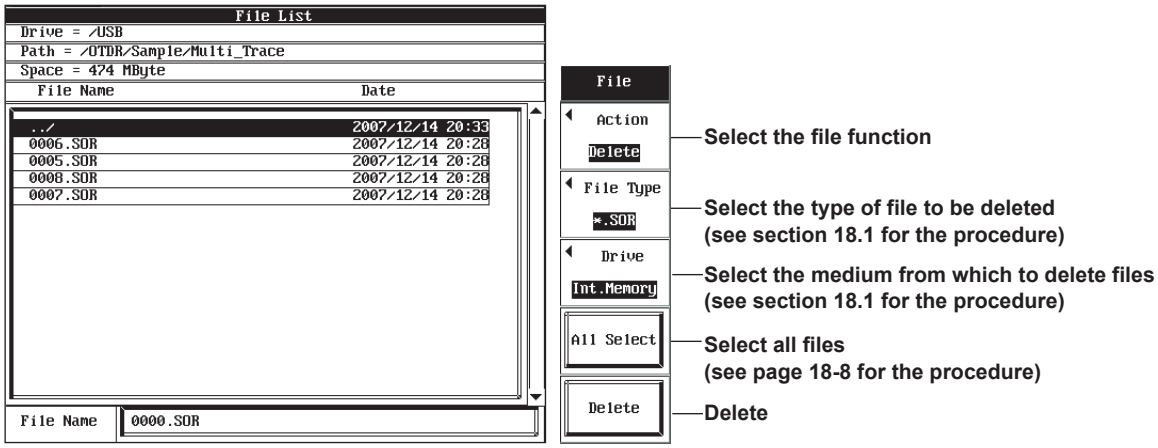
See appendix 3 for TXT and CSV file output examples.

18.2 Deleting or Copying the Files

Procedure

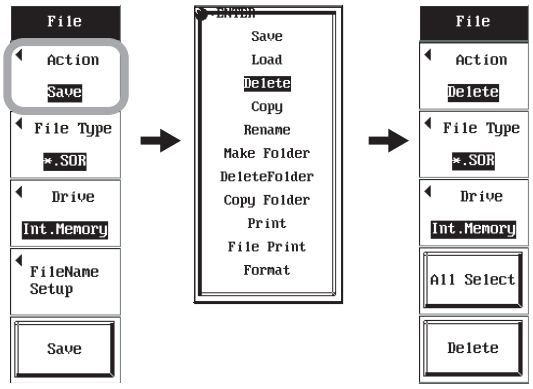
Carry out the steps below to delete waveforms saved in the past or copy them to another medium.

1. Press **FILE**. The soft key menu for operating the waveform data and the file list screen appear.



Deleting a Waveform

2. Press the **Action** soft key. The screen for operating the files appears.
3. Move the cursor to Delete using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The soft key menu for the deleting waveforms appears.

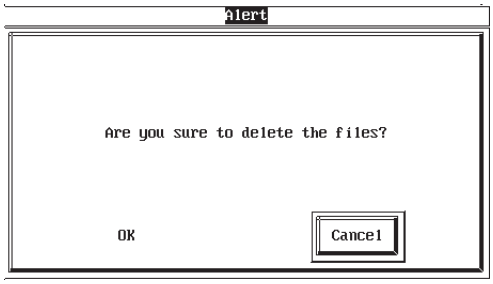


Deleting a File

5. Move the cursor to the file you want to delete in the file list screen using the **arrow keys** or the **rotary knob**. An asterisk is displayed before the file name at the cursor.
6. Press **ENTER**. An asterisk is displayed before the file name.

File to be deleted

7. Press the **Delete** soft key. A deletion confirmation message appears.



8. Move the cursor to OK using the **arrow keys** or **rotary knob**.
9. Press **ENTER**. The file is deleted.
10. Press **ESC**. The file list screen closes, and the optical pulse measurement screen appears.

Note

- If you want to delete one file, select the file using the cursor.
- If you want to delete multiple files, select the file using the cursor, and press ENTER.

Deleting All Files

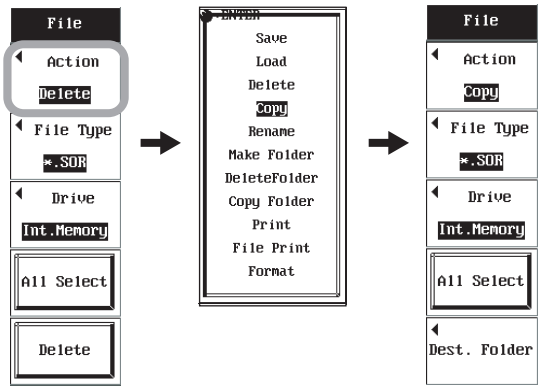
5. Move the cursor to the folder containing the files you want to delete in the file list screen using the **arrow keys** or the **rotary knob**.
6. Press **ENTER**. The files in the folder are displayed.
7. Press the **All Select** soft key. An asterisk is displayed before every file name.
8. Press the **Delete** soft key. A deletion confirmation message appears.
9. Move the cursor to OK using the **arrow keys** or **rotary knob**.
10. Press **ENTER**. The files are deleted.
11. Press **ESC**. The file list screen closes, and the optical pulse measurement screen appears.

Note

You can deselect a selected file by pressing ENTER again.

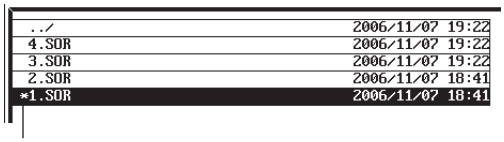
Copying Waveforms

2. Press the **Action** soft key. The screen for operating the files appears.
3. Move the cursor to Copy using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. A soft key menu for copying the waveforms appears.



Copying the Waveforms

5. Move the cursor to the file you want to copy in the file list screen using the **arrow keys** or the **rotary knob**. An asterisk is displayed before the file name at the cursor.
6. Press **ENTER**. An asterisk is displayed before the file name.



File to be copied

7. Press the **Dest. Folder** soft key. The File List screen for selecting the copy destination appears.
8. Move the cursor to the copy destination folder in the file list screen using the **arrow keys** or the **rotary knob**.
9. Press **ENTER**. The contents of the copy destination folder are displayed.
10. Press the **Copy** soft key. The file is copied.
11. Press **ESC**. The file list screen closes, and the optical pulse measurement screen appears.

Note

- If you want to copy one file, select the file using the cursor.
- If you want to copy multiple files, select the file using the cursor, and press ENTER.

Copying All Files

5. Move the cursor to the folder containing the files you want to copy in the file list screen using the **arrow keys** or the **rotary knob**.
6. Press **ENTER**. The files in the folder are displayed.
7. Press the **All Select** soft key. An asterisk is displayed before every file name.
8. Press the **Dest. Folder** soft key. The File List screen for selecting the copy destination appears.
9. Move the cursor to the copy destination folder in the file list screen using the **arrow keys** or the **rotary knob**.
10. Press **ENTER**. The contents of the copy destination folder are displayed.
11. Press the **Copy** soft key. The files are copied.
12. Press **ESC**. The file list screen closes, and the optical pulse measurement screen appears.

Note

You can deselect a selected file by pressing ENTER again.

Selecting the File Type

See section 18.1.

Selecting the Medium

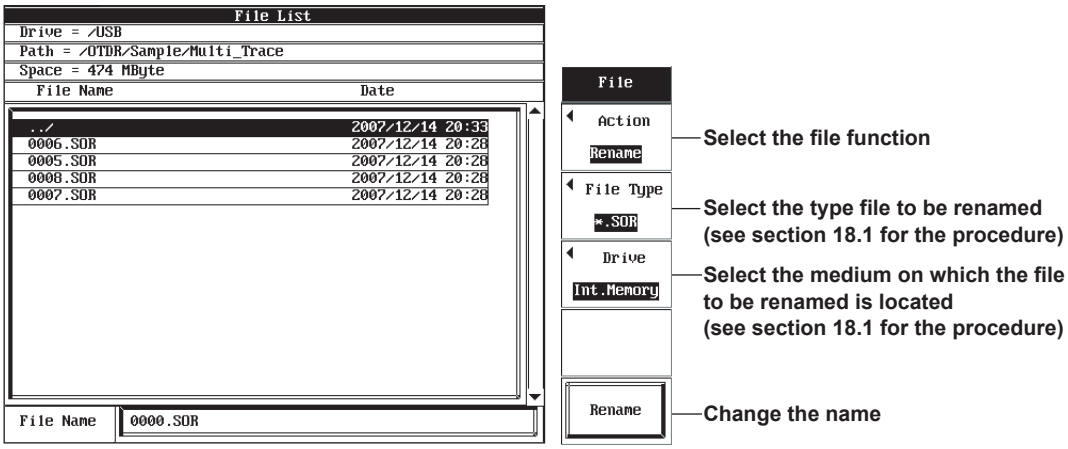
See section 18.1.

18.3 Renaming the File

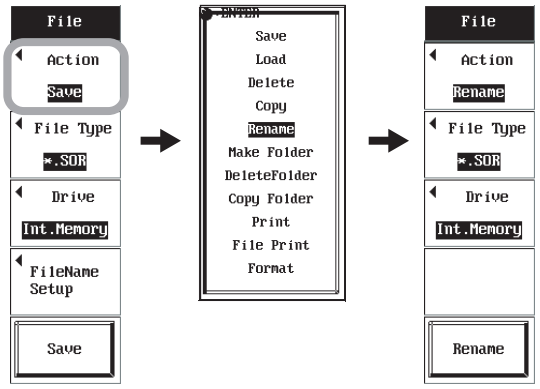
Procedure

Carry out the steps below to change the file name.

1. Press **FILE**. The soft key menu for operating the waveform data and the file list screen appear.



2. Press the **Action** soft key. The screen for operating the files appears.
3. Move the cursor to Rename using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The soft key menu for renaming files appears.



5. Move the cursor to the file you want to rename in the file list screen using the **arrow keys** or the **rotary knob**.
6. Press the **Rename** soft key. The screen for entering characters appears.
7. Enter the comment using the **arrow keys**, **rotary knob** and **ENTER**.
8. Press the **OK** soft key. The characters are confirmed.

Note

For details on entering characters, see section 18.6.

Selecting the File Type

See section 18.1.

Selecting the Medium

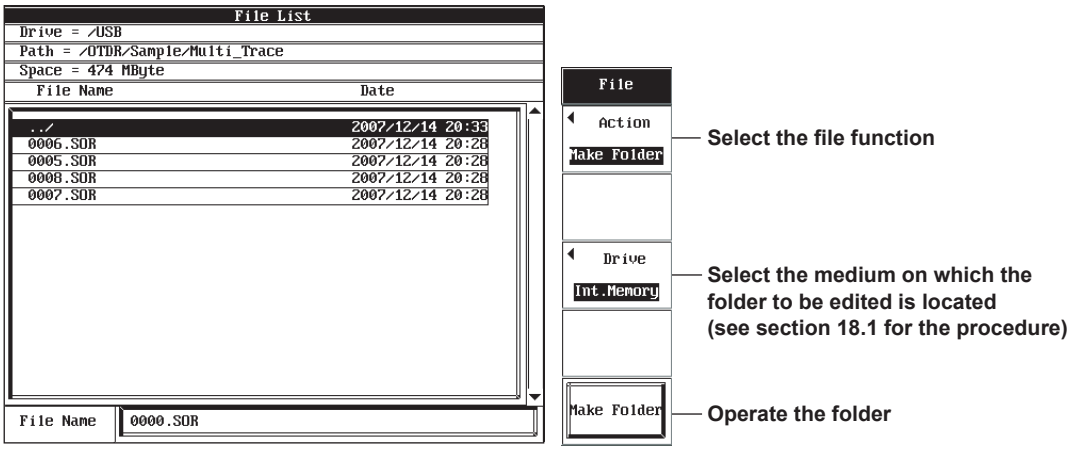
See section 18.1.

18.4 Creating, Deleting, and Copying Folders

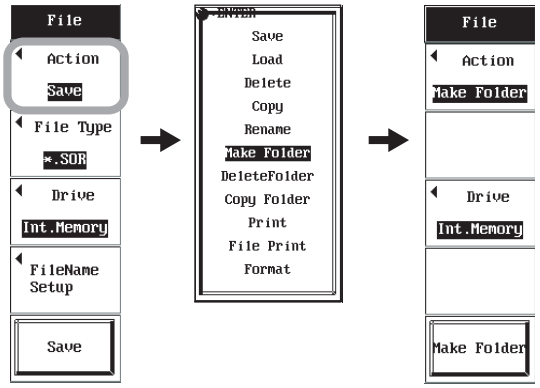
Procedure

Creating a Folder

1. Press **FILE**. The soft key menu for operating the waveform data and the file list screen appear.



2. Press the **Action** soft key. The screen for operating the files appears.
3. Move the cursor to Make Folder using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The soft key menu for creating folders appears.



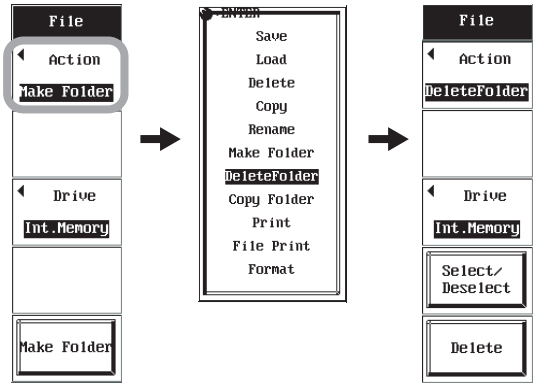
5. Move the cursor to the folder in which you want to create a new folder in the file list screen using the **arrow keys** or the **rotary knob**.
6. Press **ENTER**. The files in the folder are displayed.
7. Press the **Make Folder** soft key. The screen for entering characters appears.
8. Enter the comment using the **arrow keys**, **rotary knob** and **ENTER**.
9. Press the **OK** soft key. The characters are confirmed, and the folder is created.

Note

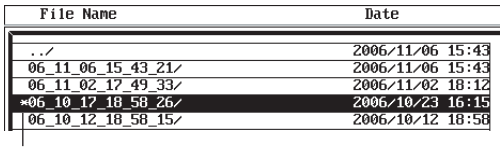
For details on entering characters, see section 18.6.

Deleting a Folder

2. Press the **Action** soft key. The screen for operating the files appears.
3. Move the cursor to DeleteFolder using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The soft key menu for the deleting folders appears.



5. Move the cursor to the folder you want to delete in the file list screen using the **arrow keys** or the **rotary knob**. An asterisk is displayed before the file name at the cursor.
6. Press the **Select/Deselect** soft key. An asterisk is displayed before the folder name.



File to be deleted

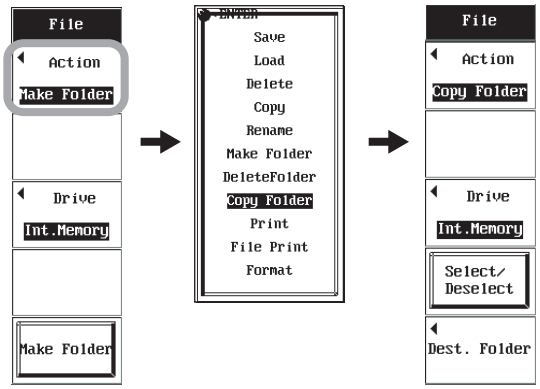
7. Press the **Delete** soft key. The folder is deleted.
8. Press **ESC**. The file list screen closes, and the optical pulse measurement screen appears.

Note

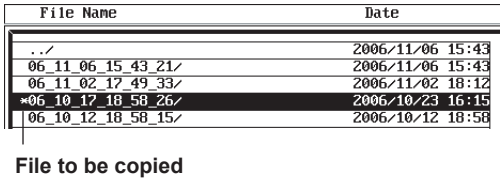
- You can deselect a selected folder by pressing Select/Deselect.
- If the level of sub folders in the selected folder is deep, the folder may not be deleted.

Copying a Folder

2. Press the **Action** soft key. The screen for operating the files appears.
3. Move the cursor to Copy Folder using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The soft key menu for the copying folders appears.



5. Move the cursor to the file you want to copy in the file list screen using the **arrow keys** or the **rotary knob**. An asterisk is displayed before the file name at the cursor.
6. Press the **Select/Deselect** soft key. An asterisk is displayed before the folder name.



7. Press the **Dest. Folder** soft key. The File List screen for selecting the copy destination appears.
8. Move the cursor to the copy destination folder in the file list screen using the **arrow keys** or the **rotary knob**.
9. Press **ENTER**. The contents of the copy destination folder are displayed.
10. Press the **Copy** soft key. The folder is copied.
11. Press **ESC**. The file list screen closes, and the optical pulse measurement screen appears.

Note

- You can deselect a selected folder by pressing Select/Deselect.
- If the level of sub folders in the selected folder is deep, the folder may not be copied.

Selecting the Medium

See section 18.1.

Explanation

When copying a folder, only the combinations below are allowed for the drives. You cannot copy from the internal memory to the internal memory or from a USB storage device to the USB storage device.

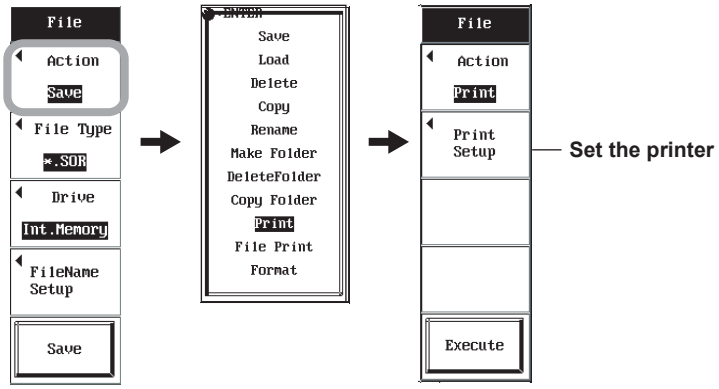
Copy Source	Copy Destination
Internal memory	USB
USB	Internal memory

18.5 Printing

Procedure

Set the printer used to print the measured results.

1. Press **FILE**. The soft key menu for operating the file appears.



Note

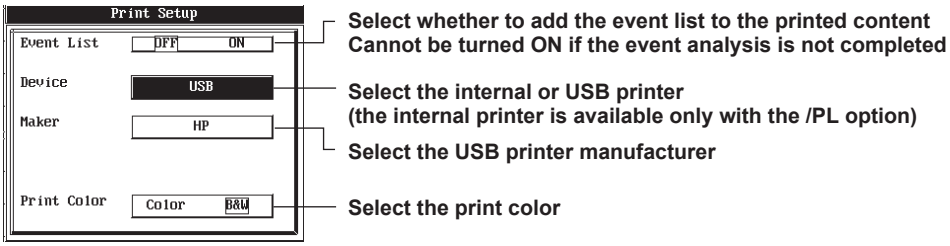
Hold down the FILE key for 1 second to directly set the file action to Print.

Selecting the Printed Contents

2. Press the **Event List** soft key to move the cursor to ON.

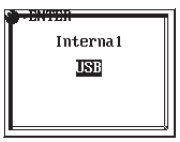
Setting the Printer

3. Press the **Print Setup** soft key. The Print Setup screen appears.



Selecting the Printer Type

4. Move the cursor to Device using the **arrow keys** or the **rotary knob**.
5. Press **ENTER**. The screen for selecting the device appears.
6. Move the cursor to the device you want to select using the **arrow keys** or the **rotary knob**.
7. Press **ENTER**. The device is confirmed.



If the USB Printer Is Selected

- **Selecting the Manufacturer**

8. Move the cursor to Maker using the **arrow keys** or the **rotary knob**.

9. Press **ENTER**. The screen for selecting the manufacturer appears.

10. Move the cursor to the manufacture you want to select using the **arrow keys** or the **rotary knob**.

11. Press **ENTER**. The manufacturer is confirmed.

- **Selecting the Print Color**

12. Move the cursor to Print Color using the **arrow keys** or the **rotary knob**.

13. Press **ENTER**. The cursor moves to Color or B&W.

14. Press **ESC**. The print setup screen closes.

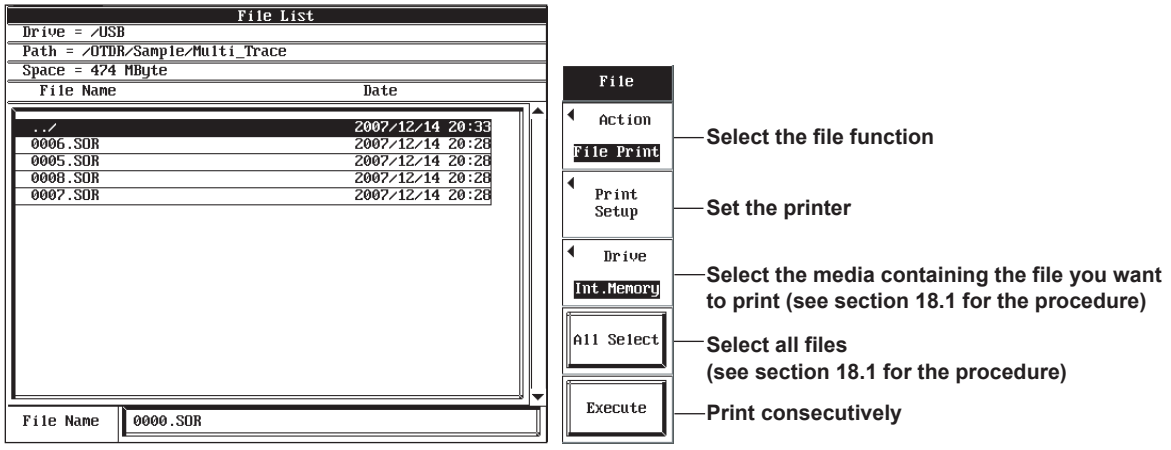
Printing

15. Press the **Execute** soft key. The printing starts.

Printing Consecutively by Specifying Files

You can select multiple waveforms files to be printed consecutively.

