User's Manual

AQ7260 OTDR

YOKOGAWA
Yokogawa Electric Corporation

IM 813920300-01E
3rd Edition

Product Registration

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PIM 103-01E

Preface

Thank you for purchasing the AQ7260. The AQ7260 is a compact optical time domain reflectometer with various functions and is designed to measure loss and detect faults in optical fibers.

This user's manual refers to AQ7260 OTDR which software version is 2.08 or later.

Before using the AQ7260 (hereafter referred to as the instrument), please read this manual thoroughly. In particular, the “Safety Precautions” given at the beginning of this manual should be read to gain a full understanding of the instrument.

After reading, please keep this manual in a safe place so that it can be referred to anytime it is required.

Caution

This user's manual refers to AQ7260 OTDR which software version is 2.08 or later.

Refer

Procedure of checking software version, refer to page 10-5.

Caution

If the pulse width is set to 100 ns, the measured waveform may differ from that when using version 2.07 of the software or earlier. This is due to changes made to the circuits used in the OTDR for improved performance, and does not indicate an abnormality with the OTDR hardware.
For more information, see section 10.1, “Checking the software version”.

TIP

- The instrument uses Linux and Microwindows. Linux is a trademark or a registered trademark of Linus Torvalds in U.S.A. and other countries.
- This product includes open source software. For the procedure of obtaining the source code, contact your nearest YOKOGAWA dealer.

Warranty

- The warranty period is one year from the date of purchase.
- Should breakdown occur during the warranty period, repairs shall be made free of charge according to the warranty policy.
- Breakdown arising from operating mistakes or modifications performed by the user or breakdown/damage caused by natural disasters shall be exempt from this warranty policy, even if it occurs during the warranty period.
- A certificate of compliance to guarantee the designed quality accompanies YOKOGAWA products.

Prior to shipment, every YOKOGAWA product undergoes strict inspections that are carried out according to its quality assurance system. However, should breakdown occur arising from defects in manufacturing or accidents during transport, please contact the agent from whom the product was purchased.

TIP

• Recommended recalibration period is 1 year. Inquiry of about recalibration, please contact the agent from whom the instrument was purchased.

• The following parts are consumable parts and are not subject to the warranty period.

product name	Part name	Life span *1
Main Frame	Liquid Crystal Display (LCD) panel	3 years
	Battery pack	1 year
	Back up battery	5 years
Optical Module	Ferrule on the connector	1 year
Expansion unit	Printer	Equivalent to 3,000 roll of printer paper.
	FDD	3 years

*1: Each life span depends on the environmental conditions and frequency of use.

Conventions Used in this Manual

Safety Graphic Marks

The following graphic marks are given in this manual to ensure the safe use of this instrument and to prevent injury and property damage. Before operating the instrument, please read the following carefully to gain thorough understanding.

The following graphic marks indicate the degree of danger and damage that may occur as a result of improper handling.

⚠ **WARNING**
Indicates a potentially hazardous situation that may possibly result in death or serious injury in the event of improper handling.

⚠ **CAUTION**
Indicates a potentially hazardous situation that may result in moderate injury or property damage in the event of improper handling.

The degree of danger and damage is indicated by the following graphic symbols.

	"△" indicates a warning or caution. This example indicates fire warning.
	"○" indicates a prohibited operation. This example indicates that disassembly is prohibited.
	"●" indicates an obligatory operation. This example indicates that the AC adapter must be removed from the power outlet.

Other Graphic Marks

Caution

This is called a caution mark. It indicates an operation or procedure that requires special care or a point to be observed regarding handling of the instrument.

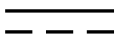
TIP

This is called a TIP mark. It indicates information that is useful for operation of the instrument.

Refer

This is called a reference mark. It indicates the reference page for the contents or terms used in this manual.

The following symbols are used on this instrument.

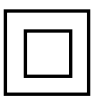


Direct current.

Alternating current.

Danger, Caution

Danger, risk of electronic shock.



Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION

Safety Precautions

This section must be read to ensure safe use of the instrument. After reading, keep this manual in a safe place so that it can be referred to anytime it is required.

For Safe Use of Laser Products

This instrument uses a laser light source and as such, falls into the category of “class 1M laser product” specified by “EN60825-1:1994 +A2:2001 Safety of Laser Products-Part 1: Equipment Classification, Requirements and User’s Guide”.

And the laser products comply with 21CFR1040.10 except for deviations pursuant to Laser Notice No.50, dated May 27 2001.

Optical module		AQ7261	AQ7264
Laser class		1M	1M
Center wavelength		1310nm, 1550nm	1310nm, 1550nm
Output power	CW	----------	≤1mW@1310nm, 1550nm
	PULSE	≤100mW@1310nm, 1550nm	≤100mW@1310nm, 1550nm
	PULSE WIDTH	≤20μs@1310nm(duty:≤1.6%) ≤20μs@1550nm(duty:≤1.6%)	≤20μs@1310nm(duty:≤1.6%) ≤20μs@1550nm(duty:≤1.6%) 50μs@1550nm(duty:≤0.8%)

Optical module		AQ7265
Laser class		1M
Center wavelength		1310nm, 1550nm
Output power	CW	≤1mW@1310nm, 1550nm
	PULSE	≤100mW@1310nm, 1550nm
	PULSE WIDTH	≤20μs@1310nm(duty:≤1.6%) ≤20μs@1550nm(duty:≤1.6%) 50μs@1550nm(duty:≤0.8%)

Optical module		AQ7269	
Laser class		1M	1M
Center wavelength		850nm, 1300nm	1310nm, 1550nm
Output power	PULSE	≤100mW@850nm, 13000nm	≤100mW@1310nm, 1550nm
	PULSE WIDTH	≤200ns@850nm(duty:≤1.6%) ≤1μs@1300nm(duty:≤1.6%)	≤20μs@1310nm(duty:≤1.6%) ≤20μs@1550nm(duty:≤1.6%)

INVISIBLE LASER RADIATION
DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS
CLASS 1M LASER PRODUCT

⚠ WARNING	
	Invisible laser beam is output from the emitter section. The emitter section is located on the top panel. A message “LASER ON” is displayed while a laser beam is emitted. Class 1M laser invisible radiation when LASER ON. *1 Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers and microscopes) within a distance of 100mm may pose eye hazard. *1: When measuring or Light source function ON
	These laser beams cannot be seen by the human eye. Should the beams enter the eyes, they may be seriously damaged, resulting in excessive deterioration of eyesight. To prevent such accidents, the following points must be strictly observed. • Never emit laser beam if no optical fiber is connected to the emitter section. • When disconnecting the optical fiber from the emitter section, stop emission first. • While laser beam is output, never stare into the emitter section nor the end of the optical fiber that is connected to the emitter section.
	Do not disassemble or modify the instrument, since high-power laser beams may be output when doing so. If repair is necessary due to breakdown, contact the agent from whom the instrument was purchased. Repair is allowed by qualified personnel only.

Notes on Power Supply

The instrument can be powered by the following two methods.

- AC adapter (supplied with the instrument)
- Battery pack (Model name : 3UR18650F-2)

Refer

For details on use of power supply, refer to page 3-3.

Before connecting the instrument to the power, read the safety precautions given below.

AC adapter

⚠ CAUTION	
	Do not connect or disconnect the power cord while the instrument is powered ON. Doing so may result in breakdown.
	Only use the dedicated AC adapter with the instrument. Using a different AC adapter can result in instrument damage.

Battery Pack

⚠ WARNING	
	If the battery fluid leaks from the battery pack and enters the eyes, immediately wash with clean water, such as tap water, (never rub the eyes) and consult a doctor. Failure to do so may cause damage to the eyes.
	If leaking battery fluid enters the mouth, rinse immediately and thoroughly with tap water or some other type of clean water, then seek medical attention immediately.
	The instrument and battery pack must be kept out of the reach of children.
	If the battery fluid leaks and adheres to skin or clothes, immediately wash with clean water, such as tap water. Adhesion to the skin may produce irritation.

⚠ CAUTION	
	Do not disassemble or modify the battery pack. The battery pack has built-in safety and protective functions designed to prevent danger. If these functions are damaged, the battery fluid may leak from the battery pack, resulting in heat generation, smoke, explosion or fire.
	Do not connect the "+" and "–" terminals of the battery pack with metal objects like a wire. In addition, do not carry the battery pack or store it near metal necklaces or hairpins. Doing so may short-circuit the battery pack. This may cause excessive current flow, resulting in leakage, heat generation, smoke, explosion or fire, or may cause the metal objects, necklaces or hairpins to generate heat.
	Do not put the battery pack into a fire or heat it. Doing so may melt insulating materials, damage the protective circuit, or cause the battery fluid to catch fire, resulting in leakage, heat generation, smoke, explosion or fire.
	Do not use or leave the battery pack near a fire or hot objects such as stoves. Doing so may cause short-circuit in the battery pack, resulting in battery fluid leakage, heat generation, smoke, explosion or fire.
	Do not put the battery pack under any water, including seawater, or let it get wet. If the built-in protective circuit is damaged, the battery pack will be charged with abnormal current or voltage. This may cause a chemical reaction inside the battery pack, resulting in battery fluid leakage, heat generation, smoke, explosion or fire.
	Do not charge the battery pack near a fire or under very hot sunshine. If it gets hot, the protective device will initiate to prevent danger, hindering charging, or it gets damaged causing charging with abnormal current or voltage. Such charging may cause a chemical reaction inside the battery pack, resulting in battery fluid leakage, heat generation, smoke, explosion or fire.
	Charging of the battery pack must be performed on this instrument under the specified charging conditions. If charging is performed in an environment that does not conform to the specified charging conditions (e.g. at excessively high temperatures, with higher voltage/current than the specified, using a modified charger), the battery pack may be excessively charged, or charged with abnormal current. Such charging may cause an abnormal chemical reaction inside the battery pack, resulting in battery fluid leakage, heat generation, smoke, explosion or fire.
	Do not pierce the battery pack with a nail, hit it with a hammer, or stamp on it. Doing so may damage or deform the battery pack. This may cause short-circuit inside the battery pack, resulting in battery fluid leakage, heat generation, smoke, explosion or fire.
	Do not cause any excessive impact to the battery pack or throw it. Doing so may result in battery fluid leakage, heat generation, smoke, explosion or fire. Furthermore, if the built-in protective circuit is damaged, the battery pack will be charged with abnormal current or voltage. This may cause an abnormal chemical reaction inside the battery pack, resulting in battery fluid leakage, heat generation, smoke, explosion or fire.
	Do not solder directly on the battery pack. Doing so may melt insulating materials, damage the protective circuit, resulting in battery fluid leakage, heat generation, smoke, explosion or fire.
	Do not use the battery pack if it shows excessive damage or deformation. Using it in such condition may result in battery fluid leakage, heat generation, smoke, explosion or fire.

⚠ CAUTION	
	The battery pack must only be used for this instrument.
	If charging is not complete even if the specified charging time has elapsed, stop charging. Continuing to charge the battery pack may result in battery fluid leakage, heat generation, smoke, explosion or fire.
	Do not put the battery pack in a microwave oven or high-pressure container. The battery pack may be heated rapidly or may no longer be airtight, resulting in battery fluid leakage, heat generation, smoke, explosion or fire.
	If battery fluid leakage or an odd smell is detected, immediately take the battery pack away from the heat source. Leaving it in such condition may cause the battery fluid to catch fire, resulting in smoke, explosion or fire.
	If odd smells, heat generation, discoloration or deformation are noticed during use, charging or storage of the battery pack, disconnect it from the instrument or charger, and do not use it. Continuing to use it in such conditions may result in battery fluid leakage, heat generation, smoke, explosion or fire.
	Do not use or leave the battery pack in strong direct sunlight or in places like inside an automobile under very strong sunshine. Doing so may result in battery fluid leakage, heat generation or smoke. It also may deteriorate the performance or life of the battery pack.
	The battery pack has a built-in protective circuit designed to prevent danger. So, do not use the battery pack in places where static electricity that is likely to damage the protective device is generated. Using the battery pack in such places may damage the protective device, resulting in battery fluid leakage, heat generation, smoke, explosion or fire.
	The battery pack can be charged in the following temperature range. Charging the battery pack outside this range may cause battery fluid leakage, heat generation or breakdown. It may also deteriorate the performance or life of the battery pack. Allowed charging temperature range: 5°C to 30°C
	If rust, odd smells, heat generation or any other abnormality are found when using the instrument for the first time following purchase, stop its use and contact the agent from whom the instrument was purchased.

Notes on Operating Environment and Conditions

Restrictions Regarding Operating Environment

WARNING	
	Take care not to let water enter the instrument or to allow it to get wet. Failure to observe this may result in fire, electric shock or breakdown.

Restrictions Regarding Operating Conditions

WARNING	
	The power cord specified by YOKOGAWA must be used. Use of any other power cord may result in fire, electric shock or accident.
	Never use a power cord nor AC adapter other than the ones specified. Doing so could result in fire, electric shock, or instrument damage.

Notes on Installation

For Personnel Performing Installation

⚠ WARNING	
	Do not connect the instrument to an AC outlet using an extension power cord. Doing so may result in heat generation or fire.

⚠ CAUTION	
	Do not dissemble or modify the instrument. Doing so may result in electric shock, fire or accident.
	Do not expose the instrument to water splashes. Failure to observe this may result in electric shock, fire or accident.
	Do not allow the terminals to short-circuit. Failure to observe this may result in fire or breakdown.
	When using an AC adapter, make sure that it is inserted into the AC outlet properly. If the power plug comes into contact with metal objects, fire or electric shock may result.
	When carrying out work with the instrument on your shoulders, take care not to let it drop. Failure to observe this may result in injury or breakdown.

Restricted and Prohibited Items Regarding Operating Environment and Conditions

⚠ WARNING	
	Do not insert metal bars or such like into gaps on the instrument. Doing so may result in fire, electric shock or accident.

⚠ CAUTION	
	Keep the power cord away from heaters etc. Failure to observe this may result in electric shock.
	Do not connect or disconnect the power plug with wet hands. Doing so may result in electric shock.
	Do not place the instrument in humid or dusty areas. Doing so may result in electric shock or breakdown.
	Do not place the instrument on an unstable surface like a shaky table or slope. The instrument may drop or turn over, causing injury.
	Do not place the instrument in areas where there is excessive vibration or impact. The instrument may drop or turn over, causing injury.
	When disconnecting the power cord, always hold the plug and pull it out. Pulling the power cord may damage the cord, resulting in fire or electric shock.
	Do not place the instrument in direct sunlight or in places like inside a car under the very hot sunshine. Placing the instrument in such places may cause the temperature inside the instrument to rise, resulting in breakdown.

Prohibited Items Regarding Installation Method

⚠ WARNING	
	Do not place heavy objects on the power cord, heat or pull it, and do not modify the power cord. Doing so may damage the cord, resulting in fire or electric shock.

⚠ CAUTION	
	Before transferring the instrument to another site, make sure that the power plug is removed from the AC outlet and all the external connecting cables are disconnected. Failure to observe this may damage the cord, resulting in fire or electric shock.

Notes on Handling

The instrument must be handled according to the procedures given in this manual.

Warning marks (“WARNING”, “CAUTION”) must be strictly observed.

⚠ WARNING	
	Do not leave metal objects or containers of liquid, such as water, near the instrument. Strong wind may turn over the container spilling the water or cause metal objects to hit the instrument, resulting in fire, electric shock or breakdown.
	Do not modify the power cord, bend, twist or pull it excessively. Failure to observe this may result in fire or electric shock.
	Before plugging in or removing connectors from the instrument, make sure that the instrument is powered OFF. Failure to observe this may result in fire, electric shock or breakdown.
	Do not disassemble or modify the instrument. Doing so may result in fire, electric shock or accident.
	Do not allow the terminals of the battery pack to get wet. Failure to observe this may result in rust, fire or electric shock.

⚠ CAUTION	
	When closing panels and covers, take care not to trap your fingers.
	If you are not going to use the instrument for a long period of time, the power plug must be removed from the AC outlet for safety reasons. It must also be removed in the event of thunderstorms. Failure to observe this may result in fire, electric shock or breakdown.
	Do not use the instrument at -10°C or lower temperatures. Operation of the indicators cannot be guaranteed.
	Do not allow short-circuiting of the battery pack's terminals with metal objects. Failure to observe this may result in fire or breakdown.

If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.

Notes on Maintenance and Inspection

Periodic maintenance and inspection of the instrument are recommended. For enquiries regarding maintenance and inspection, contact the agent from whom the instrument was purchased.

⚠ CAUTION	
	Take care not to let dust or dirt collect inside the instrument. Collection of dust or dirt inside the instrument may result in fire or breakdown.

Actions to be Taken in Case of Abnormalities

⚠ WARNING	
	Do not repair the instrument even though the instrument becomes faulty. Doing so may result in electric shock or injury. In addition, the instrument repaired by the user without permission will be exempt from the warranty.
	Should the instrument be dropped or damaged, turn OFF the power switch on the instrument, disconnect the power plug from the AC outlet and then contact your agent from whom the instrument was purchased. Continuing to use it may result in fire, electric shock or breakdown.
	Should foreign items enter the instrument, turn OFF the power switch on the instrument, disconnect the power plug from the AC outlet and then contact your agent from whom the instrument was purchased. Continuing to use it may result in fire, electric shock or breakdown.
	Should smoke or odd smells be detected, turn OFF the power switch on the instrument, disconnect the power plug from the AC outlet and then contact your agent from whom the instrument was purchased. Failure to observe this may result in fire, electric shock or breakdown.
	If the power cord is damaged, contact the agent for replacement. Continuing to use it may result in fire or electric shock.

Notes on Disposal

⚠ WARNING	
	When disposing of the instrument, do not put it into a fire. Doing so may cause explosion, resulting in fire or burns.

⚠ CAUTION	
	The instrument uses a lithium battery for memory backup and a gallium arsenide battery for the light source module. In addition, the liquid crystal display panel contains fluorescent tubes. So, disposal of the instrument must be carried out according to the laws and regulations of the country and local authorities.

Other Precautions

Notes on Backup Battery

⚠ CAUTION	
	The instrument uses a lithium battery for memory backup. The instrument may malfunction suddenly due to battery life, therefore, early replacement of the battery is recommended. The life of the battery is approximately five years.

Refer

For details on replacement of the backup battery, refer to page 1-29.

Notes on LCD Panel

⚠ CAUTION	
	This instrument uses a liquid crystal display panel. The display panel gradually becomes unclear due to the backlight life. The LCD panel needs to be replaced when it becomes unclear. The life of the LCD panel is approximately three years. Please contact the agent when the panel is no longer clear.
	If the LCD display panel breaks and fluid leaks out, do not allow the fluid to come into contact with the skin, eyes, or mouth. If fluid enters the eyes or mouth, rinse immediately and thoroughly with tap water or some other type of clean water, then seek medical attention immediately.

Structure of this Manual

Chapter 1 BEFORE USING THE INSTRUMENT

Explains the names and functions of each part of the instrument, and how to carry out daily maintenance.

Chapter 2 BEFORE STARTING MEASUREMENT

Explains how to set up the instrument.

Chapter 3 PERFORMING MEASUREMENTS

Explains how to set measurement conditions and how to measure optical fiber cables.

Chapter 4 ENTERING CHARACTERS

Explains how to enter label and file names.

Chapter 5 EDITING AUTOMATIC SEARCH RESULTS

The instrument has a function that detects events in the measurement results automatically at the end of measurement. This chapter explains how to edit the detection results.

Chapter 6 FILE OPERATION

Explains how to use (e.g. open, delete) files saved to a storage medium.

Chapter 7 USING USEFUL FUNCTIONS

This instrument has various useful functions. This chapter explains these functions.

Chapter 8 USING OPTIONS AND EXTERNAL DEVICES

Explains how to use options and external devices (e.g. USB printer) and how to control the instrument from a personal computer.

Chapter 9 SPECIFICATIONS

Explains the specification of the instrument itself, optical module and options.

Chapter 10 APPENDIX

Explains corrective actions to be carried out in case of breakdown. Also provides a list of technical terms regarding the instrument.

Contents

Chapter 1
BEFORE USING THE INSTRUMENT

1.1 What is the AQ7260?

This instrument emits a light pulse into an optical fiber and searches faults from the end of the fiber, then calculates transmission loss effectively by detecting back scattering rays caused by Rayleigh scattering inside the fiber, and rays reflecting at connection points and fault points.

Since the optical section comes in a module, an appropriate optical module can be selected according to the wavelength and type of optical fiber to be used.

This instrument also can be used for light source depend on the mounted optical module.

1.2 Installation, Storage and Transport

This section explains points to be observed when installing, storing or transporting the instrument.

Unpacking and Receiving Inspection

Prior to shipment, the instrument has undergone strict mechanical and electrical inspection to ensure its correct operation. On delivery, immediately unpack and check the instrument for any damage that might have occurred during transport.

Mechanical Inspection

After the instrument is unpacked, check the appearance, operation of each switch and connector, and check for any damage or defects that might have occurred during transport. In addition check that all the accessories are present and correct.

TIP

It is recommended that packing materials, such as corrugated boxes and cushioning materials, be kept in a safe place so that they can be reused when transporting the instrument again.

Operation Inspection

If no defects are found by mechanical inspection, check the instrument to see whether it conforms to the specifications.

When Damage or Defects are Found

If damage or non-conformation to the specifications is found during mechanical or operation inspection, contact the agent from whom the instrument was purchased.

Notes on Storage

This section explains points to be observed when storing the instrument for a long period of time.

Notes Before Storage

Dust, fingerprints, dirt and stains etc. collected on the instrument must be wiped off with a piece of cloth.

Carry out operation inspection to check that the instrument operates correctly.

Refer

For the method of cleaning the exterior of the instrument, refer to page 1-8.

Storage Conditions

When storing the instrument, make sure it is stored under the following environmental conditions.

- Temperature −20 to 60°C
- Humidity 95%RH or less (No condensation allowed)
- Temperature/humidity does not change excessively throughout the day.
- Areas where the instrument will not be exposed to direct sunlight
- Areas where there is little dust
- Low-humidity areas where no water drops are generated or collect on the instrument
- Areas where the instrument will not be exposed to active gases or oxidized.

Caution

If you are not going to use the instrument for a long period of time, store it with the battery pack removed. Furthermore, when storing the instrument outside the above temperature range, make sure that the battery pack is removed.

Refer

For the method of removing the battery pack, refer to page 1-23.

Notes When Re-Using the Instrument

When using the instrument again after storing it for a long period of time, first carry out operation inspection to check that the instrument operates correctly.

Notes on Transport

This section explains points to be observed when transporting the instrument.

Repacking

To repack the instrument, the packing materials used to deliver the instrument must be used. If they have been discarded or damaged, pack the instrument as explained below.

1. **Wrap the instrument with a thick vinyl sheet to prevent entry of dust.**
2. **Place cushioning material on projecting parts on the bottom and front/rear panels of the instrument to protect them.**
3. **Prepare a corrugated, wooden or aluminum box that is large enough to accommodate the instrument and allows 10 to 15 cm space between the surface of each part of the instrument (top, bottom, front, rear, right/left panels) and the sides of the box.**
4. **Put shock-absorbent materials at the bottom of the box to absorb shocks, such as vibration.**
5. **Place the instrument in the center of the box and fill the spaces (between the box's internal surface and each surface of the instrument: top, front, rear, right/left panels) with shock absorbent materials.**
6. **Secure the outside of the box with packing cord, adhesive tape or bands.**

Caution

The instrument must be packed so that any impact or vibration on the instrument is 50G or less. If the instrument is exposed to impact or vibration exceeding 50G, the instrument may get damaged. In particular, take care not to let any excessive pressure be exerted on the LCD.

TIP

It is recommended that packing materials used to deliver the instrument be kept in a safe place. Using these materials will facilitate packing work when transporting the instrument.

Transport

During transport, make sure that vibration is avoided and the required storage conditions are satisfied.

Refer For details on the storage conditions, refer to page 1-4.

Caution When the battery pack is transport by using aircraft. Pleas each package contains 12 battery pack or less. However, airlines refuse transport battery packs. Please inquire to the airline in advance.

1.3 Power Supply

The instrument can run on AC power (AC battery is supplied with the instrument) or battery pack.

The AC adapter must be connected to an AC power outlet (100 to 240 V, 50/60Hz). Necessary measures must be taken to prevent the following.

- Accident by electric shock
- Internal damage of the instrument by abnormal voltage

1.4 Daily Maintenance

The instrument can be used for many years if daily maintenance is carried out properly.

Daily maintenance is also important to prevent trouble and breakdowns.

This section explains how to clean the following items.

- Exterior of the instrument
- Optical connector
- Optical adapter

Cleaning the Exterior of the Instrument

Wet a cloth with lukewarm water, squeeze it thoroughly, wipe the LCD and exterior of the instrument with it, and then wipe the instrument with dry cloth.

Caution

- Before carrying out daily maintenance, make sure that the power is turned OFF.
- Do not use chemicals such as thinner, benzene and alcohol. Use of such chemicals may cause deterioration or discoloration of the exterior of the instrument.
- To prevent entry of water into the instrument, the wet cloth must be firmly squeezed before it is used to wipe the exterior.

Cleaning the Optical Connector

The end of the optical connector must be kept clean at all times. Collection of dust or dirt on the end may damage the optical adapter of the instrument, hindering correct measurement.

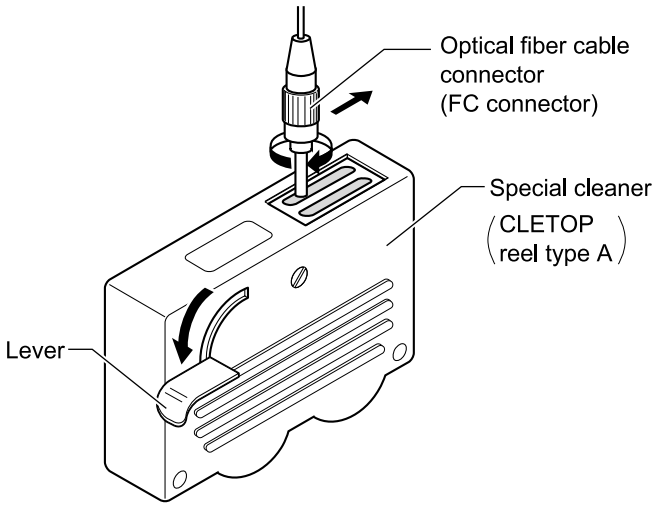
This section explains how to clean the end of the optical connector by taking a FC connector as an example.

1. **Place the end of the optical connector perpendicular to the cleaner's cleaning surface.**

2. **With the end of the optical connector pushed against the cleaning surface, turn it approximately one turn.**

3. **Then, slide the end of the optical connector.**

4. **Repeat steps 2 to 3 to clean the end of the optical connector.**



Caution

When cleaning the optical connector, make sure that it is pushed against the cleaner firmly. If not, the optical connector may not be cleaned sufficiently.

TIP

•To check the condition of the end of the optical connector, use of a surface check microscope (x200 to x400) is helpful.

•Various cleaners designed for optical fiber cables are available, including "OPTICAL FIBER CONNECTOR CLEANER" manufactured by NTT-ME.

Product Name	Appropriate Connector Types
CLETOP reel-type A	SC, FC, ST, DIN, D4
CLETOP reel-type B	MT, Biconic
CLETOP spare tape	----------
CLETOP stick-type	----------

Cleaning the Optical Adapter

This section explains how to clean the optical adapter.

1. Make sure that the power to the instrument is turned OFF.

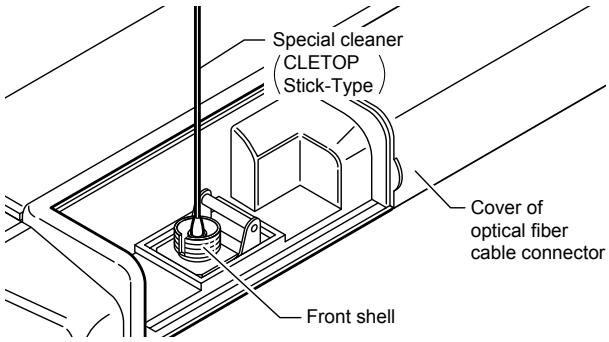
WARNING	
	Never clean the instrument if the power is ON. Laser beams are invisible to the naked eye, but if they enter the eyes, they may cause impaired eyesight.
	Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Refer

For the method of turning OFF the power, refer to page 3-108.

2. Slide the optical connector cover on the top of the instrument to open it.

3. Clean the outer surface inside the optical adapter using a special cleaning stick. Also clean the end of the optical fiber with a special cleaning stick.



TIP

Various cleaners designed for optical adapters are available, including “CLETOP Stick-Type” manufactured by NTT-ME.

1.5 Replacing the Optical Module

This section explains how to replace the optical module with a new one.

Removing the Optical Module

Caution

The optical module cannot be replaced if the expansion unit is connected.

Refer

For the method of removing the expansion unit, refer to page 8-5.

AQ7261 / AQ7264 / AQ7265

1. Make sure that the power to the instrument is turned OFF.

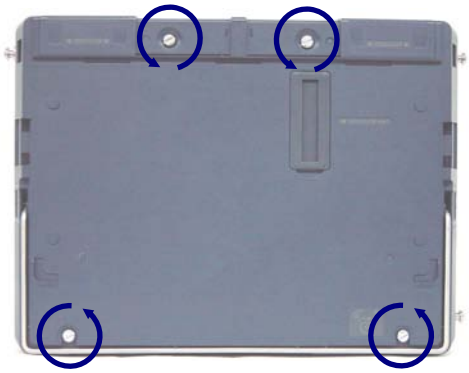
WARNING	
	Do not replace the optical module while the instrument is powered ON. Failure to observe this may result in electric shock or breakdown.

Refer

For the method of turning OFF the power, refer to page 3-108.

2. Remove the optical module cover.

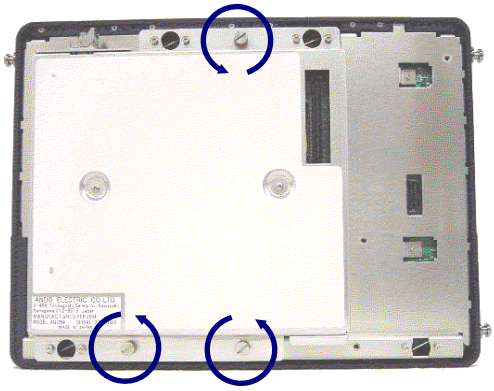
Loosen the four screws shown below counter-clockwise.

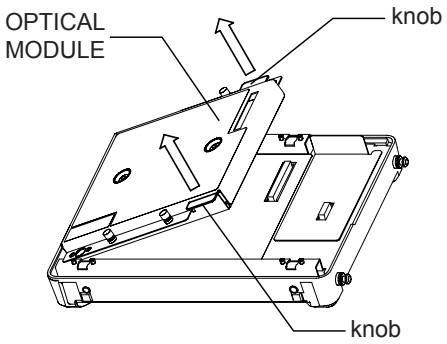


3. Lift the optical module cover straight to remove it.

4. Remove the optical module.

Loosen the three screws shown below counter-clockwise. Then, pull out the optical module as shown below to remove it.





⚠ CAUTION	
⊘	When removing the optical module, lift the two knobs slowly at the same time to detach them. Never shake it sideways or remove it by force. Doing so may damage the connector.
⊘	Take care not to touch the connector on the optical module or the one on the instrument. Doing so may result in breakdown.

AQ7269

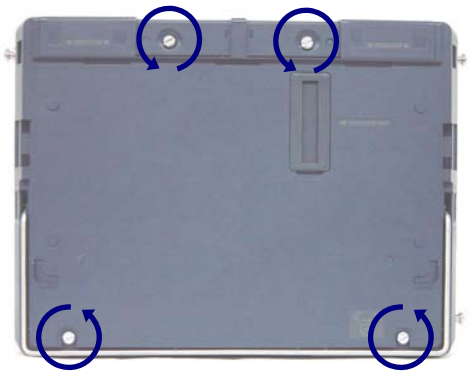
1. Make sure that the power to the instrument is turned OFF.

⚠ WARNING	
	Do not replace the optical module while the instrument is powered ON. Failure to observe this may result in electric shock or breakdown.

Refer For the method of turning OFF the power, refer to page 3-108.

2. Remove the optical module cover.

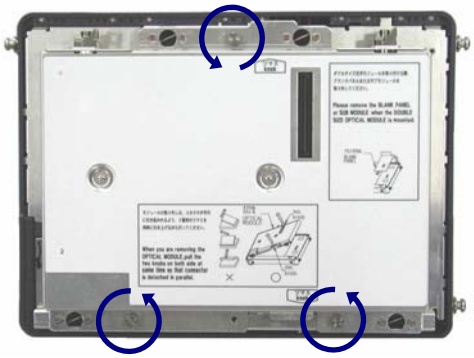
Loosen the four screws shown below counter-clockwise.

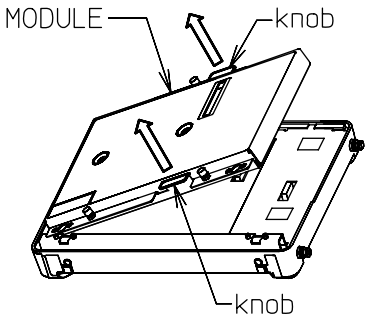


3. Lift the optical module cover straight to remove it.

4. Remove the optical module.

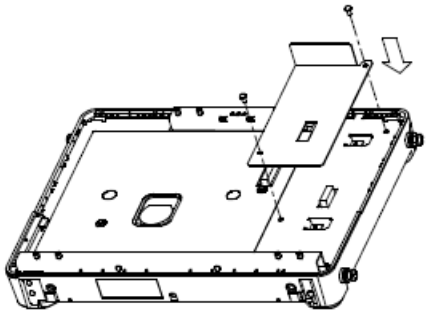
Loosen the three screws shown below counter-clockwise. Then, pull out the optical module as shown below to remove it.





CAUTION	
	When removing the optical module, lift the two knobs slowly at the same time to detach them. Never shake it sideways or remove it by force. Doing so may damage the connector.
	Take care not to touch the connector on the optical module or the one on the instrument. Doing so may result in breakdown.

5. Attach the blank panel.



CAUTION	
	Use the attached screws with the blank panel. Size of the screws are M3 (5[mm]). If the screws that exceed 5 [mm] in lengths are used, they may cause a failure  5mm

Attaching a New Optical Module

This section explains how to attach a new optical module. It is assumed that the optical module and its cover have been removed.

AQ7261 / AQ7264 / AQ7265

1. Make sure that the power to the instrument is turned OFF.

⚠ WARNING	
	Do not replace the optical module while the instrument is powered ON. Failure to observe this may result in electric shock or breakdown.

Refer

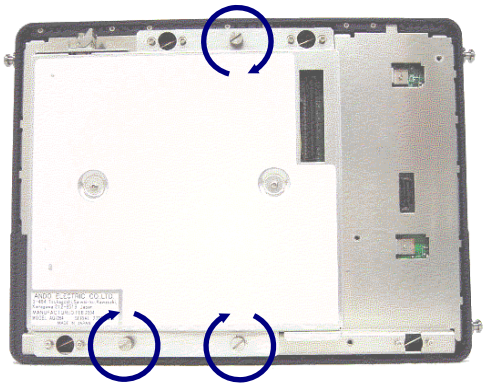
For the method of turning OFF the power, refer to page 3-108.

2. Connect the optical module's connector to the one on the optical module.

⚠ CAUTION	
	When attaching the optical module, insert the connector slowly. Never shake the connector sideways or insert it by force. Doing so may damage the connector.

3. Fix the optical module.

Tighten the three screws shown below clockwise to secure the optical module.

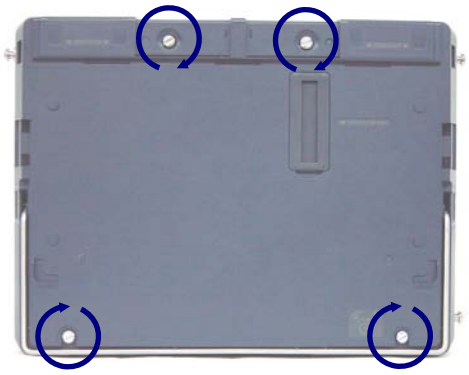


Caution

Make sure that the screws are tightened firmly.

4. Attach the optical module cover.

Tighten the four screws shown below clockwise.



Caution

Make sure that the screws are tightened firmly.

AQ7269

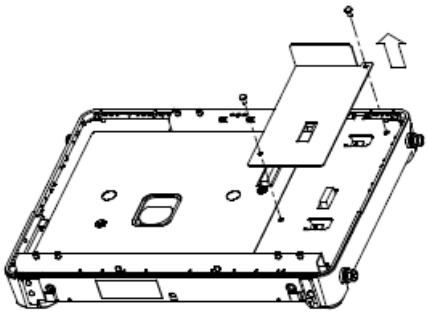
1. Make sure that the power to the instrument is turned OFF.

⚠ WARNING	
	Do not replace the optical module while the instrument is powered ON. Failure to observe this may result in electric shock or breakdown.

Refer

For the method of turning OFF the power, refer to page 3-108.

2. Detach the blank panel.



Caution

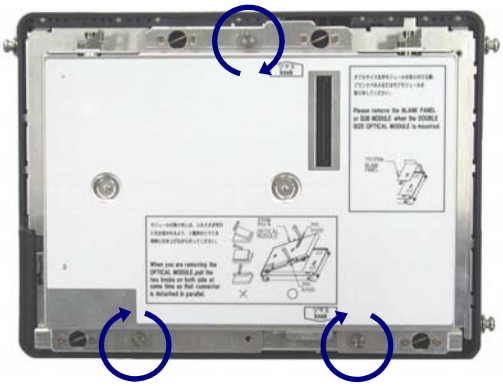
Keep the detached screws.

3. Connect the optical module's connector to the one on the optical module.

⚠ CAUTION	
	When attaching the optical module, insert the connector slowly. Never shake the connector sideways or insert it by force. Doing so may damage the connector.

4. Fix the optical module.

Tighten the three screws shown below clockwise to secure the optical module.

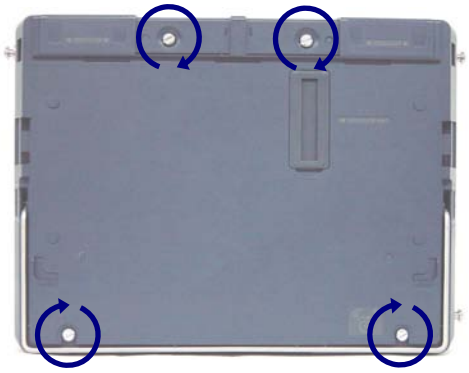


Caution

Make sure that the screws are tightened firmly.

5. Attach the optical module cover.

Tighten the four screws shown below clockwise.



Caution

Make sure that the screws are tightened firmly.

1.6 Replacing the Optical Adapter

This section explains how to replace the optical adapter with a new one.

Removing the Optical Adapter

Refer Refer to the Cautions given on page 1-22.

1. Make sure that the power to the instrument is turned OFF.

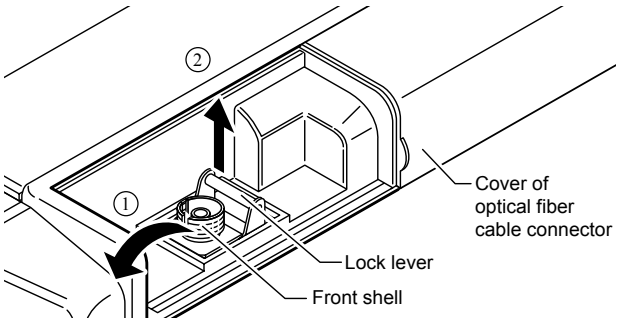
⚠ WARNING	
	Do not replace the optical adapter while the power to the instrument is ON. Should the laser emit and enter the eyes, they may be seriously damaged or loss of eyesight may result.

Refer For the method of turning OFF the power, refer to page 3-108.

2. Slide the optical connector cover on the top of the instrument to open it.

3. Push the optical adapter's lock lever inward to unlock the adapter.

4. Lift the adapter to pull it out.



Attaching a New Optical Adapter

Refer

Refer to the Cautions given on page 1-22.

1. Make sure that the power to the instrument is turned OFF.

WARNING	
	Do not replace the optical adapter while the power to the instrument is ON. Should the laser emit and enter the eyes, they may be seriously damaged or loss of eyesight may result.

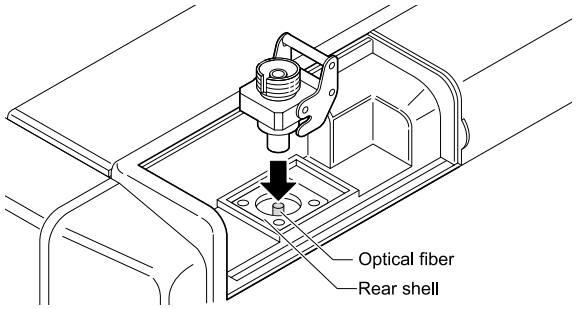
Refer

For the method of turning OFF the power, refer to page 3-108.

2. Slide the optical connector cover on the top of the instrument to open it.

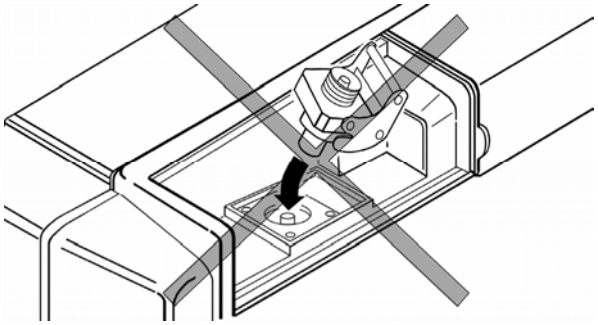
3. Insert the new optical adapter straight into the rear shell.

4. Push the optical adapter's lock lever outward to lock the adapter.



⚠ CAUTION

- Take care not to damage the end of the optical fiberl.
  If the end of the optical fiber is damaged, correct measurement may no longer be possible or the optical fiber to be measured may also be damaged.
- When removing/inserting the optical adapter, it must be removed/inserted slowly.
  Shaking it sideways or removing/inserting by force may not only damage the optical adapter, but also damage the ferrule on the optical connector.



1.7 Replacing the Battery Pack

This section explains how to replace the battery pack with a new one.

Removing the Battery Pack

1. Make sure that the power to the instrument is turned OFF.

⚠ WARNING	
⃠	Do not replace the battery pack while the power to the instrument is ON. Failure to observe this may result in electric shock or breakdown.

Refer For the method of turning OFF the power, refer to page 3-108.

2. Open the battery pack protecting rubber.

3. Remove the battery pack bracket.

Loosen the screw shown below counter-clockwise to remove the bracket.

⚠ CAUTION	
	When removing the bracket, make sure that the right side of the instrument is not facing the floor. Doing so may cause the battery pack to drop, resulting in damage.

4. Remove the battery pack.

⚠ CAUTION	
	Do not touch the electrodes on the removed battery pack. Doing so may result in breakdown.

Attaching a New Battery Pack

This section explains how to attach a new battery pack. It is assumed that the battery pack bracket has been removed.

1. Make sure that the power to the instrument is turned OFF.

⚠ WARNING	
	Do not replace the battery pack while the power to the instrument is ON. Failure to observe this may result in electric shock or breakdown.

Refer

For the method of turning OFF the power, refer to page 3-108.

2. Insert a new battery pack into the instrument.

Caution

Make sure that the battery pack is inserted in the correct direction.

3. Attach the battery pack bracket.

Tighten the screw shown below clockwise to secure the bracket.

Caution Make sure that the screw is tightened firmly.

4. Close the battery pack protecting rubber.

⚠ CAUTION	
⊘	Make sure that the battery pack protecting rubber is closed firmly. Failure to observe this may result in breakdown.

1.8 Charging the Battery Pack

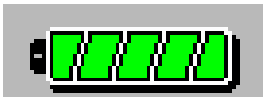
This section explains how to charge the battery pack.

When there is insufficient power in the battery pack, charge it as explained below.

Caution

Charging of the battery pack must be performed at temperatures of 5°C to 35°C. Charging outside this temperature range may not only deteriorate the battery pack's performance or shorten its life, but in the worst case may also prevent start of charging. The CHARGE LED blinks if charging is not yet started.

The remaining power in the battery pack can be seen on the power indicator located in the lower right corner of the screen.



Fully charged

Insufficient remaining power

The following message appears when there is insufficient power in the battery pack.

> Low battery.
> Please use AC adapter,
> or replace the charged battery.
>
> Push any key.

Take the required actions according to the above message. If the required actions are not taken within a few minutes following the appearance of the above message, the following message will appear and the power will be turned OFF automatically.

> ⚠
> Low battery.
> OTDR will shutdown in 10 sec.

When the battery pack is heated, the instrument prevents to charge the battery. If the battery pack is heated. Please remove the battery pack. After the temperature become cool to room temperature and insert battery pack.

Refer

For the method of removing the battery pack, refer to page1-23.

1. Make sure that the power to the instrument is turned OFF.

Refer

For the method of turning OFF the power, refer to page 3-108.

2. With the battery pack installed in the instrument, connect the AC adapter to the instrument.

Refer

- For the method of attaching the battery pack, refer to page 1-25.
- For the method of connecting the AC adapter, refer to page 3-4.

3. Insert the AC adapter's power plug into an AC power outlet.

Charging of the battery pack will start.

⚠ CAUTION	
	Do not insert the AC adapter's power plug into an AC power outlet if the power to the instrument is ON. Failure to observe this may result in breakdown.

TIP

The CHARGE LED will be lit steadily while the battery pack is charged, and will go out when charging is complete.

1.9 Replacing the Backup Battery

This section explains how to replace the backup battery with a new one.

The backup battery must be replaced with a new one periodically, since it may cause sudden malfunctions due to its battery life even though the instrument is working properly.

The backup battery must be replaced approximately every five years.

Caution

- When the backup battery is replaced, the date and time will be initialized.
- The battery model “CR2032” must be used.

1. Make sure that the power to the instrument is turned OFF.

⚠ WARNING	
	Do not replace the backup battery while the power to the instrument is ON. Failure to observe this may result in electric shock or breakdown.

Refer

For the method of turning OFF the power, refer to page 3-108.

2. Remove the optical module cover and then remove the optical module.

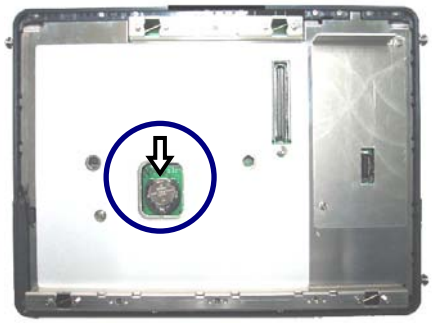
Refer

For the method of removing the optical module and its cover, refer to page 1-12.

3. Remove the battery.

3-1. Slide the battery as shown below.

3-2. Pull up the battery



Caution

When removing the backup battery, take care not to short-circuit the instrument.

4. Insert a new battery.

Caution

Make sure that the battery is inserted in the correct direction. The printing board side is minus.

5. Attach the optical module and then attach its cover.

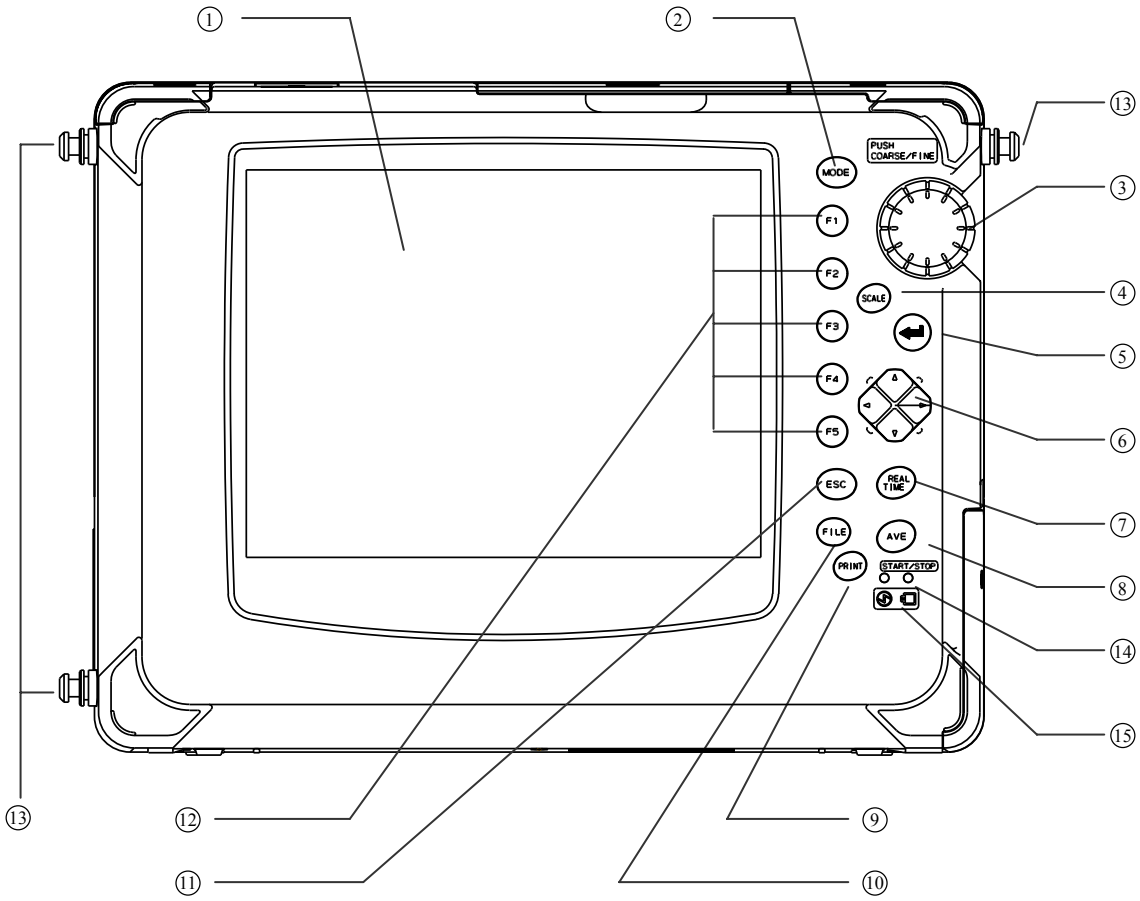
Refer For the method of attaching the optical module and its cover, refer to page 1-16.

⚠ CAUTION	
⚠	The instrument uses a lithium battery for memory backup. So, disposal of the instrument must be carried out according to the laws and regulations of the country and local authorities.

1.10 Names of Instrument Parts

This section explains the name and function of each part of the instrument (front, rear, top and right side panels). It also explains standard accessories and options.

Front View



Caution

The instrument uses a color LCD (hereafter called LCD). A filter plate is attached to the front surface of the LCD for protection. However, if the filter plate is exposed to strong impact, it may crack or the LCD itself may be damaged, so special care must be taken when handling it.

No.	Name	Description
①	LCD *	8.4-inch color TFT (640 x 480 dots). Measured trace, measurement conditions and measured values are displayed.
②	MODE key	Used to switch the operation mode.
③	Rotary knob	Used to move the distance cursor or increase/decrease entered values. Holding down the key will allow you to move the distance cursor at different speeds.
④	SCALE key	Used to enlarge/reduce the trace size or shift the trace.
⑤	ENTER key	Used to confirm entered values etc.
⑥	Arrow key	Used to move the trace, enlarge/reduce the trace size, or change entered values.
⑦	REAL TIME key	Starts/stops real-time measurement.
⑧	AVERAGE key	Starts/stops average measurement.
⑨	PRINT key	Prints out the information displayed on the screen.
⑩	FILE key	Used for file operation (saving, deleting, recalling).
⑪	ESC key	Used to cancel the operation or restore the previous screen contents.
⑫	Function keys	Performs the function inscribed on each key.
⑬	Shoulder belt fixture	Used to attach a shoulder belt to the instrument.
⑭	CHARGE LED	Lit while the battery pack is charged. When the battery pack is full charged, the LED is off. It blinks if the battery pack has not been charged or if it is in critical condition.
⑮	POWER LED	Lit while the power to the instrument is ON. When the instrument is running on the battery pack, this LED turns from green to red when there is insufficient power in the battery pack.

*: The LCD may contain some pixels that are always ON or always OFF (0.002% or fewer of all pixels including RGB). Please understand that this does not indicate a malfunction.

Conventions Used in This Manual

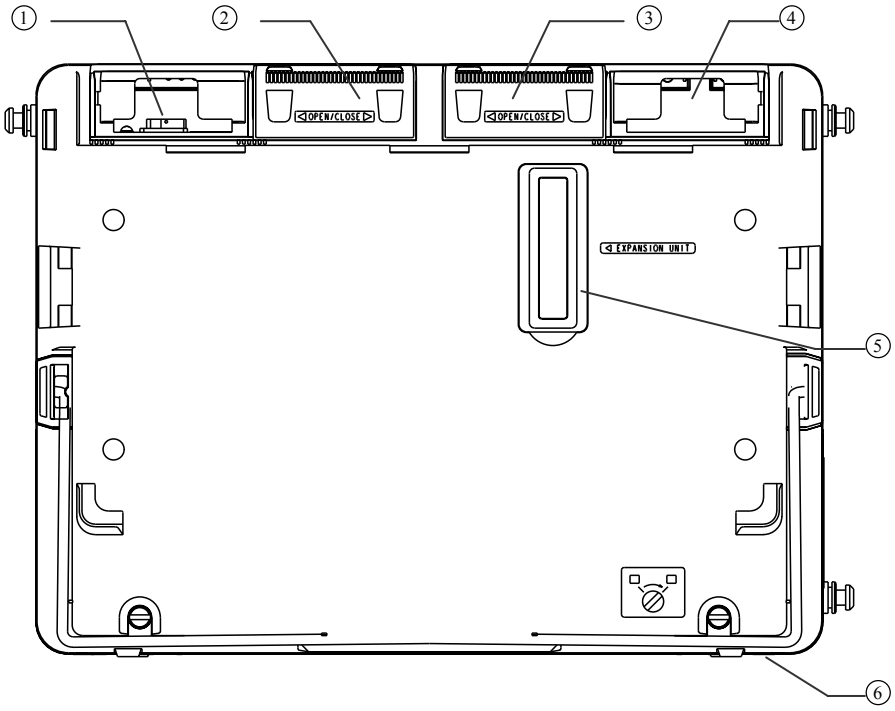
In this manual, each key is expressed as follows.

[key name]

Example

 → [ENTER]

Rear View



No.	Name	Description
①	Optical adapter	Used to connect the optical fiber to be measured.
②	Optical adapter cover (main port)	Used to protect the optical adapter when the fiber to be measured is not connected.
③	Optical adapter cover (sub port)	Used to protect the optical adapter in the sub port.
④	Module sub port	Used when AQ7269 module is connected.
⑤	Expansion unit port	Used to connect an expansion unit.
⑥	Stand	Used to support the instrument when it is placed on a desk etc.

Caution

Class 1M laser invisible radiation when optical adapter cover open. *1

Do not view directly with optical instruments.

*1: When measuring or Light source function ON

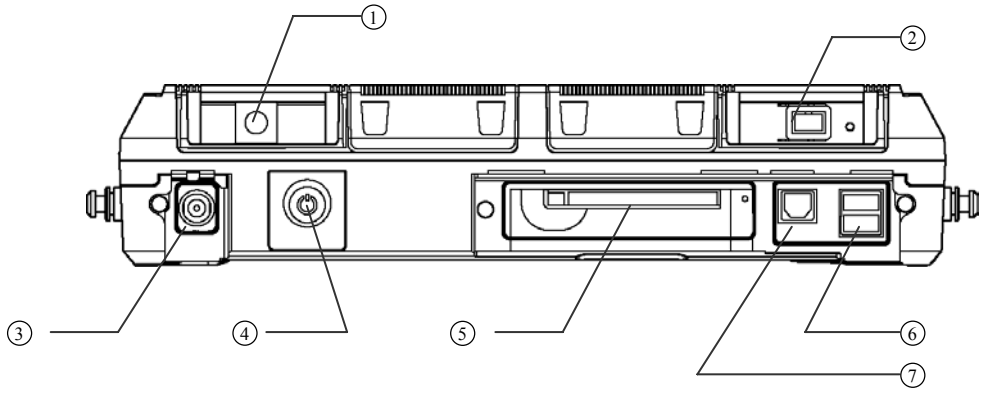
CATION

CLASS 1M INVISIBLE LASER RADIATION WHEN OPEN
DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS

⚠ WARNING	
	When no optical fiber is connected, make sure that the optical adapter cover is closed. Laser beams are invisible to the naked eye, but if they enter the eyes, they may cause impaired eyesight.

⚠ CAUTION	
	When carrying the instrument, do not carry it by the stand. Doing so may damage the instrument.

Top View

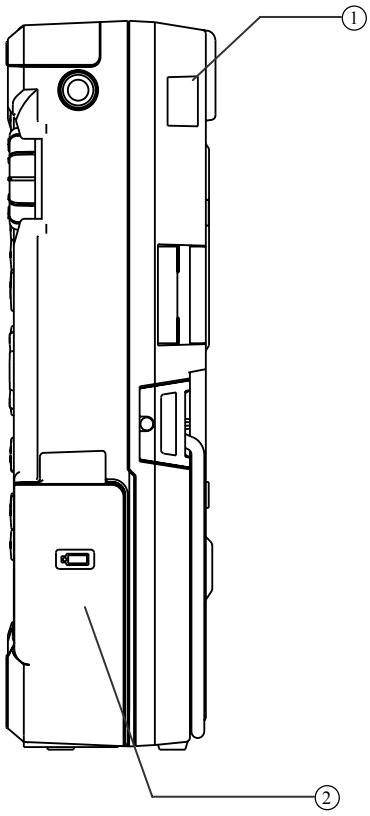


No.	Name	Description
①	Sub module port	Used when AQ7269 module is connected.
②	Optical adapter	Used to connect the optical fiber to be measured.
③	DC power connector	Used to connect the AC adapter.
④	Power switch	Used to turn ON/OFF the power to the instrument.
⑤	PCMCIA slot	Used to insert an optional IC card etc.
⑥	USB connector (host side) 2 ports	Used to connect FDD or memory.
⑦	USB connector (function side)	Now, not available.

Caution

- Two USB ports (host side) are available, but do not connect a storage medium or printer to both ports.
- Now, USB connector (function side) is not available.

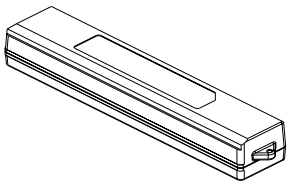
Right Side View



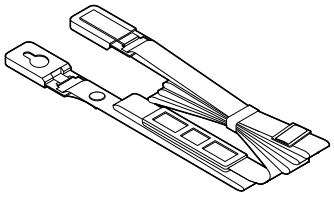
No.	Name	Description
①	Optical module cover	Used to protect the optical module
②	Battery pack section	Used to accommodate a battery pack.

Accessories

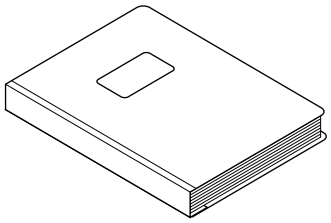
This section explains the accessories supplied with the instrument.



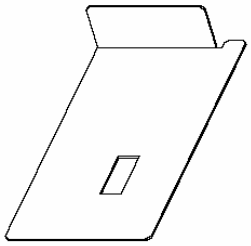
Battery pack



Shoulder belt



User's Manual



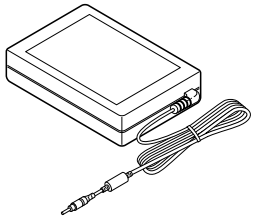
Blank panel

TIP

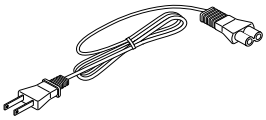
The blank panel may be attached to the AQ7260.

Options

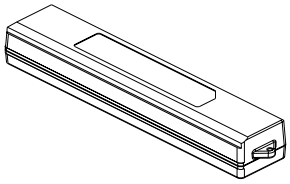
The section explains the options that can be purchased individually.



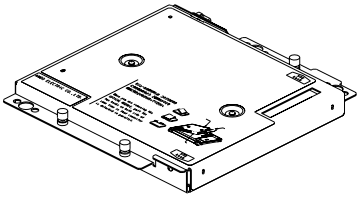
AC adapter



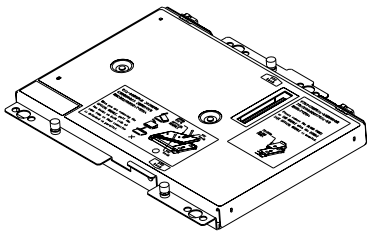
AC power cord



Battery pack

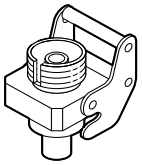


Optical module
(Standard size)



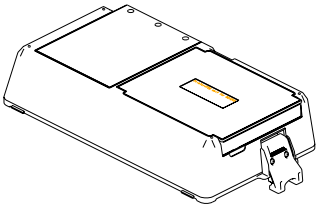
Optical module
(Double size)

Soft carrying case

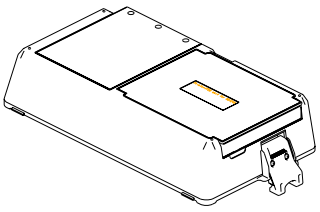


Universal adapter AQ9441 (*)

Expansion Unit



Printer/FDD unit



Printer unit

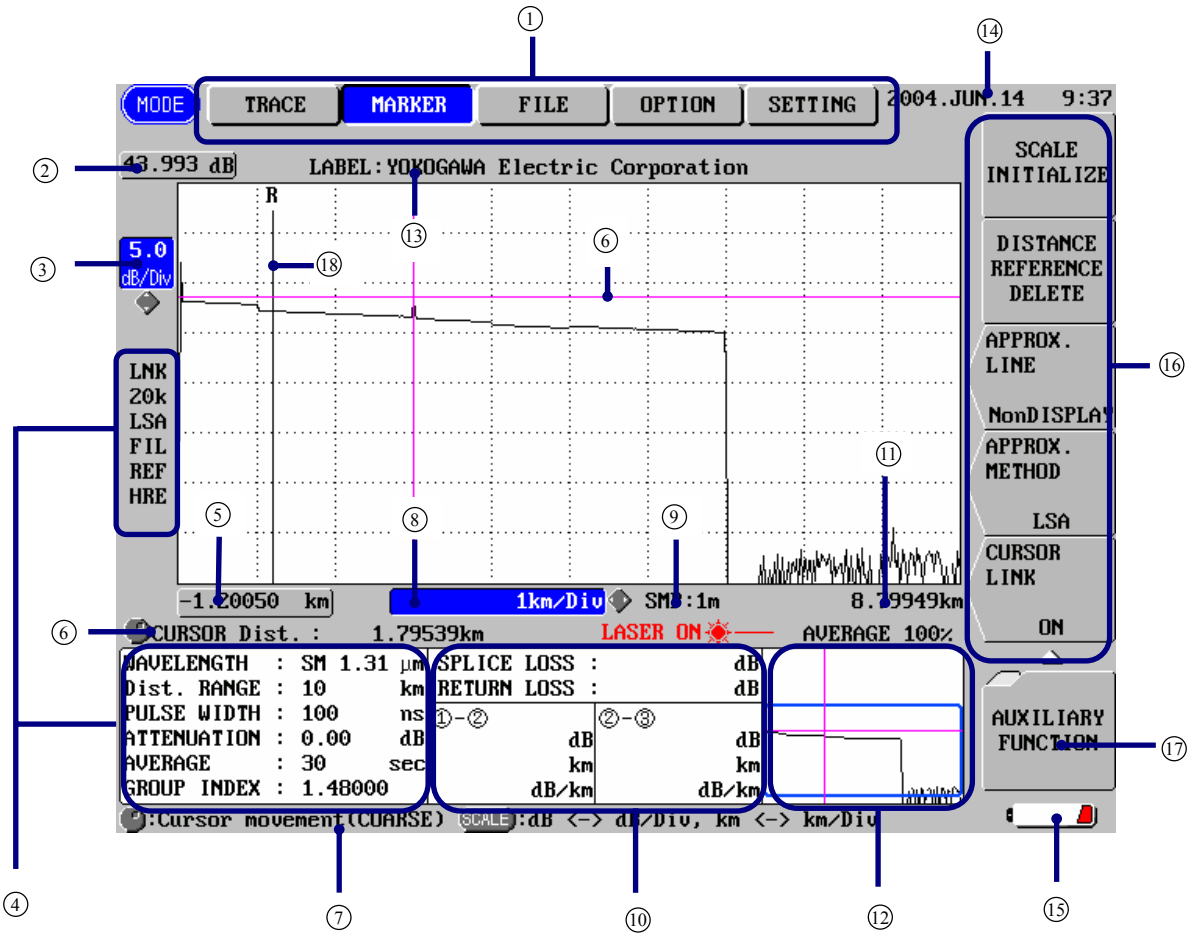
1.11 Screen Display

This section explains screen display.

Description of Screen Display

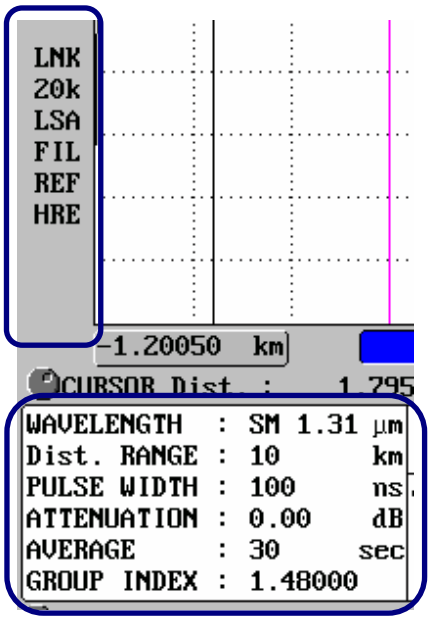
The main screen displays the measured trace and measurement conditions.

The name and function of each part of the screen are explained below.



No.	Name	Description
①	MODE	Highlights the currently selected mode.
②	Display start level	Displays the vertical-axis display start level (above the trace display section).
③	Vertical-axis scale	Displays the value per grid along the vertical axis.
④	Measurement conditions	Displays various measurement conditions.
⑤	Display start distance	Displays the horizontal-axis display start distance (left to the trace display section).
⑥	Cursor distance	Displays the distance from the origin to the cursor point.
⑦	Guidance	Displays outline of the operation.
⑧	Horizontal-axis scale	Displays the value per grid along the horizontal axis.
⑨	SMP	Displays the sampling resolution.
⑩	Calculated values	Displays the calculation results obtained from the measurement data.
⑪	Display end distance	Displays the horizontal-axis display end distance (right to the trace display section).
⑫	Overall trace	Displays a measured trace for the entire measured range in simplified format. The part displayed in the main screen will be enclosed by a frame.
⑬	Label	Displays the entered label.
⑭	Date	Displays the current date and time.
⑮	Power	Displays the currently used power. Battery mark: The instrument is running on the battery pack. == AC ==: The instrument is running on AC power.
⑯	Function keys	Displays the functions of the current function keys.
⑰	Hierarchy level	Displays the hierarchy level of the operation. The larger the tag count, the lower the hierarchy level.
⑱	Distance origin marker	Displays the position of the distance origin.

Display of Measurement Conditions



Name	Description
LNK	Displayed when the cursor link function is currently enabled.
20k	Displays the currently selected data size. 5k: 5k mode 20k: 20k mode 60k: 60k mode
LSA	Displays the currently selected approximate method. LSA: Least squares approximate TPA: Two point approximate
FIL	Displayed when the filter function is currently enabled.
REF	Displayed when the distance origin marker is currently set.
HRE	Displays the currently selected average method. HRE: High return loss average NOM: Normal average HSP: High speed average
WAVELENGTH	Displays the wavelength to be used for measurement.
Dist. RANGE	Displays the distance range to be used for measurement.
PULSE WIDTH	Displays the width of light pulse to be used for measurement.
ATTENUATION	Displays the value set to restrict increase of the light to be measured.
AVERAGE	Displays the currently selected average time or average interval.
GROUP INDEX	Displays the currently selected group index.

Function Keys and Hierarchy Level Display

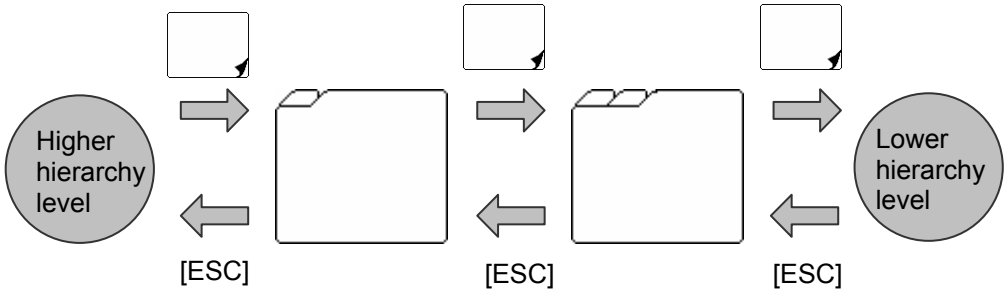
When [MODE] is pressed, the function menu for currently selected mode will be displayed.

The function keys are displayed in one of the three shapes, for each of which execution format has been set.

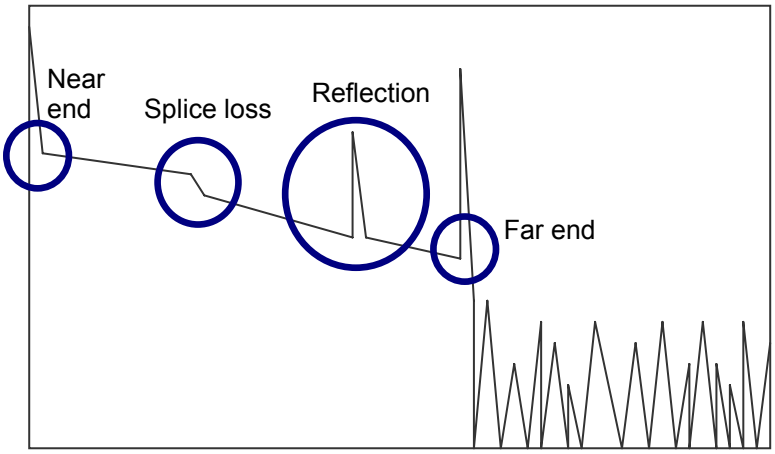
Execution format for each shape is explained below.

Shape	Description
	When a function key of this shape is pressed, a function window (lower-hierarchy window) relating to the function will appear. The number of tags indicating the hierarchy level is also increased by one. To return to the previous hierarchy level, press [ESC] *1
	When a function key of this shape is pressed, a window allowing you to change the currently set values or setting conditions will appear.
	When a function key of this shape is pressed, the function indicated on the key will be executed.

* 1



Meaning of Each Part of the Trace



Near end

Connection point between the instrument and optical fiber and its surrounding area

Far end

The end of an optical fiber cable and its surrounding area

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.

Splice loss

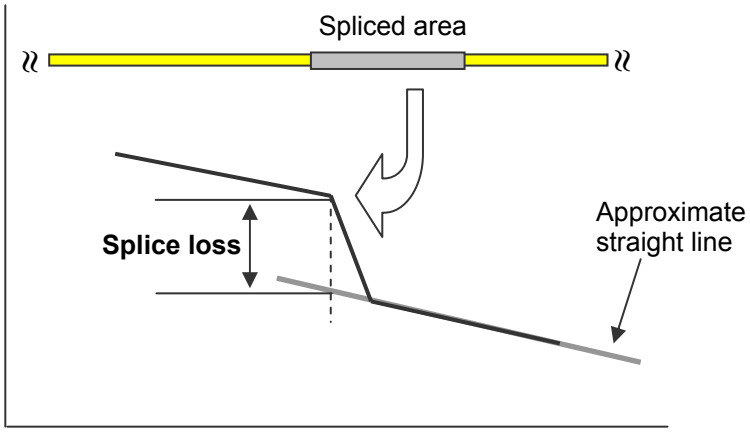
Explained on the next page.

Reflection

Explained on the next page.

Splice Loss

Splice loss occurs at areas where the optical fiber cable is fusion spliced.

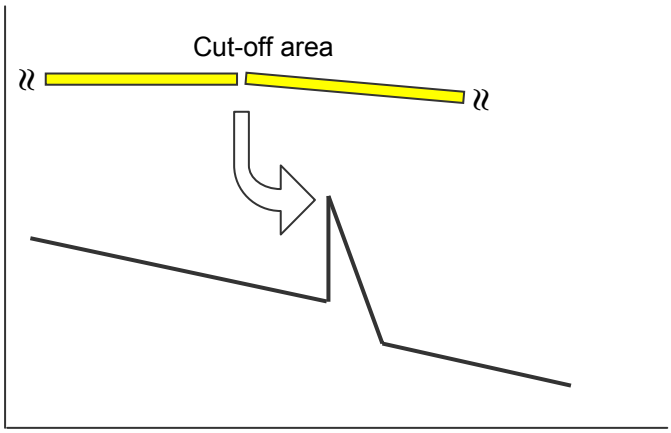


Refer For details on approximate straight line, refer to pages 3-81 and 3-85.

Reflection

Reflection occurs at areas where the optical fiber cable is connected by a connector or areas where the optical fiber is cut off.

Reflection level is often expressed by return loss.



Refer For detail on return loss, refer to page 10-15.

1.12 Notes Before Performing Measurement

This section explains points to note when measuring a communication system. The following points must be observed when performing measurement.

When Using AQ7261 / AQ7264 / AQ7265 / AQ7269

These modules perform measurement by using the same wavelength as that used for communications. Thus, if the optical fiber to be measured contains communication light, communications will be affected. Furthermore, measurement cannot be performed correctly by this instrument. So, the measurement environment (presence/absence of communication light) must be taken sufficiently into account when using these modules. For the wavelength used by the modules, refer to “Chapter 9 Specifications”.

The AQ7265 is available when the software version of the AQ7260 main frame is 2.00 or later; the AQ7269 is available when the software version of the AQ7260 main frame is 2.04 or later.

⚠ CAUTION	
	Special care must be taken when using these modules since devices connected to the system to be measured may be damaged depending on total power of the light.

- Special care must be taken not to allow communication failure. Should communication failure occur by mistake by the user, YOKOGAWA will not accept responsibility arising from that communication failure.
- The AQ7260 main frame can use AQ7265 module at the software version 2.00 or later.
- The AQ7260 main frame can use AQ7269 module at the software version 2.04 or later.

Procedure of checking software version, refer to page 10-5.

Furthermore, take care not to allow any external light to enter the instrument.

⚠ CAUTION	
	Entry of external light may result in damage to the instrument.

Chapter 2
BEFORE STARTING MEASUREMENT

2.1 Changing System Settings

This chapter explains how to change the following system settings.

