

SONY®

Hi-speed HDD Data Recorder

SIR-3400H

Precision Analog Unit / Wide Band Analog Unit

SIR-3032i / SIR-3032W

Read all the instructions in the manual carefully before use and strictly follow them.
Keep the manual for future references.

Instruction Manual

[For U.S.A. and Canada]

THIS CLASS A DIGITAL DEVICE COMPLIES WITH PART15 OF THE FCC RULES AND THE CANADIAN ICES-003. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS.

- (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND
- (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDERSIGNED OPERATION.

CET APPAREIL NUMÉRIQUE DE LA CLASSE A EST CONFORME À LA NORME NMB-003 DU CANADA.

[For the customers in Australia]

Australian EMC Notice

This product complies with the following Australian EMC standard.

AS/NZS CISPR11/2002 Emission Standard for ISM Equipment

[For EU and EFTA countries]

CE Notice

Marking by the symbol CE indicates compliance with the EMC directive and the Low-voltage directive of the European Community. This marking shows conformity to the following technical standards.

EN 55011 Group 1 Class A/1998 A1/1999 A2/2002 :

"Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment"

EN 61000-3-2/2000 :

"Limits for harmonic currents emissions (equipment input current ≤ 16 A per phase)"

EN 61000-3-3/1995 A1/2001 :

"Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤ 16 A"

EN 61000-6-2/2001 :

"Electromagnetic compatibility (EMC) - Part 6-2 : Generic standards - Immunity for industrial environments"

EN 61010-1/2001 :

"Safety requirements for electrical equipment for measurement, control and laboratory use Part 1: General requirements"

For DC power-driven products to meet EN 61000-6-2/2001, the following operational conditions must be satisfied.

1. Input and output signal cable length : 30 m or less
2. Cable length for input power source : 10 m or less

Note

When using the same cable for output signal and input power source, the cable must not be longer than 10 m.

For AC power-driven products to meet EN 61000-6-2/2001, the following operational conditions must be satisfied.

1. Input and output signal cable length : 30 m or less

Raadpleeg uw leverancier indien de
batterij toch vervangen moet worden.



De batterij mag alleen vervangen
worden door vakbekwaam servicepersoneel.

English



Disposal of Waste Electrical and Electronic Equipment for Business use (Applicable in the European Union and other European countries with separate collection systems)

This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead it shall be handed over to the applicable take-back scheme for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please visit Sony Manufacturing Systems Europe's web site:

<http://www.sonymanufacturing.com/environment>

Deutsch



Entsorgung von als Industriemüll anfallenden elektrischen und elektronischen Geräten (anzuwenden in den Ländern der Europäischen Union und anderen europäischen Ländern mit einem separaten Sammelsystem für diese Geräte)

Das Symbol auf dem Produkt oder seiner Verpackung weist darauf hin, dass dieses Produkt nicht als normaler Haushaltsabfall zu behandeln ist, sondern im Rahmen des entsprechenden Rücknahmeprogramms für das Recycling von elektrischen Geräten abgegeben werden muss. Durch Ihren Beitrag zum korrekten Entsorgen dieses Produkts schützen Sie die Umwelt und die Gesundheit Ihrer Mitmenschen. Umwelt und Gesundheit werden durch falsches Entsorgen gefährdet. Materialrecycling hilft, den Verbrauch von Rohstoffen zu verringern. Weitere Informationen über das Recycling dieses Produkts erhalten Sie auf der Webseite von Sony Manufacturing Systems Europe:

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Safety Precautions

Sony Manufacturing Systems Corporation products are designed in full consideration of safety. However, improper handling during operation or installation is dangerous and may lead to fire, electric shock or other accidents resulting in serious injury or death. In addition, these actions may also worsen machine performance.

Therefore, be sure to observe the following safety precautions in order to prevent these types of accidents, and to read these "Safety Precautions" before operating, installing, maintaining, inspecting, repairing or otherwise working on this unit.

Warning indication meanings

The following indications are used throughout this manual, and their contents should be understood before reading the text.

Warning

Failure to observe these precautions may lead to fire, electric shock or other accidents resulting in serious injury or death.

Caution

Failure to observe these precautions may lead to electric shock or other accidents resulting in injury or damage to surrounding objects.

Important

If there is any abnormal phenomena during installation or operation, disconnect the power cord and contact service engineer person immediately. It is dangerous to use the unit if it is not operating normally.

General

WARNING

- No user-serviceable parts are inside the unit. Removing the covers may expose you danger.
- Never push objects of any kind into the unit through the slots.
- Do not place any liquids on the top of the unit.
- Should any object or liquid fall into the unit, turn the power OFF and unplug the unit and call service engineer person to check it before using again.
- The SIR-3000 series should be used indoors or under similar conditions.
- Clean the recorder by wiping it with a dry cloth.
- Be careful that you do not listen to earphones (sold separately) at a high volume for extended periods of time.

Installation

WARNING

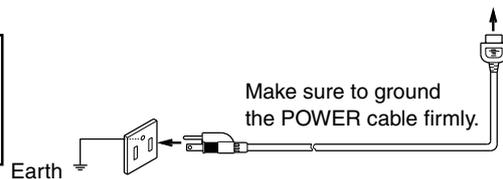
- When unpacking, packing or installing, assign more than 2 persons to handle the unit to prevent injury.
- Be careful never to drop the unit when handling, unboxed or boxed. If the unit is dropped, turn the power OFF and unplug the unit and call service engineer person to check it before using again.
- Be sure that the unit is firmly positioned on its supporting surface. The unit cause an injury if it falls or dropped.
- To allow adequate air circulation, do not block the ventilation of the unit.
- Do not place the unit or other heavy objects on the power cord. If damaged, the cord may cause fire or electric shock.

Operating Cautions

* Be sure to observe the following cautions.

- Use the supplied power cord.

The POWER cord contains a safety earth ground. Make sure to connect this earth ground. Failure to do so may result in electric shock or fire.



CAUTION

- Keep the unit away from strong magnetic fields such as high voltage transformers, speakers, and electric motors.
- When receives strong outer noises, the unit may operate improperly.
- Do not locate the unit in a dusty, hot or humid place.
- Do not place heavy objects on the top of the unit, otherwise it may fall and cause an injury.
- To disconnect the power cord or signal cable, always pull it by the plug. Pulling wire may cause it to be damaged resulting fire or electric shock.
- Keep the power cord or signal cable away from where people might step on it or trip over it.
- Be sure that the attached AC power cord is firmly connected.
There is a protective ground wire in attached AC power cord.

Operation

WARNING

- Be sure operate the unit only with the specified power supply. Use of an incorrect voltage will cause severe damage.
- Be sure to input to the unit only the specified signal voltage.
- Replace only with specified type and rated fuse.

CAUTION

- Disconnect the power cord from the unit if it is not in use.
- Disconnect the power cord before replacing fuse.

Caution

Please read carefully the following precautions prior to use. These precautions will prevent your data on recording media from being damaged or lost.

Condensation

In the default settings, the condensation sensor on this unit is set to off.

- (1) Always turn the condensation sensor on under conditions where condensation may form easily such as when the temperature around the recording unit goes from a low to high temperature.
- (2) To prevent damage to data in environments where condensation tends to occur, be sure to always eject the recording media after using the recording unit, and then press the POWER switch to turn off the power.

<Reference> (Section 7-2-2)

Off : Condensation is not detected. If condensation occurs the recording media and data may become damaged.

On : Condensation is detected when the unit's power is turned on to protect the recording media and data from being damaged.

Warming Up/Cooling Down

When the temperature inside the unit is too high or too low, the unit displays one of the following messages and the unit is automatically cooled down or warming up. The unit cannot be operated until the temperature reaches proper level and the message on LCD display disappears.

LCD message	Recording unit status	Remarks
Low Temp Warming Up	Internal temperature < 5 °C	Displayed until the internal temperature is 5 °C or higher
High Temp Cooling Down	70 °C ≤ Internal temperature	Displayed until the internal temperature is less than 70 °C

Overwrite

Once overwritten, the previously recorded data after the point where the overwriting ends cannot be reproduced (see section 2-5).

<Reference> (Section 8-2-3)

Overwriting is prohibited in the default settings.

To cancel the overwrite protection, set the Overwrite option under Utility_Global Setup Menu_Function to On in the LCD screen.

In an attempt of overwriting, a message "Overwrite?" will appear on the LCD of the recording unit. If you wish to overwrite the old data, press FWD key with REC key pressed down.

Power Switch

When turning off the unit completely, first confirm that the ACCESS lamp is out and then turn off the POWER switch on the rear of unit.

Power Supply Back-up (Power Outages or Power Cord Disconnection)

When the power supply is stopped, the unit switches to the backup power supply without turning off the power. The unit automatically switches to the power supply in the following order of priority (starting from the highest priority): AC > DC > Internal backup battery.

- (1) When the unit is backed up by the internal battery for 3 minutes or longer, to protect the recording media, the operation is stopped. Then, the unit starts the shut-down operation.
- (2) The backup power supply may not be activated if the internal backup battery is not fully charged.

CAUTION

The unit is shut-down in the following process of operation in which case both of more than 3 minutes passed or pressing the Standby key on the front panel to more than 2 seconds, during the back-up operating state.

The screen display goes out. $\xrightarrow{\text{(10 seconds at the maximum)}}$ The standby lamp and other lamps on the front panel go out.
(The unit is completely shut down.)

Connection of Cables for IEPE Inputs

Be sure to make the input format settings while a signal source is not connected to the INPUT connector of the unit.

Use of IEPE inputs format* may damage the signal source as 24 V power is supplied to the INPUT connector.

* IEPE input format: The input format for using a sensor with built-in the pre-amplifier (IEPE type). In this unit, either TEDS mode, which acquires the TEDS data, or IEPE mode, which doesn't acquire TEDS data, can be selected.

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1. Overview

1-1. Introduction

The SIR-3000 series is a lineup of data recorders consisting of a recording unit and measuring unit. The recording unit and measuring unit are used in combination together.

Seven speeds are available for both recording and playback so that high-speed data recorded at 4× speed can be played back at 1/16× speed, or the maximum 250 hours of data recorded at 1/16× speed can be played in four hours at 4× speed.

SIR-3400H (recording unit)

This device records data obtained from the measuring unit.

Two hard disk drives (HDD) are used for the recording media. Data is written simultaneously to the two HDDs so that even if a failure were to occur in one HDD, recording is still maintained in the other HDD. When the SMH-200 is used, the capacity of HDD is 200 Gbytes. The unit can continuously record the digital data of 128 ch × 20 kHz (SIR-3032i / SIR-3032W) / 32 ch × 80 kHz (SIR-3032W) for about 4 hours.

SIR-3032i/SIR-3032W (measuring unit)

This device sends the measured data to the recording unit.

Up to four measuring units can be connected to a single recording unit.

1-2. Major Features

Wideband, Multi-Channel

By combining with a measuring unit, the SIR-3000 series can be used to build the optimum system for measurement subjects.

Support for 32 ch × 20 kHz is provided by combining the minimum configuration of the SIR-3400H and SIR-3032i.

Replacing the measuring unit with the SIR-3032W enables wideband recording at 32 ch × 80 kHz.

Connection of four SIR-3032i/W to the recording unit enables recording and playback to one HDD group at 128 ch × 20 kHz.

Equipped with Sensor Input

The SIR-3032i/W (measuring unit) can supply power to the sensor with built-in pre-amplifier (IEPE type). This enables the sensor to be connected directly to the data recorder, realizing enhanced portability and saving total costs. A choice between the IEPE input (IEPE or TEDS) and conventional DIRECT input is available for each channel.

Input Range

The input range now covers ± 0.1 Vpk to ± 10 Vpk (Maximum 7 ranges), enabling a broad range of signals to be recorded and played back at the optimum levels.

Subchannels

In addition to the above analog channels, the recorder is equipped with the subchannels listed below to allow various types of subdata to be recorded or played back together with the analog data.

Channel	Application	Input/Output connector
Voice channel	Voice annotation	Front panel
AUX analog channel	IRIG-B timecodes, etc.	Rear panel
AUX digital channel	Binary data such as tachometer pulse	Rear panel

Recording/Playback

By adopting the 16 bit linear quantization, the dynamic range of 90 dB Typ is achieved. Further more the phase difference between channels is suppressed to less than 1 degree. And the analog input level is allowed to $\pm 133\%$ of the input range value, and the input DC offset of each channel can be automatically or manually adjusted within $\pm 100\%$.

Time Axis Conversion

Data speeds for recording and playback can be selected from the 7 levels of 4, 2, 1 (normal speed), 1/2, 1/4, 1/8 and 1/16. Data can be recorded for a maximum of 256 hours at 1/16 speed when using a 200 GB HDD. By playing back at low speed the data recorded at high speed, data can be converted to the playback frequency to meet the process speed of the external analyzing equipment.

Synchronized Operation

By connecting two recording units with the synchronizing cable (option), the synchronized recording/playback can be performed with accuracy of a quartz level.

This enables doubling of the number of channels without reducing the frequency bandwidth or data transfer rate.

Trigger Recording

Recording can be started by receiving the trigger signal from the external source.

Once the pre-trigger is enabled, a built-in large capacity data buffer memory allows data to be recorded before and after a trigger. This is useful for recording suddenly-occurring phenomena such as lightning and avalanches.

Compatibility with Computers

Data recorded in HDDs by the SIR-3000 series can be read out directly using the optional Media docking station (STC-3010).

Therefore, even if the recording unit is not available, data can be directly analyzed.

High-speed Data Transfer Interface

By employing the high-speed data transfer interface (option), digital data can be transferred to a computer in real-time during recording or playing back. (The transfer speed depends on the computer performance.)

Control Functions

The unit can be controlled from the local (front panel) or from the host computer via Ethernet.

2-way Power Supply System

The SIR-3000 series can run on AC 100/120 V (allowable range 90 to 132 V) or AC 220/240 V (allowable range 198 to 250 V), or DC 12 V (allowable range 11 to 30 V) supplied externally. The recording unit also includes a dedicated nickel-hydrate battery pack for smooth, uninterrupted operation if the power is suddenly cut off.

The unit automatically switches to the power supply in the following order of priority: ① AC, ② DC, ③ internal backup battery.

If the AC source is cut off, the external DC or internal backup battery provides uninterrupted backup. If the external DC source is cut off, the internal backup battery provides uninterrupted backup. The SIR-3000 series cannot operate on the battery only. The internal backup battery is used to protect the recording media when the power failure occurs. When the backup operation continues for 3 minutes or longer, the unit is shut down.

Note

The internal backup battery is recharged automatically, but note that it may not be charged in the cases shown below based on the power switch setting or power supply conditions.

	Power switch off	Power switch on				
		No power supply input	Standby mode			Operating mode
			DC	AC + DC	AC	
Internal backup battery charging	No	No	Yes	Yes	Yes	Yes
Standby lamp	Off	Off	Lit orange	Lit orange	Lit orange	Lit green

Easy Operation

The SIR-3000 series was designed to provide an intuitive man-machine interface.

- Central display screen featuring a backlit, semi-transparent, color LCD panel.
- Direct access to all functions by dedicated keys.

Compact and Light

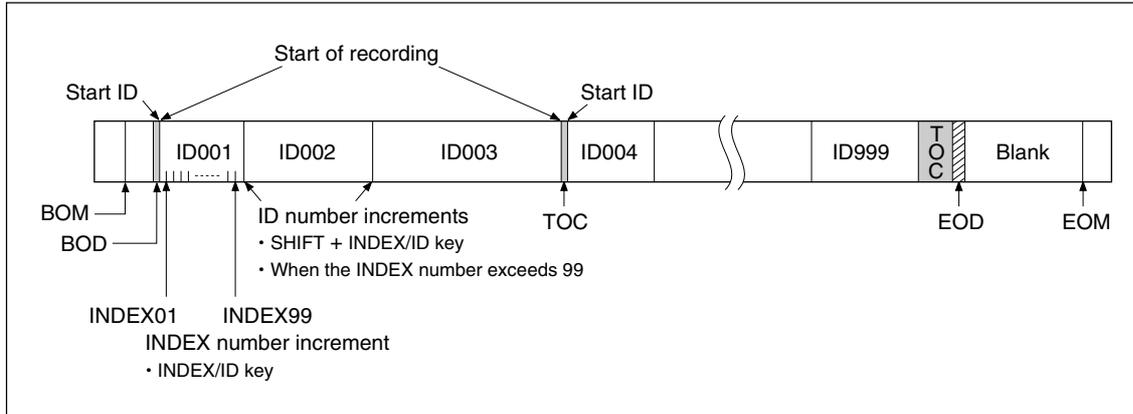
Dimensions of 449 (W) × 88 (H) × 305 (D) mm (recording unit only, without projections) and a weight of approximately 10.5 kg for the recording unit and 7.5 kg for the measuring unit give the SIR-3000 a design with superior compactness and portability.

2. Data Format and Basic Operations

2-1. Data Format

Data recorded to HDDs by the SIR-3400H is based on the FAT32 logical format. However, at the application level the data is of the SIR dedicated format. This is outlined below.

Generally, recording and playback are performed by observing the HDD as sequential media.



BOM (Beginning Of Media)	Position of beginning physical recording.
BOD (Beginning Of Data)	User data is recorded from here.
EOD (End Of Data)	Each time recording stops, an EOD is written. When a recording is added, the previous EOD is overwritten and deleted, and a new EOD is written at the location where the last recording ended. Generally, data cannot be read after the EOD, even if previously recorded data remains.
EOM (End Of Media)	Last position where recording is physically possible.
ID number	ID blocks are formed for each recording with ID numbers (001 to 999) automatically assigned. These can be used for ID searches. Increments -Automatic- • Start of each recording (including cancellation of recording pauses) • When the index number exceeds 99 -Manual- • When the INDEX/ID key is pressed after the SHIFT key during recording
INDEX number	An index (01 to 99) can be added at desired locations during measuring. By marking an index, the desired location can quickly be found during analysis (INDEX search). Increments -Manual- • When the INDEX/ID key is pressed during recording
Start ID	This indicates the point where recording starts. The start ID is not actually written on the recording media, but the position is registered in the TOC. The start ID can be used for start ID searches.
TOC (Table of Contents)	The position and other information for all ID blocks are recorded in table format in this area.

2-2. TOC

The position on the media of each recording block is registered in the TOC together with the ID and index number and recorded immediately before the EOD. This allows searching to be performed by specifying an ID or index number.

2-3. Initialization of Recording Media (Formatting)

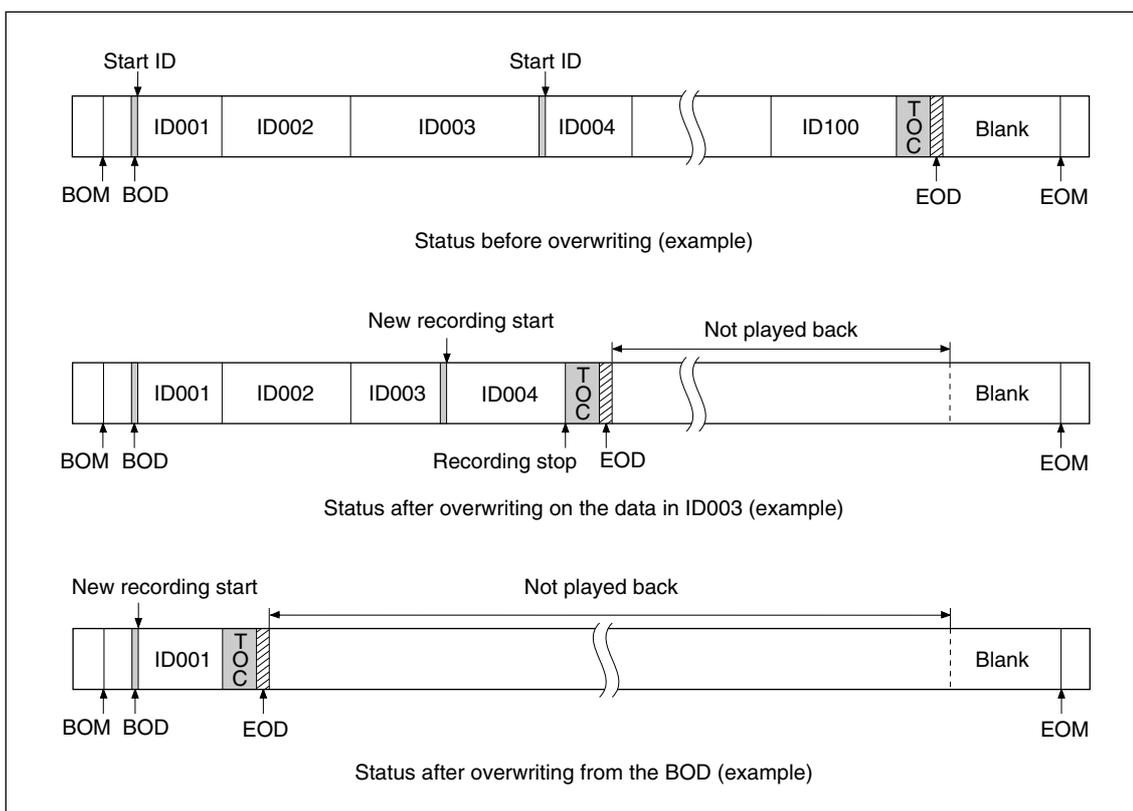
When a different format (such as one where data has been written by a computer) or unformatted SMH cartridge is loaded in the SIR-3400H, the Format Error is displayed on the LCD screen. Implement the HDD formatting.