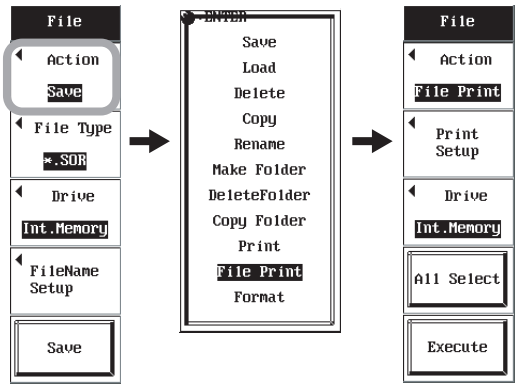
1. Press FILE. The soft key menu for operating the file and the file list screen appear.



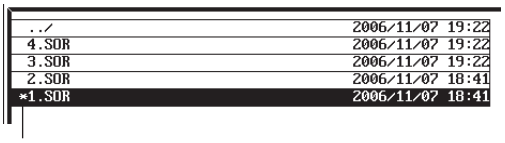
2. Press the **Action** soft key. A soft key menu for the action appears.

3. Move the cursor to File Print using the **arrow keys** or **rotary knob**.

4. Press **ENTER**. A soft key menu for the file print appears.



5. Move the cursor to the file you want to print in the file list screen using the **arrow keys** or the **rotary knob**. An asterisk is displayed before the file name at the cursor.
6. Press **ENTER**. An asterisk is displayed before the file name.



File to be printed

7. Press the **Execute** soft key. The file is displayed on the screen and printed. This operation repeats until all selected files are printed.

Note

Consecutive printing of specified files can be used only on the SOR file type.

Explanation

Printers That Can Be Used

You can use the internal printer (option) or connect a USB printer to the AQ7270/AQ7275. USB printers conforming to USB Printer Class Version 1.1 can be used.

Note

- Connect only the printers that are allowed
- For details on USB printers that have been tested for compatibility, contact your nearest YOKOGAWA dealer.

Printed Contents (Event List ON/OFF)

Select the information to be printed.

If event list is set to ON

Prints the displayed contents of the screen (hard copy) and the event list (event detection results), measurement conditions and analysis conditions (the group refraction index, the threshold level of the event).

Note that the event list is printed only if the event analysis is performed and events are detected.

If event list is set to OFF

Prints only the displayed contents of the screen (hard copy).

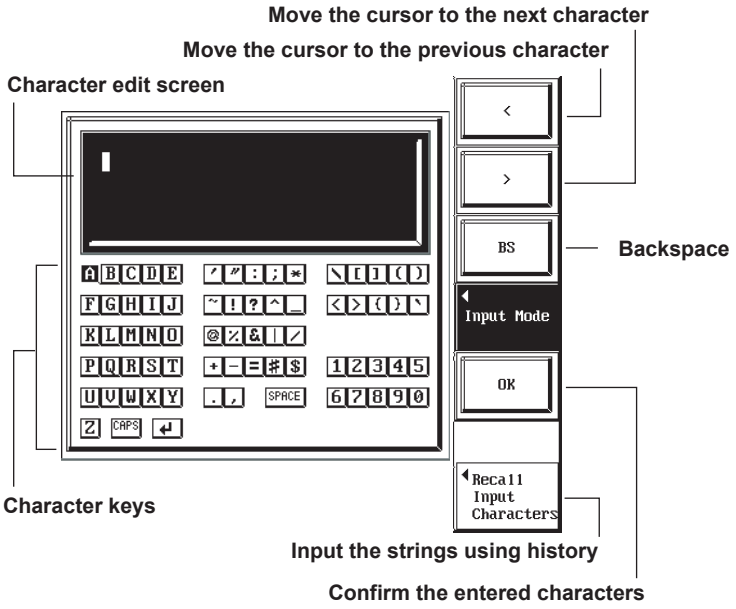
18.6 Entering Characters

Procedure

Entering Characters

You can enter file names and comments from the character input screen when saving the measured waveforms.

Character Input Screen



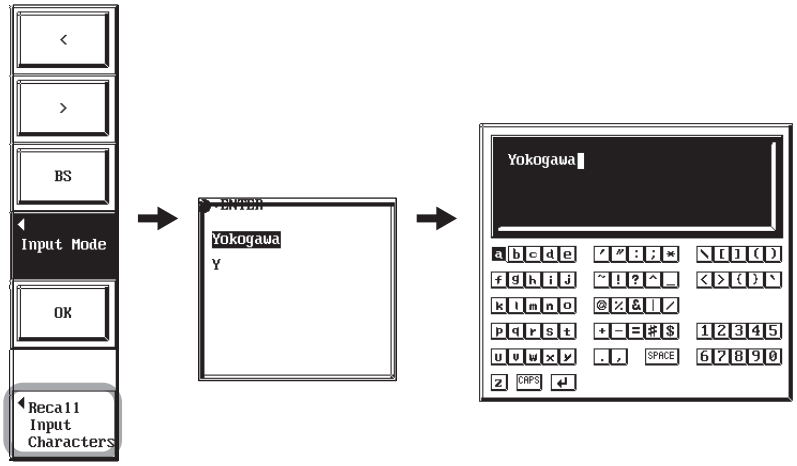
1. Move the cursor to the character you want to enter using the **arrow keys** or the **rotary knob**.
2. Press **ENTER**. The character appears in the character edit screen.
3. As necessary, use the edit functions of each soft key.
4. Press the **OK** soft key. The characters are confirmed.

Note

- If there is a limit in the number of allowed characters, the characters exceeding the limit are not applied.
- You can also enter characters by using the USB104 keyboard.

History Input

1. Press the **Recall Input Characters** soft key (FILE key). The Input History screen is displayed.
2. Move the cursor to string you wish to input using the **arrow keys** or **rotary knob**.
3. Press **ENTER**. The character string selected in the Edit Character Display screen is displayed.



Note

- The input history is saved when the string is finalized. Up to 50 strings can be saved to input history, and finalized strings are arranged in order from most recent.
- You can load user defined strings (TXT files) using the Load command in the File menu.

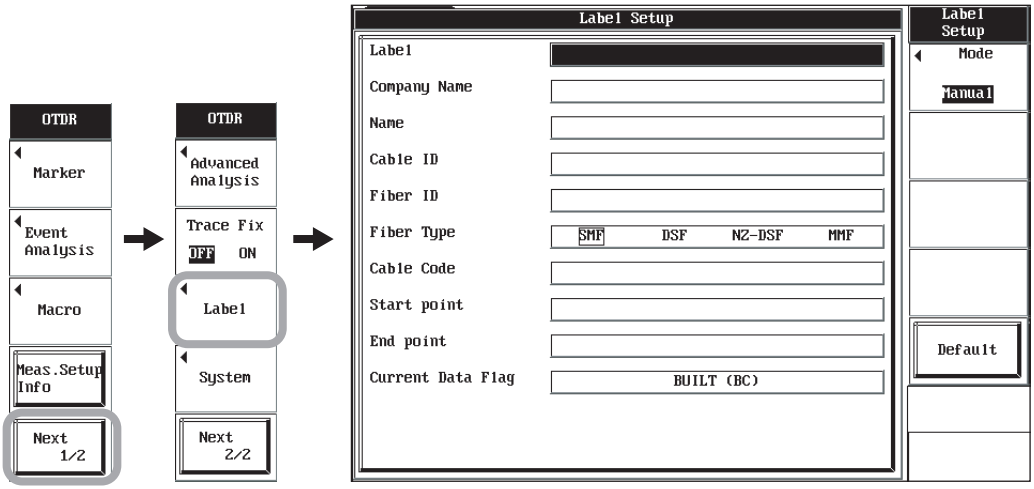
18.7 Creating Labels

Procedure

Setting a Label

You can enter detailed information such as the measurement conditions as comments. You can also enter detailed information such as the name of the company that measured the optical fiber cable or the name of the person in charge.

1. Press the **Next 1/2** soft key.
2. Press the **Label** soft key. The **Label Setup** screen appear.



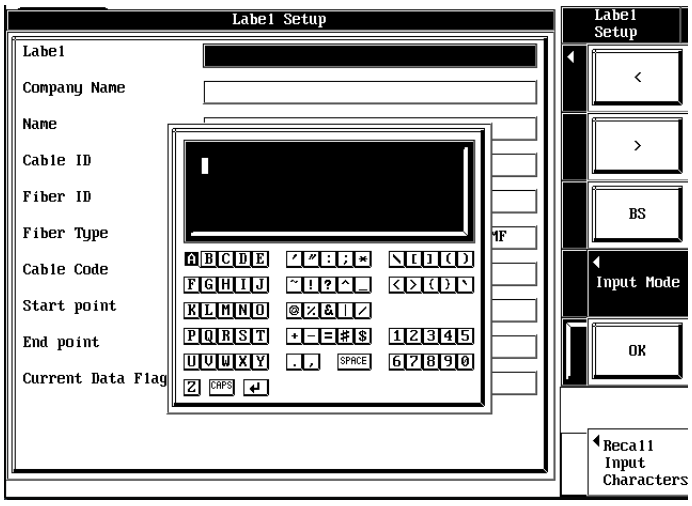
Entering Labels

Enter a label in the Label Setup screen.

Three label input modes are available.

- **Setting the Label Input Mode to Manual**

3. Press the **Mode** soft key. The soft key menu for selecting the label mode appears.
4. Press the **Manual** soft key. The Manual label mode is finalized.
5. Press **ENTER**. The character input soft key menu and screen are displayed.
6. Input characters. For information on inputting characters, see section 18.6.



- **Setting the Label Input Mode to File Name Duplication**

  3. Press the **Mode** soft key. The soft key menu for selecting the label mode appears.

  4. Press the **File Name Duplication** soft key. The File Name Duplication label mode is finalized.

  5. Press **ENTER**. The character input soft key menu and screen are displayed.

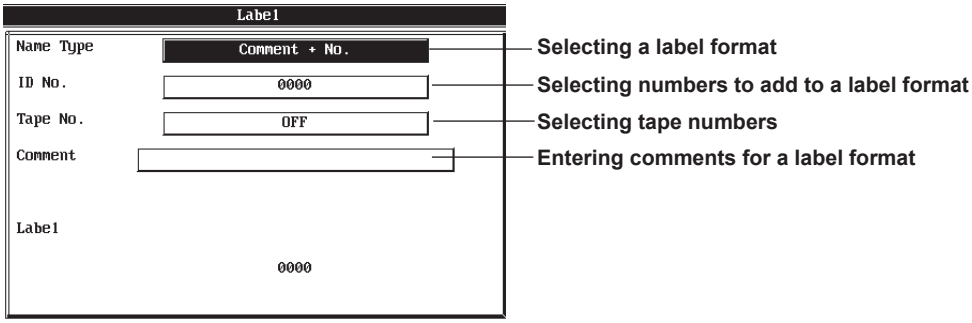
  6. Input characters. For information on entering characters, see section 18.6.

- **Setting the Label Input Mode to Fixed Format**

  3. Press the **Mode** soft key. The soft key menu for selecting the label mode appears.

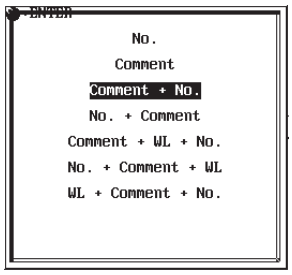
  4. Press the **Fixed Format** soft key. The Fixed Format label mode is finalized.

  5. Press **ENTER**. The comment entry screen appears.



  6. Move the cursor to **Name Type** using the arrow keys or rotary knob.

  7. Press **ENTER**. The **Name Type** selection screen appears.



  8. Move the cursor to the **Name Type** to select using the arrow keys or rotary knob.

  9. Press ENTER. **Name Type** is finalized.

Note

- Automatic numbering is not available for formats that do not include numbers.
- Part of the comment may be deleted depending on the length of the selected Name Type and comment.

Setting Label Numbers

10. Move the cursor to ID No. using the **arrow key** or **rotary knob**.

11. Press **ENTER**. The ID No. setting screen appears.

12. Move the cursor to the ID No. value using the **arrow keys** or **rotary knob**.

13. Press **ENTER**. ID No. is confirmed.

Note

- Every time a label is saved, the number is incremented by 1 automatically.
- The ID No. has 4 digits. It can be used in the range from 0000 to 9999.

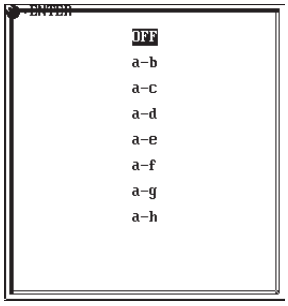
Setting Control Numbers for Tape Fiber and Other Items

14. Move the cursor to Tape No. using the **arrow key** or **rotary knob**.

15. Press **ENTER**. The Tape No. selection screen appears.

16. Move the cursor to the Tape No. to select using the **arrow keys** or **rotary knob**.

17. Press **ENTER**. Tape No. is confirmed.



Note

Example Setup: If ID No. and Tape No. are combined, for a-c, 0000a→0000b→0000c→0001a →0001b→0001c•••.

Entering the Comment Portion of the Label

18. Move the cursor to Comment using the **arrow key** or **rotary knob**.

19. Press **ENTER**. A character entry screen for entering comments appears.

20. Enter characters using the **rotary knob**, **arrow keys**, and **ENTER**.

21. Press the **Finalize** soft key. The character entry is finalized.

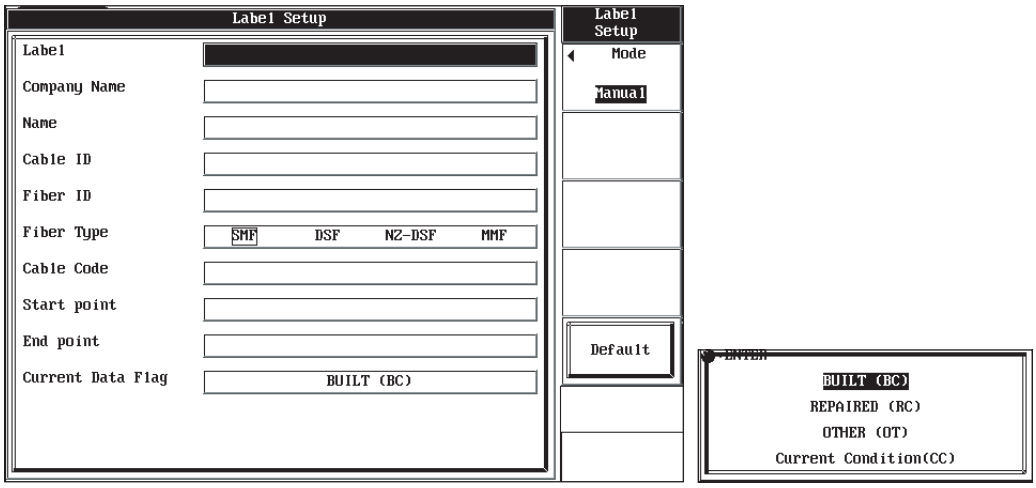
Note

For details on entering characters, see section 18.6. Comment + Tape No. is set for the label.

Entering Other Items

Entering Items Other Than the Label in the Label Setup Screen

3. Move the cursor to the item you want to enter using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The soft key menu for entering characters and a keyboard screen for selecting characters appear.
5. Enter the characters.
6. Move the cursor to Fiber Type using the **arrow keys** or the **rotary knob**.
7. Press **ENTER** to move the cursor to the fiber type you want to select.
8. Move the cursor to Current Data Flag using the **arrow keys** or the **rotary knob**.
9. Press **ENTER**. The screen for selecting Current Data Flag appears.
10. Move the cursor to the flag to select using the **arrow keys** or **rotary knob**.
11. Press **ENTER**. The flag is confirmed.



Initializing the Setup Conditions

12. Press the **Default** soft key. The characters that you entered are cleared and reset to factory default settings.

Note

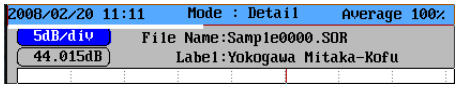
- For details on entering characters, see section 18.6.
- The information that you enter is held until you enter new information.
- The information is saved along with the waveform if the waveform is saved in the SOR type.

Explanation

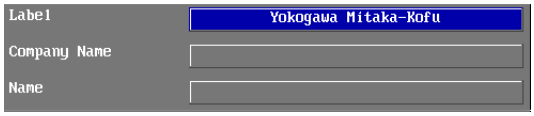
Label Display Area

There are 2 label display areas as follows.

- OTDR main view label area



- Label menu preview area



Entering Labels

- The maximum label length is 36 characters.
- You cannot enter the label while the measurement is in progress.

Mode Selection

The following label mode is selected.

- Manual

You can edit labels as desired.

Contents	OTDR Main View	Label Menu
When editing labels	Display edited contents	Same as left
When loading files	Reflect contents of file	Same as left
When measuring (auto-save)	No change	Same as left
When stopping measurement (auto-save)	No change	Same as left
When changing measurement conditions	No change	Same as left

Auto-numbering function: No

- File Name Duplication

The item with the same file name is automatically input into the label.

Contents	OTDR Main View	Label Menu
When editing labels	-	Cannot edit
When loading files	Reflect contents of file	Same as file name
When measuring (auto-save)	Same contents as file name	Same as file name
When stopping measurement (auto-save)	Same as file name	Next-saved file name
When changing measurement conditions	Clear	Same as file name

Auto-numbering function: Same as file name setting

- Fixed Format

Enter details such as the auto-numbering in the same manner as file name setting.

Contents	OTDR Main View	Label Menu
When editing labels	Edited contents not reflected	Edited Contents
When loading files	Reflect contents of file	Edited Contents
When measuring (auto-save)	Same contents as edited contents	Edited Contents
When stopping measurement (auto-save)	Edited Contents	Next-saved file name
When changing measurement conditions	Clear	Edited Contents

Auto-numbering function: Yes

Entering the Company Name

The maximum number of characters is 36.

Entering the Name

The maximum number of characters is 36.

Entering the Cable ID

The maximum number of characters is 36.

Entering the Fiber ID

The maximum number of characters is 36.

Selecting the Fiber Type

The following optical fiber cable types are selectable.

SMF	Single mode fiber
DSF	Dispersion shifted fiber
NZ-DSF	Non-zero dispersion shifted single-mode fiber
MMF	Multi-mode fiber

Entering the Cable Code

The maximum number of characters is 36.

Entering the Start Point

The maximum number of characters is 36.

Entering the End Point

The maximum number of characters is 36.

Selecting the Current Data Flag

You can indicate the work status as a flag.

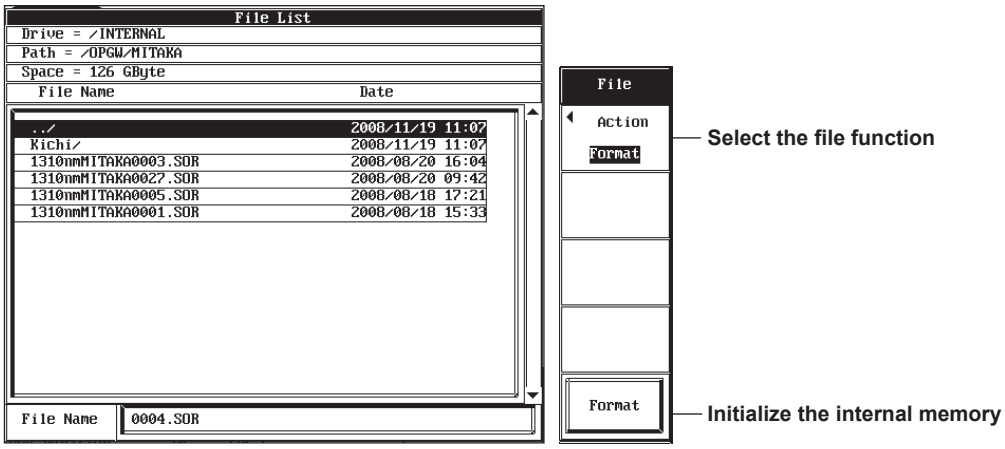
BUILT (BC)
REPAIRED (RC)
OTHER (OT)
Current Condition (CC)

18.8 Initializing (formatting) the internal memory

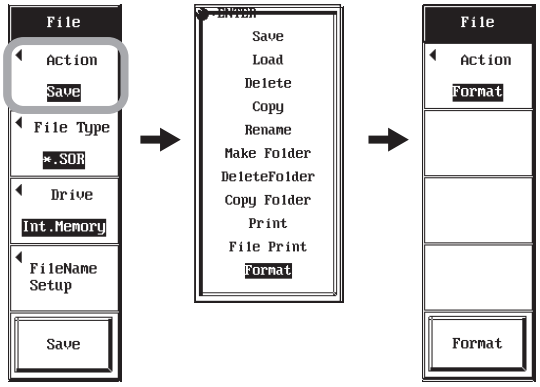
Procedure

Deletes all folders and files in the internal memory.

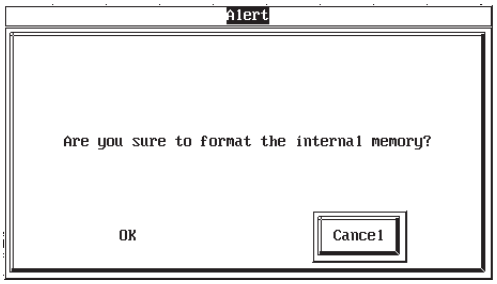
1. Press **FILE**. The soft key menu for operating the waveform data and the file list screen appear.