- Changing the Display Language
- Changing the Trace Type
- Changing the Cursor Type
- Changing the Grid Setting
- Changing the Second Cursor Setting
- Changing the Trace Form Setting
- Changing the Distance Unit
- Changing the Distance Reference Mark Type
- Changing the Number of dB Display Digits
- Changing the Display Color
- Displaying the level value at the cursor
- Hiding the marker distance display
- Changing the Date/Time
- Changing the Lockout Setting
- Changing the Alarm Sound Setting
- Changing the Power Save Setting
- Changing the LCD Brightness
- Changing the Print Type
- Changing the Print Color
- Zooming the cursor distance display
- Changing the Fiber Module(MMF/SMF)

Displaying the Setting Change Window

This section explains how to display the window by which system settings can be changed.

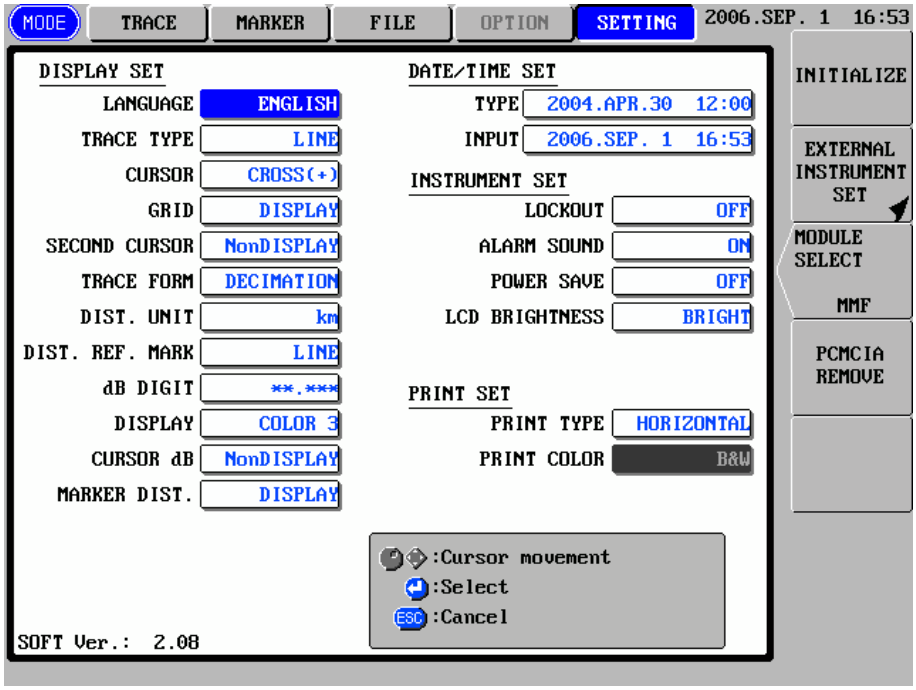
1. Make sure there is no measurement currently in progress.

Caution

If measurement is in progress, it is not possible to change system parameter settings.

2. Press [MODE] to locate the cursor to “SETTING”.

A window allowing you to change system settings will appear.



Changing Settings

This section explains how to change the setting for each parameter.

TIP

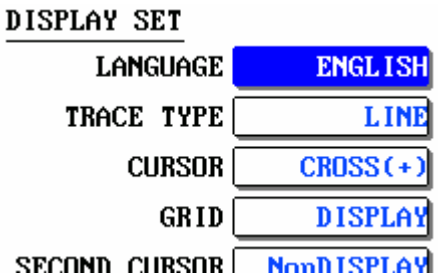
The system settings are retained in the internal memory even if the instrument is turned OFF. So, when the instrument is turned ON, the system settings in effect just before the instrument was turned OFF last time will be restored.

Changing the Display Language

The display language can be changed as explained below.

♦ Example: “ENGLISH” → “日本語”

1. Locate the cursor to “LANGUAGE” by using the rotary knob or the arrow key.



TIP

The cursor is already at “LANGUAGE” when the setting change window appears.

2. Press [ENTER].

A selection window will appear.

TIP

Selectable languages	日本語	Displays characters in Japanese.
	* ENGLISH	Displays characters in English.

*: Indicates the default setting.

3. **Locate the cursor to “日本語” by using the rotary knob or [▲] / [▼].**

4. **Press [ENTER] to register the change made to the language setting.**

Caution

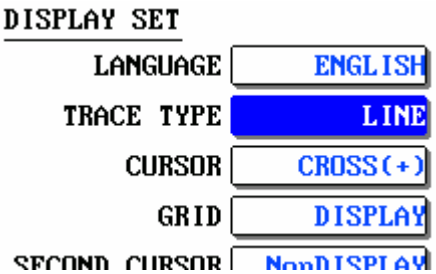
The change will not be registered if [ESC] is pressed instead of [ENTER].

Changing the Trace Type

The trace type can be changed as explained below.

♦ Example: “LINE” → “DOT”

1. Locate the cursor to “TRACE TYPE” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable trace types	*LINE	Displays the trace in line form.
	DOT	Displays the trace in dot form.

*: Indicates the default setting.

3. Locate the cursor to “DOT” by using the rotary knob or [▲] / [▼].

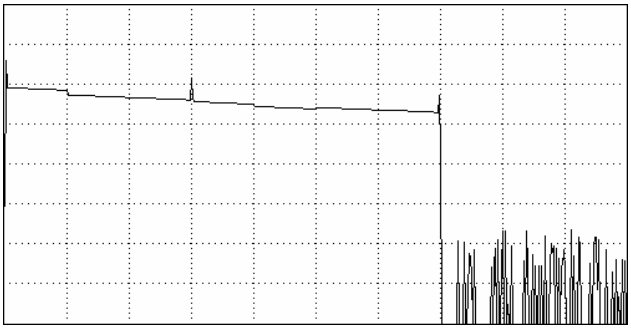
4. Press [ENTER] to register the change made to the trace type.

Caution

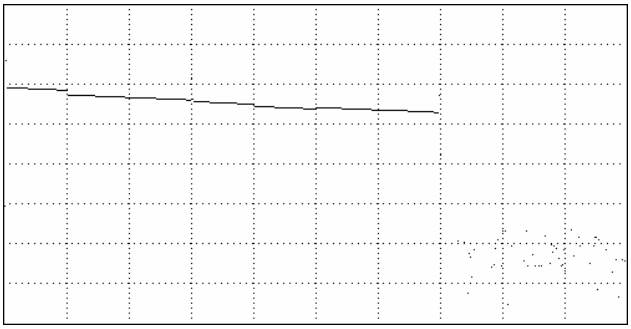
The change will not be registered if [ESC] is pressed instead of [ENTER].

TIP

When “LINE” is selected



When “DOT” is selected

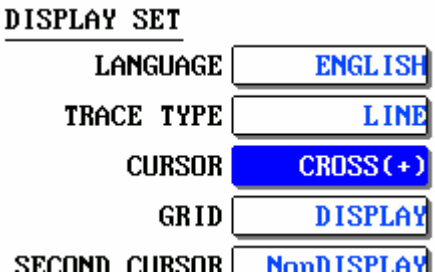


Changing the Cursor Type

The cursor type can be changed as explained below.

♦ Example: “CROSS(+)” → “LINE(|)”

1. Locate the cursor to “CURSOR” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable cursor types	*CROSS(+)	Displays the cursor by a cross (+).
	LINE(|)	Displays the cursor by a line (|).

*: Indicates the default setting.

3. Locate the cursor to “LINE(|)” by using the rotary knob or [▲] / [▼].

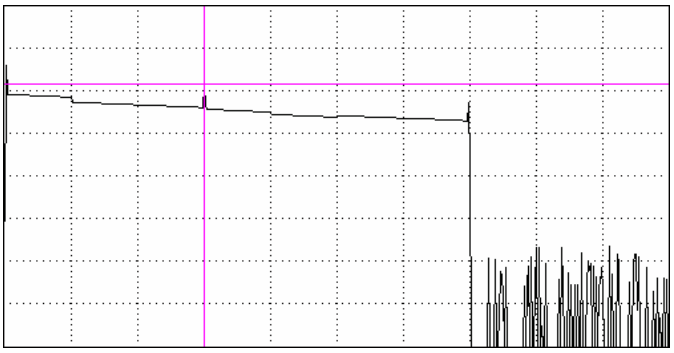
4. Press [ENTER] to register the change made to the cursor type.

Caution

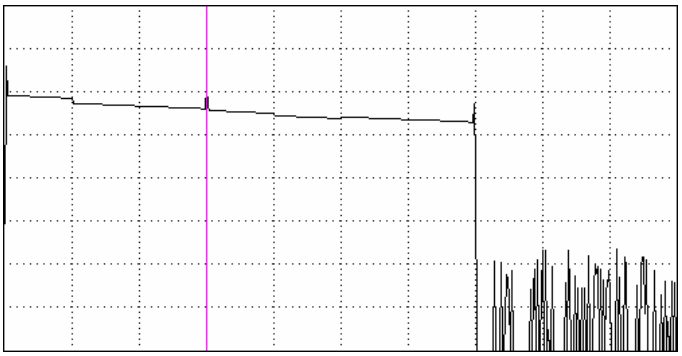
The change will not be registered if [ESC] is pressed instead of [ENTER].

TIP

When “CROSS(+)” is selected



When “LINE(|)” is selected

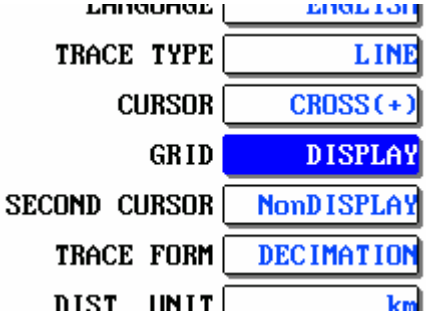


Changing the Grid Setting

The grid setting can be changed as explained below.

♦ Example: “DISPLAY” → “NonDISPLAY”

1. Locate the cursor to “GRID” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable grid settings	NonDISPLAY	Hides the grid.
	*DISPLAY	Shows the grid.

*: Indicates the default setting.

3. Locate the cursor to “NonDISPLAY” by using the rotary knob or [▲] / [▼].

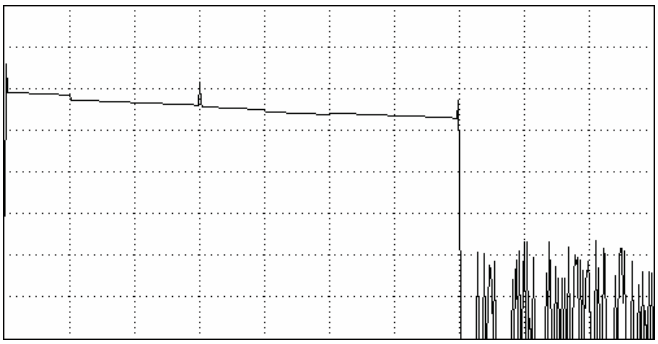
4. Press [ENTER] to register the change made to the grid setting.

Caution

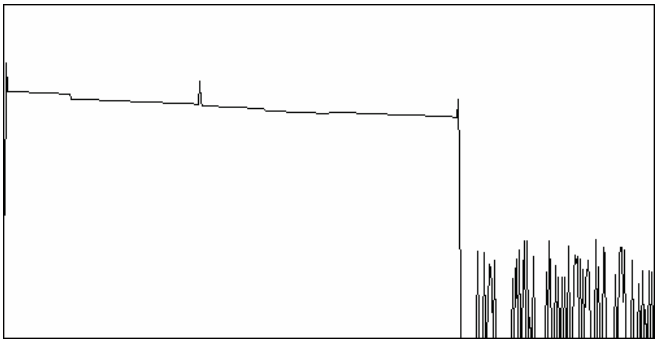
The change will not be registered if [ESC] is pressed instead of [ENTER].

TIP

When “DISPLAY” is selected



When “NonDISPLAY” is selected

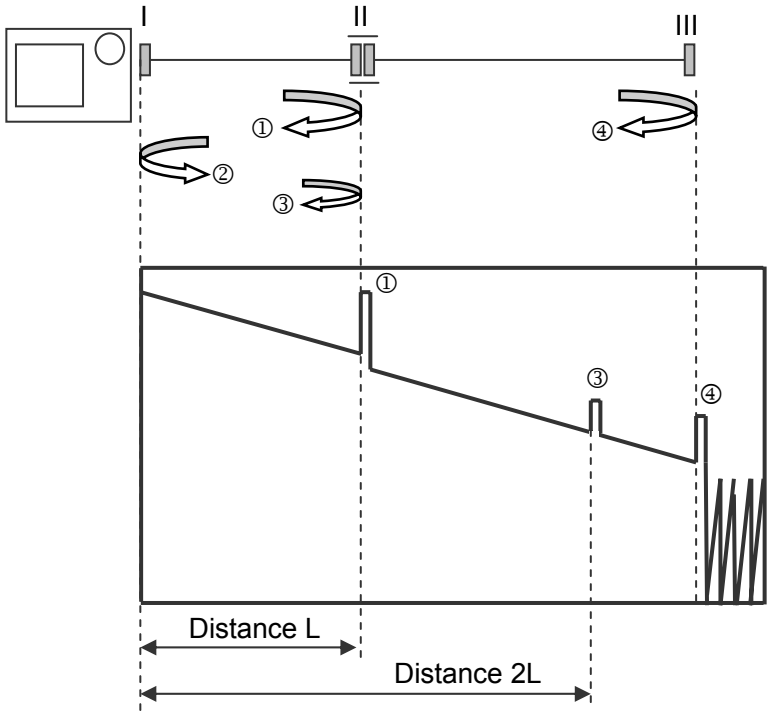


Changing the Second Cursor Setting

Before explaining how to change the setting, an explanation is given below about the second cursor.

The second cursor is used to check for the secondary reflection.

The secondary reflection makes an event look as if it were present in places where it is actually not.



Assuming that excessive reflection occurs at point II

Mechanism of generation of secondary reflection

A pulsed ray that is output at point I advances toward point II.

↓

The ray (①) reflecting on the spliced surface at point II reflects again on the spliced surface at point I and advances toward point II (②).

The instrument acquires ① as data.

↓

Due to the ray ②, a reflection ray (③) is generated again on the spliced surface at point II.

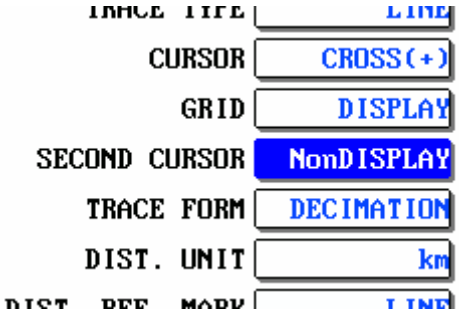
The instrument acquires ③ as data.

Since all the reflection rays (①, ③, ④) are measured by the instrument, ③ is also acquired as data in the same way as those that are actually generated, and is displayed. As a result, the secondary reflection makes an event look as if it were present in places where it is actually not.

The second cursor can be changed as explained below.

♦ Example: “NonDISPLAY” → “DISPLAY”

1. Locate the cursor to “SECOND CURSOR” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable second cursor settings	*NonDISPLAY	Hides the second cursor.
	DISPLAY	Shows the second cursor.

*: Indicates the default setting.

3. Locate the cursor to “DISPLAY” by using the rotary knob or [▲] / [▼].

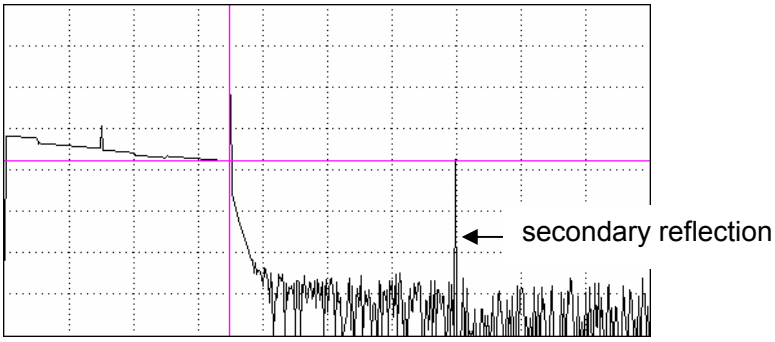
4. Press [ENTER] to register the change made to the second cursor.

Caution

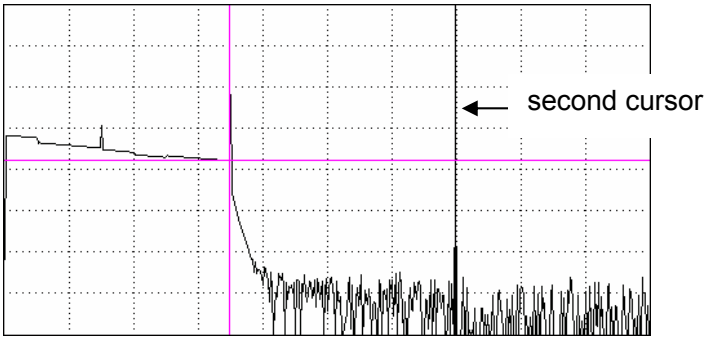
The change will not be registered if [ESC] is pressed instead of [ENTER].

TIP

When “NonDISPLAY” is selected



When “DISPLAY” is selected



The second cursor is displayed at a position twice as far as the distance from the zero point as the cursor.

Changing the Trace Form Setting

Before explaining how to change the setting, an explanation is given below about trace form.

This instrument can acquire data of maximum 60,000 points. However, since the number of dots on the LCD is limited, it is not possible to display all the acquired data at the same time. Therefore, the instrument employs methods to display only the selected data. The following four display methods are available.

- DECIMATION
- MAXIMUM
- MEAN
- ENVELOPE

Before explaining each display method, an explanation is given below about the data display section of the instrument. The instrument uses 500 dots (horizontal direction) on the LCD to display the acquired data. So, the data quantity per dot can be calculated as follows.

Data quantity per dot = Acquired data quantity / 500

If the data size is 60,000 points, the data quantity assigned per dot will be 120 points.

Refer For the method of changing the data size, refer to page 3-28.

The procedure to choose and display data (120 points) assigned for each dot is shown below for each display method.

DECIMATION

The data to be displayed on each dot is the first data of those assigned for each dot.

1st dot: Display the first data.

2nd dot: Display the 121st data.

•

•

•

499th dot: Display the 59761st data.

500th dot: Display the 59881st data.

However, the data on which the marker or the cursor is located and the data of reflection points are preferentially displayed.

MAXIMUM

The data to be displayed on each dot is the maximum reflection level value among the data assigned to each dot.

1st dot: Display the maximum value among the 1st to 120th data.

2nd dot: Display the maximum value among the 121st to 240th data.

-
-
-

499th dot: Display the maximum value among the 59761st to 59880th data.

500th dot: Display the maximum value among the 59881st to 60000th data.

MEAN

The data to be displayed on each dot is the mean value of all the data assigned to each dot.

1st dot: Displays the mean value among the 1st to 120th data.

2nd dot: Displays the mean value among the 121st to 240th data.

-
-
-

499th dot: Displays the mean value among the 59761st to 59880th data.

500th dot: Displays the mean value among the 59881st to 60000th data.

ENVELOPE

The data to be displayed on each dot is the maximum and minimum reflection level values among the data assigned for each dot by turns. The maximum and minimum values are linked by a straight line.

1st dot: Displays the maximum values among the 1st to 120th data.

2nd dot: Displays the minimum values among the 121st to 240th data.

-
-
-

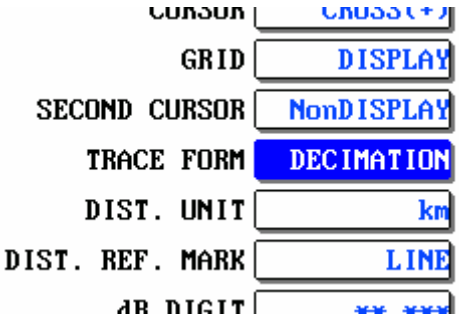
499th dot: Displays the maximum values among the 59761st to 59880th data.

500th dot: Displays the minimum values among the 59881st to 60000th data.

The trace form can be changed as explained below.

♦ Example: “DECIMATION” → “MAXIMUM”

1. Locate the cursor to “TRACE FORM” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable race forms	*DECIMATION
	MEAN
	MAXIMUM
	ENVELOPE

*: Indicates the default setting.

3. Locate the cursor to “MAXIMUM” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the trace form.

Caution

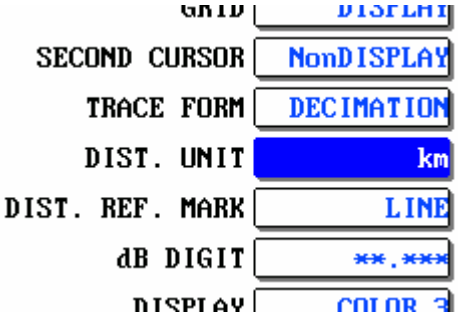
The change will not be registered if [ESC] is pressed instead of [ENTER].

Changing the Distance Unit

The distance unit can be changed as explained below.

♦ Example: “km” → “mile”

1. Locate the cursor to “DIST. UNIT” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable distance units	*km
	mile
	kf

*: Indicates the default setting.

3. Locate the cursor to “mile” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the distance unit.

Caution

The change will not be registered if [ESC] is pressed instead of [ENTER].

Changing the Distance Reference Mark Type

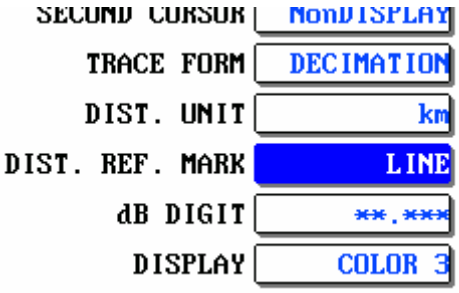
The distance reference mark type can be changed as explained below.

♦ Example: “LINE” → “ARROW”

Refer

For the method of changing the distance reference, refer to page 7-27.

1. Locate the cursor to “DIST. REF. MARK” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable mark types	*LINE
	ARROW

*: Indicates the default setting.

3. Locate the cursor to “ARROW” by using the rotary knob or [▲] / [▼].

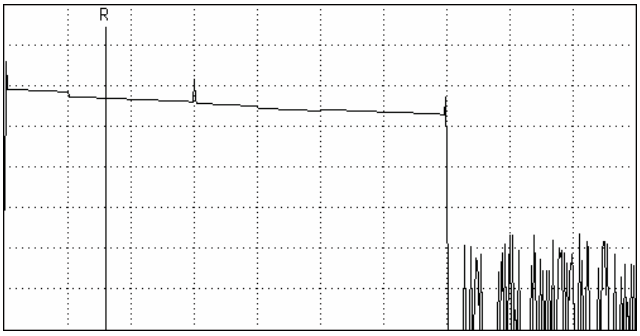
4. Press [ENTER] to register the change made to the distance reference mark type.

Caution

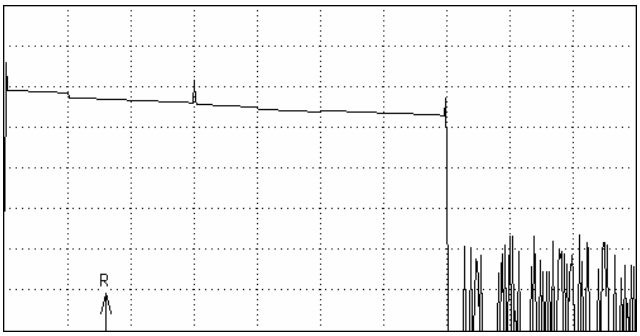
The change will not be registered if [ESC] is pressed instead of [ENTER].

TIP

When “LINE” is selected



When “ARROW” is selected

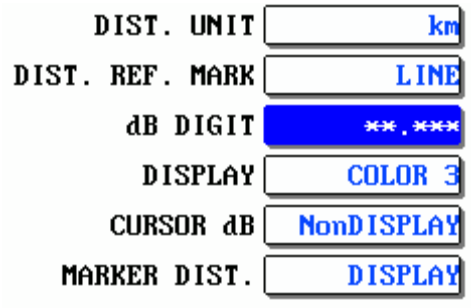


Changing the Number of dB Display Digits

The number of dB display digits can be changed as explained below.

♦ Example: "**.***" → "**.**"

1. Locate the cursor to "dB DIGIT" by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable dB digits	**.*	Displays dB with one decimal place.
	.	Displays dB with two decimal places.
	.	Displays dB with three decimal places.

*: Indicates the default setting.

3. Locate the cursor to ".**" by using the rotary knob or [▲] / [▼].**

4. Press [ENTER] to register the change made to the number of dB display digits.

Caution

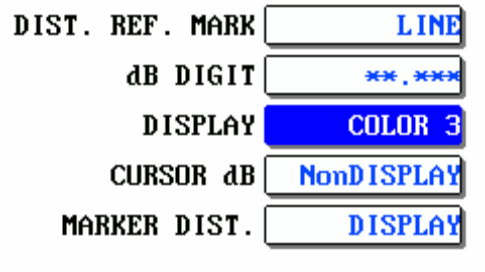
The change will not be registered if [ESC] is pressed instead of [ENTER].

Changing the Display Color

The display color can be changed as explained below.

♦ Example: “COLOR3” → “B&W”

1. Locate the cursor to “DISPLAY” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable display colors	*COLOR1
	COLOR2
	COLOR3
	B&W

*: Indicates the default setting.

3. Locate the cursor to “B&W” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the display color.

Caution

The change will not be registered if [ESC] is pressed instead of [ENTER].

Displaying the Level Value at the Cursor

The cursor dB display function displays the level value at the location of the cursor on the screen. This is convenient for checking such things as the amount of relative change of a level in a numerical format.

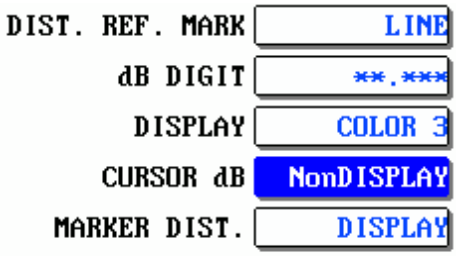
Caution

The cursor dB number is a value that is relative to the grid lines on screen. It does not indicate absolute values such as the amount of reflection or optical input level.

The following describes the procedure for showing or hiding the cursor dB display.

♦ Example: “DISPLAY” → “NonDISPLAY”

1. Move the cursor to “CURSOR dB” by using the rotary knob or the arrow key.



2. Press [ENTER]. A selection window will appear.

TIP

Selectable cursor dB settings	*NonDISPLAY	Hides the cursor dB.
	DISPLAY	Shows the cursor dB.

*: Indicates the default setting.

3. Move the cursor to “DISPLAY” by using the rotary knob or [▲] / [▼].

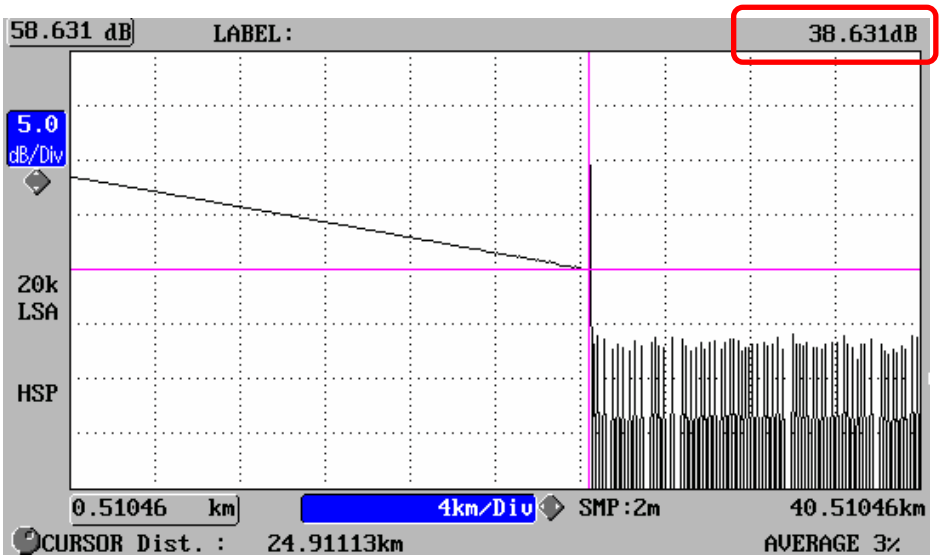
4. Press [ENTER] to register the change made to the cursor dB display.

Caution

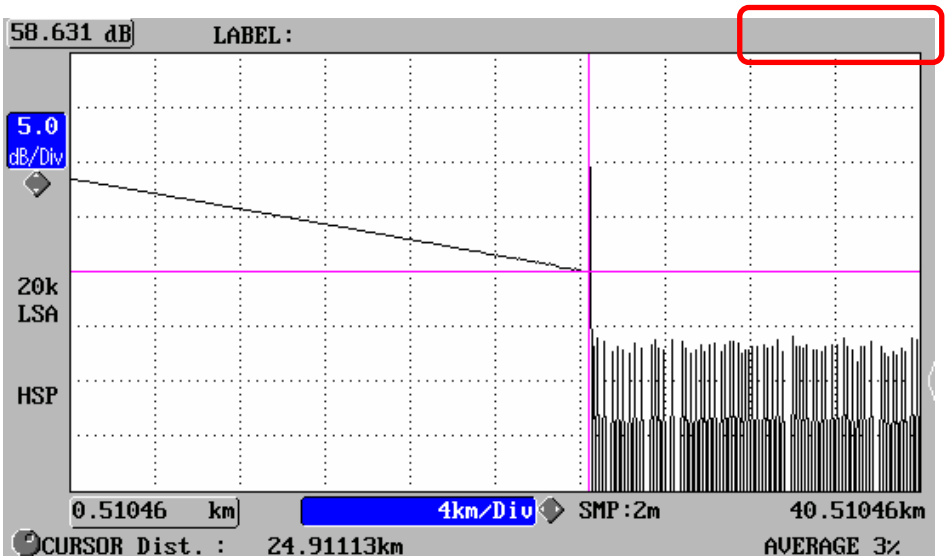
The change will not be registered if [ESC] is pressed instead of [ENTER].

TIP

When “DISPLAY” is selected



When “NonDISPLAY” is selected



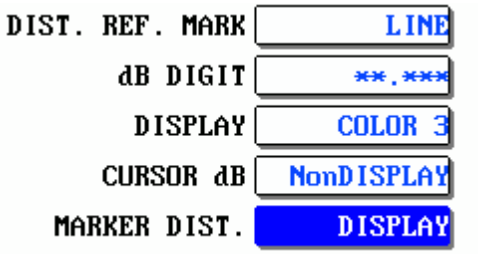
Hiding the Marker Distance Display

When markers are displayed, the distance position of each marker is shown in the upper right part of the waveform screen by default, but this can be turned ON and OFF. It can be helpful to turn the marker distance/position display OFF in cases such as if it overlaps with a waveform.

The following describes the procedure for turning the marker distance display in the upper right part of the screen OFF.

♦ Example: “DISPLAY” → “NonDISPLAY”

1. Move the cursor to “MARKER DIST.” by using the rotary knob or the arrow key.



2. Press [ENTER]. A selection window will appear.

TIP

Selectable marker distance settings	*NonDISPLAY	Hides the marker distance in the upper right part.
	DISPLAY	Shows the marker distance in the upper right part.

*: Indicates the default setting.

3. Move the cursor to “Non DISPLAY” by using the rotary knob or [▲] / [▼].

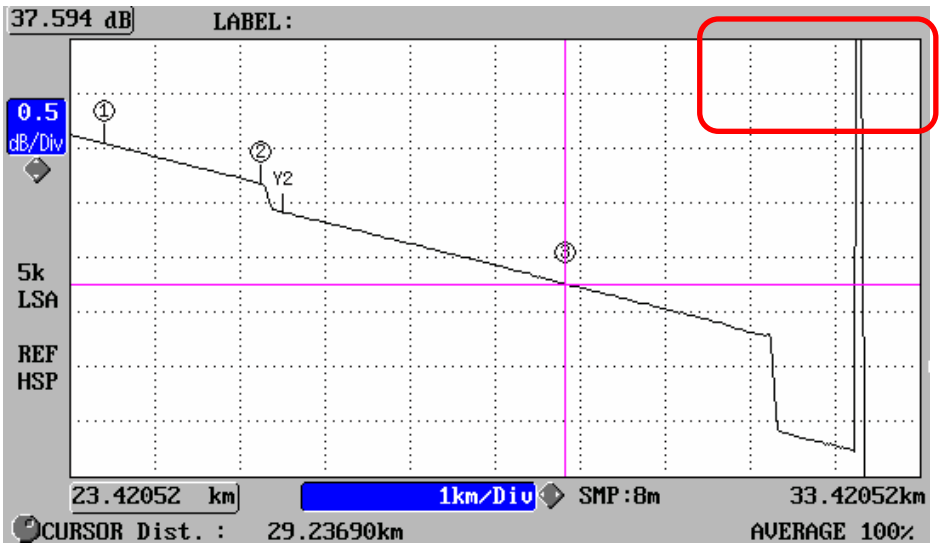
4. Press [ENTER] to register the change made to the marker distance display.

Caution

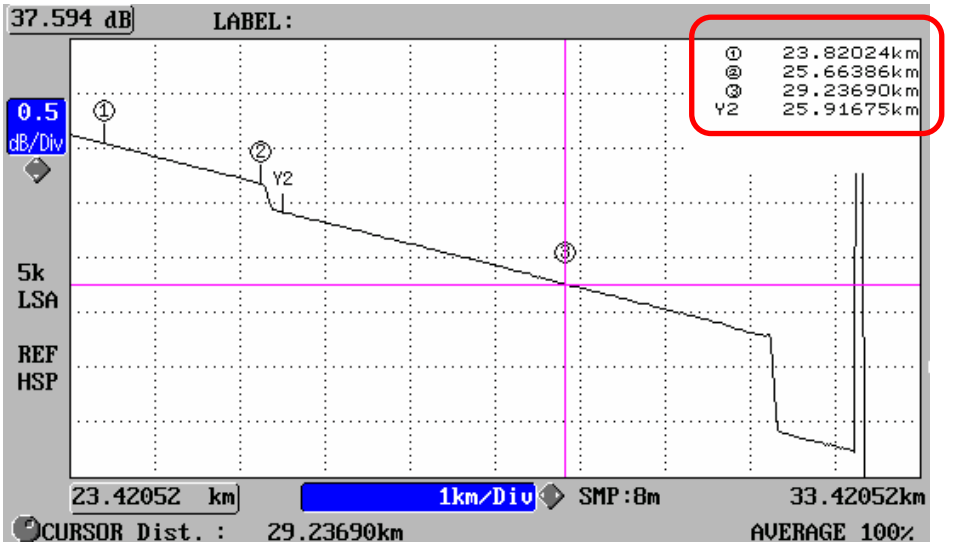
The change will not be registered if [ESC] is pressed instead of [ENTER].

TIP

When “NonDISPLAY” is selected



When “DISPLAY” is selected



Changing the Date/Time Display Format

The date/time display format can be changed as explained below.

♦ Example: “2004.APR.30 12:00” → “2004.4.30 12:00”

1. Locate the cursor to “TYPE” by using the rotary knob or the arrow key.

2. Press [ENTER].

A selection window will appear.

TIP

Selectable display formats	APR.30.2004 12:00	Displays the date/time in order of MONTH (alphabet), DAY and YEAR.
	4.30.2004 12:00	Displays the date/time in order of MONTH (numeric), DAY and YEAR.
	30.APR.2004 12:00	Displays the date/time in order of DAY, MONTH (alphabet) and YEAR.
	30.4.2004 12:00	Displays the date/time in order of DAY, MONTH (numeric) and YEAR.
	*2004.APR.30 12:00	Displays the date/time in order of YEAR, MONTH (alphabet) and DAY.
	2004.4.30 12:00	Displays the date/time in order of YEAR, MONTH (numeric) and DAY.
	NonDISPLAY	Hides the date/time.

*: Indicates the default setting.

The date/time displayed in the selection window is an example only to show how it will look, not the actual date/time.

The date/time can be changed in the [INPUT] field.

3. Locate the cursor to “2004.4.30 12:00” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the date/time display format.

The change will not be registered if [ESC] is pressed instead of [ENTER].

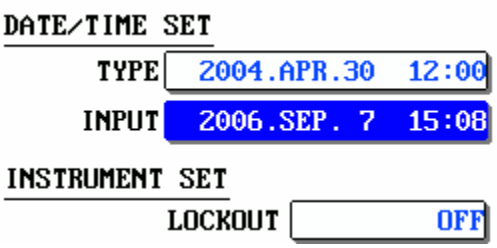
The selected display format will be reflected on the current time (displayed in the upper right corner of the screen), and date/time for the file list.

Changing the Date/Time

The date/time can be changed as explained below.

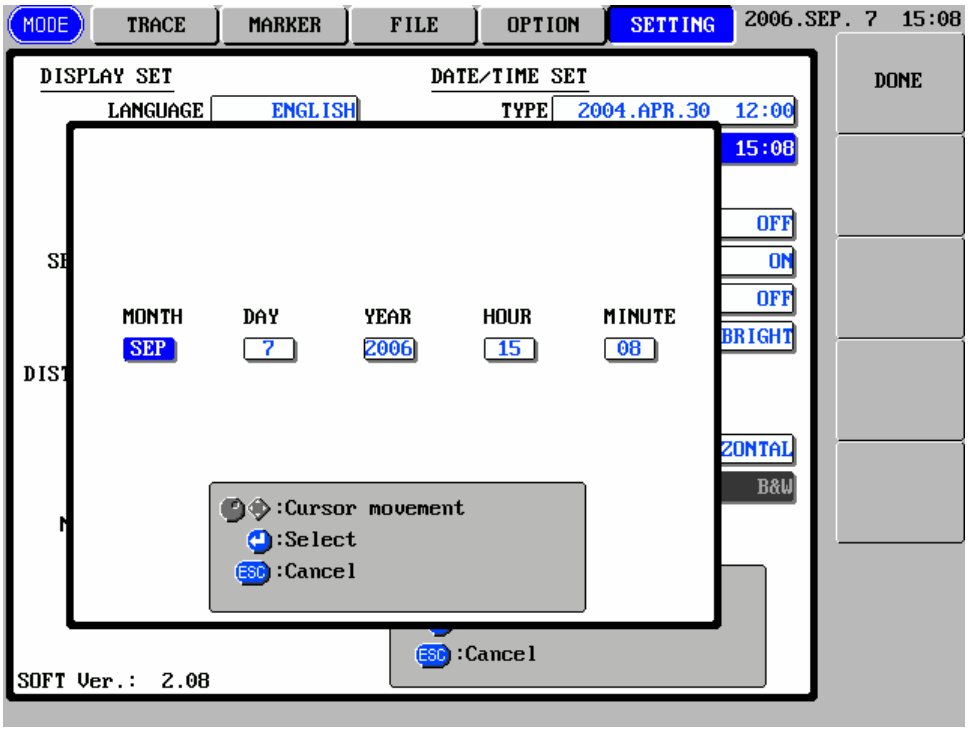
♦ Example: “2006.SEP.7 15:08” → “2007.SEP.7 15:50”

1. Locate the cursor to “INPUT” by using the rotary knob or the arrow key.



2. Press [ENTER].

The following window will appear.



3. Change the year.

3-1. Locate the cursor to "YEAR" by using the rotary knob or [◀] / [▶].

3-2. Press [ENTER].

A selection window will appear.

3-3. Locate the cursor to "2007" by using the rotary knob or [▲] / [▼].

3-4. Press [ENTER] to register the change made to the year.

4. Change the minute.

4-1. Locate the cursor to "MINUTE" by using the rotary knob or [◀] / [▶].

4-2. Press [ENTER].

A selection window will appear.

4-3. Locate the cursor to "50" by using the rotary knob or [▲] / [▼].

4-4. Press [ENTER] to register the change made to the minute.

TIP

The month, day and hour can be changed in the same way as year and minute.

5. Press [F1](DONE) to register the change made to the date/time .

Caution

The change will not be registered if [ESC] is pressed instead of [ENTER].

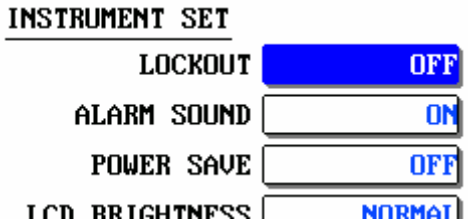
Changing the Lockout Setting

The lockout function is to prevent the preset measurement conditions and system settings being changed by other operators. If this function is enabled, the measurement conditions and system settings cannot be changed.

The lockout setting can be changed as explained below.

♦ Example: “OFF” → “ON” (setting the lockout code to “7260”)

1. Locate the cursor to “LOCKOUT” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

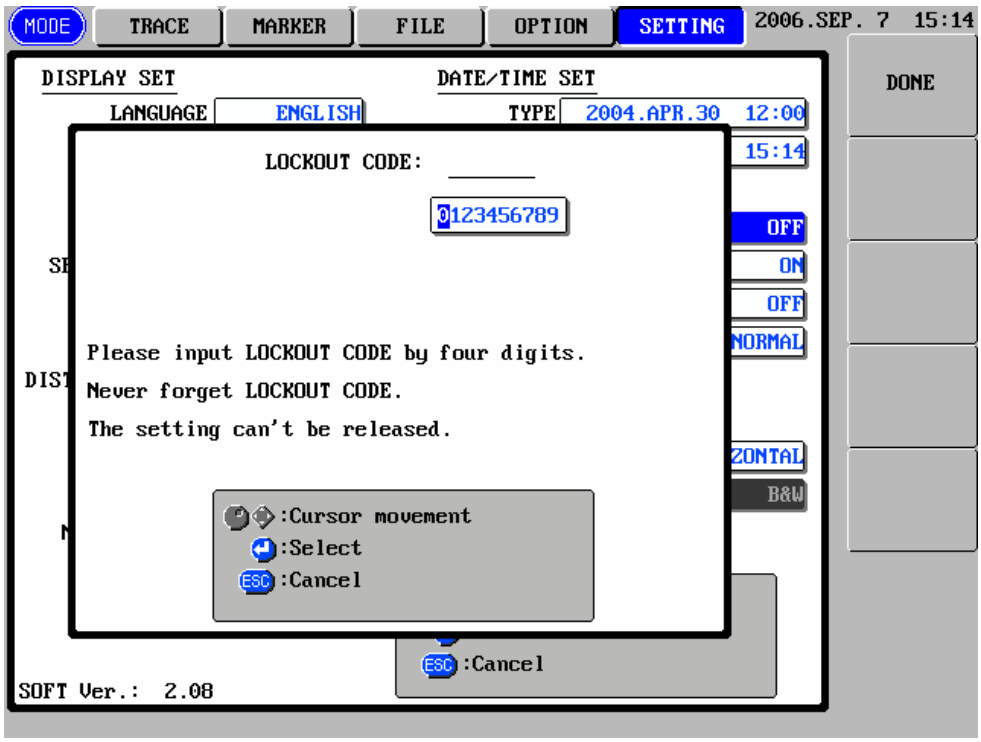
Selectable lockout settings	*OFF	Disables the lockout function.
	ON	Enables the lockout function.

*: Indicates the default setting.

3. Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].

4. Press [ENTER].

The following window will appear.



5. Enter a lockout code (4-digit code) as follows. In this example, "7260" is entered.

5-1 Locate the cursor to "7" by using the rotary knob or [◀] / [▶].

5-2 Press [ENTER].

5-3 Locate the cursor to "2" by using the rotary knob or [◀] / [▶].

5-4 Press [ENTER].

5-5 Locate the cursor to "6" by using the rotary knob or [◀] / [▶].

5-6 Press [ENTER].

5-7 Locate the cursor to "0" by using the rotary knob or [◀] / [▶].

5-8 Press [ENTER].

5-9 Press the [F1](DONE) key.

Caution

The lockout code must be a 4-digit number.

6. Enter the same lockout code again.

Enter it according to steps 5-1 to 5-9.

Caution

- The lockout function will be enabled when the same lockout code is entered at both steps 5 and 6.
- Do not forget the lockout code. It will be required when disabling the function.

Disabling the Lockout Function

1. **Perform steps 1 and 2.**
2. **Select "OFF" in the selection window.**
3. **Enter the same lockout code.**
4. **Press the [F1] (DONE) key.**

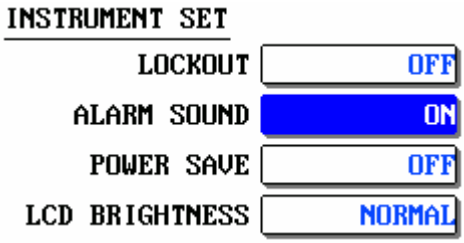
Changing the Alarm Sound Setting

If this setting is enabled (ON), the buzzer will sound when a warning message is displayed.

The alarm sound setting can be changed as explained below.

♦ Example: "ON" → "OFF"

1. Locate the cursor to "ALARM SOUND" by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable alarm sound settings	OFF	Disables the buzzer.
	*ON	Enables the buzzer.

*: Indicates the default setting.

3. Locate the cursor to "OFF" by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the alarm sound setting.

Caution

The change will not be registered if [ESC] is pressed instead of [ENTER].

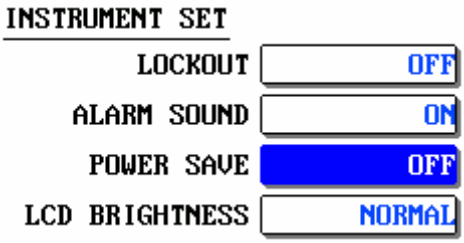
Changing the Power Save Setting

The power save function is to save power consumption by turning OFF the LCD display's backlight automatically when the instrument is ON but not operated for a certain period of time.

The power save setting can be changed as explained below.

♦ Example: "OFF" → "3min"

1. Locate the cursor to "POWER SAVE" by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable power save settings	*OFF	Disables the power save function.
	30sec	Enables the power save function if no keys are pressed for 30 seconds.
	1min	Enables the power save function if no keys are pressed for 1 minute.
	3min	Enables the power save function if no keys are pressed for 3 minutes.
	5min	Enables the power save function if no keys are pressed for 5 minutes.
	10min	Enables the power save function if no keys are pressed for 10 minutes.
	20min	Enables the power save function if no keys are pressed for 20 minutes.

*: Indicates the default setting.

3. **Locate the cursor to “3min” by using the rotary knob or [▲] / [▼].**

4. **Press [ENTER] to register the change made to the power save setting.**

Caution

The change will not be registered if [ESC] is pressed instead of [ENTER].

TIP

The screen becomes darker when the power save function is ON.

Disabling the Power Save Function

1. **Press any key.**

Changing the LCD Brightness

Ease of reading the LCD display varies considerably with its brightness.

The LCD brightness can be changed as explained below.

♦ Example: “NORMAL” → “DARK”

TIP

In general, each brightness mode has the following features.

BRIGHT

For outdoor, daytime, or other use.

The screen is easy to see even when the surroundings are light.

However, this mode consumes a lot of power.

When using the instrument by the battery pack only, always pay attention to the remaining power of the battery pack.

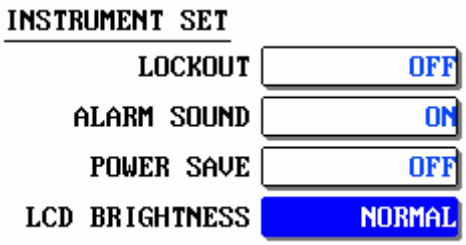
DARK

For indoor or other use.

It can be used when the surroundings are dark.

When operating the instrument by the battery pack only, it can be operated continuously and longer than “BRIGHT”.

1. Locate the cursor to “LCD BRIGHTNESS” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable LCD brightness levels	BRIGHT
	*NORMAL
	DARK

*: Indicates the default setting.

3. Locate the cursor to “DARK” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the LCD brightness.

Caution

The change will not be registered if [ESC] is pressed instead of [ENTER].

Changing the Print Type

The print type can be changed as explained below.

♦ Example: “HORIZONTAL” → “SCREEN”

1. Locate the cursor to “PRINT TYPE” by using the rotary knob or the arrow key.

2. Press [ENTER].

A selection window will appear.

TIP

Selectable print types	*HORIZONTAL	Prints along the print direction. The mode, function, time and guidance will not be printed.
	VERTICAL	Prints across the print direction. The mode, function, time and guidance will not be printed.
	SCREEN	Prints across the print direction. All the pieces of information displayed in the screen is printed.

*: Indicates the default setting.

3. Locate the cursor to “SCREEN” by using the rotary knob or [▲] / [▼].

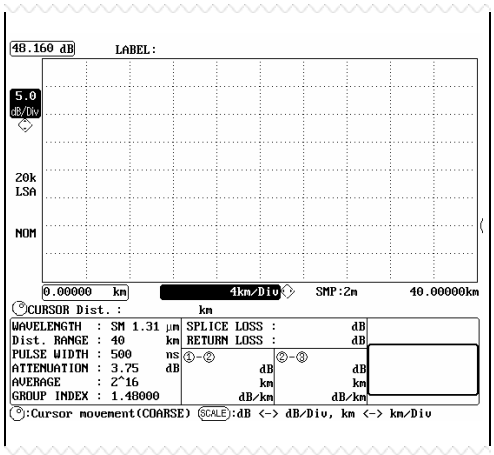
4. Press [ENTER] to register the change made to the print type.

Caution

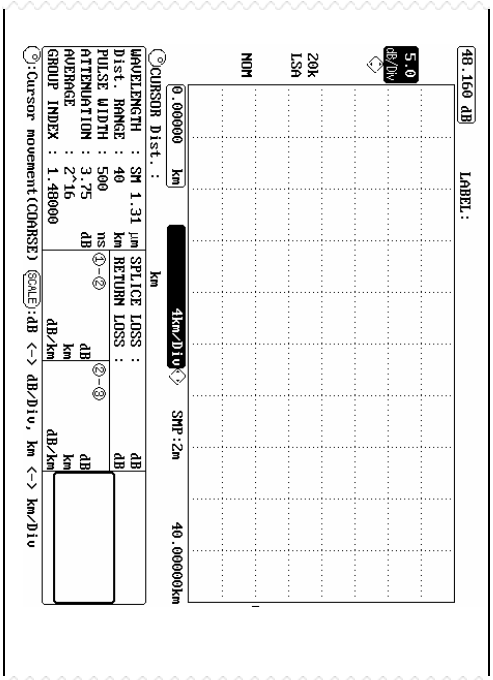
The change will not be registered if [ESC] is pressed instead of [ENTER].

TIP

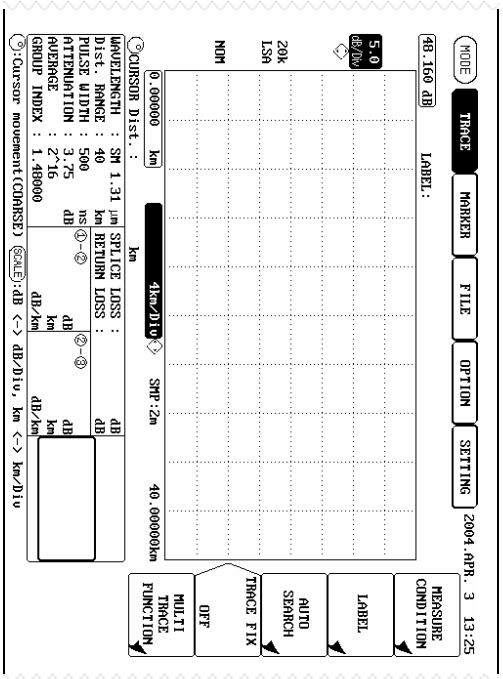
When “HORIZONTAL” is selected



When “VERTICAL” is selected



When “SCREEN” is selected



Changing the Print Color

The print color can be changed as explained below.

♦ Example: “B&W” → “DISPLAY”

Caution

Selection of print color is not possible if an expansion unit has been set in the printer setting. Only black & white print is possible (B&W) if an expansion unit has been set.

Refer

For the method for making printer settings, refer to page 8-6, 8-18.

1. Locate the cursor to “PRINT COLOR” by using the rotary knob or the arrow key.

2. Press [ENTER].

A selection window will appear.

TIP

Selectable Print colors	DISPLAY
	B&W

3. Locate the cursor to “DISPLAY” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the print color.

Caution

The change will not be registered if [ESC] is pressed instead of [ENTER].

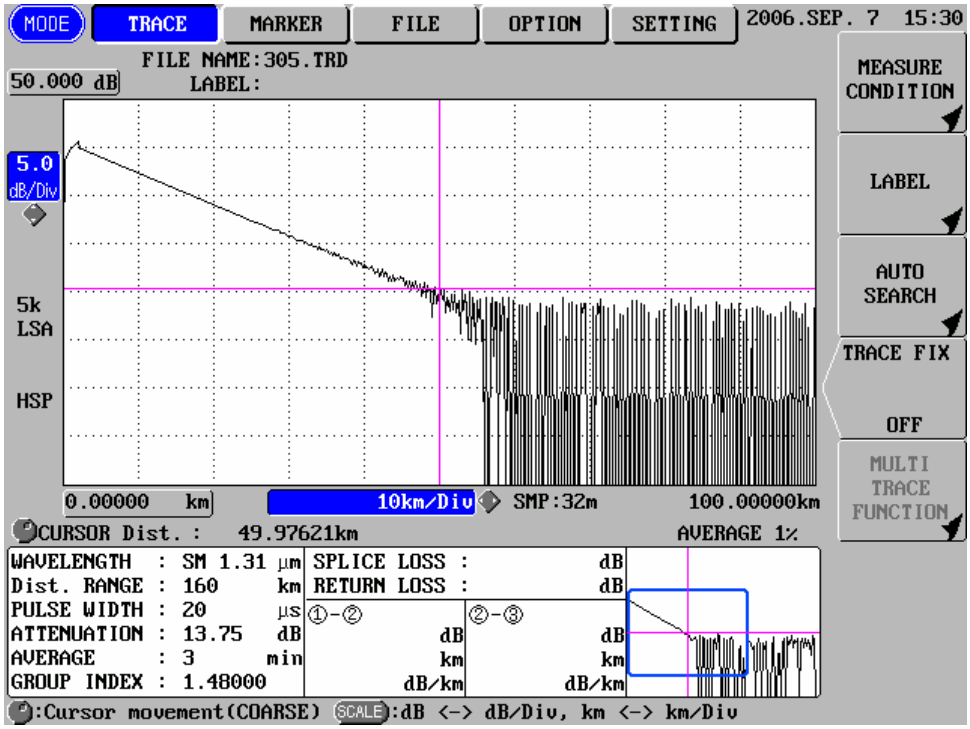
Zooming the Cursor Distance Display

You can zoom the cursor distance display that is shown after auto-detection.
This function is convenient when you only want to check the distance to the point of fiber disconnection.

The following describes the procedure for zooming (changing the information display of) the cursor distance display.

♦ Example: Changing information display; “Total information” → “Cursor distance.”

1. **Check that measurement is stopped and a waveform is displayed.**
   If a waveform is not displayed, execute measurement or load a waveform file.
2. **Press [MODE], move the cursor to TRACE mode, then press [F3] (AUTO SEARCH).**



3. Press [F3] (INFO. DISP.). A selection window will appear.

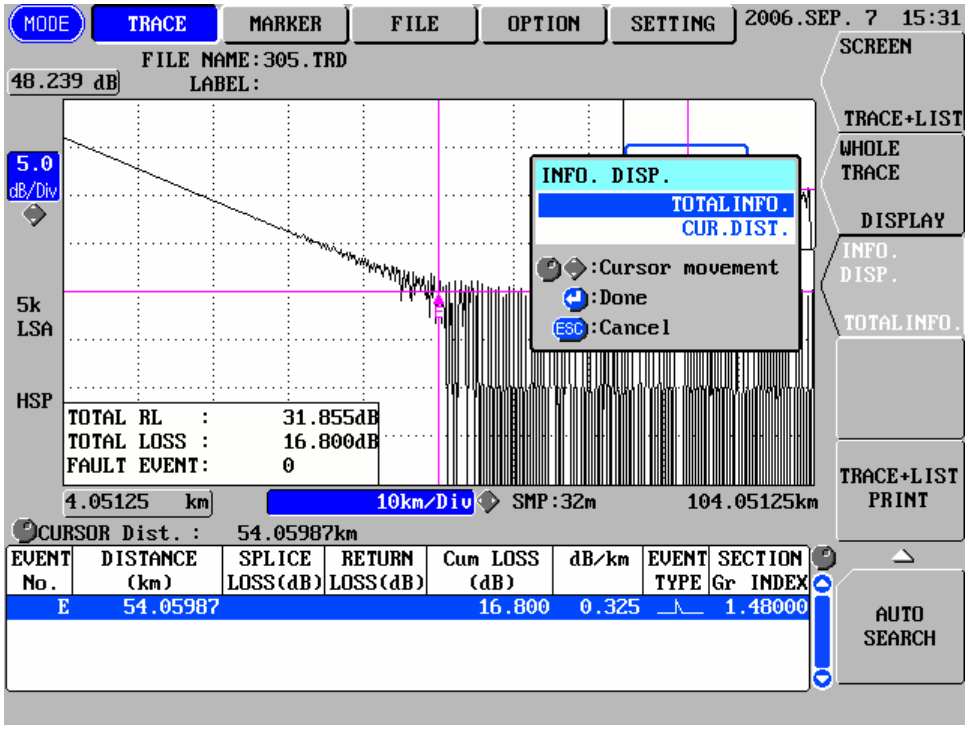
TIP

Selectable Information display	*Total information
	Cursor distance

*: Indicates the default setting.

Caution

If F1 (SCREEN) is TRACE or LIST, select TRACE+LIST. See P3-105 for how to switch screens.



4. Move the cursor to "CUR. DIST." by using the rotary knob or [▲] / [▼].

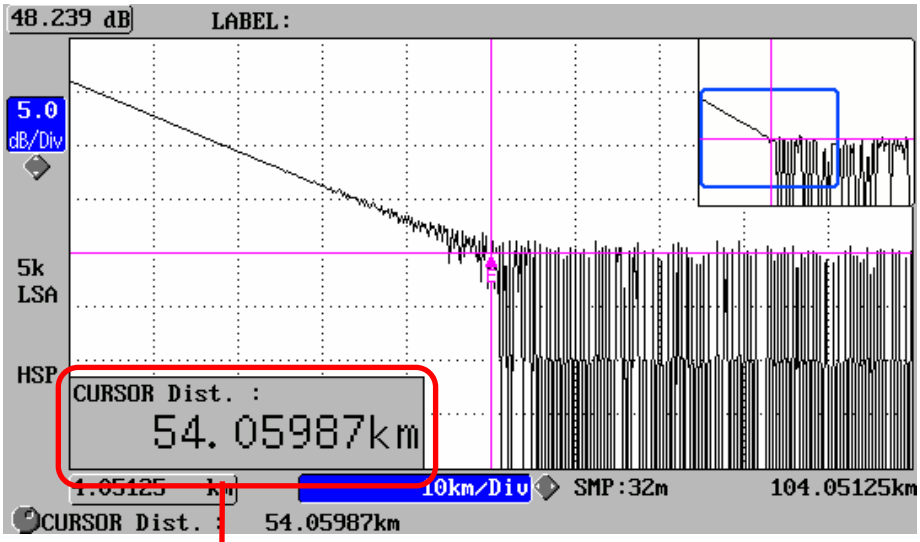
5. Press [ENTER] to register the change made to the information display. The cursor distance is zoomed in the information display area.

Caution

The change will not be registered if [ESC] is pressed instead of [ENTER].

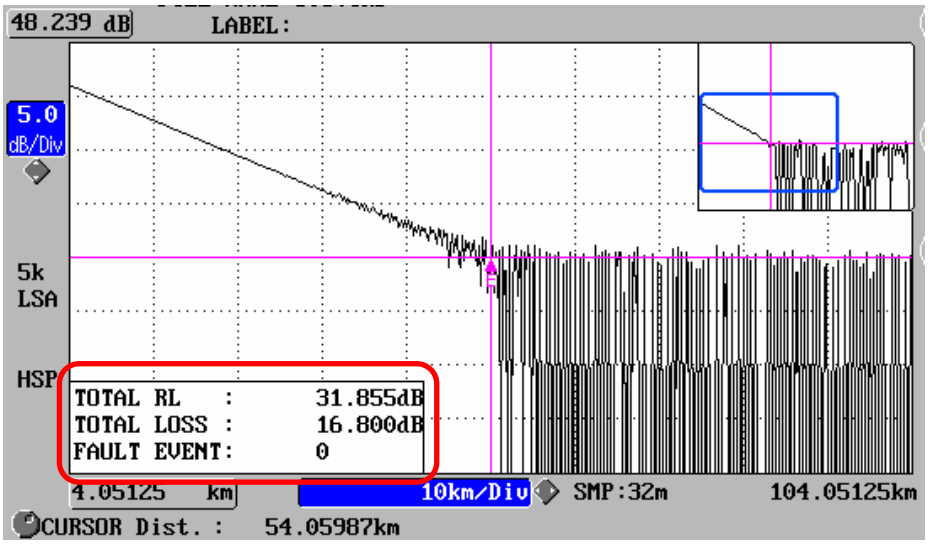
TIP

When “CUR. DIST.” is selected



Distance from distance origin to cursor (zoomed)

When “TOTAL INFO.” is selected



Changing the fiber module (MMF/SMF)

The AQ7269 Optical Module is equipped with the following two fiber modules.

- Multi mode fiber module (MMF)
- Single mode fiber module (SMF)

Caution When the AQ7269 Optical Module is used, it is necessary to make settings for the fiber module.

The fiber module setting can be changed as explained below.

♦ Example: "MMF(0.85µm/1.30µm)" → "SMF(1.31µm/1.55µm)"

1. Make sure there is no measurement currently in progress.

Caution If measurement is in progress, it is not possible to change system parameter settings.

2. Press [MODE] to move the cursor to "SETTING".

A window allowing you to change system settings appears.

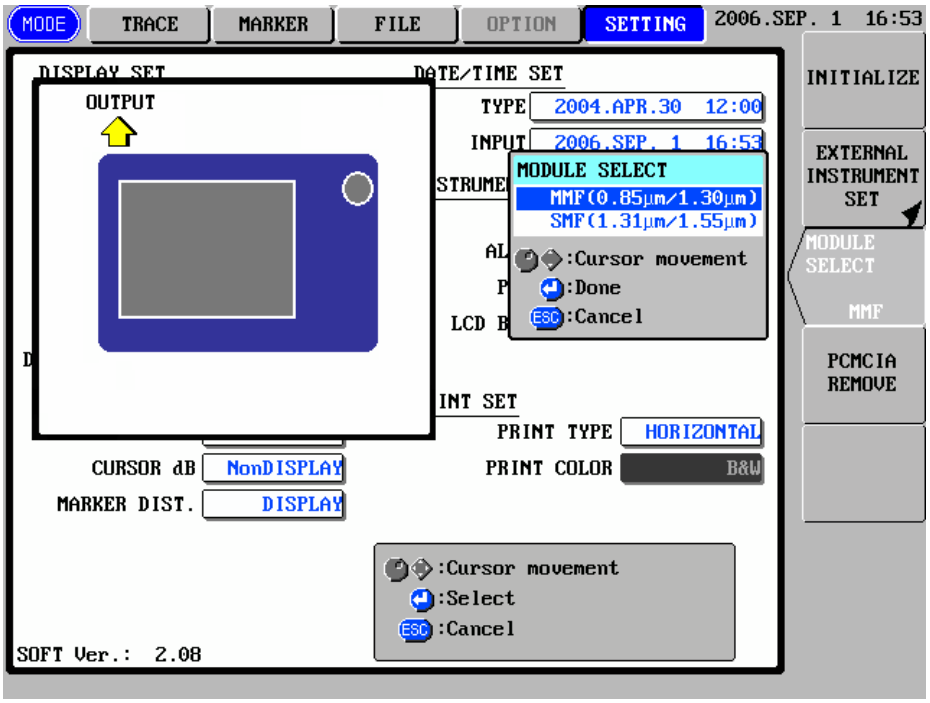
3. Press [F3](MODULE SELECT).

A selection window appears.

TIP

Selectable Module select	*MMF(0.85µm/1.30µm)
	SMF(1.31µm/1.55µm)

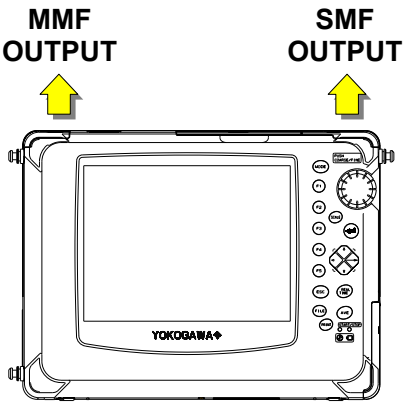
*: Indicates the default setting.



4. Move the cursor to "SMF(1.31µm/1.55µm)" by using the rotary knob or [▲] / [▼].

Caution

The output port changes when the fiber module is changed.



5. Press [ENTER] to register the change made to the fiber module.

Caution

The change will not be registered if [ESC] is pressed instead of [ENTER].

TIP

When the fiber module is changed, the following measurement conditions are applied.

Wavelength	0.85μm@MMF, 1.31μm@SMF
Auto set	Auto Range
Dist. Range	5km@MMF, 40km@SMF
Pulse width	100ns@MMF, 500ns@SMF
Attenuation	5.00dB@MMF, 2.50dB@SMF
Ave condition	Set value
Ave interval (times)	Set value
Group index	1.48000
Data size	Set value
Average method	Set value
Auto saving	Set value
Event search	Set value
Approx. method	Set value
Backscatter	-32.00dB@MMF, -50.00dB@SMF
Splice loss	Set value
Return loss	Set value
End of fiber	Set value
Filter	Set value
Plug check	Set value
Ave. continue	OFF
Multi wl measure	OFF

Refer

For the measurement conditions, refer to page 3-9.

Restoring the Default System Settings

This section explains how to restore the default settings for all the system parameters.

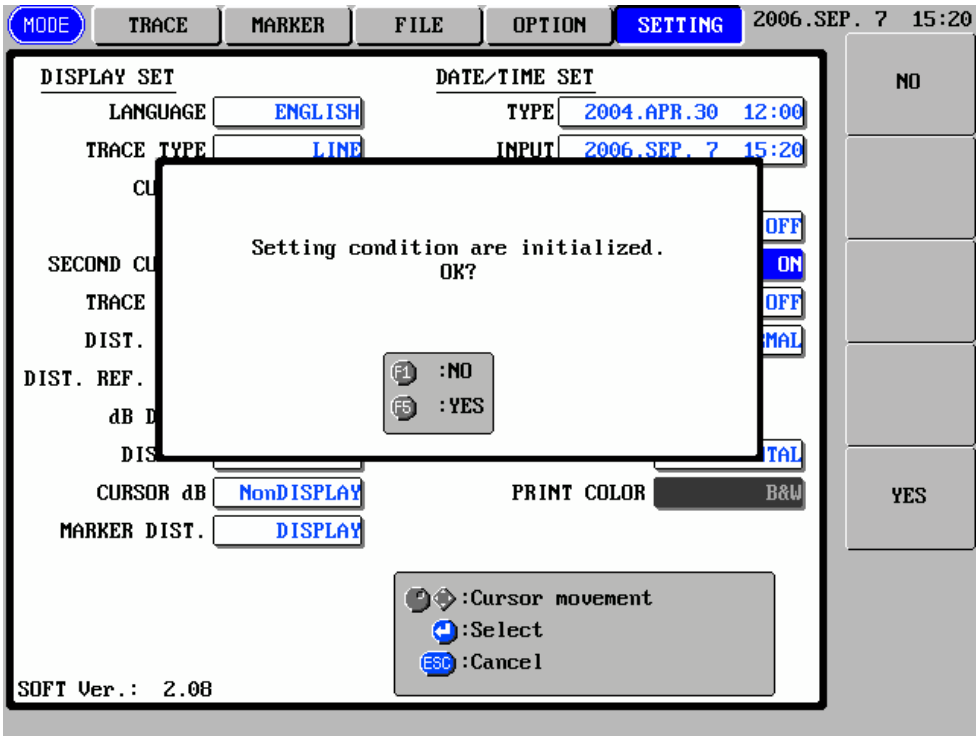
1. Display the setting change window.

Refer

For the method of displaying the setting change window, refer to page 2-3.

2. Press [F1](INITIALIZE).

The following window will appear.



3. Press [F5](YES) to restore the default system settings.

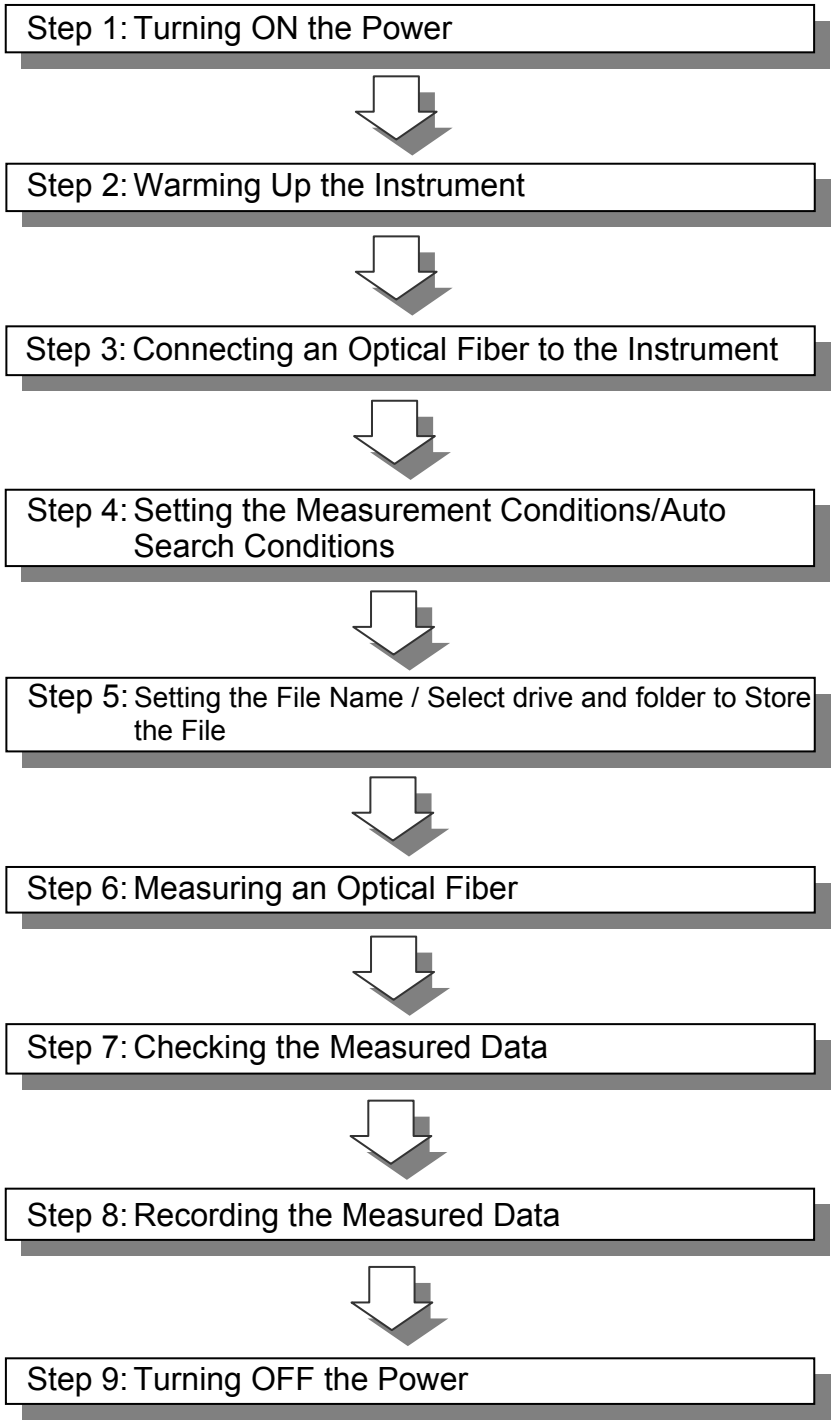
TIP

The display language and date/time will remain unchanged.

Chapter 3
PERFORMING MEASUREMENTS

3.1 Flow of Measurement Steps

This section explains the flow of optical fiber measurement.



⚠ WARNING	
	Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

3.2 Turning ON the Power [Step 1]

This section explains how to turn ON the power to the instrument.

Caution

If the instrument has been stored outside the operating temperature range, do not turn ON the power immediately. A temperature sensor is provided inside the instrument. If the internal temperature is either too high or too low, a warning message will appear, so take required action according to the message. If the required actions are not taken, the power will be turned OFF forcibly to prevent damage to the instrument. A similar message may also appear if the instrument is operated at high or low temperatures.

When Using AC Power

Caution

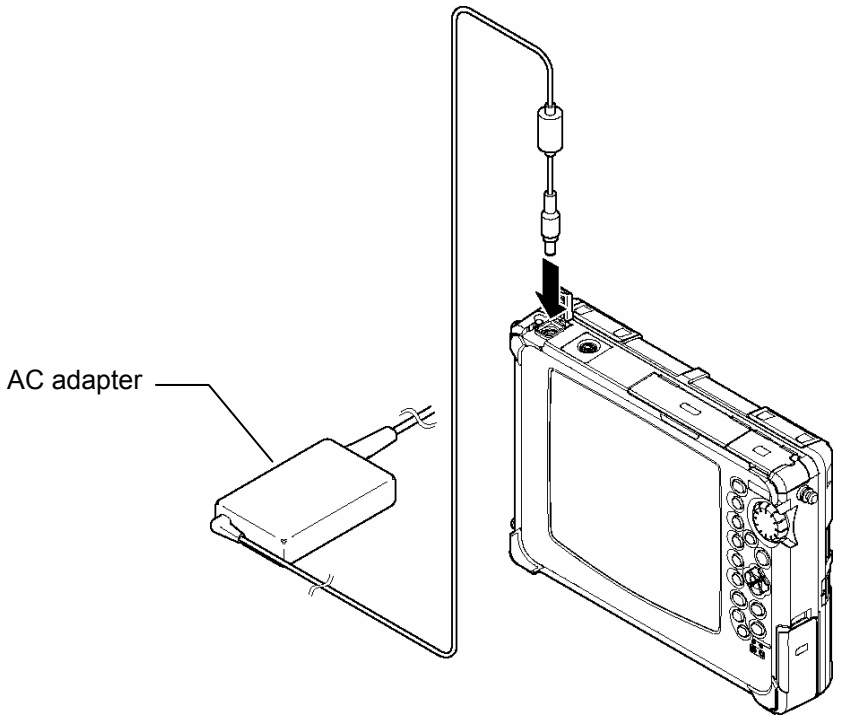
- If you are going to use AC power to operate the instrument, the battery pack must be removed from the instrument.
- Using AC adapter is only indoors (0 to 40 °C). Don't use outdoors.

Refer

For the method of removing the battery pack, refer to page 1-23.

1. **Read the "Safety Precautions" given at the beginning of this manual thoroughly to ensure safety.**

2. **Connect the dedicated AC adapter to the instrument.**



3. **Insert the AC adapter's power plug into an AC power outlet.**

4. **Press the power switch located on the top of the instrument to turn ON the power.**

TIP

The POWER LED will be lit while the power to the instrument is ON.