2-4. Removing Recording Media

Before removing a HDD, be sure to first set to STOP mode and check that HDD access has been completed. Then, use the supplied key to eject the cartridge. If you attempt to remove it during HDD access, the HDD can be damaged. Remove the cartridge after making sure that the access lamp goes out. If you open the front panel while in REC mode, a warning sound is made continuously to indicate that recording is in progress.

2-5. Overwriting Data

Overwriting can be performed on pre-recorded HDDs. An EOD is written at the point where the new recording ends, and so old data remaining after that point cannot be played back. Therefore, care should be taken when overwriting on pre-recorded HDDs. The figure below shows an example of an HDD which has been overwritten from the middle of ID number 003.



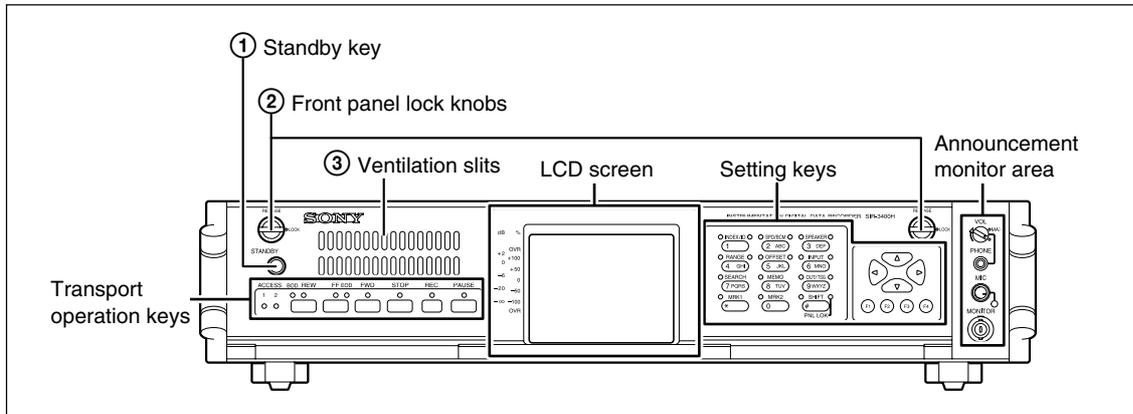
2-6. ID Block

Each ID block consists of segments of approximately 550 kbytes referred to Records. Therefore, the shortest ID block length is one Record. This is approximately 42 ms at 4× speed, 170 ms at normal speed (1×), and 2.7 seconds at 1/16× speed. Thus, recording at 1/16× speed cannot be stopped within 2.7 seconds.

3. Names and Functions of Parts

3-1. SIR-3400H (Recording unit)

3-1-1. Front Panel



① Standby key

Used to changes mode between standby and operation. Press and keeping this key at least two seconds to changes standby or operation mode.

* When the unit is set to the panel lock mode, the standby key is also inhibited.

	Power switch off	Power switch on				
		No power supply input	Standby mode			Operation mode
			DC	AC + DC	AC	
Standby key	Disabled	Disabled	Hold down for 2 seconds to switch between standby and operation modes			
Standby lamp	Off	Off	Lit orange	Lit orange	Lit orange	Lit green

② Front panel lock knobs

Used to open and close the front panel.

When set to RELEASE, the front panel can be opened. When the front panel is closed, both knobs are set to LOCK.

CAUTION

Be sure to always close the front panel when using the recording unit.

③ Ventilation slits

These slits are used to take in air to cool the inside of the recording unit.

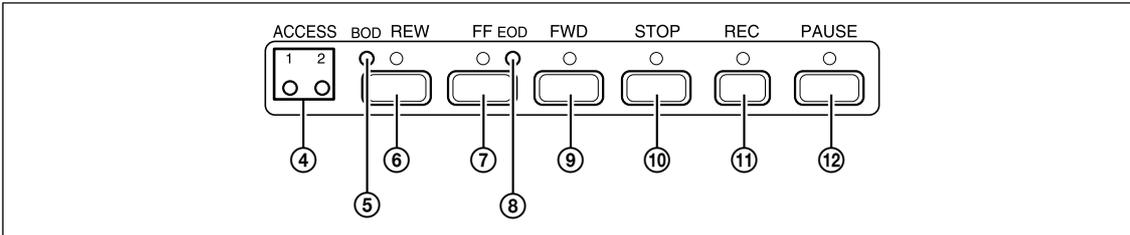
WARNING

To prevent the inside of the recording unit from overheating, do not cover the ventilation slits.

Transport Operations Keys

The lamps above the keys light to indicate the active mode.

During transport mode transition, the lamp over the respective key blinks, and no key operation is accepted.



④ ACCESS lamps (1, 2)

Lights when access to the recording media is possible.

The lamps blink while access is in progress.

ACCESS1: Recording media 1 ACCESS2: Recording media 2

Lit green	Access possible
Blinking orange	HDD operation in progress

⑤ BOD lamp

Lights when the recording media is at the BOD (beginning of data recorded on the recording media) position.

⑥ REW key

Used for the following operations.

- Rewinding data
- Start ID search of the current data
- Manual search (rewind direction)

⑦ FF key

Used for the following operations.

- Fast-forwarding data
- Start ID search of the next data
- Manual search (fast-forward direction)

⑧ EOD lamp

Lights when the recording media is at the EOD (end of data recorded on the recording media) position.

⑨ FWD key

Plays back the data.

⑩ STOP key

Stops data playback or recording.

CAUTION

After the stop key is pressed, a buffer recording for up to 20 seconds is made. As a result, the recording media may not stop.

⑪ REC key

Press this key alone to select the E-E mode.

Press this key together with the FWD key to record data.

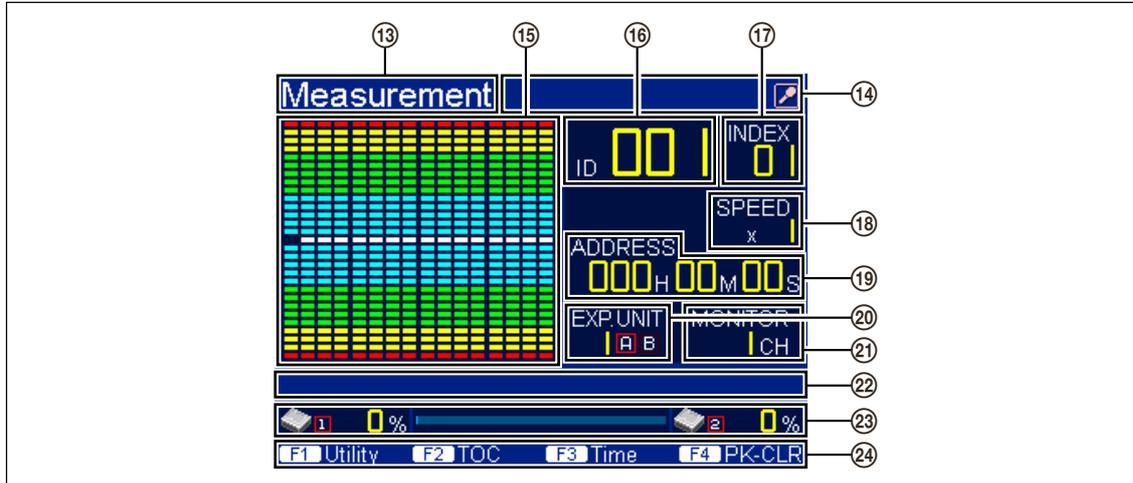
⑫ PAUSE key

Used when performing a recording pause or playback pause.

LCD Screen

Checking of the recording and playback statuses, basic settings, operation settings, and other operations are performed at the LCD screen.

For details about the settings, see the setting description chapter. This section explains the recording/playback screen (Measurement).



⑬ Title display area

This area displays the title of the currently displayed screen.

For details, see “6-2. LCD Screen Configuration.”

⑭ Status display area

This area uses icons to indicate the input status of subchannel data or essential notification information such as errors or warnings.

Mark	Description
	When a power supply error occurs
	When a condensation error occurs
	When a recording/playback error occurs
	When multiple measuring units are operating in synchronizing mode
	When signals are input to the AUX1 (DIGITAL) IN connector or when the recorded signals are played back
	When signals are input to the AUX2 (IRIG-B) IN connector or when the recorded signals are played back
	When IRIG-B time code signals that are input from an external time code generator are detected correctly or when the recorded signals are played back
	When the playback signal source of the speakers or earphones are set to voice annotation
	When the playback signal source of the speakers or earphones are set to analog data signals

⑮ Bar meter display area

This area displays the bar meters for each channel.

A single bar meter indicates one channel. A maximum of 16 channels can be displayed from left to right. The displayed channels vary depending on if the red frame is lit for A or B in the measuring unit number display area ⑳.

A: Channels 1 to 16 B: Channels 17 to 32

Selection of a bidirectional or unidirectional bar meter is made using the Barmeter Scale setting (section 9-2-2).

⑯ ID display area

This area indicates the ID number.

The displayed information varies depending on the transport mode.

Transport mode	Display
E-E, REC-PAUSE, REC, and succeeding STOP	Value set in recording unit
FWD and succeeding STOP	Value recorded on recording media

⑰ INDEX display area

This area indicates the INDEX number.

The displayed information varies depending on the transport mode.

Transport mode	Display
E-E, REC-PAUSE, REC, and succeeding STOP	Value set in recording unit
FWD and succeeding STOP	Value recorded on recording media

⑱ Speed display area

This area displays the speed of the recording media.

The displayed information varies depending on the transport mode.

Transport mode	Display
E-E, REC-PAUSE, REC, and succeeding STOP	Value set in recording unit
FWD and succeeding STOP	Value recorded on recording media

⑲ Recording media position display area

The displayed information varies depending on the transport mode.

Transport mode	Display
E-E, REC-PAUSE, REC, and succeeding STOP	ADDRESS, REMAIN, and S-TIME values set in recording unit
FWD and succeeding STOP	ADDRESS, REMAIN, and R-TIME values recorded on recording media

ADDRESS : Displays the recording media position from the (00H00M00S) of each recording block in hour, minute and second.

- The address is set automatically to 00H00M00S when recording begins.
- The address counts in step with real time at 1× speed, and slows down in proportion to the speed at 1/2 speed or slower.
- In addition, when operating at 1/2 speed or slower, the lower digit for indication of seconds blinks at a rate of once per second.

REMAIN : Displays the amount of recording media remaining in hour and minute according to the speed.

S-TIME : Displays the current time in recording unit in year/month/day and in hour/minute/second.

R-TIME : Displays the time recorded on the recording media in year/month/day and in hour/minute/second.

⑳ Measuring unit number display area

This area displays the measuring unit number and channel group of the displayed bar meter.
The displayed bar meter channels group vary depending on if the red frame is lit for A or B.

A: Channels 1 to 16 B: Channels 17 to 32

㉑ MONITOR display area

This area displays the channel number selected for monitor output of the recording unit.

㉒ Setting value display area

This area displays setting values, recording notes, status of the recording unit, and other information using the setting key.

<Displayed setting values>

Input range, Input DC offset, Output level, Input format, Recording note, Test signal

㉓ Recording media status display area

This area displays the recording media capacity that is being used.

㉔ Function key command display area

This area displays the function key commands during setting.

(The function key commands vary depending on the setting option.)

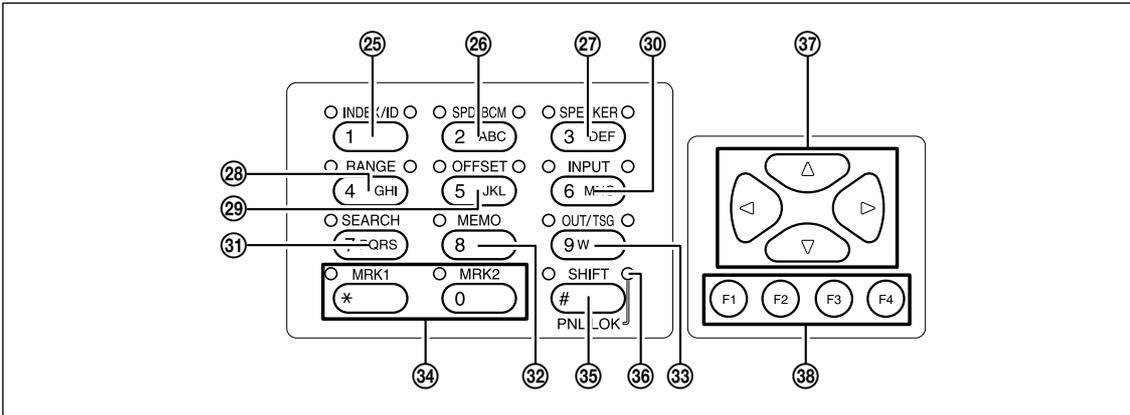
Setting Keys

The setting keys can be used to perform the following two operations.

- Function and operation settings
- Input of numbers and text (for recording notes only)

Key operation is described primary as function/operation keys.

Also, in this manual, the key names (such as INDEX/ID key) are used as function/operation setting keys except in the description of note recording.



The enabled keys are changed in transport mode. (Yes: Enabled, No: Disabled)

Transport mode	Setting keys											
	INDEX/ID	SPD/BCM	SPEAKER	RANGE	OFFSET	INPUT	SEARCH	MEMO	OUT/TSG	MRK1	MRK2	SHIFT
STOP	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes/No	Yes	Yes	Yes
E-E	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
REC-PAUSE	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
REC	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
FWD	No	No	Yes	No	No	No	No	No	Yes/No	Yes	Yes	No
FF	No	No	Yes	No	No	No	No	No	No	No	No	No
REW	No	No	Yes	No	No	No	No	No	No	No	No	No
SEARCH	No	No	No	No	No	No	No	No	No	No	No	No

<Lamps>

The lamp above the key indicates the status below.

Blinking : The key is enabled.

Lit : The key was pressed, and the setting can be made.

When there are two lamps, the key has the following two functions. (See “Setting Key Descriptions”.)

Left-side lamp : When the key is pressed by itself

Right-side lamp : When the setting key is pressed after pressing the SHIFT key (except for the SHIFT key right lamp)

<Setting Key Descriptions>

The functions of some setting keys change depending on if the key was pressed by itself or if the setting key was pressed after pressing the SHIFT key.

The descriptions in this section use the expressions below to indicate how the key was pressed.

When the key is pressed by itself : No additional comment

When the setting key is pressed after the SHIFT key : in SHIFT mode

②⑤ INDEX/ID key

Press this key to increment the value of the INDEX number by 1 in the REC mode.

INDEX number: 01 to 99 (The ID numbers increase up to 99 and then go back to 01.)

When this key is pressed in SEARCH mode, the data for the set INDEX number is searched.

[In SHIFT mode]

Press this key to increment the value of the ID number by 1 in the REC mode.

ID number: 001 to 999

When this key is pressed in SEARCH mode, the data for the set ID number is searched.

These keys ②⑥ to ③③ are used when making the settings below.

Number	Key	Key by itself	In SHIFT mode
②⑥	SPD/BCM key	Recording/Playback speed setting	Setting for number of recording channels
②⑦	SPEAKER key	Selects the speaker or the earphone for listening to the played signal	
②⑧	RANGE key	Manual range setting	Auto range setting
②⑨	OFFSET key	Manual input DC offset setting	Auto input DC offset setting
③①	INPUT key	Input format setting	
③②	SEARCH key	Search mode setting	
③③	MEMO key	Editing of recording note	
③④	OUT/TSG key	Output level setting	Test signal setting

③④ MRK1/MRK2 key

Press this key in REC or FWD mode to store the current recording or playback position in the memory.

③⑤ SHIFT key

This key enables the shift operation for each setting key.

Hold the SHIFT key down for at least 2 seconds to switch key operation of the recording unit between enabled or disabled.

③⑥ PNL LOK lamp

Lights when key operation of the recording unit is set to disable (panel lock mode).

③⑦ Δ , ∇ , \triangleleft , \triangleright keys

- Used to select items and values.
- Used for changing monitor channels.

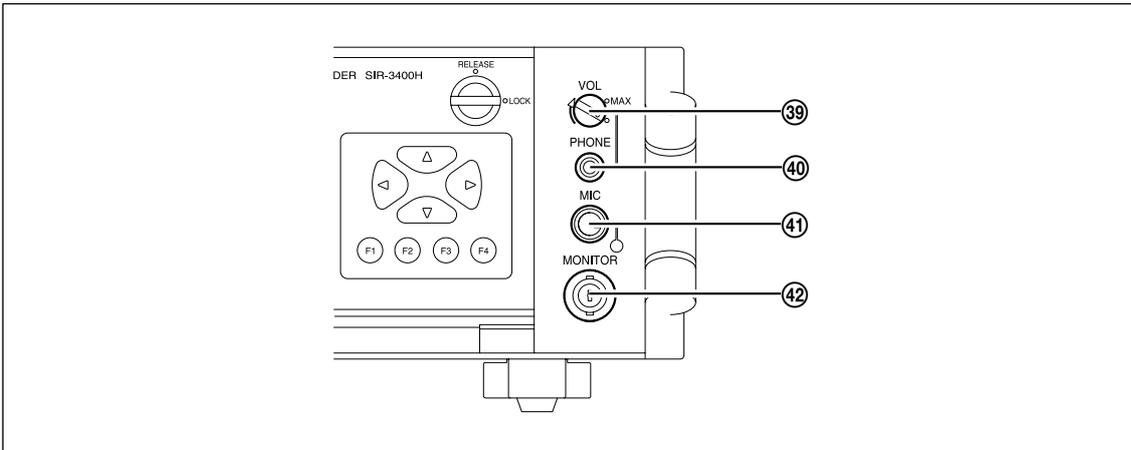
Δ / ∇ key : Every 16 channels

\triangleleft / \triangleright key : Every channel

③⑧ F1 to F4 keys

The functions displayed on the current LCD screen are assigned to F1 to F4 keys. The assigned functions vary depending on the setting item.

Announcement Monitor Area



- ③⑨ **VOL knob**
Rotate to adjust the playback volume for the speakers or earphones.
- ④⑩ **PHONE jack**
Insert the plug of any separately purchased earphones using a mini plug here.
- ④① **MIC jack**
Insert the supplied microphone plug here.
The lamp at the bottom right lights according to the sound input.
- ④② **MONITOR**
The channel of the measuring unit displayed on the LCD screen is output.