2. Press the **Action** soft key. The screen for operating the files appears.
3. Move the cursor to Format using the **arrow keys** or the **rotary knob**.
4. Press **ENTER**. The soft key menu for initializing appears.



5. Press the **Format** soft key. A formating confirmation message appears.



6. Move the cursor to OK using the **arrow keys** or **rotary knob**.
7. Press **ENTER**. The internal memory is initialized.
8. Press **ESC**. The optical pulse measurement screen appears.

Note

All the data are cleared when the internal memory is initialized (formatted). Be sure to back up important data beforehand.

19.1 Setting the System

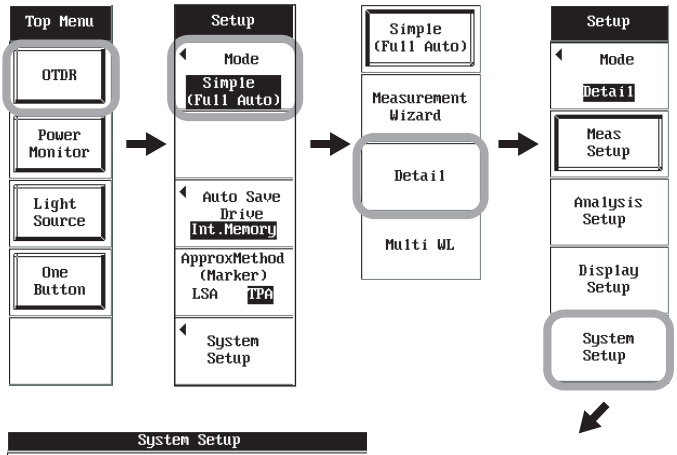
Procedure

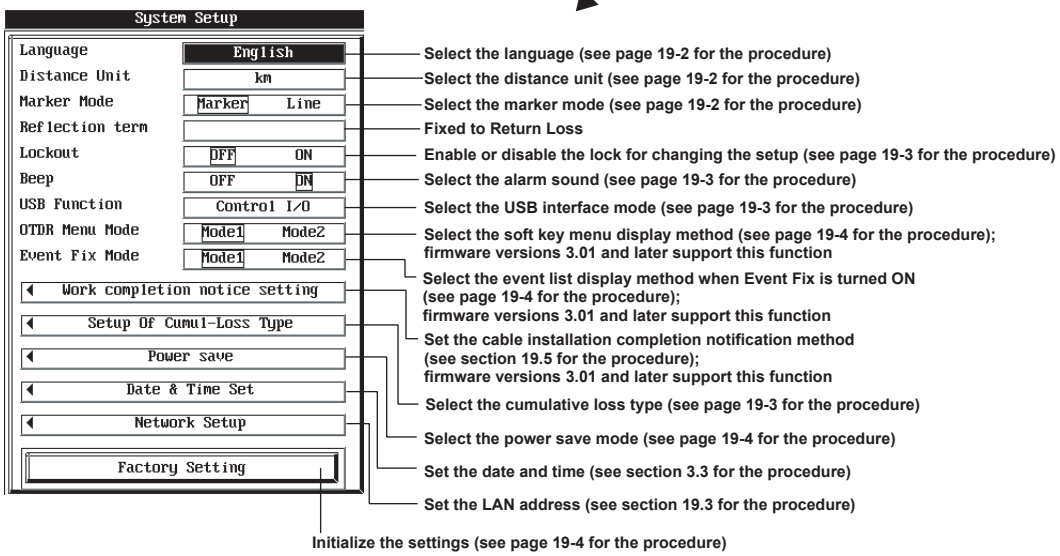
Selecting the Detail Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Detail** soft key. A soft key menu for the Detail mode appears.

Setting the System

5. Press the **System Setup** soft key. The system setup screen appears.





- **Selecting the Language**

  6. Move the cursor to Language using the **arrow keys** or the **rotary knob**.

  7. Press **ENTER**. A screen for selecting the language appears.

  8. Move the cursor to the language you want to select using the **arrow keys** or the **rotary knob**.

  9. Press **ENTER**. The language is confirmed.

Display example when the language specification is English (Suffix Code: -HE).

Suffix Code: -HC **-HK** **-HR**

- **Selecting the Distance Unit**

  10. Move the cursor to Distance Unit using the **arrow keys** or the **rotary knob**.

  11. Press **ENTER**. The screen for selecting the distance unit appears.

  12. Move the cursor to the distance unit you want to select using the **arrow keys** or the **rotary knob**.

  13. Press **ENTER**. The distance unit is confirmed.

Note

If you set the language to Japanese, the distance unit is fixed to km (you cannot change it).

- **Selecting the Marker Mode**

  14. Move the cursor to Marker Mode using the **arrow keys** or the **rotary knob**.

  15. Press **ENTER** to move the cursor to Marker or Line.

Note

For details on the marker mode, see section 11.1.

- **Enabling or Disabling Local Lockout**

  16. Move the cursor to Lockout using the **arrow keys** or the **rotary knob**.

  17. Press **ENTER** to move the cursor to ON or OFF.

- **Enabling or Disabling the Alarm Sound**

  18. Move the cursor to Beep using the **arrow keys** or the **rotary knob**.

  19. Press **ENTER** to move the cursor to ON or OFF.

- **Selecting the USB Function**

  20. Move the cursor to USB Function using the **arrow keys** or the **rotary knob**.

  21. Press **ENTER**. The screen for selecting the USB function appears.

  22. Move the cursor to the USB function you want to select using the **arrow keys** or the **rotary knob**.

  23. Press **ENTER**. The USB function is confirmed.

Note

- You cannot change the display while the AQ7270/AQ7275 is being remotely controlled.
- Select Storage to read or write the measured results in the AQ7270/AQ7275 internal memory from the PC.
- The AQ7270/AQ7275 cannot be remotely controlled while the storage function is in operation.Remote control via the Ethernet interface is also not possible.

- **Selecting the Method for Measuring Cumulative Loss**

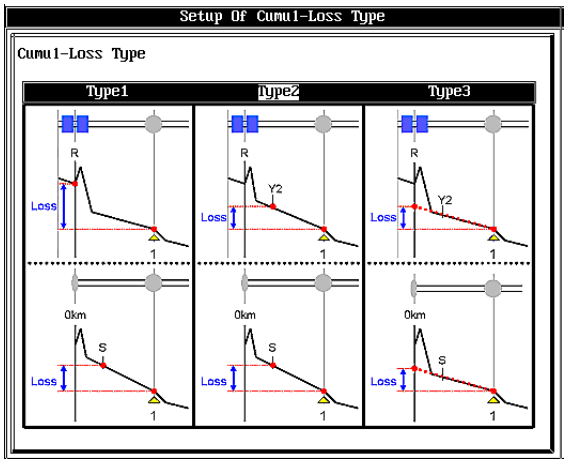
  You can select how to add the near end splice loss to the cumulative loss.

  24. Move the cursor to the cumulative loss type setting using the **arrow keys** or **rotary knob**.

  25. Press the **ENTER** key. The cumulative loss type selection screen is displayed.

  26. Press the **ENTER** key. Press the cursor repeatedly to scroll through the types (type 1, etc.) and finalize the cumulative type.

  27. Press the **ESC** key. The instrument returns to the previous screen.



- **Selecting the Power Save Mode**

  28. Move the cursor to PowerSave using the **arrow keys** or the **rotary knob**.

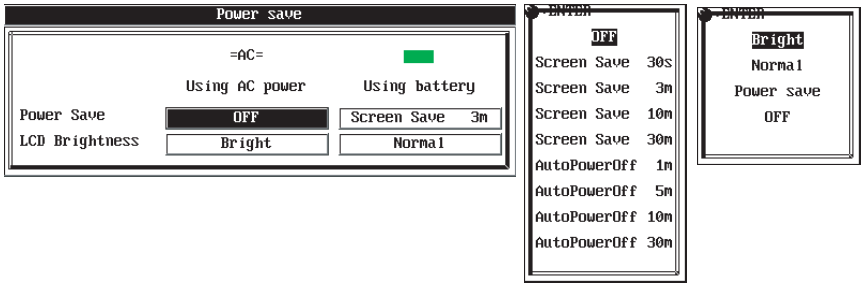
  29. Press **ENTER**. The screen for setting the power save mode and LCD brightness appears.

  30. Move the cursor to the item you want to set using the **arrow keys** or the **rotary knob**.

  31. Press **ENTER**. The screen for selecting the power save mode or LCD brightness appears.

  32. Move the cursor to the item you want to select using the **arrow keys** or the **rotary knob**.

  33. Press **ENTER**. The power save mode or LCD brightness is confirmed.



Note

- When the auto power off function executes, the instrument enters Sleep mode. When starting up from sleep mode, the instrument returns to the screen active before auto power off executed.
- The current folder of the file also returns to the one before auto power off. When recovering from a normal power OFF, the current folder is the root folder of the internal memory.
- Power saving mode and LCD brightness settings can be entered separately for battery drive and AC drive.
- In the case of the AQ7275, display is possible in direct sunlight or in bright surroundings even if the LCD brightness (backlight) is turned OFF.

- **Initialize the settings**

  34. Move the cursor to Factory setting using the **arrow keys** or the **rotary knob**.

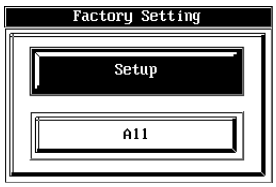
  35. Press **ENTER**. The screen for factory setting appears.

  36. Move the cursor to the item you want to execute using the **arrow keys** or the **rotary knob**.

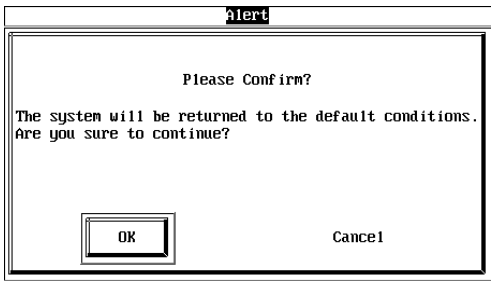
  37. Press **ENTER**. The default confirmation message appears.

  38. Move the cursor to OK using the **arrow keys** or the **rotary knob**.

  39. Press **ENTER**. The settings are initialized.



Default confirmation message (Setup)



Default confirmation message (All)

- **Selecting the Event Fix Mode (Firmware Versions 3.01 and Later)**

  40. Move the cursor to Event Fix Mode using the **arrow keys** or the **rotary knob**.

  41. Press **ENTER** to move the cursor to MODE1 or MODE2.

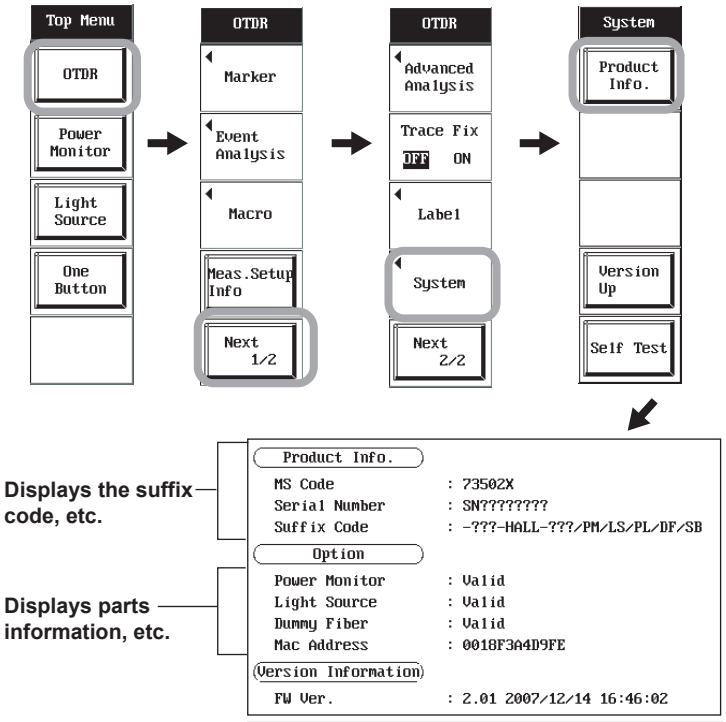
- **Selecting the Soft Key Menu Display Method (Firmware Versions 3.01 and Later)**

  42. Move the cursor to OTDR Menu Mode using the **arrow keys** or the **rotary knob**.

  43. Press **ENTER** to move the cursor to MODE1 or MODE2.

Viewing the System Information

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press the **Next 1/2** soft key.
3. Press the **System** soft key. The soft key menu for the system appears.
4. Press the **Product Info** soft key. The system information screen appears.



Saving the List Screen

5. Press the **Screen Image Save** soft key. The screen image is saved to the root folder of the internal memory with the file name SystemInfo.BMP.

Note

The colors of the saved screen image are the same as the colors of the displayed screen. To select other colors, see section 19.2.

Explanation

Selecting the Distance Unit

You can select the distance unit that is displayed on the screen. If you set the language to Japanese, the distance unit is fixed to km.
km, mile, and kfeet

Enabling or Disabling Local Lockout

This function protects the measurement conditions and system settings from being changed by another person.

OFF	Releases the lockout.
ON	Sets the lockout.

Enabling or Disabling the Alarm Sound

A beep is generated such as when an error message is displayed if the alarm sound is enabled.

OFF	Disables the alarm sound.
ON	Enables the alarm sound.

Setting the Power Save Mode

If the AQ7270/AQ7275 is left with the power turned ON, the LCD backlight is automatically turned off to save power. You can select the following modes.

OFF	Disables the power save mode.
Screen Save 30s	Switches to screen save mode if the AQ7270/AQ7275 is not operated for 30 seconds.
Screen Save 3m	Switches to screen save mode if the AQ7270/AQ7275 is not operated for 3 minutes.
Screen Save 10m	Switches to screen save mode if the AQ7270/AQ7275 is not operated for 10 minutes.
Screen Save 30m	Switches to screen save mode if the AQ7270/AQ7275 is not operated for 30 minutes.
AutoPowerOff 1m	The power is turned OFF if the AQ7270/AQ7275 is not operated for 1 minute.
AutoPowerOff 5m	The power is turned OFF if the AQ7270/AQ7275 is not operated for 5 minutes.
AutoPowerOff 10m	The power is turned OFF if the AQ7270/AQ7275 is not operated for 10 minutes.
AutoPowerOff 30m	The power is turned OFF if the AQ7270/AQ7275 is not operated for 30 minutes.

If you select auto power off, the AQ7270/AQ7275 switches to the power save mode after half of the time until the power is turned off elapses.

Selecting the Brightness

The visibility of the LCD varies greatly by its brightness.
In general, the following characteristics apply.

- **Bright**
  If the environment is bright, the visibility improves, but the power consumption increases. If the AQ7270/AQ7275 is running on the battery pack, pay attention to the battery level.
- **Normal**

An easily viewed screen that is used in most situations.

- **Power save**
  The visibility degrades slightly, but it is bright enough to be viewed in a dark environment. If the AQ7270/AQ7275 is running on the battery pack, the operation time is longer than when the brightness is set high.
- **OFF (AQ7275)**
  The backlight is ON, but display is possible in direct sunlight or bright surroundings. Even longer continuous operation than in power-saving mode.

Selecting the USB Function

There are two USB interfaces on the AQ7270/AQ7275. Select the appropriate interface according to the usage.

Communication (Type B)	Specify this setting to remotely control the AQ7270/AQ7275 from the PC.
Storage (Type B)	Select this setting to read or write the measured results in the AQ7270/AQ7275 internal memory from the PC.

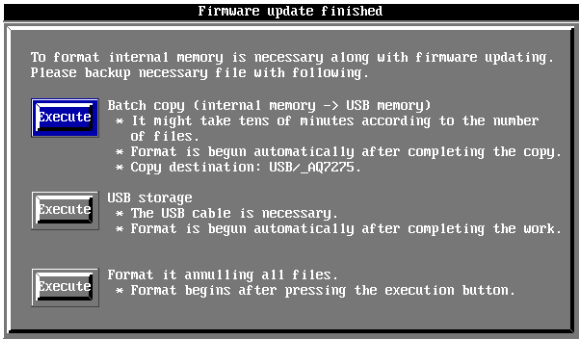
Storage (Type-B) (Firmware Versions 3.02 and Later)

The contents of the AQ7270/AQ7275 internal memory can be displayed on the PC screen. The waveform data measured on the AQ7270/AQ7275, screen images, measurement conditions, and other related files are stored in the DATA folder.
To save these files in your PC, copy the files in the DATA folder to a folder of your choice on your PC.

Note

- Do not save files in folders other than the DATA folder on the AQ7270/AQ7275.
- Do not manipulate (create, delete, and rename) the folders on the AQ7270/AQ7275 from a PC.

If you do, the AQ7270/AQ7275 may not be able to start correctly and may require internal memory initialization.
If initialization is necessary, the following screen will appear. Follow the instructions on the screen, and back up the waveform data, screen images, measurement conditions, and other files if necessary.



You can carry out the “USB storage” procedure shown in the message as follows:

1. Press **Execute**. The USB function of the AQ7270/AQ7275 will be set to storage mode.
2. On your PC, open the AQ7270/AQ7275's DATA folder.
3. Select the files you want to back up, and copy them to a folder of your choice on your PC.
4. Turn the AQ7270/AQ7275 off and then back on. If the AQ7270/AQ7275 starts normally, initialization is complete.

Selecting the Language

The following character can be displayed on the AQ7270/AQ7275.

- **Japanese**
  Alphanumeric
  One-byte katakana
  SJIS (Level 1 and 2)

- **Korean**
  Alphanumeric
  KSC JASO
  HANGLE

- **Simplified Chinese**
  Alphanumeric
  GB2312
  Level 1 and 2 Kanji

Selecting the Event Fix Mode (Firmware Versions 3.01 and Later)

For details, see the explanation in section 12.2.

Initialize the setting

Setup

The system will be returned to the default conditions.

All

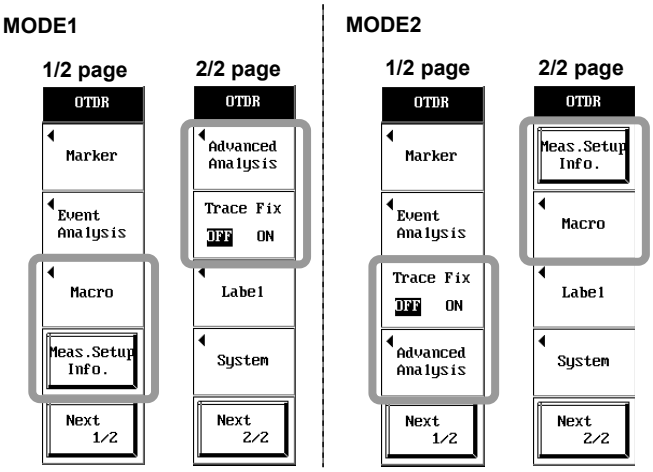
Restore the factory setup. The internal memory is to be formatted.
Please backup your data before execuyion if needed.

Selecting the Soft Key Menu Display Method (Firmware Versions 3.01 and Later)

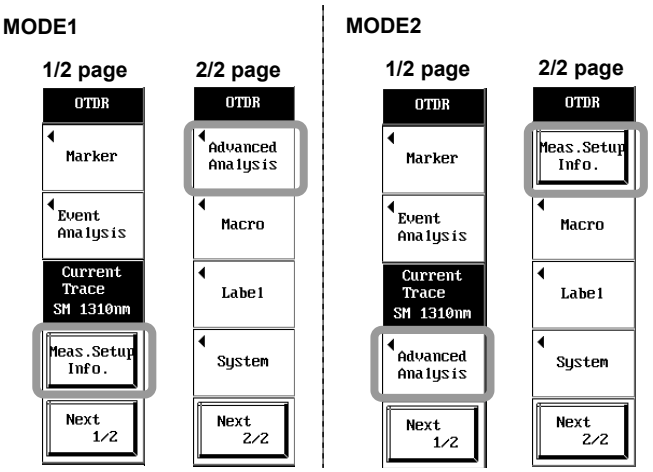
You can select the order that soft keys are displayed on the top menu for optical pulse measurements.

MODE1	Simple mode and detail mode The Macro and Meas. Setup Info soft keys are displayed on page 1/2. The Advanced Analysis and Trace Fix soft keys are displayed on page 2/2. Multi Wavelength Measurement Mode The Meas. Setup Info soft key is displayed on page 1/2. The Advanced Analysis soft key is displayed on page 2/2.
MODEL2	Simple mode and detail mode The Advanced Analysis and Trace Fix soft keys are displayed on page 1/2. The Macro and Meas. Setup Info soft keys are displayed on page 2/2. Multi Wavelength Measurement Mode The Advanced Analysis soft key is displayed on page 1/2. The Meas. Setup Info soft key is displayed on page 2/2.