When Using the Battery Pack

Caution

- To prevent trouble with the battery pack, check its appearance periodically for damage, such as cracks and deformation, and battery fluid leakage.
- If the charged battery pack is stored for a long period of time, the operating time will be shortened due to natural discharge.
- To prevent over discharge, the battery pack must be charged periodically (every other month).
- Charging of the battery pack must be performed at temperatures of 5°C to 35°C. Charging outside this temperature range may not only deteriorate the battery pack's performance or shorten its life, but in the worst case may also prevent charging.
- If you are not going to use the instrument for a long period of time, the battery pack must be removed from the instrument. The battery pack must be stored in an area of low humidity and at a temperature between –20°C and +60°C.

Refer

For the method of charging the battery pack, refer to page 1-27.

1. **Read the "Safety Precautions" given at the beginning of this manual thoroughly to ensure safety.**

2. **Press the power switch located on the top of the instrument to turn ON the power.**

TIP

- The POWER LED will be lit while the power to the instrument is ON.
- The remaining power in the battery pack can be seen on the power indicator located in the lower right corner of the screen.

3.3 Warming Up the Instrument [Step 2]

After the instrument is powered ON (Step 1), warm up the instrument for 30 minutes to stabilize it.

TIP

Warm-up operation will enable acquisition of more accurate measurement data.

3.4 Connecting an Optical Fiber to the Instrument [Step 3]

This section explains how to connect the optical fiber to be measured to the instrument.

Cleaning the Optical Connector and Adapter

1. Check the type of the optical adapter.

Before cleaning the optical connector and adapter, make sure that the connector of the optical fiber to be measured has the same type as that of the optical adapter. If not, replace the optical adapter with one of the same type.

Refer For the method of replacing the optical adapter, refer to page 1-20.

2. Clean the optical connector and adapter.

Refer For the method of cleaning the optical connector and adapter, refer to pages 1-9 and 1-11.

Connecting the Optical Fiber

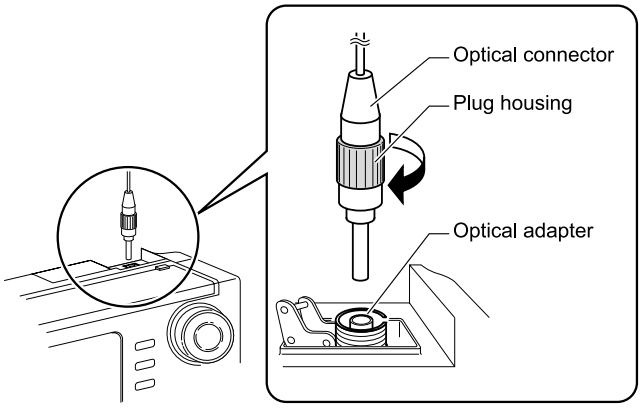
This section explains how to connect an optical fiber by taking an example of connecting a FC connector.

1. **Open the optical connector cover on the top of the instrument.**

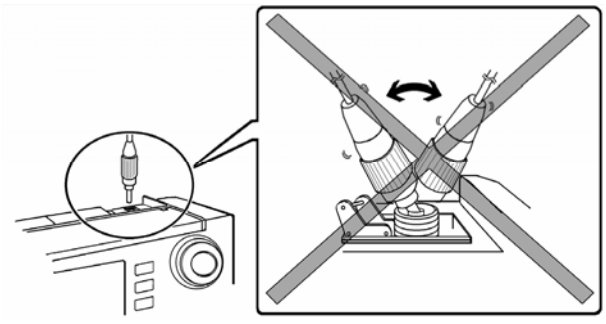
2. **Fit the tab of the optical connector into the slot on the optical adapter, and insert the connector into the adapter.**

3. **Turn the plug housing clockwise to secure the connector.**

FC connector



⚠ CAUTION	
	When connecting the optical connector, gently insert it perpendicularly into the optical adapter. Shaking it sideways or inserting it by force may not only damage the optical adapter, but also damage the ferrule on the optical connector.



3.5 Setting the Measurement Conditions/Auto Search Conditions [Step 4]

Before starting measurement of the optical fiber, it is necessary to set conditions under which the measurement is to be performed. This section explains how to change the following measurement conditions and auto search conditions.

- Wavelength
- Measurement condition auto set
- Distance range
- Pulse width
- Attenuation
- Average condition
- Average time / average interval
- Group index
- Data size
- Sampling Resolution
- Average method
- Auto saving
- Event search
- Approximate method
- Back scatter level
- Splice loss threshold
- Return loss threshold
- Fiber end threshold
- Filter
- Plug check
- Average measurement continue

Displaying the Measurement Condition Change Window

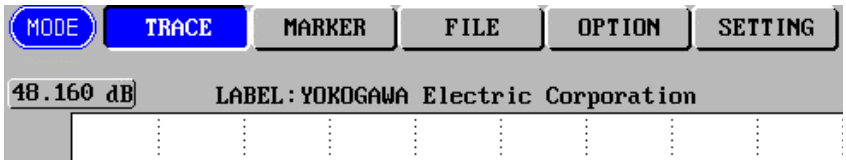
This section explains how to display the window by which the measurement conditions can be changed.

1. Make sure there is no measurement currently in progress.

Caution

If measurement is in progress, some items cannot be changed.

2. Press [MODE] to locate the cursor to “TRACE”.



3. Press [F1](MEASURE CONDITION).

The following conditions can be changed using [F1] to [F4].

- Wavelength
- Distance range
- Pulse width
- Attenuation

Caution

•The distance range, pulse width and attenuation cannot be changed if “AUTO RANGE” has been selected for AUTO SET.

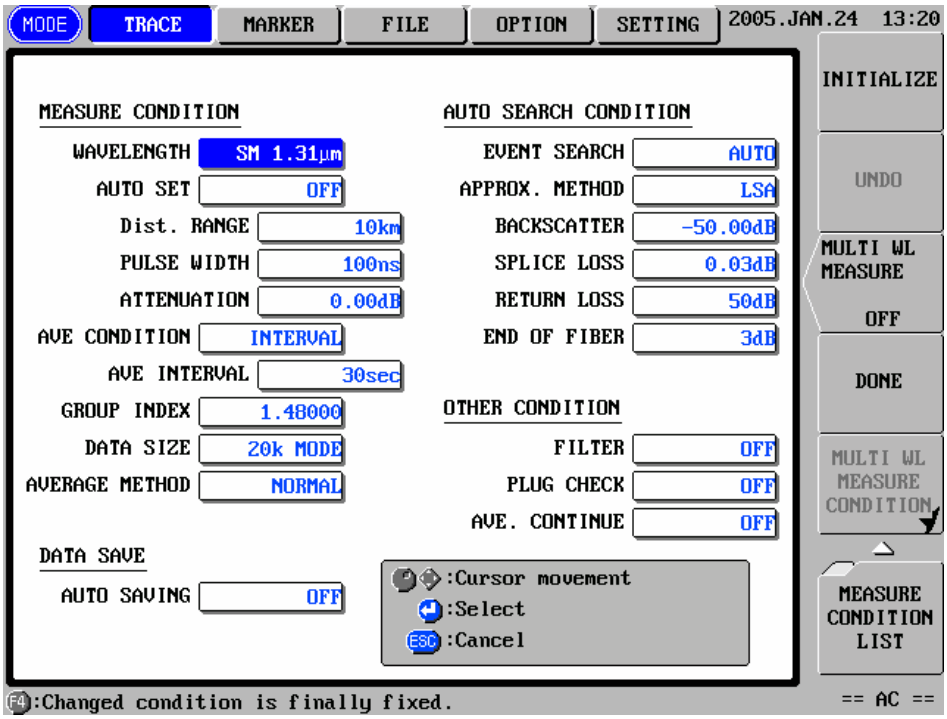
•The attenuation cannot be changed if “AUTO ATTN” has been selected for AUTO SET.

Refer

For details on measurement condition auto setting, refer to page 3-14.

4. Press [F5](MEASURE CONDITION LIST).

The following measurement condition change window will appear.



Changing the Measurement Conditions

TIP

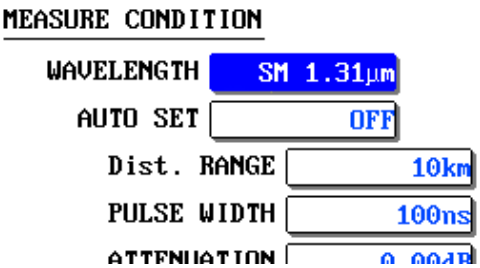
Measurement conditions will be retained in the internal memory even if the instrument is turned OFF. So, when the instrument is turned ON, the measurement conditions in effect immediately before the instrument was turned OFF previously will be restored. However, this is not true if the optical module has been changed.

Changing the Wavelength

The wavelength can be changed as explained below.

♦ Example: “SM 1.31µm” → “SM 1.55µm”

1. Locate the cursor to “WAVELENGTH” by using the rotary knob or the arrow key.



Caution

When F3 [MULTI WL MEASURE] is selected “ON”, the cursor can not move on wavelength.

2. Press [ENTER].

A selection window will appear.

TIP

This instrument also allows setting multiple wavelengths and continuously measures an optical fiber cable with the set wavelengths.

The wavelengths that can be set vary with the optical module used.

Optical module		Selectable wavelengths
AQ7261		*SM 1.31µm, SM 1.55µm
AQ7264		*SM 1.31µm, SM 1.55µm
AQ7265		*SM 1.31µm, SM 1.55µm
AQ7269	MMF	*MM 0.85µm, MM 1.30µm
	SMF	*SM 1.31µm, SM 1.55µm

*: Indicates the default setting.

Refer

•For continuous measurement with multiple wavelengths, refer to page 7-52.

•For the procedures to set MMF/SMF when the AQ7269 is used, refer to page 2-45.

3. Locate the cursor to "SM 1.55µm" by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the wavelength.

5. Press [F4] (DONE) to register the changes made to the measurement conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Measurement Condition Auto Setting

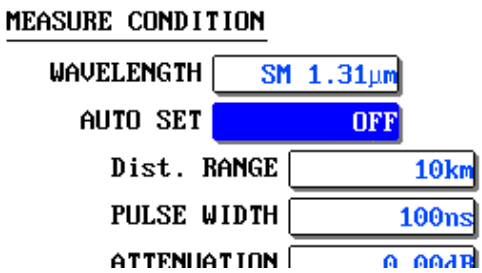
To simplify operation, the instrument provides a function that allows it to check the state of the optical fiber at the start of measurement and set the following measurement conditions automatically.

- Distance range
- Pulse width
- Attenuation

This measurement condition auto setting can be changed as explained below.

♦ Example: “OFF” → “AUTO RANGE”

1. Locate the cursor to “AUTO SET” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable auto setting	OFF	Performs measurement using the preset distance range, pulse width and attenuation.
	*AUTO RANGE	Sets distance range, pulse width and attenuation automatically at the start of measurement.
	AUTO ATTN	Sets attenuation automatically at the start of measurement.

*: Indicates the default setting.

3. **Locate the cursor to "AUTO RANGE" by using the rotary knob or [▲] / [▼].**

4. **Press [ENTER] to register the change made to the measurement condition auto setting.**

5. **Press [F4] (DONE) to register the changes made to the measurement conditions.**

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Distance Range

The distance range can be changed as explained below.

♦ Example: “40km” → “80km”

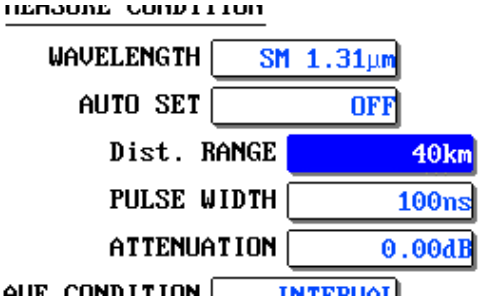
TIP

•The distance range cannot be changed if “AUTO RANGE” has been selected for AUTO SET.

•A distance range that is longer than the optical fiber to be measured must be set. Correct measurement will not be possible if a distance range shorter than the optical fiber is set.

•The larger the distance range, the longer the measurement time.

1. Locate the cursor to “Dist. RANGE” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

The distance ranges that can be selected vary with the optical module and wavelength used. The table below shows the distance ranges that can be selected in the case of AQ7264 optical module.

Wavelength	1.31µm	1.55µm
Shorter ↑	2km	2km
	5km	5km
	10km	10km
	20km	20km
Selectable	40km	40km
distance ranges	80km	80km
	160km	160km
	240km	240km
	320km	320km
Longer ↓		640km

3. Locate the cursor to "80km" by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the distance range setting.

5. Press [F4] (DONE) to register the changes made to the measurement conditions.

TIP

•When a new distance range is set, appropriate pulse width and attenuation will be set automatically.

•When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Pulse Width

The pulse width can be changed as explained below.

♦ Example: “100ns” → “200ns”

Caution

The pulse width cannot be changed if “AUTO RANGE” has been selected for AUTO SET.

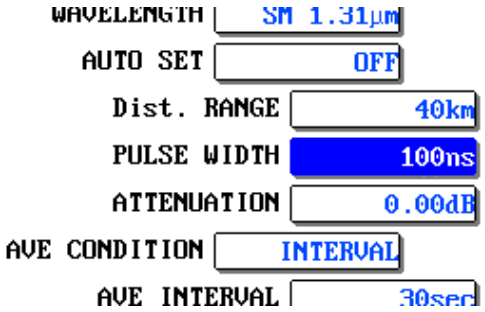
TIP

The pulse width has the following features.

•Short pulse width:Enables measurement with high spatial resolution, but not measurement at long distances.

•Long pulse width: Enables measurement at long distances, but not measurement with high spatial resolution.

1. Locate the cursor to “PULSE WIDTH” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

The pulse widths that can be selected vary with the optical module, wavelength and distance range selected. The table below shows the pulse widths that can be selected in the case of AQ7264 optical module and wavelength of 1.55µm.

Distance range	**2km 5km**	**10km 20km**	**40km**	**80km 160km 240km 320km**	640km
Shorter ↑	10ns	10ns	10ns	10ns	10ns
	20ns	20ns	20ns	20ns	20ns
	50ns	50ns	50ns	50ns	50ns
	100ns	100ns	100ns	100ns	100ns
	200ns	200ns	200ns	200ns	200ns
Selectable pulse widths	500ns	500ns	500ns	500ns	500ns
		1µs	1µs	1µs	1µs
			4µs	4µs	4µs
			10µs	10µs	10µs
Longer ↓				20µs	20µs
					50µs

3. Locate the cursor to "200ns" by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the pulse width setting.

5. Press [F4] (DONE) to register the changes made to the measurement conditions.

TIP

- When a new pulse width is set, appropriate attenuation will be set automatically.
- When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Attenuation

If excessive reflection occurs at the optical connector's connection point or optical fiber's break point, the trace may be saturated. To prevent saturation of the trace, attenuation is used.

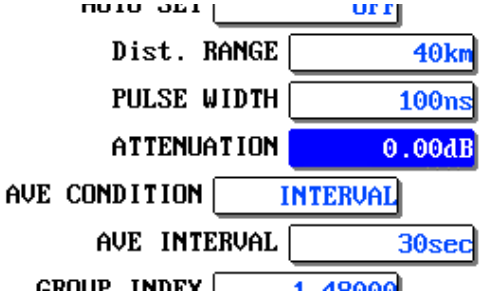
The attenuation setting can be changed as explained below.

♦ Example: "0.00dB" → "10.00dB"

Caution The attenuation setting cannot be changed if "AUTO RANGE" or "AUTO ATTN" has been selected for AUTO SET.

Refer For details on saturation of trace, refer to "Checking the Return Loss" on page 3-86.

1. Locate the cursor to "ATTENUATION" by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

•If the trace is saturated, measurement cannot be performed with high sensitivity.

•The attenuations that can be selected vary with the optical module, wavelength and pulse width selected. The table below shows the attenuations that can be selected in the case of AQ7264 optical module and wavelength 1.55µm.

Pulse width	10ns 20ns 50ns	100ns 200ns 500ns	1µs 4µs	10µs 20µs 50µs
Smaller ↑ Selectable attenuations ↓ Larger	0.00dB to 16.25dB (1.25dB step)	0.00dB to 20.00dB (1.25dB step)	0.00dB to 23.75dB (1.25dB step)	0.00dB to 26.25dB (1.25dB step)

3. Locate the cursor to "10.00dB" by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the attenuation setting.

5. Press [F4] (DONE) to register the changes made to the measurement conditions.

TIP

•When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Average Condition

Average condition means the method of averaging the data obtained by measurement. The following two average methods are available.

- Averaging by intervals
- Averaging by times

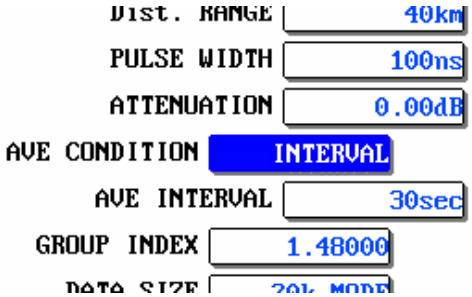
The average condition can be changed as explained below.

♦ Example: “INTERVAL” → “TIMES 2^*”

Refer

For details on average measurement, refer to page 3-57.

1. Locate the cursor to “AVE CONDITION” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable average conditions	TIMES 2^*
	TIMES *k
	*INTERVAL

*: Indicates the default setting.

3. Locate the cursor to “TIMES 2^*” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the average condition setting.

5. Press [F4] (DONE) to register the changes made to the measurement conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

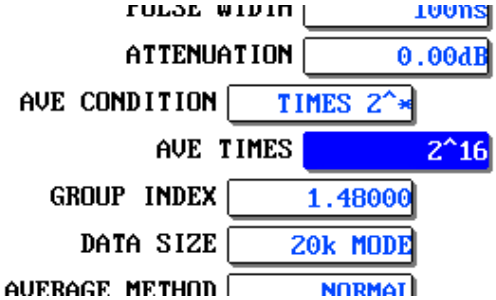
Changing the Average Time/Average Interval

The average time can be changed as explained below.

♦ Example: “2^16” → “2^13”

1. Locate the cursor to “AVE TIMES”(*1) by using the rotary knob or the arrow key.

*1: “AVE TIME” is displayed if “TIMES 2^*” or “TIMES *k” is selected for “AVE CONDITION”, and “AVE INTERVAL” will be displayed if “INTERVAL” is selected for “AVE CONDITION”.



2. Press [ENTER].

A selection window will appear.

TIP

• The larger the average time/average interval, the higher the accuracy of measurement results. However, measurement time will be prolonged, so an appropriate average time/average interval must be set with the instrument’s dynamic range and loss of optical fiber taken into account.

• The average time/average interval that can be set vary with the selected average condition.

AVE CONDITION	TIMES 2^*	TIMES *k	INTERVAL
	2^10	1k times	10sec
Smaller ↑	2^11	2k times	20sec
	2^12	4k times	*30sec
Selectable	2^13	8k times	1min
average time /	*2^14	*16k times	3min
average interval	2^15	32k times	5min
	2^16	65k times	10min
	2^17	131k times	20min
Larger ↓	2^18	262k times	30min

*: Indicates the default setting.

3. **Locate the cursor to "2^13" by using the rotary knob or [▲] / [▼].**

4. **Press [ENTER] to register the change made to the average time.**

5. **Press [F4] (DONE) to register the changes made to the measurement conditions.**

Caution

Influenced by other measurement conditions, the actual averaging time may be shorter than the set period.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Group Index

The group index can be changed as explained below.

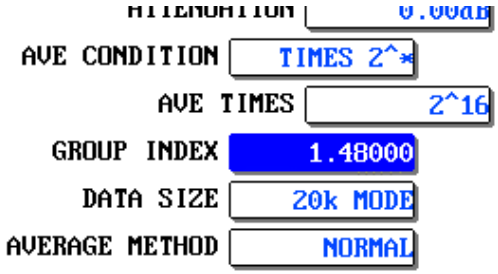
♦ Example: “1.48000” → “1.50000”

Caution

•Distance calculation is performed using the group index. So measured distance will not be accurate if the given group index is also not accurate.

•The group index for each wavelength is stored in the memory. So if the wavelength is changed, the group index set for each wavelength will be displayed.

1. Locate the cursor to “GROUP INDEX” by using the rotary knob or the arrow key.



Caution

When F3 [MULTI WL MEASURE] is selected “ON”, the cursor can not move on group index.

2. Press [ENTER].

A selection window will appear.

TIP

Selectable group index range	1.00000 to 1.99999 (0.00001 step)

Default setting: 1.48000

3. **Locate the cursor to “4” by using [◀] / [▶].**

4. **Change to “5” by using the rotary knob or [▲].**

5. **Locate the cursor to “8” by using [◀] / [▶].**

6. **Change to “0” by using the rotary knob or [▼].**

7. **Press [ENTER] to register the change made to the group index.**

8. **Press [F4] (DONE) to register the changes made to the measurement conditions.**

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

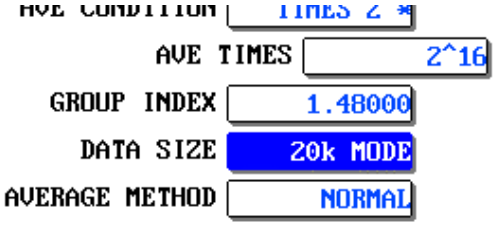
Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Data Size

The data size can be changed as explained below.

♦ Example: “20k MODE” → “5k MODE”

1. Locate the cursor to “DATA SIZE” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Data size has the following features.

Large data size: More accurate measured trace, but longer measurement time.

When the measured trace is saved in a file, the file size will be large.

Small data size: Smaller file size and shorter measurement time.

However, some events may not be detected since the sampling interval (i.e. interval at which data is acquired) gets longer.

Selectable data size	5k MODE
	*20k MODE
	60k MODE

*: Indicates the default setting.

Caution

The size of actually acquired data may differ from the selected data size due to influences of the other measurement conditions.

3. **Locate the cursor to "5k MODE" by using the rotary knob or [▲] / [▼].**

4. **Press [ENTER] to register the change made to the data size.**

5. **Press [F4] (DONE) to register the changes made to the measurement conditions.**

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

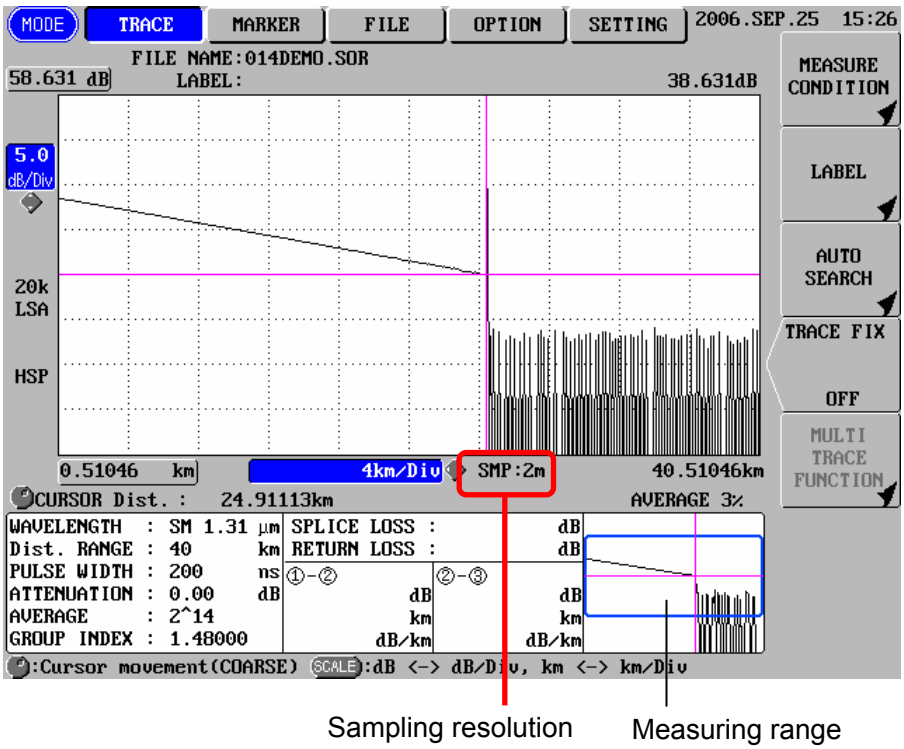
Changing the Sampling Resolution(SMP).

The *sampling resolution* is the distance interval at which data is acquired. It is linked with the distance range setting, and is set automatically.
The following describes the procedure for changing the sampling resolution independently of the distance range setting. The sampling resolution can be shortened when analyzing portions of waveforms in detail.
The sampling resolution is displayed by SMP in the figure below.
The sampling resolution can be changed as explained below.

1. **Press [MODE], move the cursor to "TRACE".**
2. **Press [REALTIME]. Real time measurement will start.**
3. **During real time measurement, use the cross key to zoom the horizontal scale. The sampling resolution display (SMP) changes each time you zoom the scale. Note that the minimum resolution is 5 cm.**

Refer

For the method of enlarging the trace along the horizontal-axis, refer to page 3-66.



Caution

The border of the overall trace display is the measuring range.

Changing the Average Method

Before explaining how to change the setting, an explanation is given below regarding average method.

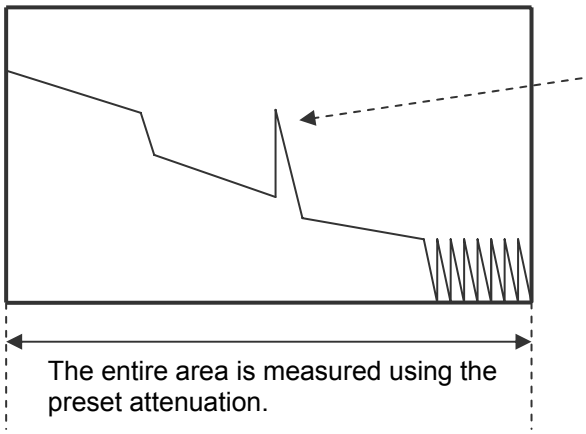
This instrument allows use of the following three average methods.

- Hi-Speed
- Normal
- Hi-Return

Hi-Speed

This method is used to measure the entire area using the preset attenuation.

If excessive reflection occurs when the preset attenuation is not appropriate, that part of the trace may be saturated.



TIP

This method is recommended when measuring short optical fiber cables (no reflection in the fiber).

Refer

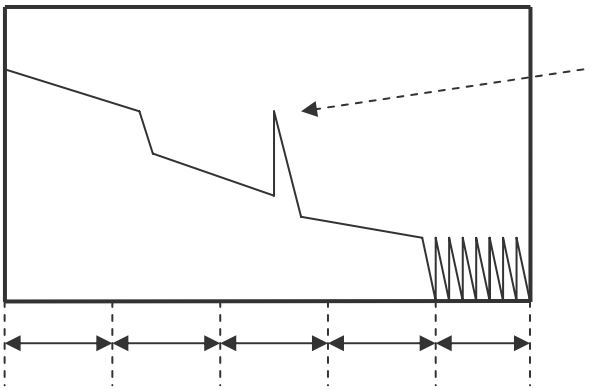
For saturation of trace and the method of setting the attenuation, refer to page 3-88.

Normal

This method is used to obtain a satisfactory trace when measuring a long optical fiber, by dividing the measurement area into blocks and setting an appropriate attenuation for each block.

Division of the measurement area into blocks and setting of an appropriate attenuation for each block are carried out automatically by the instrument. So, measurement time will be longer compared to the total average method.

Furthermore, since the attenuation is set based on the back scatter level at the near end, if excessive reflection occurs in a block the trace for that block may be saturated.



TIP

This method is recommended when there is no excessive reflection in the optical fiber to be measured.

Refer

For details on saturation of trace, refer to page 3-88.

Hi-Return

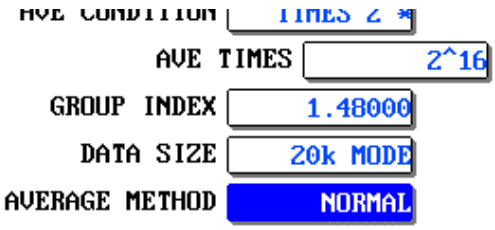
Like the division average method, this method is used to measure each block using the attenuation set for each block. Instead of setting attenuation for each block using the back scatter level at the near end, it is set based on the back scatter level at each block. As a result, measurement time will be longer compared to the division average method.

Division of the measurement area into blocks and setting of an appropriate attenuation for each block are carried out automatically by the instrument.

The average method can be changed as explained below.

♦ Example: “NORMAL” → “Hi-RETURN”

1. Locate the cursor to “AVERAGE METHOD” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable average methods	Hi-RETURN
	*NORMAL
	Hi-SPEED

*: Indicates the default setting.

Caution

The Hi-SPEED cannot be selected if “AUTO” has been selected for AVERAGE CONDITION.

3. Locate the cursor to “Hi-RETURN” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the average method.

5. Press [F4] (DONE) to register the changes made to the measurement conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Measured Data Auto Saving Conditions

Changing the Measured Data Auto Saving Setting

Measured data auto saving is a function to save the acquired data in a specified storage media after average measurement was done.

This section explains how to change the measured data auto saving setting.

♦ Example: “OFF” → “ON”

Refer

•For the method to perform an average measurement, refer to page 3-57.

•For the method to specify storage media, refer to page 3-92.

1. Locate the cursor to “AUTO SAVING” by using the rotary knob or the arrow key.

TIP

The cursor is already at “AUTO SAVING” when measurement condition change window appears.

2. Press [ENTER].

A selection window will appear.

TIP

Selectable auto saving	ON	Measured data is saved after average measurement was done.
	*OFF	Measured data is not saved after average measurement was done.

*: Indicates the default setting.

3. **Locate the cursor to "ON" by using the rotary knob or [▲] / [▼].**

4. **Press [ENTER] to register the change made to the auto saving.**

5. **Press [F4] (DONE) to register the changes made to the measurement conditions.**

Caution

If this function has been set to ON, the acquired data is automatically saved. So make sure to set the saving condition prior to measurement.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

- For the method to set the saving condition, refer to page 3-89.
- Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Auto Search Conditions

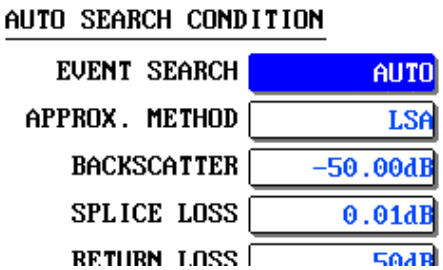
Changing the Event Search Setting

Event search is a function to automatically search for events in the acquired data after average measurement was done.

The event search setting can be changed as explained below.

♦ Example: “AUTO” → “MANUAL”

1. Locate the cursor to “EVENT SEARCH” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable event search setting	*AUTO	Searches events automatically at the end of average measurement, and creates a table summarizing event information.
	MANUAL	Displays a trace at the end of average measurement, but does not search events.

*: Indicates the default setting.

3. Locate the cursor to “MANUAL” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the event search setting.

5. Press [F4] (DONE) to register the changes made to the measurement conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Approximate Method

Before explaining how to change the setting, an explanation is given below regarding approximate method.

When calculating splice loss or return loss, a straight line is assumed for calculation. This straight line is called the approximate line. The following two methods are available to assume the approximate line.

- Least squares approximate (hereafter called LSA)
- Two point approximate (hereafter called TPA)

LSA

An explanation of LSA is given below.

LSA calculates the loss between two points (①-②) using least squares approximate. Features of LSA are given below.

Advantages

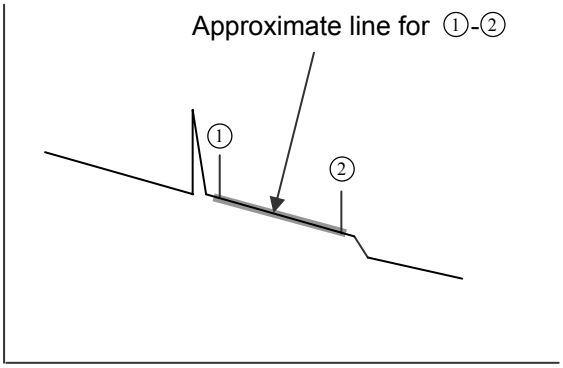
- Loss can be calculated with high accuracy since all the data present between the two points are used.
- Variation of calculated loss caused by operators is reduced and repeatability of calculated loss is improved.

Disadvantages

If excessive reflection or large step is present within the area between the specified two points, calculation of loss will be performed with such reflection and step taken into account, resulting in larger measurement error.

Use LSA when you want to check the loss within a section where no events are present as shown below.

LSA enables calculation of loss with higher accuracy than TPA.



Refer For the method of displaying the approximate line, refer to page 7-3.

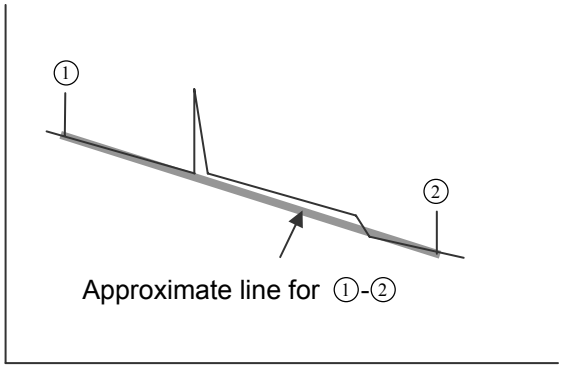
TPA

An explanation of TPA is given below.

TPA calculates the loss based on the level difference between the specified two points.

There is a possibility that variation of calculated loss caused by operators is reduced and repeatability of calculated loss is changed considerably.

Use TPA when you want to check the loss for each event or the loss in the area where events are present as shown below.

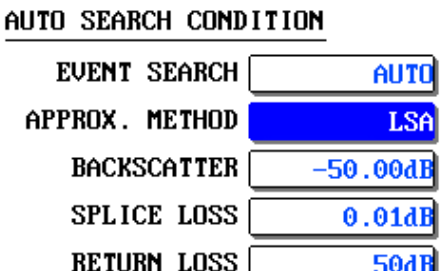


Refer For the method of displaying the approximate line, refer to page 7-3.

The approximate method can be changed as explained below.

♦ Example: “LSA” → “TPA”

1. Locate the cursor to “APPROX. METHOD” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable approximate methods	*LSA
	TPA

*: Indicates the default setting.

3. Locate the cursor to "TPA" by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the approximate method.

5. Press [F4] (DONE) to register the changes made to the measurement conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Back Scatter Level

The light traveling through an optical fiber causes phenomena called Rayleigh scattering. Among these scattering rays, those which travel in the opposite direction of incident rays are called back scattering rays.

The backscatter level set here will be used as a constant to calculate the return loss for each event and the total return loss.

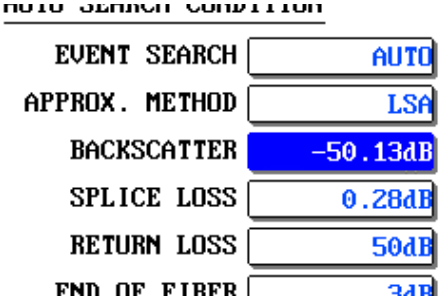
The backscatter level can be changed as explained below.

♦ Example: "–50.13dB" → "–52.00dB"

Caution

- The calculated return loss for each event and the total return loss will not be accurate unless the back scatter level set here is accurate.
- The back scatter level set for each wavelength is stored in the memory. So if the wavelength is changed, the backscatter level set for each wavelength will be displayed.
- Set the back scatter level at pulse width 1 µs.

1. Locate the cursor to "BACKSCATTER" by using the rotary knob or the arrow key.



Caution

When F3 [MULTI WL MEASURE] is selected "ON", the cursor can not move on backscatter.

2. Press [ENTER].

A selection window will appear.

TIP

Selectable back scatter level	−10.00dB to −64.99dB (0.01dB step)	Default setting Wavelength 0.85µm: −32.00dB Wavelength 1.30µm: −41.00dB Wavelength 1.31µm: −50.00dB Wavelength 1.55µm: −52.00dB

3. Locate the cursor to "0" by using [◀] / [▶].

4. Change to "2" by using the rotary knob or [▲].

5. Locate the cursor to "1" by using [◀] / [▶].

6. Change to "0" by using the rotary knob or [▼].

7. Locate the cursor to "3" by using [◀] / [▶].

8. Change to "0" by using the rotary knob or [▼].

9. Press [ENTER] to register the change made to the backscatter level.

10. Press [F4] (DONE) to register the changes made to the measurement conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Splice Loss Threshold

When auto search is executed, splice losses exceeding the threshold set here will be detected as events.

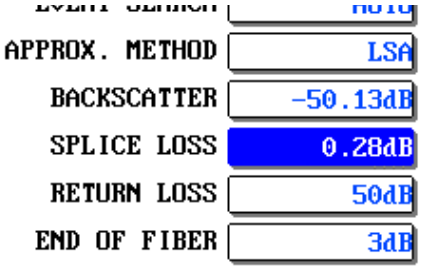
The splice loss threshold can be changed as explained below.

♦ Example: “0.28dB” → “0.35dB”

Refer

For details on splice loss, refer to page 1-45.

1. Locate the cursor to “SPLICE LOSS” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable splice loss threshold	0.01dB to 9.99dB (0.01dB step)

Default setting: 0.03dB

3. Locate the cursor to “2” by using [◀] / [▶].

4. Change to “3” by using the rotary knob or [▲].

5. **Locate the cursor to “8” by using [◀] / [▶].**

6. **Change to “5” by using the rotary knob or [▼].**

7. **Press [ENTER] to register the change made to the splice loss threshold.**

8. **Press [F4] (DONE) to register the changes made to the measurement conditions.**

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Return Loss Threshold

When auto search is executed, return losses exceeding the threshold set here will be detected as events.

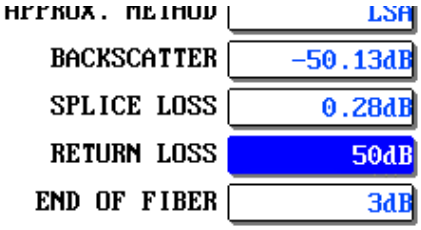
The return loss threshold can be changed as explained below.

♦ Example: “50dB” → “38dB”

Refer

For details on return loss, refer to page 1-45.

1. Locate the cursor to “RETURN LOSS” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable return loss threshold	20 to 70 (1dB step)

Default setting: 50dB

3. Locate the cursor to “5” by using [◀] / [▶].

4. Change to “3” by using the rotary knob or [▼].

5. Locate the cursor to “0” by using [◀] / [▶].

6. **Change to "8" by using the rotary knob or [▲].**

7. **Press [ENTER] to register the change made to the return loss threshold.**

8. **Press [F4] (DONE) to register the changes made to the measurement conditions.**

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Fiber End Threshold

When auto search is executed, events exceeding the threshold set here will be detected as the fiber end.

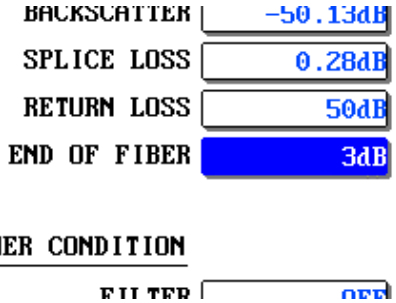
The fiber end threshold can be changed as explained below.

♦ Example: “3dB” → “10dB”

Refer

For details on the fiber end, refer to page 1-44.

1. Locate the cursor to “END OF FIBER” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable fiber end threshold	3dB
	4dB
	5dB
	6dB
	7dB
	8dB
	9dB
	*10dB

*: Indicates the default setting.

3. Locate the cursor to “10dB” by using the rotary knob or [▲] / [▼].

4. **Press [ENTER] to register the change made to the fiber end threshold.**

5. **Press [F4] (DONE) to register the changes made to the measurement conditions.**

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing the Filter Setting

Refer

For the method of changing the filter setting, refer to page 3-59.

Changing the Plug Check Setting

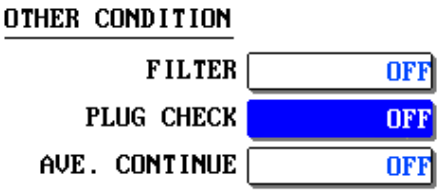
The plug check function checks the connection condition between the instrument and optical fiber to be measured.

When this function is enabled (ON), emission of laser from the instrument will be prevented if the optical fiber is not connected or it is connected but not properly.

The plug check setting can be changed as explained below.

♦ Example: "OFF" → "ON"

1. Locate the cursor to "PLUG CHECK" by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable plug check setting	*OFF	Disables the plug check function.
	ON	Enables the plug check function.

*: Indicates the default setting.

3. Locate the cursor to "ON" by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the plug check function setting.

5. Press [F4] (DONE) to register the changes made to the measurement conditions.

TIP

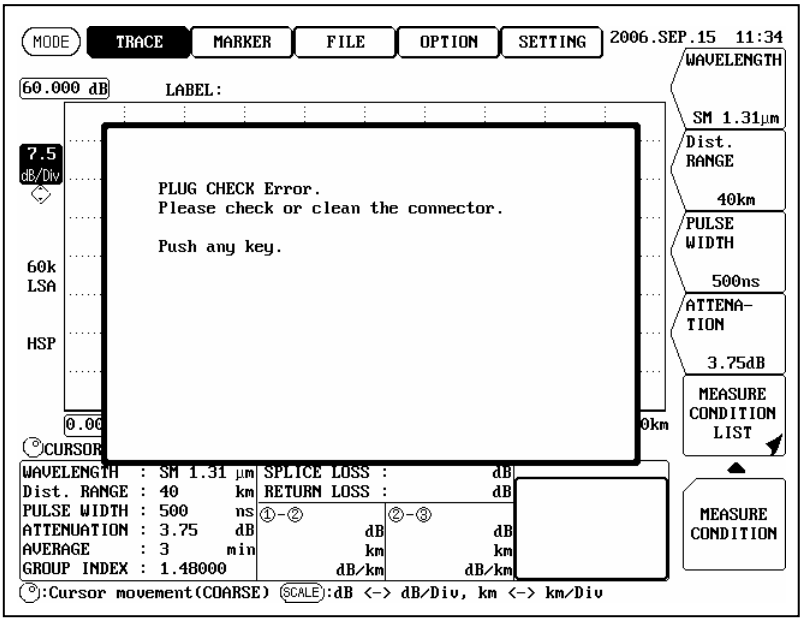
When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Caution

When the plug check is ON, the following message appears upon measurement start if there is not a good connection between the unit and the optical connector.



Changing the Average Continue Setting

Refer

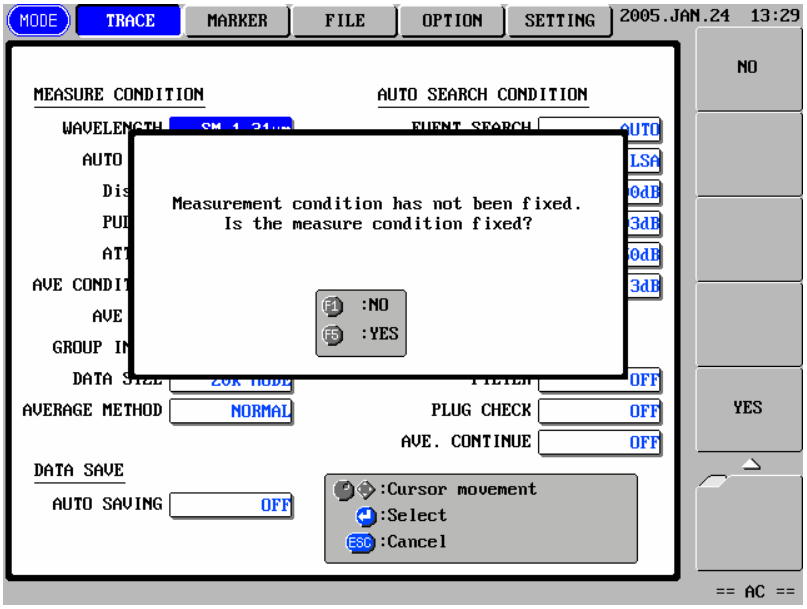
For average measurement continue and the method of changing the average continue setting, refer to page 3-62.

Notes on Changing of Measurement Conditions / Auto Search Conditions

Caution

If you try to close the measurement condition / auto search condition change window without pressing [F4] (DONE)(*1), the following message will appear.

*1: Press [MODE] or [ESC].



TIP

To restore the previous condition setting, press [F2] (UNDO).

Undo can be performed up to five times.

Assuming that the wavelength, distance range and pulse width are changed in this order as follows.

Wavelength :1.31µm → 1.55µm

⇩

Distance range:40km → 80km

⇩

Pulse width :20µs → 10µs

After the measurement conditions are changed as above, press [F2] (UNDO).

Press [F2] (UNDO): The pulse width will return to 20µs.

⇩

Press [F2] (UNDO): The distance range will return to 40km.

⇩

Press [F2] (UNDO): The wavelength will return to 1.31µm.

Restoring the Default Measurement Conditions / Auto Search Conditions

This section explains how to restore the default measurement conditions / auto search conditions.

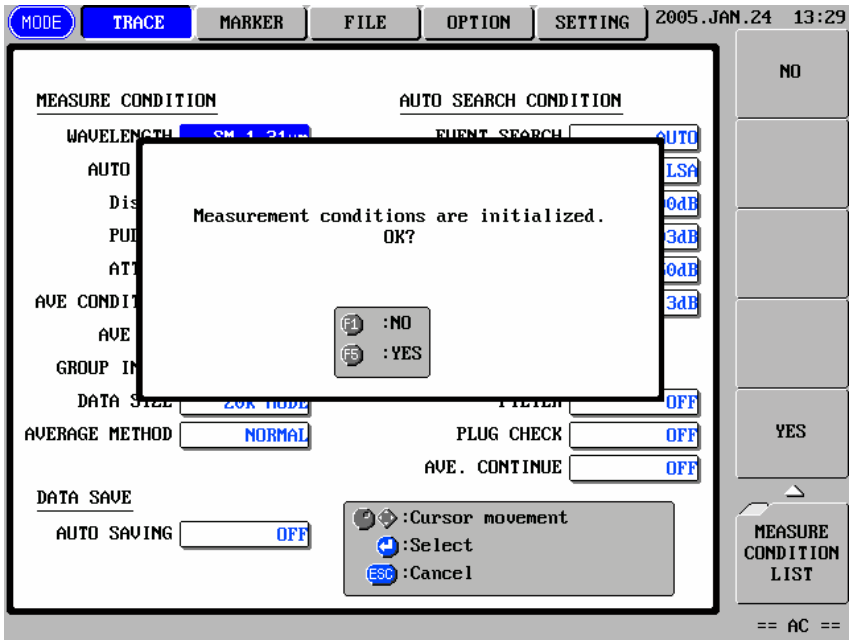
1. Display the measurement condition setting window.

Refer

For the method of displaying the measurement condition setting window, refer to page 3-10.

2. Press [F1] (INITIALIZE).

The following window will appear.



3. Press [F5] (YES) to restore the default measurement conditions / auto search conditions.

3.6 Setting the File Name/Location to Store the File [Step 5]

If the measured data auto saving function of the measurement condition has been enabled, the acquired data is automatically saved when an average measurement is completed. So it is necessary to set the file name and to select drive and folder to store the data, prior to measurement.

Refer

- For the method to enable the measured data auto saving function, refer to page 3-34.
- For the method to set the file name, refer to page 3-97, page 3-104.
- For the method to set the location to store the data, refer to page 3-89.

3.7 Measuring an Optical Fiber [Step 6]

This section explains how to measure the optical fiber connected to the instrument and display the measured data. This instrument allows use of the following two measurement methods.

- Real time measurement
- Average measurement

Caution

Use of devices, such as cellular phones, that generate a strong magnetic field near the instrument during measurement may affect measured data. So, such devices should not be used during measurement.

Performing Real Time Measurement

Real time measurement uses the default average time set to the instrument to perform measurement and display the measured data. The average time set by the user will be disabled.

Since measurement conditions can be changed during real time measurement, changes in the trace occurring as a result of changes in the measurement conditions can be observed in real time.

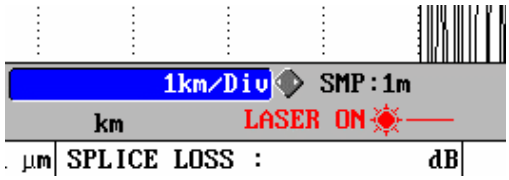
1. Press [REALTIME].

Real time measurement will start.

WARNING	
	Do not disconnect the optical fiber from the instrument during measurement. Laser beams are invisible to the naked eye, but if they enter the eyes, they may cause impaired eyesight.

TIP

•A message “LASER ON” is displayed during measurement.



•To stop real time measurement, press [REALTIME] again.

•Information such as comment and operator’s name can be added to the trace during measurement.

Refer

For the method of entering information, refer to Chapter 4.

Performing Average Measurement

Average measurement obtains data for each pulse, calculates the mean of the data obtained for all the pulses, and then displays it.

This method improves the signal to noise ratio (S/N), and is effective when you want to detect weak signals overwhelmed by noise.

If “NORMAL” or “Hi-RETURN” has been set for “AVERAGE METHOD”, the attenuation that has been set will be disabled since the instrument sets an appropriate attenuation automatically and performs measurement.

Refer

For details on average method, refer to page 3-31.

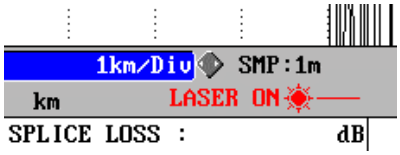
1. Press [AVE].

Average measurement will start.

WARNING	
	Do not disconnect the optical fiber from the instrument during measurement. Laser beams are invisible to the naked eye, but if they enter the eyes, they may cause impaired eyesight.

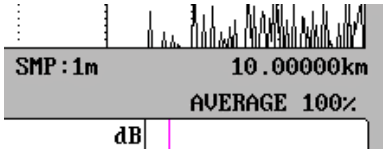
TIP

•A message “LASER ON” is displayed during measurement.

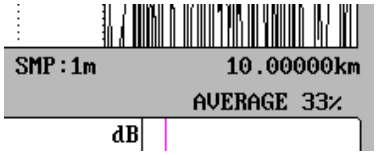


•The following bar showing progress will appear during measurement.

•Average measurement will end automatically, and “100%” will be displayed when it is completed successfully.



•If [AVE] is pressed during measurement, measurement will stop and the progress of averaging performed so far will be displayed.



•Time required up to the end of measurement varies with measurement conditions (distance range, average time).

•Information such as label and operator’s name can be added to the trace during measurement.

•If the event search function has been set to AUTO, an event search is performed when a measurement is successfully completed.

•If the measured data auto saving function has been set to ON, the measured data is saved in a selected storage media when a measurement is successfully completed.

Refer

•For the method of entering information, refer to Chapter 4.

•For the method to enable the event search function, refer to page 3-36.

•For the method to enable the automatic saving function, refer to page 3-34.

•For the method to select a storage media, refer to page 3-92.

When the Trace Contains a Lot of Noise

If the trace obtained by average measurement contains so much noise that the trace cannot be observed clearly, remove noise as explained below.

- Use the filter function to eliminate noise.
- Use the average measurement continue function to eliminate noise.
- Increase the average time/interval and perform average measurement again.
- Increase the pulse width and perform average measurement again.
- Switch the average method to “DIVISION” and perform measurement again.

Using the Filter Function

The filter function setting can be changed as explained below.

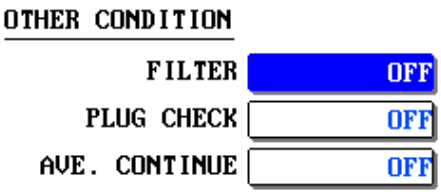
♦ Example: “OFF” → “ON”

1. Display the measurement condition/auto search condition change window.

Refer

For the method of displaying the window, refer to page 3-10.

2. Locate the cursor to “FILTER” by using the rotary knob or the arrow key.



3. Press [ENTER].

A selection window will appear.

TIP

- The filter function can be used for measured traces or recalled traces.
- The filter has the following features.

The signal to noise ratio (S/N) is improved by processing the trace digitally. However, this makes edges of the trace round, and therefore difficult to identify Fresnel reflection occurring in adjacent areas.

Selectable filter setting	*OFF	Disables the filter function.
	ON	Enables the filter function.

*: Indicates the default setting.

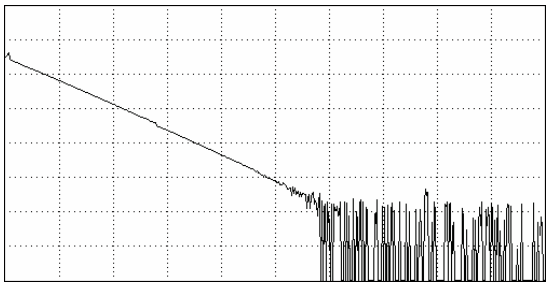
4. Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].

5. Press [ENTER] to register the change made to the filter setting.

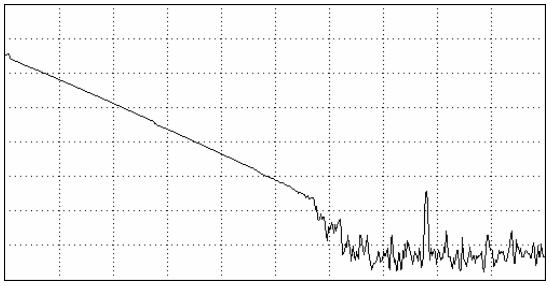
6. Press [F4] (DONE) to register the changes made to the measurement conditions.

TIP

When “OFF” is selected



When “ON” is selected



Caution

The filter setting will be retained in the internal memory even if the instrument is turned OFF. So, when the instrument is turned ON, the measurement conditions in effect immediately before the instrument was turned OFF previously will be restored.

Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Using the Average Measurement Continue Function

The average measurement continue function allows you to perform average measurement on the obtained trace additionally.

For instance, if the data obtained by average measurement (2^16) contains a lot of noise, enabling this function and starting average measurement will continue to perform average measurement on that data up to 2^18 times. This results in shorter measurement time, compared to that when increasing the average time and performing average measurement from the beginning again.

The average measurement continue setting can be changed as explained below.

♦ Example: “OFF” → “ON”

Caution

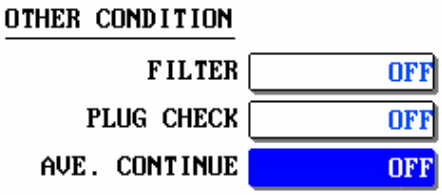
- This function cannot be used for data obtained by “2^18”, “262k” or “30min”.
- This function cannot be changed if “AUTO RANGE” or “AUTO ATTENUATION” has been selected for AUTO SET. And multi wavelength is set.

1. Display the measurement condition/auto search condition change window.

Refer

For the method of displaying the window, refer to page 3-10.

2. Locate the cursor to “AVE. CONTINUE” by using the rotary knob or the arrow key.



3. Press [ENTER].

A selection window will appear.

TIP

Selectable average measurement continue setting	*OFF	Disables the average measurement continue function.
	ON	Enables the average measurement continue function.

*: Indicates the default setting.

4. **Locate the cursor to "ON" by using the rotary knob or [▲] / [▼].**

5. **Press [ENTER] to register the change made to the average measurement continue setting.**

6. **Press [F4] (DONE) to register the changes made to the measurement conditions.**

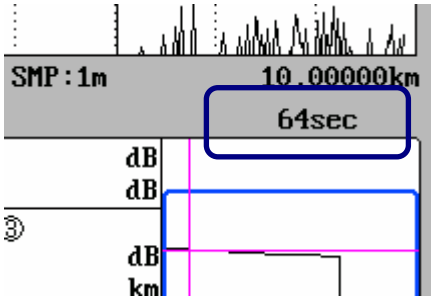
7. **Press [AVE] to start measurement.**

Caution

The average measurement continue setting will be retained in the internal memory even if the instrument is turned OFF. So, when the instrument is turned ON, the measurement conditions in effect immediately before the instrument was turned OFF previously will be restored.

TIP

Averaging time or averaging interval is displayed, when measurement start.



Refer

Refer to the notes given on changing the measurement conditions (page 3-51).

Changing measurement conditions and average measurement again

Refer

•For the method of changing the measurement conditions, refer to page 3-12.

•For the method of performing average measurement, refer to page 3-57.

3.8 Checking the Measured Data [Step 7]

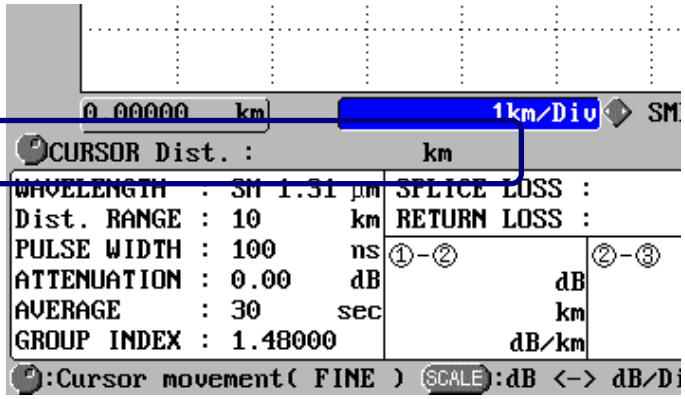
This section explains how to display and check the details of measured data.

Basic Operations

Moving the Cursor

The cursor can be moved as explained below.

1. Make sure the CURSOR Dist. field is displayed in the window.

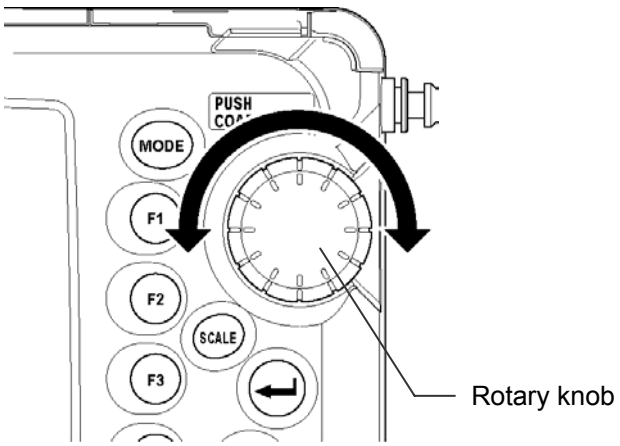


2. Turn the rotary knob.

The cursor will move.

Clockwise: The cursor moves to the right.

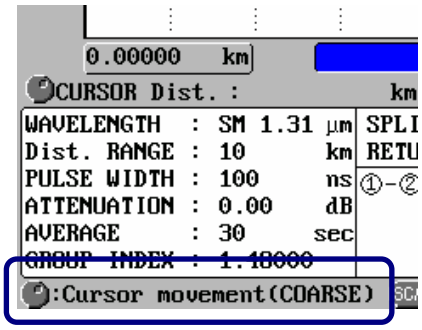
Counter-clockwise: The cursor moves to the left.

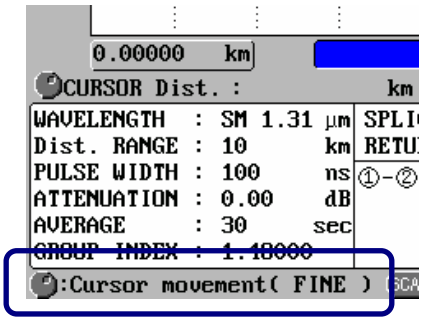


TIP

•The cursor can move between the measurement start and end points. However, at the measurement start point, the cursor will not move any more even if the rotary knob is rotated counter-clockwise. Similarly, it will not move even if the rotary knob is rotated clockwise at the measurement end point.

Holding down the rotary knob will allow you to change the cursor speed.





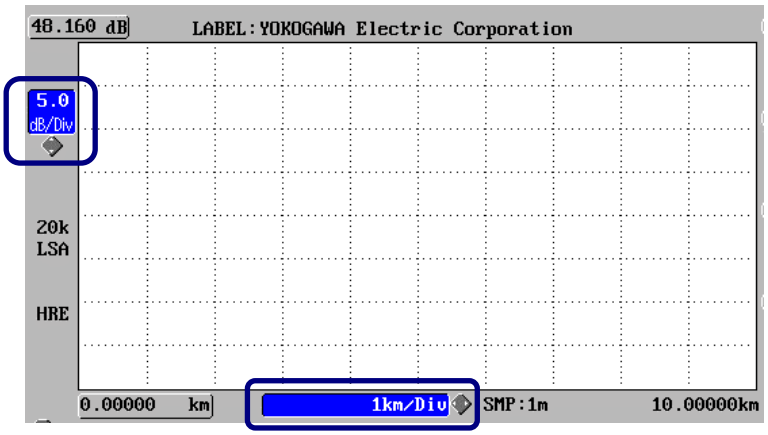
•If a trace is currently displayed, the cursor will move along it.

Enlarging/Reducing the Trace in Size

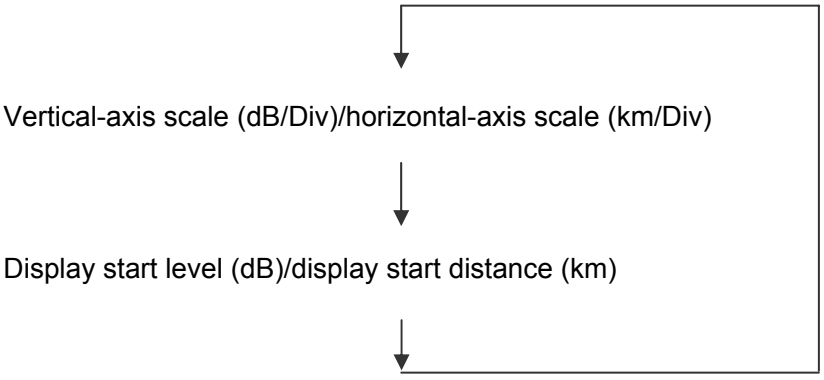
The currently displayed trace can be enlarged or reduced in size as explained below.

1. Locate the cursor to that part of the trace you want to enlarge or reduce by turning the rotary knob.

2. Press [SCALE] to highlight the vertical-axis scale (dB/Div)/horizontal-axis scale (km/Div).



The following items will be highlighted alternately each time [SCALE] is pressed.



3. Use the arrow keys to enlarge/reduce the trace.

Press [▲]: Reduces the trace along the vertical-axis (dB/Div).

Press [▼]: Enlarges the trace along the vertical-axis (dB/Div).

Press [◀]: Enlarges the trace along the horizontal-axis (km/Div).

Press [▶]: Reduces the trace along the horizontal-axis (km/Div).

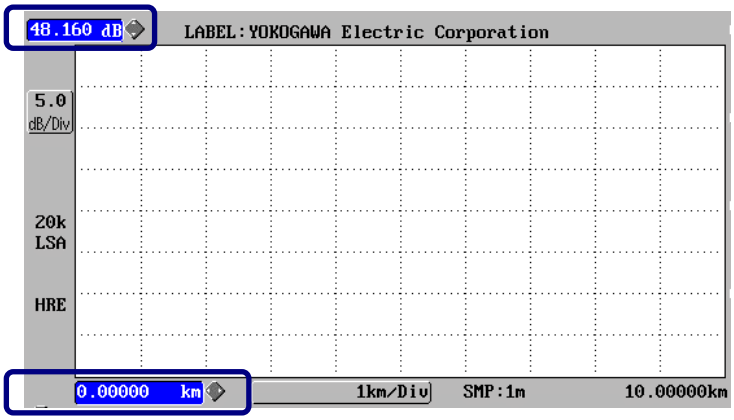
TIP

The trace will be enlarged/reduced around the cursor position.

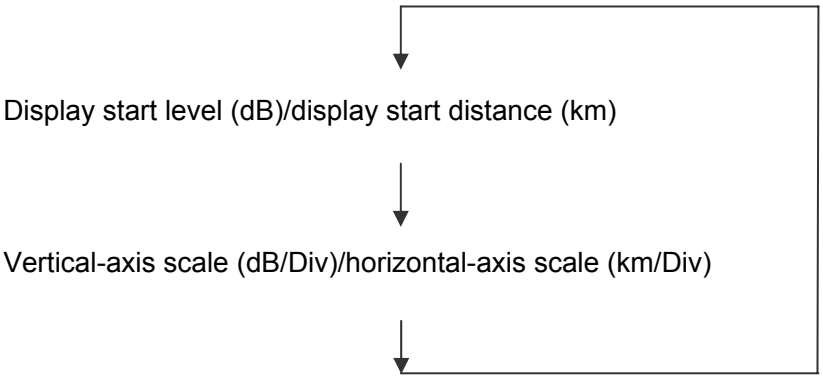
Shifting the Trace

The currently displayed trace can be shifted as explained below.

1. Press [SCALE] to highlight the display start level (dB)/display start distance (km).



The following items will be highlighted alternately each time [SCALE] is pressed.



2. Use the arrow keys to shift the trace.

Press [▲]: Shifts the trace downward.

Press [▼]: Shifts the trace upward.

Press [◀]: Shifts the trace to the left.

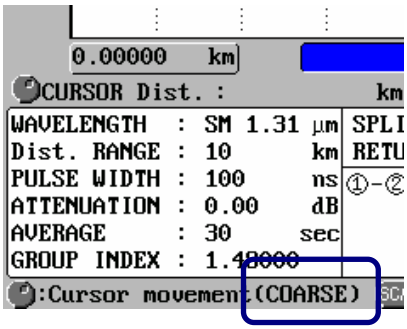
Press [▶]: Shifts the trace to the right.

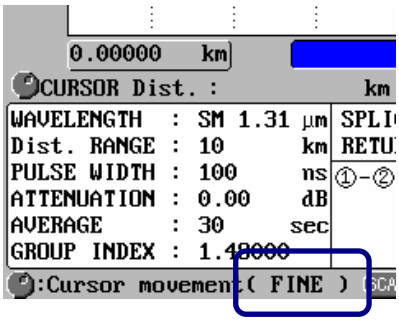
Caution This trace shift function is effective only if the trace is currently enlarged.

TIP

• The trace is shifted by turned rotary knob to same direction continuously after cursor is moved to the left end or the right end when the trace is enlarge.

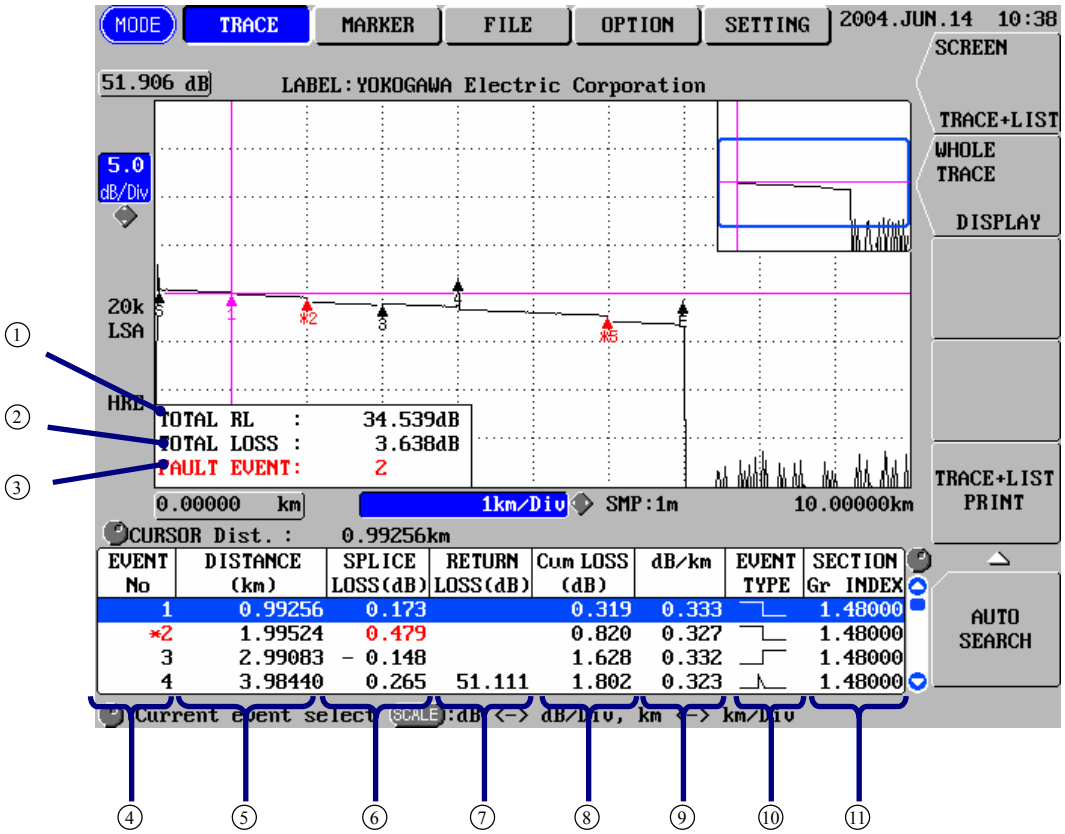
•Holding down the rotary knob will allow you to change the sift speed (COARSE/FINE).





When “AUTO” is Selected for “EVENT SEARCH”

When average measurement is completed successfully with “AUTO” currently selected for “EVENT SEARCH”, events will be searched and displayed as shown below.



TIP

In the example of the above window, both trace and event list are displayed.

It is possible to display an event list only or a trace only.

Refer

For the method of displaying an event list only or a trace only, refer to pages 3-107 and 5-3.

No.	Name	Description
①	TOTAL RL	TOTAL RL Displays the return loss occurring between S and E points. If R point has been set, the return loss occurring between R and E points will be displayed.
②	TOTAL LOSS	Displays the total loss occurring between S and E points. If R point has been set, the total loss occurring between R and E points will be displayed.
③	FAULT EVENT	Displays the number of events (fault events) whose splice loss or return loss exceeds the preset threshold.
④	EVENT No.	Displays event Nos. in ascending order, starting from the one nearest to the left edge of the fiber cable. "*" is displayed in front of fault event Nos.
⑤	DISTANCE (km)	Displays the distance from the origin to the event.
⑥	SPLICE LOSS(dB)	Displays the splice loss for the event. It will be displayed in red if it exceeds the threshold
⑦	RETURN LOSS(dB)	Displays the return loss for the event. It will be displayed in red if it exceeds the threshold.
⑧	Cum LOSS(dB)	Displays the loss accumulated, starting from the first event up to the one you are currently referring to.
⑨	dB/km	Displays the loss (per km) between events.
⑩	EVENT TYPE	 : Indicates that the event is a negative loss.  : Indicates that the event is a positive loss.  : Indicates that the event is reflection.
⑪	SECTION Gr INDEX	Displays the group index between events.

Refer

For the method of setting the threshold for fault events, refer to page 5-36 and 5-37.

Changing the Current Event

The current event is the event you are currently referring to.

1. The current event can be changed by turning the rotary knob.

TIP

Event 1 will be set as the current event just after auto search is completed.

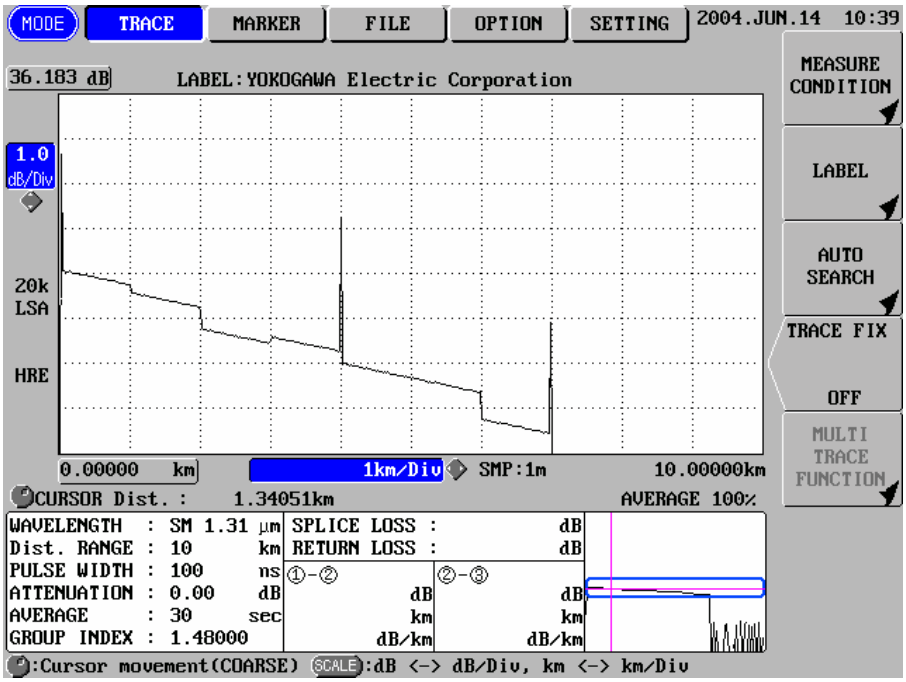
But the R point will be set as current event, if distance reference will be set.

Refer

For details on the distance reference, refer to page 7-27.

When “MANUAL” is Selected for “EVENT SEARCH”

The following window will appear at the end of average measurement if “MANUAL” is currently selected for “EVENT SEARCH”.



TIP

If [F3] is pressed in this window, auto search will be performed automatically and the window shown on page 3-68 will appear.

Refer

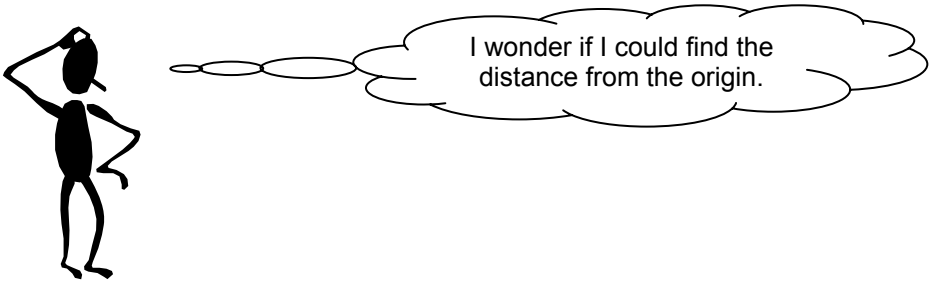
For the method of searching events, refer to page 3-36.

This section explains how to check the following items manually.

- Distance from the origin
- Distance between two points
- Splice loss
- Return loss

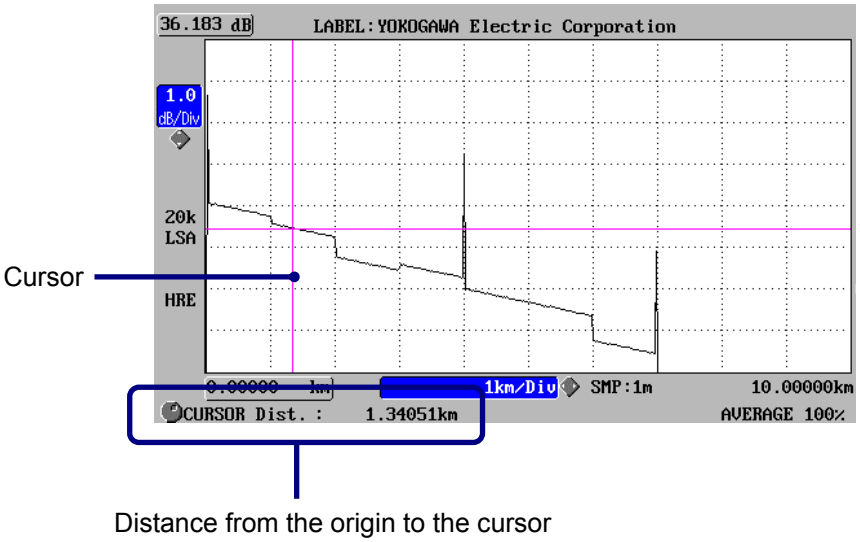
Checking the Distance from the Origin

This section explains how to check the distance from the distance origin.