Inside the Front Panel

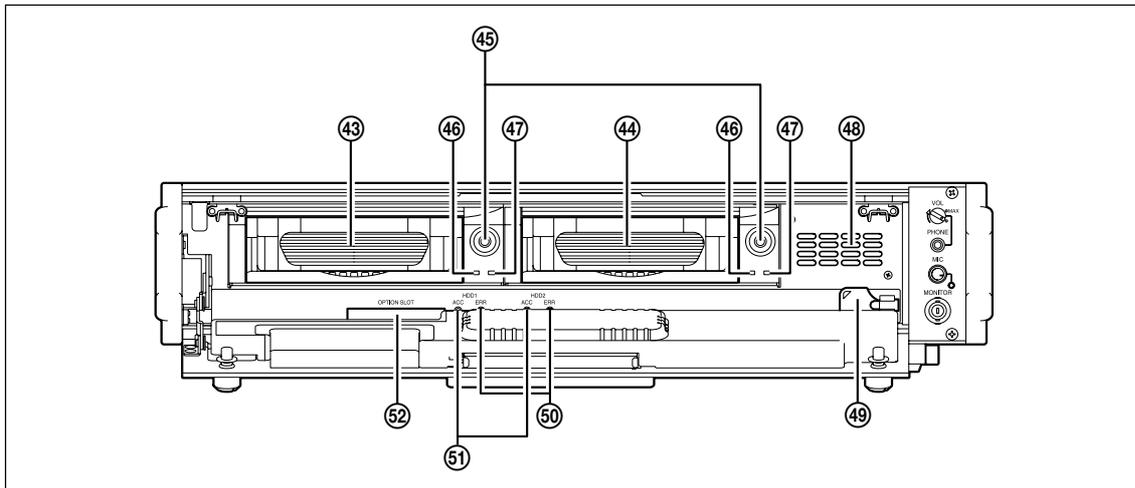
When the two lock knobs on the front panel are set to **RELEASE**, the front panel can be opened.

When the front panel is opened, the recording unit cannot switch to **REC** mode.

CAUTION

Do not open the front panel when the hard disk (HDD) is being accessed during recording, playback, or other operations.

When the front panel is opened during recording or playback, a continuous warning sound is made.



④③ HDD1

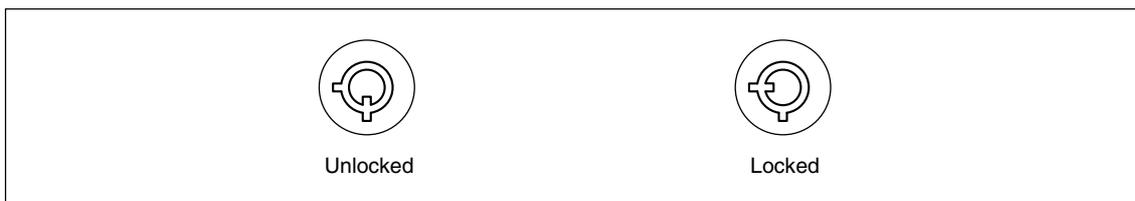
Stores the recorded data.

④④ HDD2

Stores the recorded data. It is a mirror disk of HDD1.

④⑤ HDD keyholes

These are the HDD keyholes. The supplied HDD key is used to lock or unlock the HDD compartments such as when replacing the hard disks.



④⑥ HDD power lamp

If the HDD compartment is locked when the power is on, the lamp is lit green. If it is unlocked, the HDD power is turned off, and the lamp turns off.

④⑦ HDD access lamp

Blinking orange: HDD is being accessed

CAUTION

To eject the HDD, first set to **STOP** mode, and then check that the HDD access lamp is turned off. The HDD can be damaged if you unlock the HDD while the HDD access lamp is turned on.

④⑧ **Speaker**

Used to playback the sound of monitor channel or voice channel.

④⑨ **HDD key**

Used for locking and unlocking the HDD.

⑤⑩ **Recording media error lamps**

Lit red when an error occurs in HDDs.

Lamp status	Main error cause	Error recovery method
Blinking	A discrepancy has occurred in the HDD1 and HDD2 data.	<ul style="list-style-type: none"> • RAID rebuild • HDD initialization • HDD replacement
Lit	An error occurred during HDD access.	<ul style="list-style-type: none"> • HDD initialization • HDD replacement

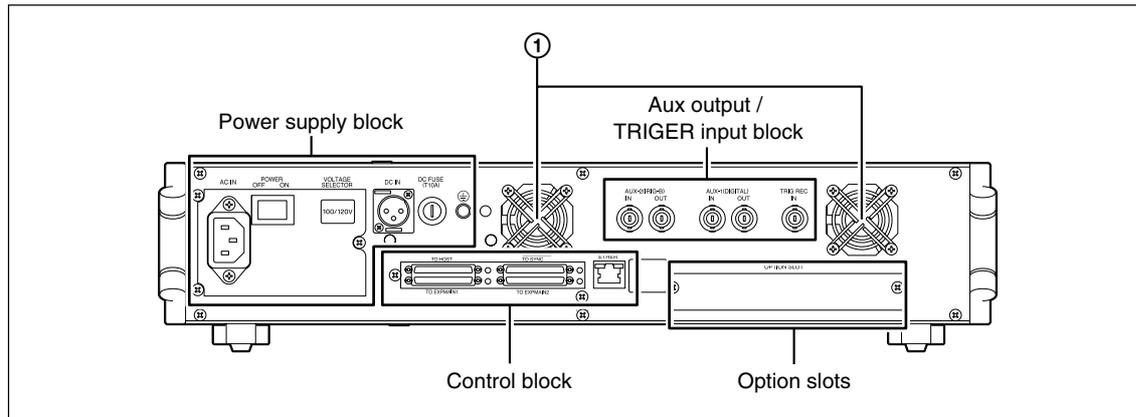
⑤⑪ **Recording media access lamps**

Lit green	The recording unit has recognized the recording media.
Blinking orange	The recording unit is accessing the recording media.

⑤⑫ **Option slot**

The recording unit settings are stores in a CF-type flash memory. The stored settings are used to make the various settings of the recording unit.

3-1-2. Rear Panel



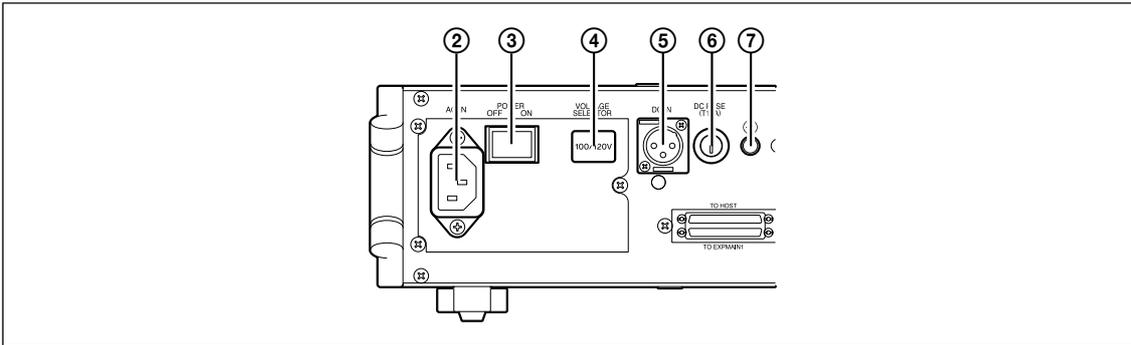
① Ventilation fans

These fans cool the inside of the recording unit.

⚠ WARNING

- To prevent the inside of the recording unit from overheating, do not block the air outlet.
- Leave a space of at least 100 mm between the rear side of the recording unit and any other object.

Power Supply Block



② AC IN

Used to supply external AC power to the recording unit.
Connect the supplied AC power cord.

③ POWER switch

Used to turn the main power of the recording unit on and off.

WARNING

Be sure to check that the recording unit is in standby mode before turning off the power. If the power is turned off during HDD operation, the HDD could be damaged.

④ AC voltage selector switch

Used to switch the AC power voltage.

Left side : 100/120 V (allowable 90 to 132 V)

Right side : 220/240 V (allowable 198 to 250 V)

CAUTION

- If using a voltage different from that printed on the sticker shown on the AC voltage selector switch, peel off the sticker and switch the selector to the side where the voltage is being used.
- The AC power cord has a safety earth. Be sure to connect the power cord to an earthed socket.

⑤ DC IN

Used to supply external DC power to the recording unit.
Connect the supplied DC power cord.

CAUTION

Be sure to supply voltage (DC 11 to 30 V) within the specified range.

⑥ DC fuse

This fuse is used to protect the DC power system.

CAUTION

When the fuse is blown, be sure to use the specified fuse of time-lag type with the following specifications:

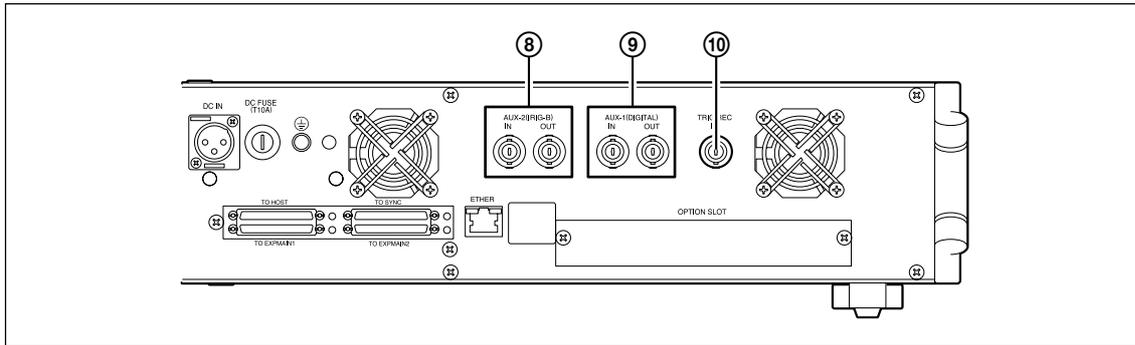
Rated current	10 A
Rated voltage	250 V
Size	5 ϕ 20L

Be sure to disconnect the DC power cord before replacing the fuse.

⑦ Ground terminal

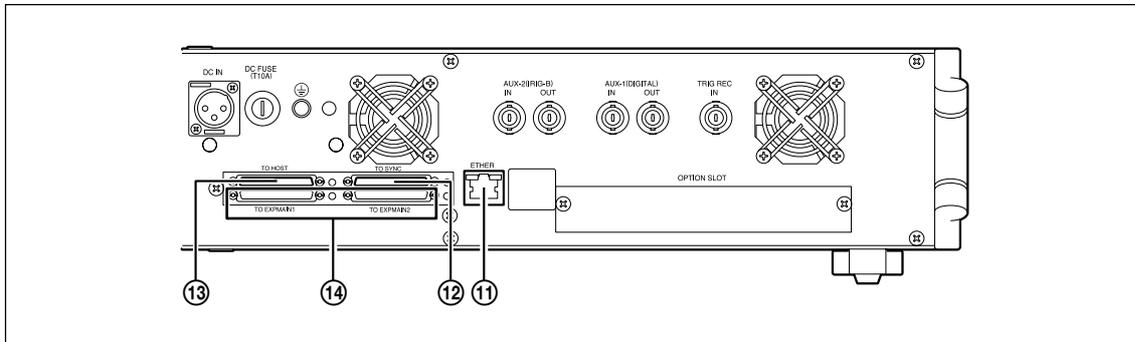
This is a ground terminal for the frame ground.

Aux Output / TRIGGER Input Block



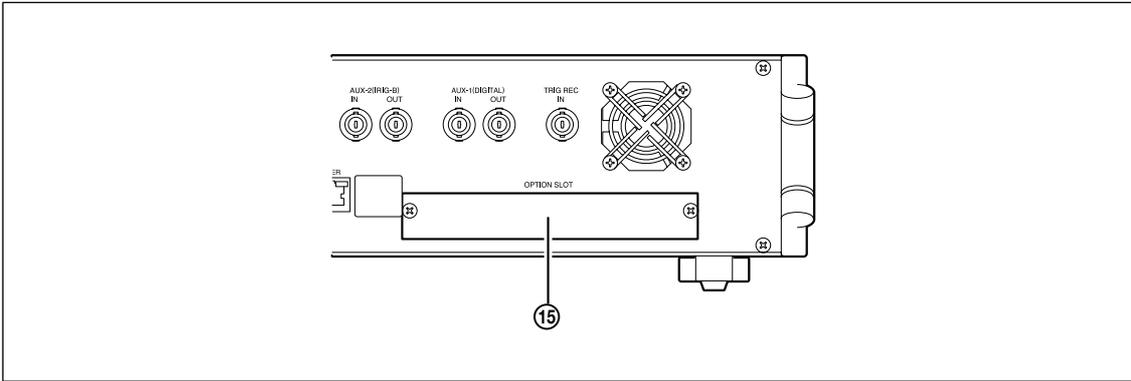
- ⑧ **AUX-2 (IRIG-B) IN/OUT**
Used to input (IN) and output (OUT) IRIG-B data.
- ⑨ **AUX-1 (DIGITAL) IN/OUT**
Used to input (IN) and output (OUT) AUX digital channel data.
- ⑩ **TRIG REC IN connector**
Used to input the trigger for trigger recording.

Control Block



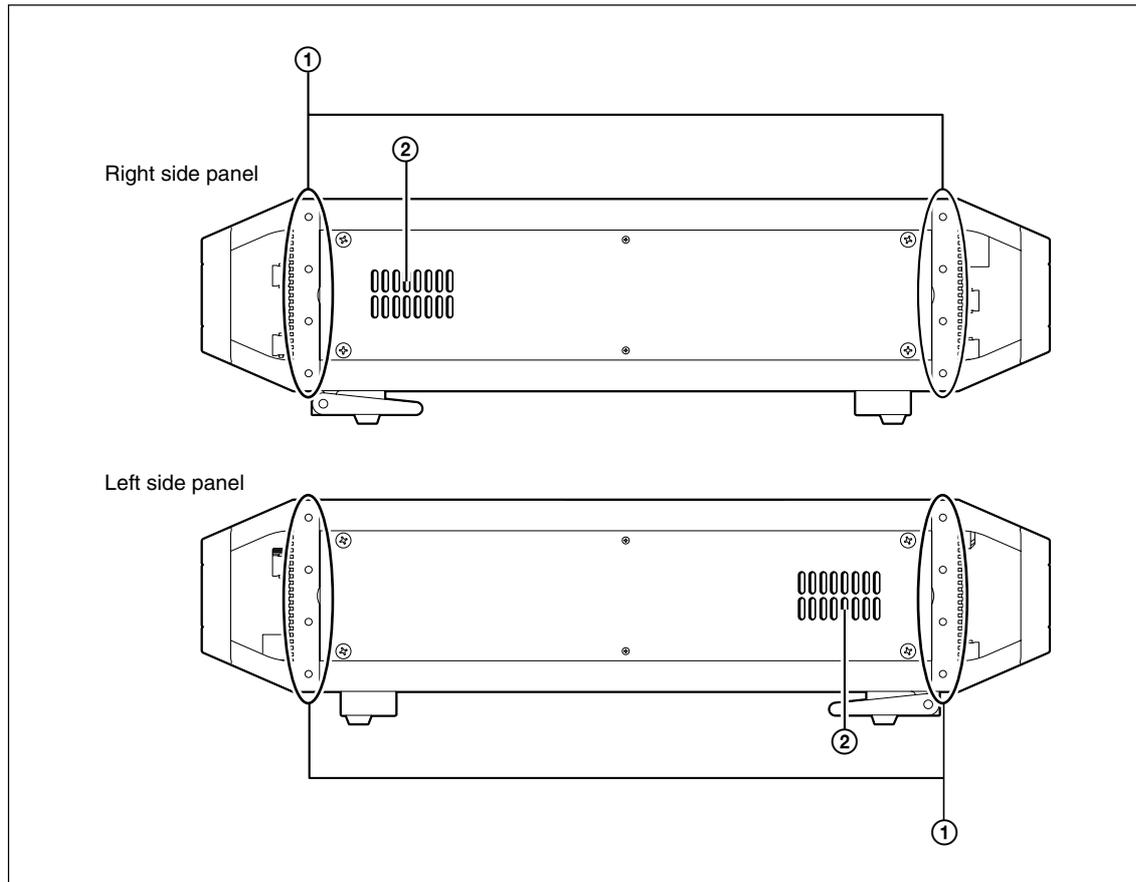
- ⑪ **ETHER connector**
Used to control the recording unit from a remote computer.
- ⑫ **TO SYNC connector**
Used to synchronously operate multiple recording units.
- ⑬ **TO HOST connector**
Used to control the recording unit from a host computer.
- ⑭ **TO EXPMAIN1/TO EXPMAIN2 connector**
Used to connect the measuring units.

Option Slots



- 15 Option slot**
Insert optional boards here.

3-1-3. Side Panels



① Measuring unit connection holes

Used to connect the measuring units.

Used to secure the shock mount adaptor.

② Ventilation slits

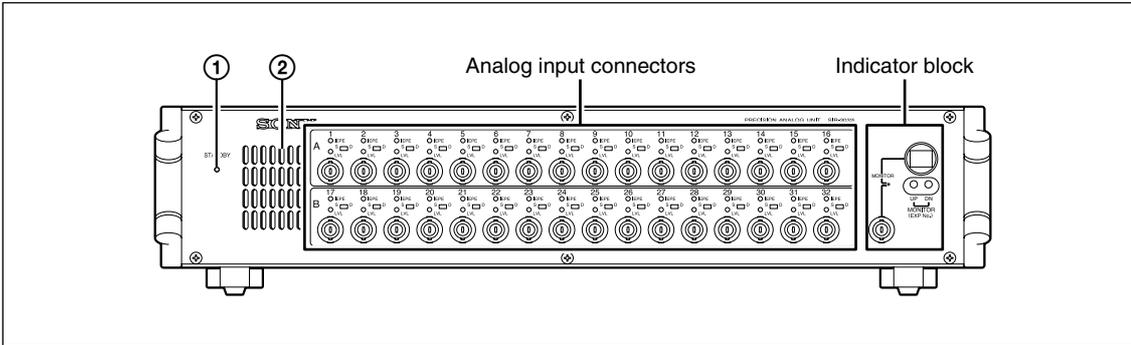
These slits are used to take in air to cool the inside of the recording unit.

⚠ WARNING

- To prevent the inside of the recording unit from overheating, do not block the ventilation slits.
- Do not place hot objects on the right and left side of the recording unit.
- Leave a space of at least 50 mm between the right and left sides of the recording unit and any other object.

3-2. SIR-3032i/W (Measuring Unit)

3-2-1. Front Panel



① Standby lamp

Off	Stopped mode
Lit orange	Standby mode
Lit green	Operating mode

② Ventilation slits

These slits are used to take in air to cool the inside of the measuring unit.

⚠ WARNING

To prevent the measuring unit from overheating, do not block the ventilation slits.

Analog Input Connectors

The analog input block consists of channel groups of A (top row) and B (bottom row).

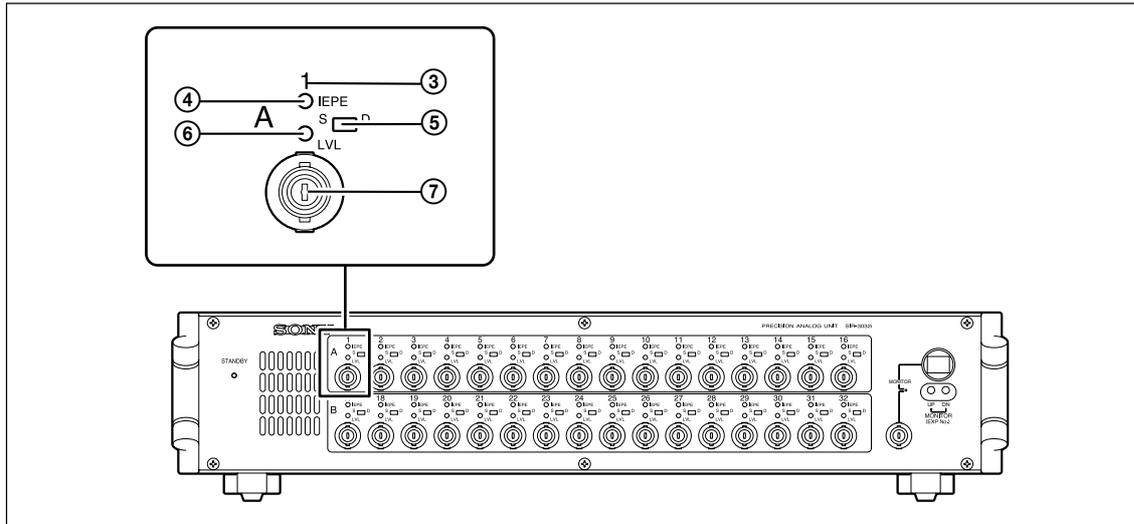
Each channel group corresponds to channels below.