- **Simple Mode and Detail Mode**



- **Multi Wavelength Measurement Mode**



19.2 Setting the Display

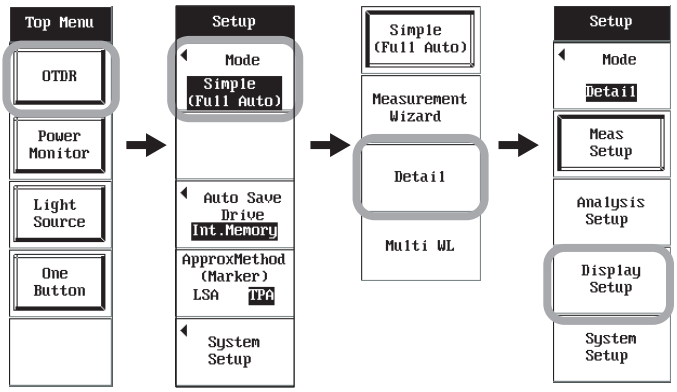
Procedure

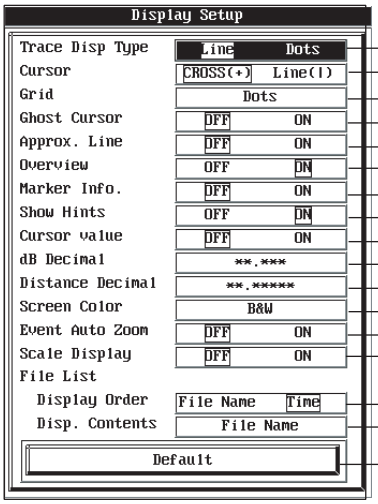
Selecting the Detail Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Detail** soft key. A soft key menu for the Detail mode appears.

Setting the Display Setup

5. Press the **Display Setup** soft key. The Display Setup screen appears.





- Select the waveform display method (see page 19-9 for the procedure)
- Select the cursor display method (see page 19-9 for the procedure)
- Select the grid display type of the screen (see page 19-9 for the procedure)
- Select the cursor display for the secondary reflection measurement (see page 19-9 for the procedure)
- Select the approximation line display (see page 19-9 for the procedure)
- Select the full screen display (see page 19-9 for the procedure)
- Select the marker distance information display (see page 19-9 for the procedure)
- Select the illustration description display of the measured waveform (see page 19-9 for the procedure)
- Select the cursor dB display (see page 19-9 for the procedure)
- Select the number of digits for the dB value display (see page 19-10 for the procedure)
- Select the number of digits for the distance display (see page 19-10 for the procedure)
- Select the screen color (see page 19-10 for the procedure)
- Select the display expanded around the event position (see page 19-11 for the procedure)
- Select the scale display (see page 19-12 for the procedure); firmware versions 3.01 and later support this function
- Select the sort condition (see page 19-11 for the procedure)
- Select the file information to be displayed on the screen (see page 19-11 for the procedure)
- Initialize the settings (see page 19-11 for the procedure)

- **Selecting the Waveform Display Type**

  6. Move the cursor to Trace Disp Type using the **arrow keys** or the **rotary knob**.

  7. Press **ENTER** to move the cursor to Line or Dot.

- **Selecting the Cursor Type**

  8. Move the cursor to Cursor using the **arrow keys** or the **rotary knob**.

  9. Press **ENTER** to move the cursor to Cross(+) or Line(|).

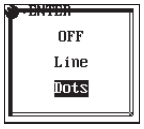
- **Selecting the Grid Display Type**

  10. Move the cursor to Grid using the **arrow keys** or the **rotary knob**.

  11. Press **ENTER.** The screen for selecting grid appears.

  12. Move the cursor to the grid format you want to select using the **arrow keys** or the **rotary knob**.

  13. Press **ENTER**. The grid display type is confirmed.



- **Showing or Hiding the Second Cursor**

  14. Move the cursor to Ghost Cursor using the **arrow keys** or the **rotary knob**.

  15. Press **ENTER** to move the cursor to ON or OFF.

- **Showing or Hiding the Approximation Line**

  16. Move the cursor to Approx. Line using the **arrow keys** or the **rotary knob**.

  17. Press **ENTER** to move the cursor to ON or OFF.

- **Showing or Hiding the Overview**

  18. Move the cursor to Overview using the **arrow keys** or the **rotary knob**.

  19. Press **ENTER** to move the cursor to ON or OFF.

- **Showing or Hiding the Marker Information**

  20. Move the cursor to Marker Info using the **arrow keys** or the **rotary knob**.

  21. Press **ENTER** to move the cursor to ON or OFF.

- **Showing or Hiding the Functional Explanation Display**

  22. Move the cursor to Show Hints using the **arrow keys** or the **rotary knob**.

  23. Press **ENTER** to move the cursor to ON or OFF.

- **Showing or Hiding the Cursor dB Display**

  24. Move the cursor to Cursor Value using the **arrow keys** or the **rotary knob**.

  25. Press **ENTER** to move the cursor to ON or OFF.

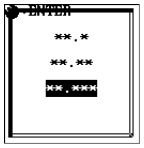
- **Selecting the Digits of the dB Display**

  26. Move the cursor to dB Decimal using the **arrow keys** or the **rotary knob**.

  27. Press **ENTER**. The screen for selecting the dB display digits appears.

  28. Move the cursor to the digit format you want to select using the **arrow keys** or the **rotary knob**.

  29. Press **ENTER**. The dB display digits is confirmed.



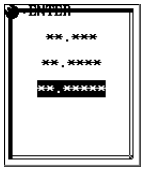
- **Selecting the Digits of the Distance Display**

  30. Move the cursor to Distance Decimal using the **arrow keys** or the **rotary knob**.

  31. Press **ENTER**. The screen for selecting the number of displayed digits of the distance appears.

  32. Move the cursor to the digit format you want to select using the **arrow keys** or the **rotary knob**.

  33. Press **ENTER**. The digits of the distance display is confirmed.



- **Selecting the Screen Color**

  34. Move the cursor to Screen Color using the **arrow keys** or the **rotary knob**.

  35. Press **ENTER**. The screen for selecting the screen color appears.

  36. Move the cursor to the color format you want to select using the **arrow keys** or the **rotary knob**.

  37. Press **ENTER**. The screen color is confirmed.

- **Selecting the Display Expanded around the Event Position**

  38. Move the cursor to Event Auto Zoom using the **arrow keys** or **rotary knob**.

  39. Press **ENTER** to move the cursor to ON or OFF.

- **Selecting the Display Order on the File List Screen**

  40. Move the cursor to File List DisplayOrder using the **arrow keys** or the **rotary knob**.

  41. Press **ENTER** to move the cursor to File Name or Time.

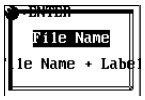
- **Selecting the Displayed Contents on the File List Screen**

  42. Move the cursor to File List DispContents using the **arrow keys** or the **rotary knob**.

  43. Press **ENTER**. The screen for selecting the displayed contents appears.

  44. Move the cursor to the displayed content format you want to select using the **arrow keys** or the **rotary knob**.

  45. Press **ENTER**. The displayed contents are confirmed.



- **Resetting the Display Setup to Factory Default Conditions**

  46. Move the cursor to Default using the **arrow keys** or the **rotary knob**.

  47. Press **ENTER**. The display settings are initialized.

- **Selecting the Scale Display (Firmware Versions 3.01 and Later)**

  48. Move the cursor to Scale Display using the **arrow keys** or the **rotary knob**.

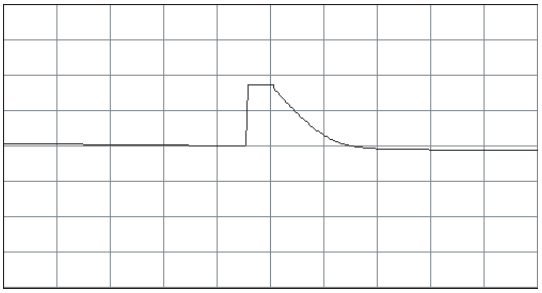
  49. Press **ENTER** to move the cursor to ON or OFF.

Explanation

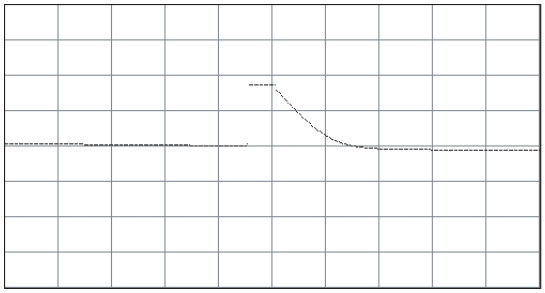
Selecting the Waveform Display Type

You can select the waveform display type from the following:

Line	Connects the sampling data with lines for the display.
Dot	Displays the sampled data with dots.



Line display

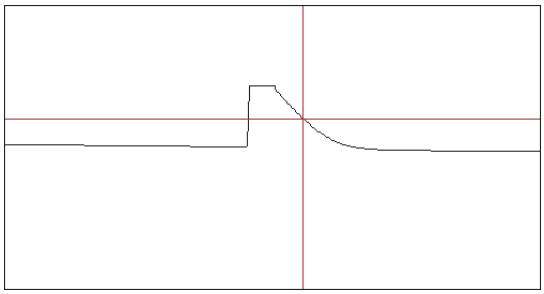


Dot display

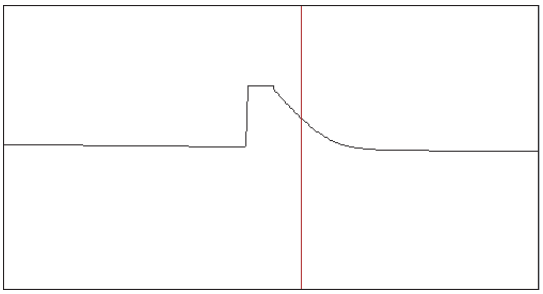
Selecting the Cursor Type

You can select the cursor type from the following:

Cross(+)	Uses a crosshair to indicate a position on the waveform.
Line(|)	Uses a line to indicate a position on the waveform.



Crosshair display

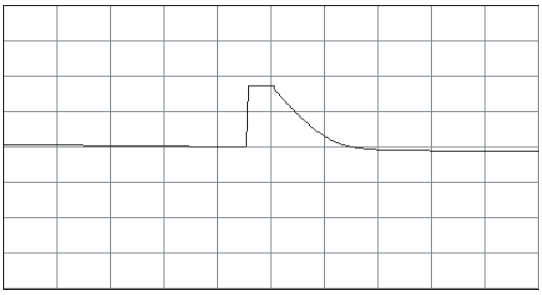


Line display

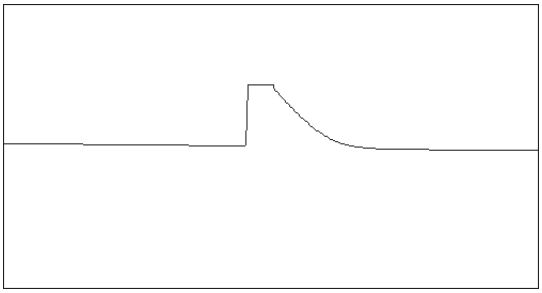
Selecting the Grid Display Type

You can select the grid display from the following:

OFF	Disables the grid display.
LINE	Displays the grid with lines.
DOTS	Displays the grid with dots.



Show the grid with lines

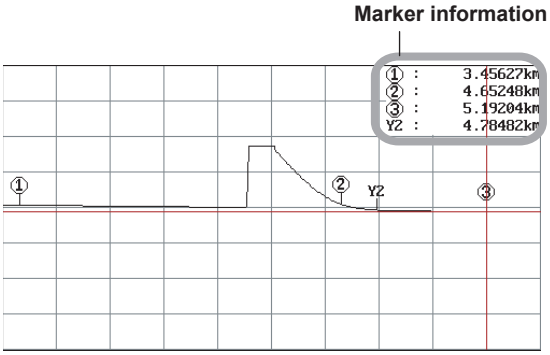


Hide the grid

Showing or Hiding the Marker Information

You can display the distance from the measurement reference to each marker in the waveform display area.

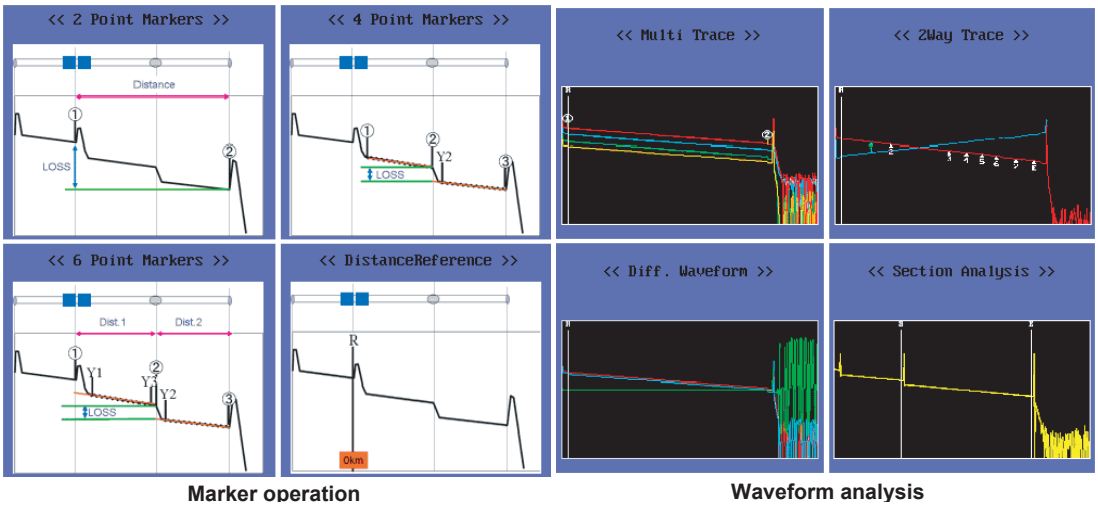
OFF	Disables the marker information display.
ON	Enables the marker information display.



Showing or Hiding the Functional Explanation Display

You can display an explanation screen at the start of the marker operation screen and waveform analysis.

OFF	Hides the functional explanation.
ON	Shows the functional explanation.



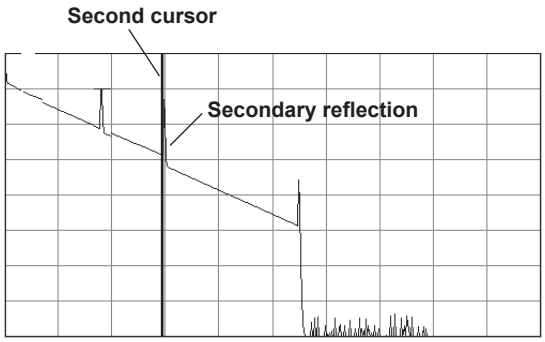
Marker operation

Waveform analysis

Showing or Hiding the Second Cursor

The second cursor is used to check the secondary reflection. A secondary reflection is a reflection that is detected at a location where there is no actual event. You can select the following modes.

OFF	Hides the second cursor.
ON	Shows the second cursor.



Principle behind Secondary Reflections

The optical pulse output from position I moves towards II.

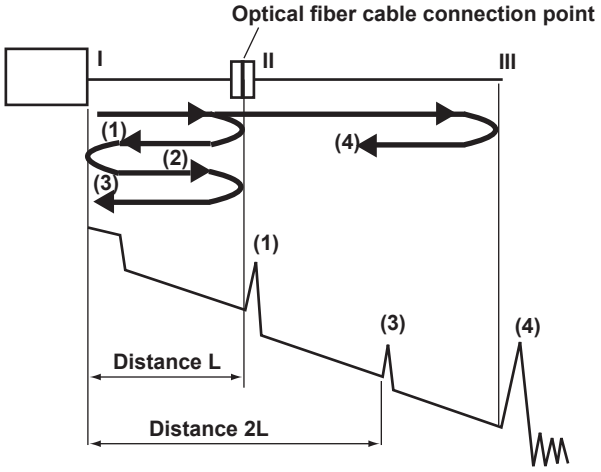
↓

The light reflected at the spliced surface of II (1) is reflected back at the spliced surface of I and moves toward II (2).
The AQ7270/AQ7275 detects (1) as an event.

↓

A reflected ray (3) occurs at the spliced surface of II due to the light of (2).
The AQ7270/AQ7275 detects (3) as an event.

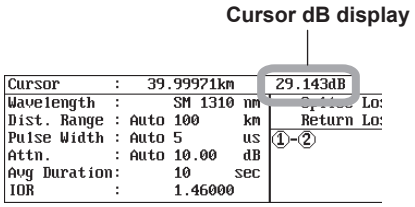
Because the AQ7270/AQ7275 measures all the reflected rays (1, 3, and 4), the AQ7270/AQ7275 detects (3) as an event in the same way as an actual occurring reflection. Therefore, it appears as though an event exists at a location where an actual event does not exist.



Showing or Hiding the Cursor dB Display

In addition to the distance information of the cursor, dB values can be displayed.

OFF	Shows only the distance information at the cursor position.
ON	Shows the distance to the cursor value and dB value.



Selecting the Digits of the dB Display

You can select the number of digits of the dB display.

**.*	Displays the value with one decimal digit.
.	Displays the value with two decimal digits.
.*	Displays the value with three decimal digits.

Selecting the Digits of the Distance Display

You can select the number of digits of the distance display.

.*	Displays the value with three decimal digits.
.**	Displays the value with four decimal digits.
.***	Displays the value with five decimal digits.

Selecting the Screen Color

You can select the screen color from color patterns 1 to 3 and black and white.

Selecting the Display Expanded around the Event Position

The waveform can be displayed expanded around the event at the cursor position or the selected event when events are being detected. Each time you select an event, the zoom ratio of the vertical and horizontal axes are automatically adjusted. Event auto zoom is invalid in 2-Way Trace mode. For details on event editing, see section 12.2.

Selecting the File List Display Method

You can select the display method of the file list screen.

Display order	File name	Displays the file names from the top in alphabetical order.
	Time	Displays the file names from the top in order from the newest file.
Displayed contents	File name	Displays the name of the file you entered when saving the file.
	File name+label	Displays the characters you entered for the file name and comment.

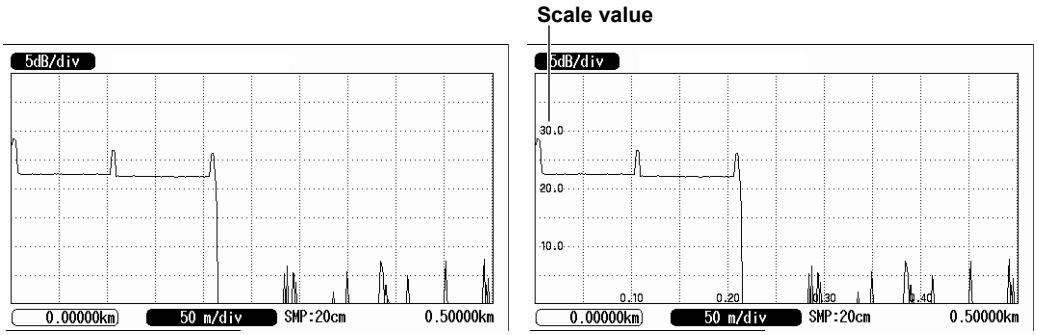
Note

When file name + label is selected, it may take some time to display. To speed up the display, only display the file name.

Displaying the Scale (firmware version 3.01 or later)

You can display not only the distance at the cursor position, but also the dB value.

OFF	The scale values are not displayed.
ON	The scale values are displayed.



Scale display off

Scale display on

19.3 Setting the Network (/PL Option)

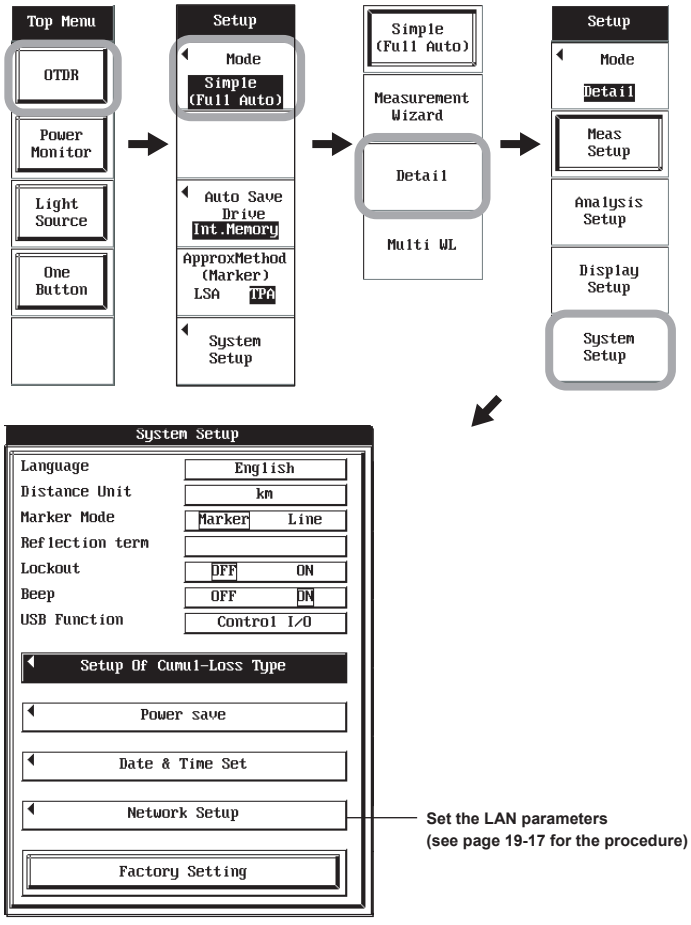
Procedure

Selecting the Detail Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Detail** soft key. A soft key menu for the Detail mode appears.