1. Turn the rotary knob.

The distance from the origin to the cursor position will be displayed.



TIP

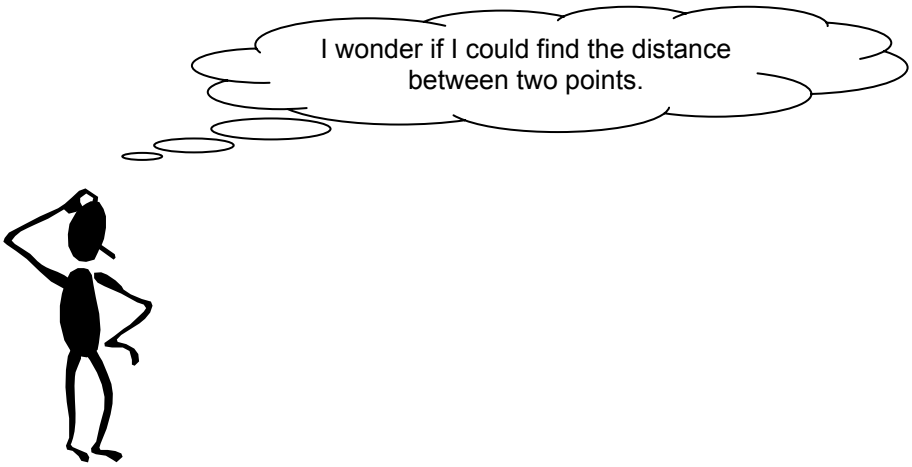
- Normally, the distance origin means the connection point between the instrument and optical fiber.
- The position of the distance origin can be changed.
- The cursor type (shape) can be changed.
- To find more accurate distance, enlarge the trace and adjust the cursor position.

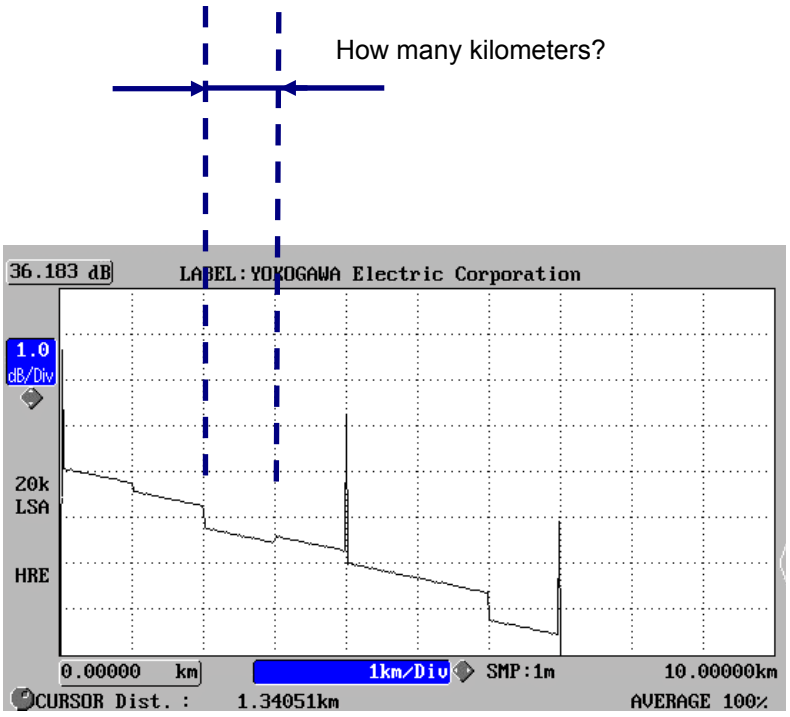
Refer

- For the method of moving the cursor, refer to page 3-64.
- For the method of changing the distance origin, refer to page 7-27.
- For the method of changing the cursor type (shape), refer to page 2-8.
- For the method of enlarging the trace, refer to page 3-66.

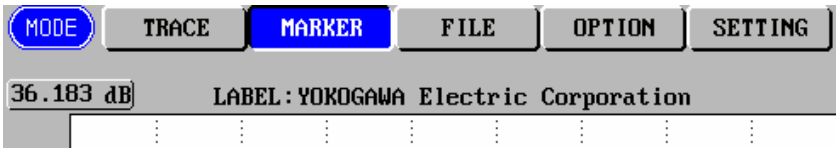
Checking the Distance between Two Points

This section explains how to check the distance between the desired two points.





1. Press [MODE] to locate the cursor to "MARKER" ("MARKER" is highlighted).



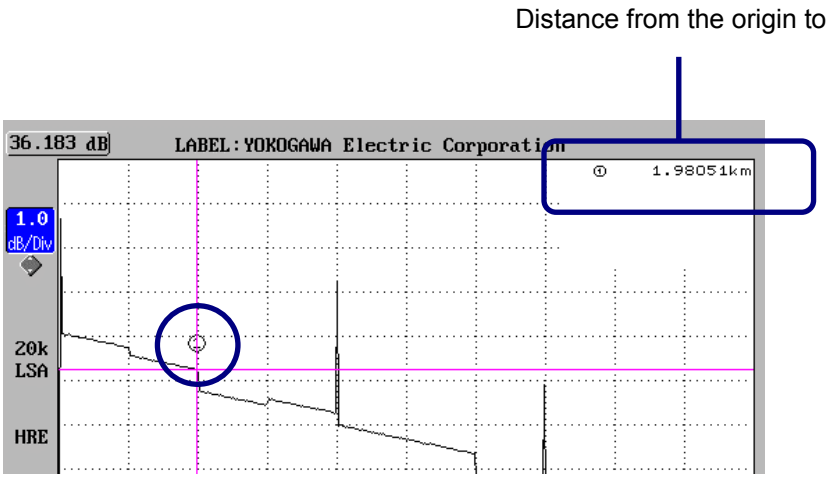
2. Turn the rotary knob and locate the cursor to the start point of the distance to be found.

Refer

For the method of moving the cursor, refer to page 3-64.

3. Press [F1] (①).

Marker ① will appear at the cursor position.

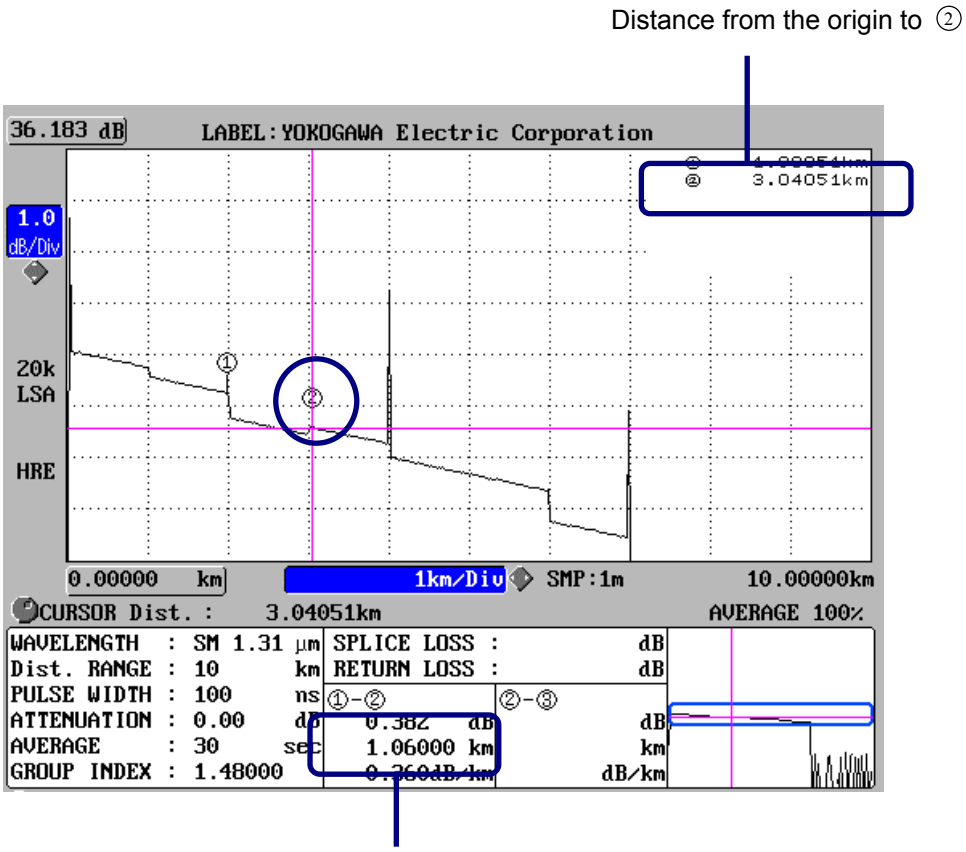


4. Locate the cursor to the end point of the distance you want to know, by turning the rotary knob.

5. Press [F2] (②).

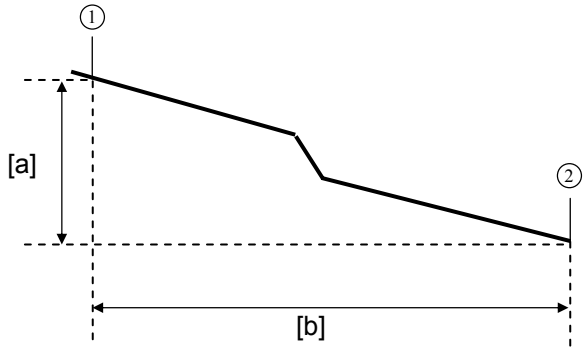
"②" will appear at the cursor position.

The distance between the two points will be displayed.



Inter-marker information

SPLICE LOSS :		dB
RETURN LOSS :		
①-②		②-③
[a]	dB	dB
[b]	km	km
[a] / [b]	dB/km	dB/km



Caution

The inter-marker values (dB and dB/km) vary considerably depending on the currently selected approximate method.

TIP

To find more accurate distance, enlarge the trace and fine-adjust the markers.

Refer

- For details on approximate method, refer to page 3-38.
- For the method of enlarging the trace, refer to page 3-66.

To clear the markers

1. **Press [F5] (NEXT PAGE) in this window.**
2. **Press [F3] (MARKER DELETE).**

To clear the cursor

1. **Press [F5] (NEXT PAGE) in this window.**
2. **Press [F4] (CURSOR DELETE).**

Checking the Splice Loss

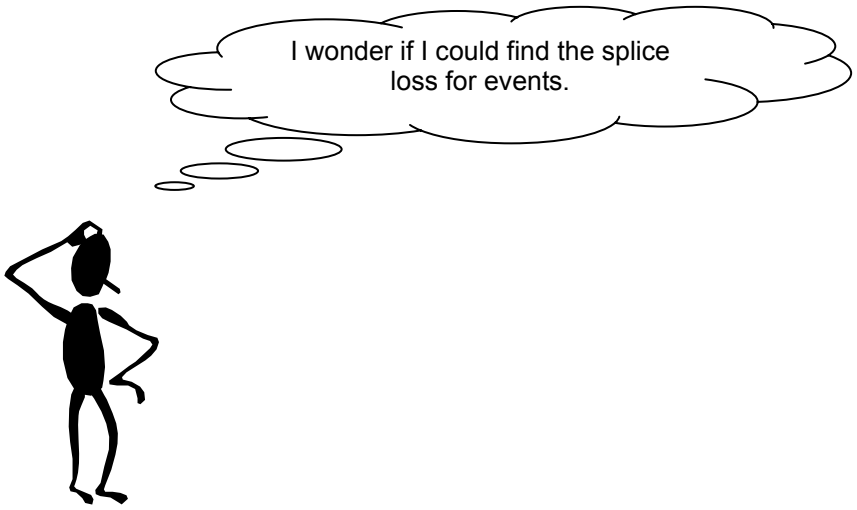
Splice loss can be checked using the following two methods.

- 4-point method
- 6-point method

An explanation is given above for each method.

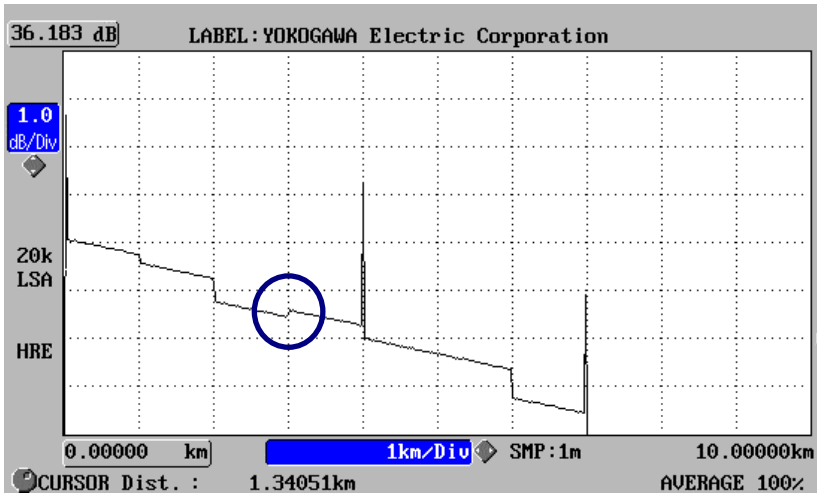
Refer

For details on splice loss, refer to page 1-45.

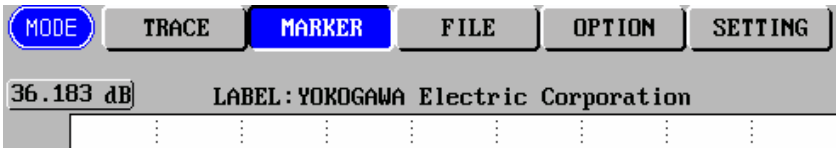


4-Point Method

The 4-point method allows you to check splice loss for the desired events using four markers.



1. Press [MODE] to locate the cursor to "MARKER" ("MARKER" is highlighted).



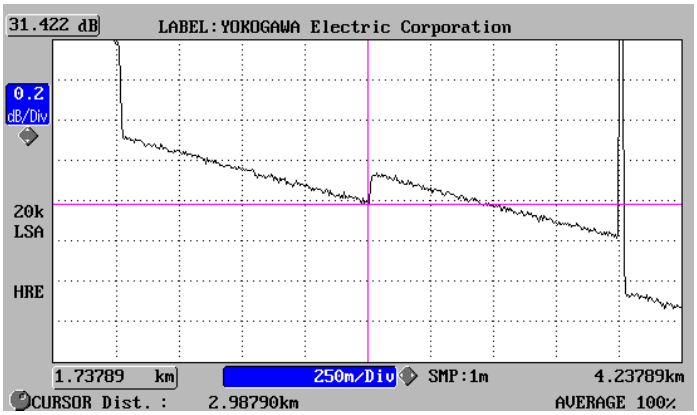
2. Locate the cursor near the desired event by turning the rotary knob.

Refer For the method of moving the cursor, refer to page 3-64.

3. Enlarge the trace.

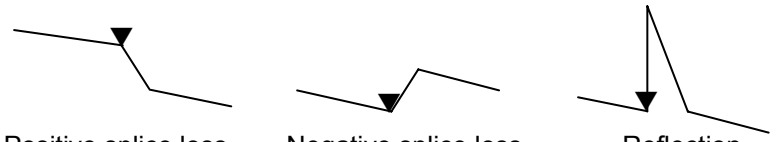
Refer For the method of enlarging the trace, refer to page 3-66.

4. Locate the cursor on the desired event by turning the rotary knob.



Caution

Events (▼) indicate the following positions.

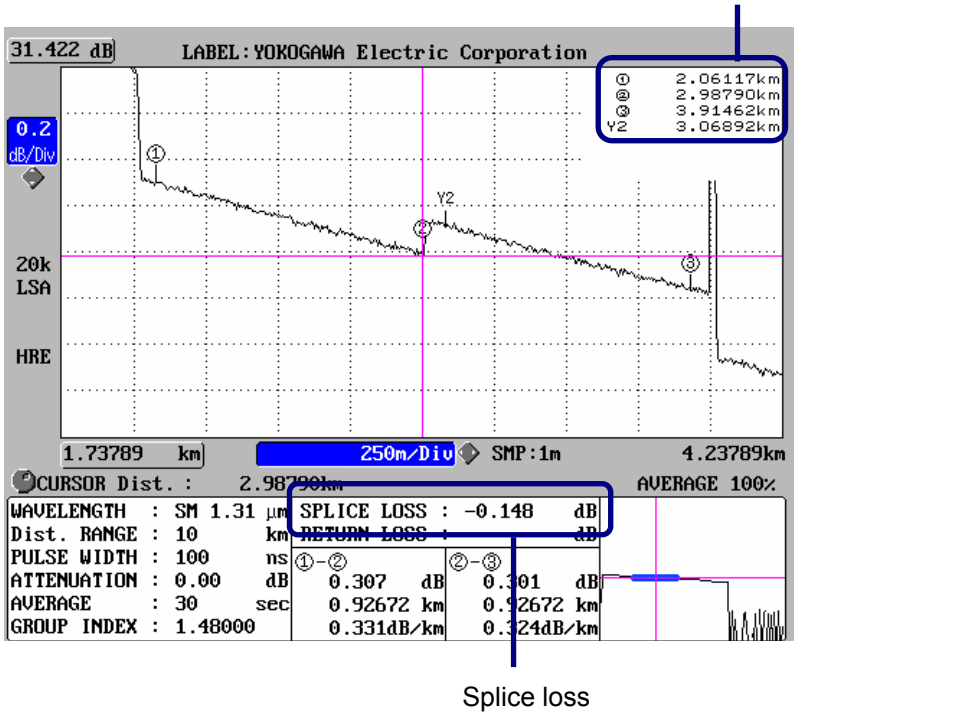


5. Press [F2] (②).

"②" will appear at the cursor position.

Markers ①, Y2 and ③ will be set when ② marker is displayed.

The splice loss will be displayed.



Caution

•If markers ①, Y2, ③, Y1 and Y3 are already set before ②, markers ①, Y2 and ③ will not be set automatically.

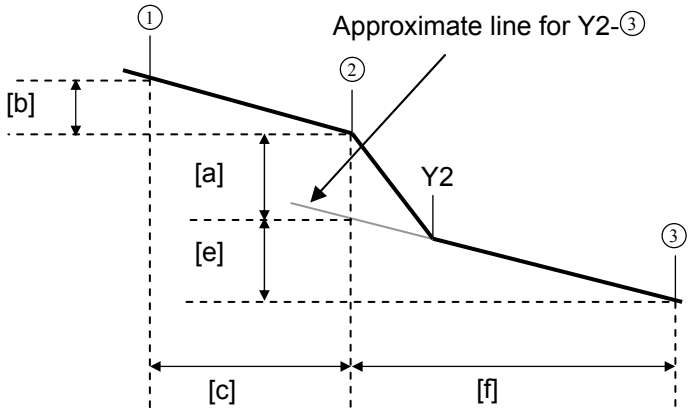
•Make sure that ② is set at the exact position. The splice loss will vary considerably depending on the position of marker ②.

TIP

Markers ① and ③ move closer to ② each time [F2] is pressed. If [F2] is pressed when they are located closest to ②, they will return to the edges of the window. This operation can be repeated as many times as you like, however, if another operation is carried out in between, this operation can no longer be carried out.

Inter-marker information

SPLICE LOSS :	[a]	dB			
RETURN LOSS :					
①-②			②-③		
[b]		dB	[e]		dB
[c]		km	[f]		km
[b] / [c]		dB/km	[e] / [f]		dB/km



Caution

The inter-marker values (dB and dB/km) vary considerably depending on the currently selected approximate method.

Refer

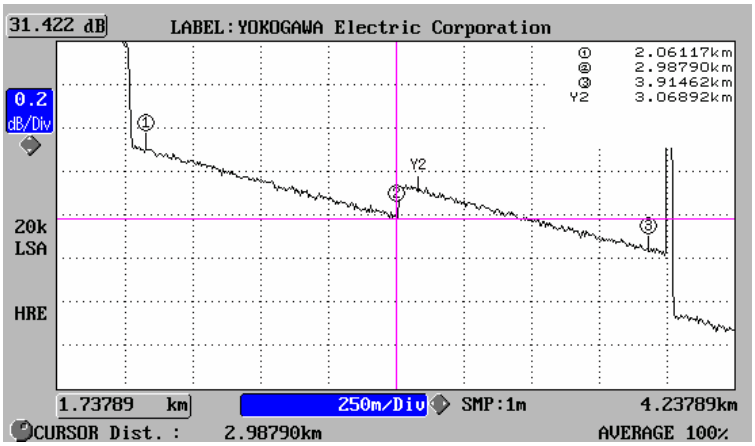
- For details on approximate method, refer to page 3-38.
- For the method of deleting markers and cursor, refer to page 3-77.
- For the method of displaying the approximate line, refer to page 7-3.

6-Point Method

The 6-point method allows you to check splice loss for the desired events using six markers.

The distance from the previous event can be found by performing this method.

In this explanation, it is assumed that four markers (① to ③, Y2) have already been set.



Refer For the method of setting four markers, refer to page 3-79.

1. Move ①.

1-1. Locate the cursor to the event just before the current one by turning the rotary knob.

Refer For the position for marker ①, refer to page 3-85.

1-2. Press [F1] (①).

The position of marker ① will move.

2. Set marker Y1.

2-1. Locate the cursor to the position where Y1 is to be set, by turning the rotary knob.

Refer

For the position for marker Y1, refer to page 3-85.

2-2. Press [F5] (NEXT PAGE).

2-3. Press [F1] (Y1).

"Y1" will appear at the cursor position.

3. Set marker Y3.

3-1. Locate the cursor to the position where Y3 is to be set, by turning the rotary knob.

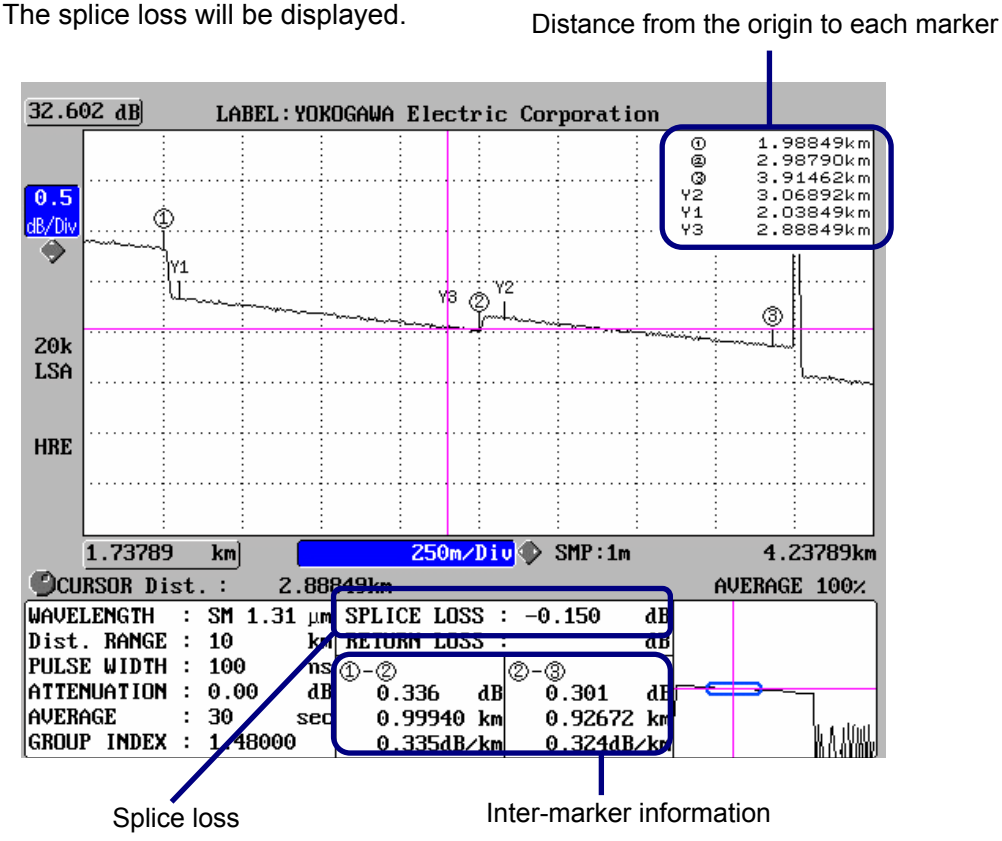
Refer

For the position for marker Y3, refer to page 3-85.

3-2. Press [F2] (Y3).

Marker Y3 will appear at the cursor position.

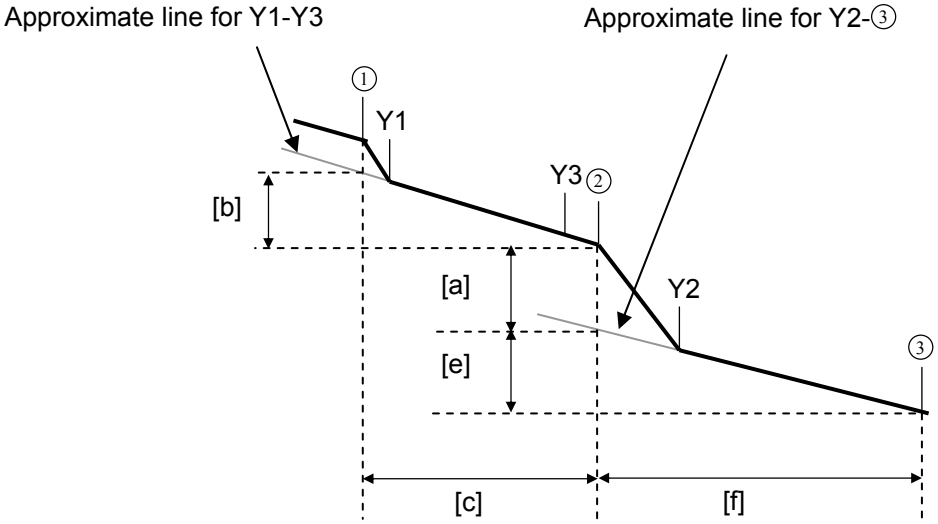
The splice loss will be displayed.



Inter-marker information

SPLICE LOSS :	[a]	dB
RETURN LOSS :		

①-②		②-③	
[b]	dB	[e]	dB
[c]	km	[f]	km
[b] / [c]	dB/km	[e] / [f]	dB/km



Caution

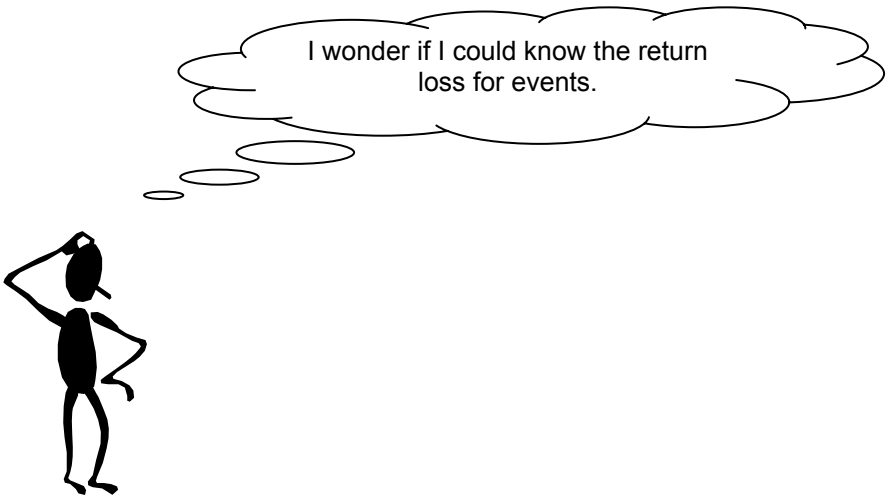
The inter-marker values (dB and dB/km) vary considerably depending on the currently selected approximate method.

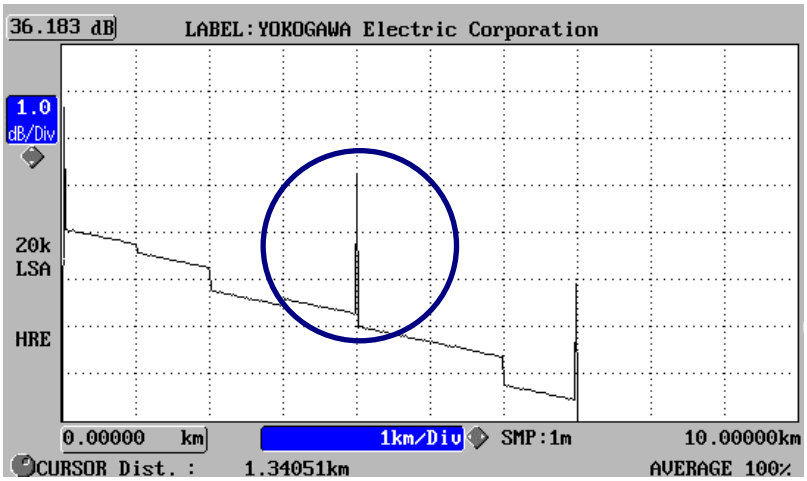
Refer

- For details on approximate method, refer to page 3-38.
- For the method of deleting markers and cursor, refer to page 3-77.
- For the method of displaying the approximate line, refer to page 7-3.

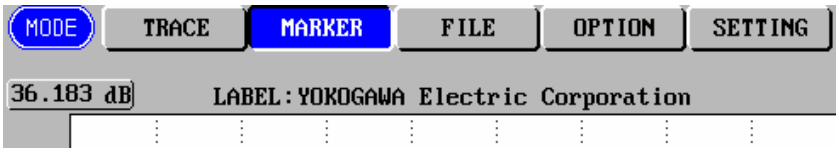
Checking the Return Loss

This section explains how to check the return loss for the desired event.





1. Press [MODE] to locate the cursor to "MARKER" ("MARKER" is highlighted).



2. Locate the cursor near the desired event by turning the rotary knob.

Refer

For the method of moving the cursor, refer to page 3-64.

3. Enlarge the trace.

Refer

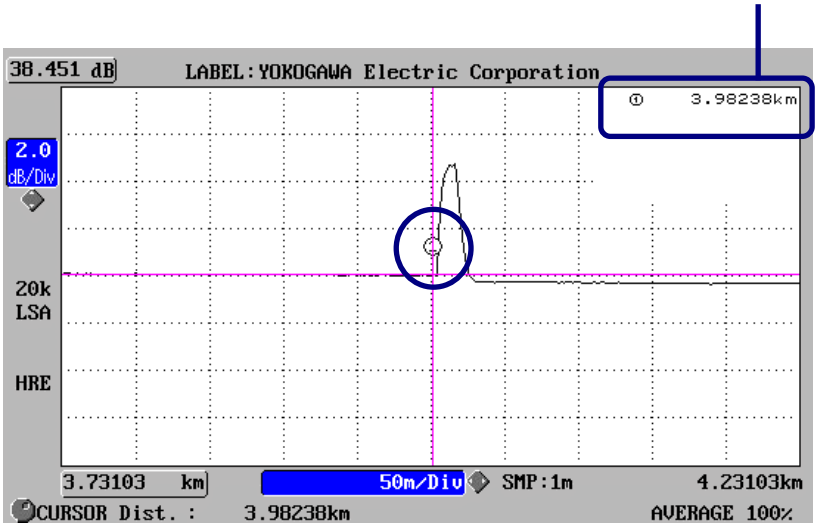
For the method of enlarging the trace, refer to page 3-66.

4. Locate the cursor to the event by turning the rotary knob.

5. Press [F1] (①).

Marker ① will appear at the cursor position.

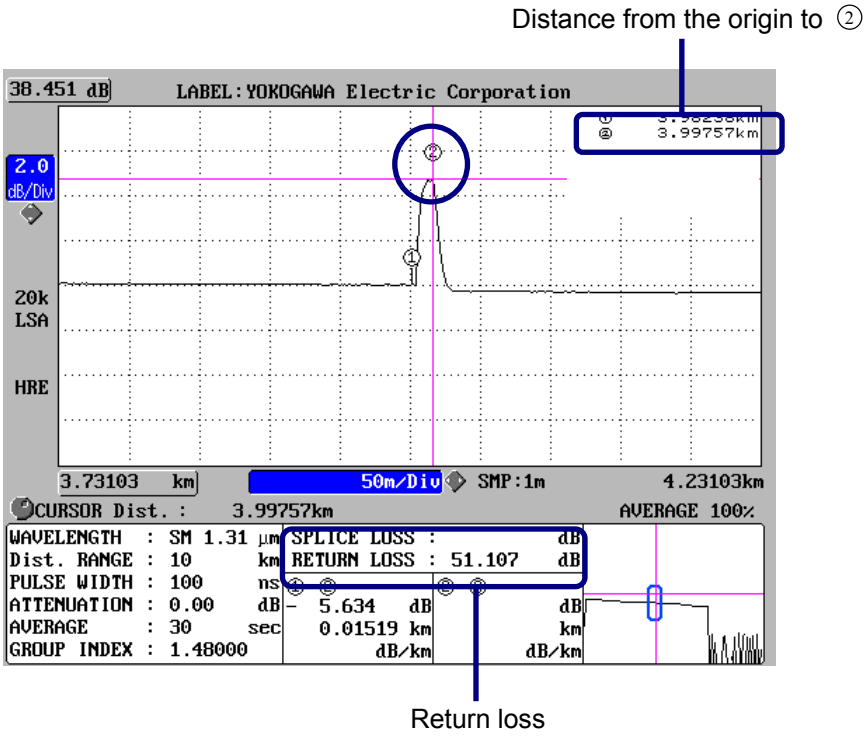
Distance from the origin to ①



6. Locate the cursor at the peak of the event by turning the rotary knob.

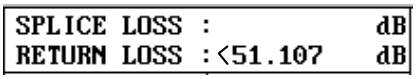
7. Press [F2] (②).

The return loss will be displayed.



Caution

"<" mark will appear in front of the return loss value if the trace is saturated.



The level of reflection occurring when the trace is saturated will be actually larger than that displayed.

To prevent saturation, the following two methods are available.

- Measuring again with larger attenuation
- Measuring again with "Hi-RETURN" average method
- Measuring again with wider pulse width

Refer

- For the method of changing the attenuation, refer to page 3-20.
- For the method of deleting markers and cursor, refer to page 3-77.

3.9 Recording the Measured Data [Step 8]

This section explains how to save and print the measured data.

Saving the Measured Data

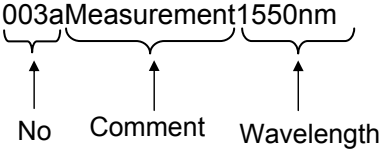
This section explains how to save the measured data, by taking an example of the following file name and location.

Save destination drive: PCMCIA

Save destination folder: 2004/Jun/16-30

File type: .SOR(Telcordia)

File name: 003aMeasurement1550nm



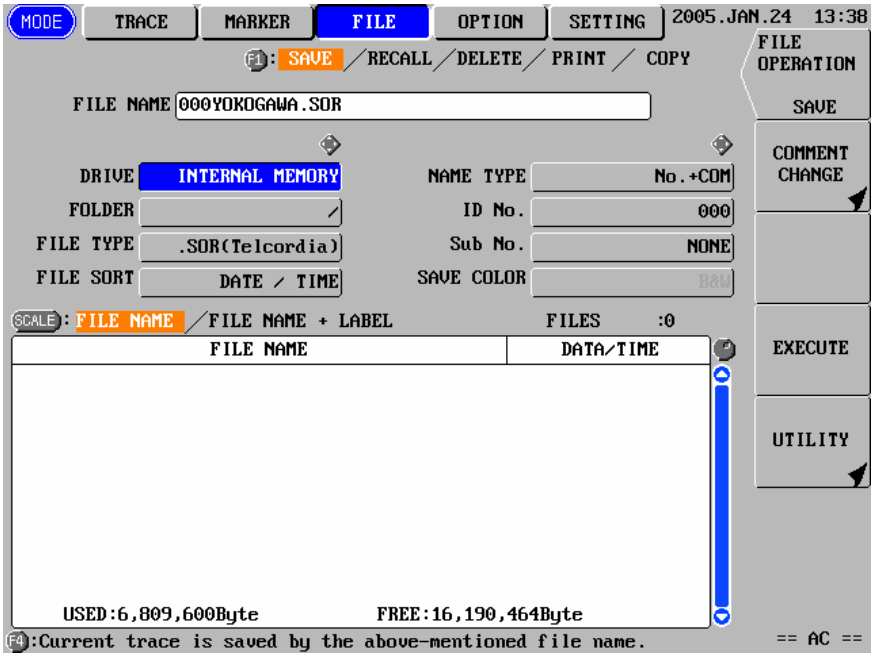
Caution If the measured data auto saving function has been set to ON, the measured data is saved under the various conditions set in this section when an average measurement is completed.

Refer For the method to enable the automatic saving function, refer to page 3-34.

Displaying the File Operation Window

1. Press [FILE].

The following file operation window will appear.



TIP

The file operation window can also be displayed by pressing [MODE] and locating the cursor at the desired file.

Changing the File Operation Setting

This instrument allows various file operations (saving, recalling, deleting, printing, copying).

This section explains how to change the file operation .

♦ Example: “COPY” → “SAVE”

1. Press [F1] (FILE OPERATION).

A selection window will appear.

TIP

Selectable file operations	*SAVE	Saves the measured data.
	RECALL	Recalls a saved file.
	DELETE	Deletes a saved file.
	PRINT	Recalls a saved file and prints its data.
	COPY	Copies a saved file to another drive or directory.

*: Indicates the default setting.

2. Locate the cursor to “SAVE” by using the rotary knob or [▲] / [▼].

3. Press [ENTER] to register the change made to the file operation setting.

Switching the Drive to Another

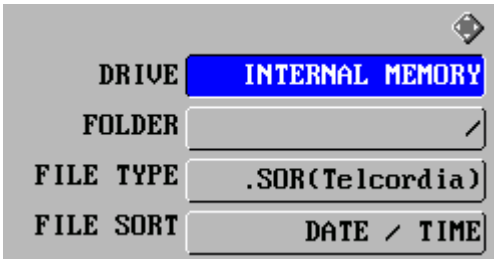
This section explains how to switch the drive.

♦ Example: “INTERNAL MEMORY” → “PCMCIA”

Caution

If no drives are installed on the instrument or if they are installed but not connected, it is not possible to select them. In this case, the measured data will be saved to the internal memory. The floppy disk drive cannot be selected unless a floppy disk is inserted into the floppy disk drive.

1. Locate the cursor to “DRIVE” by using the arrow key.



TIP

The cursor is already located at “DRIVE” when the file operation window is displayed.

2. Press [ENTER].

A selection window will appear.

TIP

Selectable drives	EXTENSION UNIT
	USB
	PCMCIA
	*INTERNAL MEMORY

*: Indicates the default setting.

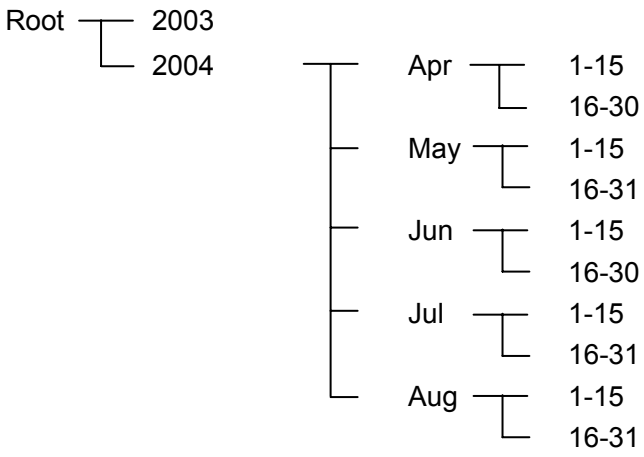
3. Locate the cursor to “PCMCIA” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the drive setting.

Switching the Folder to Another

This section explains how to change the folder.

Assuming that the selected drive has the following folder structure.



The method of changing from one folder to another is explained below.

♦ Example: “Root folder” → “2004” → “Jun” → “16-30”

Caution

•Before specifying a folder, make sure that the folder is created using a personal computer or by this instrument. It is not possible to specify a folder if it is not created. In this case, the measured data will be saved to the root folder.

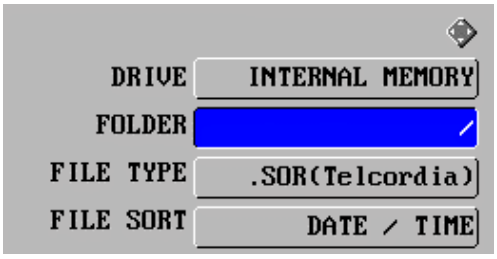
•In the case of the root folder on a storage media that has been initialized by FAT 16, up to 512 files (*1) can be stored.

*1:File names must consist of 8 characters (excluding file extension). “512” also includes the number of folders.

Refer

For the method of creating a folder by this instrument, refer to page 6-27.

1. Locate the cursor to “FOLDER” by using the arrow key.

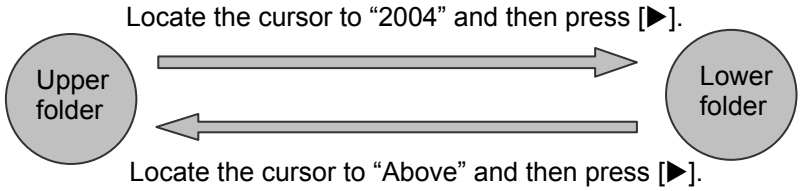


2. Press [ENTER].

A selection window will appear.

TIP

The folder (e.g. root folder) selected in the selection window shows all the sub folders. To display all the sub folders of a sub folder, locate the cursor to the sub folder, and press [◀] or [▶]. To move the upper folder, locate cursor to “Above” and press [◀] or [▶].



Display example

/
2003
2004

Above
2004
Apr
May
Jun
Jul
Aug

3. Locate the cursor to “2004” by using the rotary knob or [▲] / [▼].

4. Press [◀] or [▶].

5. Locate the cursor to “Jun” by using the rotary knob or [▲] / [▼].

6. Press [◀] or [▶].

7. Locate the cursor to “16-30” by using the rotary knob or [▲] / [▼].

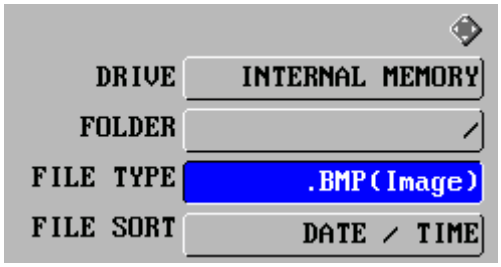
8. Press [ENTER] to register the change made to the folder setting.

Changing the File Type (Extension)

This section explains how to change the file type.

♦ Example: ".BMP(Image)" → ".SOR (Telcordia)"

1. Locate the cursor to "FILE TYPE" by using [▲] / [▼].



2. Press [ENTER].

A selection window will appear.

TIP

Selectable file types	*.SOR (Telcordia)	Saves the measured data in a format that conforms to Telcordia SR-4731.
	.TRD(AQ7260)	Saves the measured data in AQ7260's file format. Use when loading AQ7260 data on the AQ7391 Emulation software (ver. 2.8 or later).
	.SET (Setup)	Saves the measurement conditions.
	.LST (Event List)	Saves the event list in text format. The measurement conditions and traces are not saved.
	.BMP (Image)	Saves the screen displayed before [FILE] is pressed in BITMAP format.
	.TIF (Image)	Saves the screen displayed before [FILE] is pressed in TIFF format.
	.SOR(Bellcore)	Saves the measured data in a format that conforms to Bellcore GR-196-CORE.
	.CSV	Saves the measured data in CSV format.

*: Indicates the default setting.

Caution

- To recall a file saved using AQ7931 emulation software (Ver.2.8 or later), make sure that the data is saved in .TRD or SOR (Bellcore) format. Also make sure that the file name is a number with only three digits.
- The trace data of measured by 60k in data size or 640km in distance range cannot be saved in TRD format.
- Even if data has been saved in SOR (Bellcore) format, it cannot be recalled using AQ7931 emulation software (Ver.2.8) if its data size exceeds 20,000.
- Files created on the AQ7269 can be loaded on version 2.01 or later of the AQ7932 emulation software.

TIP

For the AQ7932 Emulation Software, contact the dealer from which you purchased the instrument.

3. Locate the cursor to ".SOR(Telcordia)" by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the file type.

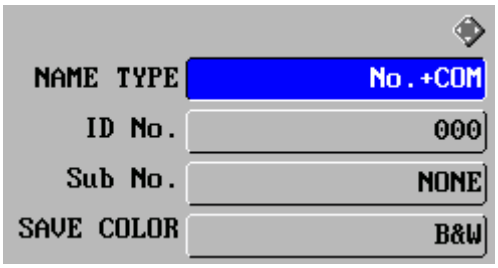
Changing the File Name Format

This section explains how to change the name type of a file.

♦ Example: “No.+COM” → ”No.+COM+No.”

Caution When file type is selected .SOR(Bellcore), File name type can not be changed.

1. Locate the cursor to “NAME TYPE” by using the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable file name formats	No.+COM	File name @@@@@@@····@@@@****.$$$
	COM+ No.	****@@@@@@@····@@@@.$$$
	No.	****.$$$
	COM	@@@@@@@····@@@@.$$$
	*No.+COM+WL	****@@@@@@@····@@@@&&&&nm.$$$
	NO.+WL+COM	****&&&&nm @@@@@@@····@@@@.$$$
	COM+No.+WL	@@@@@@@····@@@@****&&&&nm.$$$
	COM+WL+No.	@@@@@@@····@@@@&&&&nm****.$$$
	WL+No.+COM	&&&&nm****@@@@@@@····@@@@.$$$
	WL+COM+No.	&&&&nm@@@@@@@····@@@@****.$$$

@: COMMENT, ∗: No., &: Wavelength, $: Extension

*: Indicates the default setting.

For the wavelength, the value used for measurement is displayed.

Refer

For details on No., refer to page 3-99.

3. Locate the cursor to “No.+COM+WL” by using the rotary knob or [▲] / [▼].

TIP

When using multi wavelength measurement function, please selects file name included wavelength as file name type.

Refer

For continuous measurement with multiple wavelengths, refer to page 7-52.

4. Press [ENTER] to register the change made to the file name format.

Changing the ID No.

The No. is used in combination with the SUB No. described in the next section.

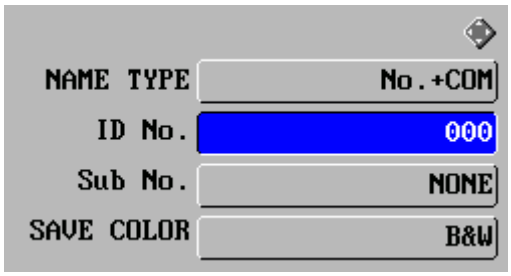
Refer For the description on the increment of No., refer to page 3-101.

This section explains how to change the main No. attached to a file name.

♦ Example: “000” → “003”

Caution No. cannot be changed if “COM” has been selected as the file name format.

1. Locate the cursor to “ID No.” by using the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable ID No.	* 000 to 999 (1 step)

*: Indicates the default setting.

3. **Locate the cursor to “0” (one’s digit) by using [◀] / [▶].**

4. **Change to “3” by using the rotary knob or [▲].**

5. **Press [ENTER] to register the change made to the ID No.**

Changing the Sub No.

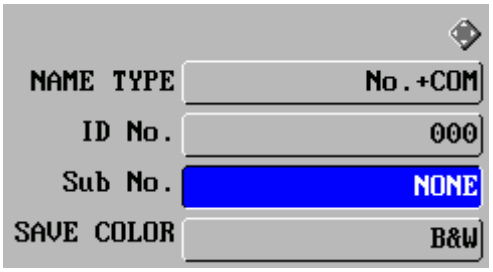
This section explains how to change the Sub No. attached to a file name.

♦ Example: “NONE” → “a-c”

Caution

When file type is selected .TRD(AQ7260) or .SOR(Bellcore), SUB No. can not be changed.

1. Locate the cursor to “Sub No.” by using the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable sub No.	*NONE
	a-b
	a-c
	a-d
	a-e
	a-f
	a-g
	a-h

*: Indicates the default setting.

The label No. will increase as follows when “NONE” or “a-c” is selected.

NONE: 003→004→005→006→…

a-c : 003a→003b→003c→004a→004b→004c→…

(When the start No. is set to “003”)

3. **Locate the cursor to “a-c” by using the rotary knob or [▲] / [▼].**

4. **Press [ENTER] to register the change made to the sub No.**

Changing the Save Color

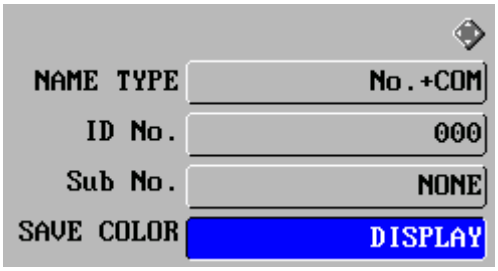
This section explains how to change the save color.

♦ Example: “DISPLAY” → “B&W”

Caution

The save color can be specified only if “.BMP(Image)” or “.TIF(Image)” is selected as the file type.

1. Locate the cursor to “SAVE COLOR” by using the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable save colors	DISPLAY
	*B&W

*: Indicates the default setting.

3. Locate the cursor to “B&W” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the save color.

Changing the File Name

This section explains how to change the comment part of the file name.

Caution

- The file name can consist of up to 43 characters in total.

  Comment: 29 characters

  No.: 4 characters

  Wavelength: 6 characters

  Extension: 4 characters

- The comment cannot be changed if “No.” has been selected as the file name format.

1. Press [F2] (COMMENT CHANGE).

A window allowing you to change the comment will appear.

Refer

For method of input the character, refer to Chapter 4.

Saving the Data

1. Press [F4] (EXECUTE) to save the data.

Caution

It is not allowed to use a space or a period (.) as the first character of a file name.

TIP

After the data has been saved, the trace mode will be activated.

Printing the Measured Data

The following three print functions are available.

- Printing the currently displayed window
- Printing the trace and event list
- Printing the event list

Caution

Before starting to print, make sure that a printer is connected to the instrument and correct print settings are made.

Refer

- For the method of connecting a printer, refer to pages 8-3 and 8-16.
- For the method of changing the printer, refer to pages 8-6 and 8-18.
- For the method of setting the print direction, refer to page 2-39.
- For the method of setting the print color, refer to page 2-41.

Printing the Currently Displayed Window

This section explains how to print the currently displayed window.

1. Press [PRINT].

Printing will start.

Printing the Trace and Event List

This section explains how to print both the measured trace and information on the events detected by auto search.

Caution The trace and event list can be printed only if auto search has been performed.

1. Display a window showing the trace and event list.

Refer For the method of displaying the trace+event list window, refer to page 3-69.

2. Press [F5] (TRACE+LIST PRINT).

Printing will start.

Printing the Event List

This section explains how to print only the information regarding the events detected by auto search.

Caution The event list can be printed only if auto search has been performed.

1. Display a window showing the trace and event list.

Refe For the method of displaying the trace+event list window, refer to page 3-69.

2. Press [F1] (SCREEN).

A selection window will appear.

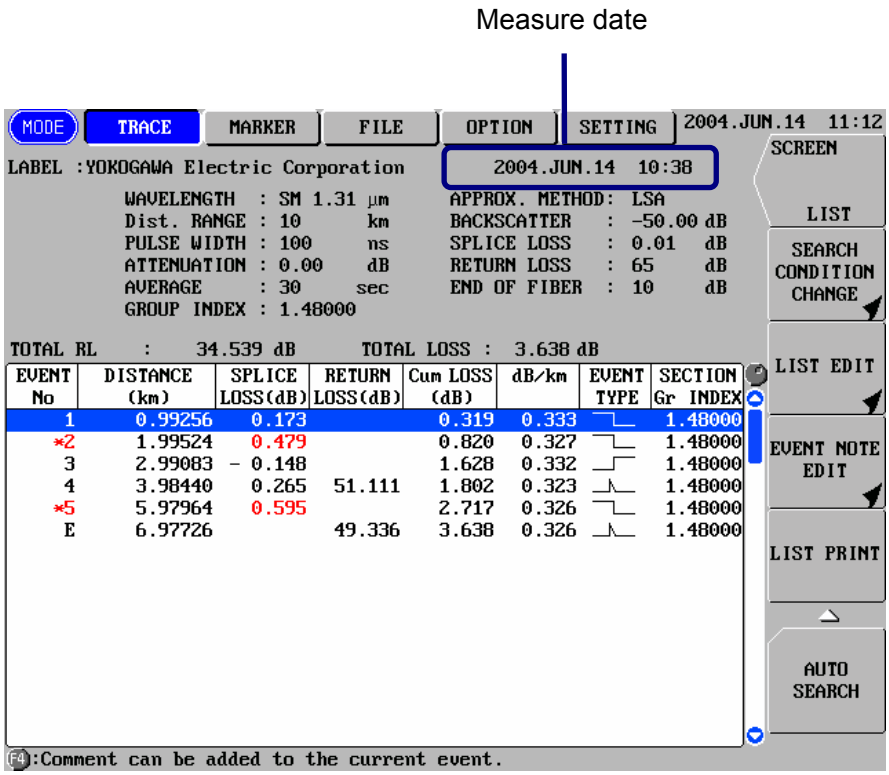
TIP

Selectable screens	*TRACE + LIST
	LIST
	TRACE

*: Indicates the default setting.

3. Locate the cursor to "LIST" by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the print object setting.



5. Press [F5] (LIST PRINT).

Printing will start.

3.10 Turning OFF the Power [Step 9]

Turning OFF the Power

This section explains how to turn OFF the power to the instrument.

1. Make sure there is no measurement currently in progress.

TIP A message “LASER ON” is displayed during measurement.

Refer For the display in the laser ON , refer to page 3-56.

⚠ CAUTION	
⃠	Before turning OFF the power, make sure that no measurement is in progress. Turning OFF the power while measurement is in progress may damage the optical module.

⚠ WARNING	
⃠	Before turning OFF the power, make sure that measurement is stopped. Laser beams are emitted during measurement. Never stare into the laser. Laser beams are invisible to the naked eye, but if they enter the eyes, they may cause impaired eyesight.

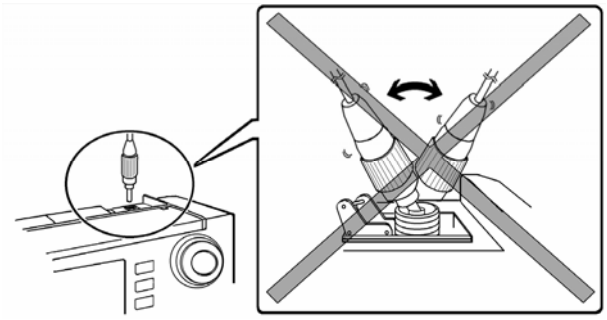
2. Press the power switch located on the top of the instrument to turn OFF the power.

TIP The POWER LED will go out when the power to the instrument is OFF.

3. If you are operating the instrument by AC power, remove the AC adapter from the instrument. Also disconnect the power plug from the AC power outlet.

Disconnecting the Optical Fiber

1. Disconnect the optical fiber that has been measured from the instrument.

⚠ CAUTION	
	When disconnecting the optical connector, position the connector perpendicular to the optical adapter and remove it gently. Shaking it sideways or removing by force may not only damage the optical adapter, but also damage the ferrule on the optical connector. 

2. Close the connector cover.

Chapter 4
ENTERING CHARACTERS

4.1 Entering Characters

With this instrument, a comment (label) on traces can be entered. In addition to the comment, detailed information, such as the names of the company and personal who measured the optical fiber, and the file name to be used to save the measured data can be entered.

This section gives an example of entering a label in order to explain how to enter characters.

Labels can be entered by the following methods.

- Entering a new label
- Using a label that has already been entered. [Fixed form input]

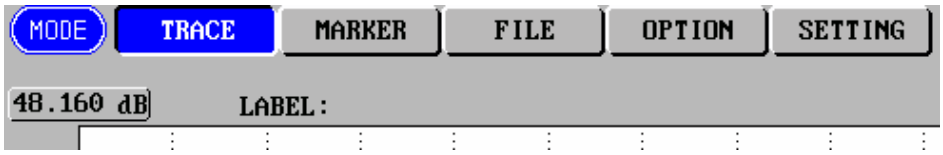
This section explains how to enter a new label.

Refer

- For how to enter a file name, refer to page 3-104.
- For details on the fixed form input method, refer to page 7-11.
- For how to enter detailed information, refer to page 7-16.

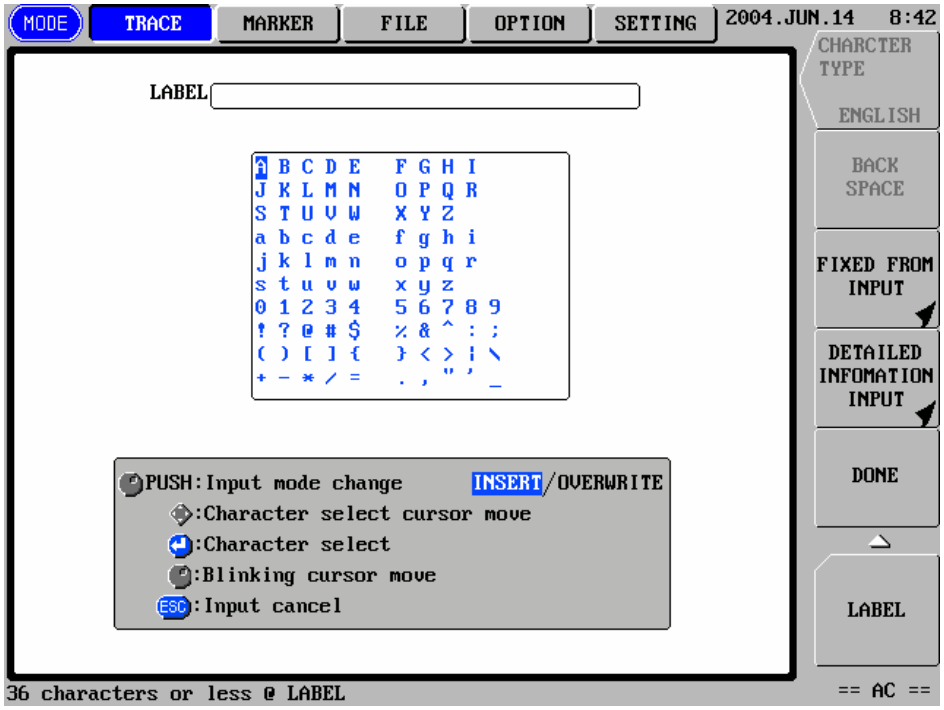
Displaying the Label Input Window

1. Press [MODE] and locate the cursor to “TRACE”.



2. Press [F2] (LABEL).

A window allowing you to enter a label will appear.



Entering a Label

This section explains how to enter the following characters.

♦ Example: AQ7260 OTDR

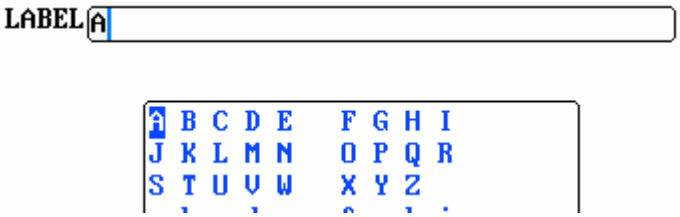
Caution The label can consist of up to 36 characters.

TIP A label can be entered even when measurement is in progress.

1. **Locate the character cursor to “A” by using the arrow key.**

2. **Press [ENTER].**

   “A” will be displayed in the [LABEL] field.



3. **Locate the character cursor to “Q” by using the arrow key.**

4. **Press [ENTER].**

5. **Locate the character cursor to “7” by using the arrow key.**

6. **Press [ENTER].**

7. **Locate the character cursor to “2” by using the arrow key.**

8. **Press [ENTER].**

9. **Locate the character cursor to “6” by using the arrow key.**

10. **Press [ENTER].**

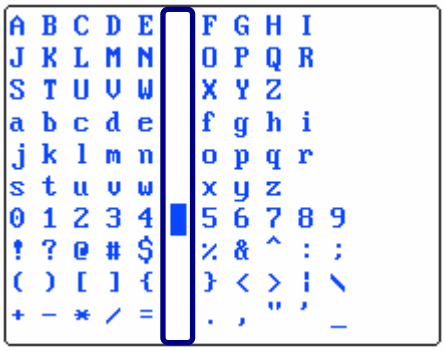
11. **Locate the character cursor to “0” by using the arrow key.**

12. **Press [ENTER].**

13. **Locate the character cursor to “space” by using the arrow key.**

TIP

A space is provided for each line.



14. **Press [ENTER].**

15. **Locate the character cursor to “O” by using the arrow key.**

16. **Press [ENTER].**

17. **Locate the character cursor to “T” by using the arrow key.**

18. **Press [ENTER].**

19. **Locate the character cursor to “D” by using the arrow key.**

20. **Press [ENTER].**

21. **Locate the character cursor to “R” by using the arrow key.**

22. Press [ENTER].

TIP

"AQ7260 OTDR" is displayed in the [LABEL] field at the end of step 22.

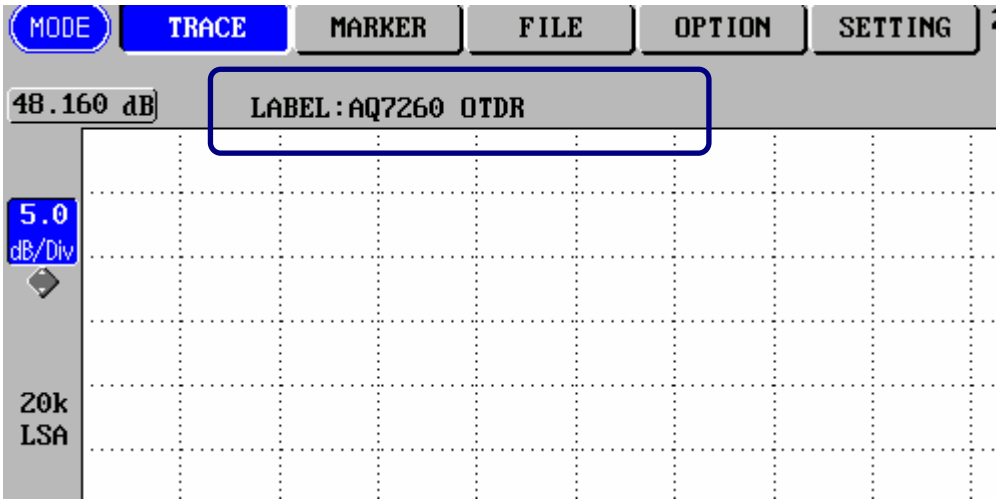
23. Check whether "AQ7260 OTDR" is displayed in the [LABEL] field.

Refer

For the method of editing the entered characters, refer to page4-7.

24. Press [F5] (DONE) to register the label.

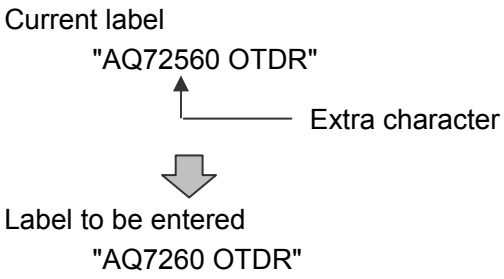
The entered character string will be displayed in the [LABEL] field.



4.2 Editing Characters

Deleting a Character

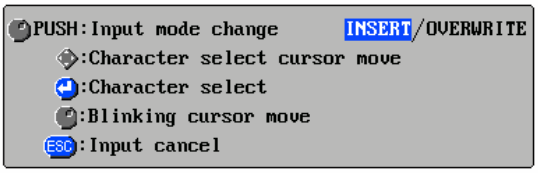
This section explains how to delete a character by taking an example in which an superfluous character is entered by mistake into the label.



1. Display the label input window.

Refer For the method of displaying the label input window, refer to page 4-3.

2. Push the rotary knob to switch the input mode to “INSERT”.



3. Locate the blink cursor after the character “5” to be deleted by turning the rotary knob.

TIP If the current input mode is “OVERWRITE”, locate the blinking cursor on “5”.

4. Press [F2] (BACK SPACE) to delete the unwanted character (“5”).

5. Press [F5] (DONE) to register the label.

Changing a Character

This section explains how to change a character by taking an example in which a wrong character is entered by mistake into the label.

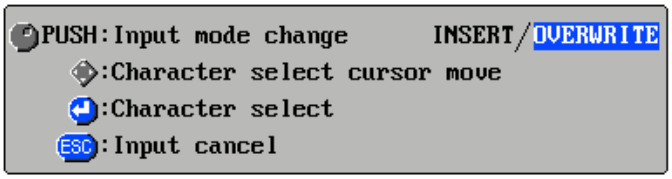
Current label
"AQ7250 OTDR"
Wrong character
Label to be entered
"AQ7260 OTDR"

1. Display the label input window.

Refer

For the method of displaying the label input window, refer to page 4-3.

2. Push the rotary knob to switch the input mode to "OVERWRITE".



3. Locate the blink cursor to the character "5" to be changed by turning the rotary knob.

4. Locate the cursor to "6" by using the arrow key.

5. Press [ENTER].

6. Press [F5] (DONE) to register the label.

Adding a Character

This section explains how to add a character by taking an example in which a character is omitted by mistake from the label.

Current label
"AQ7260 ODR"
"T" is missing.
Label to be entered
"AQ7260 OTDR"

Caution

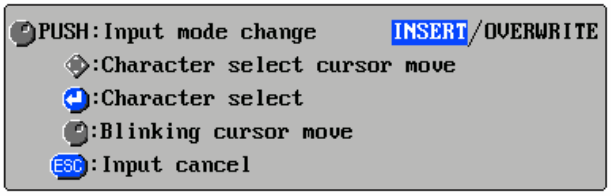
If the allowed maximum number of characters has already been entered or will be exceeded by adding new characters, it will not be possible to add them.

1. Display the label input window.

Refer

For the method of displaying the label input window, refer to page 4-3.

2. Push the rotary knob to switch the input mode to “INSERT”.



3. Locate the blink cursor after the character “O” by using the rotary knob.

4. Locate the cursor to “T” by using the arrow key.

5. Press [ENTER].

Caution

- The character you want to add will be added next to the blinking cursor.
- When adding the character, make sure that the input mode is set to “INSERT”. If “OVERWRITE” is selected, the character at the blinking cursor will be overwritten by the one you enter.

6. Press [F5] (DONE) to register the label.

Chapter 5
EDITING AUTOMATIC SEARCH RESULTS

5.1 Editing an Event

When measurement of an optical fiber starts and auto search is performed, detection of events will be performed by the instrument. In some cases, the instrument cannot detect events since the back scatter level at reflection points is excessively low or it detects noise as an event.

This section explains the following event edit functions.

- Inserting an event
- Deleting an event
- Moving an event

Inserting an Event

This section explains how to insert an event.

1. Measure the optical fiber and perform auto search.

Refer

- For the method of measuring an optical fiber, refer to page 3-57.
- For the screen that shows auto search results at the end of measurement, refer to page 3-69.

2. Press [F1] (SCREEN).

A selection window will appear.

TIP

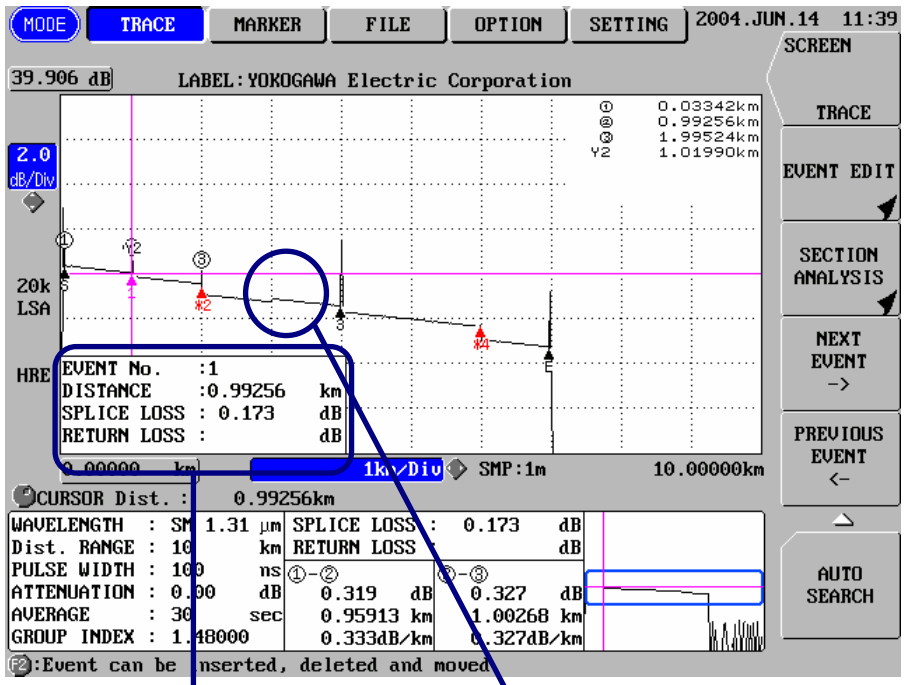
Selectable screens	*TRACE + LIST
	LIST
	TRACE

*: Indicates the default setting.

3. Locate the cursor to "TRACE" by using the rotary knob or [▲] / [▼].

4. Press [ENTER].

The following screen will appear.



Information regarding the current event is displayed.

An event is to be inserted here.

5. Press [F2] (EVENT EDIT).

6. Locate the cursor to the point where an event is to be inserted by turning the rotary knob.

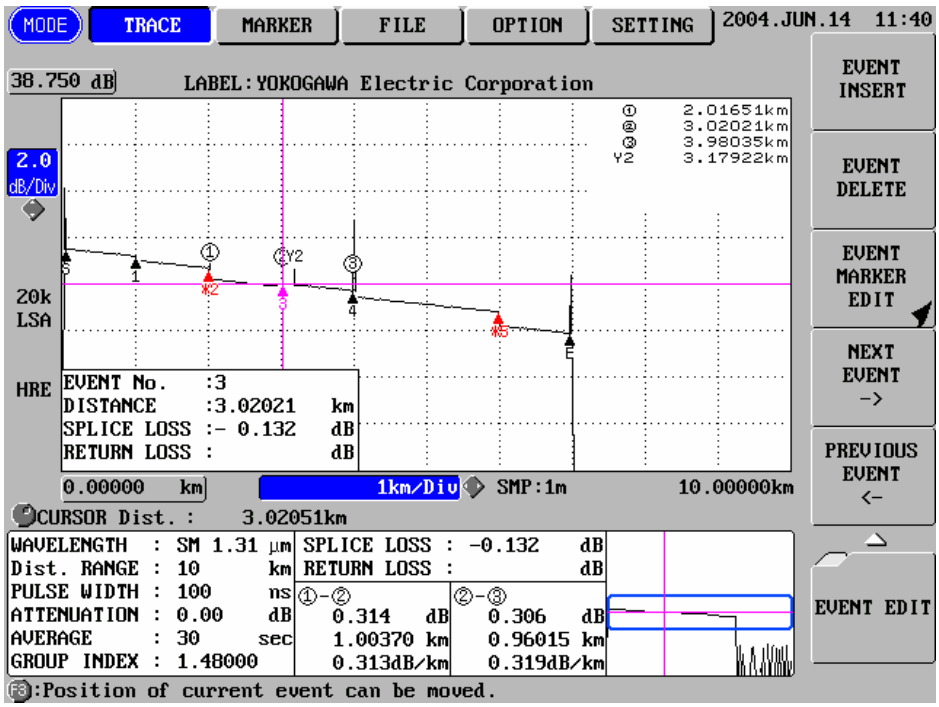
If necessary, enlarge the trace.

Refer

- For the method of moving the cursor, refer to page 3-64.
- For the method of enlarging the trace, refer to page 3-66.

7. Press [F1] (EVENT INSERT).

The event is inserted.



Caution

One trace can be set up to 100 events.

TIP

- When an event is inserted between event Nos. 2 and 3, the inserted event will be set as event 3 and a new No. will be assigned to each subsequent event.
- If an event is inserted to the left of the S event, the inserted event will be set as the S event and a new No. will be assigned to each subsequent event.
- If an event is inserted to the right of the E event, the inserted event will be set as the E event and a number event will be set at the point of the original E event

Deleting an Event

This section explains how to delete an event.

♦ Example: Deleting event 5

Caution This function is not possible if only S and E events exist.

1. Measure the optical fiber and perform auto search.

Refer

- For the method of measuring an optical fiber, refer to page 3-57.
- For the screen that shows auto search results at the end of measurement, refer to page 3-69.

2. Press [F1] (SCREEN).

A selection window will appear.

TIP

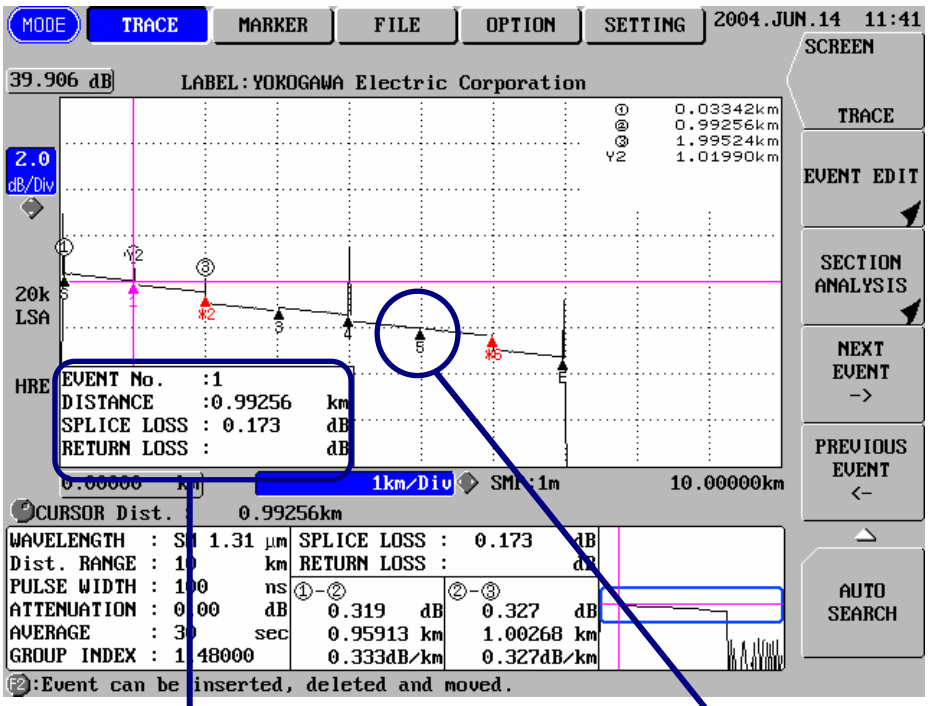
Selectable screens	*TRACE + LIST
	LIST
	TRACE

*: Indicates the default setting.

3. Locate the cursor to "TRACE" by using the rotary knob or [▲] / [▼].

4. Press [ENTER].

The following screen will appear.



An event is to be deleted here.