A : Channels 1 to 16

B : Channels 17 to 32

The LCD screen bar meters of the recording unit are displayed for A or B of the analog input connectors.

You can check whether the A or B is displayed by viewing the measuring unit number display area of the recording unit.



③ Input channel number

Displays the channel of the analog input connectors.

When there are multiple measuring units, the channels are put in order starting from the smallest measuring unit number.

<Example> Channel assignments for two 32-channel measuring units

Unit 1 : Channels 1 to 32

Unit 2 : Channels 33 to 64

④ IEPE lamp

When the input channel is set to IEPE (IEPE or TEDS), the lamp lights green.

CAUTION

Be sure to make the input format setting while a signal source is not connected to the INPUT connector of the unit.

Use of IEPE inputs* may damage the signal source as 24 V power is supplied to the INPUT connector.

* IEPE input format: The input format for using a sensor with built-in the pre-amplifier (IEPE type). In this unit, either TEDS mode, which acquires the TEDS data, or IEPE mode, which doesn't acquire TEDS data, can be selected.

⑤ S/D selector switch

Sets the transmission format in the analog input block.

S : Single-ended

D : Differential

⑥ **LVL lamp**

Displays the status of the signal input.

Off	No input signal.
Lit green	Signal is input from 5 to 100 %
Lit orange	Signal is input from 100 to 133 %
Lit red	Signal exceeds the range.

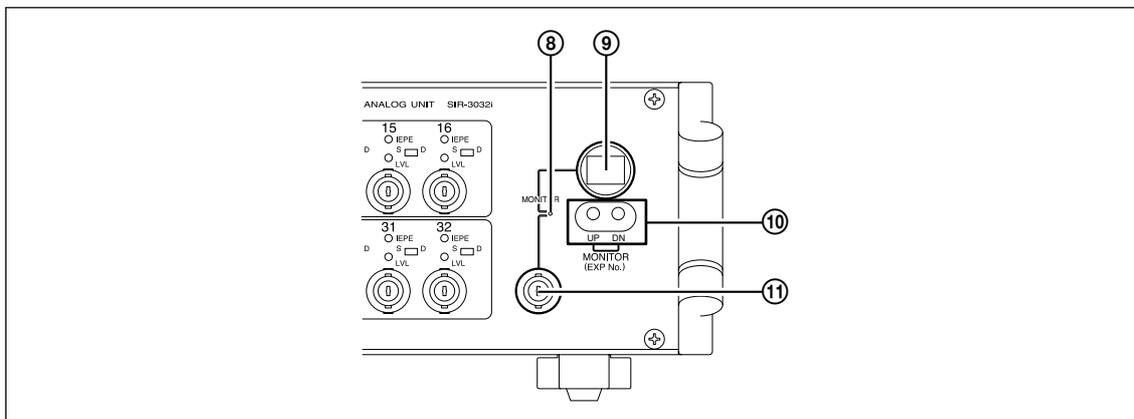
⑦ **INPUT connector**

Used to input analog signals.

⚠ WARNING

- Be sure to input the specified voltage ± 13.3 Vpk.
- Do not supply input signals exceeding ± 50 Vpk, or the internal circuitry may be damaged.

Monitor Output Block



⑧ **Monitor lamp**

Displays the indicator display status.

- Lit green : The monitor channel is displayed on the indicator.
- Lit orange : The recording unit has selected the measuring unit as the monitor channel while the monitor channel is displayed on the indicator.
- Off : A measuring unit number (EXP No.) is displayed on the indicator.

⑨ **Indicator**

Displays the measuring unit status.

- Power on : Measuring unit number (EXP No.) (3 seconds)
- Normal : Number of channel currently being monitored
- EXP No. setting : The ⑧ monitor lamp is turned off when the measuring unit number (EXP No.) is displayed.
- Error occurred : Error number

⑩ **Setting button**

Used to set the monitor channel and measuring unit number (EXP No.).

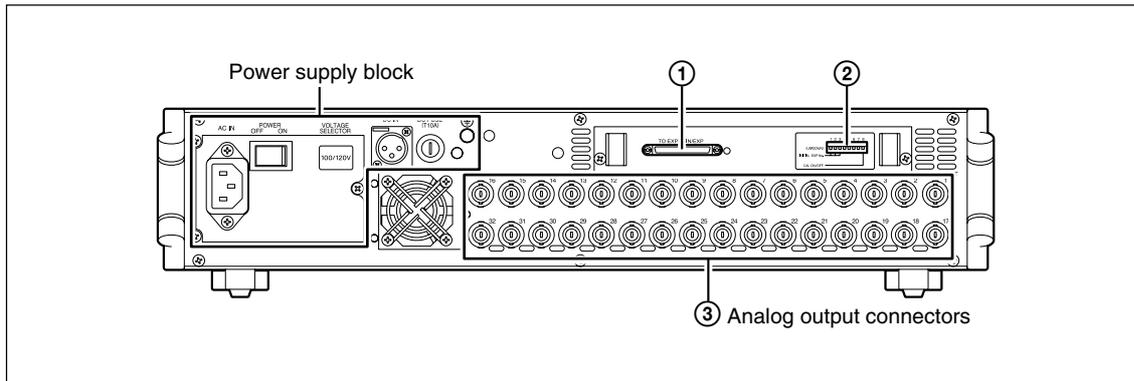
The number displayed on the indicator is incremented or decremented (UP: Increment, DN: Decrement). Press the UP button and DN button at the same time to switch to the EXP No. display where the measuring unit number setting can be made. When connecting several measuring units, set the measuring unit number starting with "1" and incrementing up by one every time a measuring unit is added.

If the setting button is not pressed within three seconds after the EXP No. display is displayed, it changes back to the monitor channel display.

⑪ **Monitor output**

Outputs the channel number displayed on the indicator from the analog channel output in the measuring unit.

3-2-2. Rear Panel



① TO EXPMAIN/EXP connector

Used to connect with a recording unit or SIF-3004 (measuring unit expansion board).

② DIP switches

These switches are used to make measuring unit settings.

SW1 to SW3 : These set the initial EXP No. of the measuring unit.

SW 1	2	3	EXP No.	Maximum number of effective channels
OFF	OFF	OFF	1	32
ON	OFF	OFF	2	64
OFF	ON	OFF	3	128
ON	ON	OFF	4	128
OFF	OFF	ON	Reserve	Reserve
ON	OFF	ON	Reserve	Reserve
OFF	ON	ON	Reserve	Reserve
ON	ON	ON	Reserve	Reserve

SW4 to SW8 : Disabled

SW8 : This sets the calibration function.

DISABLE: Disables the calibration function.

ENABLE : Enables the calibration function (factory setting).

③ OUTPUT connectors

Used to output analog signals.

Connect BNC cables (sold separately) to the corresponding connectors.

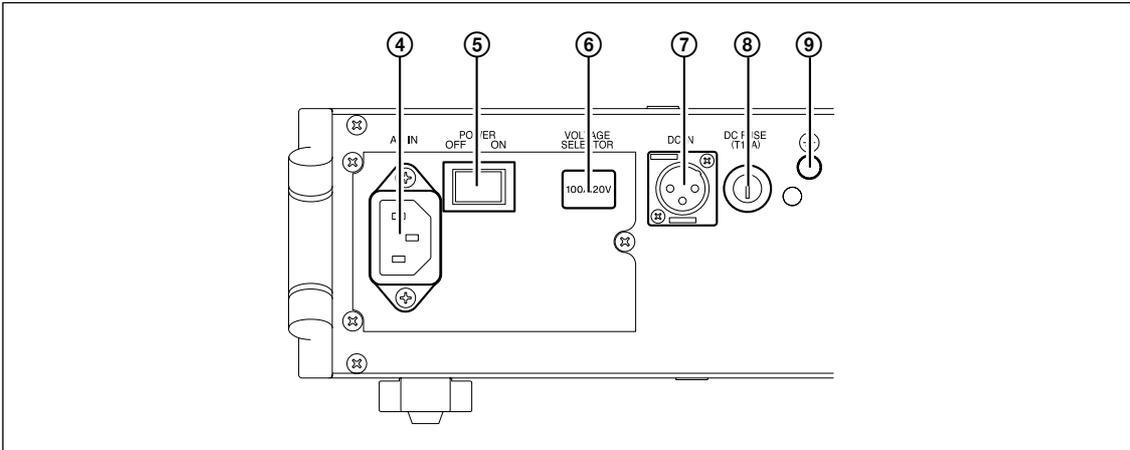
When there are multiple measuring units, the channels are put in order starting from the smallest EXP No.

<Example> Channel assignments for two 32-channel measuring units

EXP No. 1 : Channels 1 to 32

EXP No. 2 : Channels 33 to 64

Power Supply Block



④ AC IN connector

Used to supply external AC power to the measuring unit.
Connect the supplied AC power cord.

⑤ POWER switch

Used to turn the power on and off.

⑥ AC voltage selector switch

Used to switch the AC power voltage.

Left side : 100/120 V (allowable 90 to 132 V)

Right side : 220/240 V (allowable 198 to 250 V)

⚠ CAUTION

- If using a voltage different from that printed on the sticker shown on the AC voltage selector switch, peel off the sticker and switch the selector to the side where the voltage is being used.
- The AC power cord has a safety earth. Be sure to connect the power cord to an earthed socket.

⑦ DC IN connector

Used to supply external DC power to the measuring unit.
Connect the supplied DC power cord.

⚠ CAUTION

Be sure to supply voltage (DC 11 to 30 V) within the specified range.
If the voltage exceeds 34 V, the hyper voltage protection circuit works and the DC fuse blows.

⑧ DC fuse

This fuse is used to protect the DC power system.

⚠ CAUTION

When the fuse is blown, be sure to use the specified fuse of time-lag type with the following specifications:

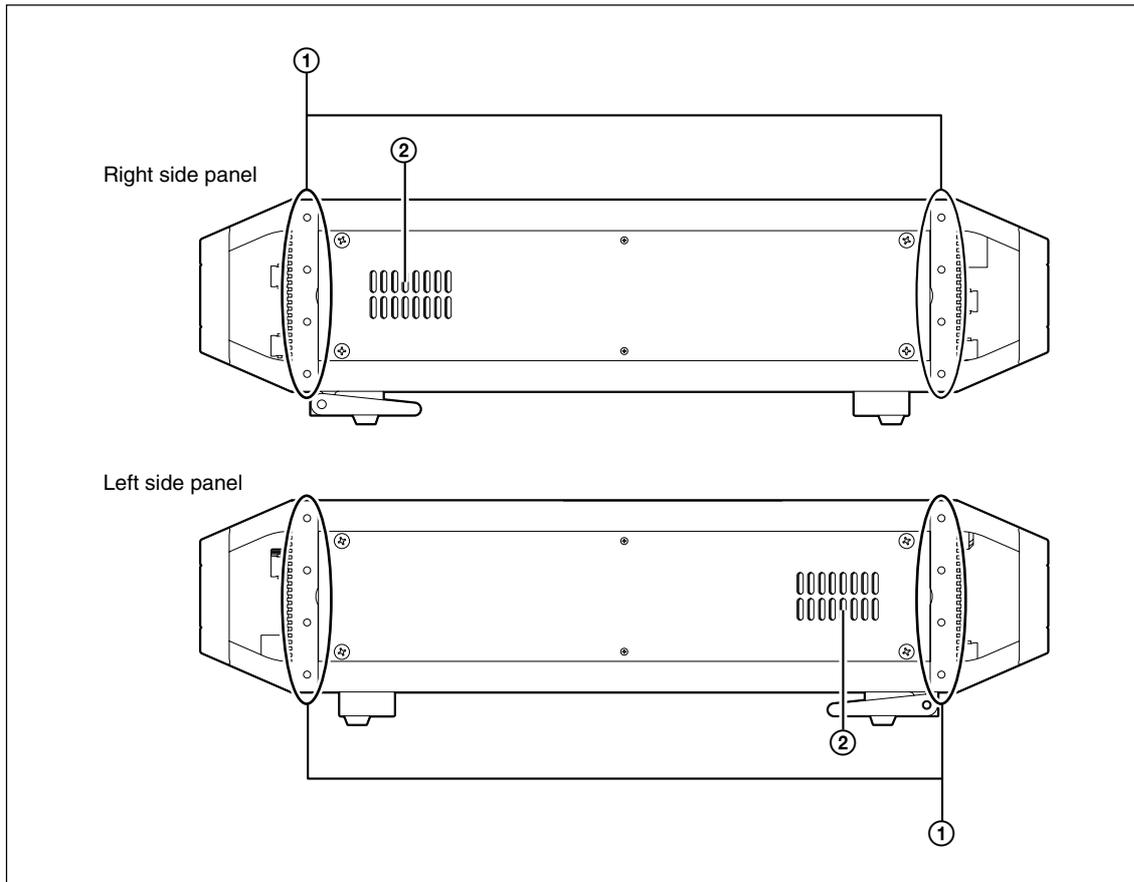
Rated current	10 A
Rated voltage	250 V
Size	5 ϕ 20L

Be sure to disconnect the DC power cord before replacing the fuse.

⑨ Ground terminal

This is a ground terminal for the frame ground.

3-2-3. Side Panels



① Recording unit/Measuring unit connection holes

Used to connect the recording units or measuring units.

Used to secure the shock mount adaptor.

② Ventilation slits

These slits are used to take in air to cool the inside of the measuring unit.

⚠ WARNING

- To prevent the inside of the measuring unit from overheating, do not block the ventilation slits.
- Do not place hot objects on the right and left side of the measuring unit.
- Leave a space of at least 50 mm between the right and left sides of the measuring unit and any other object.

4. Preparations

4-1. Connecting the Power Supply

4-1-1. AC Power Supply

⚠ WARNING

Be careful to use the correct voltage since usage of an incorrect voltage can lead to a fire or failure of the unit.

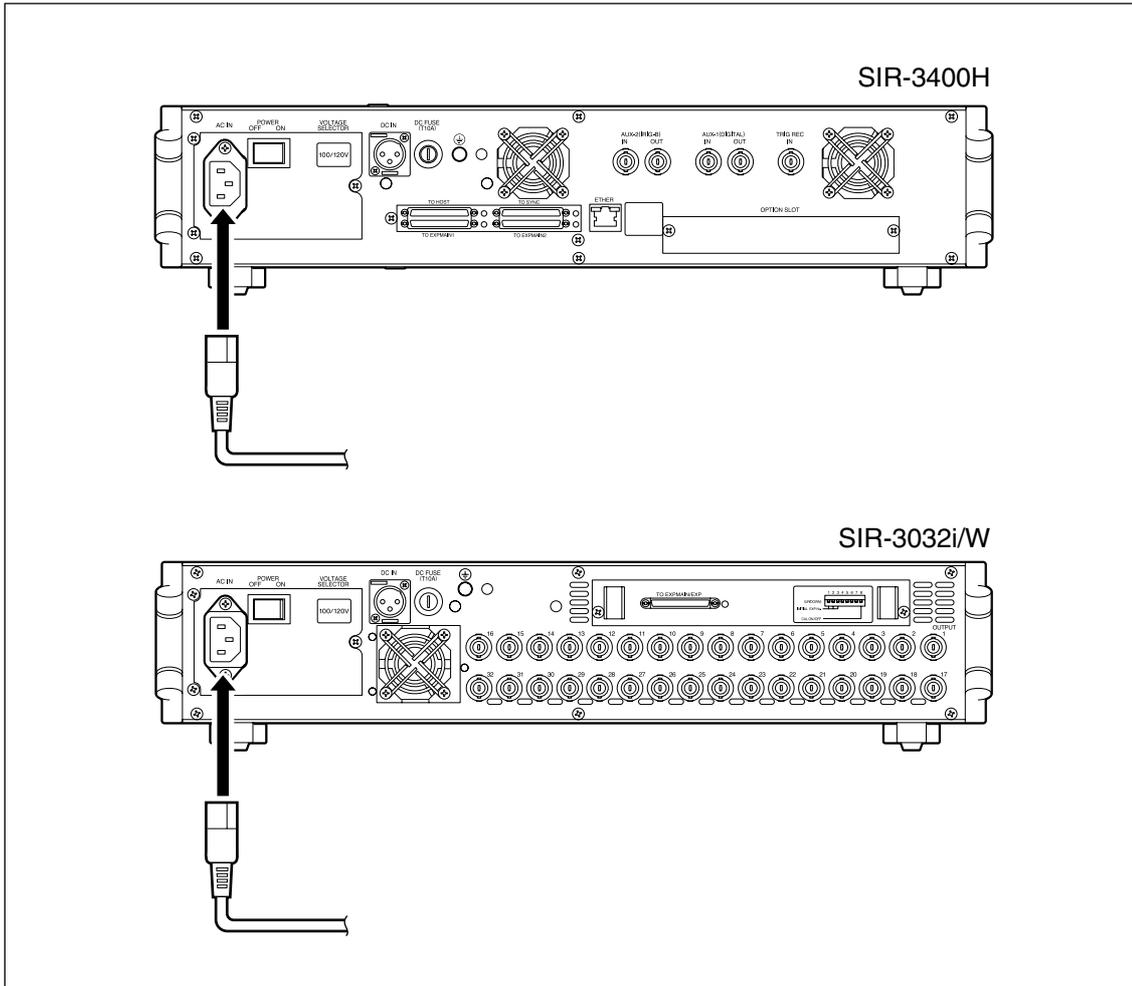
At shipping, the AC voltage is set to either 100/120 V or 220/240 V. The setting is displayed on the sticker on the AC voltage selector switch. If you peel off the sticker and change the voltage, be sure to always re-check the usage voltage before using.

CAUTION

- When the AC voltage selector switch is set to AC 100/120 V, supplying AC 198 to 250 V may damage the recording unit's internal circuitry.
- When the AC voltage selector switch is set to AC 220/240 V, the recording unit will not operate when supplied with AC 90 to 132 V.
- The AC power cord has a safety earth. Be sure to connect the power cord to an earthed socket.
- When using a plug adaptor (3-pin to 2-pin) for the AC power cord, be sure to connect the green wire to earth.
- Make sure that spike noise is not included when taking AC power from an inverter, etc.
- The internal backup battery is charged whenever the POWER switch is set to ON regardless of whether the unit is in standby mode.