Displaying the System Setup Screen

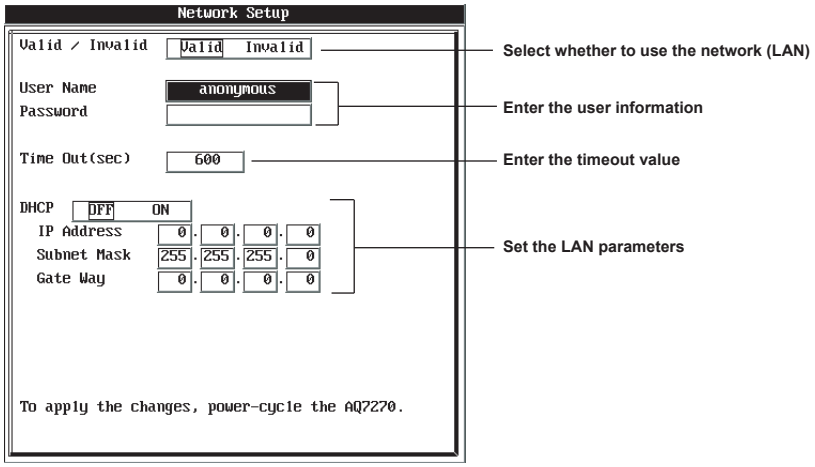
5. Press the **System Setup** soft key. The system setup screen appears.



Displaying the Network Setup Screen

6. Move the cursor to Network Setup using the **arrow keys** or the **rotary knob**.

7. Press **ENTER**. The Network Setup screen appears.



Note

Power up takes a long time if you power up the AQ7270/AQ7275 with the Valid/Invalid item set to Valid when the AQ7270/AQ7275 not connected to the network.

- **Enabling the Network Setup**

8. Press **ENTER**. The cursor moves, and the item text color turns white.

- **Entering the User Name**

9. Move the cursor to the User Name using the **arrow keys** or the **rotary knob**.

10. Press **ENTER**. The screen for entering characters appears.

11. Enter the user name.

Note

For details on entering characters, see section 18.6.

- **Entering the Password**

12. Move the cursor to Password using the **arrow keys** or the **rotary knob**.

13. Press **ENTER**. The screen for entering characters appears.

14. Enter the password.

Note

For details on entering characters, see section 18.6.

- **Setting the Timeout Value**

  15. Move the cursor to Time Out using the **arrow keys** or the **rotary knob**.

  16. Press **ENTER**. The screen for setting the timeout value appears.

  17. Use the **rotary knob** to set the value.

  18. Press **ENTER**. The timeout value is confirmed.

Note

The selectable range is 1 to 9999.

- **Setting the Address (Auto)**

  19. Move the cursor to DHCP using the **arrow keys** or the **rotary knob**.

  20. Press **ENTER** to move the cursor to ON.

Note

- You cannot set the address manually if the DHCP function is turned ON.
- A DHCP server is required on the network to use the DHCP function.

- **Setting the Address (Manual)**

  21. Move the cursor to IP Address using the **arrow keys** or the **rotary knob**.

  22. Press **ENTER**. The screen for setting the address appears.

  23. Use the **rotary knob** to set the value.

  24. Press **ENTER**. The address is confirmed.

  25. Move the cursor to Subnet Mask using the **arrow keys** or the **rotary knob**.

  26. Press **ENTER**. The screen for setting the address appears.

  27. Use the **rotary knob** to set the value.

  28. Press **ENTER**. The address is confirmed.

  29. Move the cursor to Gate Way using the **arrow keys** or the **rotary knob**.

  30. Press **ENTER**. The screen for setting the address appears.

  31. Use the **rotary knob** to set the value.

  32. Press **ENTER**. The address is confirmed.

Note

- If you change the LAN parameters, power cycle the AQ7270/AQ7275.
- You cannot change the display while the AQ7270/AQ7275 is being remotely controlled.

Explanation

Set the Ethernet parameters of the AQ7270/AQ7275.
The IP address of the AQ7270/AQ7275 must be set correctly to use this function correctly.
If a DHCP server is available on the network to which the AQ7270/AQ7275 is connected, the IP address is automatically assigned. In this case, turn ON DHCP on the AQ7270/AQ7275.
For details on the network to which the AQ7270/AQ7275 is connected, consult your network administrator.

Setting the User Name and Password

The Ethernet interface has a user verification function. Set a user name and password for the AQ7270/AQ7275 in advance.

- **Setting the User Name**
  Enter the user name using up to 15 characters. The default setting is “anonymous.’
- **Setting the Password**
  Enter the password using up to 15 characters.

Setting the Timeout Value

The connection to the network is automatically disconnected if there is no access to the AQ7270/AQ7275 for the specified time.

Setting the TCP/IP Parameters

You must set the following TCP/IP parameters to use the Ethernet interface function.

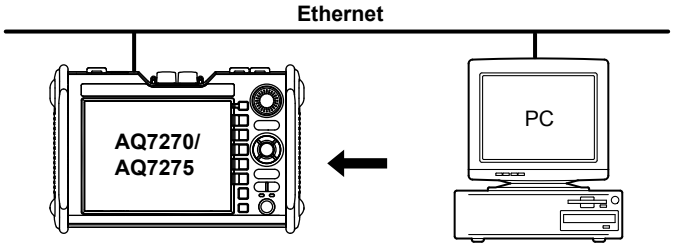
- IP address
- Subnet mask
- Gateway

Note

- If the user verification fails, the connection to the AQ7270/AQ7275 is disconnected.
- A password is not required if the user name is “anonymous.’

19.4 Network File Transfers

This section describes the FTP server function when a general FTP client (such as WS_FTP or FFFTP) is used. (Applicable to products with firmware version 1.04 or higher.)
To use this function, set the network according to the instructions in section 19.3, “Setting the Network (/PL Option).”



Note

- To apply new settings, power-cycle the AQ7270/AQ7275.
- You cannot transfer data from the PC to the AQ7270/AQ7275 memory.

19.5 Cable Installation Completion Notification

Firmware versions 3.01 and later support this function.

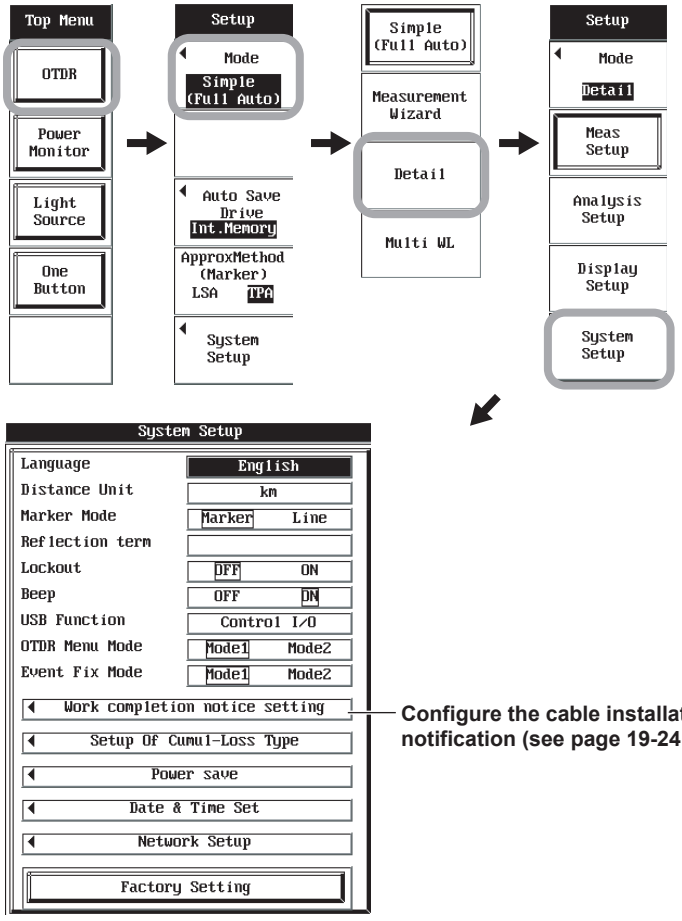
Procedure

Selecting the Detail Mode

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press **SETUP**. A soft key menu for the settings appears.
3. Press the **Mode** soft key. A soft key menu for selecting the setup mode appears.
4. Press the **Detail** soft key. A soft key menu for the Detail mode appears.

Displaying the System Setup Screen

5. Press the **System Setup** soft key. The system setup screen appears.

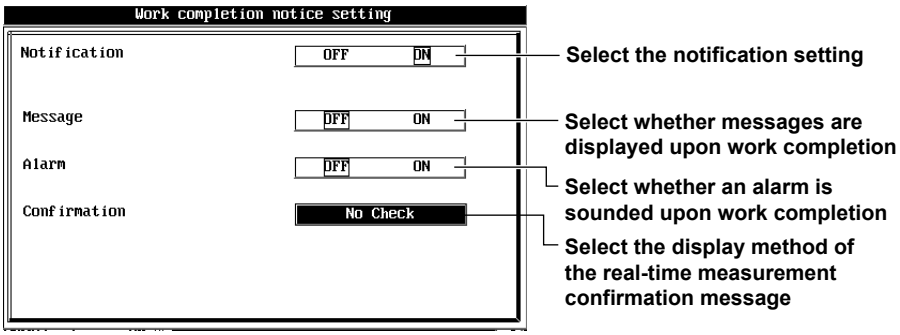


Configure the cable installation completion notification (see page 19-24 for the procedure)

Displaying the Work Completion Notice Setting Screen

6. Move the cursor to Work completion notice setting using the **arrow keys** or the **rotary knob**.

7. Press **ENTER**. The Work completion notice setting screen appears.



- **Selecting the Notification Setting**

8. Move the cursor to Notification using the **arrow keys** or the **rotary knob**.

9. Press **ENTER** to move the cursor to ON or OFF.

Note

If you set Notification to OFF, you will not be able to set the other values.

- **Selecting Whether Messages Are Displayed upon Work Completion**

The AQ7270/AQ7275 can display a completion message on the screen when work is completed.

10. Move the cursor to Message using the **arrow keys** or the **rotary knob**.

11. Press **ENTER** to move the cursor to ON or OFF.

- **Selecting Whether an Alarm Is Sounded upon Work Completion**

The AQ7270/AQ7275 can sound an alarm when work is completed.

12. Move the cursor to Alarm using the **arrow keys** or the **rotary knob**.

13. Press **ENTER** to move the cursor to ON or OFF.

- **Selecting the Display Method of the Real-Time Measurement Confirmation Message**

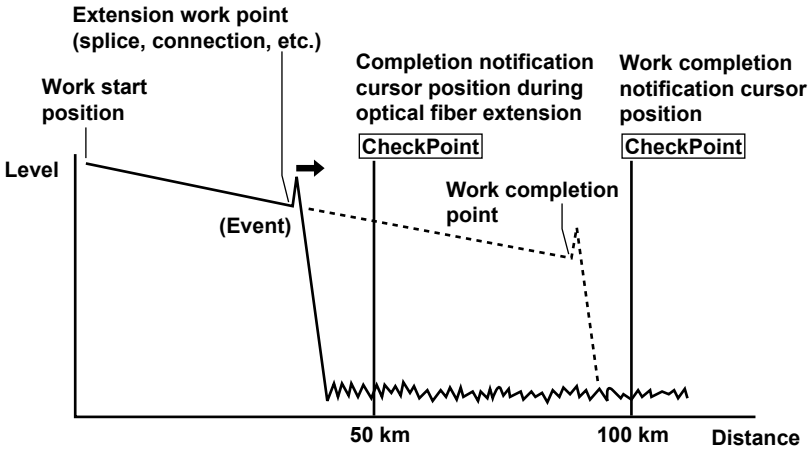
The AQ7270/AQ7275 can display a message before real-time measurements are performed. This message confirms that the cursors have been set for work completion.

14. Move the cursor to Confirmation using the **arrow keys** or the **rotary knob**.

15. Press **ENTER** to move the cursor to ON or OFF.

Explanation

Before you check whether the work is complete, move the cursor to the fiber end point after the optical fiber has been installed (the extension work point or the work completion point) and turn on the work completion confirmation notification. When the fiber end detection position (the event) during real-time measurement is the same as the cursor position (CheckPoint), the AQ7270/AQ7275 gives a notification that the installation is complete.



Message Display

When the event reaches a “CheckPoint,” a message is displayed on the screen.

Off	Messages are not displayed.
On	Completion messages are displayed on the screen.

Alarm

When the event reaches a “CheckPoint,” an alarm is sounded.

Off	The AQ7270/AQ7275 does not sound an alarm.
On	The AQ7270/AQ7275 sounds an alarm.

Confirmation

When the AQ7270/AQ7275 checks the work completion, a message confirming whether you have set the cursor to a position that is a little after the installation point is displayed.

No Check	The confirmation message is not displayed.
Check only once	After you start the AQ7270/AQ7275, the message is only displayed before the AQ7270/AQ7275 performs work completion notification for the first time.
Check everytime	The message is displayed each time before the AQ7270/AQ7275 performs work completion notification.

20.1 Troubleshooting

Troubleshooting

- If a message is displayed on the screen, read the next section.
- If servicing is necessary or if the software is not operating correctly after performing the corrective actions, contact your nearest YOKOGAWA dealer.

Problem and Corrective Action		Reference Section
Nothing is displayed even if the power switch is turned ON.		
	If you are using the AC adapter, check that the power plug is connected to the outlet, the power cord is connected to the AC adapter, and the plug at the DC end of the AC adapter is connected to the AQ7270/AQ7275.	3.1
	If you are using the battery pack, install it securely.	3.1
	Charge the battery pack and check that the ON lamp is illuminated.	1.1
	The LCD display darkens in high temperatures. The display speed slows down in low temperatures. Check that the temperature at the operating location is within the operating temperature range.	21
The display turns off after some time elapses.		
	The power turns OFF automatically when the battery level is low. Check the battery level of the battery pack.	20.7
	If a time value is specified in power save mode, the display is turned off if you do not operate the AQ7270/AQ7275 for the specified time. Check the settings.	19.1
The display is dark.		
	If the LCD brightness is set to Power save, the display appears dark. Check the settings.	19.1
	The LCD may be worn out. Servicing is required.	20.11
	If the AQ7270/AQ7275 or the battery pack becomes hot, the LCD brightness is lowered automatically to prevent malfunction. Check that the temperature at the operating location is within the operating temperature range.	21
The measurement conditions cannot be changed.		
	You cannot change the conditions if lockout is ON. Check the settings.	19.1
The power turns OFF while in use.		
	The AQ7270/AQ7275 turns OFF automatically if an abnormal condition is detected. A warning message is displayed before the power is turned OFF. Check the message.	20.2*
	Fix the problem indicated by the warning message, and turn the power switch back ON.	
The battery pack cannot be charged.(The CHARGE lamp blinks.)		
	The battery pack may be too cold or too hot. Check that the temperature at the operating location is within the operating temperature range. Remove the battery pack from the AQ7270/AQ7275 and place it in a location at room temperature for a while.	21.3
	The battery pack may be in the preliminary charging condition because the battery charge is too low for fast charging. Leave the AC adapter connected to the AQ7270/AQ7275 for 2 to 3 hours. If the CHARGE lamp is still blinking after 2 to 3 hours, the battery pack may be approaching the end of its useful life. Replace with a new battery pack.	3.1
The power turns OFF while starting up.		
	You may have pressed the power switch twice.	–

* To prevent malfunction, the AQ7270/AQ7275 displays a warning message and automatically turns the power OFF if the operating conditions are close to exceeding the allowed range. For the conditions that cause a message to be displayed, see section 20.2.

20.2 Error Messages

Error Messages

A message may appear on the screen during operation. This section describes the meanings of the messages and their corrective actions. The messages can be displayed either in English or Japanese (see section 19.1). If the corrective action requires servicing, contact your nearest YOKOGAWA dealer for repairs.
In addition to the error messages listed below, there are communication error messages. Communication error messages are given in the *Communication Interface User's Manual (IM735020-17E)*.

Error in Execution

Code	Message
20	Network Option is not installed.
21	Power Monitor Option is not installed.
22	Light source option is not installed.
23	Internal Printer Option is not installed.
24	One or more conditions in this file are not supported by this product.
25	The Real Time measurement is executed. Thus, the setting mode has been changed from Multi-wavelength Mode to Advanced Mode.
27	The end point is different between acquired data and reference data. Please check the connected fiber cable.
28	The measurement may not be completed within the specified duration.
29	In remote control mode, all keys are locked except F1 key. Please hit F1 key to exit the remote control mode.
31	<Pause - Macro> Macro will be paused when the current job has been completed.
33	File operation is cancelled.
34	Printing is cancelled.
35	The optical plug may not be connected securely.
36	Either of the analysis information below could not be retrieved. (Cursor info, Free marker info., Event info.)
37	The end point distance does not match with the master end point.
40	No more averaging is allowed. (already MAX averaging condition) Set "Average Continue"OFF for new measurement.
41	Now updating firmware. Please wait. It takes approx. 20 seconds. Do not turn off power during update. Restart automatically after successful updating.
500	The measurement condition is failed. Please reset ****** in SETTING menu.
501	Not executable during measurement. Please stop the measurement and execute again.
502	The measurement cannot be started during printing. Please either wait until the end of the printing or interrupt the printing.
503	The measurement cannot be started during the file operation. Please either interrupt the file operation or wait until the end of the file operation.
504	The measurement could not be completed within the specified averaging duration. Please modify the averaging duration.
505	Hardware failed, and needs to be repaired. Please contact Yokogawa's representatives.
506	Hardware failed, and needs to be repaired. Please contact Yokogawa's representatives.
507	Hardware failed, and needs to be repaired. Please contact Yokogawa's representatives.
508	Hardware failed, and needs to be repaired. Please contact Yokogawa's representatives.
509	Hardware failed, and needs to be repaired. Please contact Yokogawa's representatives.
510	PLUG CHECK Error. Please check or clean the connector.
511	This parameter is not valid in Simple (Full Auto) mode.
512	ZERO SET ERROR
513	ZERO SET ERROR
514	Exceeding limit. It may cause damage of the instrument. Please disconnect the plug.
515	ZERO SET ERROR
516	Fiber In Use Alarm Error 1
517	Fiber In Use Alarm Error 2

Code	Message
550	The event list does not exist in either of trace or both.
551	Measurement range of those two traces are not same reference points. Please set the origin (0m).
552	Fiber lengths do not match. The end point distance error between two traces must be within 3%.
553	Total number of events exceeds 100 for the 2-way analysis.
555	The differential trace cannot be created. Trace conditions are not same.
556	The differential trace cannot be created. No trace data available.
557	The differential trace cannot be created. The sampling resolutions are not same.
558	The differential trace cannot be created. The group indices are not same.
559	The differential trace cannot be created. The start points are not same.
560	When the event fix is ON, the distance reference setup cannot be performed.
601	Cannot save onto the media. This media is for read-only.
602	Can not recognize file system. -Internal memory: Contact Yokogawa's representatives. - USB memory: Try the other media or format again with FAT.
604	Storage media has been disconnected while the media is being accessed.
605	Same file name or folder name exists.
606	File system failed. Please use another media.
607	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
608	Invalid file name or folder name.
609	Invalid file format
610	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
611	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
612	Invalid path name
613	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
614	Unknown file or folder
615	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
616	Cannot save onto the media. This media is for read-only.
617	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
618	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
619	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
620	Free space is not enough.
621	File system failed. Please try another media.
622	Unknown folder
623	Folder is not empty.
624	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
625	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
626	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
627	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
628	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
629	Writing to USB memory is not allowed.
630	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
631	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
632	File system failed and needs to be repaired. Please contact Yokogawa’s representatives.
633	File system failed. Please try another media.
634	Folder cannot be deleted. Please confirm the following. - Media is correctly installed. - Media is formatted. - Media is not read-only.
635	Folder cannot be deleted. The path name or the file name is too long.