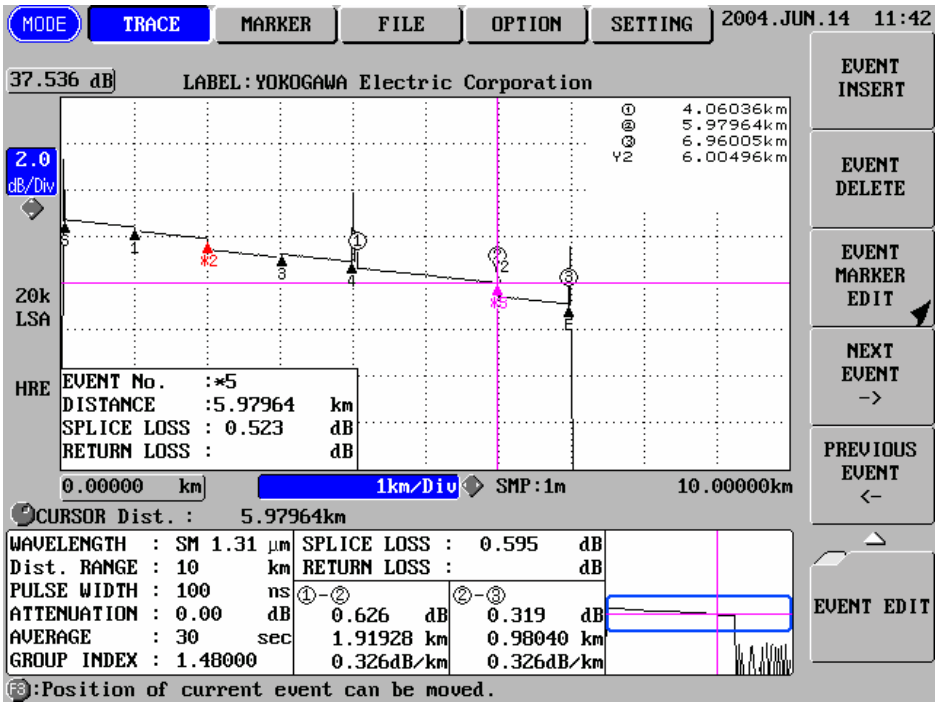
Information regarding the current event is displayed

5. Press [F2] (EVENT EDIT).

6. Press [F4] (NEXT EVENT) or [F5] (PREVIOUS EVENT) to set event 5 as the current event.

7. Press [F2] (EVENT DELETE).

The event is deleted.



TIP

- A new No. will be assigned to each event located after the deleted event.
- If the S event is deleted, event 1 will be set as the S event, and a new event No. will be assigned to each subsequent event.
- If the E event is deleted, the event with the largest event No. will be set as the E event.

Moving an Event

This section explains how to move an event.

♦ Example: Moving event 3

1. Measure the optical fiber and perform auto search.

Refer

•For the method of measuring an optical fiber, refer to page 3-57.

•For the screen that shows auto search results at the end of measurement, refer to page 3-69.

2. Press [F1] (SCREEN).

A selection window will appear.

TIP

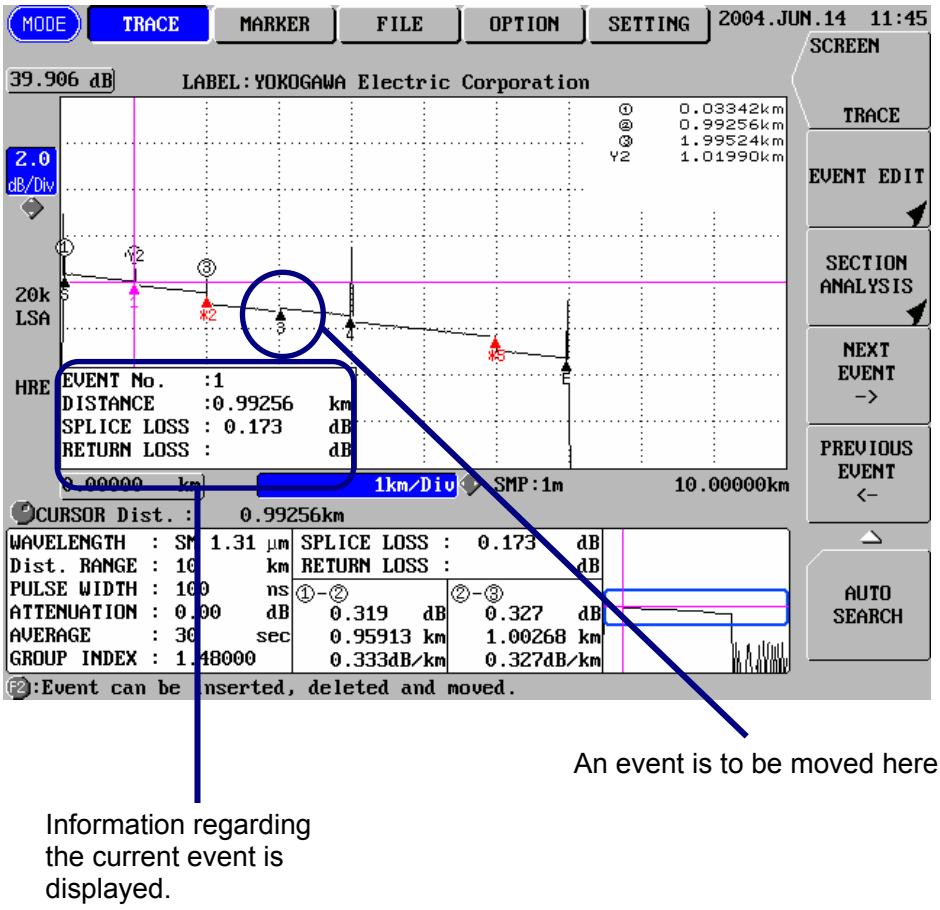
Selectable screens	*TRACE + LIST
	LIST
	TRACE

*: Indicates the default setting.

3. Locate the cursor to "TRACE" by using the rotary knob or [▲] / [▼].

4. Press [ENTER].

The following screen will appear.



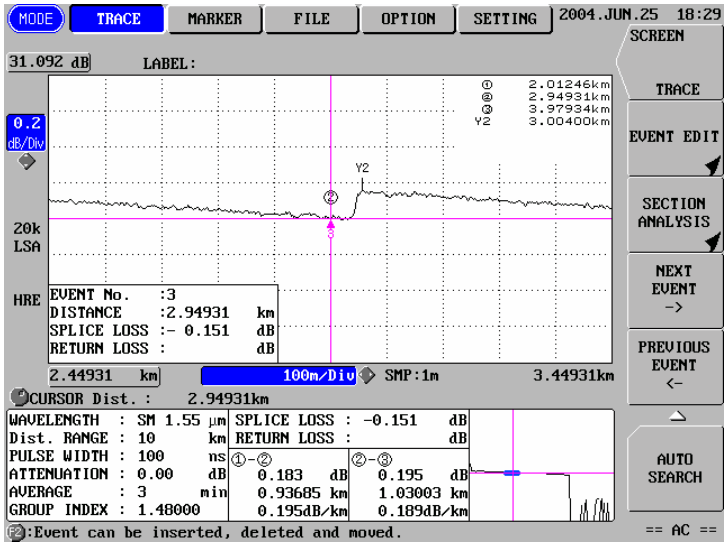
5. Press [F2] (EVENT EDIT).

6. Press [F4] (NEXT EVENT) or [F5] (PREVIOUS EVENT) to set event No.3 as the current event.

7. Press [F3] (EVENT MARKER EDIT).

8. Locate the cursor to the point to which the current event is to be moved by turning the rotary knob.

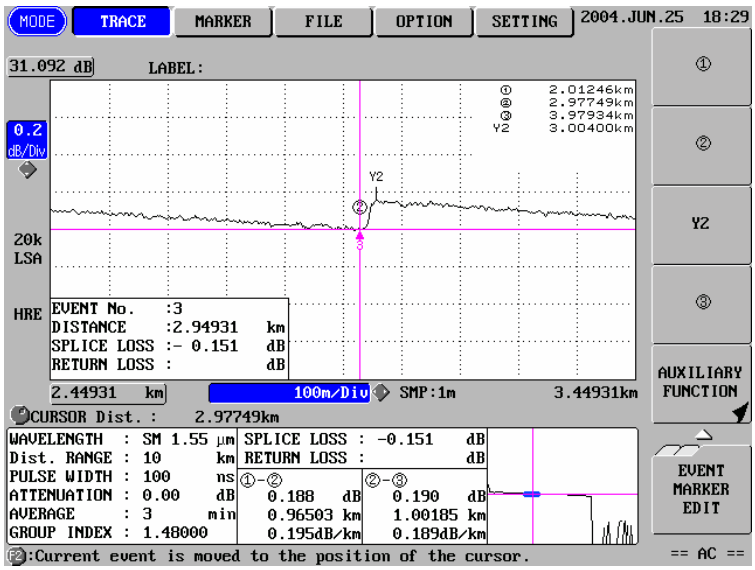
If necessary, enlarge the trace.



Refer For the method of moving the cursor, refer to page 3-64.

9. Press [F2] (②)

The event moves.



Caution The event can be moved between ① and Y2.

5.2 Editing an Event Marker

When auto search is performed, events will be searched by the instrument. An event marker (①,②, Y2, ③) is added to each detected event to calculate splice loss etc.

The splice loss and dB/km vary slightly depending on the event marker positions.

This section explains how to change the marker position assigned to an event.

♦ Example: Changing the position of event marker ① assigned to event 3

Refer

For details on splice loss, refer to pages 1-45 and 3-78.

1. Measure the optical fiber and perform auto search.

Refer

•For the method of measuring an optical fiber, refer to page 3-57.

•For the screen that shows auto search results at the end of measurement, refer to page 3-69.

2. Press [F1] (SCREEN).

A selection window will appear.

TIP

Selectable screens	*TRACE + LIST
	LIST
	TRACE

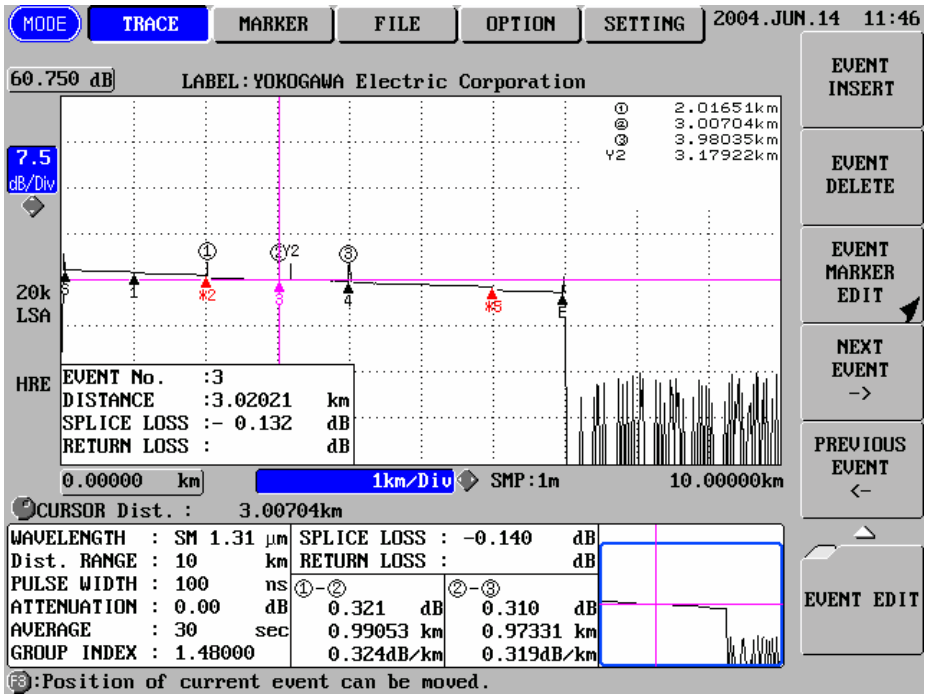
*: Indicates the default setting.

3. Locate the cursor to "TRACE" by using the rotary knob or [▲] / [▼].

4. **Press [ENTER].**

5. **Press [F2] (EVENT EDIT).**

6. **Press [F4] (NEXT EVENT) or [F5] (PREVIOUS EVENT) to set event No.3 as the current event.**



7. **Press [F3].**

8. **Locate the cursor to the point to which marker ① is to be moved by turning the rotary knob.**

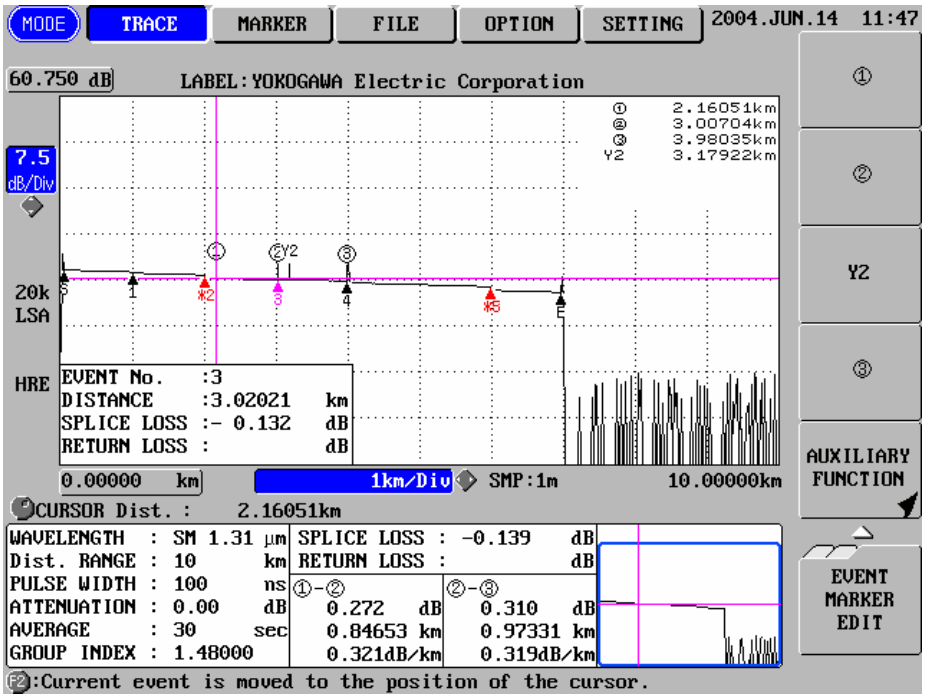
If necessary, enlarge the trace.

Refer

- For the method of moving the cursor, refer to page 3-64.
- For the method of enlarging the trace, refer to page 3-66.

9. Press [F1] (①).

The marker ① moves.



TIP

- When a marker is moved, the information regarding events will be searched re-calculated.
- The other marker positions can also be changed in the same way.

5.3 Editing the Event List

Distance calculation is performed using the group index set in the measurement conditions. However, if two or more optical fibers are connected as a result of installation of new transmission system, the group index varies with the optical fibers. In this case, distance calculation can be performed with higher accuracy by setting the group index of each optical fiber. To obtain accurate analysis results, it is necessary to edit the value between certain points.

This section explains the following event list edit functions.

- Editing an interval distance
- Editing a return loss
- Editing an interval group index

Displaying the List Edit Window

This section explains how to display the window by which the event list can be changed.

1. Measure the optical fiber and perform auto search.

Refer

- For the method of measuring an optical fiber and performing auto search, refer to page 3-57.
- For the screen that shows auto search results at the end of measurement, refer to page 3-69.

2. Press [F1] (SCREEN).

A selection window will appear.

TIP

Selectable screens	*TRACE + LIST
	LIST
	TRACE

*: Indicates the default setting.

3. Locate the cursor to "LIST" by using the rotary knob or [▲] / [▼].

4. Press [ENTER].

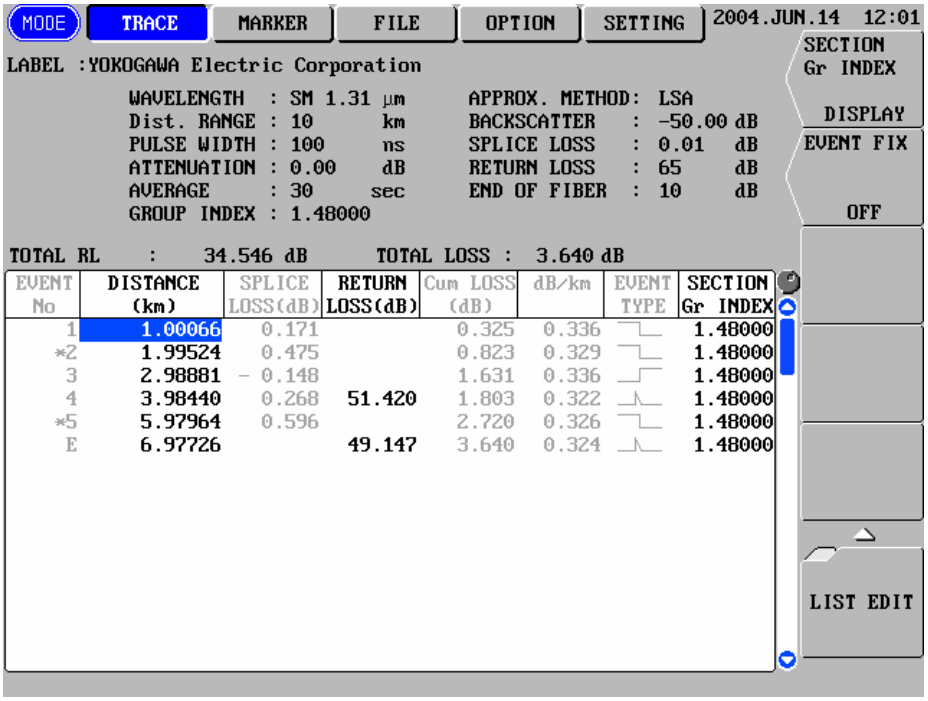
A new screen will appear.

Refer

For the new window, refer to page 3-107.

5. Press [F3] (LIST EDIT).

The following window will appear.



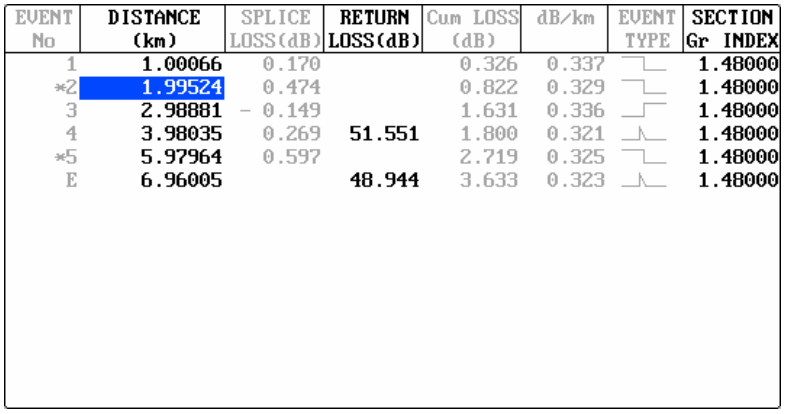
Editing the Event List

Editing an Interval Distance

With this instrument, the distance is calculated using the group index. However, in some cases, the distance between two points on the optical fiber is already known. In this case, the interval group index can be calculated by changing the distance.

The method of changing the interval distance is given below.

1. Locate the cursor to the distance to be changed by using the rotary knob or the arrow key.



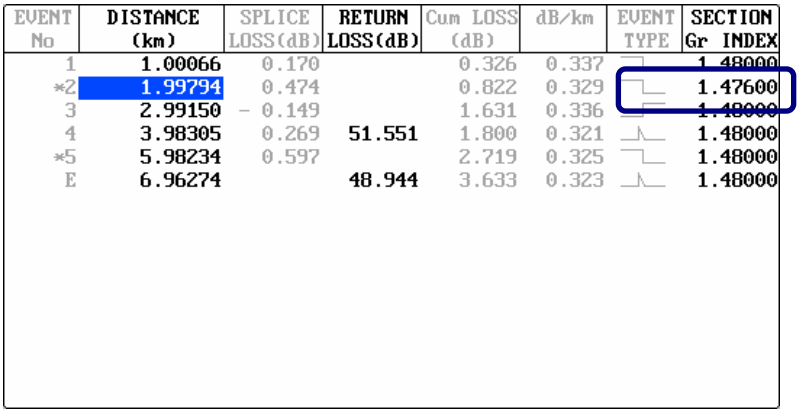
EVENT No	DISTANCE (km)	SPLICE LOSS(dB)	RETURN LOSS(dB)	Cum LOSS (dB)	dB/km	EVENT TYPE	SECTION Gr INDEX
1	1.00066	0.170		0.326	0.337		1.48000
*2	1.99524	0.474		0.822	0.329		1.48000
3	2.98881	- 0.149		1.631	0.336		1.48000
4	3.98035	0.269	51.551	1.800	0.321		1.48000
*5	5.97964	0.597		2.719	0.325		1.48000
E	6.96005		48.944	3.633	0.323		1.48000

2. Press [ENTER].

A selection window will appear.

3. Change the value by using the rotary knob or the arrow key.

4. Press [ENTER], and the value is fixed.



EVENT No	DISTANCE (km)	SPLICE LOSS(dB)	RETURN LOSS(dB)	Cum LOSS (dB)	dB/km	EVENT TYPE	SECTION Gr INDEX
1	1.00066	0.170		0.326	0.337		1.48000
*2	1.99794	0.474		0.822	0.329		1.47600
3	2.99150	- 0.149		1.631	0.336		1.48000
4	3.98305	0.269	51.551	1.800	0.321		1.48000
*5	5.98234	0.597		2.719	0.325		1.48000
E	6.96274		48.944	3.633	0.323		1.48000

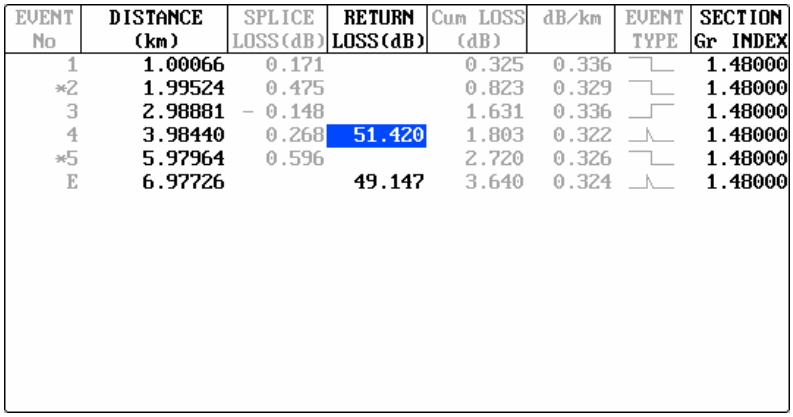
TIP

When the distance is changed, the interval group index for the changed events and the distances for the subsequent events will be re-calculated.

Editing a Return Loss

With this instrument, the return loss is normally calculated based on the back scatter level. However, in some cases, the return loss is already known. In this case, enter the return loss to calculate the back scatter level.

1. Locate the cursor to the return loss to be changed by using the rotary knob or the arrow key.



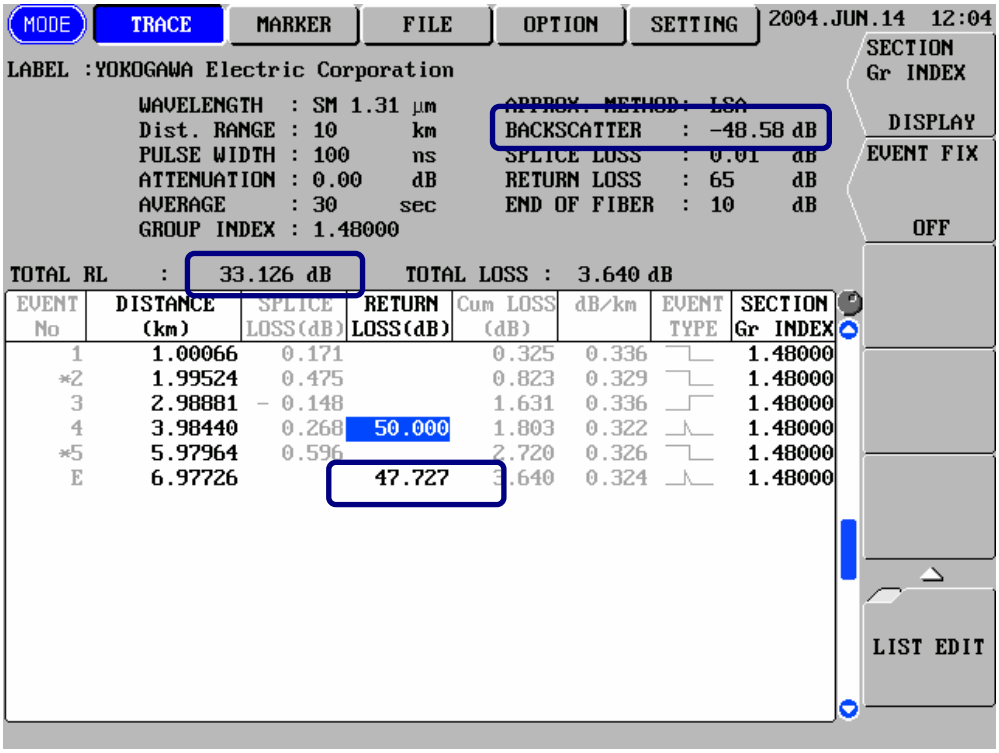
EVENT No	DISTANCE (km)	SPLICE LOSS(dB)	RETURN LOSS(dB)	Cum LOSS (dB)	dB/km	EVENT TYPE	SECTION Gr INDEX
1	1.00066	0.171		0.325	0.336		1.48000
*2	1.99524	0.475		0.823	0.329		1.48000
3	2.98881	- 0.148		1.631	0.336		1.48000
4	3.98440	0.268	51.420	1.803	0.322		1.48000
*5	5.97964	0.596		2.720	0.326		1.48000
E	6.97726		49.147	3.640	0.324		1.48000

2. Press [ENTER].

A selection window will appear.

3. **Change the value by using the rotary knob or the arrow key.**

4. **Press [ENTER], and the value is fixed.**



TIP

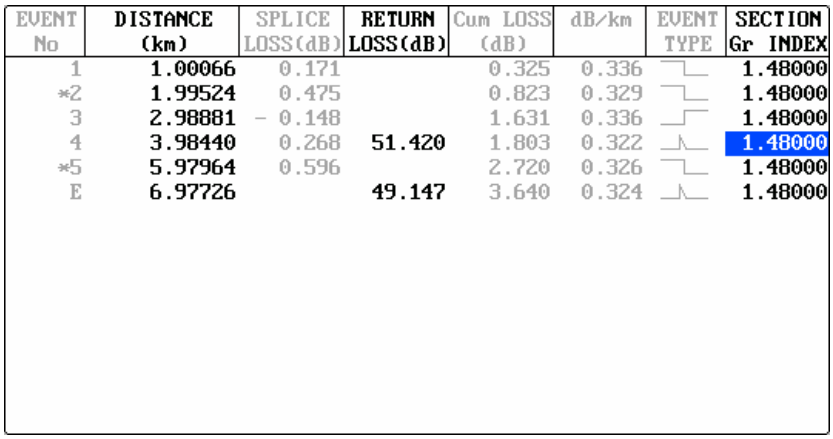
When the return loss is changed, the back scatter level will be re-calculated.

The return loss for all the events is then re-calculated based on the newly calculated back scatter level.

Editing an Section Group Index

If two or more optical fibers are connected as a result of installation of new transmission system, the group index varies with the optical fibers. In this case, calculation of interval distance can be performed with higher accuracy by setting the group index of each optical fiber.

1. Locate the cursor to the interval group index to be changed by using the rotary knob or the arrow key.



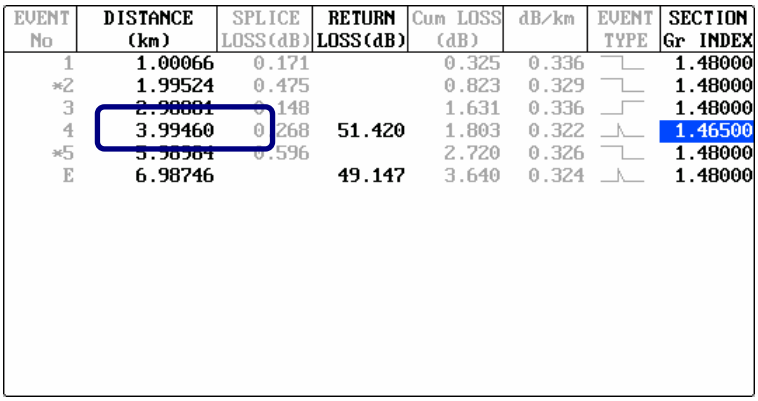
EVENT No	DISTANCE (km)	SPLICE LOSS(dB)	RETURN LOSS(dB)	Cum LOSS (dB)	dB/km	EVENT TYPE	SECTION Gr INDEX
1	1.00066	0.171		0.325	0.336		1.48000
*2	1.99524	0.475		0.823	0.329		1.48000
3	2.98881	- 0.148		1.631	0.336		1.48000
4	3.98440	0.268	51.420	1.803	0.322		1.48000
*5	5.97964	0.596		2.720	0.326		1.48000
E	6.97726		49.147	3.640	0.324		1.48000

2. Press [ENTER].

A selection window will appear.

3. **Change the value by using the rotary knob or the arrow key.**

4. **Press [ENTER], and the value is fixed.**



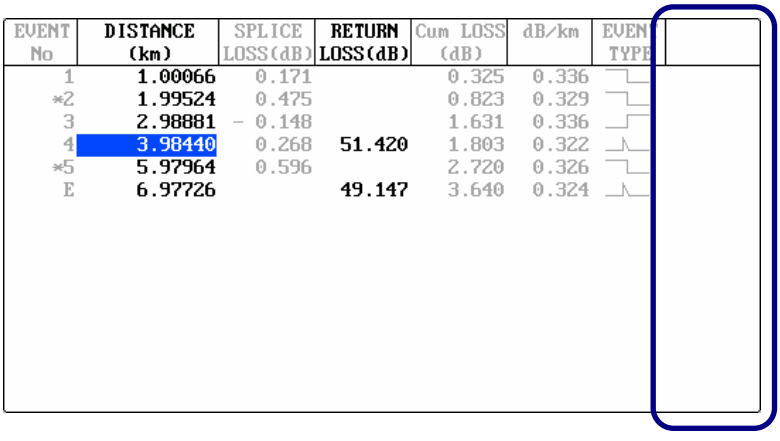
EVENT No	DISTANCE (km)	SPLICE LOSS(dB)	RETURN LOSS(dB)	Cum LOSS (dB)	dB/km	EVENT TYPE	SECTION Gr INDEX
1	1.00066	0.171		0.325	0.336		1.48000
*2	1.99524	0.475		0.823	0.329		1.48000
3	2.98881	0.148		1.631	0.336		1.48000
4	3.99460	0.268	51.420	1.803	0.322		1.46500
*5	5.98984	0.596		2.720	0.326		1.48000
E	6.98746		49.147	3.640	0.324		1.48000

TIP

•When the interval group index is changed, the distance for the changed event will be re-calculated.

•It is also possible not to display the interval group index. The method is given below.

1. With this screen displayed, press [F1] (SECTION Gr INDEX).
2. Locate the cursor to “NonDISPLAY”.
3. Press [ENTER].



EVENT No	DISTANCE (km)	SPLICE LOSS(dB)	RETURN LOSS(dB)	Cum LOSS (dB)	dB/km	EVENT TYPE
1	1.00066	0.171		0.325	0.336	
*2	1.99524	0.475		0.823	0.329	
3	2.98881	0.148		1.631	0.336	
4	3.98440	0.268	51.420	1.803	0.322	
*5	5.97964	0.596		2.720	0.326	
E	6.97726		49.147	3.640	0.324	

5.4 Attaching a Comment to an Event

This instrument allows you to attach a comment (event note) to each event detected by auto search.

This method of attaching a comment to an event is explained below.

♦ Example: Attaching a comment to event 1

Caution

A comment can consist of up to 36 characters.

1. Measure the optical fiber and perform auto search.

Refer

•For the method of measuring an optical fiber and performing auto search, refer to page 3-57.

•For the screen that shows auto search results at the end of measurement, refer to page 3-69.

2. Press [F1] (SCREEN).

A selection window will appear.

TIP

Selectable screens	*TRACE + LIST
	LIST
	TRACE

*: Indicates the default setting.

3. Locate the cursor to "LIST" by using the rotary knob or [▲] / [▼].

4. Press [ENTER].

A new screen will appear.

Refer

For the new screen, refer to page 3-107.

5. Locate the cursor to "No.1 Event" by using the rotary knob or [▲] / [▼].

6. Press [F4] (EVENT NOTE EDIT).

The comment input window will appear, so enter the desired comment.

Refer

For the comment input window and the method of entering a comment, refer to Chapter 4.

7. After the comment is input, press [F5] (DONE).

The entered comment will appear below the information for event 1.

TIP

EVENT No	DISTANCE (km)	SPLICE LOSS(dB)	RETURN LOSS(dB)	Cum LOSS (dB)	dB/km	EVENT TYPE	SECTION Gr INDEX
1	1.00066	0.170		0.326	0.337		1.48000
*2	1.99524	0.474		0.822	0.329		1.48000
F-Event:AQ7260/AQ7261							
3	2.98881	- 0.149		1.631	0.336		1.48000
4	3.98035	0.269	51.551	1.800	0.321		1.48000
*5	5.97964	0.597		2.719	0.325		1.48000
E	6.96005		48.944	3.633	0.323		1.48000

Caution

The event note will be cleared when the power is turned OFF or when the next measurement is started.

5.5 Changing the Conditions and Performing Auto Search Again

It is possible to change search conditions for the data obtained by auto search, and perform auto search with the new conditions.

The method of changing the following search conditions is explained below.

- Group index
- Approximate method
- Back scatter level
- Splice loss threshold
- Return loss threshold
- Fiber end threshold
- Fault event show/hide setting
- Splice loss threshold for fault events
- Return loss threshold for fault events

Displaying the Auto Search Condition Change Window

This section explains how to display the window by which the auto search conditions can be changed.

1. Measure the optical fiber and perform auto search.

Refer

•For the method of measuring an optical fiber and performing auto search, refer to page 3-57.

•For the screen that shows auto search results at the end of measurement, refer to page 3-69.

2. Press [F1] (SCREEN).

A selection window will appear.

TIP

Selectable screens	*TRACE + LIST
	LIST
	TRACE

*: Indicates the default setting.

3. Locate the cursor to “LIST” by using the rotary knob or [▲] / [▼].

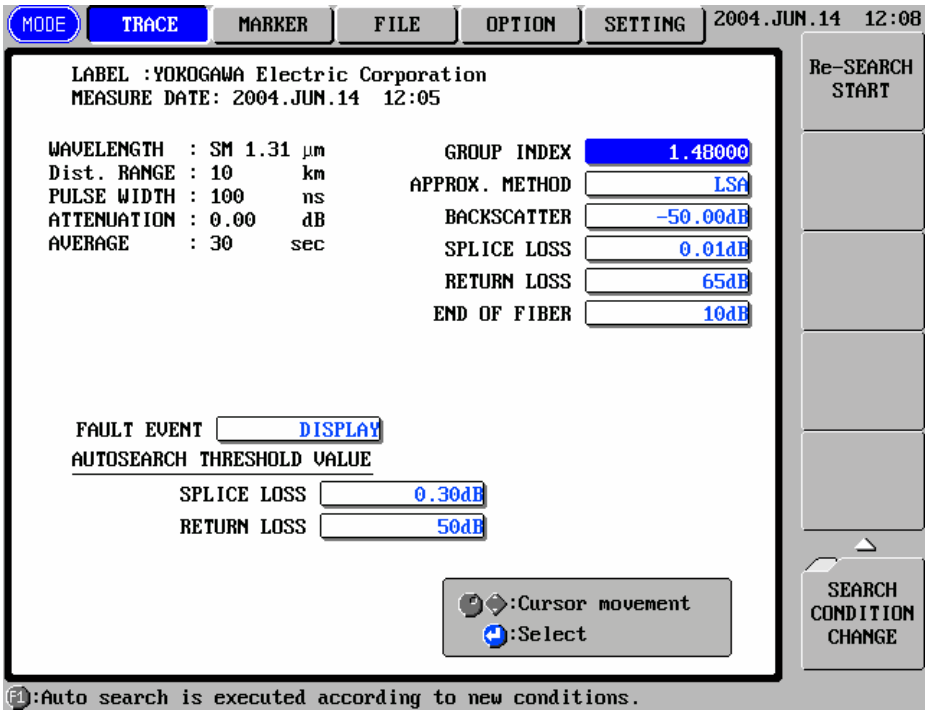
4. Press [ENTER].

Refer

For the new screen, refer to page 3-107.

5. Press [F2] (SEARCH CONDITION CHANGE).

The auto search condition change window will appear as shown below.



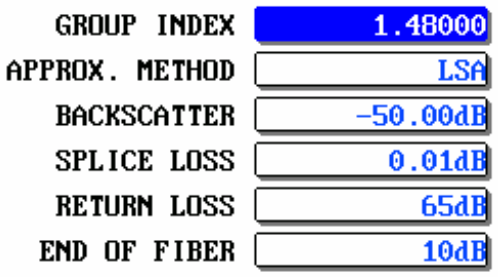
Changing the Auto Search Conditions

Changing the Group Index

Refer

For details on group index, refer to page 3-26.

1. Locate the cursor to “GROUP INDEX” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

3. Change to the desired group index.

Refer

For the method of changing the group index, refer to page 3-26.

4. Press [F1] (Re-SEARCH START).

Auto search will start with the newly set search conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

Refer

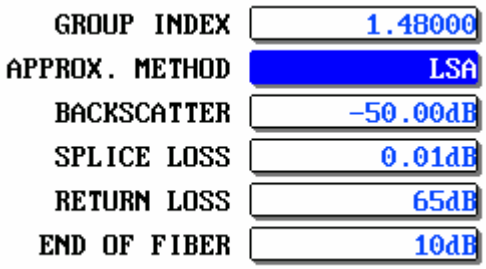
Refer to the notes given on changing the search conditions (page 5-38).

Changing the Approximate Method

Refer

For details on approximate method, refer to page 3-38.

1. Locate the cursor to "APPROX. METHOD" by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

3. Change to the desired approximate method.

Refer

For the method of changing the approximate method, refer to page 3-38.

4. Press [F1] (Re-SEARCH START).

Auto search will start with the newly set search conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

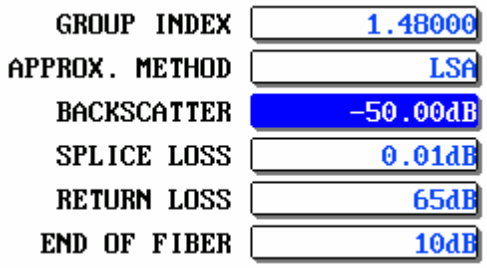
Refer

Refer to the notes given on changing the search conditions (page 5-38).

Changing the Back Scatter Level

Refer For details on back scatter level, refer to page 3-41.

1. Locate the cursor to "BACKSCATTER" by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

3. Change to the desired back scatter level.

Refer For the method of changing the back scatter level, refer to page 3-41.

4. Press [F1] (Re-SEARCH START).

Auto search will start with the newly set search conditions.

TIP When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

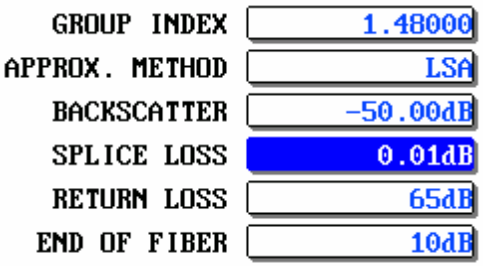
Refer Refer to the notes given on changing the search conditions (page 5-38).

Changing the Splice Loss Threshold

Refer

For details on splice loss threshold, refer to page 3-43.

1. Locate the cursor to "SPLICE LOSS" by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

3. Change to the desired splice loss threshold.

Refer

For method of changing the splice loss threshold, refer to page 3-43.

4. Press [F1] (Re-SEARCH START).

Auto search will start with the newly set search conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

Refer

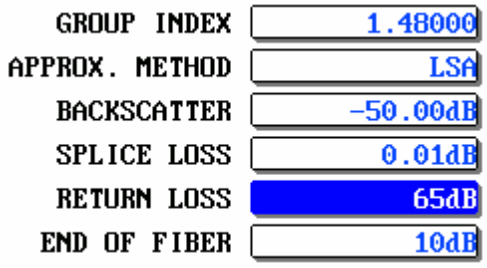
Refer to the notes given on changing the search conditions (page 5-38).

Changing the Return Loss Threshold

Refer

For details on return loss threshold, refer to page 3-45.

1. Locate the cursor to "RETURN LOSS" by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

3. Change to the desired return loss threshold.

Refer

For method of changing the return loss threshold, refer to page 3-45.

4. Press [F1] (Re-SEARCH START).

Auto search will start with the newly set search conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

Refer

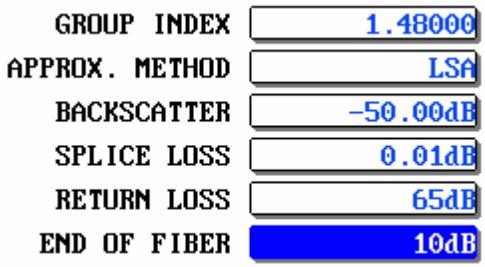
Refer to the notes given on changing the search conditions (page 5-38).

Changing the Fiber End Threshold

Refer

For details on fiber end threshold, refer to page 3-47.

1. Locate the cursor to "END OF FIBER" by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

3. Change to the desired fiber end threshold.

Refer

For the method of changing the fiber end threshold, refer to page 3-47.

4. Press [F1] (Re-SEARCH START).

Auto search will start with the newly set search conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

Refer

Refer to the notes given on changing the search conditions (page 5-38).

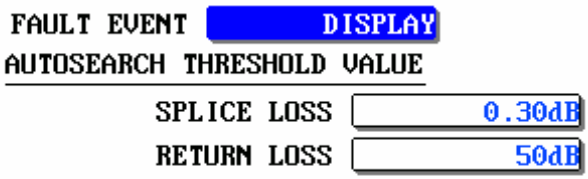
Changing the Fault Event Show/Hide Setting

The fault event show/hide setting can be changed as explained below.

♦ Example: “DISPLAY” → “NonDISPLAY”

Refer For details on fault event, refer to page 3-69.

1. Locate the cursor to “FAULT EVENT” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

TIP

Selectable fault event settings	*DISPLAY	Performs auto search and displays noticeably the fault events if any.
	NonDISPLAY	Performs auto search, and handles fault events as normal events and displays them.

*: Indicates the default setting.

Refer For the method of displaying fault events, refer to page 3-69.

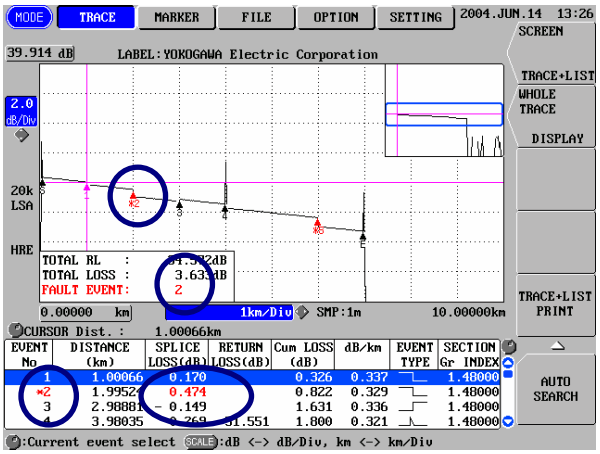
3. Locate the cursor to “NonDISPLAY” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the fault event show/hide setting.

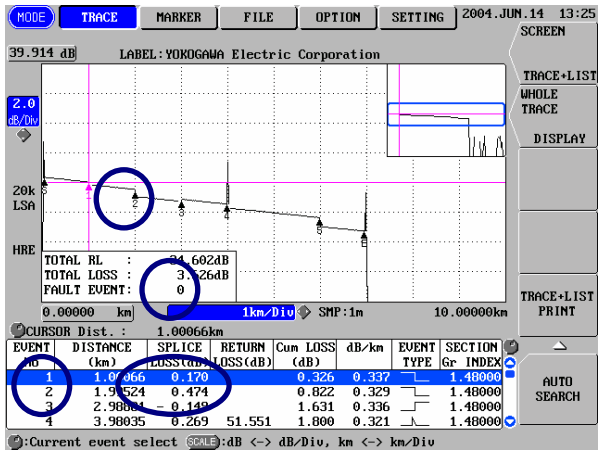
5. Press [F1] (Re-SEARCH START).

TIP

When “DISPLAY” is selected



When “NonDISPLAY” is selected



TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

Refer

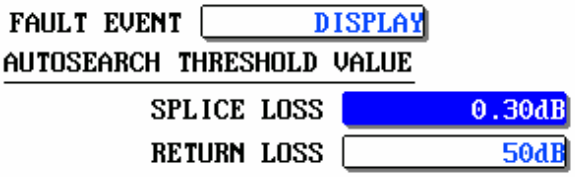
Refer to the notes given on changing the search conditions (page 5-38).

Changing the Splice Loss Threshold for Fault Events

Caution

The splice loss threshold for fault events cannot be changed if “NonDISPLAY” is selected for “FAULT EVENT”.

1. Locate the cursor to “SPLICE LOSS” for “AUTOSEARCH THRESHOLD VALUE” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

3. Change to the desired splice loss threshold.

Refer

For method of changing the splice loss threshold, refer to page 3-43.

4. Press [F1] (Re-SEARCH START).

Auto search will start with the newly set search conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

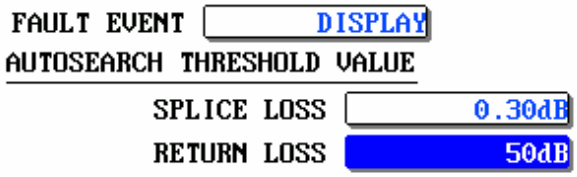
Refer

Refer to the notes given on changing the search conditions (page 5-38).

Changing the Return Loss Threshold for Fault Events

Caution The return loss threshold for fault events cannot be changed if “NonDISPLAY” is selected for “FAULT EVENT”.

1. Locate the cursor to “RETURN LOSS” for “AUTOSEARCH THRESHOLD VALUE” by using the rotary knob or the arrow key.



2. Press [ENTER].

A selection window will appear.

3. Change to the desired return loss threshold.

Refer For method of changing the return loss threshold, refer to page 3-45.

4. Press [F1] (Re-SEARCH START).

Auto search will start with the newly set search conditions.

TIP When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

Refer Refer to the notes given on changing the search conditions (page 5-38).

Notes on Changing of Auto Search Conditions

Caution

If the auto search conditions are changed using this window, they will be used as the measurement conditions and auto search conditions to obtain data next time.

If you are not going to use the conditions set by this window to obtain new data, the measurement conditions and auto search conditions must be changed.

Refer

For the method of setting the conditions to be applied when obtaining new data, refer to page 3-9.

Chapter 6
FILE OPERATION

6.1 File Operation

This section explains the following file operation functions.

- Saving a file
- Recalling a file
- Deleting a file
- Printing a file
- Copying a file

Saving a File

For the method of saving a file, refer to page 3-89.

Recalling a File

This section explains how to recall a file.

Displaying the File Operation Window

1. Press [FILE] to display the file operation window.

Refer

For details on the file operation window, refer to page 3-90.

2. Press [F1] (FILE OPERATION).

A selection window will appear.

TIP

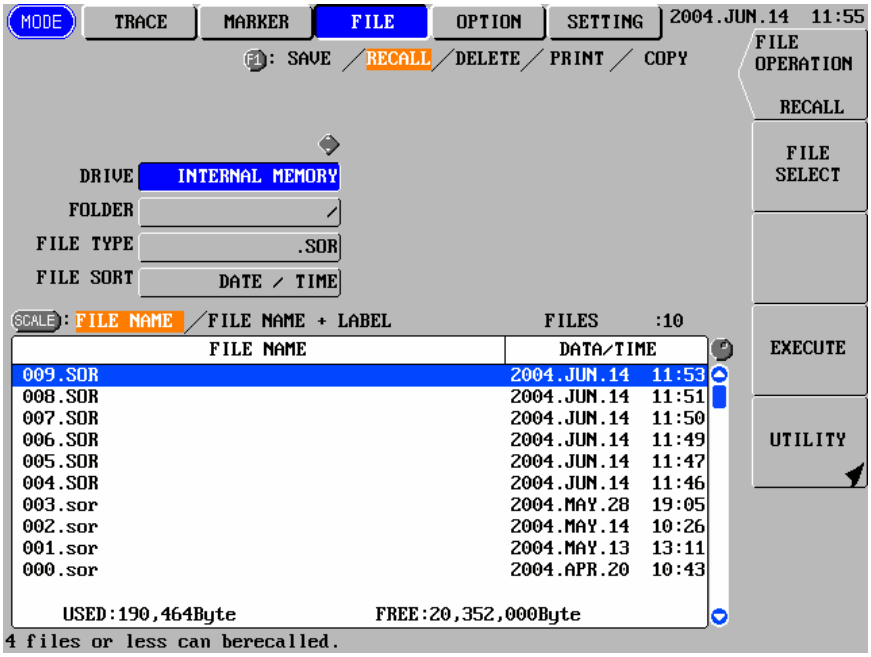
Selectable file operations	*SAVE
	RECALL
	DELETE
	PRINT
	COPY

*: Indicates the default setting.

3. Locate the cursor to “RECALL” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to change file operation.

The following window will appear.



Selecting a Drive

Caution

If no drives are installed on the instrument or if they are installed but not connected, it is not possible to select them. In this case, only files that are stored in the internal memory can be recalled. In the case of the floppy disk drive, this function is not possible unless a floppy disk is inserted into the floppy disk drive.

5. Select the drive.

Refer

For the method of changing the drive, refer to page 3-92.

Selecting a Folder

6. Select the desired folder.

Refer

For the method of selecting a folder, refer to page 3-93.

Selecting a File Type (Extension)

7. Select the file type of the file to be recalled.

Refer

For the method of selecting a file type, refer to page 3-95.

TIP

Selectable file types	.SOR	Displays a list of files saved in the file type that conforms to Bellcore GR-196-CORE and Telcordia SR-4731.
	TRD (AQ7260)	Displays a list of files that have been saved by AQ7260.
	.SET (Setup)	Displays a list of files containing only the measurement conditions.
	.LST (Event List)	Displays a list of files containing an event list.
	.TRB (AQ7250)	Displays a list of files that have been saved by AQ7250.
	.TRA (AQ7210/20)	Displays a list of files that have been saved by AQ7210/20.
	.4 (AQ-7140C/D)	Displays a list of files that have been saved by AQ-7140C/D.

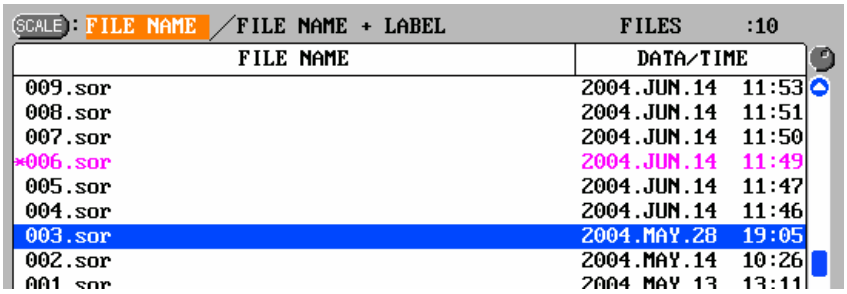
Selecting the File to be Recalled

8. Locate the cursor to the file to be recalled by turning the rotary knob.

9. Press [F2] (FILE SELECT) to select the file.

TIP

The color of the selected file name will change. “*” also appears in front of the file name.



Up to four files (traces) can be selected.

•If a file(s) that you do not want to recall is selected by mistake, repeat steps 8 and 9. This will cancel selection of that file(s).

•By pressing [SCALE], the file list display format can be changed. However, if “FILE NAME + LABEL” is selected, it will take some time before the file list is displayed.

FILE NAME + LABEL

Recalling the Selected File(s)

10. Press [F4] (EXECUTE) to recall the selected file(s).

Deleting a File

This section explains how to delete a file.

Displaying the File Operation Window

1. Press [FILE] to display the file operation window.

Refer

For details on the file operation window, refer to page 3-90.

2. Press [F1] (FILE OPERATION).

A selection window will appear.

TIP

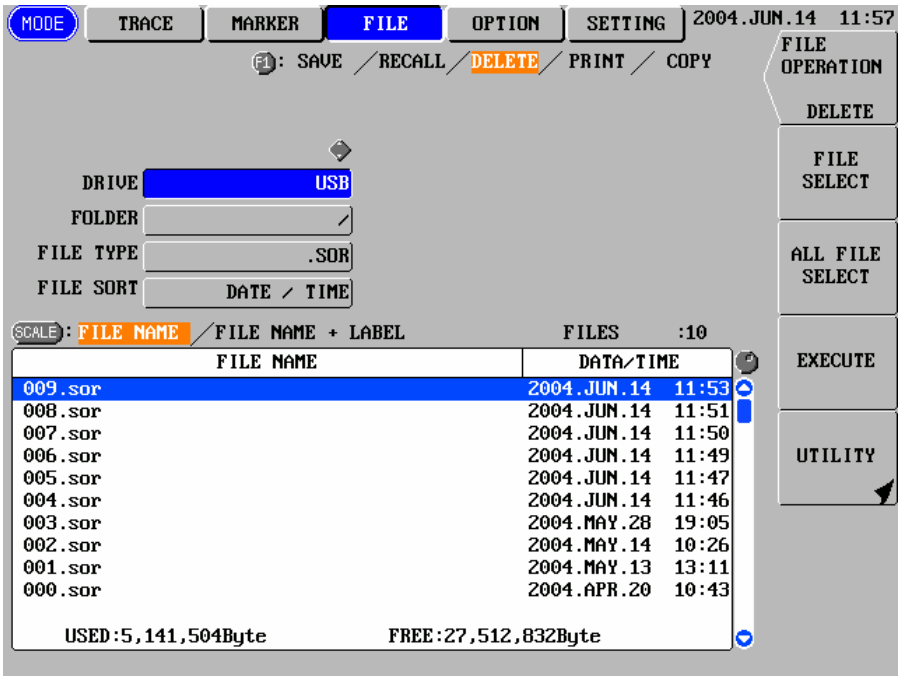
Selectable file operations	*SAVE
	RECALL
	DELETE
	PRINT
	COPY

*: Indicates the default setting.

3. Locate the cursor to “DELETE” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to change file operation.

The following window will appear.



Selecting a Drive

Caution

If no drives are installed on the instrument or if they are installed but not connected, it is not possible to select them. In this case, only files that are stored in the internal memory can be deleted. In the case of the floppy disk drive, this function is not possible unless a floppy disk is inserted into the floppy disk drive.

5. Select the drive.

Refer

For the method of changing the drive, refer to page 3-92.

Selecting a Folder

6. Select the desired folder.

Refer

For the method of selecting a folder, refer to page 3-93.

Selecting a File Type (Extension)

7. Select the file type of the file to be deleted.

Refer

For the method of selecting a file type, refer to page 3-95.

TIP

Selectable file types	.SOR	Displays a list of files saved in the file type that conforms to Bellcore GR-196-CORE and Telcordia SR-4731.
	.TRD (AQ7260)	Displays a list of files that have been saved by AQ7260.
	.SET (Setup)	Displays a list of files containing only the measurement conditions.
	.LST (Event List)	Displays a list of files containing an event list.
	.BMP (Image)	Displays a list of files that have been saved in BITMAP format.
	.TIF (Image)	Displays a list of files that have been saved in TIFF format.
	.CSV	Displays a list of files that have been saved in CSV format.
	. (All)	Displays a list of the files stored in the specified folder.

Selecting the File to be Deleted

8. Locate the cursor to the file to be deleted by turning the rotary knob.

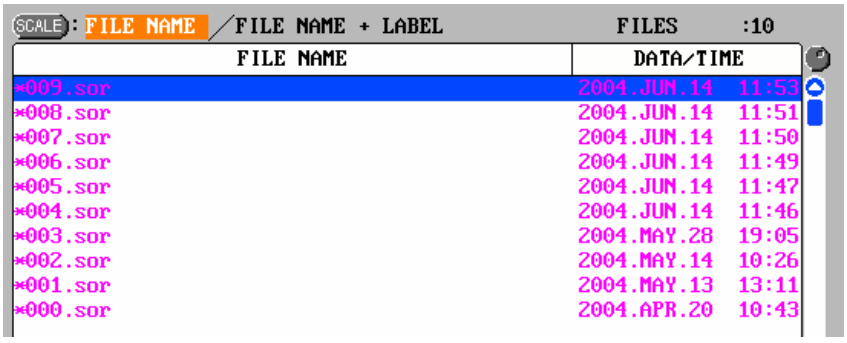
9. Press [F2] (FILE SELECT) to select the file.

TIP

•The color of the selected file name will change. “*” also appears in front of the file name. (Refer to page 6-6.)

•If a file(s) that you do not want to delete is selected by mistake, repeat steps 8 and 9. This will cancel selection of that file(s).

•When you want to delete all the files displayed in the list, they can be selected by pressing [F3] (ALL FILE SELECT) at step 8.

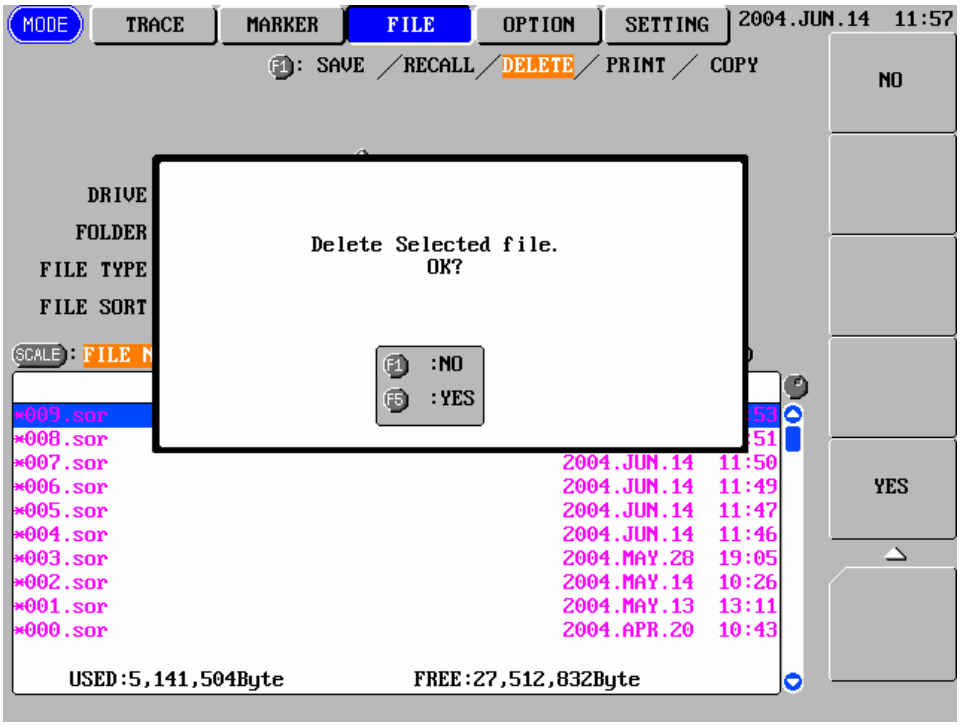


•By pressing [SCALE], the file list display format can be changed. However, if “FILE NAME + LABEL” is selected, it will take some time before the file list is displayed. (Refer to page 6-6.)

Deleting the Selected File(s)

10. Press [F4] (EXECUTE).

The following window will appear.



11. Press [F5] (YES) to delete the selected file(s).

TIP

If [F1] (NO) is pressed, the procedure will go back to the end of step 9.

Printing a File

This section explains how to print the data saved in a file.

Caution Before starting to print, make sure that a printer is connected to the instrument and correct print settings are made.

Refer For the method of connecting/selecting a printer, refer to pages 8-3, 8-6, 8-16, and 8-18.

Displaying the File Operation Window

1. Press [FILE] to display the file operation window.

Refer For details on the file operation window, refer to page 3-90.

2. Press [F1] (FILE OPERATION).

A selection window will appear.

TIP

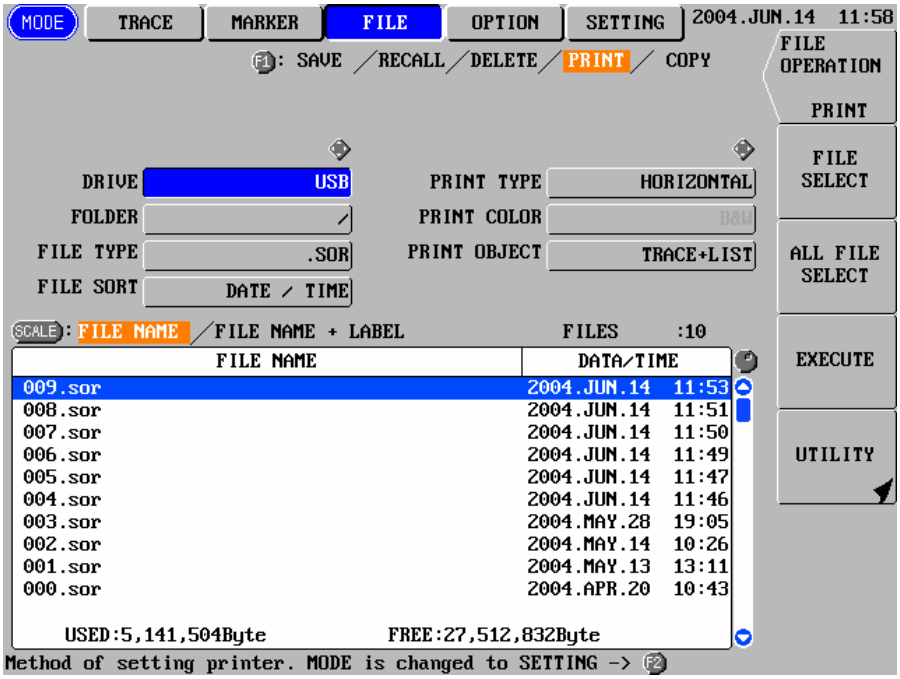
Selectable file operations	*SAVE
	RECALL
	DELETE
	PRINT
	COPY

*: Indicates the default setting.

3. **Locate the cursor to “PRINT” by using the rotary knob or [▲] / [▼].**

4. **Press [ENTER] to change file operation.**

The following window will appear.



Selecting a Drive

Caution

If no drives are installed on the instrument or if they are installed but not connected, it is not possible to select them. In this case, only files that are stored in the internal memory can be printed. In the case of the floppy disk drive, this function is not possible unless a floppy disk is inserted into the floppy disk drive.

5. **Select the drive.**

Refer

For the method of changing the drive, refer to page 3-92.

Selecting a Folder

6. Select the desired folder.

Refer

For the method of selecting a folder, refer to page 3-93.

Selecting a File Type (Extension)

7. Select the file type of the file to be printed.

Refer

For the method of selecting a file type, refer to page 3-95.

TIP

Selectable file types	.SOR	Displays a list of files saved in the file type that conforms to Bellcore GR-196-CORE and Telcordia SR-4731.
	.TRD (AQ7260)	Displays a list of files that have been saved by AQ7260.
	.LST (Event List)	Displays a list of files containing an event list.
	.TRB (AQ7250)	Displays a list of files that have been saved by AQ7250.
	.TRA (AQ7210/20)	Displays a list of files that have been saved by AQ7210/20.
	.4 (AQ-7140C/D)	Displays a list of files that have been saved by AQ-7140C/D.

Selecting a Print Type

8. Select the desired print type.

TIP

The print type can also be selected in the SETTING mode.

Refer

For details on print type, refer to page 2-39.

Selecting a Print Color

9. Select the desired print color.

TIP

The print type can also be selected in the SETTING mode.

Refer

For the method of selecting a print color, refer to page 2-41.

Selecting a Print Object

The print object can be changed as explained below.

♦ Example: “TRACE + LIST” → “TRACE”

Caution

The print object cannot be changed if “.LST” has been selected as the file type.

10. Locate the cursor to “PRINT OBJECT” by using the arrow key.

11. Press [ENTER].

A selection window will appear.

TIP

Selectable objects	*TRACE + LIST	Prints both the trace and event list.
	TRACE	Prints the trace only.
	LIST	Prints the event list only.

*: Indicates the default setting.

12. Locate the cursor to “TRACE” by using the rotary knob or [▲] / [▼].

13. Press [ENTER] to register the change made to the print object setting.

Selecting the File to be Printed

14. Locate the cursor to the file to be printed by turning the rotary knob.

15. Press [F2] (FILE SELECT) to select the file.

TIP

- The color of the selected file name will change. "*" also appears in front of the file name. (Refer to page 6-6.)
- If a file(s) that you do not want to print is selected by mistake, repeat steps 14 and 15. This will cancel selection of that file(s).
- When you want to print all the files displayed in the list, they can be selected by pressing [F3] (ALL FILE SELECT) at step 14. (Refer to page 6-10.)
- By pressing [SCALE], the file list display format can be changed. However, if "FILE NAME + LABEL" is selected, it will take some time before the file list is displayed. (Refer to page 6-6.)

Printing the Selected File(s)

16. Press [F4] (EXECUTE).

Caution

Once printing starts, it cannot be stopped halfway.

Copying a File

This section explains how to copy a file to another folder.

Displaying the File Operation Window

1. Press [FILE] to display the file operation window.

Refer

For details on the file operation window, refer to page 3-90.

2. Press [F1] (FILE OPERATION).

A selection window will appear.

TIP

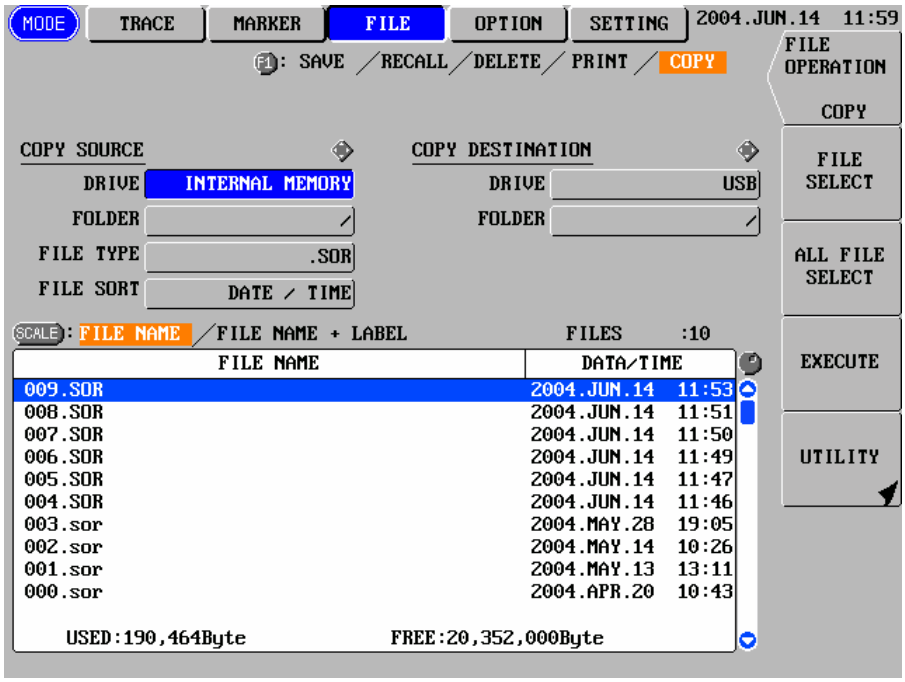
Selectable file operations	*SAVE
	RECALL
	DELETE
	PRINT
	COPY

*: Indicates the default setting.

3. Locate the cursor to “COPY” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to change file operation.

The following window will appear.



Selecting the Copy Source/Destination (Drive)

Caution

If no drives are installed on the instrument or if they are installed but not connected, it is not possible to select them. In this case, files can be copied within the internal memory. In the case of the floppy disk drive, this function is not possible unless a floppy disk is inserted into the floppy disk drive.

5. Select the drive.

Refer

For the method of changing the drive, refer to page 3-92.

Selecting the Copy Source/Destination (Folder)

6. Select the desired folder.

Refer For the method of selecting a folder, refer to page 3-93.

Selecting a File Type (Extension)

7. Select the file type of the file to be copied.

Refer For the method of selecting a file type, refer to page 3-95.

TIP

Selectable file types	.SOR	Displays a list of files saved in the file type that conforms to Bellcore GR-196-CORE and Telcordia SR-4731.
	.TRD (AQ7260)	Displays a list of files that have been saved by AQ7260.
	.SET (Setup)	Displays a list of files containing only the measurement conditions.
	.LST (Event List)	Displays a list of files containing an event list.
	.BMP (Image)	Displays a list of files that have been saved in BITMAP format.
	.TIF (Image)	Displays a list of files that have been saved in TIFF format.
	.CSV	Displays a list of files that have been saved in CSV format.
	. (All)	Displays a list of the files stored in the specified folder.

Selecting the File to be Copied

8. Locate the cursor to the file to be copied by turning the rotary knob.

9. Press [F2] (FILE SELECT) to select the file.

TIP

- The color of the selected file name will change. "*" also appears in front of the beginning of the file name. (Refer to page 6-6.)
- If a file(s) that you do not want to copy is selected by mistake, repeat steps 8 and 9. This will cancel selection of that file(s).
- When you want to copy all the files displayed in the list, they can be selected by pressing [F3] (ALL FILE SELECT) at step 8. (Refer to page 6-10.)
- By pressing [SCALE], the file list display format can be changed. However, if "FILE NAME + LABEL" is selected, it will take some time before the file list is displayed. (Refer to page 6-6.)

Copying the Selected File(s)

10. Press [F4] (EXECUTE).

6.2 Using the Utility Functions

This chapter explains how to use the following utility functions.

- Initializing a drive
- Deleting a folder
- Creating a folder
- Copying a folder

Initializing a Drive

This section explains how to initialize the specified storage media.

Caution

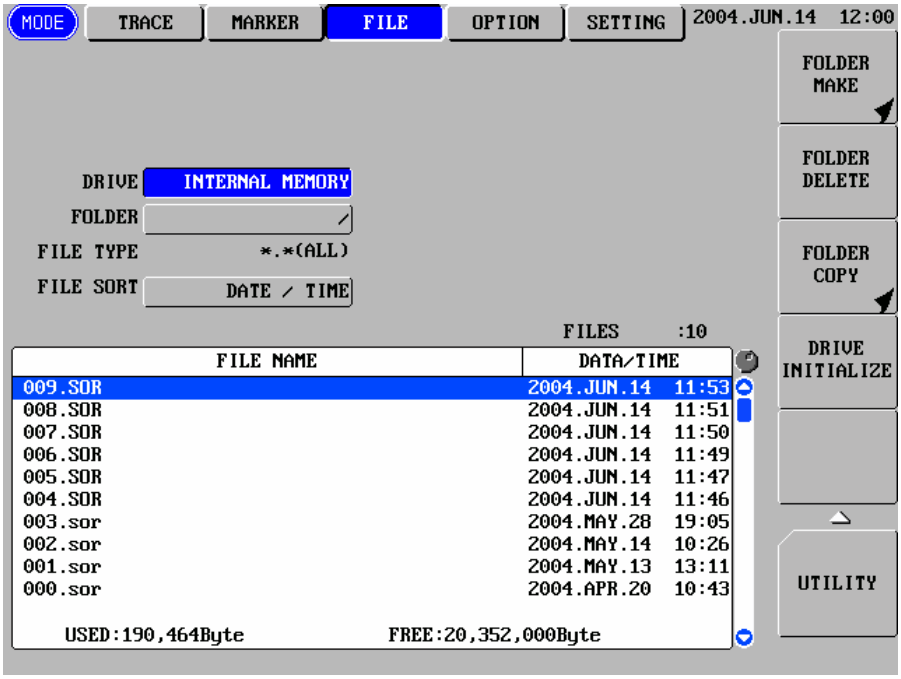
- Storage media for more than 32G byte cannot be formatted.
- The storage media which does not format by DOS can not be initialized.

1. Press [FILE].

Refer For details on the file operation window, refer to page 3-90.

2. Press [F5] (UTILITY).

The following window will appear.

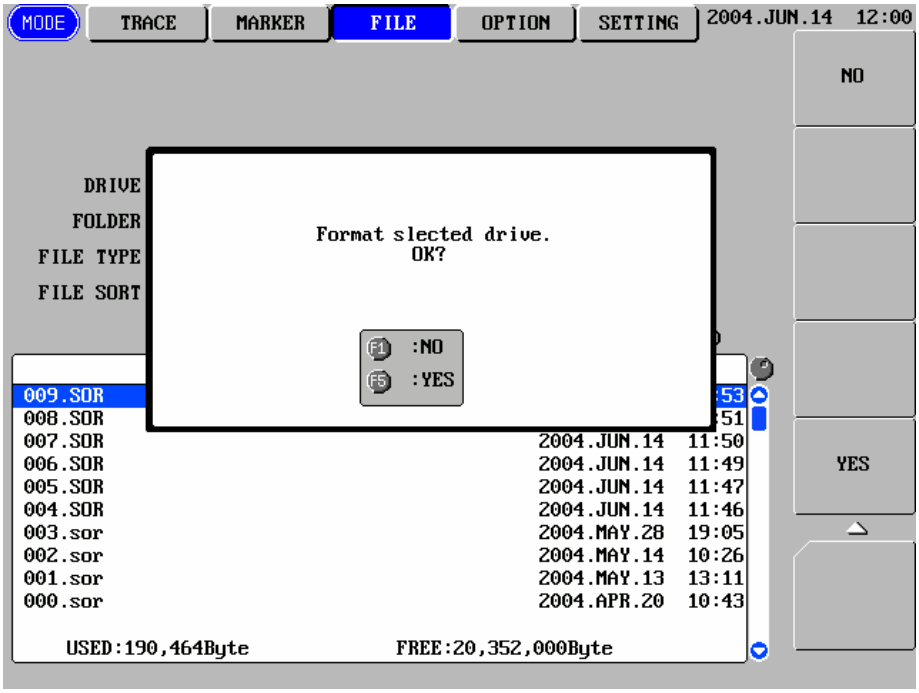


3. Select the drive to be initialized.

Refer For the method of selecting a drive, refer to page 3-92.

4. Press [F4] (DRIVE INITIALIZE).

The following window will appear.



5. Press [F5] (YES) to start initialization.

Caution All the folders and files in the drive will be deleted.

TIP The drive will not be initialized if [F1] (NO) is pressed.

Deleting a Folder

This section explains how to delete the desired folder.

1. Press [FILE].

Refer — For details on the file operation window, refer to page 3-90.