4. Preparations

- 1 Check that the AC voltage setting is correct for the voltage that is used.
- 2 Connect the AC power cord (supplied) to the AC IN connector.
- 3 Supply the power.
When set to 100/120 V : 90 to 132 V AC
When set to 220/240 V : 198 to 250 V AC

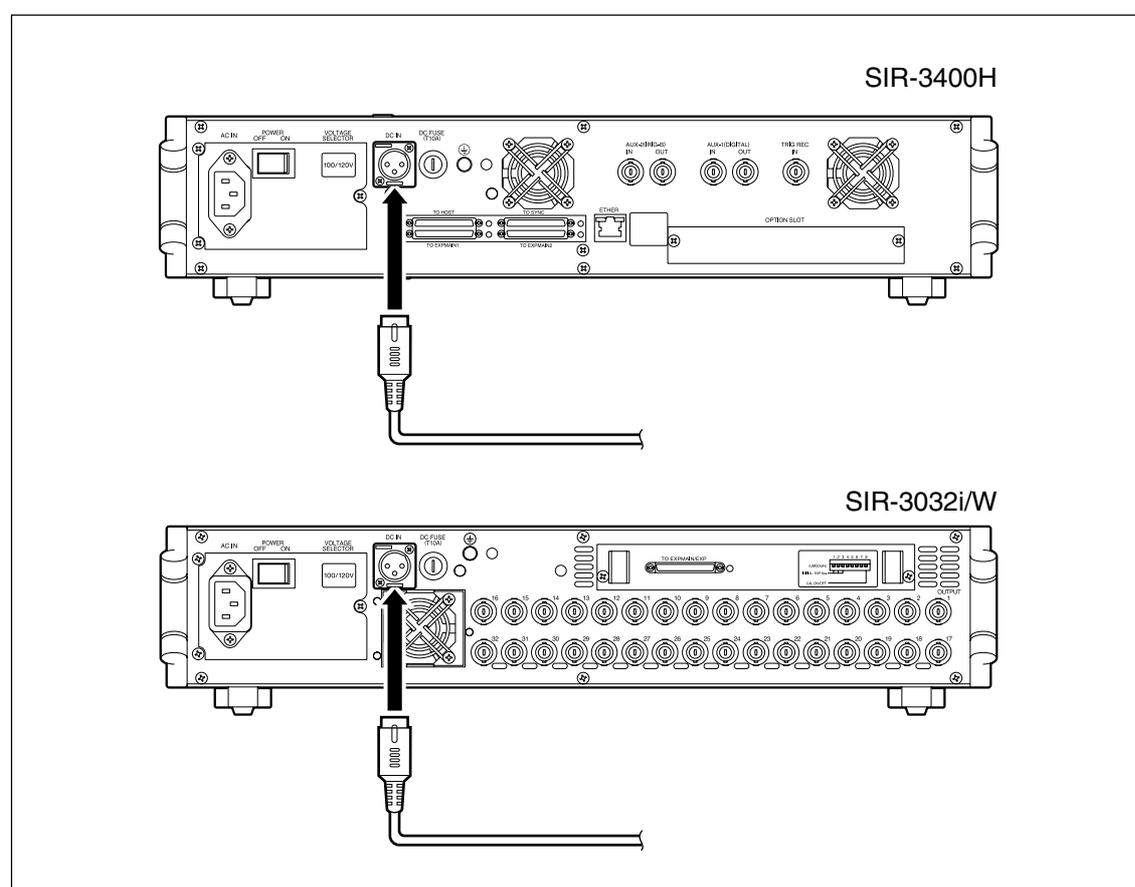


4-1-2. DC Power Supply

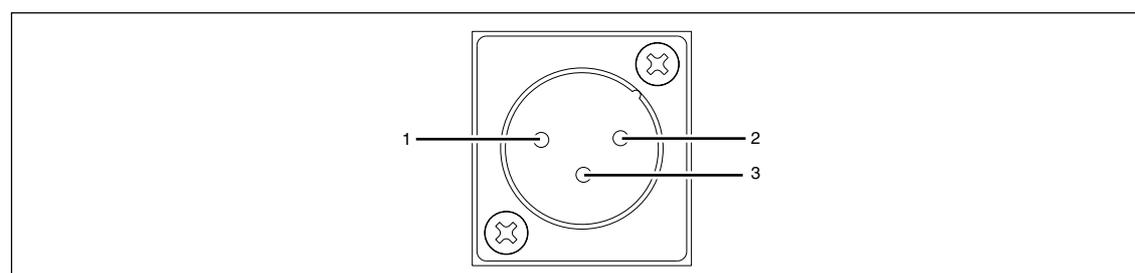
CAUTION

- When the recording unit is supplied from a specified AC power source, the AC power source takes priority.
- Be careful that the output voltage of the DC power supply does not exceed 30 V.
When the unit is used in low voltage, considering the voltage drop across the cable, keep the voltage so that the voltage at the DC IN connector terminal does not drop to lower than 11 V.
If the voltage exceeds 34 V, the hyper voltage protection circuit works and the DC fuse blows.
- When the DC power is fed to the unit, the unit may not become standby mode.
In this case, turn off the POWER switch on the rear of unit while feeding the DC power. And after leaving the unit for 10 seconds, turn on the POWER switch on the rear again.
When the unit is rack-mounted, the unit should be AC powered.

- 1 Connect the DC power cord (supplied) to the DC IN connector.
- 2 Connect the 12 V DC power supply (allowable 11 to 30 V)



The polarities of the DC power cord are red: positive and black: negative.
The connector pin assignment is Pin 1: positive, Pin 2: negative and Pin3: frame GND.



4-1-3. Internal Backup Battery

This unit cannot run only on the internal backup battery. The AC power supply or DC power supply must also be used at the same time.

CAUTION

When the recording unit is supplied from a specified external AC or DC power source, the external source takes priority.

Charging the internal backup battery

Charging can be done from either AC or DC input.

For details, see the table entitled “2-way Power Supply System” in section 1-2.

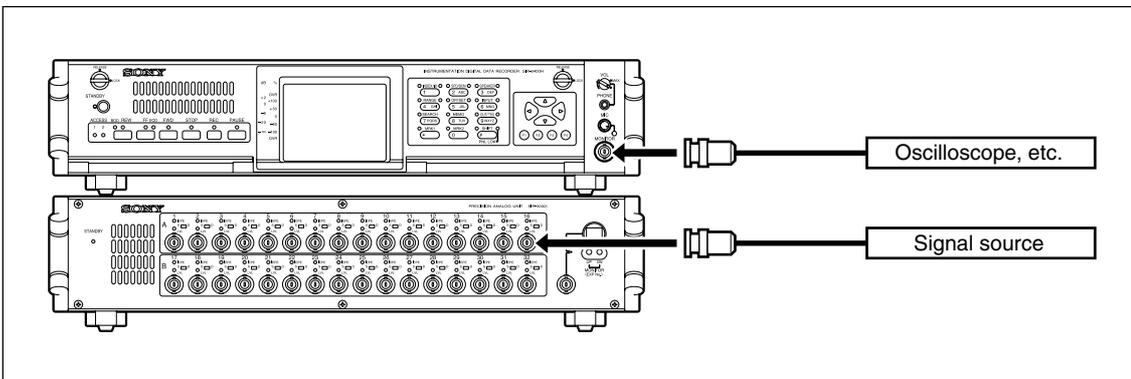
Charging time: Approx. 2.5 hours max.

4-2. Connecting the Signals

Connecting the Analog Data Signals

Using BNC cables (sold separately), connect the INPUT connector on the front panel to the analog signal source for each channel.

If necessary, use a BNC cable to connect the MONITOR connector to an oscilloscope or other measuring device.



WARNING

Do not supply input signals exceeding ± 50 Vpk, or the internal circuitry may be damaged.

CAUTION

- Keep the input voltage range via the INPUT connectors to within 13.3 Vpk.
- Do not simultaneously input signals with different ground levels during single end input.
- The input impedance is 100 k Ω .
- 24 V power is supplied to BNC cable when the recorder is set in E-E, REC-PAUSE or REC mode during IEPE input (IEPE or TEDS). Be sure to check the input format when connect a signal source to the INPUT connector.

4-3. Cartridges

4-3-1. Cartridges

To record, playback, and store data in the best condition, be sure to keep the following precautions.

Turning off the main power supply

CAUTION

Be sure to always follow the procedure below when turning off the main power. When the ACCESS lamp is lighting/blinking, if the unit is powered down with the POWER switch, it may lead to the HDD damage.

- 1 Check that the ACCESS lamp on the front panel is turned off.
- 2 Press the Standby key.
- 3 Set the POWER switch on the rear panel to OFF.

Cartridges compatible with the SIR-3400H

SMH cartridge

4-3-2. Loading a Cartridge

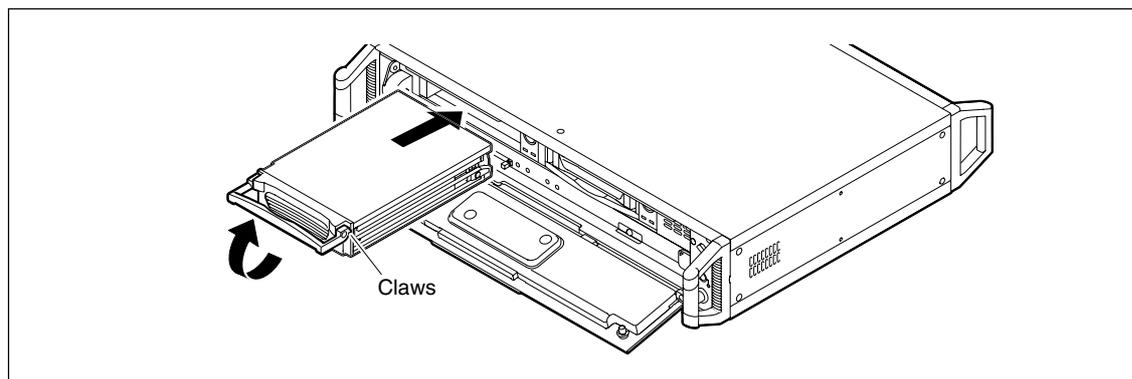
- 1 Press the Standby key to turn on the power.
- 2 Confirm that the lamp at the left side of standby key on the front panel lights.
- 3 When the right and left lock knobs on the front panel are set to RELEASE, the front panel can be opened.
- 4 Before inserting the SMH cartridge, ensure that the HDD key is unlocked.



- 5 Insert the SMH cartridge all the way inside while lifting the handle upward. When the cartridge is all the way inside, lower the handle to secure the cartridge.

CAUTION

DO NOT insert the cartridge as far as it goes with the handle lowered. It may lead to the damage of claws.

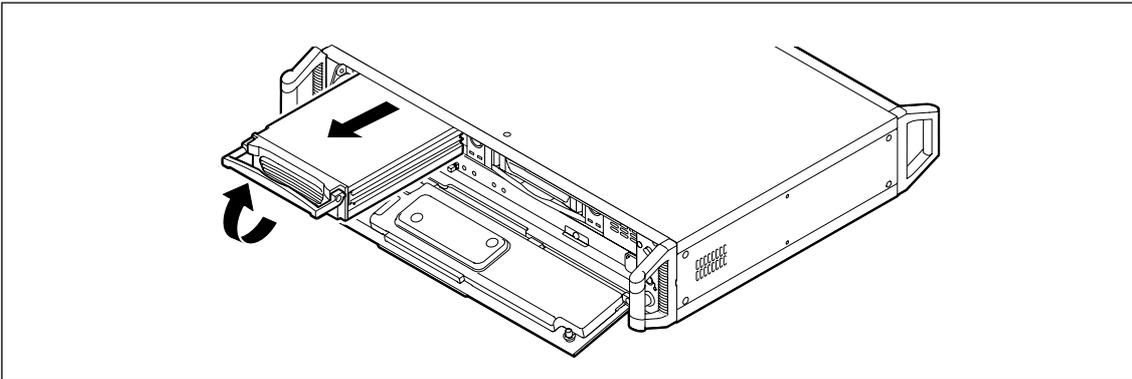


4. Preparations

- 6** Turn the HDD key clockwise.
This locks the cartridge, and turns on the HDD power.
When the power is turned on, the HDD power lamp next to the cartridge turns on.
When the HDD is recognized normally : The recording media access lamp is lit green.
When an error occurred with the HDD : The recording media error lamp is lit red.
- 7** Close the front panel. Set the right and left lock knobs on the front panel to LOCK, and check that the front panel is closed properly.

4-3-3. Ejecting the Cartridge

- 1** Check that the transport mode is set to STOP mode. (See section 5-1.)
- 2** Check that the ACCESS lamp on the front panel is lit green.
CAUTION
Access to the HDD is in progress if the ACCESS lamp is lit orange.
If the front panel is opened during access to the HDD, a warning sound is made. Be sure that access to the HDD is completed before proceeding.
- 3** Set the right and left lock knobs on the front panel to RELEASE, and then open the front panel.
- 4** Check that the internal recording media access lamp is lit green.
- 5** Turn the HDD key counter-clockwise.
This unlocks the cartridge and turns off the HDD power.
- 6** Pull out the SMH cartridge while pulling the handle forward.



- 7** Close the front panel. Set the right and left lock knobs on the front panel to LOCK, and check that the front panel is closed properly.

4-4. Diagnostics

Before performing the operations described in the following chapters, perform the diagnostics to make sure that the recording unit is functioning correctly.

Diagnostics : HDD recording/playback check, Recording/playback amplifier check

Required time : Approx. 1 min.

During the diagnostics, the recording unit actually records a signal on the cartridge and plays it back. Be sure to insert the cartridge before performing the diagnostics.

For the diagnostics procedure, see “14-7. Executing Diagnostics (Diagnostics)”.

4-5. Calibration

This measuring unit was calibrated prior to shipment, and these settings are stored in memory. While frequent calibration is unnecessary, the measuring unit should be calibrated a few times a year if necessary.

- To perform calibration, first enable calibration using the DIP switches on the rear of the measuring unit. (See section 3-2-2.) Calibration cannot be performed if the calibration function is disabled with the DIP switches.
- After the power is turned on, wait at least 15 minutes before performing calibration.
- Perform calibration in the environment where it will actually be used.
- If you stop calibration before it is completed, turn the power off and then on again before using.

For the calibration procedure, see “14-5. Executing Calibration (Calibration)”.

4-6. Required Settings Before Recording

Before starting to record data, be sure to set the following items:

- Setting the Recording Unit Clock (section 11-1)
- Setting the Recording/Playback Speed (section 12-3)
- Setting the Number of Recording Channels (section 12-4)
- Setting the Input Range (section 12-5)
- Setting the Input DC Offset (section 12-6)
- Setting the Input Format (section 12-7)
- Setting the Test Signal (section 12-11)

If necessary, make other settings based on section 6 to 14.

CAUTION

24 V power is supplied to BNC cable when the recording unit is set in E-E, REC-PAUSE or REC mode during IEPE input (IEPE or TEDS). Be sure to check the input format when connect a signal source to the INPUT connector.

In order to stabilize the DC bias of the IEPE sensor, make a recording after warming up the unit sufficiently with E-E mode.

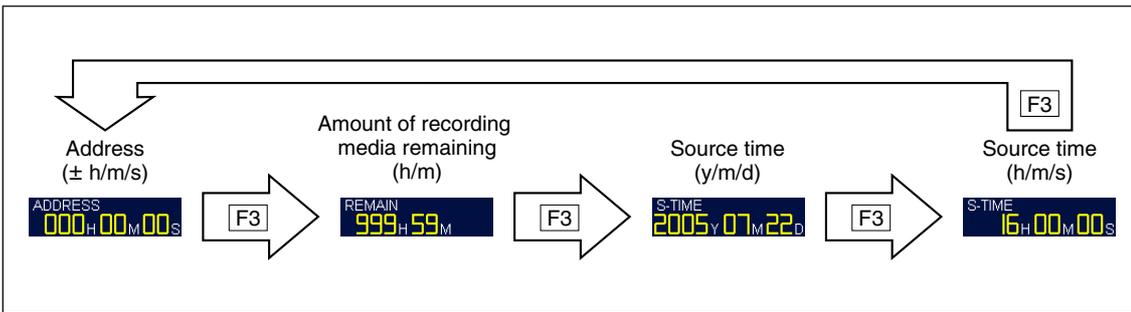
4-7. Source and Record

If the media position information or amplifier setting information is altered in the STOP mode, the mode automatically changes to the source mode.

4-7-1. Source

When the unit is in the E-E, REC-PAUSE, or REC mode, or is stopped from one of these modes, it automatically switches to the source mode. In this mode, source data (values set in the recording unit) is displayed for the media position information (address, and real-time clock) and the amplifier setting information (input range value, input DC offset value, and output level value).

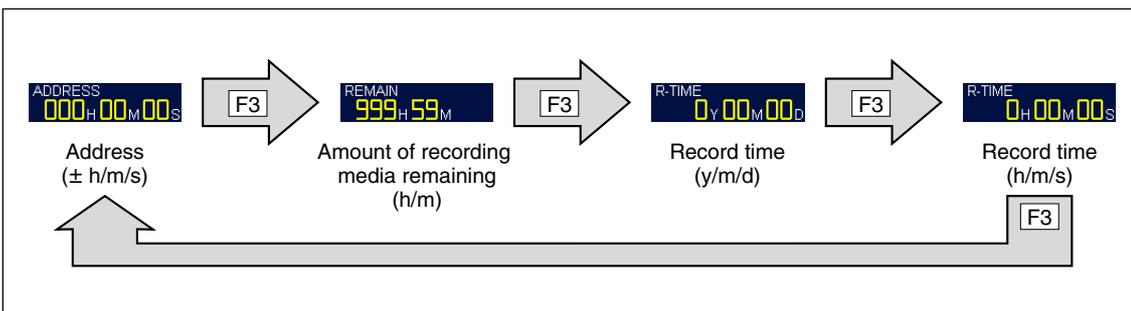
In the source mode, press the F3 key to sequentially change the contents displayed as follows.



4-7-2. Record

When the unit is in the FWD mode, or is stopped from FWD mode, it automatically switches to the record mode. In this mode, record information on the media (values recorded) is displayed for the media position information (ID number, address, and real-time clock) and the amplifier setting information (input range value, input DC offset value, and output level value).

In the record mode, press the F3 key to sequentially change the contents displayed as follows.

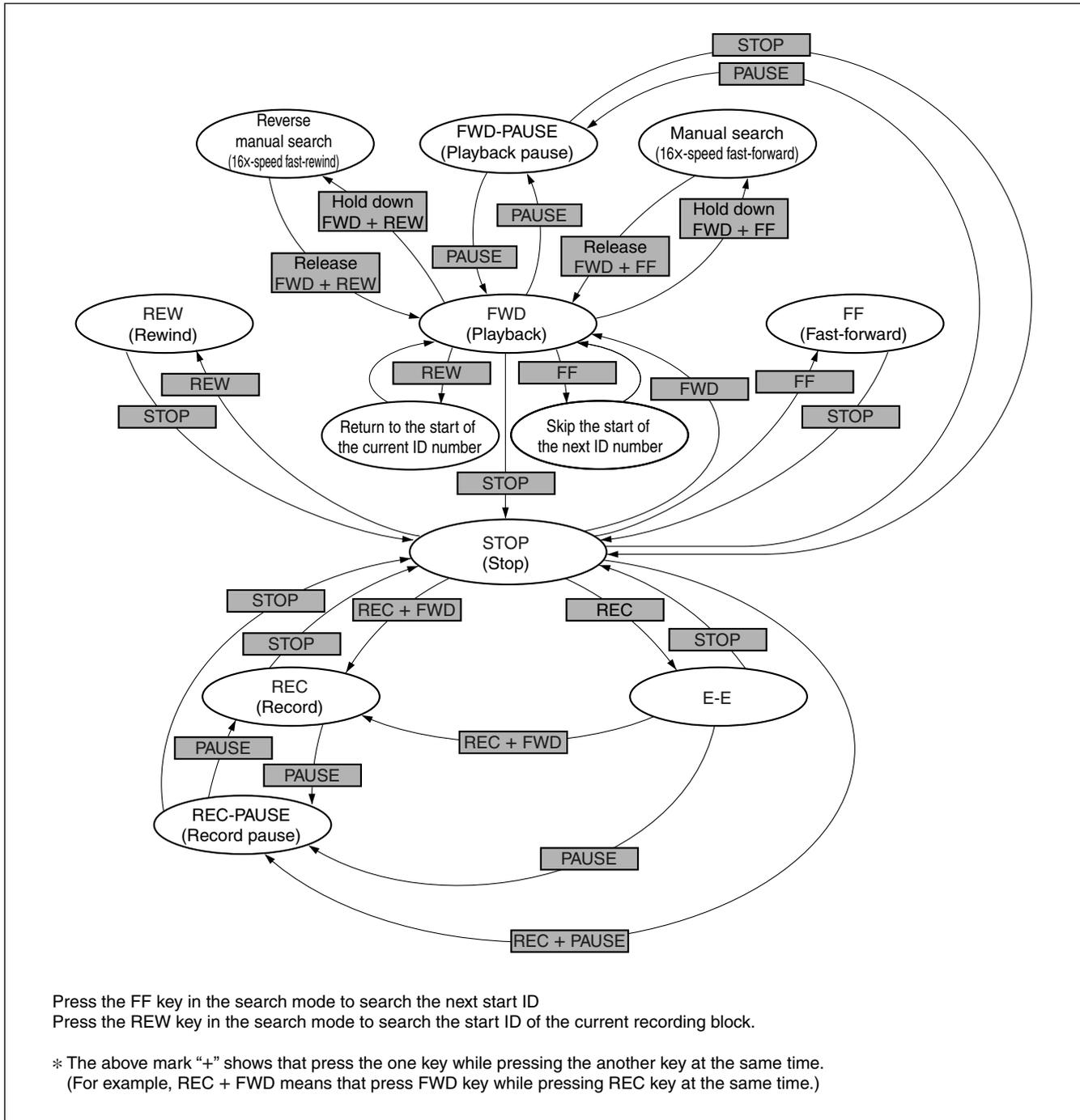


5. Description of Transport Mode

5-1. Transport Modes

Mode name	Description	Lit lamp (over key)
STOP	This is stopped status. This is the mode entered when the power for the recording unit is turned on. Be sure to set to this mode before turning off the power.	STOP
E-E	This mode is for adjusting the range and offset while checking the signal on the screen before actual recording.	REC
REC	This mode is for recording the data to recording media. Monitoring can also be performed at the same time.	REC, FWD
REC-PAUSE	This mode pauses REC mode. When the pause is cancelled, the ID is sent, and the next recording data is processed using the next ID number.	REC, FWD, PAUSE
FWD	This plays back the data recorded on the recording media.	FWD
FWD-PAUSE	This mode pauses the FWD mode. When the pause is cancelled, playback starts from the data at that point.	FWD, PAUSE
FF	This fast-forwards data playback.	FF
REW	This rewinds data playback.	REW
ID skip	This searches and plays back the start of the current or next ID block.	
SEARCH	This performs a search. The following searches are available. (See "16. Search.")	
Start ID search	This searches the ID at the start position for each recording.	
ID/INDEX number search	This sets the ID/INDEX number and searches the start.	
Mark search	This searches the Mark1/Mark2 that were marked in the recording media.	
Address search	This searches designated addresses (controlled by Telnet).	
Real-time clock search	This searches the specified real-time clock value written on the recording media (controlled by Telnet).	
Manual search	This performs 16x-speed fast-forwarding or fast-rewind.	