20.2 Error Messages

Code	Message
636	Folder cannot be deleted. The hierarchy below the specified folder is too deep.
637	Folder cannot be deleted. The path name is invalid.
638	Folder cannot be deleted. It failed in the deletion of the file. Please confirm the following. - Media is correctly installed. - Media is formatted. - Media is not read-only.
639	Folder cannot be copied. Please confirm the following. - Media is correctly installed. - Media is formatted. - Media is not read-only.
640	Folder cannot be copied. The path name or the file name is too long.
641	Folder cannot be copied. The hierarchy below the specified folder is too deep.
642	Failed to copy the folder. The path name is invalid.
643	Folder cannot be copied. It failed in the creation of the destination folder. Please confirm the following. - Media is correctly installed. - Media is formatted. - Media is not read-only.
644	Folder cannot be copied. It failed in the copy of the file. Please confirm the following. - Media is correctly installed. - Media is formatted. - Media is not read-only.
645	The path name is too long.
646	USB memory can not be recognized.
647	Can not make file or folder in this folder.
690	Cannot save the measurement data. Please confirm the following. - Media is correctly installed. - Media is formatted. - Media is not read-only.
691	There is **** files in the destination folder. Please use other folder.
692	Media is full. Please install new media.
693	Cannot make a folder. Please change the folder name.
694	Cannot open the file. Please confirm the following. - Media is correctly inserted. - Media is not changed.
695	One or more conditions in this file cannot be restored. The instrument automatically determines those conditions.
696	Folder cannot be deleted. Please confirm the following. -There is no file or folder in this folder.
697	Folder can’t be copied. The destination folder is a subfolder of the source folder.
698	Folder can not be copied. Please confirm the following. -There is no file or folder in this folder. - Media is correctly inserted. - Media is formatted. - Media is not read-only.
700	Failed to open the file.
701	Failed to close the file.
702	Failed to read the file.
703	Irregular file format.
704	Failed to write the file.
705	Cannot be saved. No trace data.
706	Cannot be saved. No event data.
707	One or more measurement conditions are not specified. Please confirm the measurement conditions.
708	Cannot be saved. This data is not taken with this instrument.
709	File cannot be retrieved. Distance range exceeds 400km.
710	File cannot be retrieved. Invalid wavelength

Code	Message
711	File cannot be retrieved. Invalid distance range
712	File cannot be retrieved. Invalid pulse width
713	File cannot be retrieved. Invalid sampling points
714	File cannot be retrieved. Distance range exceeds 400km.
715	File cannot be retrieved. Sampling intervals exceed 64m.
716	File cannot be retrieved. Actual averaging times or duration is not set.
717	Duplicate file name.
718	File is damaged. Check the file.
719	File name too long. Maximum length is 37 letters.
720	File is now being accessed. Execute after access is released.
721	Cannot load this file. Invalid file format or this firmware version is old.
722	Recall Setup File cannot load the measurement condition which sampling interval has been changed to shorter than the standard sampling interval at Meas. Range Change function.
750	Difficulty in printing. Please confirm the following matter. Is the printer connected? Does the printer cover close? Is the setting of the printer correct? Has there been a paper in the printer head?
751	The temperature of the printer head has got heat up. Please do not print until the temperature of the printer head falls.
752	Print Error. Printer cannot be found.
753	No paper.
754	USB printer error Perform the power cycle.
755	USB printer is offline.
756	No paper (USB printer)
757	USB printer cannot be found. Perform the power cycle.
758	The printer is out of order, and needs to be repaired. Please contact Yokogawa’s representatives.
759	Event list cannot be printed because event analysis is not performed.
760	Cannot execute it while printing.
761	This operation is not excuted while light is emitting. Stop emitting the light then excute the operation.
800	This function is not supported.
814	Failed network initialize. Please confirm network connection and setting.
816	Network setting is updated. Rebooting is required to reflect the changes.
817	Test Error occurred.
818	Test succeeded.
853	In Lockout mode, all keys are locked. Please cancel the lockout.
854	In USB Storage mode, all keys are locked. Please disconnect the USB Cable.
855	While a measurement is progressed or a file is accessed, it cannot go to USB storage mode. Please try again after stopping a measurement or a file access.
900	Backup data is damaged. this instrument starts up with the factory setting.
901	Optical connector is not correctly connected. Please clean and reconnect the connector again.
902	Battery is low Please power it off, and charge the battery or replace the battery. Or, please use the AC power supply.
903	Backup battery failed, and needs to be repaired. Please contact Yokogawa’s representatives.

20.2 Error Messages

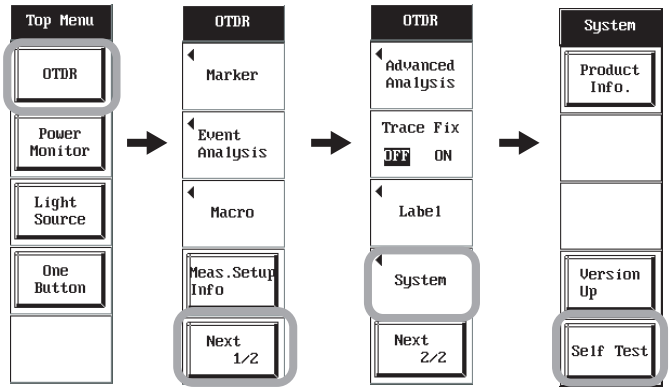
Code	Message
904	Hardware failed, and needs to be repaired. Please contact Yokogawa's representatives.
905	Battery error. Please replace the battery.
906	Battery is low. The instrument will be powered off in 10 sec.
907	Battery temperature is too high. The instrument will be powered off in 10 sec. Please do not power it on till the battery is cooled down.
908	Battery temperature is too low. The instrument may be damaged if it is kept using in this condition. The instrument will be powered off in 10 sec. Please do not power it on till the battery is cooled down.
909	The temperature inside the instrument is too high. The instrument may be damaged if it is kept using in this condition. The instrument will be powered off in 10 sec. Please do not power it on till the battery is cooled down.
910	The temperature inside the instrument is too low. The instrument may be damaged if it is kept using in this condition. The instrument will be powered off in 10 sec. Please do not power it on till the battery is cooled down.
911	The Voltage of AC power supply is too low. The instrument may be damaged if it is kept using in this condition. The instrument will be powered off in 10 sec. Please make sure of using the dedicated AC adapter.
912	The Voltage of AC power supply is too high. The instrument may be damaged if it is kept using in this condition. The instrument will be powered off in 10 sec. Please make sure of using the dedicated AC adapter.
913	Battery is low. The instrument may be damaged if it is kept using in this condition. The instrument will be powered off in 10 sec. Please use AC adapter.
914	Errors in the battery or in the charging circuit. The instrument may be damaged if it is kept using in this condition. The instrument will be powered off in 10 sec. Please remove the battery and use AC adapter.
915	Battery temperature is too high. Please stop measuring, and wait for a while.
916	Battery temperature is too high.The measurement was aborted. Please power it off.
917	The temperature inside the instrument is increasing. Please stop measuring, and wait for a while.
918	The temperature inside the instrument is too high. The measurement was aborted. Please power it off.
921	There is incoming light. Or, optical module may be damaged.
922	Incorrect date and time setting. Set the correct date and time.
923	The ambient temperature is out of range. The light source cannot be turned on.
925	Please use AC adapter.
926	Cannot find AQ7270.BIN file. Put in root folder of USB memory and try again.
927	Cannot find AQ7275.BIN file. Put in root folder of USB memory and try again.

20.3 Self Test

Procedure

Carry out the steps below to perform a self test.

1. Press the **OTDR** soft key. The optical pulse measurement display appears.
2. Press the **Next 1/2** soft key.
3. Press the **System** soft key.
4. Press the **Self Test** soft key. The self test starts.



Note

A message is displayed when the self test is complete.

Explanation

The self test checks the operation of the following items.

- Internal memory
- RTC battery check

20.4 Updating the Firmware

Procedure

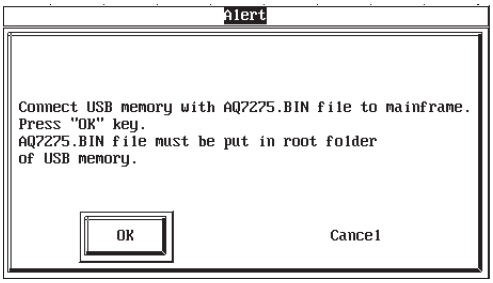
The firmware in the AQ7270/AQ7275 can be updated if the firmware version is updated such as when a new function is added.
The following are two ways of updating the firmware.

- Update from the version upgrade menu.
- Start up in the dedicated screen

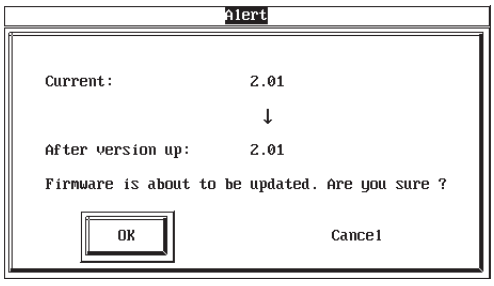
There are two firmware programs: a main program that provides the functions of the AQ7270/AQ7275 and a boot program that starts the system.

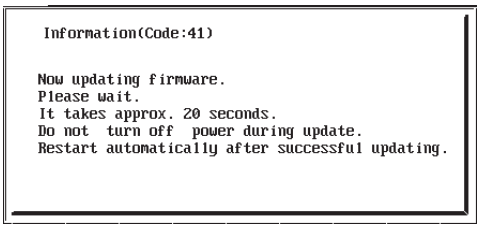
Updating from the version upgrade menu

1. Press the **OTDR** soft key.
2. Press the **Next 1/2** soft key.
3. Press the **System** soft key.
4. Press the **Update** soft key. The **Alert** screen appears.



5. Connect the USB memory located AQ7270.BIN(AQ7270) or AQ7275.BIN (AQ7275) to the USB connector (Type A) of the AQ7270/AQ7275.
6. Move the cursor to **OK** using the **arrow keys**.
7. Press **ENTER**. The screen for checking the execution of updating appears.
8. Check that the cursor is on **OK**.
9. Press **ENTER**. Updating is executed.





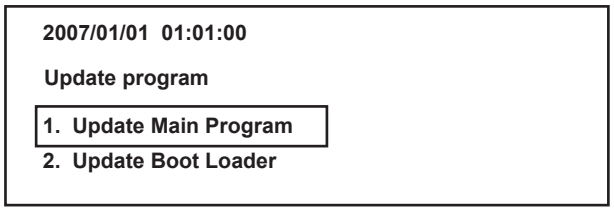
Note

- Make sure that AQ7270.BIN or AQ7275.BIN is located in the root folder of the USB memory.
- You can view the current and upgrade firmware versions in the version upgrade menu.

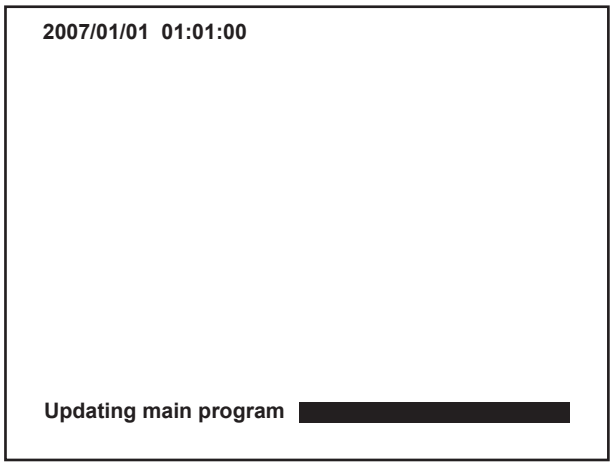
Starting Up in the Dedicated Screen

Updating the Main Program

1. Store the updated program file in the root directory of a USB memory.
2. Connect the AC adapter to the AQ7270/AQ7275 and connect the power plug to an outlet.
3. Press the power switch while holding down F1. The AQ7270/AQ7275 starts and the update screen appears.
4. Connect the USB memory to the USB connector (Type A) of the AQ7270/AQ7275.
5. Check that the access lamp of the USB memory turns OFF.
6. Move the cursor to Update Main Program using the **arrow keys**.



7. Press **ENTER**. A progress bar indicating the progress of the program updating operation is displayed. When the operation is complete, a message is displayed.



Updating the Boot Program

8. Move the cursor to Update Boot Loader using the **arrow keys**.
9. Press **ENTER**. A progress bar indicating the progress of the program updating operation is displayed. When the operation is complete, a message is displayed.
10. Turn the power OFF.
11. Turn the power ON. The AQ7270/AQ7275 starts.

Note

- You cannot update the firmware while using the battery pack.
- The main program file name is AQ7270.BIN(AQ7270) or AQ7275.BIN(AQ7275).
- Store the program file in the root folder of the USB memory.
- If the firmware updating completes successfully, the following message appears on the screen.

  Updating of the main program completed
- If the updating fails, the following message appears.

  Updating of the main program failed

  Check that the program file is stored correctly, and carry out the updating procedure again.

20.5 Mechanical Inspection

WARNING

Turn the power OFF when you are performing an inspection.

CAUTION

- Operation errors or malfunction may result if a foreign object is clogged in the various connectors.
- If the connectors are loose, the AQ7270/AQ7275 may not operate correctly.
- If there are problems, contact your nearest YOKOGAWA dealer.

Check the following items.

- Check that there is no damage or deformation in the external appearance.
- Check that there are no loose parts in the switches, connectors, and other components.
- Check that the operation of the switches or the like is smooth.

20.6 Checking the Operation

Checking the Operation of the Switches

Turn the power ON, operate all the switches once, and check that the AQ7270/AQ7275 operates correctly.

Checking the Operation of the Internal Printer (Option)

1. Load paper in the internal printer.
2. Press the paper feed button, and check that the printer paper is fed correctly.
3. Show the screen to be printed on the LCD.
4. Check that the displayed screen can be printed.

Note

- For the procedure to load the printer paper, see section 3.4.
- For the procedure to print the screen, see section 18.5.

20.7 Replacing the Battery Pack

WARNING

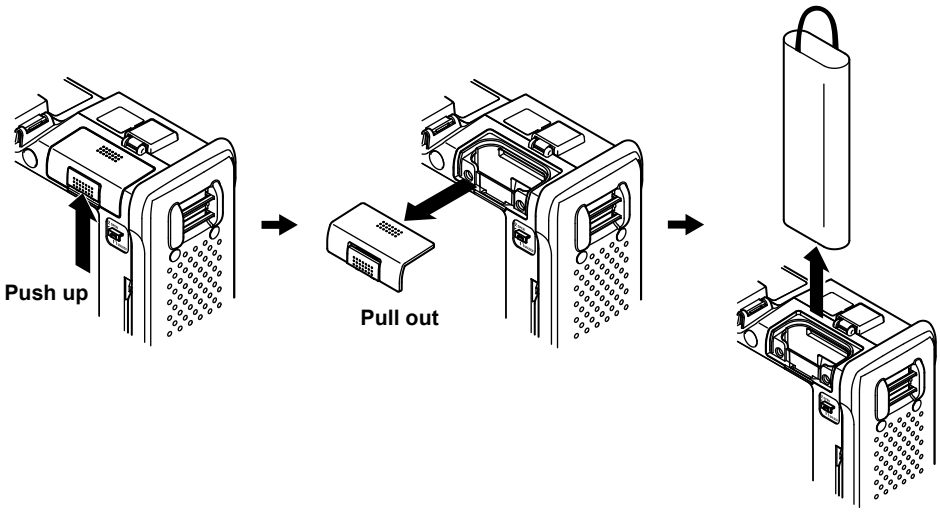
- Because the electrolyte solution inside the battery pack is alkaline, harm can be done to the clothes or skin, if the battery pack leaks or explodes and the solution comes in contact. If the electrolyte solution enters the eye, it can cause blindness. In such cases, do not rub the eye. Rinse thoroughly with water and immediately consult your eye doctor.
- To prevent the possibility of electric shock and accidents, always turn OFF the power switch and remove the AC adapter power supply from the instrument when replacing the battery pack.
- Only use the battery pack provided by YOKOGAWA.
- Do not leave the battery pack in strong direct sunlight, inside a hot vehicle, or near fire. This may cause leakage or degrade the performance and life of the battery pack.
- Do not disassemble or modify the battery pack. This can compromise the protection function provided by the battery pack and cause excessive heating and explosions.
- Do not short the battery pack. You can receive burns from the generated heat.
- Do not throw the battery pack into fire or apply heat to it. This can cause dangerous explosions or spraying of the electrolytes.
- Do not throw the battery pack or apply strong shock to it. This can cause leaks, excessive heating, and explosions.
- Do not use the battery pack if abnormal symptoms are present such as leakage, deformity, and discoloration.
- Do not carry the battery pack along with metallic objects such as paper clips. This may short the battery pack.

CAUTION

- When opening the battery pack cover, do not turn the AQ7270/AQ7275 upside down. The battery pack may fall.
- Do no touch the electrodes of the battery pack. Doing so may cause malfunction.
- Check the orientation of the battery pack.
- After installing the battery pack, close the battery pack cover securely. Damage may result if the cover is not closed.
- If heat or abnormal odor is emitted while charging the battery pack, immediately remove the AC adapter from the AQ7270/AQ7275 or remove the power cord from the AC adapter.
- When disposing of the batteries, follow the proper disposal regulations as specified by the relevant ordinance in your area.
- If not using the AQ7270/AQ7275 for one week or more, prevent overdischarging by charging the battery pack, removing it from the AQ7270/AQ7275, then storing it away from sunlight in a 10–30°C environment. When storing the battery pack for one month or more, compensate for self-discharging by charging it with the instrument once a month.

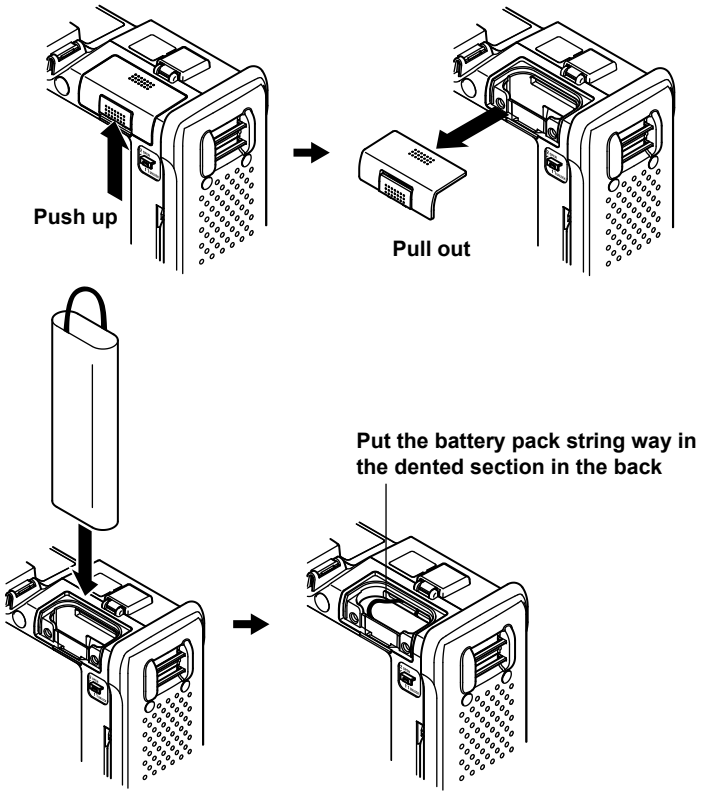
Removing the Battery Pack

1. Turn the power switch OFF and remove the AC adapter.
2. Push up the battery pack cover lock.
3. Pull out the battery pack cover while pushing the lock up.
4. Pull out the battery pack.



Loading the Battery Pack

1. Push up the battery pack cover lock.
2. Pull out the battery pack cover while pushing the lock up.
3. Insert the battery pack. Pay attention to the direction.
4. Put the battery pack string way in the dented section in the back.
5. Close the battery pack cover and securely lock the battery pack cover.

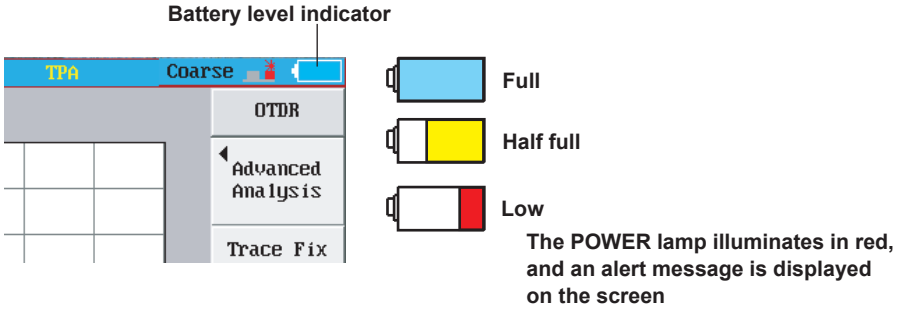


Charging the Battery Pack

A warning message appears when the battery level is low. If you see the message, charge the battery pack.

1. Connect the AC adapter to the AQ7270/AQ7275.
2. Connect the power cord to the AC adapter.
3. Insert the power plug to an outlet. The CHARGE lamp on the AQ7270/AQ7275 illuminates(Green).

The battery level is displayed at the top section of the screen.



Note

- The power automatically turns OFF a few minutes after the warning message is displayed.
- If the battery pack is hot, let the battery pack cool to room temperature before charging it.
- If the fast charging is complete, the CHARGE lamp turns OFF. The battery pack is charged to 80–90% of full capacity. Even though the CHARGE lamp turns OFF, you will need to wait three hours for the top-off charging to completely charge the battery pack.
- If the fast charging does not start, the CHARGE lamp blinks(Green).
- The battery power may drain in about an hour and half depending on the usage conditions such as setting the LCD brightness to high or using the printer (an option).

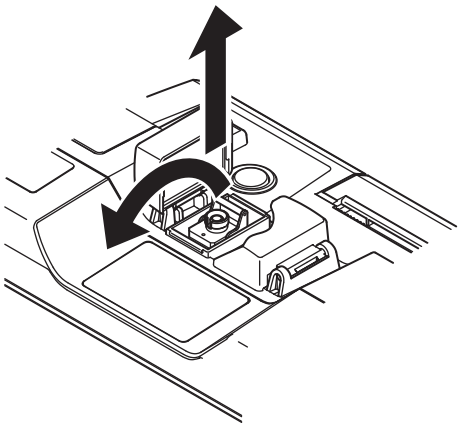
20.8 Replacing the Optical Adapter

WARNING

- Do not replace the optical adapter while the power is turned ON. If the laser light enters the eye, it may cause damage to the eye or eyesight.
- Close the cover for the optical connector that is not in use. On models with two optical connectors, if you are using only one of the connectors and you leave the other optical connector open, the laser light from the other optical connector may enter the eye.

Removing the Optical Adapter

1. Open the optical connector cover at the top of the AQ7270/AQ7275.
2. Tip the lock lever of the optical adapter inward to release the lock.
3. Pull out the optical adapter.

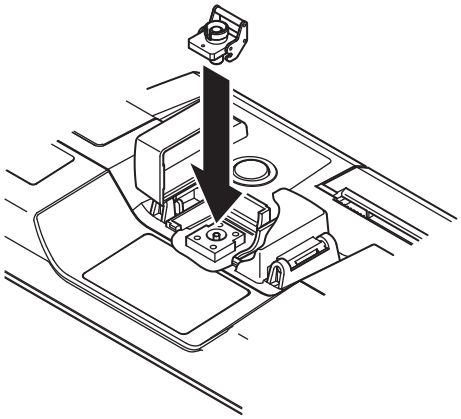


Note

- If the cover comes off, bend the axis section of the cover with your fingers and attach it.
- Because the optical connector is fixed on the -SCC and -FCC options, you cannot remove it.