2. Press [F5] (UTILITY).

3. Select the drive that contains the folder to be deleted.

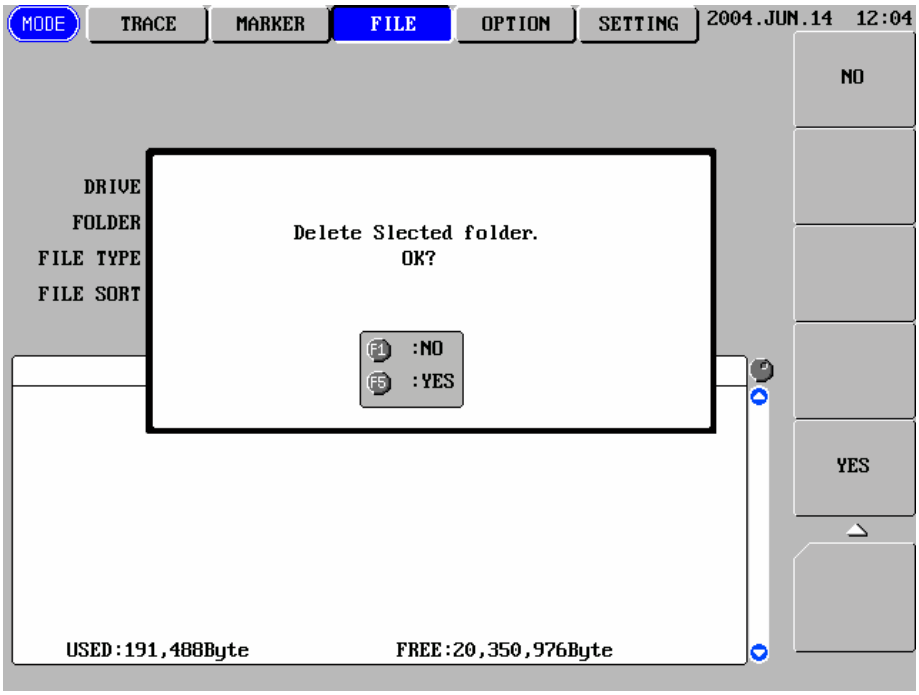
Refer — For the method of selecting a drive, refer to page 3-92.

4. Select the folder to be deleted.

Refer — For the method of specifying a folder, refer to page 3-93.

5. Press [F2] (FOLDER DELETE).

The following window will appear.



6. Press [F5] (YES) to start deletion.

Caution If the specified folder contains files or sub folders, it cannot be deleted. In this case, a message will appear, so take necessary steps according the message.

TIP The folder will not be deleted if [F1] (NO) is pressed.

Creating a Folder

This section explains how to create a folder.

1. Press [FILE].

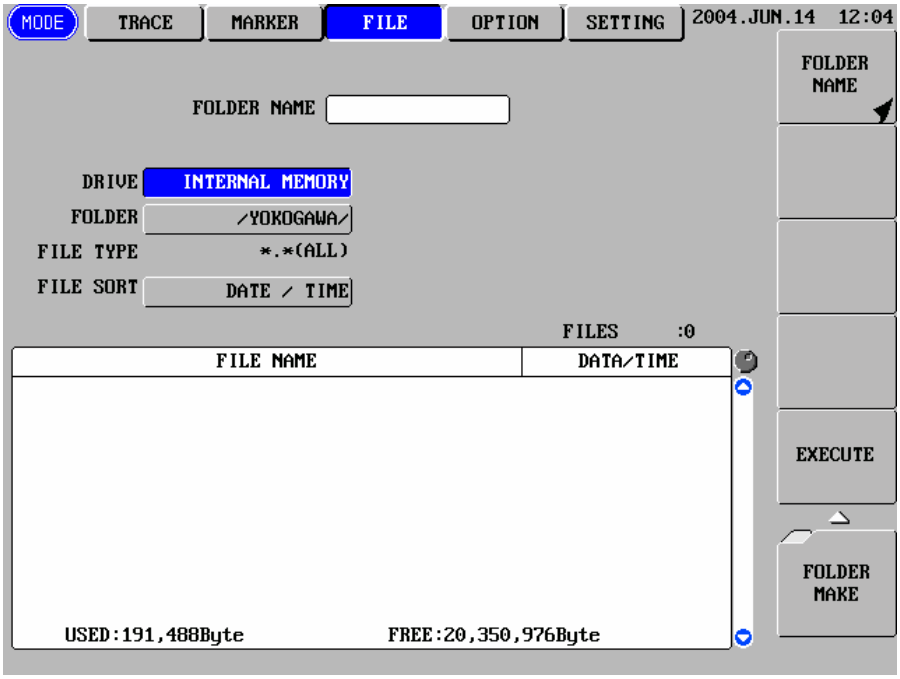
Refer

For details on the file operation window, refer to page 3-90.

2. Press [F5] (UTILITY).

3. Press [F1] (FOLDER MAKE).

The following window will appear.



4. Select the drive in which you want to create a folder.

Refer

For the method of selecting a drive, refer to page 3-92.

5. Select the desired folder.

TIP

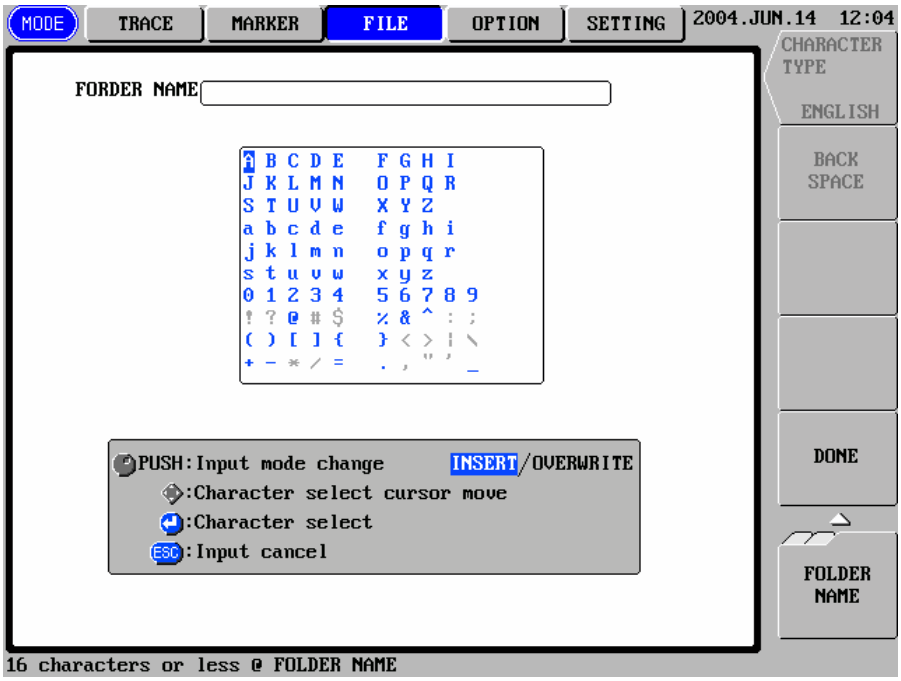
A new folder will be created as a sub folder of the selected folder.

Refer

For the method of specifying a folder, refer to page 3-93.

6. Press [F1] (FOLDER NAME).

A window allowing you to enter a folder name will appear.



7. Enter the desired folder name.

Caution

The folder name can consist of up to 16 characters.

Refer

For the method of entering a folder name, refer to Chapter 4.

8. Press [F5] (DONE).

The folder name is fixed.

9. Press [F5] (EXECUTE).

The folder is made.

Caution

- If the specified folder has a sub folder with the same name as the one you are going to create, the folder cannot be created. In this case, a message will appear, so take necessary steps according the message.
- It is not allowed to use a space nor a period (.) as the first or last character of a folder name.

Copying a Folder

This section explains how to copy a folder.

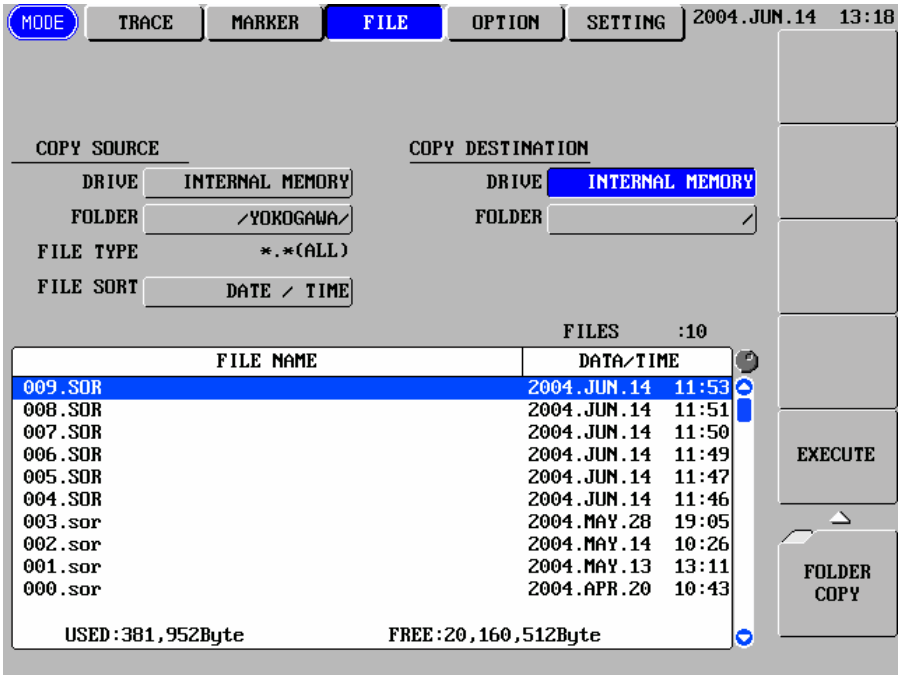
1. Press [FILE].

Refer — For details on the file operation window, refer to page 3-90.

2. Press [F5] (UTILITY).

3. Press [F3] (FOLDER COPY).

The following window will appear.



4. Select the drive that contains the folder to be copied.

Refer

For the method of selecting a drive, refer to page 3-92.

5. Select the folder to be copied.

Refer

For the method of specifying a folder, refer to page 3-93.

6. Select the drive to which the folder is to be copied.

Refer

For the method of selecting a drive, refer to page 3-92.

7. Select the copy destination folder.

TIP

The copy source folder will be copied as a sub folder of the selected folder.

Refer

For the method of specifying a folder, refer to page 3-93.

8. Press [F5] (EXECUTE) to create the specified folder.

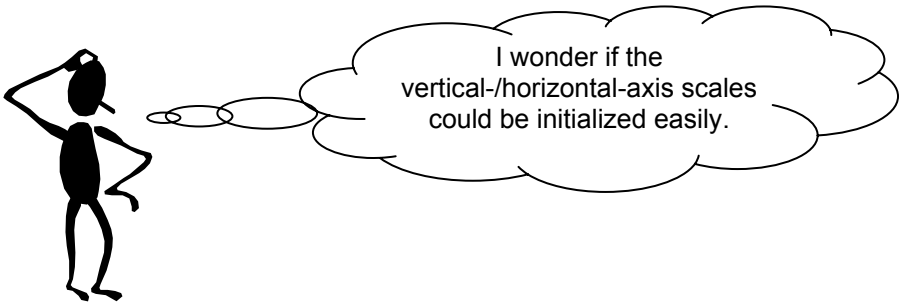
Caution

If the destination folder contains files or sub folders, it cannot be copied. In this case, a message will appear, so take necessary steps according the message.

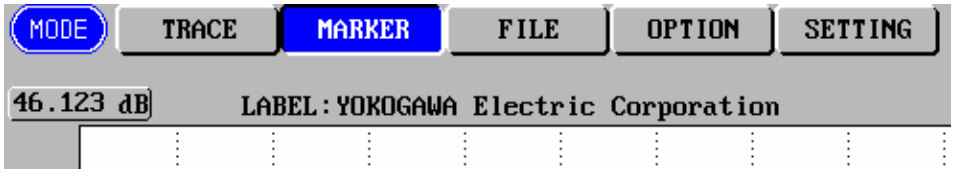
Chapter 7
USING USEFUL FUNCTIONS

7.1 Initializing the Vertical-/Horizontal-Axis Scales

This section explains how to restore the original scale of the trace that has been enlarged, reduced or shifted.



1. **Press [MODE] to locate the cursor to “MARKER”.**



2. **Press [F5] (NEXT PAGE).**

3. **Press [F5] (AUXILIARY FUNCTION).**

4. **Press [F1] (SCALE INITIALIZE).**

   The scales will be initialized.

TIP

Both the vertical-axis and horizontal-axis scales will be initialized at the same time.

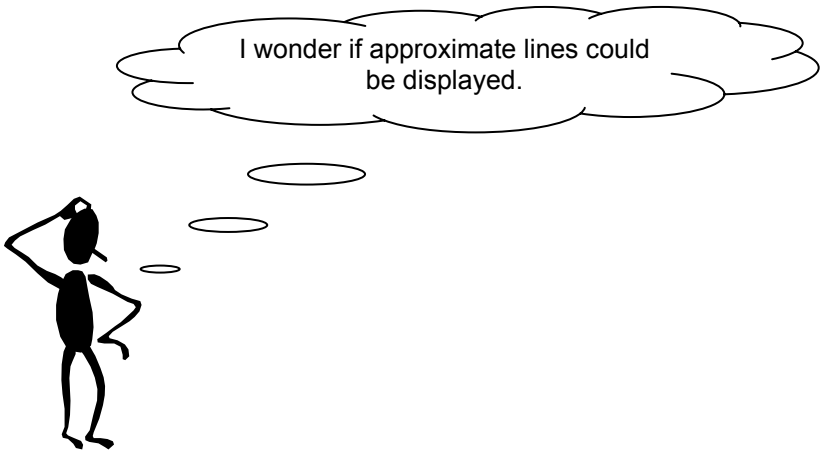
7.2 Displaying Approximate Lines

This section explains how to change the approximate line display setting.

♦ Example: “NonDISPLAY” → “DISPLAY”

Refer

For details on approximate method and approximate line, refer to page 3-38.



For Traces that Have Been Auto Searched

Refer

For the window that shows auto search results at the end of measurement, refer to page 3-69.

1. Press [F1](SCREEN).

A selection window will appear.

TIP

Selectable screens	*TRACE + LIST
	LIST
	TRACE

*: Indicates the default setting.

2. Locate the cursor to “TRACE” by using the rotary knob or [▲] / [▼].

3. Press [ENTER].

A new window will appear.

Refer

For details on the window, refer to page 5-4.

4. Press [F2] (EVENT EDIT).

5. Press [F3] (EVENT MARKER EDIT).

6. Press [F5] (AUXILIARY FUNCTION).

7. Press [F4] (APPROX. LINE).

A selection window will appear.

TIP

Selectable approximate line setting	*NonDISPLAY
	DISPLAY

*: Indicates the default setting.

8. Locate the cursor to "DISPLAY" by using the rotary knob or [▲] / [▼].

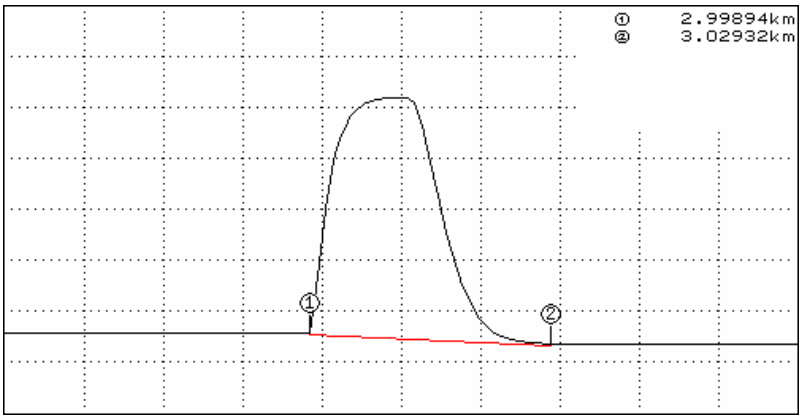
9. Press [ENTER].

An approximate line will appear.

Caution

No approximate line will appear if no markers have been set.

TIP

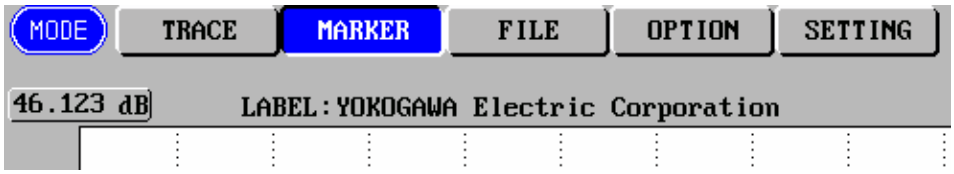


For Traces that Have Not Been Auto Searched

Refer

For the window that is displayed just after measurement is finished (without auto search), refer to page 3-72.

1. Press [MODE] to locate the cursor to “MARKER”.



2. Press [F5] (NEXT PAGE).

3. Press [F5] (AUXILIARY FUNCTION).

4. Press [F3] (APPROX. LINE).

A selection window will appear.

TIP

Selectable approximate line setting	*NonDISPLAY	Hides the approximate line.
	DISPLAY	Shows the approximate line.

*: Indicates the default setting.

5. Locate the cursor to “DISPLAY” by using the rotary knob or [▲] / [▼].

6. Press [ENTER].

An approximate line will appear.

Caution

No approximate line will appear if no markers have been set.

7.3 Using the Cursor Link Function

The cursor link function keeps a certain distance among markers (① to ③, Y1 to Y3). For instance, when the cursor is moved 1km, all the markers will be moved 1km in the same direction as the cursor.

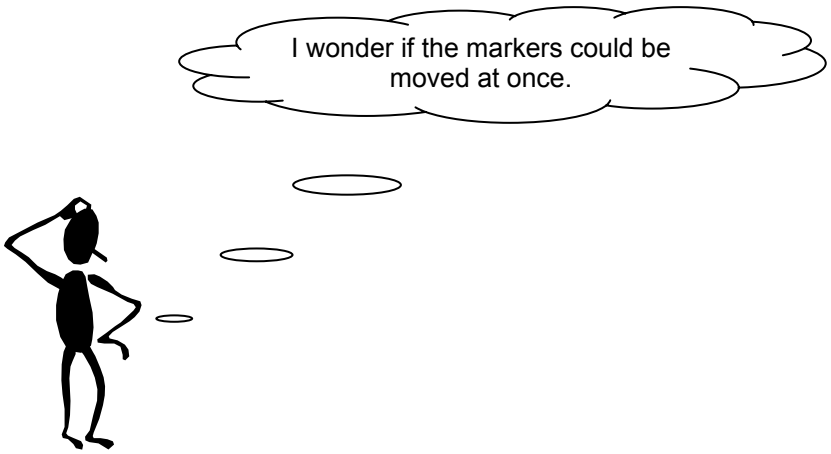
The method of changing the cursor link setting is given below.

♦ Example: “OFF” → “ON”

TIP

•The cursor link function must be used when you want to change marker positions without changing the distances among the markers.

•The cursor link setting will be retained in the internal memory even if the instrument is turned OFF. So, when the instrument is turned ON, the cursor link setting in effect just before the instrument was turned OFF last time will be restored.



For Traces that Have Been Auto Searched

Refer

For the window that shows auto search results at the end of measurement, refer to page 3-69.

1. Press [F1](SCREEN).

A selection window will appear.

TIP

Selectable screens	*TRACE + LIST
	LIST
	TRACE

*: Indicates the default setting.

2. Locate the cursor to "TRACE" by using the rotary knob or [▲] / [▼].

3. Press [ENTER].

A new window will appear.

Refer

For details on the window, refer to page 5-4.

4. Press [F2] (EVENT EDIT).

5. Press [F3] (EVENT MARKER EDIT).

6. Press [F5] (AUXILIARY FUNCTION).

7. Press [F5] (CURSOR LINK).

A selection window will appear.

TIP

Selectable cursor link	*OFF
	ON

*: Indicates the default setting.

8. Locate the cursor to "ON" by using the rotary knob or [▲] / [▼].

9. Press [ENTER].

The cursor link function will be enabled and "LNK" will be displayed at the left edge of the window.

Refer

For details on "LNK", refer to page 1-42.

10. Turn the rotary knob to move the cursor.

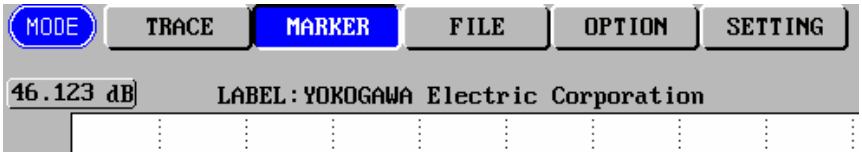
As the cursor moves, all the markers will move accordingly.

For Traces that Have Not Been Auto Searched

Refer

For the window that is displayed just after measurement is finished (without auto search), refer to page 3-72.

1. **Press [MODE] to locate the cursor to “MARKER”.**



2. **Press [F5] (NEXT PAGE).**

3. **Press [F5] (AUXILIARY FUNCTION).**

4. **Press [F5] (CURSOR LINK).**

   A selection window will appear.

TIP

Selectable cursor link	*OFF
	ON

*: Indicates the default setting.

5. **Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].**

6. **Press [ENTER].**

   The cursor link function will be enabled and “LNK” will be displayed at the left edge of the window.

Refer

For details on “LNK”, refer to page 1-42.

7. **Turn the rotary knob to move the cursor.**

   As the cursor moves, all the markers will move accordingly.

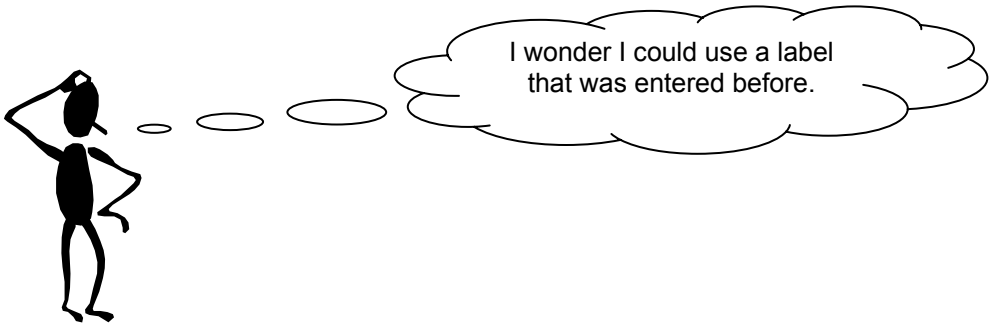
7.4 Using the Label Fixed Form Input Function

When labels are added to traces, they will be stored in the internal memory automatically.

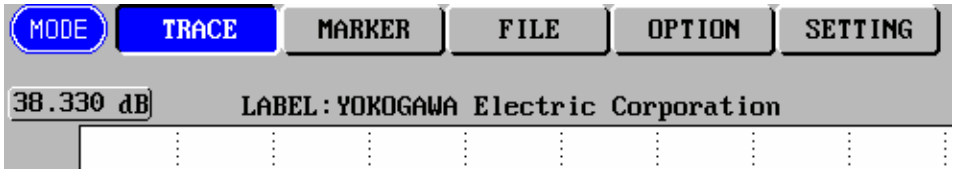
The label fixed form input function allows you to import a label from the memory (edit it if necessary) and add it to the current trace.

This section explains how to select a label that has been entered before.

TIP Up to 100 labels can be stored in the internal memory.



1. Press [MODE] to locate the cursor to “TRACE”.



2. Press [F2] (LABEL).

A window allowing you to enter a label will appear.

3. Press [F3] (FIXED FORM INPUT).

A list of labels that were entered before will appear.

TIP The list shows labels in order, with the latest label at the top of the list.

4. Locate the cursor to the desired label by using the rotary knob or [▲] / [▼].

5. Press [F1] (SELECT).

A character input window will appear, with the selected label displayed in the label field.

If necessary, edit the label.

Refer

For the method of editing a label, refer to page 4-7.

6. Press [F5] (DONE) to confirm the label.

TIP

•The internal memory can accommodate up to 100 labels. So, the 101st label will be deleted automatically. However, labels you do not want deleted can be protected.

1.Locate the cursor to the label to be protected.

2.Press [F2] (RESERVE) to protect it.

"*" will appear in front of the label indicating that it is protected.

•The label list can be saved to a storage media in TXT format.

1.Press [F5] (LABEL LIST SAVE/RECALL) to switch [F1] (FILE OPERATION) to "SAVE".

2.For the method of saving the label list, refer to page 3-88.

•A label list can be created using a personal computer and recalled to the instrument.

1.Press [F5] (LABEL LIST SAVE/RECALL) to switch [F1] (FILE OPERATION) to "RECALL".

2.For the method of recalling a label list, refer to page 6-3.

Caution

•Up to 50 labels can be protected.

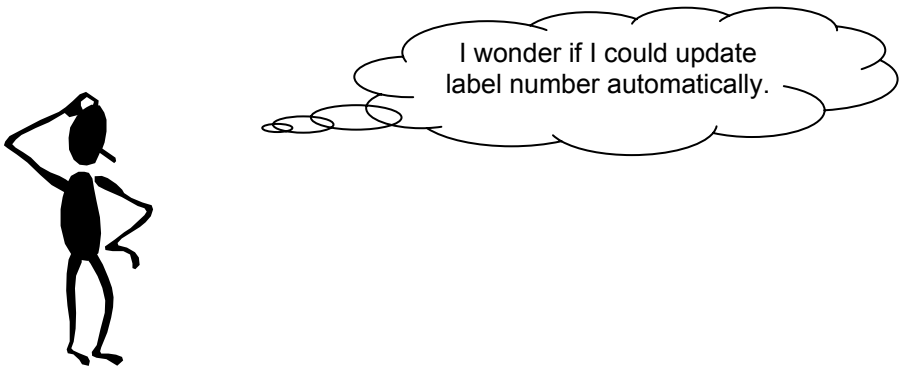
•When creating a label list using a personal computer, the following must be observed.

Number of characters	: Max. 36 characters
Number of labels	: Max. 100 labels
File format	: txt (text) format

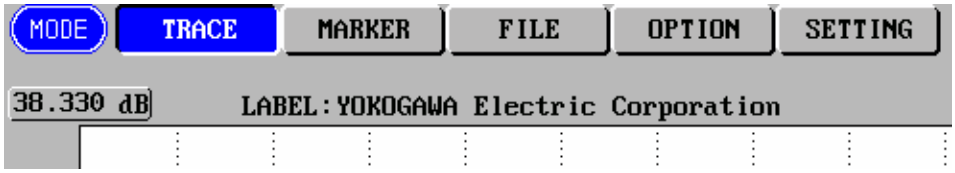
7.5 Using the Label Auto Increment Function

The label auto increment function allows you to add a number at the end of the label and increase the number by one automatically. This function is useful when measuring a multi-fiber cable.

This section explains how to set the label auto increment function.



1. Press [MODE] to locate the cursor to “TRACE”.



2. Press [F2] (LABEL).

A character input window will appear.

3. Press [F3] (FIXED FORM INPUT).

4. Press [F3] (LABEL NUMBER).

A selection window will appear.

TIP

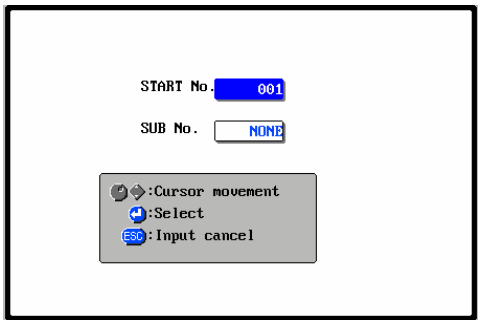
Selectable settings	*OFF
	ON

*: Indicates the default setting.

5. Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].

6. Press [ENTER].

The following window will appear.



7. Locate the cursor to "START No." by using the rotary knob or [▲] / [▼].

TIP

"START No." is already highlighted when this window appears.

8. Press [ENTER].

A selection window will appear.

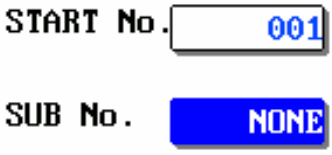
TIP

Selectable start No.	*001 to 999 (1 step)

*: Indicates the default setting.

9. Enter the desired start No.

10. Locate the cursor to "SUB No." by using the rotary knob or [▲] / [▼].



11. Press [ENTER].

A selection window will appear.

TIP

Selectable sub No.	*NONE
	a-b
	a-c
	a-d
	a-e
	a-f
	a-g
	a-h

*: Indicates the default setting.

The label No. will increase as follows when “NONE” or “a-c” is selected.

NONE: 001→002→003→004→…

a-c: 001a→001b→001c→002a→002b→002c→…

(When the start No. is set to “001”)

12. Select “SUB No.” by using the rotary knob or [▲] / [▼].

13. Press [ENTER] to confirm the sub No.

14. Press [F1] (DONE) to confirm the label No.

A character input window will appear, with the specified label No. shown in the label field.

15. Press [F5] (DONE) to confirm the label.

TIP

The label No. will be increased by one when the next measurement is started after the measured data is saved.

7.6 Entering Various Information for the Measured Trace

In addition to a label, this instrument allows you to enter various pieces of information regarding the measured trace.

The items that can be entered are shown below.

- Company name
- Name
- Cable ID
- Fiber ID
- Fiber type
- Cable code
- Originating location
- Terminating location
- Current data flag

The section explains how to enter these items.

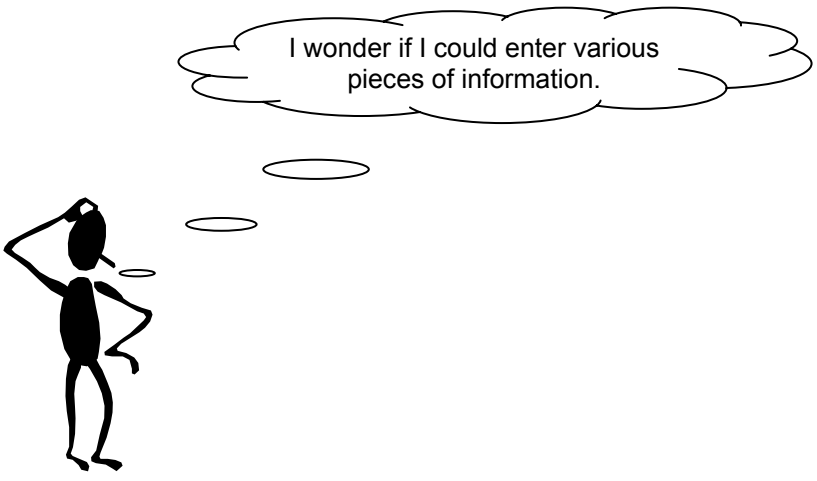
TIP

•Once information is entered, it will be retained until new information is entered.

•The entered information will be saved together with the measured data (in SOR and TRD format).

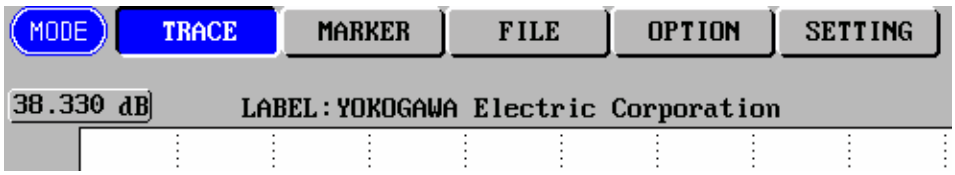
Refer

For the method of entering a label, refer to Chapter 4 and page 7-11.



Displaying the Detailed Information Input Window

1. Press [MODE] to locate the cursor to “TRACE”.

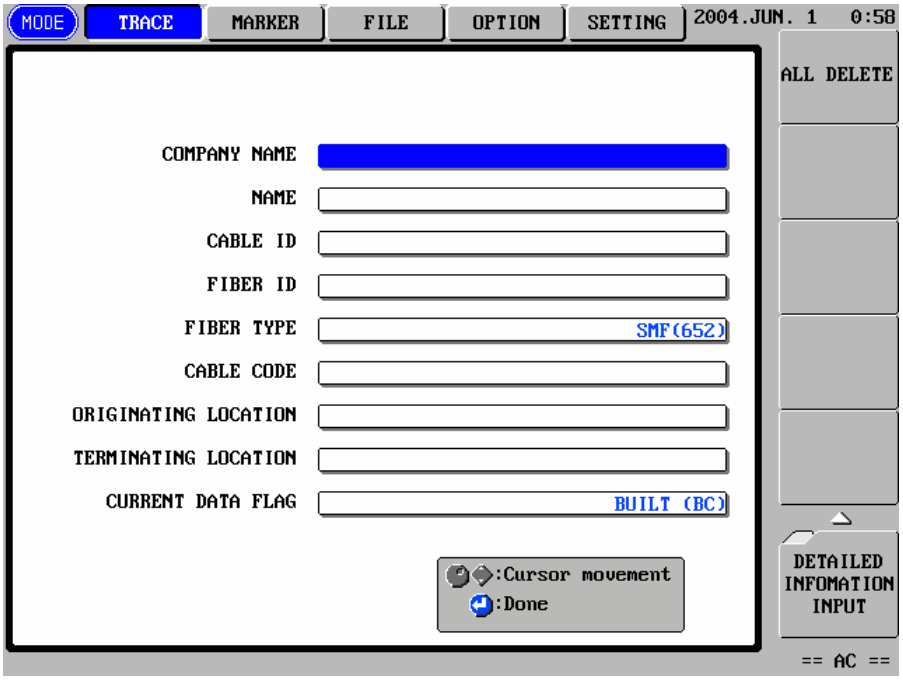


2. Press [F2] (LABEL).

A window allowing you to enter a label will appear.

3. Press [F4] (DETAILED INFORMATION INPUT).

A window allowing you to enter detailed information will appear.



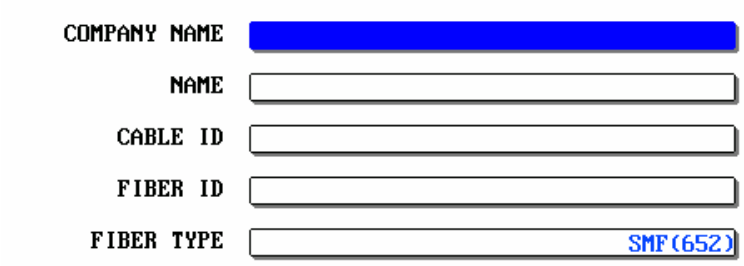
TIP

If [F1] (ALL DELETE) is pressed, all the currently entered characters will be deleted.

Entering Detailed Information

Entering the Company Name

1. Locate the cursor to “COMPANY NAME” by using the rotary knob or [▲] / [▼].



TIP

The cursor is already located at “COMPANY NAME” when the detailed information input window appears.

2. Press [ENTER].

A character input window will appear.

Caution

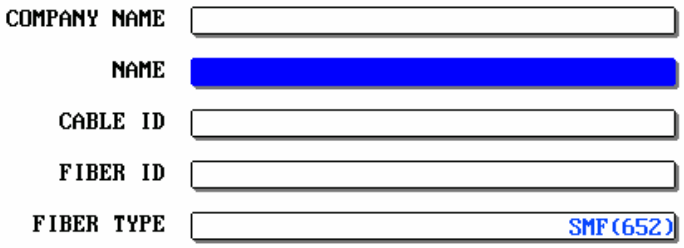
The company name can consist of up to 36 characters.

Refer

For the method of entering characters, refer to Chapter 4.

Entering the Name

1. Locate the cursor to “NAME” by using the rotary knob or [▲] / [▼].



2. Press [ENTER].

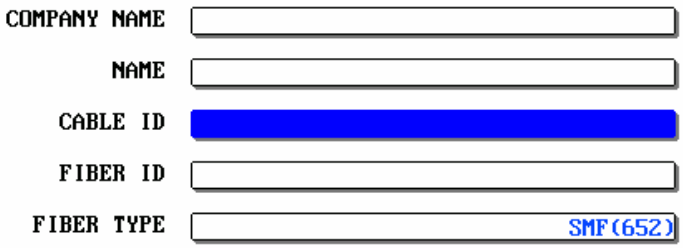
A character input window will appear.

Caution The name can consist of up to 36 characters.

Refer For the method of entering characters, refer to Chapter 4.

Entering the Cable ID

1. Locate the cursor to “CABLE ID” by using the rotary knob or [▲] / [▼].



2. Press [ENTER].

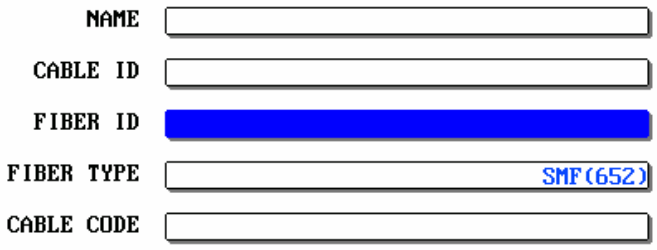
A character input window will appear.

Caution The cable ID can consist of up to 36 characters.

Refer For the method of entering characters, refer to Chapter 4.

Entering the Fiber ID

1. Locate the cursor to “FIBER ID” by using the rotary knob or [▲] / [▼].



2. Press [ENTER].

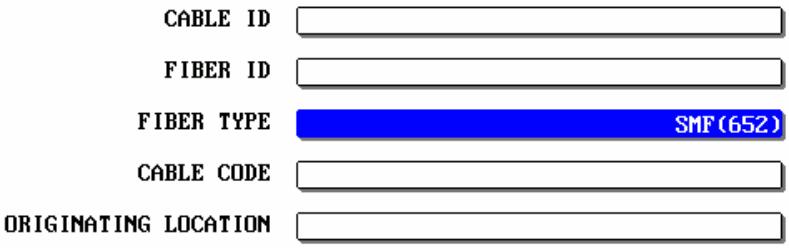
A character input window will appear.

Caution The fiber ID can consist of up to 36 characters.

Refer For the method of entering characters, refer to Chapter 4.

Entering the Fiber Type

1. Locate the cursor to "FIBER TYPE" by using the rotary knob or [▲] / [▼].



2. Press [ENTER].

A selection window will appear.

TIP

Selectable fiber types	*SMF(652)	Single mode fiber
	DSF(653)	Dispersion-shifted fiber
	NZ-DSF (655)	Non-zero dispersion shifted single mode fiber
	MMF(651)	Multi mode fiber

*: Indicates the default setting.

3. Locate the cursor to the type of currently measured optical fiber by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the fiber type.

Entering the Cable Code

1. Locate the cursor to “CABLE CODE” by using the rotary knob or [▲] / [▼].

2. Press [ENTER].

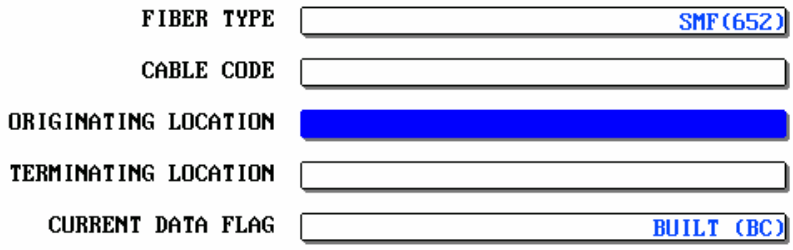
A character input window will appear.

Caution The cable code can consist of up to 36 characters.

Refer For the method of entering characters, refer to Chapter 4.

Entering the Originating Location

1. Locate the cursor to "ORIGINATING LOCATION" by using the rotary knob or [▲] / [▼].



2. Press [ENTER].

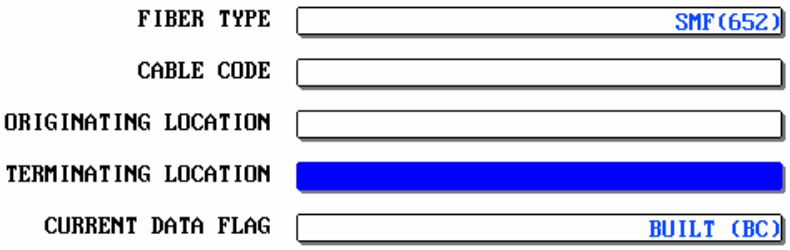
A character input window will appear.

Caution The originating location can consist of up to 36 characters.

Refer For the method of entering characters, refer to Chapter 4.

Entering the Terminating Location

1. Locate the cursor to "TERMINATING LOCATION" by using the rotary knob or [▲] / [▼].



2. Press [ENTER].

A character input window will appear.

Caution

The terminating location can consist of up to 36 characters.

Refer

For the method of entering characters, refer to Chapter 4.

Changing the Current Data Flag

1. **Locate the cursor to "CURRENT DATA FLAG" by using the rotary knob or [▲] / [▼].**

2. **Press [ENTER].**

   A selection window will appear.

TIP

Selectable current data flags	*BUILT (BC)
	REPAIRED (RC)
	OTHER (OT)

*: Indicates the default setting.

3. **Locate the cursor to the desired current data flag by using the rotary knob or [▲] / [▼].**

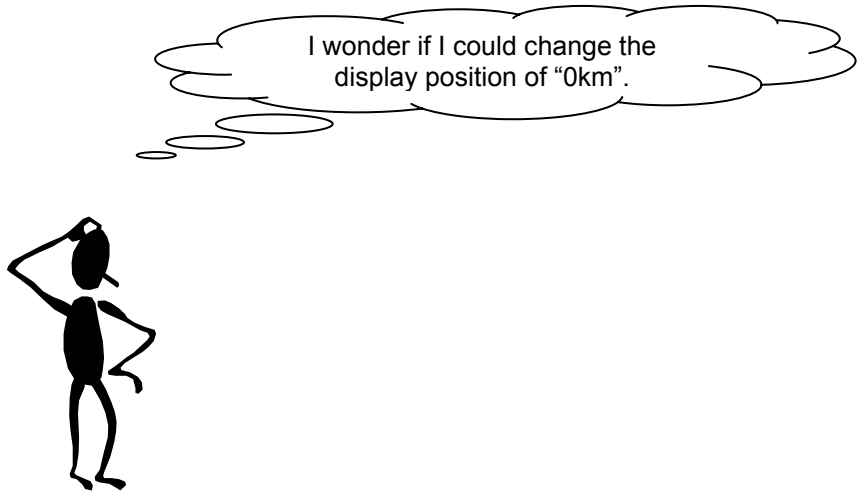
4. **Press [ENTER] to register the change made to the data flag setting.**

7.7 Changing the Distance Reference

Normally, the instrument considers the distance reference to be the connection point between the instrument and the optical fiber to be measured, and calculates all the distance data, such as cursor position and marker positions, based on the distance reference.

This instrument allows you to change the distance reference freely. The distance reference is always displayed as “0km”.

This section explains how to change the distance reference.



For Traces that Have Been Auto Searched

Refer

For the window that shows auto search results at the end of measurement, refer to page 3-69.

1. Press [F1](SCREEN).

A selection window will appear.

TIP

Selectable screens	*TRACE + LIST
	LIST
	TRACE

*: Indicates the default setting.

2. Locate the cursor to “TRACE” by using the rotary knob or [▲] / [▼].

3. Press [ENTER].

A new window will appear.

Refer

For details on the window, refer to page 5-4.

4. Press [F2] (EVENT EDIT).

5. Press [F3] (EVENT MARKER EDIT).

6. Press [F5] (AUXILIARY FUNCTION).

7. Locate the cursor to the point to which the distance reference is to be set, by turning the rotary knob.

TIP

To display the cursor at an accurate position, enlarge the trace.

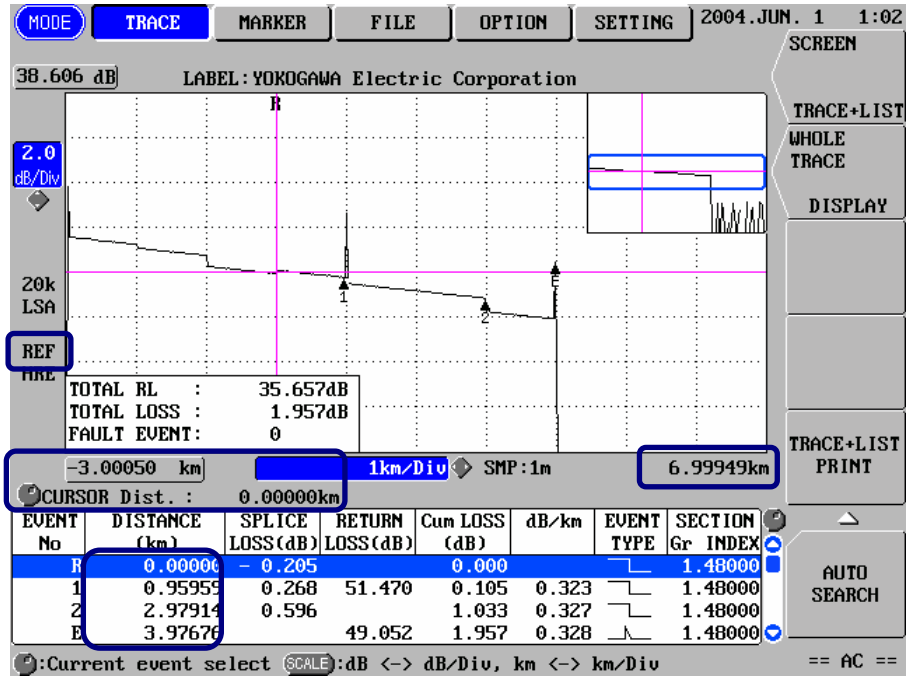
Refer

For the method of enlarging the trace, refer to page 3-66.

8. Press [F3] (DISTANCE REFERENCE SET).

The cursor position will be set as the distance reference.

“REF” will be displayed at the left edge of the window.



Caution

- All the distance data will be re-calculated based on the new distance reference.
- Only the events present after the distance reference will be displayed.
- When distance reference is changed, other operation for event edit are canceled.

TIP

- Carrying out step 7 with the distance reference set will restore the connection point between the instrument and optical fiber as the distance reference.
- The mark shape of the distance reference can be changed.

Refer

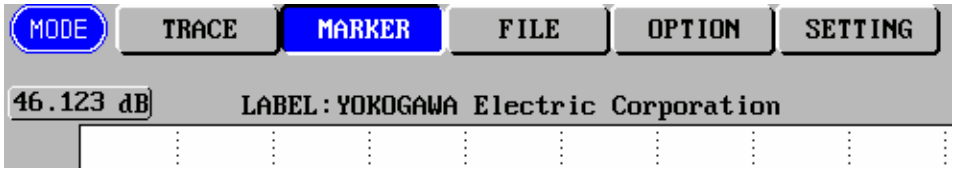
For the method of changing the distance reference mark, refer to page 2-19.

For Traces that Have Not Been Auto Searched

Refer

For the window that is displayed just after measurement is finished (without auto search), refer to page 3-72.

1. **Press [MODE] to locate the cursor to "MARKER".**



2. **Press [F5] (NEXT PAGE).**

3. **Press [F5] (AUXILIARY FUNCTION).**

4. **Locate the cursor to the point to which the distance reference is to be set, by turning the rotary knob.**

TIP

To display the cursor at an accurate position, enlarge the trace.

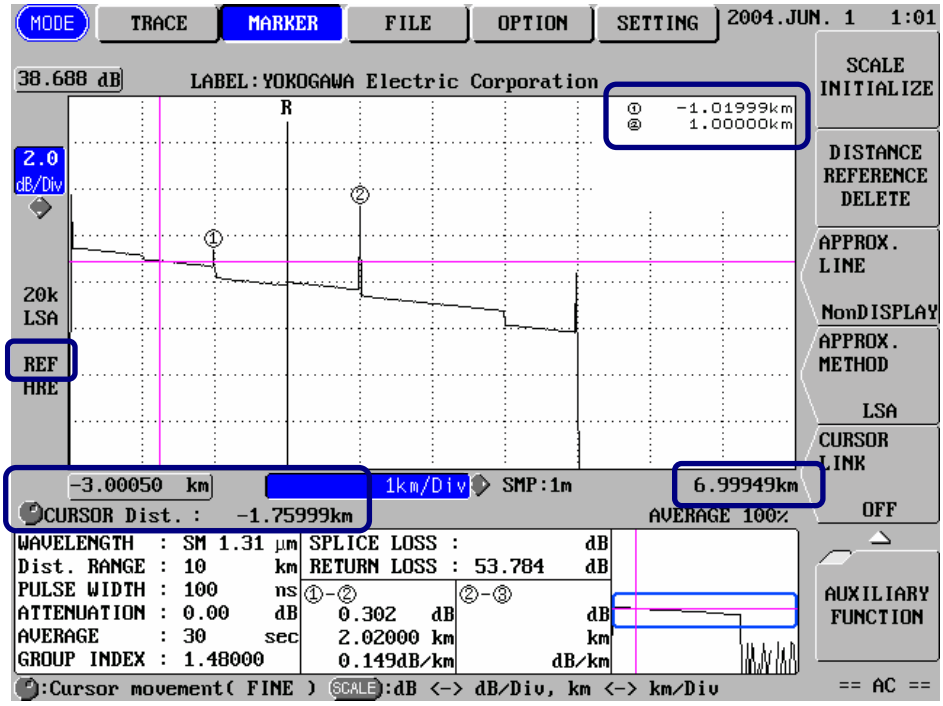
Refer

For the method of enlarging the trace, refer to page 3-66.

5. Press [F2] (DISTANCE REFERENCE SET).

The cursor position will be set as the distance reference.

"REF" will be displayed at the left edge of the window.



Caution

- All the distance data will be re-calculated based on the new distance reference.

TIP

- Carrying out step 4 with the distance reference set will restore the connection point between the instrument and optical fiber as the distance reference.
- The mark shape of the distance reference can be changed.
- If auto search is executed with the distance reference set, events present after the distance reference will be detected.

Refer

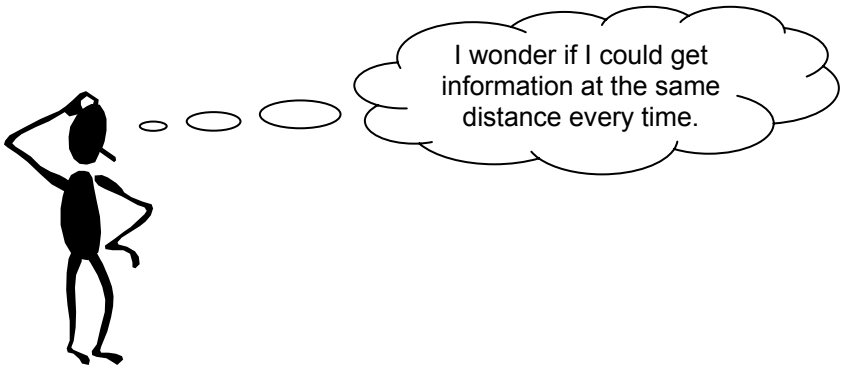
For the method of changing the distance reference mark, refer to page 2-19.

7.8 Using the Event Fix Function

When a master event is created and auto search is performed for the measured trace, this event fix function displays the information for the same distance as the master event.

This function is useful for measurements like measurement of multi-fiber cables, in which the distances to the events occurring in each fiber are expected to be the same.

This section explains how to create a master event and how to use it.



1. Measure the optical fiber and perform auto search.

Refer

- For the method of measuring an optical fiber and performing auto search, refer to page 3-57.
- For the window that shows auto search results at the end of measurement, refer to page 3-69.

2. Press [F1] (SCREEN).

A selection window will appear.

TIP

Selectable screens	*TRACE + LIST
	LIST
	TRACE

*: Indicates the default setting.

3. Locate the cursor to "LIST" by using the rotary knob or [▲] / [▼].

4. Press [ENTER].

A new window will appear.

Refer

For details on the window, refer to page 3-107.

5. Press [F3] (LIST EDIT).

A new window will appear.

Refer

For details on the window, refer to page 5-17.

6. Press [F2] (EVENT FIX).

A selection window will appear.

TIP

Selectable event fix settings	*OFF
	ON

*: Indicates the default setting.

7. Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].

8. Press [ENTER].

The currently displayed event will be set as the master event.

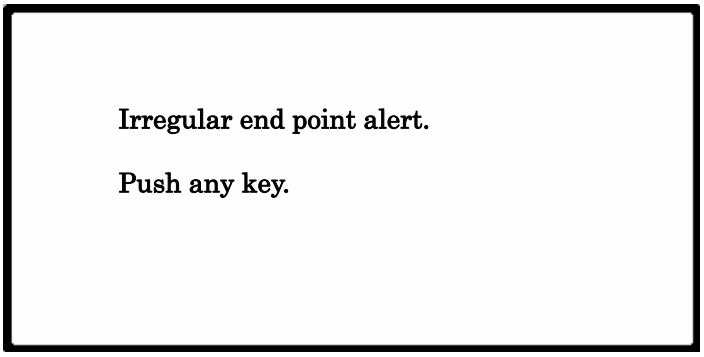
9. Measure a new optical fiber and perform auto search. The information at the position at the same distance as the master event will be displayed.

Caution

• The event fix function will be turned OFF (disabled) if measurement conditions (wavelength, distance range, pulse width, data size) are changed. It will also be turned OFF if the horizontal-axis scale is increased/decreased during real-time measurement.

•If an event other than the master event is found when another optical fiber is measured and an event search is executed, the event is also displayed.

• If end point shorter than end point of master event is found when another optical fiber measured and event search is executed, bellow message is displayed. And comment as “EVENT SEARCH detect as END point” is displayed in Event note.

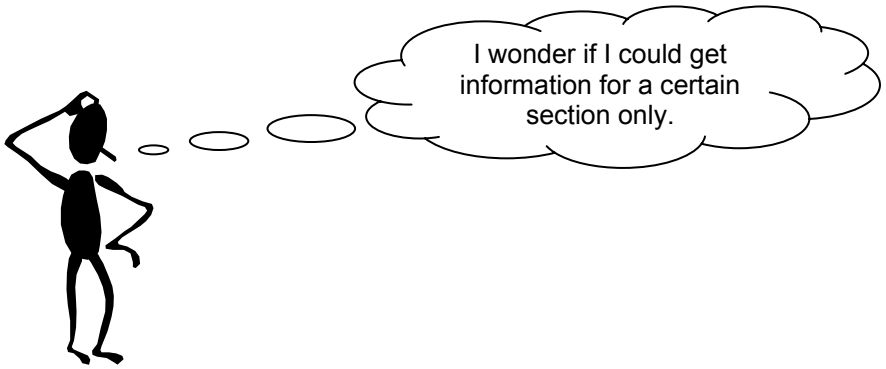


EVENT No.	DISTANCE (km)	SPLICE LOSS(dB)	RETURN LOSS(dB)	Cum LOSS (dB)	dB/km	EVENT TYPE	SECTION Gr INDEX
1	0.98040	0.159		0.321	0.338		1.48000
2	1.97498	0.469		0.820	0.342		1.48000
3	2.98172	-0.115		1.630	0.338		1.48000
*4	3.97630	4.605	<16.593	1.741	0.227		1.48000
5	4.02289	0.817		6.947	12.906		1.48000
6	4.97696	-0.150		15.392	7.995		1.48000
7	5.93406	0.086	60.717	16.218	1.020		1.48000
EVENT SEARCH detect as END point.							
E	6.96916		57.445	16.789	0.469		1.48000

7.9 Using the Section Analysis Function

The section analysis function allows you to calculate total return loss and total loss within the specified section.

This section explains how to specify a section.



1. Measure the optical fiber and perform auto search.

Refer

- For the method of measuring an optical fiber and performing auto search, refer to page 3-57.
- For the window that shows auto search results at the end of measurement, refer to page 3-69.

2. Press [F1] (SCREEN).

A selection window will appear.

TIP

Selectable screens	*TRACE + LIST
	LIST
	TRACE

*: Indicates the default setting.

3. Locate the cursor to "TRACE" by using the rotary knob or [▲] / [▼].

4. Press [ENTER].

A new window will appear.

Refer For details on the window, refer to page 5-4.

5. Press [F3] (SECTION ANALYSIS).

6. Locate the cursor to the point from which section analysis is to be started, and then press [F1] (START POINT SET).

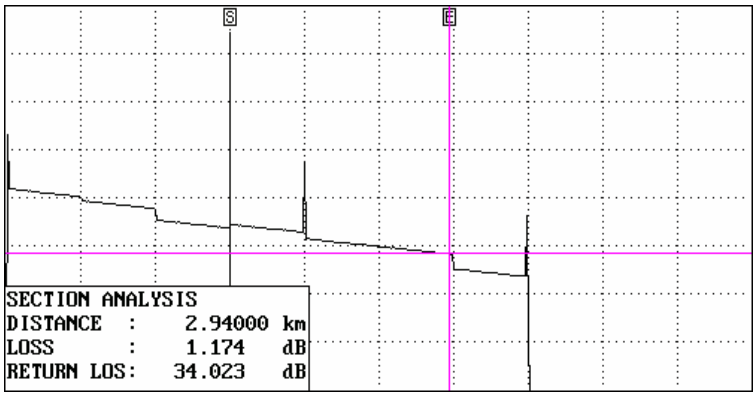
The S marker will appear at the cursor position.

Refer For the method of moving the cursor, refer to page 3-64.

7. Locate the cursor to the point at which section analysis is to be stopped, and then press [F2] (STOP POINT SET).

Marker E will appear at the cursor position.

The total return loss and total loss within the specified section (between the specified two points) will be displayed.

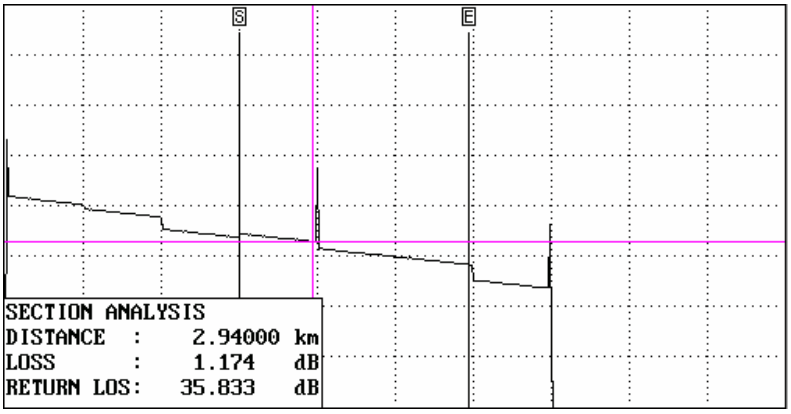


TIP

The total return loss is calculated based on the back scatter level at the near end. However, it can be re-calculated based on the back scatter level at the desired position (e.g. section analysis start point) instead of the near end.
The method of changing the reference level is explained below.

1. Move the cursor to the point whose back scatter level is to be set as the reference level.
2. Press [F3] (REFERENCE LEVEL ADJUST).

   A new reference level will be set, and the total return loss will be re-calculated based on this reference level.



Refer

For the method of moving the cursor, refer to page 3-64.

To cancel the section analysis setting

1. **Press [F4] (SET CLEAR).**

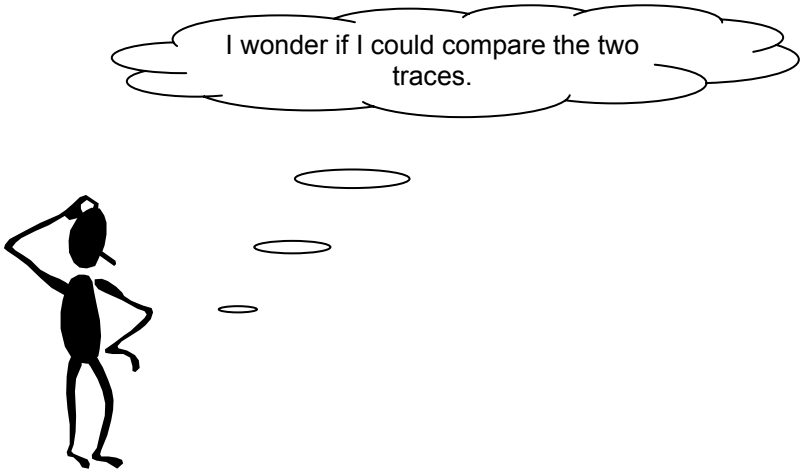
TIP

Also section analysis setting is canceled, to get out this window (Press [ESC]).

7.10 Manipulating Two or More Traces

This section explains the following functions.

- Displaying multiple traces
- Displaying the subtract trace of two traces
- Merging two traces



Displaying Multiple Traces

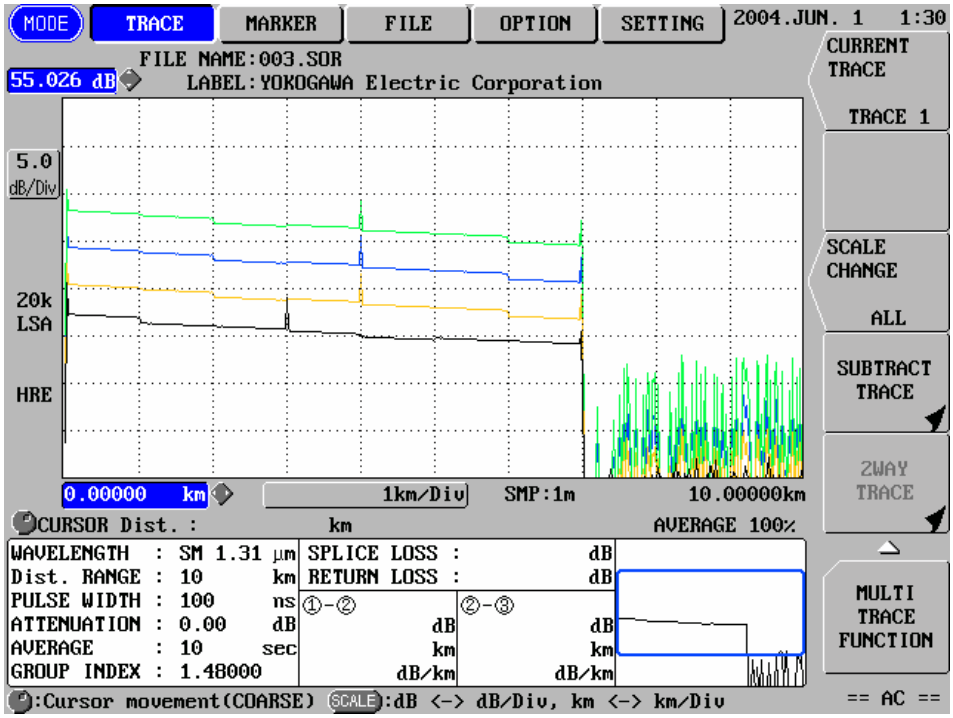
The following two methods are available to display multiple traces.

- By recalling multiple files
- By displaying a new trace while displaying the current trace
- By making a measurement continuously on multiple wavelengths

This section explains how to display a new trace while displaying the current trace.

TIP

• Display example (Four traces display)



Displayed information (file name, measurement conditions, etc) is for current trace.

• When [F3] (SCALE CHANGE) is selected current trace, operations for enlarge/reduce and sift of trace are as follows.

Enlargement/reduction (horizontal)	: Takes effect on the multi traces
Shift (horizontal)	: Takes effect on the multi traces.
Enlargement/reduction (vertical)	: Takes effect on the multi traces.
Shift (vertical)	: Takes effect on the current traces.

Refer

- For the method of recalling multiple files, refer to page 6-3.
- For the method to make a measurement continuously on multiple wavelengths, refer to page 7-52.

1. Display a trace.

Perform measurement or recall one file to display the window that is displayed before Auto search.

Refer

For details on the window, refer to page 3-72.

2. Press [F4] (TRACE FIX).

A selection window will appear.

TIP

Selectable trace fix settings	*OFF
	ON

*: Indicates the default setting.

3. Locate the cursor to "ON" by using the rotary knob or [▲] / [▼].

4. Press [ENTER].

The current trace will be fixed.

TIP

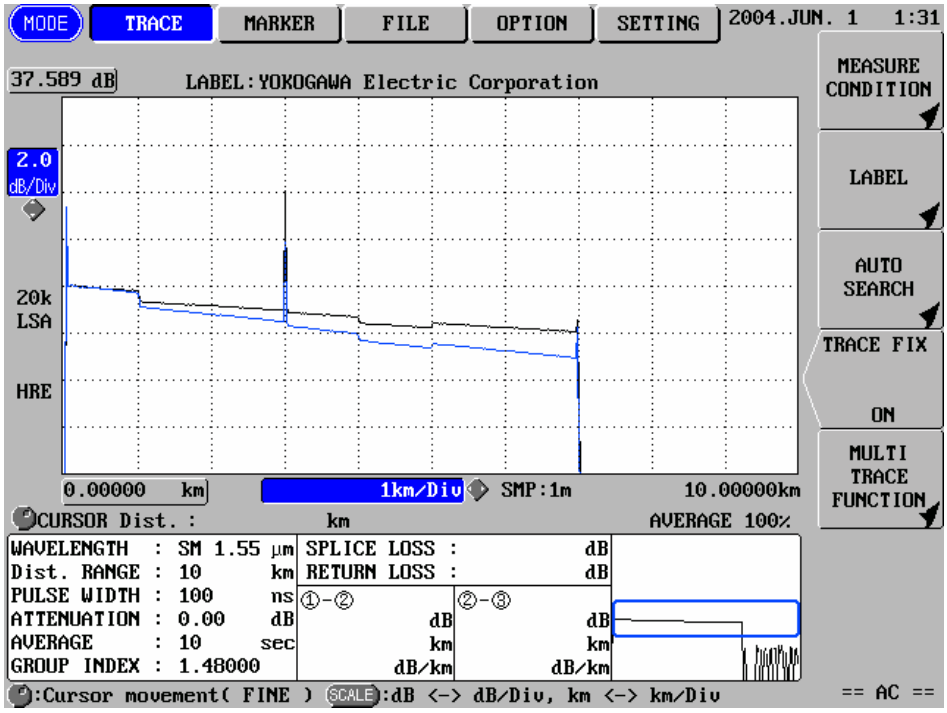
The color of the trace will change if the display color is not currently set to "B&W".

Refer

For the method of changing the display color, refer to page 2-22.

5. Change measurement conditions and start measurement.

A new trace will be displayed.



Caution

The fixed trace will be discarded if the distance range is changed.

Displaying the Subtract Trace of Two Traces

Displaying the Subtract Trace

This section explains how to display the subtract trace of two traces (reference trace, target trace).

Caution

The subtract trace cannot be displayed unless the following measurement conditions are the same for both the reference and target traces.

- Distance range
- Sampling resolution
- Actual data size

1. Display the traces.

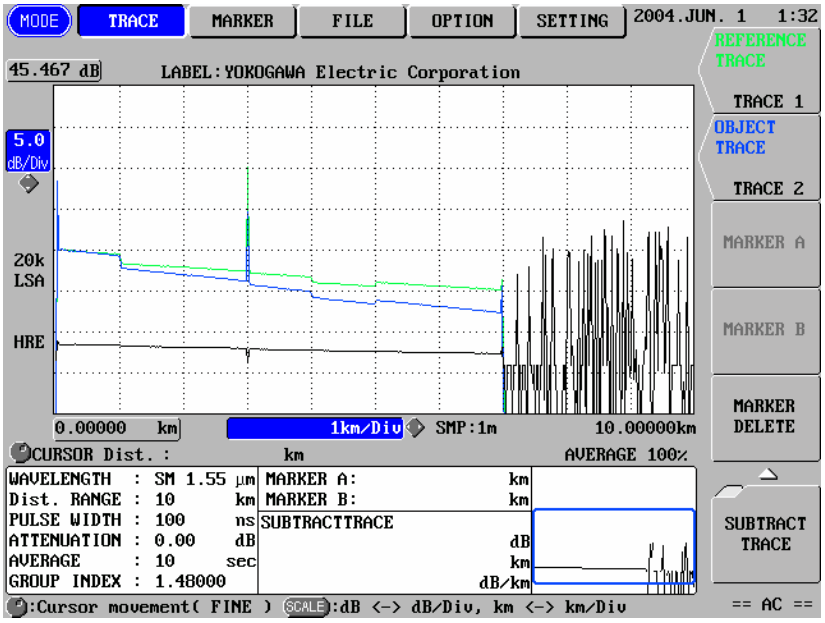
Refer

For the method of displaying two or more traces, refer to page 6-3.

2. Press [F4] (SUBTRACT TRACE)*1.

The subtract trace will be displayed.

*1: If the window (page 3-71) is currently displayed, the subtract trace can be displayed by pressing [F5] (MULTI TRACE FUNCTION) instead of [F4] (SUBTRACT TRACE).



TIP

The reference and object traces can be changed by pressing [F1] and [F2].

Analyzing the Subtract Trace

This section explains how to set markers A and B on the subtract trace and calculate the loss occurring between those marker points.

1. Locate the cursor to the position to which marker A is to be set.

2. Press [F3] (MARKER A).

Marker A will appear at the cursor position.

3. Locate the cursor to the position to which marker B is to be set.

4. Press [F4] (MARKER B).

Marker B and analysis results will appear at the cursor position.

Marker A:	①	km
Marker B:	②	km
Subtract trace		
	③	dB
	④	dB/km
	⑤	dB

①	Distance from distance reference to marker A
②	Distance from distance reference to marker B
③	Loss between points A and B on the target trace
④	Loss per km between points A and B on the target trace
⑤	Return loss between points A and B on the target trace

TIP

Analyzed by approximate method of reference trace.

It is not possible to save the subtract trace and analysis results.

Refer

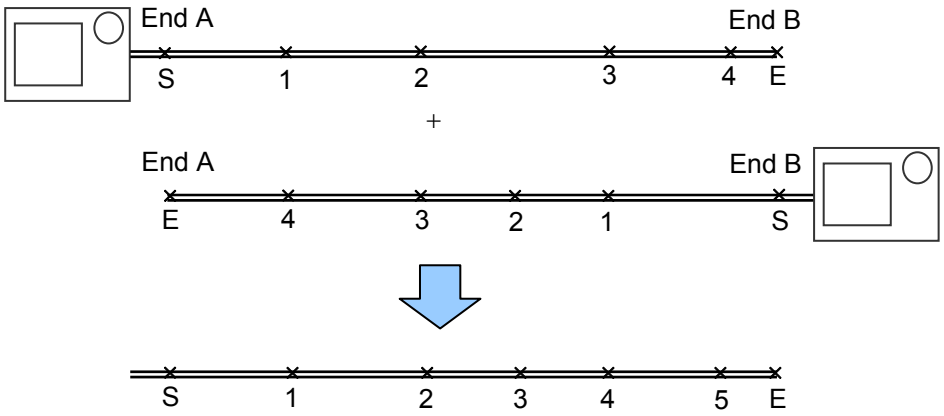
For details on approximate method, refer to page 3-38.

To clear the markers

1. **Press [F5] (MARKER DELETE).**

Merging Two Traces

The 2-way trace function allows you to merge the events detected on an optical fiber in the direction from end A to end B with those detected in the direction from end B to end A.



Merging Events

This section explains how to merge events of two traces.

1. Recall two files.

Caution

- The 2-way trace function can be used only when two files are recalled (same file type). It cannot be used if three or more files are recalled.
- The 2-way trace function cannot be used unless the following measurement conditions are the same for both the two recalled traces.

  Wavelength

  Distance range

  Pulse width

  Sampling resolution

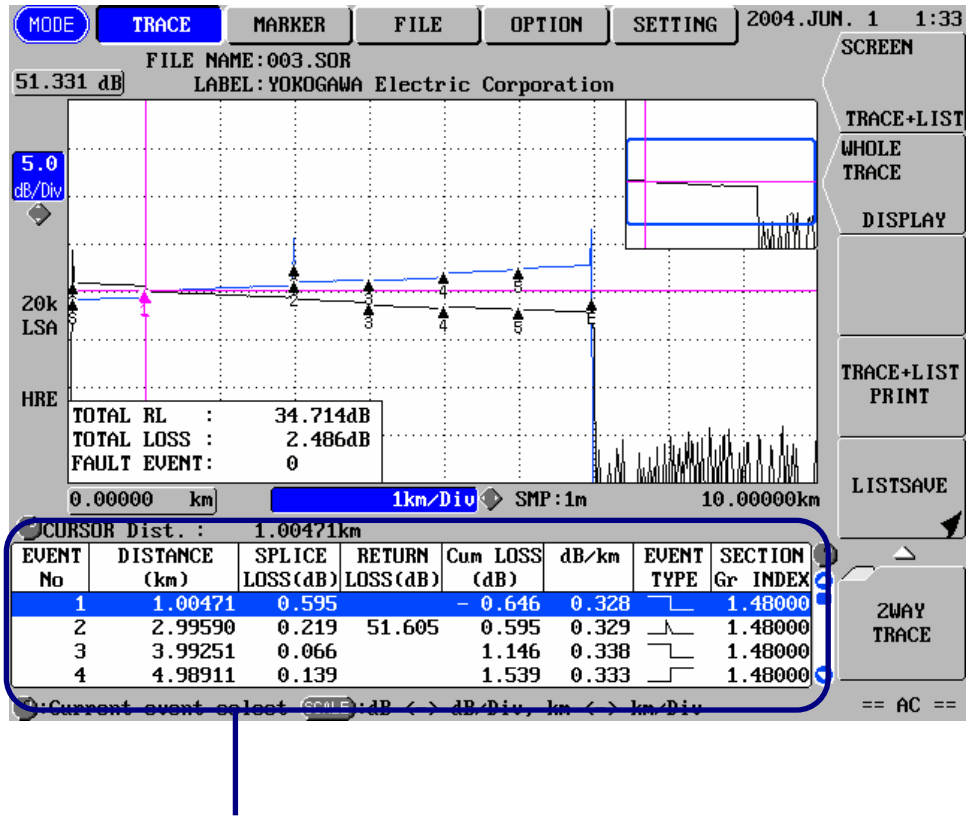
  Actual data size

Refer

For the method of recalling two files, refer to page 6-3.

2. Press [F5] (2WAY TRACE).

The following window will appear.



A list of merged events will be shown.

TIP

- The merged trace of the two traces will not be displayed. But all of event maker displayed on the original direction trace.
- The merged event list can be saved.
- The merged event list can be printed.
- A comment can be added to the merged event list.

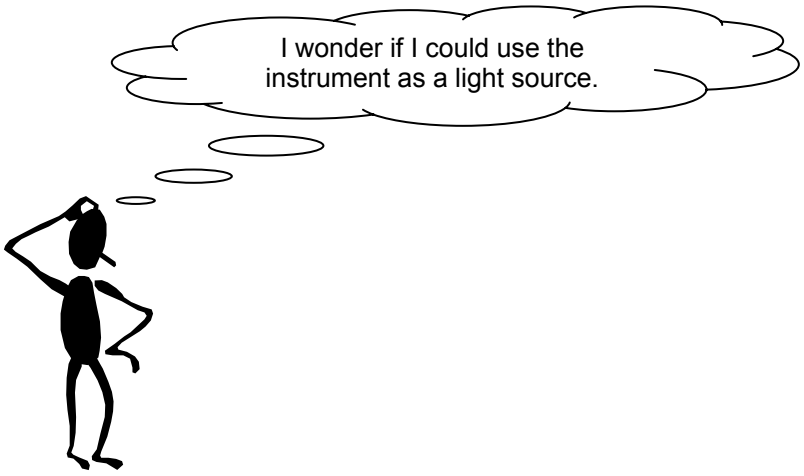
Refer

- For the method of saving the event list, refer to page 3-89.
- For the method of printing the event list, refer to page 3-106.
- For the method of adding a comment to the event list, refer to page 5-23.

7.11 Using the Light Source Function

The light source function allows use of the instrument as a light source, not as an OTDR.

This section explains how to use the instrument as a light source.



Caution The instrument cannot be used as a light source if an optical module (AQ7261/AQ7269) is installed.

TIP The light source wavelength and modulation frequency that can be used vary with the optical module installed.

They are shown below per available optical module.