5-2. Operation Transition Diagram



Press the FF key in the search mode to search the next start ID
 Press the REW key in the search mode to search the start ID of the current recording block.

* The above mark "+" shows that press the one key while pressing the another key at the same time.
 (For example, REC + FWD means that press FWD key while pressing REC key at the same time.)

5-3. Transport Mode Transition Table

* The above mark “+” shows that press the one key while pressing the another key at the same time.

(For example, REC + FWD means that press FWD key while pressing REC key at the same time.)

Current mode	Key pressed next							
	STOP	REC	REC + PAUSE	REC + FWD	PAUSE	FWD	FF/REW	FWD + FF/REW
STOP	—	E-E	REC-PAUSE	REC	FWD-PAUSE	FWD	FF/REW	Manual search
E-E	STOP	—	REC-PAUSE	REC	REC-PAUSE	—	—	—
REC-PAUSE	STOP	—	REC	REC	REC	—	—	—
REC	STOP	—	—	—	REC-PAUSE	—	—	—
FWD-PAUSE	STOP	—	—	—	FWD	FWD	—	Manual search
FWD	STOP	—	—	—	PAUSE	—	ID search	Manual search
FF	STOP	—	—	—	—	FWD	—	Manual search
REW	STOP	—	—	—	—	FWD	—	Manual search
SEARCH	STOP	—	—	—	—	—	—	—

6. Setting and Check Items

6-1. Default Settings

CAUTION

Items described here as check items can only be checked.

6-1-1. Recording Unit Setting/Checking (Including Media Settings)

○: Setting enabled

The reference section for common Telnet functions is section 17-2, and so this reference was omitted except for independent functions.

Setting	Default setting	Operation				Remarks	Reference section
		LCD screen	Key	Telnet	Panel		
Fan control	Off	○				For acoustic measurement and other situations where silence is needed	7-2-1
Condensation sensor	Off	○				Based on changes in the operating environment	7-2-2
Synchronization mode	Master	○				Based on changes in the operating environment	7-2-3
Frequency type	48 kHz series	○				Fixed at 48 kHz series	8-2-1
Auto repeat	Off	○		○		For setting at hard disk empty states	8-2-2
Overwrite	Off	○					8-2-3
Trigger mode	Single	○		○		For starting recording with an external signal	8-2-4
Pre-trigger recording	Off	○				For recording signals before the trigger	8-2-5
IRIG-B timecode	On	○				For using IRIG input	8-2-6
Response characteristics of the peak indicator	Realtime	○		○			9-2-1
Bar meter scale	%	○		○		For switching the bar meter indicator	9-2-2
LCD contrast	5	○				For adjusting the screen	9-2-3
LCD brightness	5	○				For adjusting the screen	9-2-4
Recording unit network	—	○					10-1
Setting the recording unit clock	—	○		○		Before recording	11-1
ID number	—		○	○		For adding IDs during recording	12-1
INDEX number	—		○			For adding INDEX during recording	12-2
Recording/Playback speed	1 (Normal)		○	○		For changing the speed	12-3
Number of recording channels	32 ch		○				12-4
Transmission format	S (Single-ended)				○ (Front)	For the IEPE input, set to the single ended input.	12-8
Recording memo	—		○	○		If needed during recording	12-9
Test signal	—		○	○		For recording test signals	12-11
Mark	—		○	○		If needed during recording	12-12
Changing to the address, amount of recording media remaining, or time display	—	○					13-1
Clearing the peak indicator and over indicator	On	○		○			13-2
Changing the speaker output	Voice annotations		○			When the speaker or earphone playback signal source is switched	13-3
Adjusting the playback volume	—				○ (Front)	Based on the operating environment	13-4
Changing the AC voltage	100/120 V or 200/240 V				○ (Rear)		13-5
Save of setting values/ Recall of setting values	—	○				For making batch settings with the default settings or with recording settings with a current address	14-1

Execution items

Setting	Default setting	Operation				Remarks	Reference
		LCD screen	Key	Telnet	Panel		
Panel lock	—		○	○		If necessary due to the operating environment or other conditions	12-13
Copying Mark1/Mark2	—	○		○		For editing data after recording	14-2
Formatting the hard disk drive	—	○		○		For using new media before recording	14-3
Repairing recording media discrepancies	—	○		○		When the media is corrupted, or a different media is inserted at one side	14-4
Calibration	—	○		○		If needed before recording	14-5
Bar meter auto adjustment	—	○					14-6
Diagnostics	—	○		○		If necessary after error display	14-7

Check items

Setting	Default setting	Operation				Remarks	Reference
		LCD screen	Key	Telnet	Panel		
Volume	—				○ (Front)		13-4
Recording media contents	—	○		○		After recording	14-8
Alarm status	—	○		○			17-2
Front panel status	—	○		○			17-2
Unit configuration	—	○		○			17-2
Command	—			○			17-2
Error	—	○		○			17-2
Signal level	—	○		○			17-2
Calibration	—	○		○			17-2

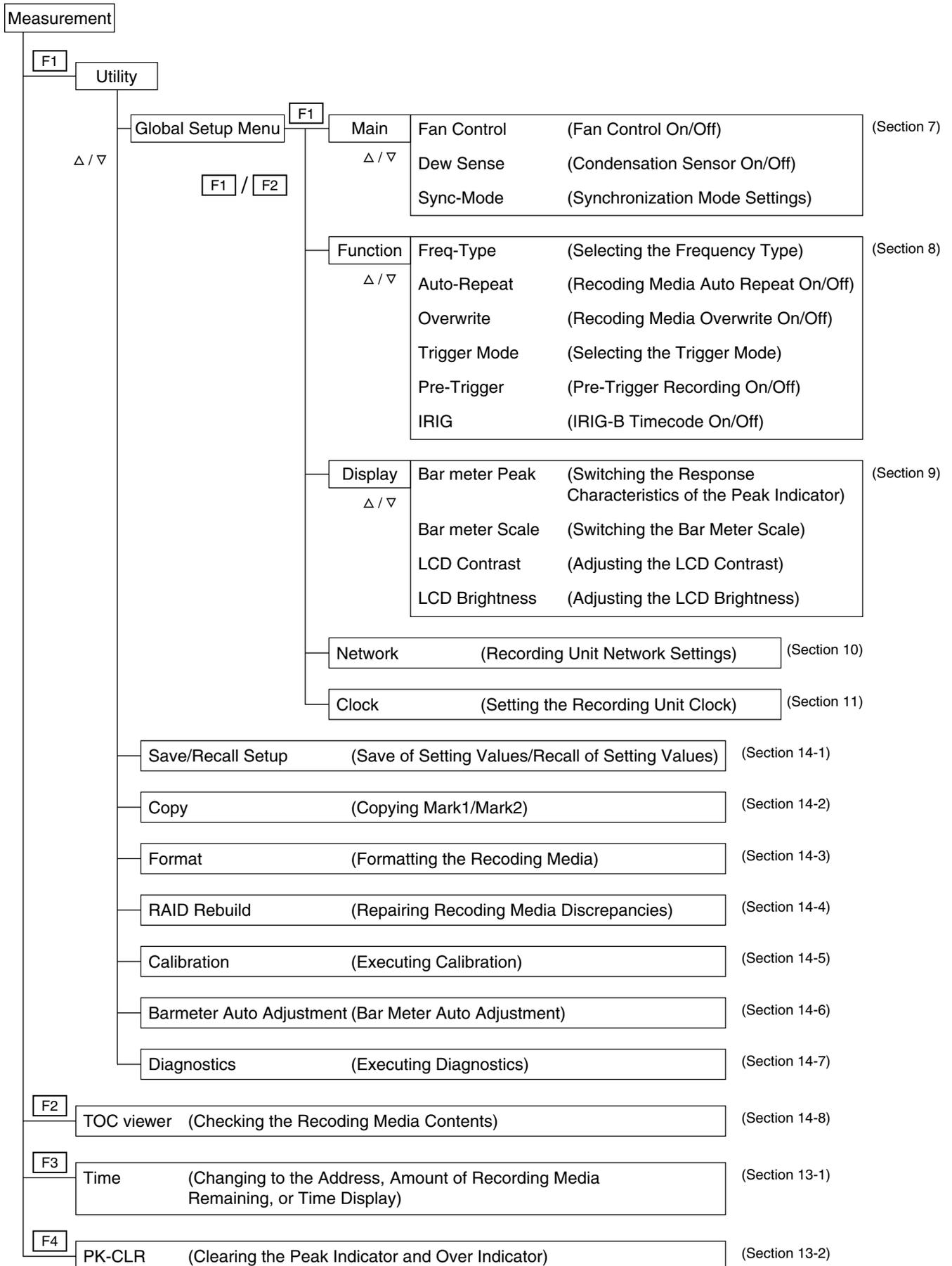
6-1-2. Measuring Unit Setting/Checking (Including Input/Output Settings)

These are the setting items for input and output. These items are set at the recording unit.

○: Setting enabled

Setting	Default setting	Operation				Remarks	Reference
		LCD screen	Key	Telnet	Panel		
Input range	±1 Vpk		○	○			12-5
Input DC offset	0 %		○	○			12-6
Input format	Direct DC		○				12-7
Output level	±1 Vpk		○	○			12-10
Measuring unit Monitor channel	—			○	○ (Front)		17-2

6-2. LCD Screen Configuration



7. Basic Settings (Main Screen)

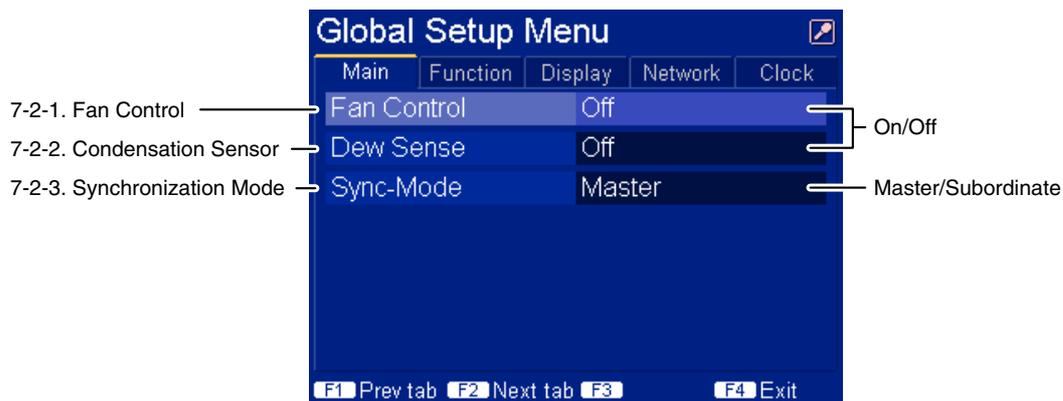
7-1. Setting Procedure (for Main Screen)

Opening the Main screen

- 1 Press the F1 key in the Measurement screen.
The Utility screen is displayed.
- 2 Select the “Global Setup Menu” with the Δ / ∇ keys.
- 3 Press the F1 key to switch the screen.
- 4 Select the “Main” with the F1/F2 keys.

Setting

- 5 Use the Δ / ∇ key to select the option.
- 6 Use the \triangleleft / \triangleright key to select the setting value.



- * The screen of “Main” – “Function” – “Display” – “Network” – “Clock” can be switched with the F1/F2 keys.
- * Press the F4 key to return to the Measurement screen.

7-2. Settings

7-2-1. Fan Control On/Off (Fan Control)

This option is useful for acoustic measurements and other applications where silence is needed.

Factory setting: Off

* For the setting procedure, see "7-1. Setting Procedure (for Main Screen)".

<When set to On>

The fan speed is controlled based on the internal temperature of the recording unit and measuring unit.

Internal temperature	Less than 30 °C	Less than 60 °C	60 °C or higher
Fan rotation speed	Stop	Medium	High

CAUTION

- The fan may automatically start running due to a rise in temperature.
- The fan rotation speeds of the recording unit and measuring unit may not be synchronized in some cases.

<When set to Off>

The fan is constantly rotating at high speed.

7-2-2. Condensation Sensor On/Off (Dew Sense)

CAUTION

- If condensation occurs the recording media and data may become damaged. In environments subject to changes in temperature and humidity, be sure to always set the condensation detection function to On.
- Leave a space of at least 50 mm between the right and left sides of the recording unit and any other object.

Factory setting: Off

* For the setting procedure, see "7-1. Setting Procedure (for Main Screen)".

<When set to On>

When condensation occurs inside the unit, such as when a cold recording unit is moved to a warm location, the condensation warning indicator turns on (see section 18-1). When the warning indicator turns on, perform the warmup operation while holding down the standby key, and then wait until the indicator turns off before using the recording unit.

Warning indicator	LCD message	Recording unit status	Remarks
—	60S to 00S	Detecting the condensation	The remaining time for detecting the condensation is displayed
 lit	Warming Up	Condensation was detected	Displayed during warmup operation
	600S to 000S	Dissipating condensation	Displays the remaining time until condensation is dissipated

CAUTION

- Once the setting is set to On, the recording unit performs detection inside the unit and cannot be used for approximately one minute every time the power is turned on.
- When condensation is detected and the condensation dissipation operation is being performed, be sure to leave the power on and wait until the operation is completed.

<When set to Off>

No warnings are indicated even if condensation occurs.

7-2-3. Synchronized Master/Subordinate Operation (Sync-Mode)

Factory setting: Master

* For the setting procedure, see "7-1. Setting Procedure (for Main Screen)".

<When set to Master>

Recording and playback are performed using quartz-accurate synchronization with multiple recording unit systems.

This enables doubling of the number of channels without reducing the frequency bandwidth or data transfer rate.

When using a synchronized connection, one recording unit must be set as the Master, and the other recording units must be set as the Subordinate.

<When set to Subordinate>

Set the rest of recording units other than one for Master to Subordinate.

8. Function Setup (Function Screen)

8-1. Setting Procedure (for Function Screen)

Opening the Function screen

- 1 Press the F1 key in the Measurement screen.
The Utility screen is displayed.
- 2 Select the “Global Setup Menu” with the Δ / ∇ keys.
- 3 Press the F1 key to switch the screen.
- 4 Select the “Function” with the F1/F2 keys.

Setting

- 5 Use the Δ / ∇ key to select the option.
- 6 Use the \triangleleft / \triangleright key to select the setting value.



- * The screen of “Main” – “Function” – “Display” – “Network” – “Clock” can be switched with the F1/F2 keys.
- * Press the F4 key to return to the Measurement screen.

8-2. Settings

8-2-1. Selecting the Frequency Type (Freq-Type)

Factory setting: 48 kHz series

* For the setting procedure, see "8-1. Setting Procedure (for Function Screen)".

Setting value: 48 kHz series

8-2-2. Recording Media Auto Repeat On/Off (Auto-Repeat)

CAUTION

The recording media auto repeat function can be used only on a media on which nothing is recorded.
Use a media after formatted.

Factory setting: Off

* For the setting procedure, see "8-1. Setting Procedure (for Function Screen)".

<When set to On>

When the end of the recording media is reached during recording, it automatically returns to the start and continues recording.

During recording, overwriting is performed regardless of the overwrite setting of the recording media.

Although the data that was overwritten is lost, the remaining data and rewritten data can be played back.

<When set to Off>

Recording and playback automatically stop when the recording media reaches the end.

8-2-3. Recording Media Overwrite On/Off (Overwrite)

Factory setting: Off

* For the setting procedure, see "8-1. Setting Procedure (for Function Screen)".

<When set to On>

The recording can be overwritten.

When you attempt to overwrite, a message "Overwrite?" will appear on the LCD screen. Be sure to check if the old data is needed. If it is not needed, press the FWD key while holding down the REC key again to start overwriting.

CAUTION

If a portion of the data is overwritten, the data after the current recording point can no longer be played.

<When set to Off>

The recording cannot be overwritten.

8-2-4. Selecting the Trigger Mode (Trigger Mode)

Factory setting: Single

* For the setting procedure, see "8-1. Setting Procedure (for Function Screen)".

Settings

Single : During trigger recording, recording starts when the trigger input signal changes from High to Low, and recording continues until the STOP key is pressed.

Multi : During trigger recording, recording starts when the trigger input signal changes to Low, and recording stops when it changes to High.

8-2-5. Pre-Trigger Recording On/Off (Pre-Trigger)

Factory setting: Off

* For the setting procedure, see "8-1. Setting Procedure (for Function Screen)".

<When set to On>

During trigger recording, data before the trigger is recorded. Data length (s) before trigger is automatically changes depending on to the recording media speed.

<When set to Off>

During trigger recording, and data is recorded immediately after the trigger.

8-2-6. IRIG-B Timecode On/Off (IRIG)

Set this switch to On to calibrate the internal clock by inputting the IRIG-B time code to the AUX analog channel. When set to Off, the internal clock is not calibrated with the IRIG-B time code.

Factory setting: On

* For the setting procedure, see "8-1. Setting Procedure (for Function Screen)".

9. Display Settings (Display Screen)

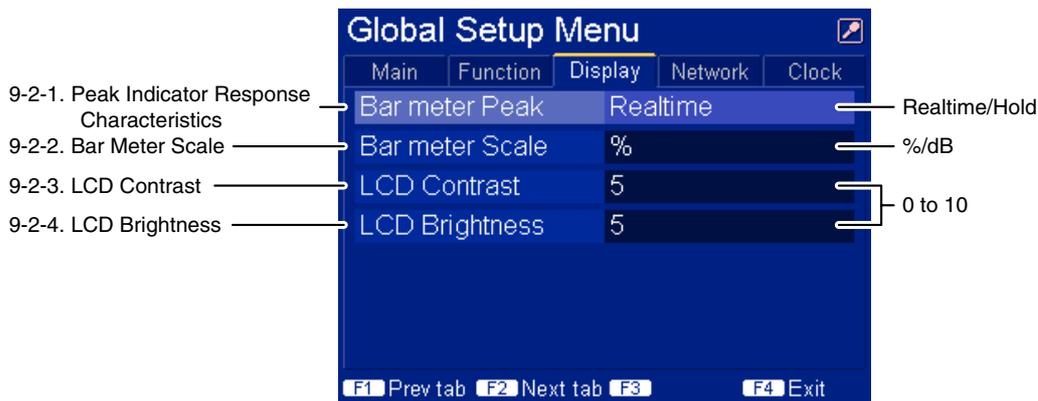
9-1. Setting Procedure (for Display Screen)

Opening the Display screen

- 1 Press the F1 key in the Measurement screen.
The Utility screen is displayed.
- 2 Select the “Global Setup Menu” with the Δ / ∇ keys.
- 3 Press the F1 key to switch the screen.
- 4 Select the “Display” with the F1/F2 keys.