Installing the Optical Adapter

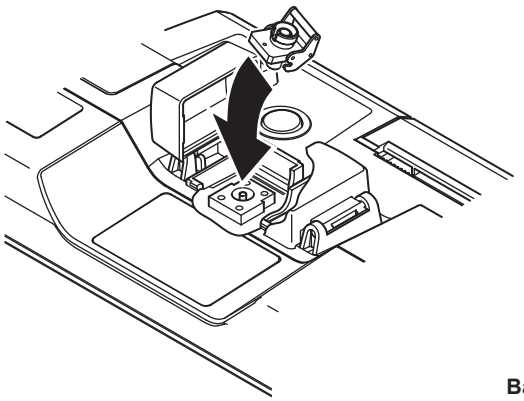
1. Open the optical connector cover at the top of the AQ7270/AQ7275.
2. Insert the optical adapter straight into the rear shell.
3. Tip the lock lever of the optical adapter outward to lock.



Good example

Note

When inserting the optical adapter, insert it slowly and straight. If you swing the optical adapter left or right or remove it by force, the optical adapter or the ferrule section of the optical connector may break.



Bad example

20.9 Routine Maintenance

Cleaning the Outside of the Instrument

Wipe dirt from the LCD and the outer case using a cloth containing water or lukewarm water that has been wrung well. Then, wipe with a dry cloth.

Note

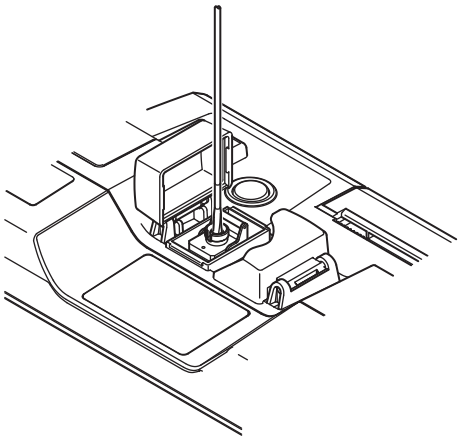
- Turn the power OFF when you are cleaning the instrument.
- Using chemicals such as benzene, thinner, or alcohol will cause deformation and discoloration of the outer case.
- Wring the cloth well so that water does not enter the instrument.

Cleaning the Optical Adapter

WARNING

Do not clean the optical adapter while the power is turned ON. If the laser light enters the eye, it may cause damage to the eye or eyesight.

1. Open the optical connector cover at the top of the AQ7270/AQ7275.
2. Clean the surface inside the optical adapter using a dedicated stick. Hold as close to the end of the stick as possible.



Note

We recommend you use the following cleaner to clean the optical adapter.
Recommended cleaner: CLETOP Stick Type (by NTT Advanced Technology Corporation)

20.10 Storage Precautions

Before Storing the AQ7270/AQ7275

Clean the AQ7270/AQ7275 before storage.

Note

For details on cleaning, see section 20.9.

Storage Conditions

Store the AQ7270/AQ7275 under the following conditions.

- A location in which the temperature and humidity are within the allowed range.
- A location where the temperature and humidity changes are small throughout the day.
- A location not in direct sunlight.
- A location with little dust
- A location free of corrosive gases.

Note

If not using the AQ7270/AQ7275 for one week or more, prevent overdischarging by charging the battery pack, removing it from the AQ7270/AQ7275, then storing it away from sunlight in a 10–30°C environment. When storing the battery pack for one month or more, compensate for self-discharging by charging it with the instrument once a month. For the procedure to remove the battery pack, see section 20.7.

Using the AQ7270/AQ7275 after Long Storage

If you are using the AQ7270/AQ7275 after prolonged storage, check the operation.

Packing the AQ7270/AQ7275

Carry out the steps below to pack the AQ7270/AQ7275.

1. Cover the AQ7270/AQ7275 with a thick plastic bag to prevent dust from entering the instrument.
2. Place a cushioning material against the LCD for protection.
3. Prepare a box that allows 10 to 15 cm of spacing around the instrument.
4. Pack cushioning material at the bottom of the box.
5. Pack cushioning material in the space between the instrument and the box.
6. Close the box firmly with adhesive tape.

Transporting the AQ7270/AQ7275

- Avoid vibrations when transporting the AQ7270/AQ7275.
- Transport the AQ7270/AQ7275 in an environment that meets the storage conditions.
- If you are transporting the battery packs in a aircraft, do not include more than 12 battery packs in a package. Check with your air carrier in advance, because the air carrier may refuse to transport the battery packs.

20.11 Recommended Replacement Parts

The one-year warranty applies only to the main unit of the instrument (starting from the day of delivery) and does not cover any other items nor expendable items (items which wear out).
Contact your nearest YOKOGAWA dealer to have parts replaced.

Parts Name	Replacement Period	Notes
Internal printer	Equivalent to printing of 3000 rolls of roll paper (part No.: A9010ZP)	Factory-replicable
Battery pack	Charging count : 300 times	depends on operating conditions

The items below are expendable items. We recommend the parts be replaced according to the period indicated below.
Contact your nearest YOKOGAWA dealer to have parts replaced.

Parts Name	Recommended Replacement Period*	Notes
Backup battery (lithium battery)	5 years	Factory-replicable
LCD backlight	Approx. 25000 hours	Factory-replicable
Ferrule of the optical connector	1 year	Factory-replicable
Optical connector adapter	1 year	-SCC/-FCC is factory-replicable
DC power connector	5000 times	Factory-replicable
USB connector	1500 times	Factory-replicable

* The recommended replacement periods above are estimates only: actual periods can vary greatly depending on operating conditions and frequency of use.

20.12 Calibration

Periodic calibration is a good way to maintain the performance of the instrument over an extended period and to find problems in an early stage. We recommend that the AQ7270/AQ7275 be calibrated once a year.

21.1 Models

Item	Specifications	
Model	Wavelength	Dynamic Range
735020	1550 nm	32 dB
735021	1650 nm	30 dB
735022	1310 nm	34 dB
	1550 nm	32 dB
735023	1310 nm	40 dB
	1550 nm	38 dB
735024	1550 nm	38 dB
	1625 nm	35 dB
735025	1310 nm	34 dB
	1490 nm	30 dB
	1550 nm	32 dB
735026	1310 nm	34 dB
	1550 nm	32 dB
	1625 nm	28 dB
735027	1310 nm	34 dB
	1550 nm	32 dB
	1650 nm	30 dB
735028	1310 nm	40 dB
	1550 nm	38 dB
	1625 nm	35 dB
735029	850 nm	22.5 dB (GI (62.5/125μm))
	1300 nm	24 dB (GI (62.5/125μm))
735030	850 nm	22.5 dB (GI (62.5/125μm))
	1300 nm	24 dB (GI (62.5/125μm))
	1310 nm	34 dB
	1550 nm	32 dB
735031	1650 nm	30 dB (15 dB if the suffix code is /PN)
735032	1310 nm	34 dB (36 dB if the suffix code is /DR)
	1550 nm	32 dB (34 dB if the suffix code is /DR)
735033	1310 nm	40 dB (23 dB if the suffix code is /PN)
	1550 nm	38 dB (21 dB if the suffix code is /PN)
735034	1310 nm	43 dB
	1550 nm	41 dB
735035	1310 nm	34 dB
	1490 nm	30 dB
	1550 nm	32 dB
735036	1310 nm	40 dB (23 dB if the suffix code is /PN)
	1550 nm	38 dB (21 dB if the suffix code is /PN)
	1625 nm	33 dB (16 dB if the suffix code is /PN)
735037	1310 nm	40 dB
	1550 nm	38 dB
	1650 nm	30 dB
735038	1310 nm	40 dB (23 dB if the suffix code is /PN)
	1550 nm	38 dB (21 dB if the suffix code is /PN)
	1625 nm	36 dB (16 dB if the suffix code is /PN)
735040	850 nm	22.5 dB (GI (62.5/125μm))
	1300 nm	24 dB (GI (62.5/125μm))
	1310 nm	40 dB
	1550 nm	38 dB
735041	850 nm	21.5 dB (GI (50/125μm)), 22.5 dB (GI (62.5/125μm))
	1300 nm	23 dB (GI (50/125μm)), 24 dB (GI (62.5/125μm))
	1310 nm	40 dB
	1550 nm	38 dB

21.2 Optical Section

MODEL 735020

Item	Specifications
Center wavelength	1550 nm ± 25 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone[*5, 11]	0.8 m (max.)
Attenuation dead zone[*6, 11]	8 m (typ.)
Dynamic range (min.)[*4]	32 dB
Light source (optical output)	–5 dBm or more (/LS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)[*3]	±0.5 dB (/PM option)

MODEL 735021

Item	Specifications
Center wavelength	1650 nm ± 5 nm[*1], ±10 nm[*2]
Measuring pulse optical output	≤15 dBm (max.)
Applicable fiber	SM (ITU-T G.652)
Event dead zone[*5, 11]	0.8 m (max.)
Attenuation dead zone[*6, 11]	12 m (typ.)
Dynamic range (min.)[*4, 10]	30 dB
Light source (optical output)	–5 dBm or more (/LS option)

MODEL 735022

Item	Specifications
Center wavelength	1310 nm ± 25 nm, 1550 nm ± 25 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone[*5, 11]	0.8 m (max.)
Attenuation dead zone[*6, 11]	7 m (typ.)@1310 nm, 8 m(typ.)@1550 nm
Dynamic range (min.)[*4]	34 dB@1310 nm, 32 dB@1550 nm
Light source (optical output)	–5 dBm or more (/LS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)[*3]	±0.5 dB (/PM option)

MODEL 735023

Item	Specifications
Center wavelength	1310 nm ± 25 nm, 1550 nm ± 25 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone[*5, 11]	0.8 m (max.)
Attenuation dead zone[*6, 11]	7 m (typ.)@1310 nm, 8 m(typ.)@1550 nm
Dynamic range (min.)[*4]	40 dB@1310 nm, 38 dB@1550 nm
Light source (optical output)	–5 dBm or more (/LS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)[*3]	±0.5 dB (/PM option)

MODEL 735024

Item	Specifications
Center wavelength	1550 nm ± 25 nm, 1625 nm ± 25 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone[*5, 11]	0.8 m (max.)
Attenuation dead zone[*6, 11]	8 m (typ.)@1550 nm, 12 m(typ.)@1625 nm
Dynamic range (min.)[*4]	38 dB@1550 nm, 35 dB@1625 nm
Light source (optical output)	–5 dBm or more (/LS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)[*3]	±0.5 dB (/PM option)

MODEL 735025

Item	Specifications
Center wavelength	1310 nm ± 25 nm, 1490 nm ± 25 nm, 1550 nm ± 25 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone[*5, 11]	0.8 m (max.)
Attenuation dead zone[*6, 11]	7 m (typ.)@1310 nm, 8 m (typ.)@1490 nm, 8 m (typ)@1550 nm
Dynamic range (min.)[*4]	34 dB@1310 nm, 30 dB@1490 nm, 32 dB@1550 nm
Light source (optical output)	–5 dBm or more (/LS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)[*3]	±0.5 dB (/PM option)

MODEL 735026

Item	Specifications
Center wavelength	1310 nm ± 25 nm, 1550 nm ± 25 nm, 1625 nm ± 25 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone[*5, 11]	0.8 m (max.)
Attenuation dead zone[*6, 11]	7 m (typ.)@1310 nm, 8 m (typ.)@1550 nm, 12 m (typ)@1625 nm
Dynamic range (min.)[*4]	34 dB@1310 nm, 32 dB@1550 nm, 28 dB@1625 nm
Light source (optical output)	–5 dBm or more (/LS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)[*3]	±0.5 dB (/PM option)

MODEL 735027

Item	Specifications
Center wavelength	1310 nm ± 25 nm, 1550 nm ± 25 nm, 1650 nm ± 5 nm[*1], ± 10 nm[*2]
Measuring pulse optical output	≤15 dBm (max.)@1650 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone[*5, 11]	0.8 m (max.)
Attenuation dead zone[*6, 11]	7 m (typ.)@1310 nm, 8 m (typ.)@1550 nm, 12 m (typ)@1650 nm
Dynamic range (min.)[*4, 10]	34 dB@1310 nm, 32 dB@1550 nm, 30 dB@1650 nm
Light source (optical output)	–5 dBm or more (/LS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)[*3]	±0.5 dB (/PM option)

MODEL 735028

Item	Specifications
Center wavelength	1310 nm ± 25 nm, 1550 nm ± 25 nm, 1625 nm ± 25 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone*5, 11	0.8 m (max.)
Attenuation dead zone*6, 11	7 m (typ.)@1310 nm, 8 m (typ.)@1550 nm, 12 m (typ)@1625 nm
Dynamic range (min.)*4	40 dB@1310 nm, 38 dB@1550 nm, 35 dB@1625 nm
Light source (optical output)	–5 dBm or more (/LS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)*3	±0.5 dB (/PM option)

MODEL 735029

Item	Specifications
Center wavelength	850 nm ± 30 nm, 1300 nm ± 30 nm
Applicable fiber	GI (62.5/125μm)
Event dead zone*9, 11, 12	2 m (typ.)
Attenuation dead zone*11, 12, 13	7 m (typ.)@850 nm, 10 m(typ.)@1300 nm
Dynamic range (min.)*8, 12	22.5 dB@850 nm, 24 dB@1300 nm

MODEL 735030

Item	Specifications
Center wavelength	850 nm ± 30 nm, 1300 nm ± 30 nm, 1310 nm ± 25 nm, 1550 nm ± 25 nm
Applicable fiber	GI (62.5/125μm) when using the MMF port SM (ITU-T G.652) when using the SMF port
Event dead zone*11	2 m (typ.)@850/1300 nm*9, 12, 0.8 m@1310/1550 nm*5
Attenuation dead zone*11	7 m (typ.)@850 nm*12,13, 10 m (typ.)@1300 nm*12,13, 7 m (typ.)@1310 nm*6, 8 m (typ.)@1550 nm*6
Dynamic range (min.)	22.5 dB@850 nm*8, 12, 24 dB@1300 nm*8, 12, 34 dB@1310 nm*4, 32 dB@1550 nm*4
Light source (optical output)	–5 dBm or more@1310/1550 nm (/LS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)*3	±0.5 dB (/PM option)

MODEL 735031

Item	Specifications
Center wavelength	1650 nm ± 5 nm*1, ±10 nm*2
Measuring pulse optical output	≤15 dBm (max.) (excluding /PN option.)
Applicable fiber	SM (ITU-T G.652)
Event dead zone*5, 11	0.8 m (max.) (0.8(typ.) if the suffix code is /PN)
Attenuation dead zone*6, 11	12 m (typ.)
Dynamic range (min.)*4, 10	30 dB (15dB if the suffix code is /PN)*15
Light source (optical output)	–5 dBm or more (/SLS option)
Light source (output level stability)	±0.15 dB (/SLS option)

MODEL 735032

Item	Specifications
Center wavelength	1310 nm ± 25 nm, 1550 nm ± 25 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone*5, 11	0.8 m (max.)
Attenuation dead zone*6, 11	7 m (typ.)@1310 nm, 8 m(typ.)@1550 nm
Dynamic range (min.)*7	34 dB@1310 nm, 32 dB@1550 nm (36 dB@1310 nm, 34 dB@1550 nm if the suffix code is /DR)
Light source (optical output)	–5 dBm or more (/SLS option)
Light source (output level stability)	±0.1 dB (/SLS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)*3	±0.5 dB (/PM option)

MODEL 735033

Item	Specifications
Center wavelength	1310 nm ± 25 nm, 1550 nm ± 25 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone*5, 11	0.8 m (max.) (0.8(typ.) if the suffix code is /PN)
Attenuation dead zone*6, 11	7 m (typ.)@1310 nm, 8 m(typ.)@1550 nm
Dynamic range (min.)*7	40 dB@1310 nm, 38 dB@1550 nm, 23dB@1310 nm (/PN option)*15, 21dB@1550 nm (/PN option)*15
if the suffix code is /PN)Light source (optical output)	–5 dBm or more (/SLS option)
Light source (output level stability)	±0.1 dB (/SLS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)*3	±0.5 dB (/PM option)

MODEL 735034

Item	Specifications
Center wavelength	1310 nm ± 25 nm, 1550 nm ± 25 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone*5, 11	0.8 m (max.)
Attenuation dead zone*6, 11	7 m (typ.)@1310 nm, 8 m(typ.)@1550 nm
Dynamic range (min.)*7	43 dB@1310 nm, 41 dB@1550 nm
Light source (optical output)	–5 dBm or more (/SLS option)
Light source (output level stability)	±0.1 dB (/SLS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)*3	±0.5 dB (/PM option)

MODEL 735035

Item	Specifications
Center wavelength	1310 nm ± 25 nm, 1490 nm ± 25 nm, 1550 nm ± 25 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone*5, 11	0.8 m (max.)
Attenuation dead zone*6, 11	7 m (typ.)@1310 nm, 8 m (typ.)@1490 nm, 8 m (typ)@1550 nm
Dynamic range (min.)*7	34 dB@1310 nm, 30 dB@1490 nm, 32 dB@1550 nm
Light source (optical output)	–5 dBm or more (/SLS option)
Light source (output level stability)	±0.1 dB (/SLS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)*3	±0.5 dB (/PM option)

MODEL 735036

Item	Specifications
Center wavelength	1310 nm ± 25 nm, 1550 nm ± 25 nm, 1625 nm ± 25 nm
Measuring pulse optical output	≤15 dBm (max.)@1625 nm (excluding /PN option)
Applicable fiber	SM (ITU-T G.652)
Event dead zone*5, 11	0.8 m (max.)(0.8m (Typ.) if the suffix code is /PN)
Attenuation dead zone*6, 11	7 m (typ.)@1310 nm, 8 m (typ.)@1550 nm, 12 m (typ)@1625 nm
Dynamic range (min.)*7	40 dB@1310 nm, 38 dB@1550 nm, 33 dB@1625 nm, 23dB@1310 nm (/PN option)*15 21dB@1550 nm (/PN option)*15, 16dB@1625 nm (/PN option)*15
Light source (optical output)	–5 dBm or more @1310/1550 nm (/SLS option)
Light source (output level stability)	±0.1 dB (/SLS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)*3	±0.5 dB (/PM option)

MODEL 735037

Item	Specifications
Center wavelength	1310 nm ± 25 nm, 1550 nm ± 25 nm, 1650 nm ± 5 nm*1, ± 10 nm*2
Measuring pulse optical output	≤15 dBm (max.)@1650 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone*5, 11	0.8 m (max.)
Attenuation dead zone*6, 11	7 m (typ.)@1310 nm, 8 m (typ.)@1550 nm, 12 m (typ)@1650 nm
Dynamic range (min.)*7, 10	40 dB@1310 nm, 38 dB@1550 nm, 30 dB@1650 nm
Light source (optical output)	–5 dBm or more (/SLS option)
Light source (output level stability)	±0.1 dB@1310 nm, 1550 nm (/SLS option) ±0.15 dB@1650 nm (/SLS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)*3	±0.5 dB (/PM option)

MODEL 735038

Item	Specifications
Center wavelength	1310 nm ± 25 nm, 1550 nm ± 25 nm, 1625 nm ± 25 nm
Applicable fiber	SM (ITU-T G.652)
Event dead zone*5, 11	0.8 m (max.) (0.8m(Typ.)if the suffix code is /PN)
Attenuation dead zone*6, 11	7 m (typ.)@1310 nm, 8 m (typ.)@1550 nm, 12 m (typ.)@1625 nm
Dynamic range (min.)*7	40 dB@1310 nm, 38 dB@1550 nm, 36 dB@1625 nm, 23dB@1310 nm (/PN option)*15, 21dB@1550 nm (/PN option)*15, 16dB@1625 nm (/PN option)*15
Light source (optical output)	–5 dBm or more (/SLS option)
Light source (output level stability)	±0.1 dB (/SLS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)*3	±0.5 dB (/PM option)

MODEL 735040

Item	Specifications
Center wavelength	850 nm ± 30 nm, 1300 nm ± 30 nm, 1310 nm ± 25 nm, 1550 nm ± 25 nm
Applicable fiber	GI (62.5/125μm) when using the MMF port SM (ITU-T G.652) when using the SMF port
Event dead zone*11	2 m (typ.)@850/1300 nm*9,12, 0.8 m@1310/1550 nm*5
Attenuation dead zone*11	7 m (typ.)@850 nm*12, 13, 10 m (typ.)@1300 nm*12, 13, 7 m (typ.)@1310 nm*6, 8 m (typ.)@1550 nm*6
Dynamic range (min.)	22.5 dB@850 nm*8, 12, 24 dB@1300 nm*8, 12, 40 dB@1310 nm*7, 38 dB@1550 nm*7
Light source (optical output)	–5 dBm or more@1310/1550 nm (/LS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)*3	±0.5 dB (/PM option)

MODEL 735041

Item	Specifications
Center wavelength	850 nm ± 30 nm, 1300 nm ± 30 nm, 1310 nm ± 25 nm, 1550 nm ± 25 nm
Applicable fiber	GI (50/125μm) (62.5/125μm) when using the MMF port SM (ITU-T G.652) when using the SMF port
Event dead zone*11	1 m (max.)@850/1300 nm*14, 0.8 m (max.)@1310/1550 nm*5
Attenuation dead zone*11	6 m (typ.)@850 nm*13, 10 m (typ.)@1300 nm*13, 7 m (typ.)@1310 nm*6, 8 m (typ.)@1550 nm*6
Dynamic range (min.)	21.5 dB (GI (50/125μm))@850 nm*8, 22.5 dB (GI (62.5/125μm))@850 nm*8, 23 dB (GI (50/125μm))@1300 nm*8, 24 dB (GI (62.5/125μm))@1300 nm*8, 40 dB@1310 nm*7, 38 dB@1550 nm*7
Light source (optical output)	–5 dBm or more@1310/1550 nm (/SLS option)
Light source (output level stability)	±0.1 dB (/SLS option)
Optical power monitor (input level)	–50 dBm to –5 dBm (/PM option)
Optical power monitor (accuracy)*3	±0.5 dB (/PM option)