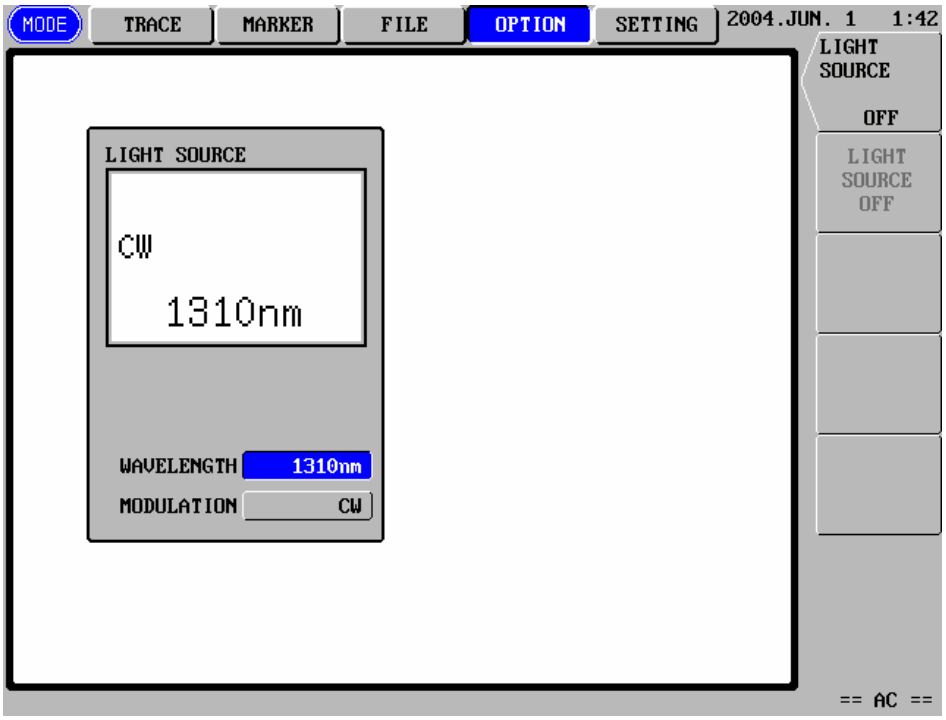
Optical module	Wavelength	Modulation frequency
AQ7261	----------	----------
AQ7264	1310nm, 1550nm	CW, CHOP (270Hz, 1kHz, 2kHz)
AQ7265	1310nm, 1550nm	CW, CHOP (270Hz, 1kHz, 2kHz)
AQ7269	----------	----------

Refer For detail on output level, refer to Chapter 9.

Displaying the Light Source Function Window

1. Press [MODE] to locate the cursor to “OPTION”.

The following window will appear.



Caution “OPTION” cannot be selected if an optical module (AQ7261/AQ7269) is installed.

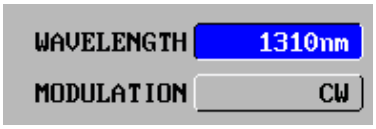
Changing the Wavelength and Modulation Frequency

Changing the Wavelength

The wavelength can be changed as explained below.

♦ Example: “1310nm” → “1550nm”

1. Locate the cursor to “WAVELENGTH” by using the rotary knob or [▲] / [▼].



TIP

“WAVELENGTH” is already highlighted when the source function appears.

2. Press [ENTER].

A selection window will appear.

TIP

Selectable wavelengths	*1310nm
	1550nm

*: Indicates the default setting.

3. Locate the cursor to “1550nm” by using the rotary knob or [▲] / [▼].

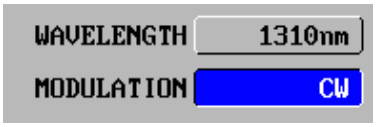
4. Press [ENTER] to register the change made to the wavelength setting.

Changing the Modulation Frequency

The modulation frequency can be changed as explained below.

♦ Example: “CW” → “1kHz”

1. Locate the cursor to “MODULATION” by using the rotary knob or [▲] / [▼].



2. Press [ENTER].

A selection window will appear.

TIP

Selectable modulation frequencies	*CW
	270Hz
	1kHz
	2kHz

*: Indicates the default setting.

3. Locate the cursor to “1kHz” by using the rotary knob or [▲] / [▼].

4. Press [ENTER] to register the change made to the modulation frequency setting.

Emitting a Laser

1. **Connect an optical fiber to the instrument.**

2. **Press [F1] (LIGHT SOURCE).**

   A selection window will appear.

TIP

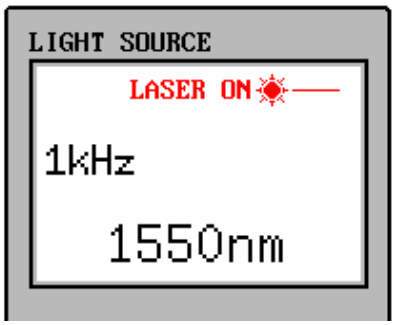
Selectable light source	*OFF
	ON

*: Indicates the default setting.

3. **Locate the cursor to "ON" by using the rotary knob or [▲] / [▼].**

4. **Press [ENTER].**

   A laser will be emitted and "LASER ON" will appear.



WARNING

Do not disconnect the optical fiber from the instrument while laser is emitted , and do not stare into the end of the connected optical fiber.

Laser beams are invisible to the naked eye, but if they enter the eyes, they may cause impaired eyesight.

Turn off a Laser

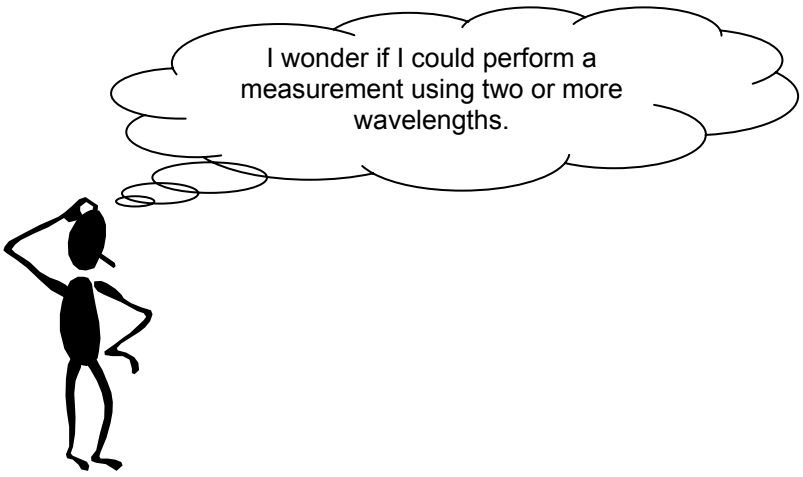
1. **Press [F2] (LIGHT SOURCE OFF).**

7.12 Making a Measurement Continuously Changing the Wavelengths

The characteristics of an optical fiber can be obtained more correctly by measuring the fiber using two or more wavelengths. This function increases the efficiency of measurement by saving the work to change the wavelength manually after a measurement was made on one wavelength.

This section explains the method to make a measurement continuously on one optical fiber changing the wavelength.

- Example: "Single-wavelength measurement with 1.31μm" → "Multi-wavelength measurement with 1.31μm and 1.55μm""



1. Select file name type including "wavelength".

Refer — For the method to enable the file name type, refer to page 3-97.

2. Display the measurement condition change window.

Refer — For the method of displaying the window, refer to page 3-11.

3. Press [F3] (MULTI WL MEASURE).

A selection window will appear.

TIP

Selectable light source	*OFF
	ON

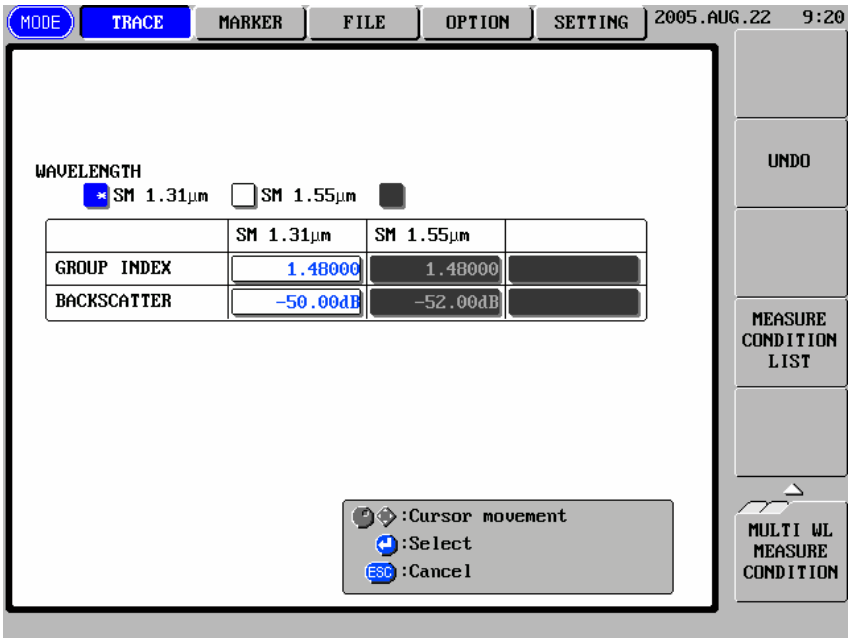
*: Indicates the default setting.

4. Locate the cursor to "ON" by using the rotary knob or [▲] / [▼].

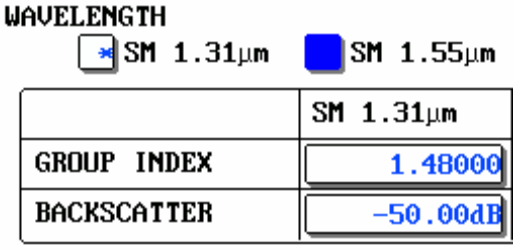
5. Press [ENTER].

6. Press [F5] (MULTI WL MEASURE CONDITION).

The following window will appear.



7. Locate the cursor to “SM 1.55µm” by using the rotary knob or arrow key.



8. Press [ENTER] .

" * " is displayed.

TIP

- Check to make sure that "*" is added to the traces 1.31µm and 1.55µm.
- Please set group index and back scatter level of each wavelength as the need arises.

9. Press [F4] (DONE) to register the changes made to the multi wl measurement conditions.

10. Press [F4] (DONE) to register the changes made to the measurement conditions.

11. Press [AVE]

Measurements are made sequentially starting from the shorter one.

TIP

・Sample measurement sequence

1. Measurement with the wavelength 1.31µm
2. Event search performed after measurement completed*
3. Measurement data saved*
4. Measurement with the wavelength 1.55µm
5. Event search performed after measurement completed*
6. Measurement data saved*

*: Performed only when the event search and auto saving functions have been set to ON.

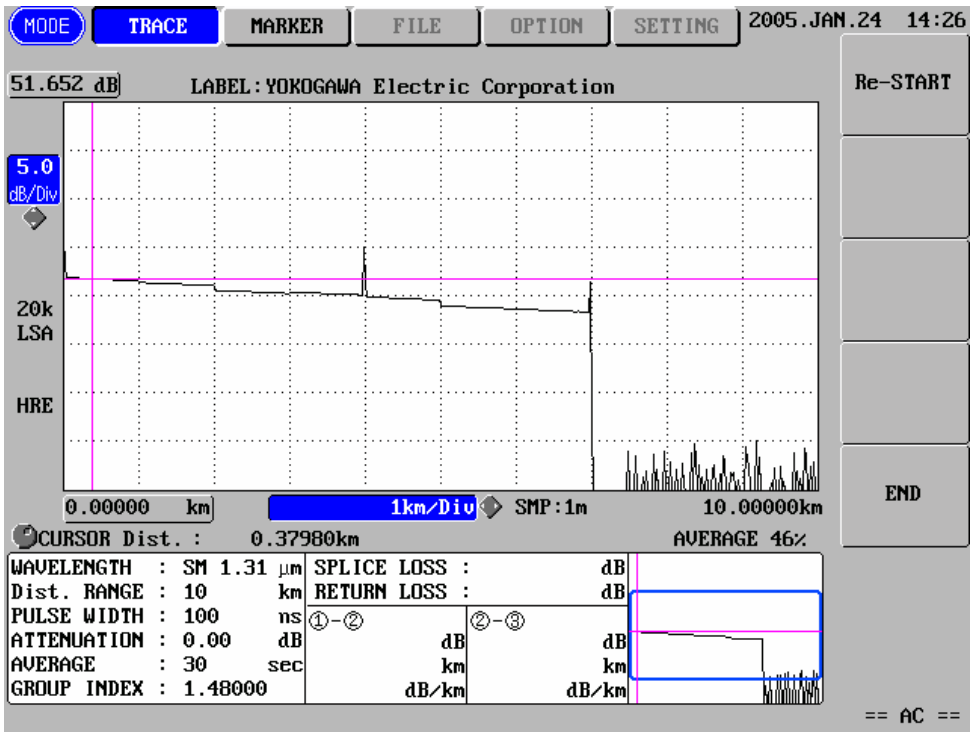
・The number of the file name is used commonly for two wavelength.

Refer

- For the method to enable the event search function, refer to page 3-36.
- For the method to enable the auto saving function, refer to page 3-34.

TIP

- If [AVE] is pressed during a continuous measurement, the following window will appear.



- Pressing [F1] (Re-START) restarts the measurement. The measurement starts from the wavelength at which the measurement was previously stopped. The file number is not incremented.
- Pressing [F5] (END) stops the continuous measurement. Pressing [AVE] again restarts the measurement from the wavelength 1310nm. The file number is not incremented.

Chapter 8
USING OPTIONS AND EXTERNAL DEVICES

8.1 Using Options

This section explains how to connect and remove the following options to the instrument.

- Printer/FDD unit
- Printer unit

Option Unit

Connecting

This section explains procedure of mounted options to take printer/FDD unit for example.

1. Make sure that the power to the instrument is turned OFF.

WARNING	
	Do not connect the printer/FDD unit while the power to the instrument is ON. Failure to observe this may result in an electric shock.

Refer For the method of turning OFF the power, refer to page 3-108.

2. Remove the cover from the expansion port located on the rear panel of the instrument.

Caution Keep the removed cover in a safe place to prevent it being lost.

3. Place the projecting part on the bottom of unit on the rear of instrument.

4. Insert the unit's connector into the expansion port.

⚠ CAUTION	
	When inserting the connector, hold the unit gently with the palms of your hands. Take care to hold the unit in such a way that pressure is not exerted on one point only or that it is held too strongly. Failure to observe this may result in damage.

5. Secure the unit to the instrument.

Hook the unit's tab (located on the side of the unit as shown below) to the instrument.

Caution Make sure that the unit's tab is hooked to the instrument.

Removing

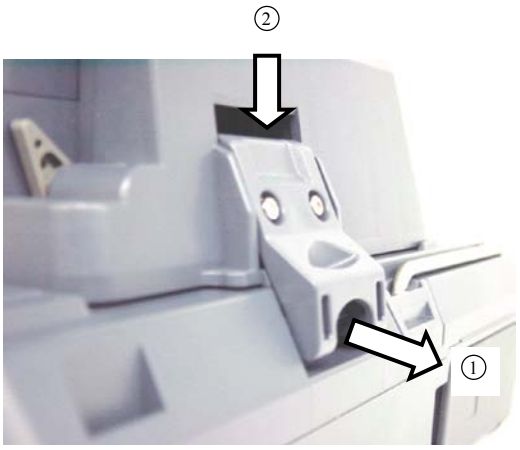
This section explains procedure of removed options to take printer/FDD unit for example.

1. Make sure that the power to the instrument is turned OFF.

WARNING	
	Do not remove the printer/FDD unit while the power to the instrument is ON. Failure to observe this may result in an electric shock.

Refer For the method of turning OFF the power, refer to page 3-108.

2. Release the tab from the instrument.



Caution When releasing the tab, take care not to trap your finger.

3. Lift the unit straight to remove it.

4. Attach the cover to the expansion port.

Caution Make sure that the cover is attached.

Setting Up the Printer

The instrument allows both optional printer unit and USB printer to be connected at the same time. In this case, the destination printer (the printer to which you want to print out) must be set up.

In this section, the method of changing the destination printer from one to the other is explained below.

♦ Example: “HP” → “EXTENSION UNIT”

Caution Make sure an option printer is connected to the instrument.

1. Press [MODE] to locate the cursor to “SETTING”.

2. Press [F2] (EXTERNAL INSTRUMENT SET).

3. Locate the cursor to “MAKER” by using the rotary knob or the arrow key.

TIP The cursor is already located at “PRINTER” when this window appears.

4. Press [ENTER].

A selection window will appear.

TIP

Selectable printer makers	*EXTENSION UNIT	Prints out to the optional printer unit.
	HP	Prints out to the HP printer connected to a USB connector.
	EPSON	Prints out to the EPSON printer connected to a USB connector.

*: Indicates the default setting.

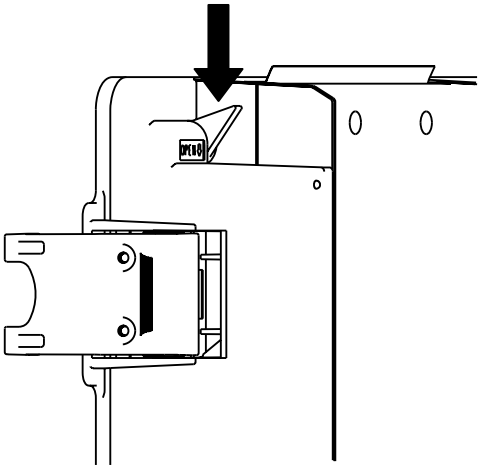
5. Locate the cursor to "EXTENSION UNIT" by using the rotary knob or the [▲] / [▼] .

6. Press [ENTER] to register the change made to the printer maker setting.

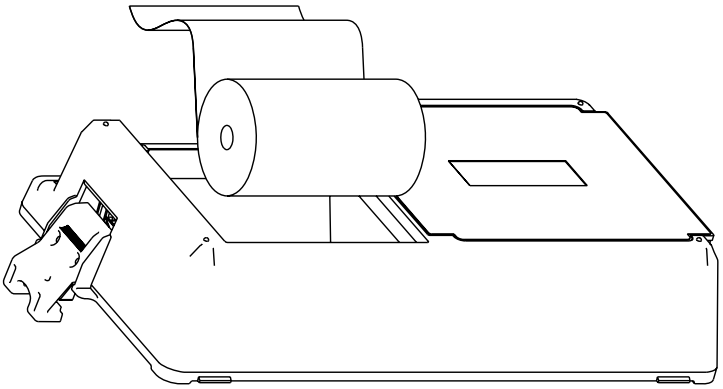
Setting the Recording Paper in the Printer

The recording paper can be set in the printer as explained below.

1. Press down the lever to remove the printer cover.



2. Set the recording paper in the unit.



3. Attach the printer cover.

8.2 Using External Devices

This instrument allows use of the following external devices by connecting them to USB ports.

- USB keyboard
- PCMCIA memory card
- USB printer
- USB storage medium (FDD, memory)

This section explains how to connect the above external devices to the instrument and remove them.

USB Keyboard

Connecting

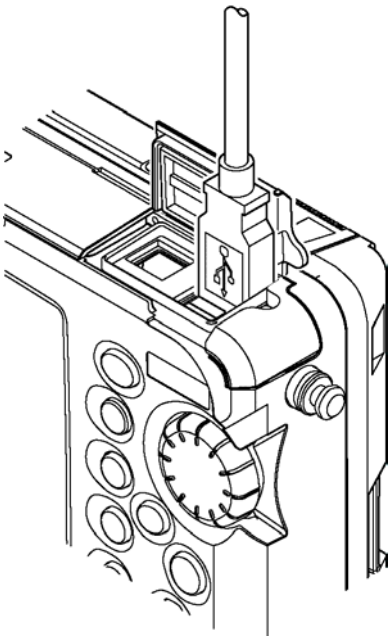
A USB keyboard can be connected to the instrument as explained below.

TIP

A USB keyboard can be connected even if the power to the instrument is currently ON.

1. **Open the cover on the top of the instrument.**

2. **Connect a USB keyboard to a USB connector (host side).**



TIP

Two USB connectors (host side) are available, and the keyboard can be connected to either of these.

Using

Using a keyboard makes entry of characters easy.

This section explains points to be observed when using a USB keyboard.

Caution The keyboard can be used in character input windows only.

Basically, characters can be entered in the same way as you normally do with a personal computer.

The following keys on the keyboard have the same effects as those provided on the instrument.

- F1 → Has the same effect as that when [F1] is pressed.
- F2 → Has the same effect as that when [F2] is pressed.
- F3 → Has the same effect as that when [F3] is pressed.
- F4 → Has the same effect as that when [F4] is pressed.
- F5 → Has the same effect as that when [F5] is pressed.
- F8 → Has the same effect as that when [MODE] is pressed.
- F11 → Has the same effect as that when the rotary knob is turned counter-clockwise.
- F12 → Has the same effect as that when the rotary knob is turned clockwise.
- Arrow → Has the same effect as that when the arrow key is pressed.
- Home → Has the same effect as that when [SCALE] is pressed.
- Insert → Has the same effect as that when the rotary knob is pressed.
- Enter → Has the same effect as that when [ENTER] is pressed.
- Esc → Has the same effect as that when [ESC] is pressed.

Removing

The USB keyboard can be removed from the instrument as explained below.

TIP The USB keyboard can be removed even if the power to the instrument is currently ON.

1. Hold the keyboard cable's connector and lift it straight to remove the keyboard.

⚠ CAUTION	
	When removing the keyboard, do not pull it by the cable. Failure to observe this may result in damage.

2. Close the cover on the top of the instrument.

PCMCIA Memory Card

Connecting

A PCMCIA memory card can be connected to the instrument as explained below.

TIP

A PCMCIA memory card can be connected even if the power to the instrument is currently ON.

1. **Open the cover on the top of the instrument.**

2. **Insert the memory card into the PCMCIA slot on the instrument.**

Caution

- When inserting the memory card, make sure it is inserted in the correct direction.
- Also make sure that the memory card's label side faces the front of the instrument.

Removing

The PCMCIA memory card can be removed from the instrument as explained below.

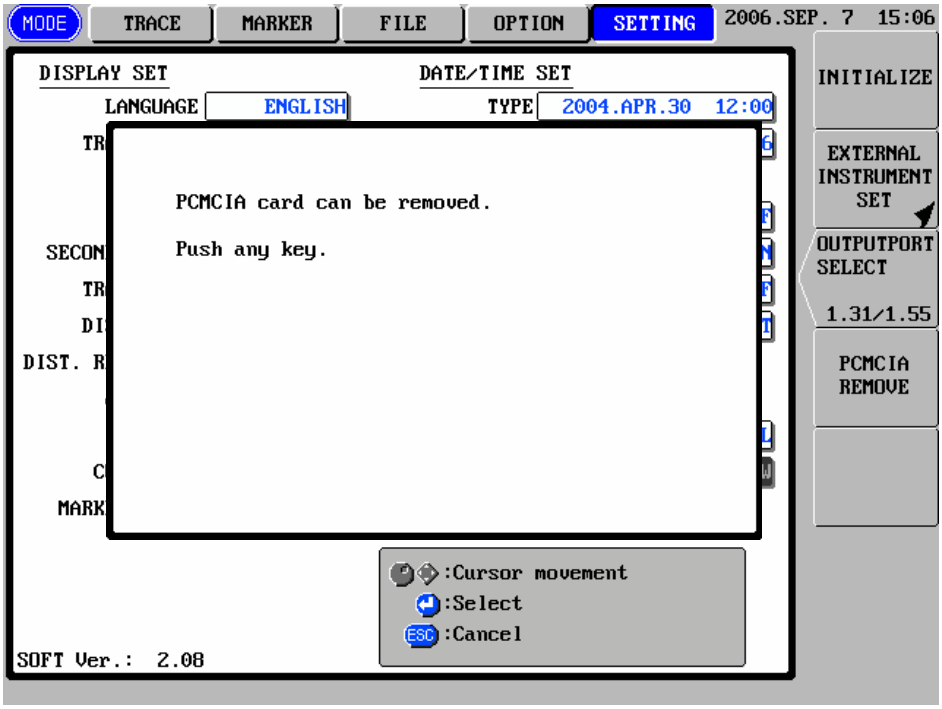
TIP

The PCMCIA memory card can be removed even if the power to the instrument is currently ON.

1. Press [MODE] to locate the cursor to “SETTING”.

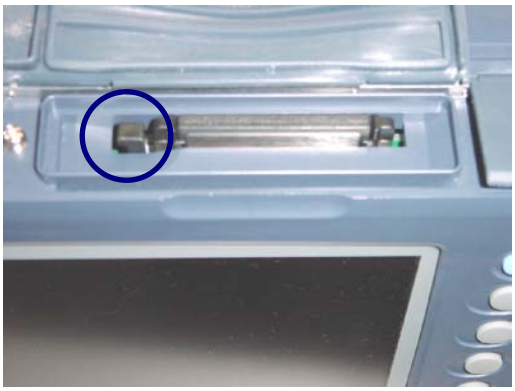
2. Press [F4] (PCMCIA REMOVE).

The following window will appear.



3. Press the card eject button.

The memory card will pop out.



4. Lift the memory card straight to remove it.

Caution

Before removing the memory card, make sure that a message stating that the card can be removed safely is displayed.

5. Close the cover on the top of the instrument.

USB Printer

Caution

The following USB printers available to use this instrument at present.

Hewlett Packard

- Deskjet5160
- Deskjet5168
- Deskjet5740
- Deskjet5748

EPSON

- PX-V500
- Stylus C45

Connecting

A USB printer can be connected to the instrument as explained below.

Caution

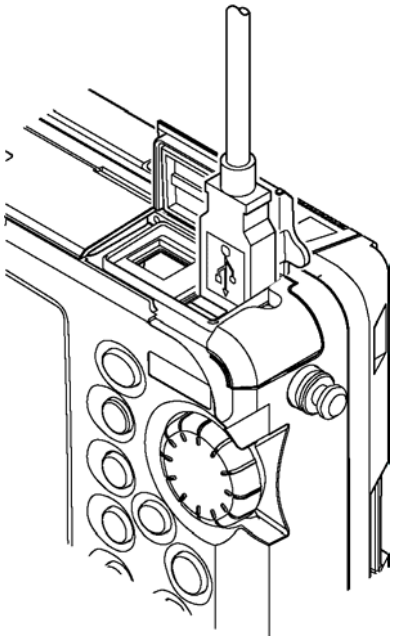
The instrument allows two USB printers to be connected, but it cannot recognize them together. So only one USB printer must be connected. If two USB printers are connected, their operation will not be guaranteed.

TIP

A USB printer can be connected even if the power to the instrument is currently ON.

1. Open the cover on the top of the instrument.

2. Connect a USB printer to a USB connector (host side).



TIP

Two USB connectors (host side) are available, and the printer can be connected to either of these.

Setting Up the Printer

The instrument allows both optional printer unit and USB printer to be connected at the same time. In this case, the destination printer (the printer to which you want to print out) must be set up.

In this section, the method of changing the destination printer from one to the other is explained below.

♦ Example: “EXTENSION UNIT” → “HP”

Caution Make sure a USB printer is connected to the instrument.

1. Press [MODE] to locate the cursor to “SETTING”.

2. Press [F2] (EXTERNAL INSTRUMENT SET).

3. Locate the cursor to “MAKER” by using the rotary knob or the arrow key.

TIP The cursor is already located at “PRINTER” when this window appears.

4. Press [ENTER].

A selection window will appear.

TIP

Selectable printer makers	*EXTENSION UNIT	Prints out to the optional printer unit.
	HP	Prints out to the HP printer connected to a USB connector.
	EPSON	Prints out to the EPSON printer connected to a USB connector.

*: Indicates the default setting.

5. Locate the cursor to “HP” by using the rotary knob or the [▲] / [▼] .

6. Press [ENTER] to register the change made to the printer maker setting.

Removing

The USB printer can be removed from the instrument as explained below.

TIP The USB printer can be removed even if the power to the instrument is currently ON.

1. Hold the printer cable's connector and lift it straight to remove the printer.

⚠ CAUTION	
	When removing the printer, do not pull it by the cable. Failure to observe this may result in damage.

2. Close the cover on the top of the instrument.

USB Storage Medium

Connecting

A USB storage medium (FDD, memory) can be connected to the instrument as explained below.

Caution

- The instrument cannot recognize two USB storage mediums together. So only one USB storage medium must be connected. If two USB storage mediums are connected, their operation will not be guaranteed.
- USB storage medium equipped with security function, such as fingerprint attestation function, cannot be used.

TIP

USB storage mediums can be connected even if the power to the instrument is currently ON.

The method of connecting USB storage mediums is the same as that for USB printers.

Refer For the method of connecting USB printers, refer to page 8-16.

Removing

The method of removing USB storage mediums is the same as that for USB printers.

Refer For the method of removing USB printers, refer to page 8-20.

8.3 Operating the Instrument from a Personal Computer

By connecting the instrument to a personal computer, the instrument can be operated from the computer (by sending commands from the computer).

This instrument controlled by following method.

- RS-232C
- GP-IB

Operation by using RS-232C

Connecting the Instrument to a Personal Computer

Caution

The instrument can be connected to a personal computer using a RS-232C cross cable. Since the instrument has no RS-232C interface, a USB-to-Serial adapter must be provided by the user.

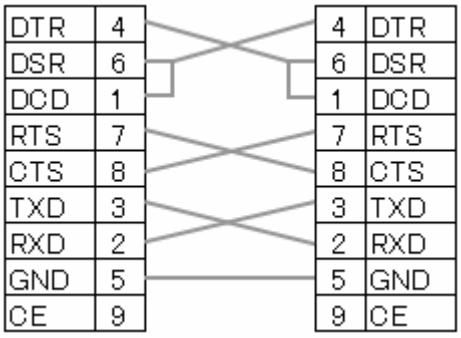
TIP

•The following USB-to-Serial adapter must be used.

Manufacturer: I-O Data Device, Inc.

Model Name: USB-RSAQ2 or later.

• The wiring diagram of cross cable is as follows.



1. Make sure that the power to both the instrument and computer is turned OFF.

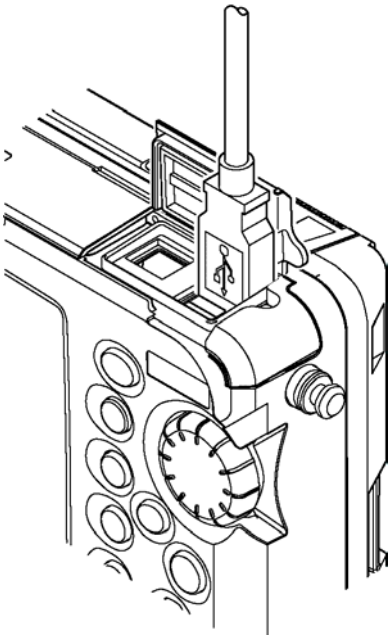
WARNING	
	Do not connect the computer while the power to the instrument is ON. Failure to observe this may result in an electric shock.

Refer

For the method of turning OFF the power, refer to page 3-108.

2. **Open the cover on the top of the instrument.**

3. **Connect the USB connector of the connecting cable to a USB connector (host side) on the instrument.**



TIP

Two USB connectors (host side) are available, and the personal computer can be connected to either of these.

4. **Connect the RS-232C connector of the cable to the personal computer.**

Setting the Instrument

This section explains how to change the communication settings to allow the instrument to communicate with the personal computer.

1. Turn ON the power to both the instrument and personal computer.

Refer For the method of turning ON the power to the instrument, refer to page 3-3.

Changing the Baud Rate

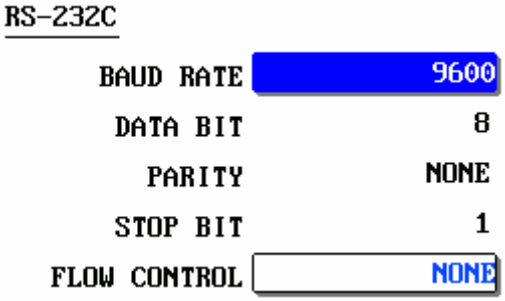
The baud rate can be changed as explained below.

♦ Example: “9600” → “38400”

2. Press [MODE] to locate the cursor to “SETTING”.

3. Press [F2] (EXTERNAL INSTRUMENT SET).

4. Locate the cursor to “BAUD RATE” by using the rotary knob or the arrow key.



5. Press [ENTER].

A selection window will appear.

TIP

Selectable baud rates	2400
	4800
	*9600
	19200
	38400
	57600
	115200

*: Indicates the default setting.

6. Locate the cursor to “38400” by using the rotary knob or [▲] / [▼].

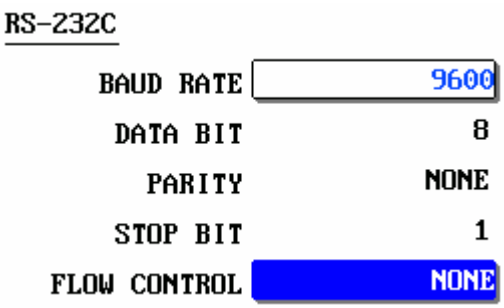
7. Press [ENTER] to register the change made to the baud rate setting.

Changing the Flow Control Setting

The flow control can be changed as explained below.

♦ Example: “NONE” → ”HARDWARE”

8. Locate the cursor to “FLOW CONTROL” by using the rotary knob or the arrow key.



9. Press [ENTER].

A selection window will appear.

TIP

Selectable flow control settings	*NONE	Disables flow control.
	HARDWARE	Uses the flow control setting made on the device (personal computer) connected to the instrument.

*: Indicates the default setting.

10. Locate the cursor to "HARDWARE" by using the rotary knob or [▲] / [▼].

11. Press [ENTER] to register the change made to the flow control setting.

Other Settings

Item	Setting
Data bits	8 bits (fixed)
Parity	None (fixed)
Stop bits	1 bit (fixed)

*: Use "CR" and "LF" for the delimiters.

Operating the Instrument

The instrument can be operated by entering commands using the personal computer's communication software.

This section explains how to operate the instrument using HyperTerminal of Microsoft Windows2000.

1. Start HyperTerminal.

From the [Start] menu of Windows2000, select [Programs] - [Accessories] - [Communications] - [HyperTerminal] to start HyperTerminal.

2. Set up HyperTerminal.

Caution

- The same settings as those for RS-232C of the instrument must be made for HyperTerminal.
- The following functions in ASCII Setup must be enabled.

  Send line ends with line feeds.

  Echo typed characters locally

3. Enter an appropriate command.

Disconnecting the instrument and the personal computer

1. Make sure that the power to both the instrument and computer is turned OFF.

⚠ WARNING	
	Do not connect the computer while the power to the instrument is ON. Failure to observe this may result in an electric shock.

Refer

For the method of turning OFF the power, refer to page 3-108.

2. Remove the USB connector of the connecting cable from the instrument.

3. Remove the RS-232C connector of the connecting cable from the personal computer.

Operation by using GP-IB

Interface function

This unit has the interface functions shown in Table of the GP-IB interface functions specified IEEE488.1.

Code	Interface function
SH1	All send handshake function
AH1	All receive handshake function
T6	Basic talker and serial pole functions
L4	Basic listener function
SR1	All service request function
RL1	All remote and local function
PP0	Parallel pole function is not provided
DC1	All device clear function
DT1	All device trigger function
C0	Controller function is not provided

Local Lock Out function

When the universal command “LLO” is received in the REMOTE mode, this unit enters the LLO (local lock out) status. To cancel this status, you must reset the REN (remote enable) and power OFF instrument, and power it ON again.

Device Clear function

This instrument stops measurement and deletes the displayed trace via “DCL” and “SDC”.

Device Trigger function

This instrument starts average measurement using “GET”.

Service Request function

When the service request is valid, the service request signal is transmitted according to the table below.

Bit	Explanation
D8	Always : 0
D7	Service request (0:None / 1: exist)
D6	Hardware information (0: normal / 1: abnormal)
D5	Always : 0
D4	Always : 0
D3	Plug check information (0: normal / 1: abnormal)
D2	Command check (0: Normal / 1: error)
D1	Status of instrument (0: On measurement / 1: No measurement)

Control command and sent data format

Several control command can be sent in connected form by using “,” for connection. However, the receive buffer capacity of this equipment is 512 bytes.

Connecting the Instrument to a Personal Computer

Caution The instrument can be connected to a personal computer using a GP-IB PC card (PCMCIA) and cable.

TIP Please use following GP-IB cards.

Manufacturer: CONTEC CO., LTD.

Model Name: GP-IB (CB) F

1. Make sure that the power to both the instrument and computer is turned OFF.

Refer For the method of turning OFF the power, refer to page 3-108.

2. Open the cover on the top of the instrument.

3. Attach GP-IB PC card to this instrument.

Refer For the procedure of attaching GP-IB card, refer to page 8-13.

4. Connect cable to personal computer.

Setting the Instrument

This section explains how to change the communication settings to allow the instrument to communicate with the personal computer.

1. Turn ON the power to both the instrument and personal computer.

Refer For the method of turning ON the power to the instrument, refer to page 3-3.

Change the GP-IB address setting.

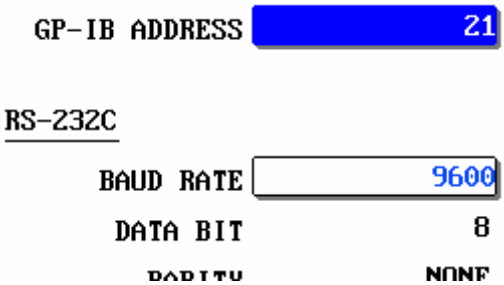
GP-IB address can be changed as explained bellow.

- Example: “21” → “7”

2. Press [MODE] to locate the cursor to “SETTING”.

3. Press [F2] (EXTERNAL INSTRUMENT SET).

4. Locate the cursor to “GP-IB ADDRESS” by using the rotary knob or the arrow key.



5. Press [ENTER].

A selection window will appear.

TIP

Selectable GP-IB address	0 to 30 (1step)

Default setting: 21

6. Locate the cursor to “7” by using the rotary knob or [▲] / [▼].

7. Press [ENTER] to register the change made to the GP-IB address setting.

Operating the Instrument

This instrument can be controlled by entering commands using GP-IB control software of PC.

1. Start control software.

2. Set the GP-IB address.

Caution GP-IB address of setting is necessary to set same GP-IB address of instrument.

3. Input commands.

Disconnecting the instrument and the personal computer

1. Make sure that the power to both the instrument and computer is turned OFF.

WARNING	
	Do not connect the computer while the power to the instrument is ON. Failure to observe this may result in an electric shock.

Refer For the method of turning OFF the power, refer to page 3-108.

2. Remove the GP-IB card from the instrument.

3. Remove the cable from the personal computer.

Control Commands

No.	Function	Device Message		Description
		Header	Numeric Part	
1-1	OTDR measurement start/stop	ST	m	Starts/stops OTDR measurement. m= 0: Stops measurement. 1: Starts real-time measurement. 2: Starts average measurement (continued). 3: Starts average measurement (new).
1-2	Current average time			No control command
1-3	Cursor position	CU	m	Places the cursor at point “m”. m= SXXXX.XXXXX “S” indicates a sign. It can be omitted in the case of “+”. The distance unit set by command 11-5 will be applied.
1-4	Magnification ratio for horizontal axis (During real-time)	H	m	Sets the magnification ratio for horizontal axis. m= –1: 640km 12: (50m) 0: 240km 13: (25m) 1: 160 km 14: 320km 2: 80 km 15: 2 km 3: 40 km 16: 400 m 4: 20 km 17: 200 m 5: 10 km 18: - 6: 5 km 19: - 7: 2.5 km 20: (100m) 8: 1 km 21: (10m) 9: 500 m 22: (5m) 10: 250 m 23: (2.5m) 11: - 24: - The values that can be set vary with the distance range.
1-5	Magnification ratio for horizontal axis (Not during real-time)	HSE	m	Sets the magnification ratio for horizontal axis. m= 0: x1 9: 1km 1: 500km 10: 500m 2: 250km 11: 250m 3: 100km 12: 100m 4: 50km 13: 50m 5: 25km 14: 25m 6: 10km 15: 10m 7: 5km 16: 5m 8: 2.5km 17: 2.5m The values that can be set vary with the distance range.
1-6	Resolution			No control command
1-7	Magnification ratio for vertical axis	V	m	Sets the magnification ratio for vertical axis. m= 0: 5 dB/div 1: 2 dB/div 2: 1 dB/div 3: 0.5 dB/div 4: 0.2 dB/div 5: 7.5 dB/div

No.	Function	Device Message		Description
		Header	Numeric Part	
1-8	Display start distance	HPOS	m	Sets the display start position for horizontal axis. m= SXXXX.XXXXX "S" indicates a sign. It can be omitted in the case of "+". The distance unit set by command 11-5 will be applied. The settable range varies with the settings made by commands 1-4 and 1-5.
1-9	Distance from the origin			No control command
1-10	Display start level	VPOS	m	Sets the display start level. m= SXX.XXX Reference: 48.160dB (when average method is selected HI-SPEED) "S" indicates a sign. It can be omitted in the case of "+".
1-11	Trace information acquisition			No control command
1-12	Display scale Initialization	I		Initializes the display scale.
1-13	Display screen print	CPY		Prints the currently displayed screen. Printing will be stopped if this command is executed during printing.
1-14	Paper feed	FED	m	Feeds the paper by "m" lines (expansion printer unit). $1 \leq m \leq 999$:1step
1-15	Magnification ratio for horizontal axis (Not during real-time) Conventional method	HSP	m	Sets the magnification ratio for horizontal axis. m= 0: x1 5: x40 (x50) 1: x2 6: x80 (x100) 2: x4 (x5) 7: x200 3: x8 (x10) 8: x400 refer to page 8-62. The above values may not be applicable if a value given in ( ) is set by command 1-4.
2-1	Marker setting	M	m	Sets a marker at the cursor position. m= 1: ① 2: ② 3: ③
2-2	Auxiliary marker	Y	m	Sets a Y marker at the cursor position. m= 1: Y1 2: Y2 3: Y3
2-3	Marker delete	C		Deletes all the markers.
2-4	Cursor delete	CC		Deletes the cursor.
2-5	Distance reference setting	REF		Sets the distance reference at the cursor position.
2-6	Distance reference delete	REC		Deletes the distance reference.
2-7	Approximate straight line	SF	m	Shows/hides the approximate straight lines. m= 0: Hides the approximate straight lines. 1: Shows the approximate straight lines.
2-8	Cursor link	CL	m	Enables (ON)/disables (OFF) the cursor link function. m= 0: OFF 1: ON

No.	Function	Device Message		Description
		Header	Numeric Part	
3-1	Label	L	XXXX	Enters the label. Up to 36 characters can be entered. The device message must be separated from the label using a comma ",".
3-2	Company name	CORP	XXXX	Enters the company name. Up to 36 characters can be entered. The device message must be separated from the company name using a comma ",".
3-3	Name	OP	XXXX	Enters the name. Up to 36 characters can be entered. The device message must be separated from the company name using a comma ",".
3-4	Cable ID	LCID	XXXX	Enters the cable ID. Up to 36 characters can be entered. The device message must be separated from the company name using a comma ",".
3-5	Fiber ID	LFID	XXXX	Enters the fiber ID. Up to 36 characters can be entered. The device message must be separated from the company name using a comma ",".
3-6	Fiber type	FT	m	Sets the fiber type. m= 0: SMF 1: DSF 2: NZ-DSF 3: MMF
3-7	Cable code	LCCD	XXXX	Enters the cable code. Up to 36 characters can be entered. The device message must be separated from the company name using a comma ",".
3-8	Originating location	LOL	XXXX	Enters the originating location. Up to 36 characters can be entered. The device message must be separated from the originating location using a comma ",".
3-9	Terminating location	LTL	XXXX	Enter the terminating location. Up to 36 characters can be entered. The device message must be separated from the terminating location using a comma ",".
3-10	Data flag	LCDF	m	Sets the data flag. m= 0: - 1: BC (as-Built Condition) 2: RC (as-Repaired Condition) 3: OT (Other)
3-11	Auto increment	AI	m	Enables (ON)/disables (OFF) the LABEL auto increment function. m= 0: ON 1: OFF

No.	Function	Device Message		Description
		Header	Numeric Part	
4-1	Wavelength	LAM	m	Sets the measurement wavelength. m= 0: Unit's first wavelength 1: Unit's second wavelength 2: Unit's third wavelength 3: Unit's fourth wavelength The wavelengths that can be set vary with the optical module used. When use AQ7269, No.16-5 must be specified in advance. MMF 850nm : FMODESET1 => LAM0 MMF 1300nm : FMODESET1 => LAM1 SMF 1310nm : FMODESET0 => LAM2 SMF 1550nm : FMODESET0 => LAM3
4-2	Filter	FIL	m	Enables (ON)/disables (OFF) the filter. m= 0: OFF 1: ON
4-3	Approximate method	LSA	m	Sets the approximate method. m= 0: Two point approximate (TPA) 1: Least squares approximate (LSA)
4-4	Plug check	PC	m	Enables (ON)/disables (OFF) the optical plug connection check. m= 0: OFF 1: ON
4-5	Measurement condition automation / event detection	ASU	m	Sets the measurement condition automation / event detection function. m= 0: Manual 1: Auto range 2: Auto attenuation 3: Auto range + Auto search 4: Auto search 5: Auto attenuation + Auto search
4-6	Distance range	R	m	Sets the distance range. m= 0: 10 km 5: 240 km 10: 1 km 1: 20 km 6: 5 km 2: 40 km 7: 2 km 3: 80 km 8: 320 km 4: 160 km 9: 640 km The distance range that can be set varies with the wavelength to be used. No.4-1 must be specified in advance.
4-7	Pulse width	PW	m	Sets the pulse width. m= 0: - 6: 1 µs 1: 10 ns 7: 4 µs 2: 20 ns 8: 10 µs 3: 100 ns 9: 20 µs 4: 200 ns 10: 50 ns 5: 500 ns 11: 50 µs The pulse width that can be set varies with the optical module and distance range to be used. No.4-1, No.4-6 must be specified in advance.

No.	Function	Device Message		Description
		Header	Numeric Part	
4-8	Attenuation	AT	m	Set the attenuation. m= 0: 0.00 dB 11: 13.75 dB 1: 1.25 dB 12: 15.00 dB 2: 2.50 dB 13: 16.25 dB 3: 3.75 dB 14: 17.50 dB 4: 5.00 dB 15: 18.75 dB 5: 6.25 dB 16: 20.00 dB 6: 7.50 dB 17: 21.25 dB 7: 8.75 dB 18: 22.50 dB 8: 10.00 dB 19: 23.75 dB 9: 11.25 dB 20: 25.00 dB 10: 12.50 dB 21: 26.25 dB The attenuation that can be set varies with the pulse width. No.4-1, No.4-6, No.4-7 must be specified in advance.
4-9	Average condition	AVD	m	Sets the type of average measurement. m= 1: Average time (2^*) 2: Average interval 3: Average time (*k)
4-10	Average time /average interval setting	NUM	m	Sets the time (interval) for average processing. m= –2: 2^10 3: 2^15 –1: 2^11 4: 2^16 0: 2^12 5: 2^17 1: 2^13 6: 2^18 2: 2^14 m= –2: 1k 3: 32 k –1: 2k 4: 65 k 0: 4k 5: 131k 1: 8k 6: 262k 2: 16k m= 0: 10seconds 5: 3minutes 1: 20seconds 6: 5minutes 2: 30seconds 7: 10minutes 3: 1minute 8: 20minutes 4: - 9: 30minutes The average count set by command 4-9 will be applied.
4-11	Average method	AVE	m	Sets the average method. m= 0: Hi-SPEED 1: NORMAL 2: Hi-RETURN
4-12	Data size	DS	m	Sets the data size. m= 0: 5k data 1: 20k data 2: 60k data

No.	Function	Device Message		Description
		Header	Numeric Part	
4-13	Group index	IOR	m	Sets the group index. 1.00000 ≤ m ≤ 1.99999:0.00001step The group index varies with each wavelength. If this setting is changed after the interval group index is set by command 5-11, the interval group index that is set by command 5-11 will be invalidated.
4-14	Back scattering ray	BS (RL)	m, n	Sets the back scatter level. m= 0: Unit's first wavelength 1: Unit's second wavelength 2: Unit's third wavelength 3: Unit's fourth wavelength 10.00 ≤ n ≤ 64.99:1step The wavelengths that can be set vary with the optical module used. When use AQ7269, No.16-5 must be specified in advance.
4-15	Measurement condition output			No control command
4-16	Multi wavelength measurement setting	NWAVESET	m	Sets the multi wavelength measurement. m= 0 : OFF 1 : ON
4-17	Wavelength setting (for multi wavelength measurement)	MWAVE	m,n,o,p	Sets the wavelength. m= 0 : The first wavelength of the unit is OFF 1 : The first wavelength og the unit is ON n= 0 : The second wavelength of the unit is OFF 1 : The second wavelength of the unit is ON o= 0 : The third wavelength of the unit is OFF 1 : The third wavelength of the unit is ON p= 0 : The fourth wavelength of the unit is OFF 1 : The fourth wavelength of the unit is ON When use AQ7269, No.16-5 must be specified in advance.
4-18	Auto saving	ASAVE	m	Sets the auto saving m= 0 : OFF 1 : ON
5-1	Auto search execution	ASE		Executes auto search.
5-2	Next event	NEX	(m)	Moves the current event to the next event. When sets the number at m, the current event moves specified number event. m = 001 to 100 (Sets S point and R point = -1, End point = 0)
5-3	Previous event	PRE	(m)	Moves the current event to the previous event. When sets the number at m, the current event moves specified number event. m = 001 to 100 (Sets S point and R point = -1, End point = 0)
5-4	Event insert	IE		Inserts an event at the cursor position.
5-5	Event delete	DE	(m)	Deletes current event. When sets the number at m, the specified number event is deleted. m = 001 to 100 (Sets S point and R point = -1, End point = 0)

No.	Function	Device Message		Description
		Header	Numeric Part	
5-6	Event marker move (① to ③)	EM	m, n	Moves the marker to the cursor position. m: Set an event No. (S, R and E point can be set only ②) m=000 to 100 (-1 for S or R point, 0 for E point) n: Marker. n= 1: ① 2: ② 3: ③
5-7	Event auxiliary marker move (Y2)	EY	m	Moves marker Y2 to the cursor position. m: Set an event No. m= 000 to 100
5-8	Event data acquisition			No control command
5-9	Event note	EN	m, n	Enters a comment for an event. m= Event No. (-1 for R point, 0 for E point) n= Comment (up to 36 characters)
5-10	Event list print	PL	m	Sets the item to be printed. m= 0: List 1: Trace + List
5-11	Section group index setting	SIORS	m, n	Sets the section group index. m= Event No. (0 for E point) 1.00000 ≤ n ≤ 1.99999:0.00001step The settings made here will be discarded if the group index set by command 4-13 is changed.
5-12	Splice loss threshold	SPL	m	Sets the splice loss threshold. 0.01 ≤ m ≤ 9.99:0.01step
5-13	Return loss threshold	BSL (RSL)	m	Sets the return loss threshold. 20 ≤ m ≤ 70:1step
5-14	Fiber end threshold	EFL (BPL)	m	Sets the fiber end threshold. 3 ≤ m ≤ 10:1step
5-15	Fault event show/hide setting	DFE	m	Shows/hides fault events. m= 0: Shows fault events. 1: Hides fault events.
5-16	Fault event threshold (Splice loss)	FESL	m	Sets the splice loss threshold for fault events. 0.01 ≤ m ≤ 9.99:0.01step
5-17	Fault event threshold (Return loss)	FERL	m	Sets the return loss threshold for fault events. 20 ≤ m ≤ 70:1step
5-18	Auto search event count output			No control command
5-19	Auto search result output			No control command
5-20	Section analysis start point setting	SSPOS		Sets the start point at the cursor position.
5-21	Section analysis end point setting	SEPOS		Sets the end point at the cursor position.
5-22	Reference return loss setting	AJPOS		Sets the cursor position as the reference return loss.
5-23	Section data acquisition			No control command

No.	Function	Device Message		Description
		Header	Numeric Part	
6-1	Drive setting	FDA	m, n	Sets the drive and file No. m= 0: FD (expansion unit) 1: Built-in memory 2: - 3: PCMCIA 4: - 5: USB n= File name (Max 39 character. excluding file extension)
6-2	Folder setting	DIR	m	Sets the folder name. The device message must be separated from the originating location using a comma "," m= Folder name (root folder sets "/") example:/aaa/bbb/ccc/ddd/
6-3	File type setting	FF	m	Sets the file type. m= 0: .TRB 6: .LST 1: - 7: .SOR(Telcordia) 2: .SET 8: .CSV 3: .SOR(Bellcore) 9: .TRD 4: .TIF 10: .TRA 5: .BMP 11: .4 (In file saveing, 3 and 7 will be not made distinction)
6-4	Recorded capacity			No control command
6-5	Recorded file name			No control command
6-6	Sub folder check			No control command
6-7	Acquisition of file list of current folder			No control command
7-1	File recall	FRC		Recalls a file. .BMP, .TIF, .LST, and .CSV files cannot be recalled. Drive (6-1), folder (6-2) and file type (6-3) must be specified in advance.
7-2	File list print	FP	m, n	Prints a list of files. m: Set the drive. m= 0: FD (expansion unit) 1: Built-in memory 2: - 3: PCMCIA 4: - 5: USB n: Set the folder name. n= Folder name(root folder sets "/") example:/aaa/bbb/ccc/ddd/
8-1	Data save	FST		Saves the data (without overwriting). Drive (6-1), folder (6-2) and file type (6-3) must be specified in advance.
8-2	Data overwriting	RFS		Overwrites the data. Drive (6-1), folder (6-2) and file type (6-3) must be specified in advance.
9-1	File delete	DEL		Deletes the file. Drive (6-1), folder (6-2) and file type (6-3) must be specified in advance.

No.	Function	Device Message		Description
		Header	Numeric Part	
10-1	Drive initialize	FIN	m	Initialized the drive. m= 0: FD (expansion unit) 1: Built-in memory 2: - 3: PCMCIA 4: - 5: - 6: USB
10-2	Copy	COPY	m, n, o, p, q	Sets the copy source file. If “o” is not specified, copy will be made for each folder. m: Set the copy source drive. m= 0: FD (expansion unit) 1: Built-in memory 2: - 3: PCMCIA 4: - 5: - 6: USB n: Set the copy source folder. n= Folder name(root folder sets “/”) example:/aaa/bbb/ccc/ddd/ o: Set the name of the file to be copied. o= File name If “*.SOR” is selected, all the SOR files present in the copy source folder will be copied. p: Set the copy destination drive. p= 0: FD (expansion unit) 1: Built-in memory 2: - 3: PCMCIA 4: - 5: - 6: USB q: Set the copy destination folder. q= Folder name(root folder sets “/”) example:/aaa/bbb/ccc/ddd/
10-3	Folder make	DRM	m, n	Creates a folder. m: Set the drive. m= 0: FD (expansion unit) 1: Built-in memory 2: - 3: PCMCIA 4: - 5: USB n: Set the folder. n= Folder name(root folder sets “/”) example:/aaa/bbb/ccc/ddd/ The characters "¥", "," and "?" cannot be used. A space cannot be used as the first nor the last character.

No.	Function	Device Message		Description
		Header	Numeric Part	
10-4	Folder delete	DRD	m, n	Deletes a folder. m: Set the drive. m= 0: FD (expansion unit) 1: Built-in memory 2: - 3: PCMCIA 4: - 5: USB n: Set the folder. n= Folder name(root folder sets "/") example:/aaa/bbb/ccc/ddd/
10-5	Storage media state			No control command
11-1	Trace type	TRC	m	Sets the trace display method. m= 0: Dot 1: Line
11-2	Cursor type Second cursor	CSR	m	Sets the cursor display method. m= 0: "+" (Second cursor OFF) 1: "|" (Second cursor OFF) 2: "+" (Second cursor ON) 3: "|" (Second cursor ON)
11-3	Grid show/hide setting	GD	m	Shows/hides the grid. m= 0: Hides the grid. 1: Shows the grid.
11-4	Trace display	DOT	m	Sets the trace display dot method. m= 0: Decimation 1: Mean 2: Maximum 3: Envelope
11-5	Distance unit	DM	m	Sets the distance unit. m= 0: km 1: mile 2: kf This setting is effective for all the distance related items.
11-6	Distance reference marker	DUO	m	Sets the type of the distance origin marker. m= 0: Line 1: Arrow
11-7	dB digit	FIG	m	Sets the number of display digits for intensity level. m= 0: **.*** 1: **.** 2: **.*
11-8	Display color	DIS	m	Sets the display color. m= 0: Color 1 1: Color 2 2: Color 3 3: B&W

No.	Function	Device Message		Description
		Header	Numeric Part	
11-9	Date display format	DTE	m	Sets the date display format. m= 0: Not displayed 1: APR. 30. 2004 2: 30. APR. 2004 3: 2004. APR. 30 4: 4. 30. 2004 5: 30. 4. 2004 6: 2004. 4. 30
11-10	Year correction	YEA	m	Corrects the year (4-digit). 1970 ≤ m ≤ 2037:1step
11-11	Month correction	MTH	m	Corrects the month. 01 ≤ m ≤ 12:1step
11-12	Day correction	DAY	m	Corrects the day. m=01 to 31:1step
11-13	Hour correction	HOU	m	Corrects the hour. m=00 to 23:1step
11-14	Minute correction	MIN	m	Corrects the minute. m=00 to 59:1step
11-15	Alarm sound setting	BEEP	m	Enables/disables the alarm. m= 0: Disables the alarm. 1: Enables the alarm.
11-16	Power save setting	POW	m	Sets the power save function. m= 0: OFF 1: 30sec 2: 1min 3: 3min 4: 5min 5: 10min 6: 20min
11-17	LCD brightness setting	BRI	m	Sets the LCD brightness. m= 0: Bright 1: Normal 2: Dark
11-18	PCMCIA cancel	PCME		Shuts off the power to the PCMCIA card.
11-19	Print direction setting	PRD	m	Sets the print direction. m= 0: Horizontal 1: Vertical 2: Screen
11-20	Print color setting	PRIC	m	Sets the print color. m= 0: Display 1: B&W This setting is effective only if “USB” is set by command 13-1.
12-1	Printer setting	PRO	m	Sets the printer port. m= 0: Expansion unit 1: - 2: - 3: - 4: - 5: USB(HP) 6: USB(EPSON)
12-2	Printer status check			No control command
12-3	RS-232C setting			No control command

No.	Function	Device Message		Description
		Header	Numeric Part	
12-4	Setting the USB printer model name	PRIM	m	Sets the model name of the USB printer. USB(HP) m= 0: Deskjet5160 1: Deskjet5740 2: Deskjet5168 3: Deskjet5748 USB(EPSON) 0: PX-V500 1: Style C45 Valid only when USB has been selected in No.12-1.
13-1	Trace data quantity			No control command
13-2	Trace data (ASCII)			No control command
13-3	Trace data (binary)			No control command
13-4	Displayed trace data (ASCII)			No control command
13-5	Displayed trace data (binary)			No control command
13-6	Acquisition of file size			No control command
13-7	Acquisition of file			No control command
13-8	Sends file PC to OTDR	FILESEND	m,n,o,p	m: received drive. m= 0 : FD（EXTENSION UNIT） 1 : INTERNAL MEMORY 2 : — 3 : PCMCIA 4 : — 5 : USB n: received folder o: file name p: byte number of send file After send this command, sent binary data is stored specified file. example FILESEND1,/,test.trb,1000
14-1	Instrument status			No control command
14-2	Instrument information			No control command
14-3	Initialization	SETINI		Returns the set values of the equipment to the factory default settings. However, the following items are not initialized. External instrument setup(GP-IB address, etc.) Language Date Internal memory
14-4	Device clear	DCL		Stops measurement and deletes displayed trace.
15-1	Service request setting	SRQ	m	Sets the service request m= 0 : OFF 1 : ON
16-1	*OTDR/Light source mode select	OPMOD	m	Selects OTDR mode or light source mode m= 0 : OTDR 1 : Light source When using the optical module does not support light source function, Light source mode can not be selected. When changing the mode, optical output is stopped.

No.	Function	Device Message		Description
		Header	Numeric Part	
16-2	*Light source setting	ILS	m	Sets the light ON/OFF m= 0 : OFF 1 : ON This command is valid at light source mode.
16-3	*Modulated frequency of light source	ILM	m	Selects modulated frequency of light source m= 0 : CW 1 : 270Hz 2 : 1kHz 3 : 2kHz This command is valid at light source mode.
16-4	*Light source wavelength	LSWL	m	Selects light source wavelength m= 0 : The first wavelength of the first 1 : The second wavelength of the unit 2 : The third wavelength of the unit 3 : The fourth wavelength of the unit Number of wavelength depends on the unit. This command is valid at light source mode.
16-5	Switching the optical module	FMODESET	m	Switches the optical module. m= 0 : SMF 1 : MMF Valid only when the AQ7269 Module is used. Sends the following commands after it waits for 5 seconds when you switch the fiber module by this command.

*: The instrument cannot be used as a light source if an optical module (AQ7261/AQ7269) is installed.

Request Commands

No.	Function	Command	Return value format	Description
1-1	OTDR measurement start/stop	STR	m	Requests the measurement status. m=0: Stops measurement. 1: Starts real-time measurement. 2: Starts average measurement (continued). 3: Starts average measurement (new). 4: Starts multi wavelength measurement
1-2	Current average time	TIMR	m	Requests the time (interval) for average processing. m= –2: 2^10 3: 2^15 –1: 2^11 4: 2^16 0: 2^12 5: 2^17 1: 2^13 6: 2^18 2: 2^14 –2: 1k 3: 32 k –1: 2k 4: 65 k 0: 4k 5: 131k 1: 8k 6: 262k 2: 16k 0: 10seconds 5: 3minutes 1: 20seconds 6: 5minutes 2: 30seconds 7: 10minutes 3: 1minute 8: 20minutes 4: - 9: 30minutes
1-3	Cursor position	CUR	SXXXX.XXXXXTT “S” indicates a sign. “TT” indicates the distance unit.	Requests the cursor position.
1-4	Magnification ratio for horizontal axis (During real-time)	HR	m	Requests the magnification ratio for horizontal axis. m= -1:640km 12: (50m) 0: 240km 13: (25m) 1: 160 km 14: 320km 2: 80 km 15: 2 km 3: 40 km 16: 400 m 4: 20 km 17: 200 m 5: 10 km 18: - 6: 5 km 19: - 7: 2.5 km 20: (100m) 8: 1 km 21: (10m) 9: 500 m 22: (5m) 10: 250 m 23: (2.5m) 11: - 24: -

No.	Function	Command	Return value format	Description
1-5	Magnification ratio for horizontal axis (Not during real-time)	HSER	m	Requests the magnification ratio for horizontal axis. m= 0: x1 9: 1km 1: 500km 10: 500m 2: 250km 11: 250m 3: 100km 12: 100m 4: 50km 13: 50m 5: 25km 14: 25m 6: 10km 15: 10m 7: 5km 16: 5m 8: 2.5km 17: 2.5m
1-6	Resolution	RESOR	XXXXTT "TT" indicates the distance unit.	Requests the sampling resolution.
1-7	Magnification ratio for vertical axis	VR	m	Requests the magnification ratio for vertical axis. m= 0: 5 dB/div 1: 2 dB/div 2: 1 dB/div 3: 0.5 dB/div 4: 0.2 dB/div 5: 7.5 dB/div
1-8	Display start distance	HPOSR	SXXXX.XXXXXTT "S" indicates a sign. "TT" indicates the distance unit.	Sets the display start position for horizontal axis.
1-9	Distance from the origin	DU	SXXXX.XXXXXTT "S" indicates a sign. "TT" indicates the distance unit.	Requests the distance from the origin.
1-10	Display start level	VPOSR	SXX.XXX	Requests the display start level.
1-11	Trace information acquisition	MD	refer to page 8-63.	Requests the trace information.
1-12	Display scale Initialization			No request command
1-13	Display screen print			No request command
1-14	Paper feed			No request command
1-15	Magnification ratio for horizontal axis (Not during real-time) Conventional method	HSPR	m	Requests the magnification ratio for horizontal axis. m= 0: x1 5: x40 (x50) 1: x2 6: x80 (x100) 2: x4 (x5) 7: x200 3: x8 (x10) 8: x400 refer to page 8-62.
2-1	Marker position	MR	m refer to page 8-63.	Requests the marker position. m= 1: ① 2: ② 3: ③
2-2	Auxiliary marker position	YR	m refer to page 8-63.	Requests the Y marker position. m= 1: Y1 2: Y2 3: Y3
2-3	Marker delete			No request command
2-4	Cursor delete			No request command

No.	Function	Command	Return value format	Description
2-5	Distance origin setting	REFR	SXXXX.XXXXXTT "S" indicates a sign. "TT" indicates the distance unit.	Requests the distance origin position.
2-6	Distance origin delete			No request command
2-7	Approximate straight line	SFR	m	Requests the approximate straight line display status. m= 0: Not displayed 1: Displayed
2-8	Cursor link	CLR	m	Requests the cursor link status. m= 0: OFF 1: ON
3-1	Label	LR	XXXX …	Requests the label.
3-2	Company name	CORPR	XXXX …	Requests the company name.
3-3	Name	OPR	XXXX …	Requests the name.
3-4	Cable ID	LCIDR	XXXX …	Requests the cable ID.
3-5	Fiber ID	LFIDR	XXXX …	Requests the fiber ID.
3-6	Fiber type	FTR	m	Requests the fiber type. m= 0: SMF 1: DSF 2: NZ-DSF 3: MMF
3-7	Cable code	LCCDR	XXXX …	Requests the cable code.
3-8	Originating location	LOLR	XXXX …	Requests the originating location.
3-9	Terminating location	LTLR	XXXX …	Requests the terminating location
3-10	Data flag	LCDFR	m	Requests the data flag. m= 0: - 1: BC (as-Built Condition) 2: RC (as-Repaired Condition) 3: OT (Other)
3-11	Auto increment	AIR	m	Requests the LABEL auto increment status. m= 0: ON 1: OFF
4-1	Wavelength	LAMR	m	Requests the measurement wavelength. m= 0: Unit's first wavelength 1: Unit's second wavelength 2: Unit's third wavelength 3: Unit's fourth wavelength
4-2	Filter	FILR	m	Requests the filter status. m= 0: OFF 1: ON
4-3	Approximate method	LSAR	m	Requests the currently used approximate method. m= 0: Two point approximate (TPA) 1: Least squares approximate (LSA)
4-4	Plug check	PCR	m	Requests the optical plug status. m= 0: OFF 1: ON

No.	Function	Command	Return value format	Description
4-5	Measurement condition automation / event detection	ASUR	m	Requests the measurement condition automation / event detection function. m= 0: Manual 1: Auto range 2: Auto attenuation 3: Auto range + Auto search 4: Auto search 5: Auto attenuation + Auto search
4-6	Distance range	RR	m	Requests the distance range. m= 0: 10 km 5: 240 km 10: 1 km 1: 20 km 6: 5 km 2: 40 km 7: 2 km 3: 80 km 8: 320 km 4: 160 km 9: 640 km
4-7	Pulse width	PWR	m	Requests the pulse width. m= 0: - 6: 1 µs 1: 10 ns 7: 4 µs 2: 20 ns 8: 10 µs 3: 100 ns 9: 20 µs 4: 200 ns 10: 50 ns 5: 500 ns 11: 50 µs
4-8	Attenuation	ATR	m	Requests the attenuation. m= 0: 0.00 dB 11: 13.75 dB 1: 1.25 dB 12: 15.00 dB 2: 2.50 dB 13: 16.25 dB 3: 3.75 dB 14: 17.50 dB 4: 5.00 dB 15: 18.75 dB 5: 6.25 dB 16: 20.00 dB 6: 7.50 dB 17: 21.25 dB 7: 8.75 dB 18: 22.50 dB 8: 10.00 dB 19: 23.75 dB 9: 11.25 dB 20: 25.00 dB 10: 12.50 dB 21: 26.25 dB
4-9	Average condition	AVDR	m	Requests the type of average measurement. m= 1: Average time (2^*) 2: Average interval 3: Average time (*k) 4: Auto

No.	Function	Command	Return value format	Description
4-10	Average time /average interval setting	NUMR	m	Requests the time (interval) for average processing. m= –2: 2^10 3: 2^15 –1: 2^11 4: 2^16 0: 2^12 5: 2^17 1: 2^13 6: 2^18 2: 2^14 –2: 1k 3: 32 k –1: 2k 4: 65 k 0: 4k 5: 131k 1: 8k 6: 262k 2: 16k 0: 10seconds 5: 3minutes 1: 20seconds 6: 5minutes 2: 30seconds 7: 10minutes 3: 1minutes 8: 20minutes 4: - 9: 30minutes
4-11	Average method	AVER	m	Requests the average method. m= 0: Hi-SPEED 1: NORMAL 2: Hi-RETURN
4-12	Data size	DSR	m	Requests the data size. m= 0: 5k data 1: 20k data 2: 60k data
4-13	Group index	IORR	1.XXXXX	Requests the group index.
4-14	Back scattering ray	BSR (RLR)	m, n	Requests the back scatter level. m= 0: Unit's first wavelength 1: Unit's second wavelength 2: Unit's third wavelength 3: Unit's fourth wavelength n= : The back scatter level. 10.00 – 64.99
4-15	Measurement condition output	U	refer to page 8-63.	Requests the measurement conditions.
4-16	Multi wavelength measurement setting	NWAVESETR	m	Requires multi wavelength measurement setting m= 0 : OFF 1 : ON
4-17	Multi wavelength measurement setting	MWAVER	m, n, o, p	Requires wavelength setting. Return value formant : m,n,o,p m= 0: The first wavelength of the unit is OFF 1: The first wavelength of the unit is ON n= 0: The second wavelength of the unit is OFF 1: The second wavelength of the unit is ON o= 0: The third wavelength of the unit is OFF 1: The third wavelength of the unit is ON p= 0: The fourth wavelength of the unit is OFF 1: The fourth wavelength of the unit is ON
4-18	Auto saving condition	ASAVER	m	Requires auto saving condition. m= 0 : OFF 1 : ON

No.	Function	Command	Return value format	Description
5-1	Auto search execution			No request command
5-2	Next event			No request command
5-3	Previous event			No request command
5-4	Event insert			No request command
5-5	Event delete			No request command
5-6	Event marker position (① to ③)	EMR	m, n refer to page 8-63.	Requests the event marker position. m: Set the event No. (-1 for S or R point, 0 for E point) n: Set the marker: (S, R and E point can be set only ②) n= 1: ① 2: ② 3: ③
5-7	Event auxiliary maker position (Y2)	EYR	m refer to page 8-63.	Requests the event marker Y2 position. m: Set an event No.
5-8	Event data acquisition	EDR	m refer to page 8-64.	Acquires event data. m: Set an event No. (-1 for R point, 0 for E point).
5-9	Event note	ENR	m	Requests the event comment. m: Set an event No. (-1 for R point, 0 for E point).
5-10	Event list print			No request command
5-11	Section group index setting	SIORSR	m	Requests the group index for each section. m: Set an event No. (R for R point). 1.XXXXX
5-12	Splice loss threshold	SPLR	X.XX	Requests the splice loss threshold.
5-13	Return loss threshold	BSLR (RSLR)	XX	Requests the return loss threshold.
5-14	Fiber end threshold	EFLR (BPLR)	XX (XX.X)	Requests the fiber end threshold.
5-15	Fault event show/hide setting	DFER	m	Requests the fault event display setting. m= 0: Displayed 1: Not displayed
5-16	Fault event threshold (Splice loss)	FESLR	X.XX	Requests the splice loss threshold for fault events.
5-17	Fault event threshold (Return loss)	FERLR	XX	Requests the return loss threshold for fault events.
5-18	Auto search event count output	SPPR	XXX	Requests the number of events detected by auto search. (R point is included, END point is not included)
5-19	Auto search result output	SPDR	refer to page 8-64.	Requests the auto search results.
5-20	Section analysis start point setting	SSPOSR	SXXXX.XXXXXTT "S" indicates a sign. "TT" indicates the distance unit.	Requests the section start position.
5-21	Section analysis end point setting	SEPOSR	SXXXX.XXXXXTT "S" indicates a sign. "TT" indicates the distance unit.	Requests the section end position.

No.	Function	Command	Return value format	Description
5-22	Reference return loss setting	AJPOSR	SXXXX.XXXXXTT “S” indicates a sign. “TT” indicates the distance unit.	Requests the reference value.
5-23	Section data acquisition	SDR	refer to page 8-64.	Requests the section loss and section return loss.
6-1	Drive setting	FDAR	m, n	Requests the drive name (m) and file name (n). Return value format: m,n m= 0: FD (expansion unit) 1: Built-in memory 2: - 3: PCMCIA 4: - 5: USB n= File name If the set drive does not exist, the drive is changed to "Built-in memory" and the folder is changed to "/".
6-2	Folder setting	DIRR	XXXX …	Requests the folder name. If the set drive or folder does not exist, "?" is returned.
6-3	File type setting	FFR	m	Requests the file type. m= 0: .TRB 6: .LST 1: - 7: .SOR(Telcordia) 2: .SET 8: .CSV 3: .SOR(Bellcore) 9: .TRD 4: .TIF 10: .TRA 5: .BMP 11: .4
6-4	Recorded capacity	FSR	m	Requests the used capacity of the drive. m: Specify the drive. m= 0: FD (expansion unit) 1: Built-in memory 2: - 3: PCMCIA 4: - 5: USB XXXXXXXXXbyte If there is no drive, "?" is returned.