Setting

- 5 Use the Δ / ∇ key to select the option.
- 6 Use the $\triangleleft / \triangleright$ key to select the setting value.



9-2. Settings

9-2-1. Switching the Response Characteristics (Bar meter Peak)

Factory setting: Realtime

* For the setting procedure, see “9-1. Setting Procedure (for Display Screen)”.

<When set to Realtime>

The bar meter always displays the current value.

<When set to Hold>

The peak indicator is held at the maximum level until PK-CLR (F4) is pressed or until entering the E-E, REC-PAUSE, or REC-FWD modes from STOP mode.

9-2-2. Switching the Bar Meter Scale (Bar meter Scale)

Factory setting: %

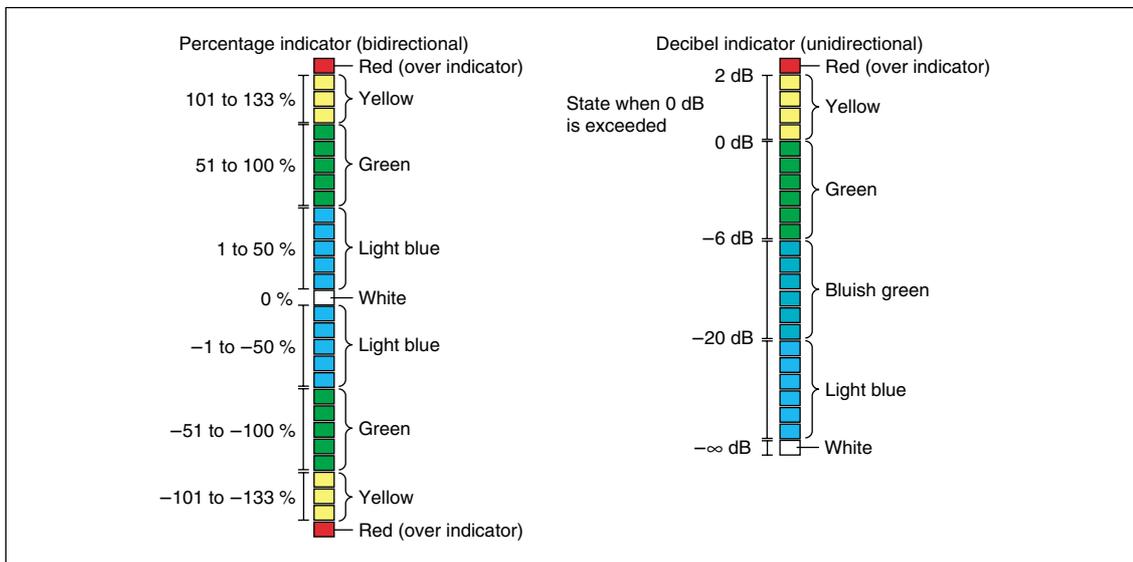
* For the setting procedure, see “9-1. Setting Procedure (for Display Screen)”.

<When set to %>

The scale is bidirectional (the level moves upward in the positive direction or downward in the negative direction from the center 0 % level line based on the signal polarity), and the data signal level is indicated as a percentage of the reference level ($\pm 100\%$) that was set for the input range.

<When set to dB>

The scale is unidirectional (the level moves in the same direction regardless of the signal polarity), and the data signal level is indicated as a relative dB value of the reference level (0 dB) that was set for the input range.



9-2-3. Adjusting LCD Contrast (LCD Contrast)

Factory setting: 5

* For the setting procedure, see “9-1. Setting Procedure (for Display Screen)”.

The LCD contrast can be adjusted in one of eleven levels.

9-2-4. Adjusting LCD Brightness (LCD Brightness)

Factory setting: 5

* For the setting procedure, see “9-1. Setting Procedure (for Display Screen)”.

The LCD brightness can be adjusted in one of eleven levels.

10. Network Settings (Network Screen)

This procedure is used to set the IP address and subnet mask of the recording unit.
The MAC address can be checked at this setting screen.

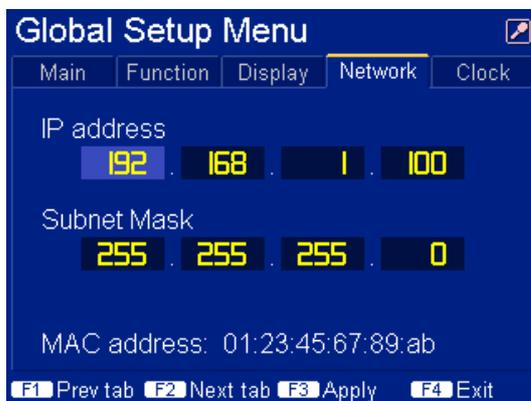
10-1. Setting Procedure

Opening the Network screen

- 1 Press the F1 key in the Measurement screen.
The Utility screen is displayed.
- 2 Select the “Global Setup Menu” with the Δ / ∇ keys.
- 3 Press the F1 key to switch the screen.
- 4 Select the “Network” with the F1/F2 keys.

Setting

- 5 Use the \leftarrow / \rightarrow key to select the option.
Use the Δ / ∇ key to select the setting value.
- 6 Use the F3 key to make the setting.



- * The screen of “Main” – “Function” – “Display” – “Network” – “Clock” can be switched with the F1/F2 keys.
- * By pressing F3 (Apply) key, the changed IP address and the changed subnet mask are set.
When escaped from the Global Setup Menu without setting, the changed value is not set.
- * Press the F4 key to return to the Measurement screen.

11. Clock Setting (Clock Screen)

This procedure sets the internal clock of the recording unit.

11-1. Setting Procedure

Opening the Clock Screen

- 1 Press the F1 key in the Measurement screen.
The Utility screen is displayed.
- 2 Select the “Global Setup Menu” with the Δ / ∇ keys.
- 3 Press the F1 key to switch the screen.
- 4 Select the “Clock” with the F1/F2 keys.

Setting

- 5 Use the \triangleleft / \triangleright key to select the option.
Use the Δ / ∇ key to select the setting value.
- 6 Use the F3 key to make the setting.



- * The screen of “Main” – “Function” – “Display” – “Network” – “Clock” can be switched with the F1/F2 keys.
- * By pressing the F3 (Apply) key, the changed time is set.
When escaped from the “Global Setup Menu” without setting, the changed value is not set.
- * Press the F4 key to return to the Measurement screen.

12. Operation Settings (Using Setting Key)

If using Telnet to make settings, refer to the procedure in “17. Control by Telnet”.
For the transport settings, refer to “5. Description of Transport Mode”.

The operation settings are saved by the internal backup battery even when the power is turned off.
In the procedures below, the parentheses in the section title indicates the transport mode where the setting can be made.

12-1. ID Number Increments (Mode: REC)

An ID number is automatically assigned to each recording block.
Each time that the SHIFT key is pressed and then INDEX/ID key is pressed during REC mode, the ID number on the LCD screen increases by one.

Setting value: 1 to 999

The ID number can be used for searches.

12-2. Index Number Increments (Mode: REC)

Each time that the INDEX/ID key is pressed during REC mode, the INDEX number on the LCD screen increases by one.

Setting value: 1 to 99 (The index number automatically increase by 1 up to 99 and then go back to 1.)

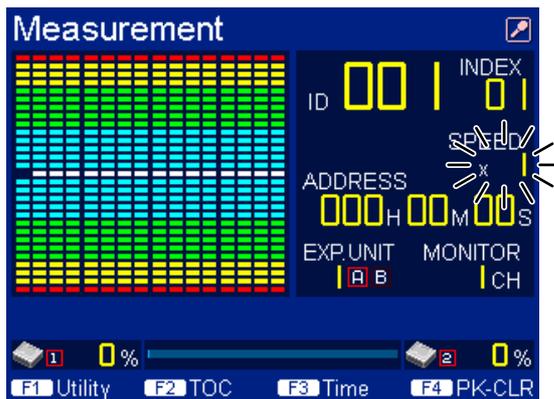
The INDEX number can be used for searches.

12-3. Setting the Recording/Playback Speed (Mode: STOP)

The recording/playback speed that was set is applied immediately after the setting is made.

1 Press the SPD/BCM key.

The lamp at the top left of the key and the LCD screen speed indicator flash.



2 Use the Δ / ▽ key to select the speed.

Some speeds may not be available depending on the number of channels used.

Setting value	x4	x2	x1	x1/2	x1/4	x1/8	x1/16
Speed	4x	2x	1x	1/2x	1/4x	1/8x	1/16
MByte/s	12	6	3	1.5	0.75	0.38	0.19

3 Press the SPD/BCM key.

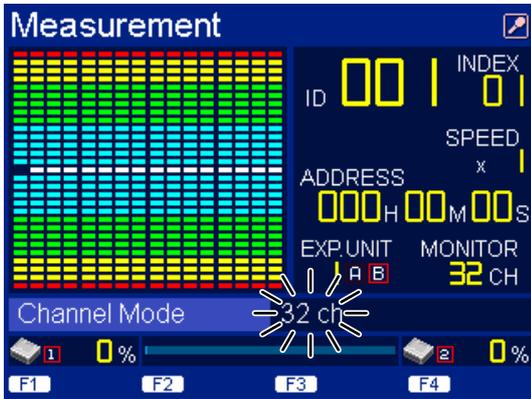
The recording/playback speed is set.

12-4. Setting the Number of Recording Channels

(Modes: STOP, E-E, and REC-PAUSE)

This sets the number of channels when recording.

- 1 Press the SHIFT key, and then press the SPD/BCM key.
The lamp at the top right of the key and the number of channels indicator on the LCD screen flash.



- 2 Use the Δ / ∇ key to select the number of channels.
Setting value: 32/64/128

No. of measuring units	Max. no. of channels
1	32
2	64
4	128

- 3 Press the SPD/BCM key.
The number of recording channels is set.

12-5. Setting the Input Range (Modes: STOP, E-E, REC-PAUSE, and REC)

The input range value of the recording amplifier is set for each channel.

Set using either Manual or Auto.

Manual setting : The range values are set manually from the setting values.

Auto setting : The range values are automatically set by the recording unit based on the input signal level.

Note

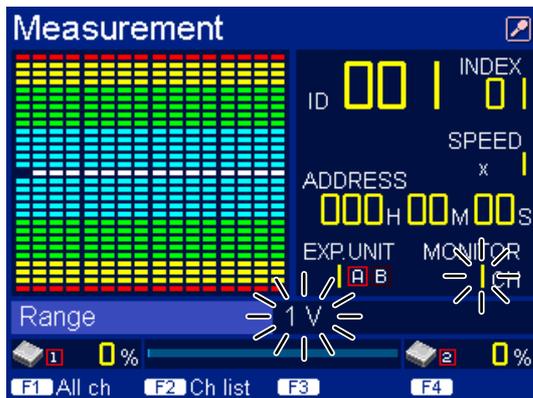
In case the DC-coupling direct input format is set (See [12-7. Setting the Input Format]):

When the unnecessary DC components are contained in the input signal, it is recommended to set the input range after canceling the DC components with the input DC offset.

12-5-1. Setting the Manual Range

- 1 Press the RANGE key.

The M lamp at the top left of the key and the channel number in the MONITOR display area flash. The Range indicator appears in the setting value display area.



- 2 Use the \triangleleft / \triangleright key to select the target channel.

Setting value : EXP. UNIT 1 to 4, A/B
MONITOR 1 to 32

- 3 Use the \triangle / ∇ key to select the input range value.

Setting value	10 V	5 V	2 V	1 V	0.5 V	0.2 V	0.1 V
Input range (Vpk)	± 10	± 5	± 2	± 1	± 0.5	± 0.2	± 0.1

Range values and bar meter scale

Example : When 10 V is set:

The bar meter scale becomes $\pm 100\%$ or 0 dB when the input voltage is $+10$ Vpk, -10 Vpk, or ± 10 Vpk.

- Pressing the F1 key applies the settings to all channels of the current channel group (A or B).
- Pressing the F2 key enables the channel setting to be checked on a list. Press the F4 key to return to the original screen.

- 4 Press the RANGE key. The settings are completed.

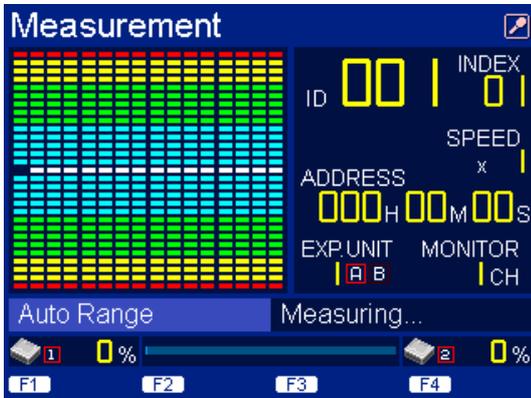
When not in setting mode, the \triangle , ∇ , \triangleleft , and \triangleright keys can be used to change the monitor channel.

\triangle / ∇ key : Every 16 channels

\triangleleft / \triangleright key : Every channel

12-5-2. Setting the Auto Range

- 1 Press the SHIFT key, and then press the RANGE key to set to A-RANGE (Auto Range setting) mode. The A lamp at the top right of the key flashes.



- 2 3 seconds later, the peak value of input level for each input channel is automatically detected. Until the RANGE key is pressed again, the peak value detection is continued. The relationship between the input level and setting range is shown below.

Input level (absolute value)	5.5 V to 11 V	2.2 V to 5.5 V	1.1 V to 2.2 V	0.55 V to 1.1 V	0.22 V to 0.55 V	0.11 to 0.22 V	Less than 0.11 V
Input range (Vpk)	±10	±5	±2	±1	±0.5	±0.2	±0.1

- 3 If the RANGE key is pressed again after at least three seconds have elapsed, the input range value is finalized for all channels for the detected peak values.

Note

In case the DC-coupling direct input format is set (See [12-7. Setting the Input Format]):

When the unnecessary DC components are contained in the input signal, it is recommended to set the input range after canceling the DC components with the input DC offset.

12-6. Setting the Input DC Offset (Modes: STOP, E-E, REC-PAUSE, and REC)

When the input DC offset setting is made, a DC offset voltage is applied to the input signal that is recorded so that the signal level can be shifted. This enables the canceling of DC components contained in the input signal that are not needed for recording, which raises the resolution.

The DC offset value is set for each channel.

Set using either Manual or Auto.

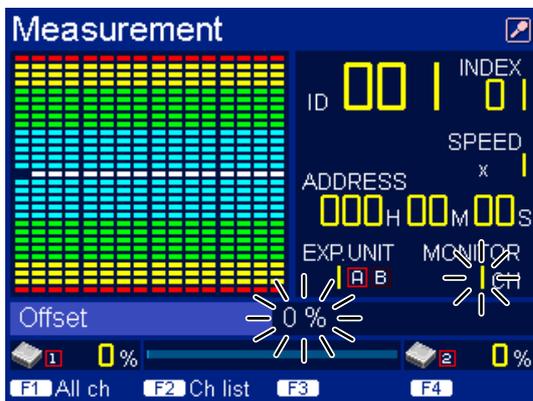
Manual setting : The input DC offset values are set manually.

Auto setting : The DC component is automatically calculated from the maximum and minimum values of the detected input signal, and then the DC offset value is automatically set by the recording unit.

12-6-1. Setting Input DC Offset Manually

1 Press the OFFSET key.

The M lamp at the top left of the key and the channel number in the MONITOR display area flash. The Offset indicator appears in the setting value display area.



2 Use the ◀ / ▶ key to select the target channel.

Setting value : EXP. UNIT 1 to 4, A/B
MONITOR 1 to 32

3 Use the Δ / ▽ key to change the input DC offset value.

The offset value changes by +1 %/−1 % each time the key is pressed. Holding down the key continually increases or decreases the value.

Setting value	100	0	−100
Input DC offset value	+100 %	±0 %	−100 %

Offset value and input range value

Example : When +100 % is set for the input DC offset value:

When the input range is +10 Vpk, a DC voltage of $+1.00 \times 10 \text{ (V)} = +10.0 \text{ (V)}$ is superimposed on the input signal so that the waveform shifts in a positive direction.

- Pressing the F1 key applies the settings to all channels of the current channel group (A or B).
- Pressing the F2 key enables the channel setting to be checked on a list. Press the F4 key to return to the original screen.

4 Press the OFFSET key. The settings are completed.

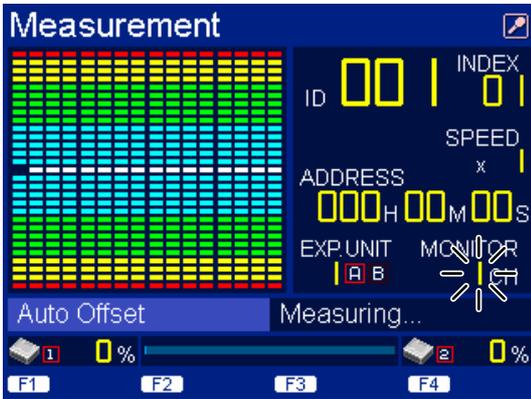
When not in setting mode, the Δ, ▽, ◀, and ▶ keys can be used to change the monitor channel.

Δ / ▽ key : Every 16 channels

◀ / ▶ key : Every channel

12-6-2. Setting Input DC Offset Automatically

- 1 Press the SHIFT key, and then press the OFFSET key.
The A lamp at the top right of the key and the channel number in the MONITOR display area flash. 3 second later, the positive and negative peak values of the input signal for each channel are detected and the DC component is calculated. Until the OFFSET key is pressed again, the peak value detection is continued.



- 2 After three or more seconds have elapsed, press the OFFSET key.
The DC input offset value is set for all channels.

12-7. Setting the Input Format (Modes: STOP)

This procedure sets the data input format for each channel.

There are two types of input formats.

Input format	Set value	Contents
IEPE input format (In case the sensor with the built-in pre-amplifier is used)	IEPE	When using the sensor without support of TEDS or the TEDS data is not acquired, set it. The acquisition of TEDS is not performed.
	TEDS	When using the sensor with support of TEDS, set it. The TEDS data is acquired and it is recorded on the recording media.
Direct input format (In case of voltage input)	Direct DC	When recording data including DC components, set it. (DC-coupling direct input format)
	Direct AC	When recording data with unnecessary DC components removed, set it. ($f_c = 0.5$ Hz) (AC-coupling direct input format)

CAUTION

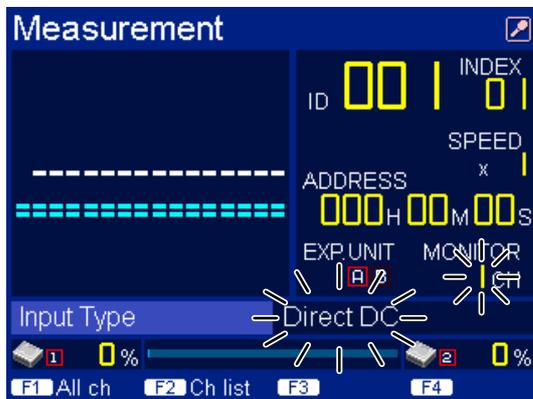
To make the input format setting, do not connect the signal source to the INPUT connector.

When set to the IEPE input format, a 24 V power supply is supplied to the INPUT connector. Be careful that you do not damage the signal source.

When using the IEPE input format, set to the single ended input. (See “12-8. Setting the Transmission Format”)

1 Press the INPUT key.

The lamp at the top left of the key and the channel number in the MONITOR display area flash. The Input Type indicator appears in the setting value display area.



2 Use the < / > key to select the target channel.

Setting value : EXP. UNIT 1 to 4, A/B
MONITOR 1 to 32

3 Use the Δ / ∇ key to change the setting.

Setting value : Direct DC/Direct AC/IEPE/TEDS

- Pressing the F1 key applies the settings to all channels of the current channel group (A or B).
- Pressing the F2 key enables the channel setting to be checked on a list. Press the F4 key to return to the original screen.

4 Press the INPUT key.

The settings are completed.