*1 ±5 nm: 20 dB point from the peak value of the pulse optical output.
*2 ±10 nm: 60 dB point from the peak value of the pulse optical output.
*3 When applying input with λ = 1310 nm at –10 dBm, at 23°C ±2°C.
*4 SNR = 1, pulse width of 20 μs, distance range of 200 km, sampling resolution of 32 m, measuring duration of 3 min.
*5 Pulse width 3 ns, return loss 45 dB or more, 1.5 dB point below the peak value at unsaturated condition.
*6 Pulse width 10 ns, return loss 45 dB or more, at a point where the backscattering light level is within ±0.5 dB of the steady-state value.
*7 SNR = 1, pulse width of 20 μs, distance range of 200 km (1310 nm)/300 km (1550 nm), sampling resolution of 8 m, measuring duration of 3 min.
*8 SNR = 1, pulse width of 500 ns (850 nm)/1 μs (1300 nm) , measuring duration of 3 min, sampling resolution of 8 m.
*9 Pulse width of 10 ns, return loss 40 dB or more, 1.5 dB point below the peak value at unsaturated condition.
*10 1.65 μs: With background light (1550 nm ± 75 nm, –19 dBm, CW light).
*11 At group reflective index 1.5
*12 GI (62.5/125μm) is measured.
*13 Pulse width 10 ns, return loss 40 dB or more, at a point where the backscattering light level is within ±0.5 dB of the steady-state value.
*14 Pulse width 3 ns, return loss 40 dB or more, 1.5 dB point below the peak value at unsaturated condition.
*15 At Pulse width 100 ns

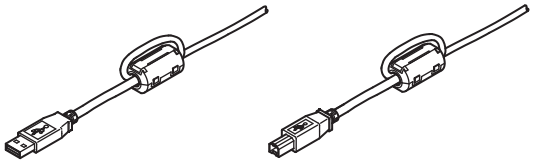
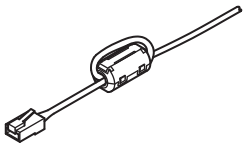
- Whenbuilt-in dummy fi ber and angled-PC connector are used, each dynamic range decreases by 0.5 dB.
- Typical value represents a typical or average value. It is not strictly warranted.
- The ampersand after the values in the optical specifications indicate that the value correspond to the wavelength after the ampersand.
- Please inquire for information on performance when using GI (50/125μm)

21.3 General Specifications

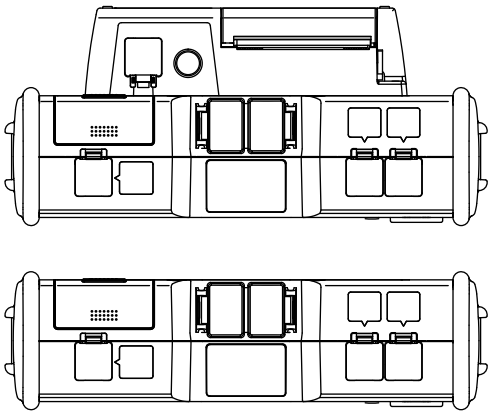
General Specifications

Item	Specifications	
Display	8.4-inch color TFT (640 × 480 dots)	
Distance range [*1]	500 m, 1 km, 2 km, 5 km, 10 km, 20 km, 50 km, 100 km, 200 km, 300 km, 400 km, 512 km [*6]	
Reading resolution	1 cm min.	
Sampling resolution	5 cm, 10 cm, 20 cm, 50 cm, 1 m, 2 m, 4 m, 8 m, 16 m, 32 m	
Number of data samples	Up to 50000 points	
Group refraction index	1.30000 to 1.79999 (0.00001 steps)	
Distance unit	km mile and kf for English display	
Pulse Width [*2,3]	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μs, 2 μs, 5 μs, 10 μs, 20 μs	
Distance measurement accuracy	±1 + measured distance × 2 × 10^{-5} ± sampling resolution	
Internal memory	Saves up to 1000 waveforms	
USB (1.1)	Type A (printer, external memory and keyboard) Type B (remote and storage)	
LAN (option)	10/100BASE-T	
Internal printer (option)	576-dot/line thermal printer, chart paper width: 80 mm	
AC power supply	100 to 240 VAC 50/60 Hz	
Battery pack	Duration: 6 hours [*4] (under specified operating conditions), charge time: 5 hours [*5]	
Weight (excluding options)	Approx. 2.8 kg	
Dimensions (projections excluded)	287 (W) × 197 (H) × 85 (D) 287 (W) × 197 (H) × 135 (D) with the /PL option	
Temperature range	During use:	0°C to 45°C
	During storage	–20°C to 60°C
	When using the printer	0°C to 35°C (80%RH or less)
	When charging the battery pack	0°C to 35°C
Maximum relative humidity	85%RH or less (without condensation)	
Storage altitude	3000 m or less	
Operating altitude	2000 m or less	
Environmental protection	Uses lead-free soldering	

*1 Up to 100 km for 850/1300 nm (GI).
*2 Up to 1 μs for 850 nm (GI), 5 μs for 1300 nm (GI).
*3 Exclude 3 ns for 850/1300 nm (GI) of 735029, 735030, and 735040.
*4 Measurement for 30 seconds in every 10 minutes, without any options, in power save mode (Full Auto 1 minute).
*5 Ambient temperature of 23°C, power OFF.
*6 Firmware versions 3.01 and later support this distance range.

Item	Specifications
Emission	
Complying standard	EN61326-1 Class A EN55011 Class A, Group 1 EMC Regulatory Arrangement in Australia and New Zealand EN 55011 Class A, Group 1 Korea Electromagnetic Conformity Standard (한국 전자파적합성기준) EN61000-3-2 EN61000-3-3 This instrument is a Class A (for industrial environment) product. Operation of this product in a residential area may cause radio interference in which case the user is required to correct the interference.
Cable conditions	• USB Use a shielded cable. Use cables of length 3 m or less. Attach a ferrite core (TDK: ZCAT2035-0930A, YOKOGAWA part number: A1190MN) with two windings at the AQ7270/AQ7275 end (see the figure below).  • Ethernet interface connector Use LAN cables of length 30 m or less. Attach a ferrite core (TDK: ZCAT2035-0930A, YOKOGAWA part number: A1190MN) with two windings at the AQ7270/AQ7275 end (see the figure below). 
Immunity	
Complying standard	EN61326-1 Table 2 (For use in industrial locations)
Cable conditions	Same as the cable conditions for emission.
Safety standards	
Conforming standards	EN61010-1 EN60825-1

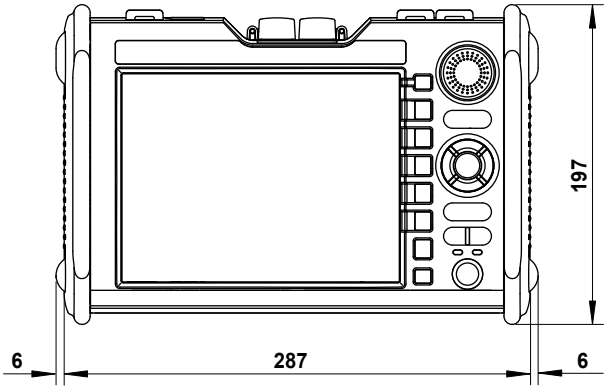
21.4 External Dimensions



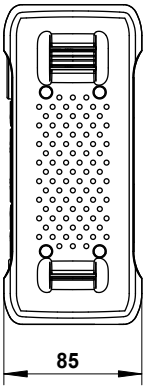
Top view

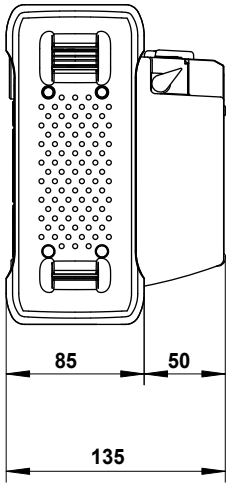
Unit: mm
Unless otherwise specified, tolerance is ±3%
(however, tolerance is ±0.3 mm when below 10 mm).

Option /PL: LAN and internal printer options



Front view





Right view (/PL)

Appendix 1 Terminology

Attenuation

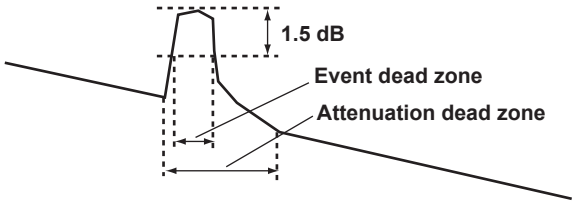
The amplification level of the amplifier built into the AQ7270/AQ7275. The amplification level increases as the displayed attenuation value decreases. Waveforms with good S/N ratio can be acquired with small attenuation values. However, the waveform may saturate in a section with high reflection levels. Select the amplification level best suited to the DUT.

Attenuation Dead Zone

The distance range where the return loss of the optical connector is greater than or equal to 45 dB and the backscattering light level is within ±0.5 dB of the steady-state value.

Event Dead Zone

The event dead zone is also called the spatial resolution.
It is the distance range from the event peak value of return loss greater than or equal to 45 dB (condition in which the event is not saturated) to the location that is – 1.5 dB.



Event Note

A comment attached to an event.

Event List

A list of information (distance, splice loss, return loss, etc.) of events that are detected through auto detection.

S/N

An abbreviation for signal-to-noise ratio. The expression “S/N is poor’ indicates that the waveform contains a high level of noise components.

LSA

An abbreviation for Least Squares Approximation.

Far end

The far end and its surrounding area of the optical fiber cable.
If the end of the optical fiber cable cannot be detected due to noise, far end indicates the cross point of the noise and optical fiber and its surrounding area.

OTDR

An abbreviation for Optical Time Domain Reflectometer. An OTDR emits optical pulse into the optical fiber cable and acquires the reflected rays. It processes the acquired data and displays the loss distribution on the optical fiber cable.
The OTDR is also called optical fiber analyzer or optical pulse tester.

Distance Measurement Accuracy

The OTDR calculates the distance (L) by measuring the time until the transmitted light pulse returns and using the equation indicated below.

$L = C \times T/(2N)$ [m]

- C: The speed of light travelling through a vacuum.
- T: The time from when the optical pulse is transmitted until the light returns.
- N: Group refraction index

The reason why the equation divides by 2 is because the round-trip time of the optical pulse is measured.
An error will occur in the distance measurement unless an accurate group refraction index is specified.

Distance Range

The length of the distance to be measured. Select a distance range that is longer than the optical fiber cable you want to measure. If the distance range is longer, the measurement time also increases accordingly.

Near End

The point where the optical fiber cable is connected to the AQ7270/AQ7275 and its surrounding area.

Spatial Resolution

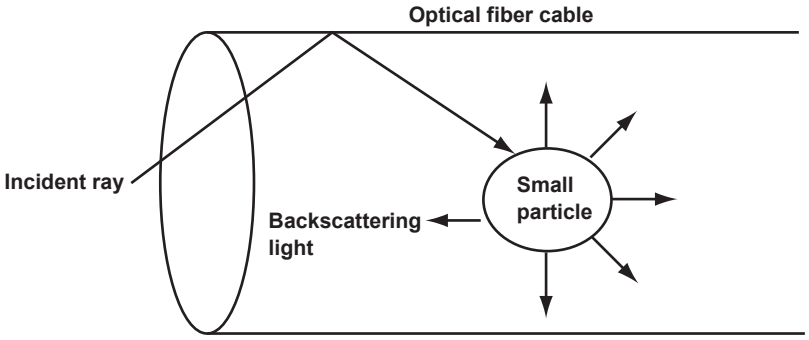
It is also called the event dead zone.

Group Refraction Index

Group refraction index (N) is a ratio of the speed of light travelling through a vacuum with respect to the speed of light travelling through a material. The equation is shown below.
N = Speed of light travelling through a vacuum/Speed of light travelling through a material
A typical SMF group refraction index N is a value around 1.46000.

Backscattering Light

When light propagates through the optical fiber cable, a phenomenon called Rayleigh Scattering occurs due to the nonuniformity of the density or constituents of materials smaller than the wavelength unit. The scattered light that is transmitted opposite to the direction of propagation is called backscattering light.



Least Squares Method

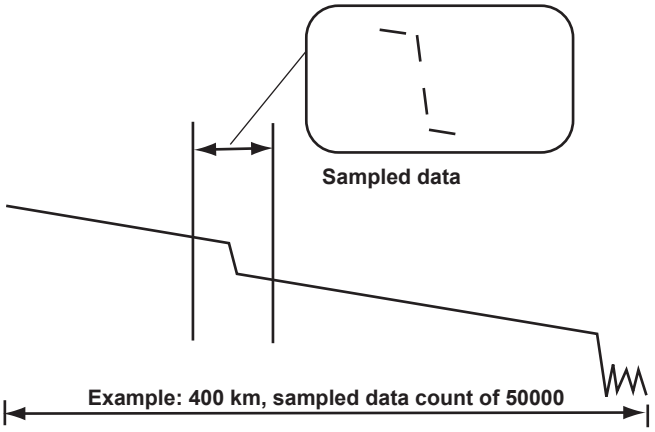
A method used to calculate the loss of an optical fiber cable. It is calculated using all the data values between two points.

Number of Data Samples

The number of data values acquired for each waveform.

Sampling Resolution

The interval at which data values are acquired.



Splice Loss

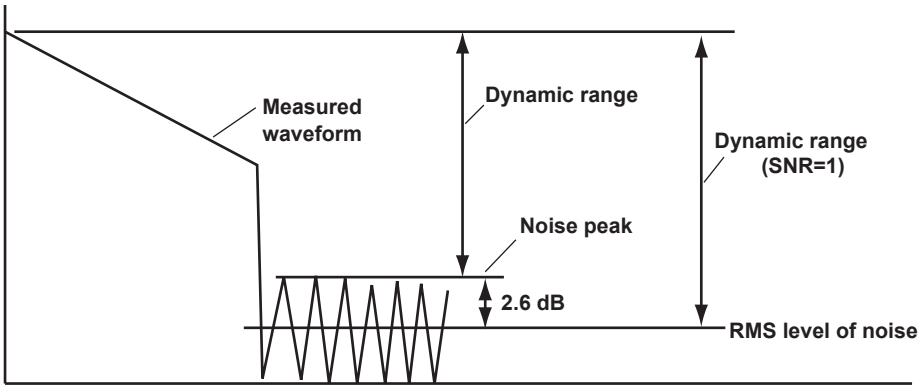
The loss that occurs at the fused points or the like of an optical fiber cable.

Connection Point

The location where the optical fiber cable is fused (including a mechanical connection) or the location where the connectors are connected with an optical adapter.

Dynamic Range

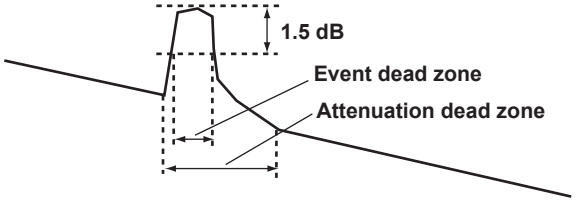
The backscattering light level that the AQ7270/AQ7275 can measure.



Dead Zone

A location where measurements cannot be performed due to effects such as Fresnel reflection. The following types of dead zones are available.

- **Event Dead Zone**
  A zone in which the reflection cannot be measured because a larger reflection is present. A zone defined by a pulse width whose level is 1.5 dB less than the peak value.
- **Attenuation Dead Zone**
  A zone in which the splice loss cannot be measured due to a large reflection nearby.



TPA

An abbreviation for Two Point Approximation.

Secondary Reflection

A phenomenon in which an event is detected at a location that does not actually exist when a large reflection is present in the optical fiber cable under measurement causing another reflection at the measurement reference.

2 Markers Method

A method used to calculate the loss of an optical fiber cable. It calculates the level difference between two points.

Broken Point

The location where the optical fiber cable is cut or the end of the cable.

Return Loss

The return loss (RL) is a ratio of the total optical power (Pr) that is reflected by optical parts or optical fiber cables with respect to the incident optical power (Pi) expressed in decibels. It is calculated using the following equation.

RL = –10log(Pr/Pi) [dB]

Reflection Point

A location where reflection is detected such as a location where the optical fiber cable is connected. The following two types of reflections are available.

- **Connection point**
  A reflection at the optical connector section.
- **Broken Point**
  A spacial reflection occurs due to the gap in the cable.

Pulse Width

The width of the optical pulse that the AQ7270/AQ7275 transmits. It is defined using a half width.

The pulse width has the following characteristics.

Short pulse width: Distance can be measured with high accuracy. However, long distance cannot be measured.

Long pulse width: Long distance can be measured. However, the distance cannot be measured with high accuracy.

Fresnel Reflection

Fresnel reflection occurs at the location where the optical fiber cable is broken or a location where the group refraction index changes such as the far end of the cable (glass and air) when light enters the cable. If the end face of the optical fiber cable is vertical, approximately 3 % (–14.7 dB) of the incident light power is reflected.

Resolution

Indicates how precise the distance to the event in the optical fiber cable can be measured. The following types of resolution are available.

- **Sampling Resolution**
  Because the maximum number of sampled data points is fixed, the resolution is determined by the interval at which the measured data is sampled.
  Example: If the distance of 400 Km is measured with 50000 data points, each sampling interval is 8 m. This value is the sampling resolution.
- **Spatial Resolution**
  A resolution determined by the optical pulse width. If the optical pulse width is short, the distance the light propagates through the optical fiber cable is shortened by the pulse width time. Consequently, the spatial resolution increases.

Label

A comment that can be attached to the waveform.

Realtime Measurement

The act of measuring the optical fiber cable in advance using the small averaging count preset in the AQ7270/AQ7275.

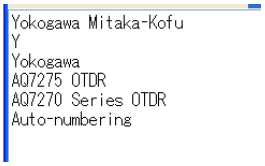
Appendix 2 Key Assignments for the USB104 Keyboard

Correspondence between panel keys and USB104 keyboard entry keys

Panel keys	USB keyboard entry keys	Description
MENU	Hold down the Ctrl key and press m	
SETUP	Hold down the Ctrl key and press Enter	
SCALE	Hold down the Ctrl key and press s	
REALTIME	Hold down the Ctrl key and press r	
AVG	Hold down the Ctrl key and press a	
FILE	Hold down the Ctrl key and press f	
FILE (PRINT)	Hold down the Ctrl key and press p	
F1	F1	
F2	F2	
F3	F3	
F4	F4	
F5	F5	
▲ (Cross: Up)	↑	
▼ (Cross: Down)	↓	
< (Cross: Left)	←	
> (Cross: Right)	→	
Rotary Knob (Right)	Hold down the Ctrl key and press →	
Rotary Knob (Left)	Hold down the Ctrl key and press ←	
Rotary Knob (Push)	Hold down the Ctrl key and press e	
Alphabet, Number		Valid in using the keyboard

Appendix 3 Example of file input/output

Example of inputting user-defined strings created on the PC



Example of CSV file output

CSV (waveform)

	A	B	C
1	Label	Yokogawa Mitaka-Kofu	
2	Date/Time	Wed Nov 22 04:32:47 2006	
3			
4	Wavelength	SM 1310nm	
5	Distance Range	5km	
6	Pulse Width	50ns	
7	Attenuation	0.00dB	
8	Avg Times	2^16	
9	IOR	1.46	
10	Data Size	1250	
11	Sample Interval	4 m	
12			
13			
14	[km]	[dB]	
15	0	32.841	
16	0.00411	29.985	
17	0.00821	25.667	
18	0.01232	25.089	
19	0.01643	24.893	
20	0.02053	24.879	
21	0.02464	24.835	
22	0.02875	24.878	
23	0.03285	24.8	
24	0.03696	24.819	
25	0.04107	24.828	
26	0.04517	24.864	
27	0.04928	24.851	
28	0.05339	24.813	
29	0.05749	24.83	
30	0.0616	24.818	
31	0.06571	24.861	

CSV (event)

	A	B	C	D	E	F	G	H
1	Label	Yokogawa Mitaka-Kofu						
2	Date/Time	Wed Nov 22 04:32:47 2006						
3								
4	Wavelength	SM 1310nm						
5	Distance Range	5km						
6	Pulse Width	50ns						
7	Attenuation	0.00dB						
8	Avg Times	2^16						
9	IOR	1.46						
10	Data Size	1250						
11	Sample Interval	4 m						
12								
13	Approx.Method	LSA						
14	Backscatter Level	-50.00dB						
15	Splice Loss	0.03dB						
16	Return Loss	70dB						
17	End of Fiber	3dB						
18								
19								
20	EventNo	Distance(km)	Splice Loss(dB)	Return Loss(dB)	Cumul-Loss(dB)	dB/km	Event Type	Section IOR
21	1	0.86652	0.093	55.561	0.356	0.421	R	1.46
22	2	1.11703	0.208		0.551	0.406	S+	1.46
23	END	1.42093		<40.708	0.854	0.313	R	1.46

Index

Symbol

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

R

S

T

U

V

W

Y

Z