No.	Function	Command	Return value format	Description
6-5	Recorded file name	FAR	m, n, o	Request the names of recorded files. Return value format: XXXXXXX,XXXXXXX, ··· m: Specify the drive. m= 0: FD (expansion unit) 1: Built-in memory 2: - 3: PCMCIA 4: - 5: USB n: Specify the folder. o: Specify the file type. o= 0: .TRB 6: .LST 1: - 7: .SOR(Telcordia) 2: .SET 8: .CSV 3: .SOR(Bellcore) 9: .TRD 4: .TIF 10: .TRA 5: .BMP 11: .4 If the set drive or folder does not exist, "?" is returned.
6-6	Sub folder check	SDIRR	XXXXXXX, XXXXXXX, ···	Requests the sub folders of the current folder. None will be returned if no sub folders exist. If the set drive or folder does not exist, "?" is returned.
6-7	Acquisition of file list of current folder	CUDIR		Requires file list of folder selected FDA or DIR. Each file names which separated by "," are output. Folder names are separated by "/". Example 001.SOR,abc/ If the set drive or folder does not exist, "?" is returned.
7-1	File recall			No request command
7-2	File list print			No request command
8-1	Data save			No request command
8-2	Data overwriting			No request command
9-1	File delete			No request command
10-1	Drive initialize			No request command
10-3	Folder make			No request command
10-4	Folder delete			No request command
10-5	Storage media state	FERR	m	Requests the storage media status. m= 0: Normal 1: - 2: No storage media is installed. 3: Not initialized 4: Writing inhibited 5: Selected not stored file 6: Selected stored file 7: Not enough media capacity 8: Other error
11-1	Trace type	TRCR	m	Requests the trace display method. m= 0: Dot 1: Line

No.	Function	Command	Return value format	Description
11-2	Cursor type Second cursor	CSRR	m	Requests the cursor display method. m= 0: "+" (Second cursor OFF) 1: "|" (Second cursor OFF) 2: "+" (Second cursor ON) 3: "|" (Second cursor ON)
11-3	Grid show/hide setting	GDR	m	Requests to show/hide the grid. m= 0: Hides the grid. 1: Shows the grid.
11-4	Trace display	DOTR	m	Requests the trace display dot method. m= 0: Decimation 1: Mean 2: Maximum 3: Envelope
11-5	Distance unit	DMR	m	Requests the distance unit. m= 0: km 1: mile 2: kf
11-6	Distance reference marker	DUOR	m	Requests the type of the distance reference marker. m= 0: Line 1: Arrow
11-7	dB digit	FIGR	m	Requests the number of display digits for intensity level. m= 0: **.*** 1: **.** 2: **.*
11-8	Display color	DISR	m	Requests the display color. m= 0: Color 1 1: Color 2 2: Color 3 3: B&W
11-9	Date display format	DTER	m	Requests the date display format. m= 0: Not displayed 1: Apr. 30. 2004 2: 30. Apr. 2004 3: 2004. Apr. 30 4: 4. 30. 2004 5: 30. 4. 2004 6: 2004. 4. 30
11-10	Year correction	YEAR	m	Requests the year.
11-11	Month correction	MTHR	m	Requests the month.
11-12	Day correction	DAYR	m	Requests the day.
11-13	Hour correction	HOUR	m	Requests the hour.
11-14	Minute correction	MINR	m	Requests the minute.
11-15	Alarm sound setting	BEEPR	m	Requests to enable.disable the alarm. m= 0: Disables the alarm. 1: Enables the alarm.
11-16	Power save setting	POWR	m	Requests the power save function. m= 0: OFF 1: 30sec 2: 1min 3: 3min 4: 5min 5: 10min 6: 20min

No.	Function	Command	Return value format	Description
11-17	LCD brightness setting	BRIR	m	Requests the LCD brightness. m= 0: Bright 1: Normal 2: Dark
11-18	PCMCIA cancel			No request command
11-19	Print direction setting	PRDR	m	Requests the print direction. m= 0: Horizontal 1: Vertical 2: Screen
11-20	Print color setting	PRICR	m	Requests the print color. m= 0: Display 1: B&W
12-1	Printer setting	PROR	m	Requests the printer port. m= 0: Expansion unit 1: - 2: - 3: - 4: - 5: USB(HP) 6:USB(EPSON)
12-2	Printer status check	PRSR (CPYR)	m	Requests the printer status. m= 0: Print ready 1: Print in progress 2: No paper 3: Head up 4: Abnormal temperature This command cannot be used in the case of USB printer.
12-3	RS-232C setting	RSR	m, n, o, p, q	Requests the RS-232C parameters. Return value format: m,n,o,p,q m: Baud rate 0: 300 5: 9600 1: 600 6: 19200 2: 1200 7: 38400 3: 2400 8: 57600 4: 4800 9: 115200 n: Data bits o: Parity 0: None p: Stop bits 0 1bit q: Flow control 0:- 1: Hardware 2: None
12-4	Setting the model name of the USB printer	PRIMR	m	Requests the model name of the USB printer. USB(HP) m= 0: Deskjet5160 1: Deskjet5740 2: Deskjet5168 3: Deskjet5748 USB(EPSON) 0: PX-V500 1: Style C45
13-1	Trace data quantity	DNR	m	Requests the number of the trace data.

No.	Function	Command	Return value format	Description
13-2	Trace data (ASCII)	DR	XX.XXX, XX.XXX, ⋯ Unit is dB.	Requests all the trace data (ASCII).
13-3	Trace data (Binary)	DABIR	D0D1D2⋯Dn EOI The upper and lower bytes of the integral part (data × 1000) will be output alternately.(0.001dB unit)	Requests all the trace data (binary).
13-4	Display trace data (ASCII)	WR	XX.XXX,XX.XXX, ⋯ example 45.000dB is 45000	Requests the trace data (ASCII) for each displayed trace.
13-5	Display trace data (Binary)	WABIR	D0D1D2⋯Dn EOI The upper and lower bytes of the integral part (data × 1000) will be output alternately.(0.001dB unit)	Requests the trace data (binary) for each displayed trace. As the return values,
13-6	File size acquisition	FILESR		The file size specified by control commands 6-1, 6-2 and 6-3 will be requested.
13-7	File acquisition	FILER	Binary data will be output continuously.	The file size specified by control commands 6-1, 6-2 and 6-3 will be requested. OTDR data file can be created by storing the returned values in the order they are received. This command must be used in conjunction with command 13-6 (File size acquisition).
13-8	Send file			No request command
13-9	Trace data (binary)	DBIR	D0D1D2⋯Dn EOI the upper and lower bytes of the integral part (data × 1000) will be output alternately.(0.004dB unit)	Requests all the trace data (binary).
13-10	Displayed trace data (binary)	WBIR	D0D1D2⋯Dn EOI the upper and lower bytes of the integral part (data × 1000) will be output alternately.(0.004dB unit)	Requests the trace data (binary) for each displayed trace.

No.	Function	Command	Return value format	Description
14-1	Instrument status	INFR	m	Requests the instrument status. m= 0: Instrument is in standby. 1: Pulse light is currently emitted. 2: - 3: - 4: No printer paper 5: - 6: No optical fiber connected 7: Plug check error 8: In state of alarm Priority order: 8>7>6>4>1>0
14-2	Instrument information	IDER	refer to page 8-64.	Requests the instrument information.
14-3	Device clear			No request command
14-4	Initialization			No request command
15-1	SRQ setting	SRQR	m	Requires service request setting m= 0 : OFF 1 : ON
16-1	OTDR/Light source mode select	OPMODR	m	Requires measurement mode m= 0 : OTDR 1 : Light source
16-2	Light source status	ILSR	m	Requires light source status m= 0 : OFF 1 : ON This command is valid at light source mode.
16-3	Modulated frequency of light source	ILMR	m	Requires modulated frequency of light source m= 0 : CW 1 : 270Hz 2 : 1kHz 3 : 2kHz This command is valid at light source mode.
16-4	Light source wavelength	LSWLR	m	Requires wavelength of light source. m= 0 : The first wavelength of the first 1 : The second wavelength of the unit 2 : The third wavelength of the unit 3 : The fourth wavelength of the unit Number of wavelength depends on the unit. This command is valid at light source mode.
16-5	Checking the optical module	FMODESETR	m	Requests the state of the optical module. m= 0 : SMF 1 : MMF Valid only when the AQ7269 Module is used.

HSP command

・Data size: 20k mode / 60k mode

	Range of data acquisition							
	640km		320km		240km		160km	
	AQ7260	AQ7250	AQ7260	AQ7250	AQ7260	AQ7250	AQ7260	AQ7250
HSP0	640km		320km	320km	240km	240km	160km	160km
HSP1	500km		250km	160km	100km	120km	100km	80km
HSP2	250km		100km	80km	50km	60km	50km	40km
HSP3	100km		50km	40km	25km	30km	25km	20km
HSP4	50km		25km	16km	10km	12km	10km	8km
HSP5	25km		10km	8km	5km	6km	5km	4km
HSP6	10km		5km	4km	2.5km	3km	2.5km	2km
HSP7	5km		2.5km	1.6km	1km	1.2km	1km	800m
HSP8	2.5km		1km	800m	500m	600m	500m	400m

	Range of data acquisition							
	80km		40km		20km		10km	
	AQ7260	AQ7250	AQ7260	AQ7250	AQ7260	AQ7250	AQ7260	AQ7250
HSP0	80km	80km	40km	40km	20km	20km	10km	10km
HSP1	50km	40km	25km	20km	10km	10km	5km	5km
HSP2	25km	20km	10km	10km	5km	5km	2.5km	2.5km
HSP3	10km	10km	5km	5km	2.5km	2.5km	1km	1.25km
HSP4	5km	4km	2.5km	2km	1km	1km	500m	500m
HSP5	2.5km	2km	1km	1km	500m	500m	250m	250m
HSP6	1km	1km	500m	500m	250m	250m	100m	125m
HSP7	500m	400m	250m	200m	100m	100m	50m	50m
HSP8	250m	200m	100m	100m	50m	50m		

・Data size: 5k mode

	Range of data acquisition									
	640km		320km		240km		160km		80km	
	AQ7260	AQ7250	AQ7260	AQ7250	AQ7260	AQ7250	AQ7260	AQ7250	AQ7260	AQ7250
HSP0	640km		320km	320km	240km	240km	160km	160km	80km	80km
HSP1	500km		250km	160km	100km	120km	100km	80km	50km	40km
HSP2	250km		100km	62km	50km	48km	50km	32km	25km	16km
HSP3	100km		50km	32km	25km	24km	25km	16km	11km	8km
HSP4	50km		25km	16km	10km	12km	11km	8km	5km	4km
HSP5	25km		10km	6.2km	5km	4.8km	5km	3.2km	2.5km	1.6km
HSP6	10km		5km	3.2km	2.5km	2.4km	2.5km	1.6km	1km	800m

	Range of data acquisition									
	40km		20km		10km		5km		2.5km	
	AQ7260	AQ7250	AQ7260	AQ7250	AQ7260	AQ7250	AQ7260	AQ7250	AQ7260	AQ7250
HSP0	40km	40km	20km	20km	10km	10km	5km	5km	2.5km	2.5km
HSP1	25km	20km	10km	10km	5km	5km	2.5km	2.5km	1km	1.25km
HSP2	10km	8km	5km	4km	2.5km	2km	1km	1km	500m	500m
HSP3	5km	4km	2.5km	2km	1km	1km	500m	500m	250m	250m
HSP4	2.5km	2km	1km	1km	500m	500m	250m	250m	100m	125m
HSP5	1km	800m	500m	400m	250m	200m	100m	100m	50m	50m
HSP6	500m	400m	250m	200m	100m	100m	50m	50m	25m	25m

・Dist. Range: 2km

	Range of data acquisition									
	2km		1km		400m		200m		100m	
	AQ7260	AQ7250	AQ7260	AQ7250	AQ7260	AQ7250	AQ7260	AQ7250	AQ7260	AQ7250
HSP0	2km	2km	1km	1km	400m	400m	200m	200m	100m	100m
HSP1	1km	1km	500m	500m	250m	200m	100m	100m	50m	50m
HSP2	500m	500m	250m	250m	100m	100m	50m	50m	25m	25m
HSP3	250m	250m	100m	125m	50m	50m	25m	25m	10m	12.5m
HSP4	100m	100m	50m	50m	25m	20m	10m	10m	5m	5m
HSP5	50m	50m	25m	25m	10m	10m	5m	5m	2.5m	2.5m

Return Value Format

MD

Return values are separated by a delimiter for each item.

In the case of RS-232C: Output for all the items at once (separated by "," for each item).
So, the delimiters (CR and LF) are provided only at the end.

In the case of GP-IB: Created by dividing the return value for each item using the delimiters (CR and LF), and outputting the items one after another.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Remarks:
C	U	R	S	O	R					S	X	X	X	X	.	X	X	X	X	X	T	T	CR	LF	Cursor position
P	O	S	I	T	I	O	N			S	X	X	X	X	.	X	X	X	X	X	T	T	CR	LF	Left-end position on screen
S	P	L	I	C	E		L	O	S	S		S	X	X	.	X	X	X	D	B			CR	LF	Insertion loss
1	-	2		L	O	S	S					S	X	X	.	X	X	X	D	B			CR	LF	TPA loss between 1 and 2 (*1)
U	N	I	T		L	O	S	S		A	S	X	X	.	X	X	X	D	B	/	T	T	CR	LF	
L	O	S	S		A							S	X	X	.	X	X	X	D	B			CR	LF	
D	I	S	T	A	N	C	E		A		X	X	X	X	.	X	X	X	X	X	T	T	CR	LF	
U	N	I	T		L	O	S	S		B	S	X	X	.	X	X	X	D	B	/	T	T	CR	LF	
L	O	S	S		B							S	X	X	.	X	X	X	D	B			CR	LF	
D	I	S	T	A	N	C	E		B		X	X	X	X	.	X	X	X	X	X	T	T	CR	LF	
I	O	R												1		X	X	X	X	X			CR	LF	
R	E	F									X	X	X	X	.	X	X	X	X	X	T	T	CR	LF	
A	P	P	R	O	X	I	M	A	T	I	O	N				X	X	X					CR	LF	
R	E	T	U	R	N		L	O	S	S		S	X	X	.	X	X	X	D	B			CR	LF	

*1: If markers 1, 2, and 3 have been set, "1-3 LOSS" is displayed.

MR, YR, EMR, EYR

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
MR	M	A	R	K	E	R		M	,	S	X	X	X	X	.	X	X	X	X	X	T	T	S	X	X	.	X	X	X	D	B	CR	LF	
YR	Y	m							,	S	X	X	X	X	.	X	X	X	X	X	T	T	S	X	X	.	X	X	X	D	B	CR	LF	
EMR	M	A	R	K	E	R		M	,	S	X	X	X	X	.	X	X	X	X	X	T	T	,	S	X	X	.	X	X	X	D	B	CR	LF
EYR	Y	m								S	X	X	X	X	.	X	X	X	X	X	T	T	,	S	X	X	.	X	X	X	D	B	CR	LF

U

The numeric part for each item is right aligned and displayed.

In the case of multi-mode fiber, "SM" will be replaced by "MM".

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
S	M		X	.	X	X	U	M	,	R	A	N	G	E		X	X	X	T	T	,	P	U	L	S	E		W	I
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
D	T	H		X	X	X	X	X	X	,	A	T	T		X	X	.	X	X	D	B	,	R	E	S		X	X	X
61	62	63	64	65	66																								
X	X	T	T	CR	LF																								

EDR

The numeric part for each item is left aligned and displayed, with the unit part at the fixed position.

Items are displayed in the order “event No.”, “distance”, “splice loss”, “return loss”, “cumulative loss”, “dB/km” and “event type”.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
X	X	X	,	S	X	X	X	X	.	X	X	X	X	X	T	T	,	S	X	X	.	X	X	X	D	B	,	S	X
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
X	.	X	X	X	D	B	,	S	X	X	.	X	X	X	D	B	,	S	X	X	.	X	X	X	D	B	/	T	T
61	62	63	64	65	66																								
,	S	X		CR	LF																								

SPDR

EDR is output in the event order, separated by a delimiter.

It is output for each event sequentially, finally followed by the END event. The format for END event is given below.

For the format for each event, refer to “EDR” since it is the same as that for EDR.

In the case of RS-232C: All the events are output at once, with each event separated by a comma (,).

In the case of GP-IB: Created by dividing the return value for each item using the delimiters (CR and LF), and outputting the items one after another.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
E	N	D	,	S	X	X	X	X	.	X	X	X	X	X	T	T	,											S	X
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
X	.	X	X	X	D	B	,	S	X	X	.	X	X	X	D	B	,	S	X	X	.	X	X	X	D	B	/	T	T
61	62	63	64	65	66																								
,	S	X		CR	LF																								

SDR

Data is output in the order of “interval distance”, “interval loss” and “interval return loss”.

The numeric part is left aligned and displayed, with the unit part at the fixed position.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
S	X	X	X	X	.	X	X	X	X	X	T	T	,	S	X	X	.	X	X	X	D	B	,	S	X	X	.	X	X
31	32	33	34	35																									
X	D	B	CR	LF																									

IDER

Data is output in the order of “company name”, “instrument’s model name (S/N)”, “optical module’s model name (S/N)” and “software version”, with each item separated by a comma (,).

Command Input Examples (RS-232C)

This section explains how to enter commands to operate the instrument using HyperTerminal of Microsoft Windows2000.

Caution

When sending commands using HyperTerminal, command codes are sent from the personal computer to the instrument, one key input at a time. As a result, the device message cannot be recognized correctly if two or more seconds are spaced between key inputs.

*: Use “CR” and “LF” for the delimiters.

Setting measurement conditions

- Set “80km” distance range. :R3ENTER
- Set “100ns” pulse width. :PW3ENTER
- Set “3min” average interval. :NUM5ENTER
- Set “High return loss average”. :AVE2ENTER
- Set “80km” distance range. :R3ENTER

Starting measurement

- Real-time measurement :ST1ENTER
- Average measurement (new) :ST3ENTER

Checking measurement status

:STR1ENTER

Return value :0 (measurement halted), 1 to 3 (measurement in progress)

Saving measured data

- Set storage media “USB” and file name “Fiber”. :FDA5,FiberENTER
- Set file type “.SOR (Telcordia)”. :FF6ENTER
- Save the data. :FSTENTER

Chapter 9
SPECIFICATIONS

9.1 Specifications of main frame

Display(note1)		8.4 inch color TFT (640dots X 480 dots)
Horizontal axis	Scale	25m, 50m, 100m, 250m, 500m, 1km, 2km, 2.5km, 5km, 10km, 20km, 40km, 80km, 160km, 240km, 320km, 640km (Depend on the optical modules)
	Shift	0 to distance range
	Readout resolution	Min. 1cm
	Sample data count	Max. 60,000 points
	Group index setting	1.00000 to 1.99999 (0.00001 step)
	Distance unit	km, mile, kf
	Distance measurement	Display the relative one-way distance between any two given points, in digits.
Vertical axis	Scale	0.2 dB/div, 0.5 dB/div, 1.0 dB/div, 2.0dB/div, 5.0dB/div, 7.5 dB/div
	Shift	1.600 to 70.000dB
	Readout resolution	Min. 0.001 dB
	Loss measurement	Displays one-way losses in steps of 0.001dB to a maximum of 5 digits. Displays the relative one-way loss, loss per unit length, and splice loss between any two given points on the waveform.
Return-loss measurement function		Return loss at mechanical connectors can be measured. Total return loss of a fiber cable or between any two points can be measured.
Memory	Internal memory	Users area : 20MB
	PCMCIA	For stored measurement waveforms and measurement conditions
Interface	USB (host interface)(note2)	2 ports, confirms USB Rev1.0
	FDD	Option
Power requirement	Battery pack	Li-Ion Operating time : Approx. 6 hours(note3) Charging time : 5 hours or less(note4)
	AC adapter	AC100 to 240V, 50/60Hz, Max. 60W
Environment condition	Operating temperature	-10 to 50 °C(note5)
	Storage temperature	-20 to＋60 °C
	Humidity	95%RH or less (no condensation)
Dimensions and mass		Approx. 299(W) X 225(H) X 62(D)mm Approx. 3kg with AQ7264 mounted
Accessories		Battery pack : 1, Shoulder strap : 1, Instruction manual : 1

(Note1) Liquid crystal display may include few defective pixels (within 0.002% with respect to the total number of pixels including RGB). There may be few pixels on the liquid crystal display that do not emit all the time or remains ON all the time. Note that these are not malfunctions.

(Note2) For connected memory, FDD, keyboard or printer
About a memory, it supports the memory which is not equipped with the security function.

(Note3) The conditions are below;
Mounted module: AQ7261
Options: Not mounted
Setting for instrument: LCD brightness dark and Power save 30sec
Measurement condition: measurement each 3 minutes at 30 seconds average

(Note4) Environment temperature: 23, at power off

(Note5) Operating FD drive or printer : 5 to 40 °C, Charging battery pack : 5 to 35 °C

9.2 Specifications of optical modules

Model name		AQ7261	AQ7264
Unit type		SMF MODULE	
Center wavelength (μm)		1.31±0.025 1.55±0.025	1.31±0.020 1.55±0.020
Measured fiber		SM (ITU-T G.652)	
Distance range (km)		2, 5, 10, 20, 40, 80, 160, 240, 320	2, 5, 10, 20, 40, 80, 160, 240, 320, 640(Note 4)
Pulse width (sec)		10n, 20n, 50n, 100n, 200n, 500n, 1μ, 4μ, 10μ, 20μ	10n, 20n, 50n, 100n, 200n, 500n, 1μ, 4μ, 10μ, 20μ, 50μ(Note 5)
Sampling resolution		Max. 5cm	
Distance accuracy(m)	Error of offset	±1	
	Error of scale	Measurement distance X 2 X 10^-5	
	Error of sampling	±1 sampling resolution	
Dynamic range (dB) (SNR = 1) (Note 1)		34(35typ.)@1.31μm 32(33typ.)@1.55μm	40(42typ.)@1.31μm 38(40typ.)@1.55μm
Event dead zone (m)(Note 2)		2typ.	2typ.
Attenuation dead zone (m)(Note 3)		15typ. @1.31μm 20typ. @1.55μm	7typ. @1.31μm 8typ. @1.55μm
Loss measurement accuracy (dB/dB)		±0.05(Note 6)	
Stabilized Light source	Wavelength (μm)	------	1.31/1.55
	Max. output (dBm)		-3±2
	Stability (dB)(Note 7)		±0.1
Optical connector		AQ9441(*) Universal connector : Option	
Environment condition	Operating temperature	-10 to 50°C	
	Storage temperature	-20 to +60°C	
	Humidity	95%RH or less (no condensation)	

Specifications without any special remarks, assured at 23±2°C.

Model name		AQ7265
Unit type		SMF MODULE
Center wavelength (μm)		1.31±0.02 1.55±0.02
Measured fiber		SM (ITU-T G.652)
Distance range (km)		2, 5, 10, 20, 40, 80, 160, 240, 320, 640(Note 4)
Pulse width (sec)		10n, 20n, 50n, 100n, 200n, 500n, 1μ, 4μ, 10μ, 20μ, 50μ(Note 5)
Sampling resolution		Max. 5cm
Distance accuracy(m)	Error of offset	±1
	Error of scale	Measurement distance X 2 X 10^-5
	Error of sampling	±1 sampling resolution
Dynamic range (dB) (SNR = 1) (Note 1)		43(45typ.)@1.31μm 41(43typ.)@1.55μm
Event dead zone (m)(Note 2)		2typ.
Attenuation dead zone (m)(Note 3)		7typ.@1.31μm 8typ.@1.55μm
Loss measurement accuracy (dB/dB)		±0.05(Note 6)
Stabilized Light source	Wavelength (μm)	1.31/1.55
	Max. output (dBm)	-3±2
	Stability (dB)(Note 7)	±0.1
Optical connector		AQ9441(*) Universal connector : Option
Environment condition	Operating temperature	-10 to 50°C
	Storage temperature	-20 to +60°C
	Humidity	95%RH or less (no condensation)

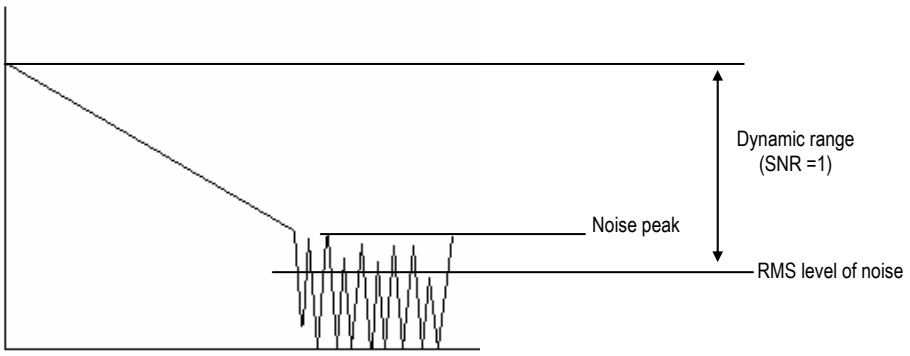
Specifications without any special remarks, assured at 23±2°C.

Model name		AQ7269	
Module type		MMF MODULE	SMF MODULE
Center wavelength (μm)		0.85±0.030 1.30±0.030	1.31±0.025 1.55±0.025
Measured fiber		MM (GI 62.5/125μm)	SM (ITU-T G.652)
Distance range (km)		1, 2, 5, 10, 20, 40, 80(Note 8)	2, 5, 10, 20, 40, 80, 160, 240
Pulse width (sec)		10n, 20n, 50n, 100n, 200n, 500n, 1μ(Note 9)	10n, 20n, 50n, 100n, 200n, 500n, 1μ, 4μ, 10μ, 20μ
Sampling resolution		Max. 5cm	
Distance accuracy(m)	Error of offset	±1	
	Error of scale	Measurement distance X 2 X 10^-5	
	Error of sampling	±1 sampling resolution	
Dynamic range (dB) (SNR = 1) (Note 1)		22.5@0.85μm 24@1.30μm	34@1.31μm 32@1.55μm
Event dead zone (m)(Note 2)		2typ.	2typ.
Attenuation dead zone (m)(Note 3)		7typ. @0.85μm 10typ. @1.30μm	7typ. @1.31μm 8typ. @1.55μm
Loss measurement accuracy (dB/dB)		±0.05(Note 6)	
Stabilized Light source	Wavelength (μm)	------	
	Max. output (dBm)	------	
	Stability (dB)	------	
Optical connector		AQ9441(*) Universal connector : Option	
Environment condition	Operating temperature	0 to 40°C	
	Storage temperature	-20 to +60°C	
	Humidity	95%RH or less (no condensation)	

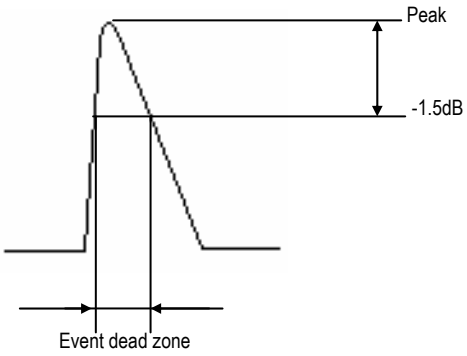
Specifications without any special remarks, assured at 23±2°C.

(Note1) The loss from the connection end of measured fiber to the point at which the back scattering ray level equals the RMS level of noise is expressed dynamic range (SNR =1).

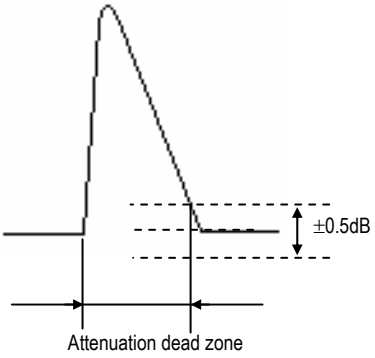
At measurement time : 3 minutes.
filter : ON.
pulse width : 20 μs@1310nm/1550nm, 200ns@0.85μm, 1μs@1.30μm.
distance range : 160km@1.31μm, 240km@1.55μm, 20km@0.85μm, 80km@1.30μm.



(Note2) Distance width between the event peak point, where the return loss is 40 dB or higher (event is not saturated), and the point where the level is 1.5 dB smaller than the event peak.
At pulse width : 10ns



(Note3) Distance width at points where the optical connector's return loss is 45 dB (40dB@AQ7269 MMF module) or higher and the back scatter level is within ±0.5 dB of the normal level.
At pulse width : 10ns (20ns@AQ7269 MMF module)



(Note4) 640km is only 1.55μm
(Note5) 50μ is only 1.55μm
(Note6) When the measuring loss is 1 dB or less, the accuracy is within ±0.05 dB.
(Note7) 5 minutes measurement at constant temperature after 30 minutes warm-up.
(Note8) 40km, 80km is only 1.30μm
(Note9) 500ns, 1μs is only 1.30μm

9.3 Specifications of optional units

Model name		Printer/FDD unit for AQ7260
Printer		576dots/LINE, Thermal printer, Record paper : 80mm width
FDD		3.5inch FD, 2HD
Environment conditions	Operating temperature	5 to 40°C
	Storage temperature	-20 to 60°C
	Humidity	85% or less (no condensation)

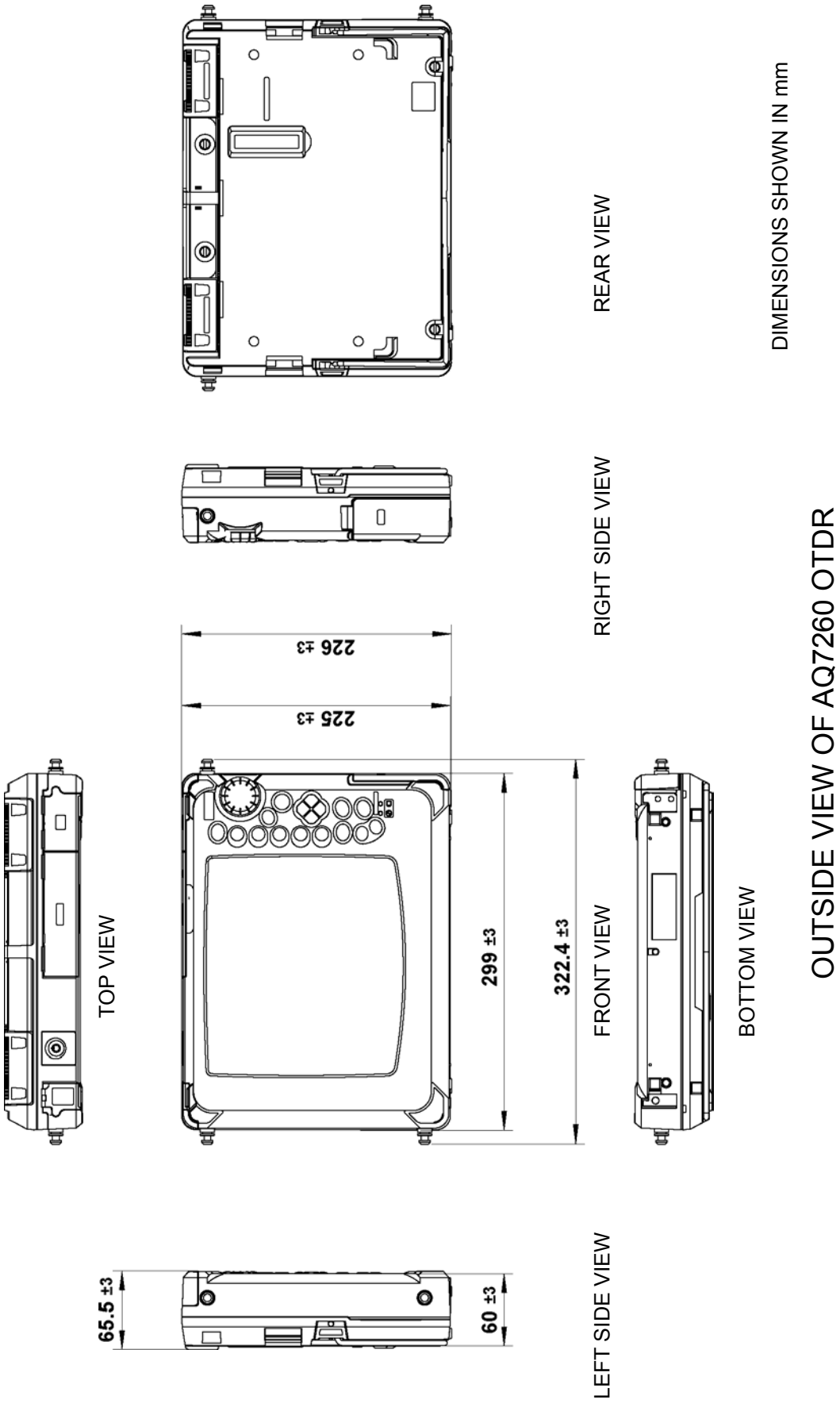
Model name		Printer unit for AQ7260
Printer		576dots/LINE, Thermal printer, Record paper : 80mm width
Environment conditions	Operating temperature	5 to 40°C
	Storage temperature	-20 to 60°C
	Humidity	85% or less (no condensation)

9.4 Outside view drawings

The Outside view drawings of the following units are attached.

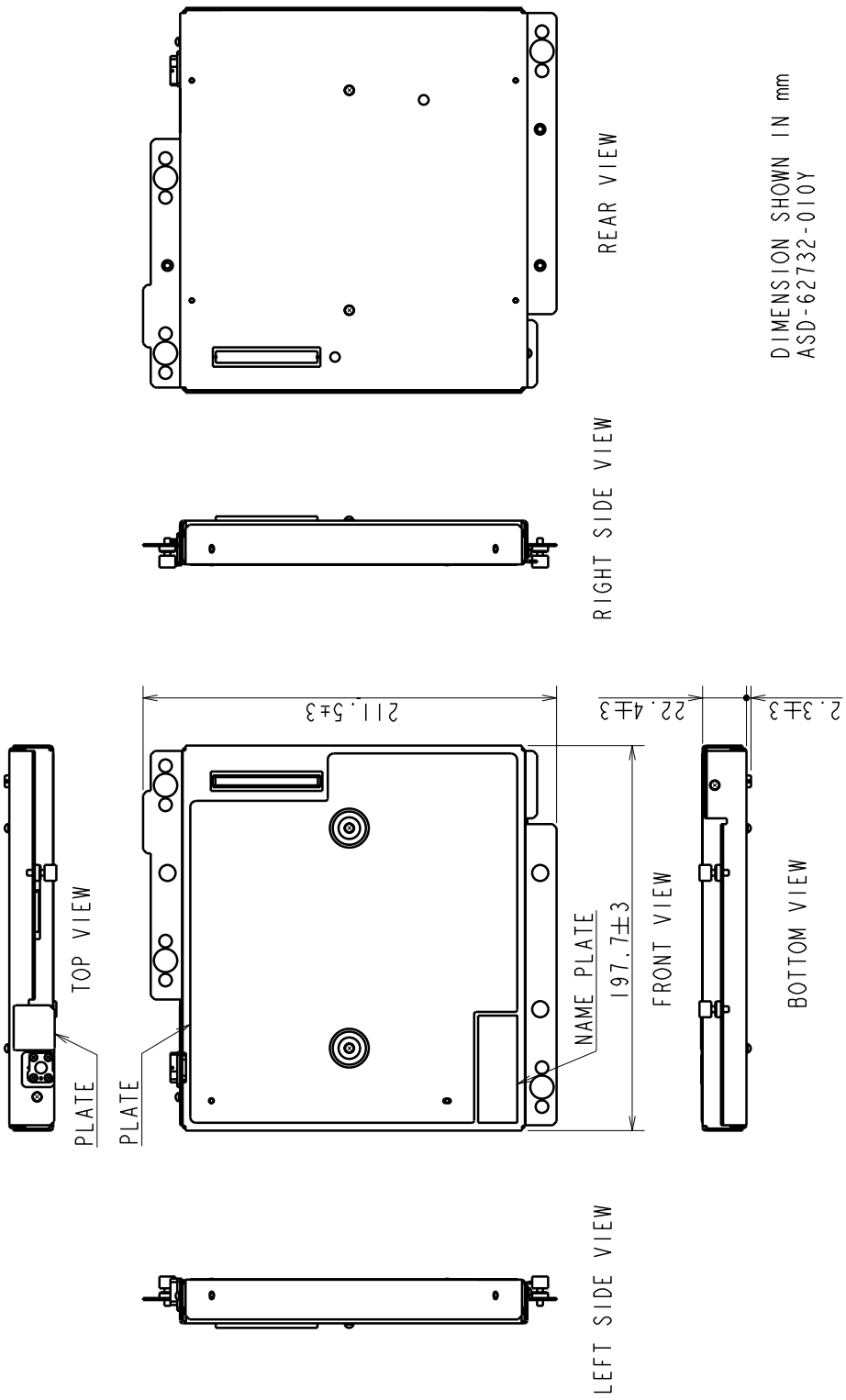
- AQ7260 OTDR
- AQ7261 SMF MODULE
- AQ7264 SMF MODULE
- AQ7265 SMF MODULE
- AQ7269 SMF/MMF MODULE
- PRINTER/FDD UNIT
- PRINTER UNIT

AQ7260 OTDR

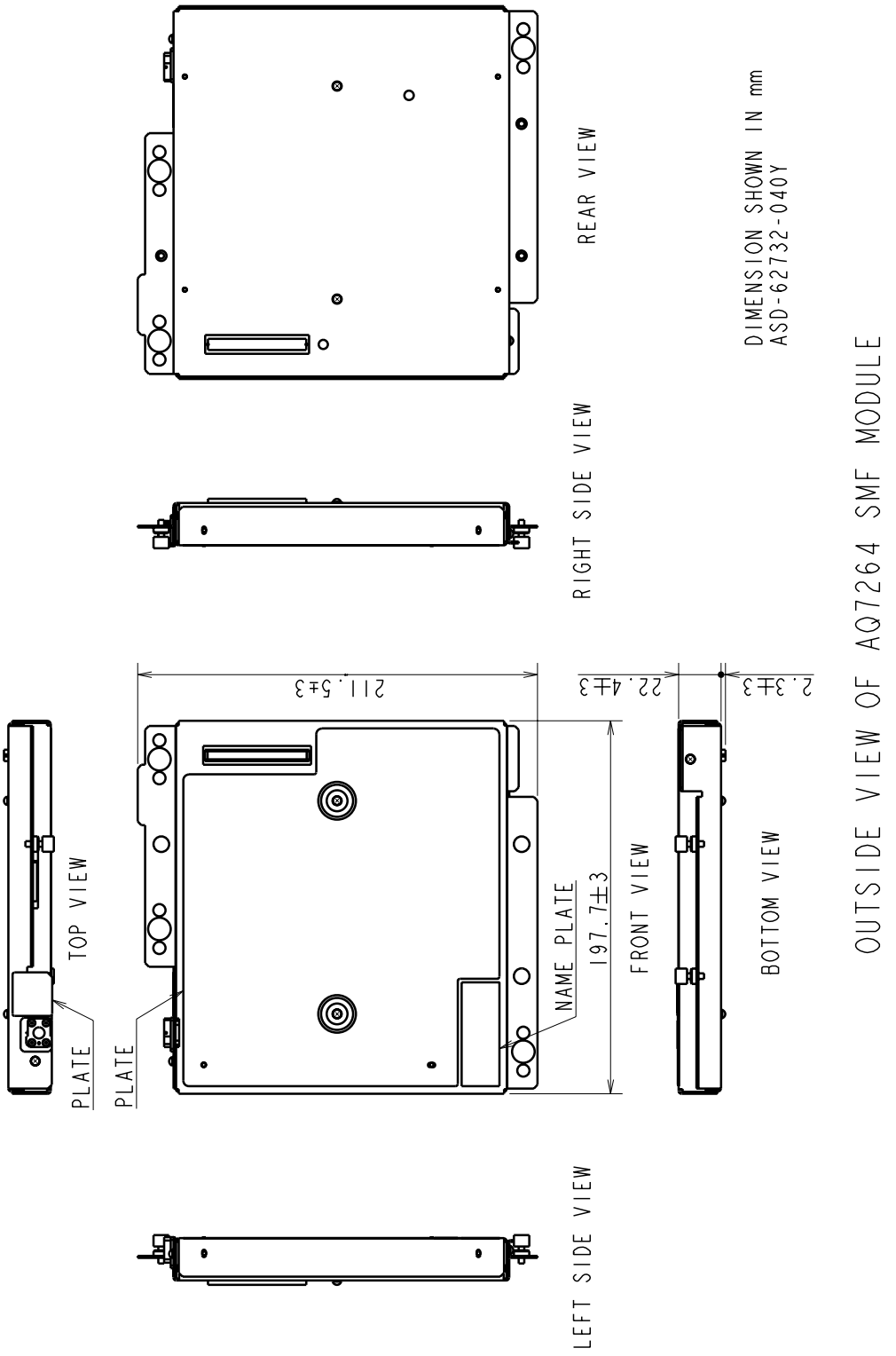


OUTSIDE VIEW OF AQ7260 OTDR

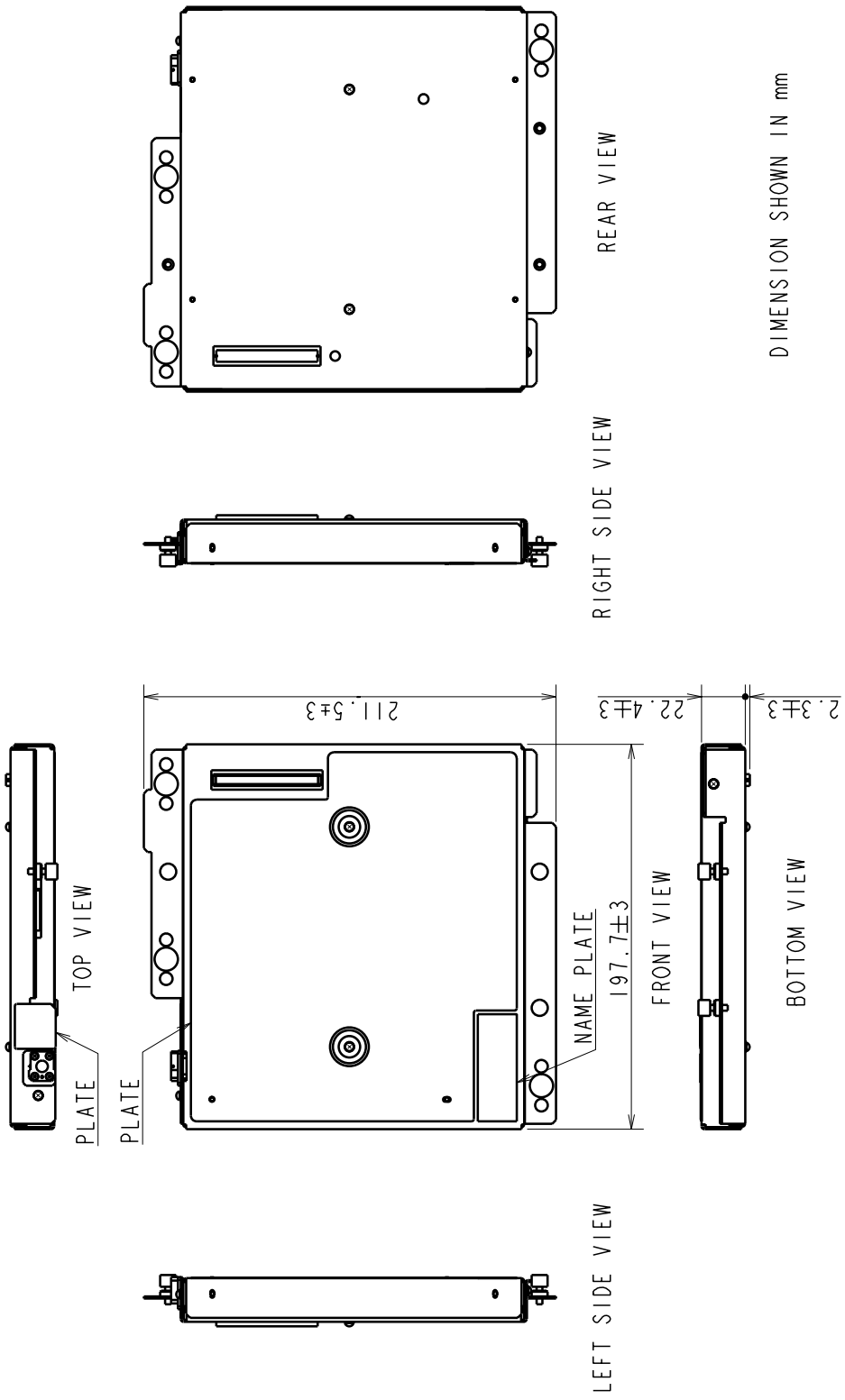
AQ7261 SMF MODULE



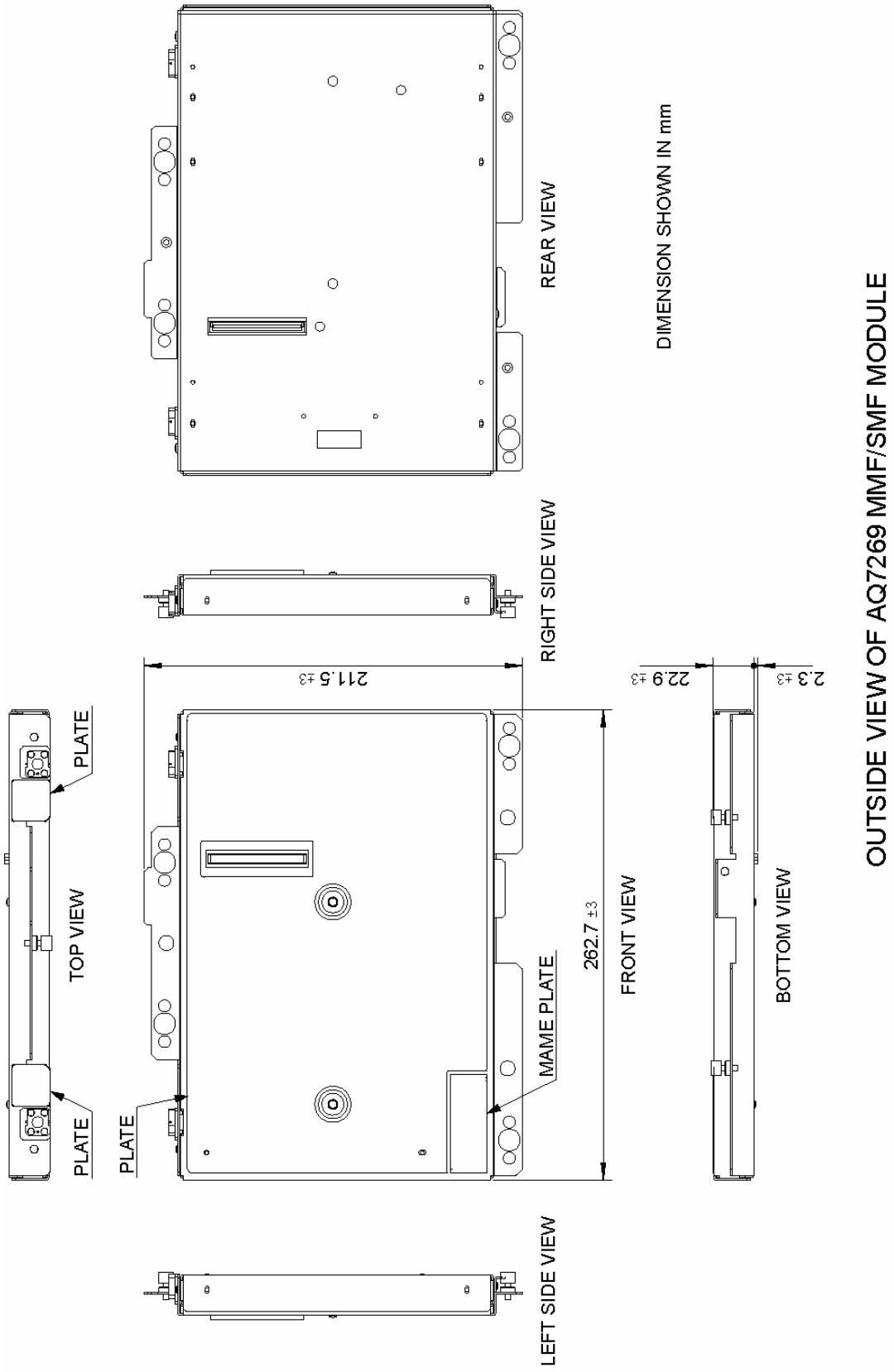
AQ7264 SMF MODULE



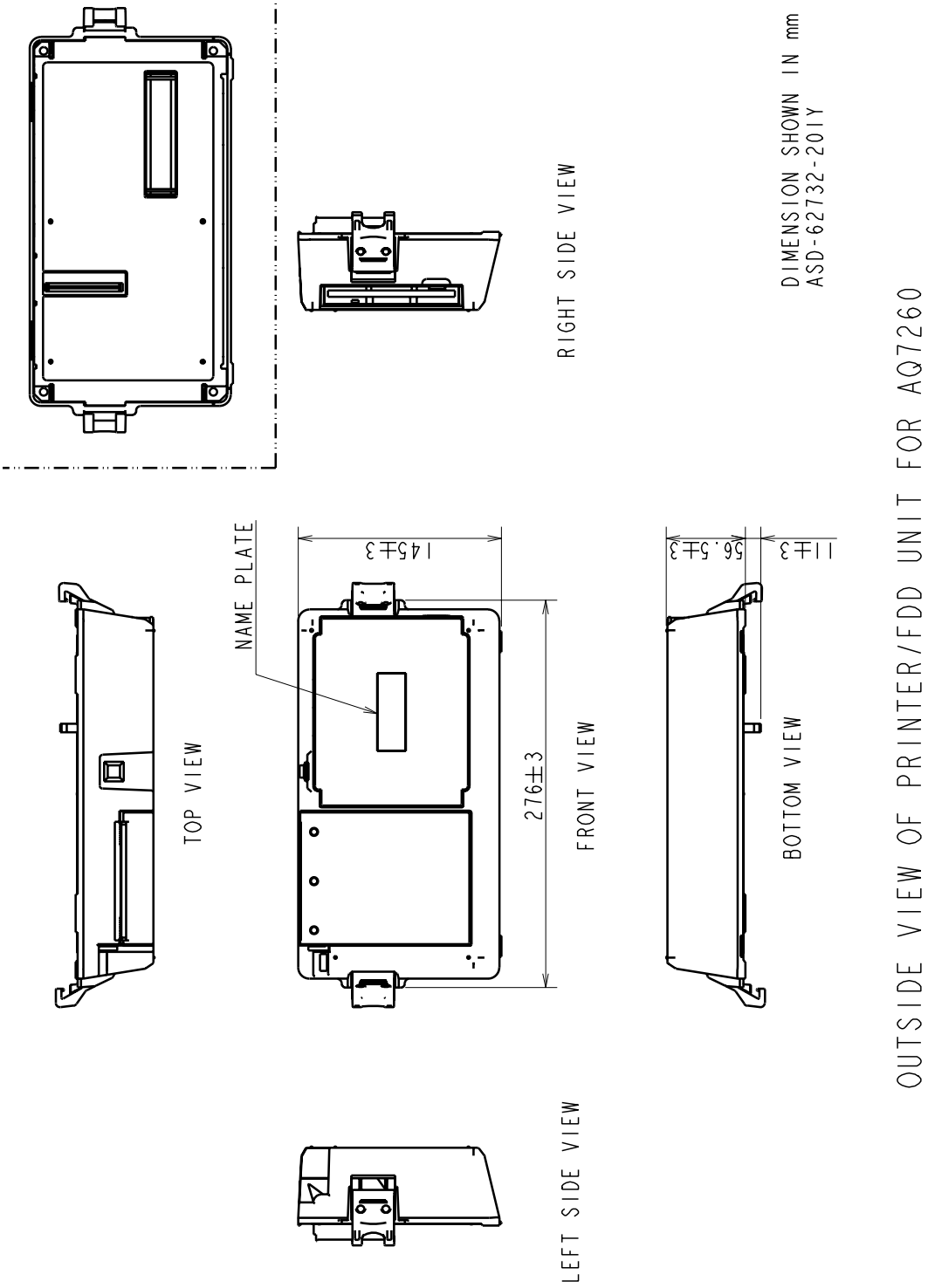
AQ7265 SMF MODULE



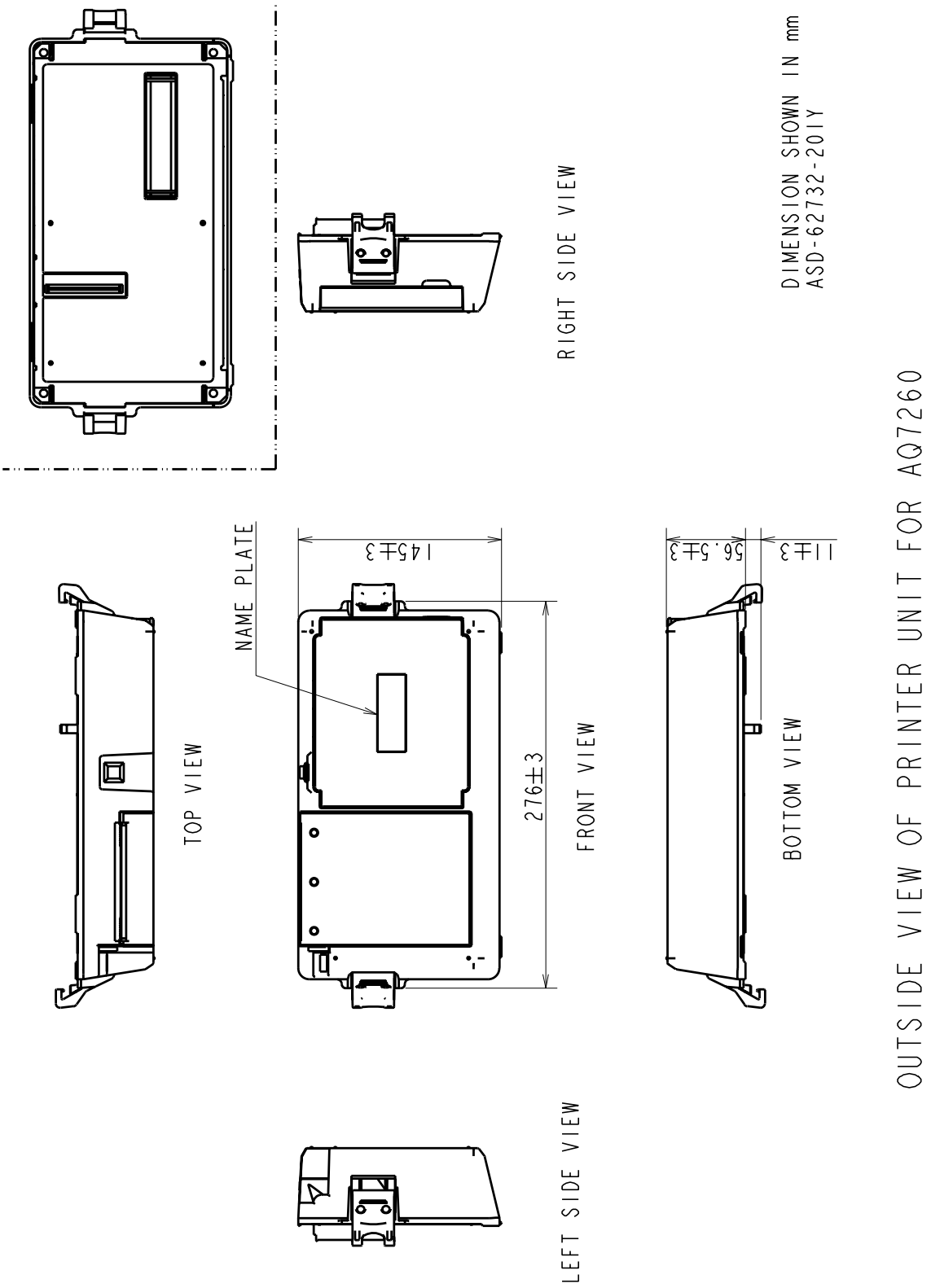
AQ7269 SMF/MMF MODULE



PRINTER/FDD UNIT



PRINTER UNIT



Chapter 10
APPENDIX

10.1 Software Upgrade

To support new products or to provide new functions, this instrument allows software upgrade. The software can be upgraded by the procedure given below.

Caution

Software upgrade can be performed using the following storage mediums.

Floppy disk (expansion unit, USB)

USB memory

PCMCIA

1. Make sure that the power to the instrument is turned OFF.

Refer

For the method of turning OFF the power, refer to page 3-108.

2. Connect the instrument to an AC power outlet using the dedicated AC adapter.

Caution

Software upgrade can be performed only when the instrument is running with AC power using the dedicated AC adapter.

3. Connect a storage medium containing the software to the instrument.

Caution

Pleas save the software to root folder in storage media.

Refer

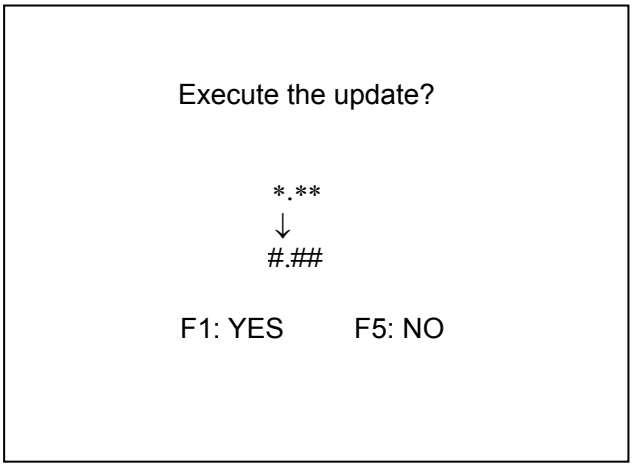
For the method of connecting a storage medium, refer to Chapter 8.

4. Turn ON the instrument.

Refer For the method of turning ON the power to the instrument, refer to page 3-3.

5. Wait until the software upgrade screen appears.

The following window will appear.

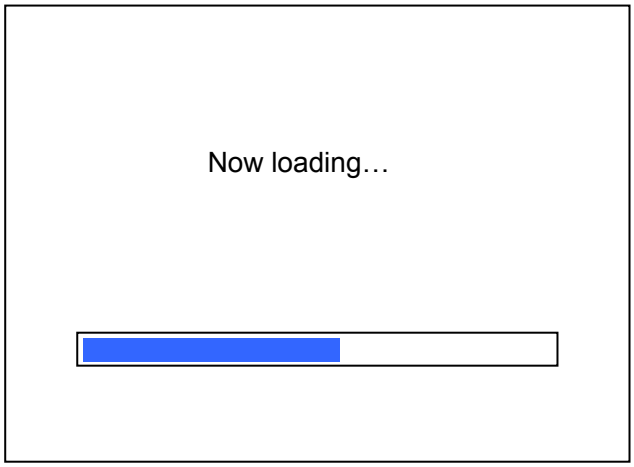


*.**: Current version

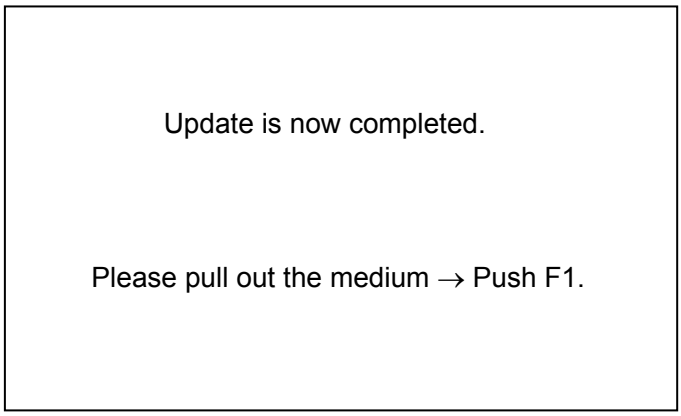
#.##: New version

6. Press [F1] to start to upgrade the software.

The following window is displayed while upgrade is in progress.



The following window appears when software upgrade is complete.



7. Remove the storage medium and press [F1].

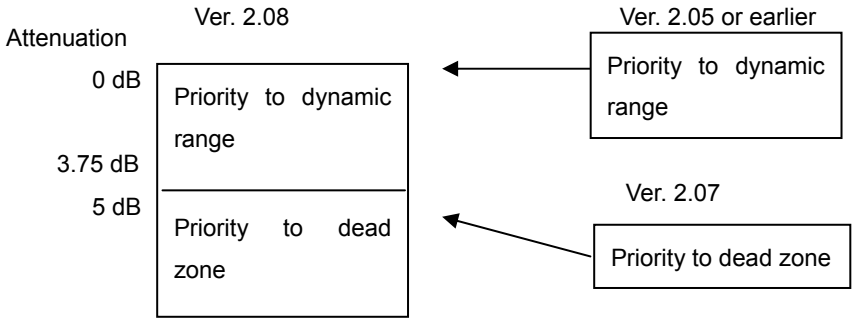
The instrument will be restarted automatically.

Caution

If your software is currently of version 1.**, you must repeat step 6 without removing the medium.

TIP

If the pulse width is set to 100 ns, the measured waveform may differ from that when using version 2.07 of the software or earlier. This is due to changes made to the circuits used in the OTDR for improved performance, and does not indicate an abnormality with the OTDR hardware. With a pulse width of 100 ns, versions on or prior to 2.05 are set to give priority to the dynamic range. Version 2.07 is set to give priority to the dead zone. **Versions 2.08 and later are set according to the preferable of these two.** For attenuation settings between 0 and 3.75 dB, priority is given to dynamic range, and for a setting of 5 dB or higher, priority is given to dead zone. When priority to dynamic range is set, the S/N ratio improves and the waveform is clearer. This is preferable for long distance measurements. When priority to dead zone is set, waveforms with short dead zones are obtained. This is preferable for analysis of points of connection or reflection.



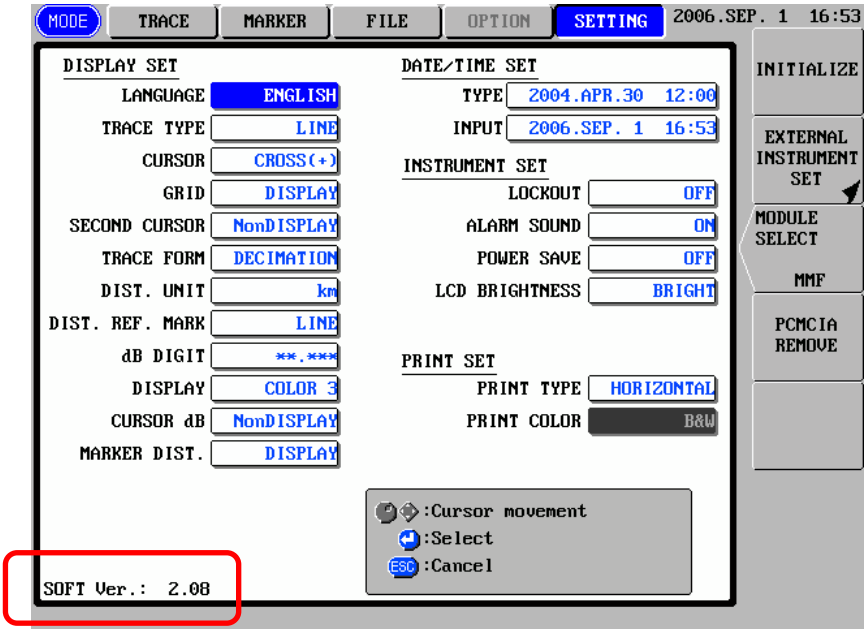
10.2 Checking the Software version

The software version displays in the starting screen as shown below.

AQ**** : Displays model name of mounted optical modules.
Nothing is displayed if no AQ7260 optical module is mounted.
#.## : Displays software version of installed.

TIP

You can even check the version of the software in the various setting screens. (2.08 or later)
For the procedure to display screens, see page 2-3.



10.3 Troubleshooting

When the Instrument Appears Faulty

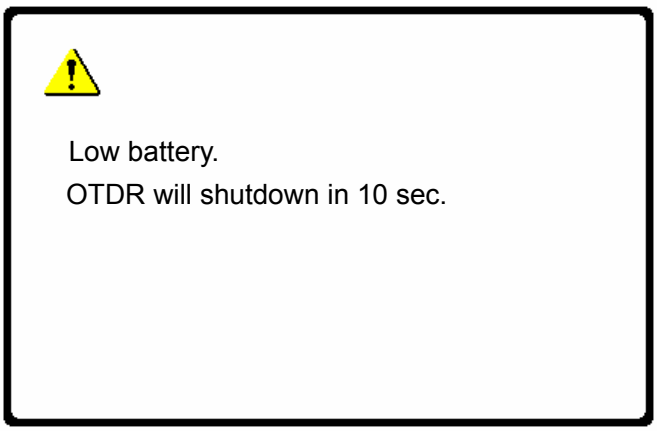
When you think that the instrument is faulty, check the following items.

Symptoms	Check Items
Not possible to turn ON the power.	Is the power switch on the instrument turned ON? Check whether the POWER LED is lit.
	Is the AC power cord or battery pack connected properly? Check the connections.
	The battery has probably run out. Check whether the POWER LED is lit in green.
Nothing is displayed on the screen.	Is the instrument operated within the specified operating temperature range? The LCD becomes dark at high temperatures, and its display speed slows down at low temperatures. Check the specified operating temperature range.
The screen becomes blank after a certain time.	The battery has probably run out. The instrument will be turned OFF when the battery has run out.
	The power save function is probably enabled. Press any key.
The screen is dark.	LCD brightness is probably set to “DARK”. Switch to the SETTING mode, and check the preset LCD brightness.
	The life of the LCD has probably expired. The life of the LCD is approximately three years.
	Temperature of the Instrument or the battery pack is probably high. The instrument may change the LCD brightness to “DARK” automatically for protected instrument against damage.
Not possible to change measurement conditions.	The lockout function is probably enabled. Enter the lockout code to disable the lockout function.
Power has been turned OFF.	The power was probably turned OFF automatically since an alarm was output from the instrument. *1 Push the power switch to turn ON the power.
Not possible to charge the battery pack.	The battery pack is probably extremely hot or cold. Remove the battery pack from the instrument, and let it stand to cool down to room temperature.
Power has been turned off while start-up.	Is the power switch turned on twice when starts this instrument?

(*1) To prevent possible breakdowns, the instrument displays a warning message and turns OFF the power automatically when it is in a critical condition. The next page shows the symptoms that cause a message to appear.

- When the power of the battery pack is insufficient
- When the instrument's internal temperature is excessively high
- When the instrument's internal temperature is excessively low
- When the battery pack's temperature is excessively high
- When the battery pack's temperature is excessively low
- When the AC power voltage is excessively high
- When the AC power voltage is excessively low
- When the battery pack's voltage is excessively high
- When the battery pack's voltage is excessively low
- When the charging circuit is abnormal
- When the temperature monitor IC has trouble.

Massage example: When the power of the battery pack is insufficient.



When the Problem Cannot Be Solved

If the cause of the problem cannot be identified or the problem cannot be solved, contact the agent from whom the instrument was purchased.

Do not try to disassemble or repair by yourself.

⚠ CAUTION	
	Do not disassemble or modify the instrument. Doing so may result in electric shock, fire or accident.

10.4 Glossary

This section explains the terms used in this manual.

Attenuation

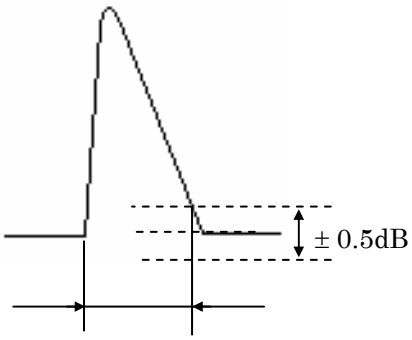
Gain of the amplifier built into this instrument. The smaller the attenuation displayed on this instrument, the larger the gain, and the better the S/N ratio of the acquired trace. However, the trace may be saturated at high reflection levels. So, it is necessary to select an appropriate gain according to the measurement object.

Refer

For the method of changing the attenuation, refer to page 3-20

Attenuation dead zone

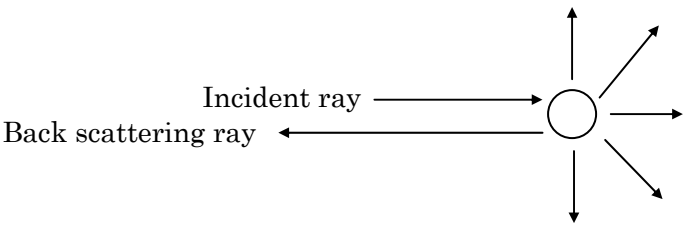
Distance width at points where the optical connector's return loss is 45dB (40dB@AQ7269 MMF module) or higher and the back scatter level is within ±0.5dB of the normal level.



Attenuation dead zone

Back scattering ray

When light travels through an optical fiber, a symptom called "Rayleigh scattering" occurs due to uneven density or components of substances that are smaller than wavelengths. Among these scattering rays, those which travel in the opposite direction of incident rays are called back scattering rays.



Connection point

Points at which the optical fiber is fused (including mechanical connection) or points where connectors are connected by adapter.

Dead zone

Areas that cannot be measured due to influences by Fresnel reflection. There are two dead zone types as shown below. For details, refer to the explanation given for each type.

- Event dead zone
- Attenuation dead zone

Distance measuring accuracy

OTDR measures the time the emitted pulse ray takes to return, and calculates the distance (L) using the following formula.

$L=C\times T/(2N)$ [m]

C: Speed of light traveling in the vacuum

T: Time spent before the pulsed ray is returned (received) after it is emitted

N: Group index

The reason why the distance is divided by “2” is to measure the time taken by the pulse ray to travel back and forth through the optical fiber.

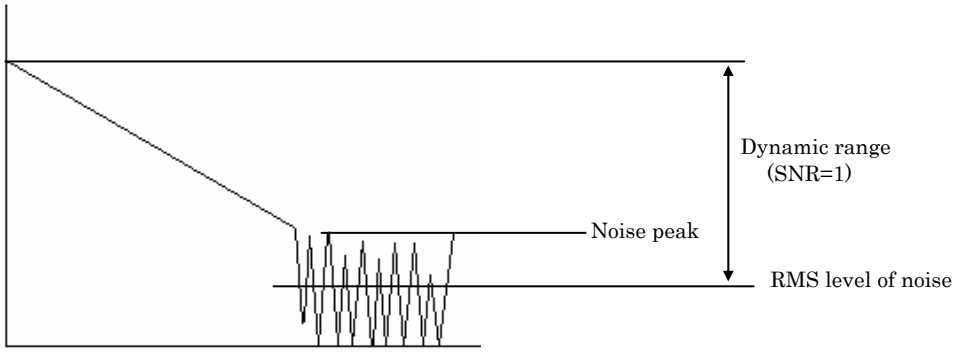
Thus, measured distance is not accurate unless the given group index is accurate.

Distance range

Range of distance the instrument can display. Select a range that is longer than the optical fiber to be measured. However, the larger the distance range, the longer the measurement time.

Dynamic range

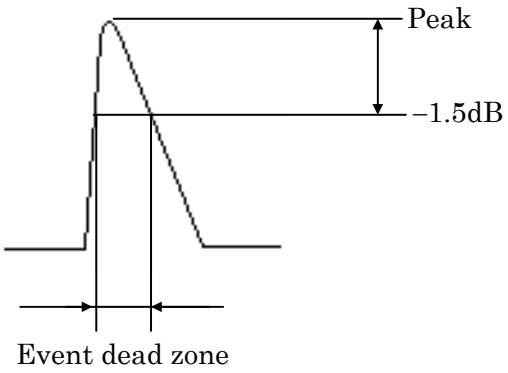
Range of back scatter level that can be measured by the instrument.



Event dead zone

Also called spatial resolution.

Distance width between the event peak point, where the return loss is 40dB or higher (event is not saturated), and the point where the level is 1.5dB smaller than the event peak point.



Event list

A list of information (distance, splice loss, return loss etc.) regarding events detected by auto search.

Event note

A comment attached to each event detected by auto search.

Refer For the method of entering an event note, refer to page 5-23.

Far end

The end of an optical fiber cable and its surrounding area

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.

Refer For details on far end, refer to page 1-44.

Fault location

Points where the optical fiber is cut or the end of the optical fiber.

Filter

Used to eliminate noise from the trace displayed at the end of average measurement.

Refer For details on filter, refer to page 3-59.

Format

Data on a storage medium like floppy disk cannot be read unless it is saved in the format appropriate for the instrument. “Format” means to convert such data to the appropriate format.

Fresnel reflection

Reflection that occurs at points (glass/air interface points), such as the end of the optical fiber or points where the optical fiber is cut, where the group index changes when a light enters the optical fiber. If the fiber is cut at right angles to the fiber axis, approximately 3% (−14.7 dB) of the incident optical power will be reflected.

Group index

Expressed by the ratio of the speed of light traveling in a vacuum to that traveling in a substance, and calculated by the following formula.

N=Speed of light traveling in a vacuum / Speed of light traveling in a substance

Group index (N) for SMF is generally around 1.48000.

Label

A comment that can be attached to the trace.

Refer

For the method of entering a label, refer to page 4-3.

Least squares approximate (LSA)

Least squares approximate is the method by which a loss measured between two points. Since this method uses all of the data between two point.

Refer

For details on least squares approximate, refer to page 3-38.

Near end

Connection point between the instrument and optical fiber and its surrounding area.

Refer

For details on near end, refer to page 1-44.

OTDR

Abbreviation for “Optical Time Domain Reflectometer”. OTDR emits a pulsed ray into an optical fiber and acquires its reflected ray. The acquired data is then processed to display a graph of loss distribution versus distance.

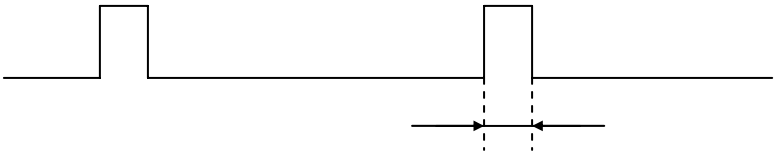
Pulse width

Width of light pulse emitted from the instrument. Normally, pulse width is expressed by half width.

The pulse width has the following features.

Short pulse width: Enables measurement with high spatial resolution, but not measurement at long distances.

Long pulse width: Enables measurement at long distances, but not measurement with high spatial resolution.



Real time measurement

Real time measurement uses the default average time (little number set to the instrument to perform measurement.

Refer For details on real time measurement, refer to page 3-56.

Reflection point

Points where the optical fiber is connected. There are two reflection point types as shown below. For details, refer to the explanation given for each type.

- Connection point
- Fault location

Resolution

Indicates how finely the object can be measured. With this instrument, resolution is defined mainly for distance, and the following resolution types are used. For details, refer to the explanation given for each type.

- Sampling resolution
- Spatial resolution

Return loss

Expressed by the ratio of the total reflected optical power (Pr) from optical system or optical fiber to the incident optical power (Pi), and calculated by the following formula.

RL=−10log (Pr/Pi) [dB]

S/N

Signal to noise ratio. “Low S/N” means that the trace contains a lot of noise.

Sampling count

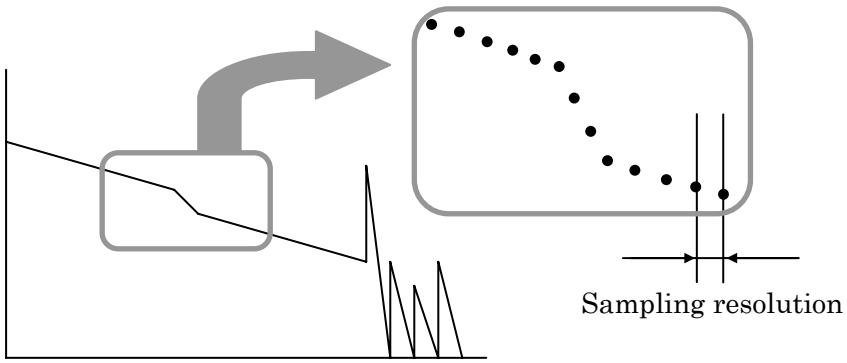
Quantity of data acquired for each trace. The sampling count must be determined by the user.

Refer

For the method of selecting a sampling count, refer to page 3-28.

Sampling resolution

Distance interval at which data is acquired.



Secondary reflection

If a large reflection occurs, the reflection of the point may return again and makes an event look as if it were present in places where it is actually not.

Refer For details on secondary reflection, refer to page 2-12.

Spatial resolution

Also called event dead zone. Refer to the explanation given for “Event dead zone”.

Splice loss

Loss that occurs at fused points.

Refer For details on splice loss, refer to page 1-45.

Two Point Approximate (TPA)

Two point approximate is the method by which a loss measured between two points. Since this method uses the level difference of the two point.

Refer For details on two point approximate, refer to page 3-38.