When not in setting mode, the Δ , ∇ , <, and > keys can be used to change the monitor channel.

- Δ / ∇ key : Every 16 channels
- < / > key : Every channel

12-8. Setting the Transmission Format

Set the S/D select switch on the front of measuring unit to the desired format.

- 1 When using the IEPE input, set to S. When set to D, the unit does not work.

Setting	Transmission format	Supported input format
S	Single ended input	Direct input, IEPE input
D	Differential input	Direct input

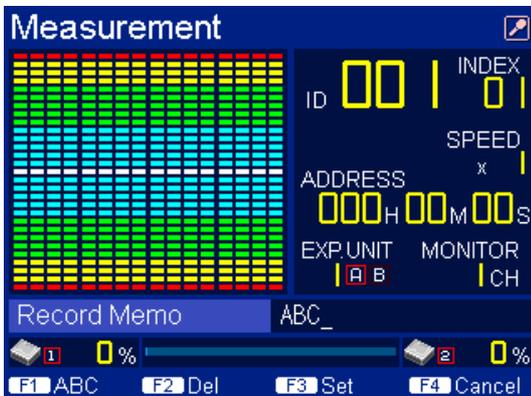
When using in the differential input, connect the signal source to the measuring unit as shown below. Unless the signal source is connected with the frame ground of measuring unit, signal may not be properly recorded.

Signal source	Measuring unit
Signal hot	– BNC terminal (Core of coaxial cable)
Signal cold	– BNC GND (Shield wire of coaxial cable)
Ground terminal	– Ground terminal (Frame ground connection)

12-9. Recording Memo (Modes: STOP, E-E, REC-PAUSE, and REC)

Up to 96 characters of information can be set during recording.

- 1 Press the MEMO key.
The lamp at the top left of the key turns on, and the Record Memo indicator appears in the setting value display area to indicate that the memo can be edited.



2 Press the respective keys to edit and exit the memo.

Key	Function
Setting key	Enters the characters (enters the character written above the key)
< / > key	Moves the cursor
F1 key	Changes the input mode (changed each time the key is pressed) <div style="margin-left: 20px;"> → ABC (enters uppercase letters) ↓ abc (enters lowercase letters) ↓ 123 (enters numbers) </div>
F2 key	Deletes character at the cursor position (Del)
F3 key	Sets the memo recording and exits (Set)
F4 key	Erases the memo recording and exits (Exit)

Input modes and keys

Key	Input mode		
	ABC	abc	123
1	Disabled	Disabled	1
2	ABCabc	abcABC	2
3	DEFdef	defDEF	3
4	GHIghi	ghiGHI	4
5	JKLjkl	jklJKL	5
6	MNOmno	mnoMNO	6
7	PQRSpqrs	pqrsPQRS	7
8	TUVtuv	tuvTUV	8
9	WXYZwxyz	wxyzWXYZ	9
*	Disabled	Disabled	*
0	Disabled	Disabled	0
# (CAUTION)	.@/#!?(),-_'~&\	.@/#!?(),-_'~&\	#.@/#!?(),-_'~&\

CAUTION

Holding down the # key for at least 2 seconds exits recording memo mode and activates panel lock. In this state, the memo editing details are erased.

Entering characters

- The character being entered blinks.
- Each time the same key is pressed, the characters assigned to that key are displayed.
- When the next key is used to input a character, the character that was entered before is set.
- To enter a character using the same key again, use the > key to move the cursor, and then make the entry.
- The 0 to 9 and * in 123 input mode are direct input keys. Therefore, a character is input each time the same key is pressed.
- You cannot enter more than 96 characters.

Deleting characters

- Pressing the F2 key deletes the character at the cursor position. The characters after the cursor position move back to fill in the deleted space.
- If the cursor is at the end of the text, the cursor position moves forward each time the F2 key is pressed.

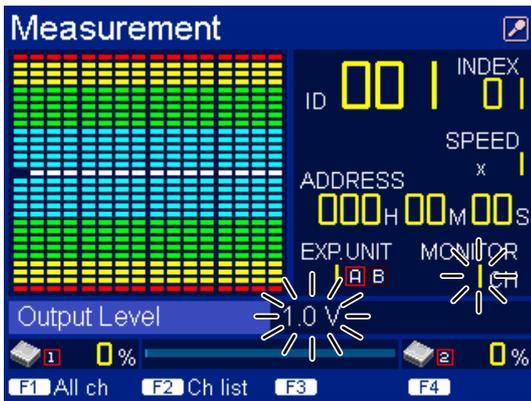
12-10. Setting the Output Level

(Modes: STOP, E-E, REC-PAUSE, REC, FWD, and PAUSE)

This procedure changes the output level of the analog channels (CH1 to CH32) for each channel.

1 Press the OUT/TSG key.

The lamp at the top left of the key and the channel number in the MONITOR display area flash. The Output Level indicator appears in the setting value display area.



2 Use the < / > key to select the target channel.

Setting value : EXP. UNIT 1 to 4, A/B

MONITOR 1 to 32

3 Use the Δ / ▽ key to change the output level.

The output level can be set in 0.1 V increments in the 1 V to 5 V range.

- Pressing the F1 key applies the settings to all channels of the current channel group (A or B).
- Pressing the F2 key enables the channel setting to be checked on a list. Press the F4 key to return to the original screen.

4 Press the OUT/TSG key.

The settings are completed.

When not in setting mode, the Δ, ▽, <, and > keys can be used to change the monitor channel.

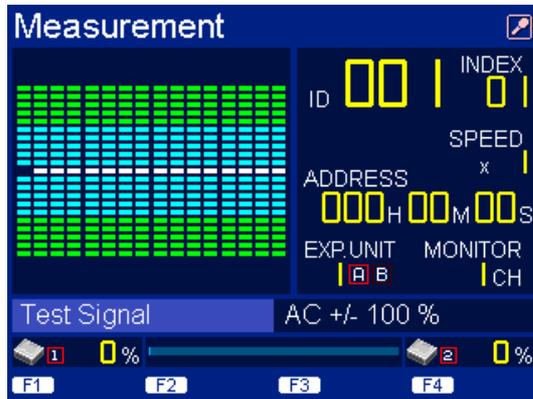
Δ / ▽ key : Every 16 channels

< / > key : Every channel

12-11. Setting the Test Signal (Modes: E-E, REC-PAUSE, and REC)

This procedure enters a preset test signal to all channels.

- 1 Press the SHIFT key, and then press the OUT/TSG key.
The lamp at the top right of the key flashes. The Test Signal indicator appears in the setting value display area.



- 2 Use the Δ / ∇ key to change the test signal value.
Setting value : AC \pm 100 %, DC +100 %, DC -100 %, 0 V
- 3 Press the OUT/TSG key.
The settings are completed.

12-12. Mark Settings (Modes: All)

Marks can be added to any two selected locations. These recording positions can be searched.

Pressing the MRK1 or MRK2 key saves the record position at that data position.

CAUTION

- Mark2 can be set even when there is no Mark1.
- If the Mark1 and Mark2 are pressed when settings have already been made for Mark1 and Mark2, the new Mark position replaces the old setting.

12-13. Panel Lock (Modes: All)

- 1 Hold down the SHIFT key for at least two seconds.
The Panel Lock state is set (key operation is disabled), and the PNL LOK lamp turns on.

Canceling Panel Lock

Hold down the SHIFT key for at least two seconds in the Panel Lock state. This cancels Panel Lock, and the PNL LOK lamp turns off.

13. Other Settings

13-1. Changing to the Address, Amount of Recording Media Remaining, or Time Display

When the LCD screen is changed to the Measurement screen, the display can be changed to address, amount of recording media remaining, or time display.

- 1 Press the F3 key in the Measurement screen.
Each time F3 key is pressed, the display for ADDRESS, REMAIN, and S-TIME/R-TIME switches as below.

Transport mode	Display
E-E, REC-PAUSE, REC, and STOP from one of these modes	ADDRESS → REMAIN → S-TIME (Y, M, D) → S-TIME (H, M, S) → ADDRESS
FWD, FF, REW, and STOP from one of these modes	ADDRESS → REMAIN → R-TIME (Y, M, D) → R-TIME (H, M, S) → ADDRESS

13-2. Clearing the Peak Indicator and Over Indicator

When the response characteristics of the peak indicator are set to Hold, the peak indicator and over indicator are cleared.

- 1 Press the F4 key in the Measurement screen.
This clears the Peak indicator and Over indicator.

13-3. Switching the Speaker or Earphone Playback Signal Source

When the LCD screen is changed to the Measurement screen, the playback signal source for the speaker or earphone jack can be changed.

- 1 Press the SPEAKER key in the Measurement screen.
The playback signal source for the speaker or earphone jack switches between the recorded voice annotations and the analog data signal. The current playback signal source is shown in the status display area of the LCD screen.

Mark	Description
	The voice annotation recorded into the voice channel is output from the speaker or earphone jack.
	The data signal of the analog channel is output from the speaker or earphone jack.

13-4. Adjusting the Playback Volume

This procedure adjusts the playback volume of the speaker or earphone.
The volume of warning buzzer accompanied by the warning message cannot be adjusted.

- 1 Turn the VOL knob on the recording unit rear panel.

WARNING

Be careful that you do not listen to earphones (sold separately) at a high volume for extended periods of time.

13-5. Changing the AC Voltage

⚠ WARNING

Be careful to use the correct voltage since usage of an incorrect voltage can lead to a fire or failure of the unit.

At shipping, the AC voltage is set to either 100/120 V or 220/240 V. The setting is displayed on the sticker on the AC voltage selector switch. If you peel off the sticker and change the voltage, be sure to always re-check the usage voltage before using.

CAUTION

- When the AC voltage selector switch is set to AC 100/120 V, supplying AC 198 to 250 V may damage the recording unit's internal circuitry.
- When the AC voltage selector switch is set to AC 220/240 V, the recording unit will not operate when supplied with AC 90 to 132 V.

1 Use the AC voltage selector switch on the rear panel of the respective unit to change the voltage.

Move the switch to the selected voltage side.

Left side : 100/120 V (allowable 90 to 132 V)

Right side : 220/240 V (allowable 198 to 250 V)

14. Execution of Function/Checking

14-1. Save of Setting Values/Recall of Setting Values (Save/Recall Setup)

Saving the current settings and changing to other settings are done with a single operation. The settings can be changed to the following settings.

- Setting values saved in the memory card
- Recording setting values for the current address
- Factory settings

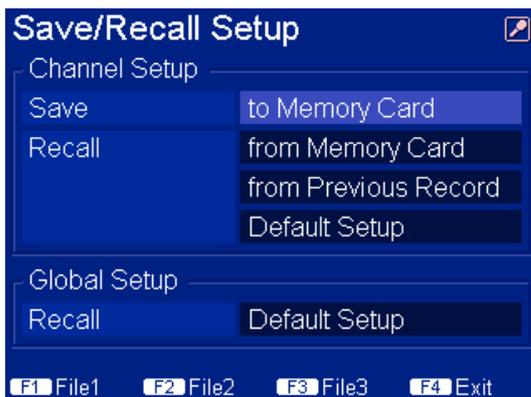
CAUTION

If the settings are made here, all settings are changed with a single operation. Be sure to check the settings before using this operation. (See section 6-1 for the factory settings.)

- 1 Press the F1 key in the Measurement screen.
The Utility screen is displayed.
- 2 Use the Δ / ∇ key to select "Save/Recall Setup".



- 3 Press the F1 key.
The Save/Recall Setup screen is displayed.



4 Use the Δ / ∇ keys to select the setting item.

Channel Setup

Save	to Memory Card	Saves the channel settings to the memory card
Recall	from Memory Card	Recalls the channel settings from the memory card
	from Previous Record	Sets the channel settings to the settings of recording with current address
	Default Setup	Sets the channel settings to the factory settings (See section 6-1-2)

Global Setup

Recall	Default Setup	Sets the basic settings (See section 7.) to the factory settings (See section 6-1)
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Three kinds of settings can be saved/recalled assigned to the F1 to F3 keys to/from the memory card.

For the settings other than stored in the memory card, use the F1 key to recall the setting.

To cancel, press the F4 key.

In channel setup, all channel input range, input DC offset, and output level settings are saved/recalled.

* "from Previous Record"

Perform playback once before recalling settings from the media.

This sets all the input range and input DC offset for all channels during recording. (No output level settings are made.)

14-2. Copying Mark1/Mark2 (Copy)

For information about Mark1/Mark2, see section “12-12. Mark Settings”.

The location to be copied is selected from three available patterns.

The copied information is pasted to the end of the data.

Data covering multiple IDs cannot be copied.

- 1 Press the F1 key in the Measurement screen.
The Utility screen is displayed.

- 2 Use the Δ / ∇ key to select “Copy”.

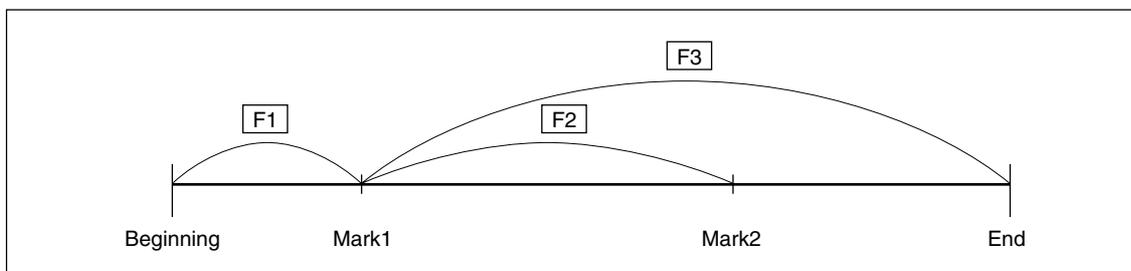


- 3 Press the key corresponding to the copy location.

From beginning of ID to Mark1 (B-Mark1) : F1 key

From Mark1 to Mark2 (Mark1-2) : F2 key

From Mark1 to end of ID (Mark1-E) : F3 key



The copy operation is performed.

CAUTION

The copy operation will not be performed when the F2 key is pressed unless Mark1 and Mark2 are within the same ID.

14-3. Formatting the Hard Disk Drive (Format)

This procedure formats the internal HDD (HDD and HDD2).

- 1 Press the F1 key in the Measurement screen.
The Utility screen is displayed.

- 2 Use the Δ / ∇ key to select "Format".



- 3 Press the F1 key.
A dialog box is displayed for confirming the formatting operation.



- 4 Press the FWD key while holding down the REC key.
Formatting is performed.

<To not execute>

Press the F4 key (cancel).

CAUTION

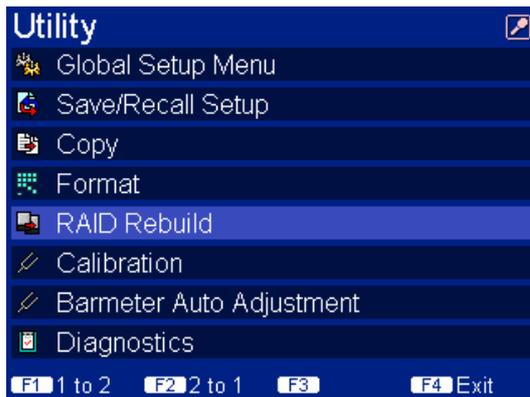
Once formatting is started, it cannot be cancelled.

14-4. Repairing Recording Media Discrepancies (RAID Rebuild)

This procedure is used to repair discrepancies in two installed HDDs.

If you try to use a HDD with corrupted data or differences in data, data writing is not performed automatically even when the HDD is installed. Be sure to always perform the repair operation.

- 1 Press the F1 key in the Measurement screen.
The Utility screen is displayed.
- 2 Use the Δ / ∇ key to select "RAID Rebuild".



- 3 Press the key based on the HDD that you want to mirror.
Mirror HDD1 to HDD2 (1 to 2) : F1 key
Mirror HDD2 to HDD1 (2 to 1) : F2 key

A dialog box is displayed for checking that the repair is executed.

<In case that the F1 key is pressed>



- 4 Press the FWD key while holding down the REC key.
The repair is started.
Once completed, a completion message is displayed.

<To not execute or cancel execution>

Press the F4 key (cancel).

CAUTION

If you cancel while the repair operation is in progress, the data in the receiving HDD will be incomplete and cannot be read.

To exit "RAID Rebuild", press the F4 key.

14-5. Executing Calibration (Calibration)

CAUTION

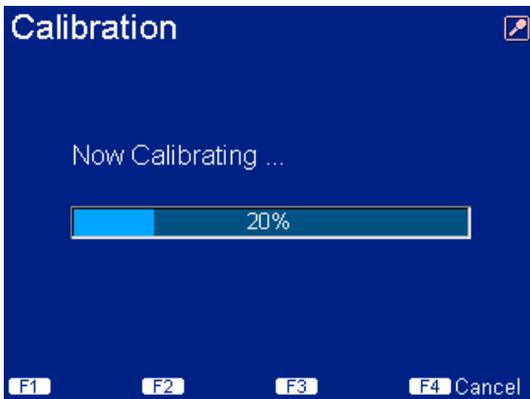
- Enable the calibration function using the DIP switches on the measuring unit.
- After the power is turned on, wait at least 15 minutes before performing calibration.
- Perform in the environment where it will actually be used.

1 Press the F1 key in the Measurement screen.
The Utility screen is displayed.

2 Use the Δ / ∇ key to select “Calibration”.



3 Press the F1 key.
Calibration is performed.



<To stop calibration>

Press the F4 key. Calibration is stopped at the point where the frequency band changes.

If calibration is stopped before completion, turn the power off and then on again before using.

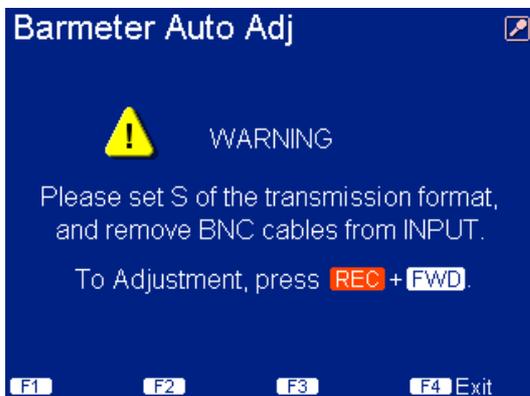
14-6. Bar Meter Auto Adjustment (Barmeter Auto Adjustment)

Because this unit has a high input impedance, when the input format is set to Single-ended, the bar meter may perform offset recording when the BNC connector is open. Continued usage will not affect the measurement data or its accuracy, but the offset can be canceled by executing the bar meter auto adjustment. When executing, set the input format single-ended with the measuring unit front panel S/D selector switch, and then set the input BNC connector to open.

- 1 Press the F1 key in the Measurement screen.
The Utility screen is displayed.
- 2 Use the Δ / ∇ keys to select “Barmeter Auto Adjustment”.



- 3 Press the F1 key.
A dialog box is displayed for confirming execution.



- 4 Press the FWD key while holding down the REC key.
This executes bar meter auto adjustment.



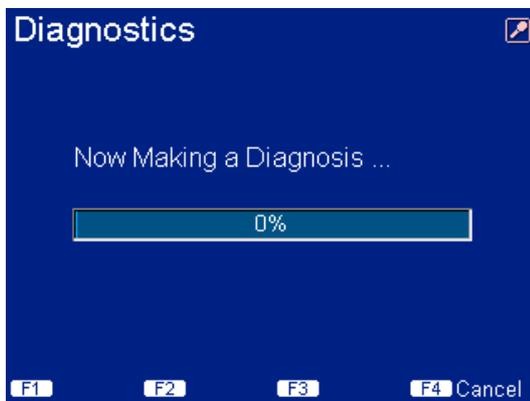
14-7. Executing Diagnostics (Diagnostics)

(See section 4-4.)

- 1 Press the F1 key in the Measurement screen.
The Utility screen is displayed.
- 2 Use the ∇ key to select “Diagnostics”.



- 3 Press the F1 key.
The diagnostics are performed.
This takes about one minute.



<To stop diagnostics>

Press the F4 key.

If an error occurs, an error code will be displayed (see section 18-2).

14-8. Checking the Recording Media Contents (TOC Viewer)

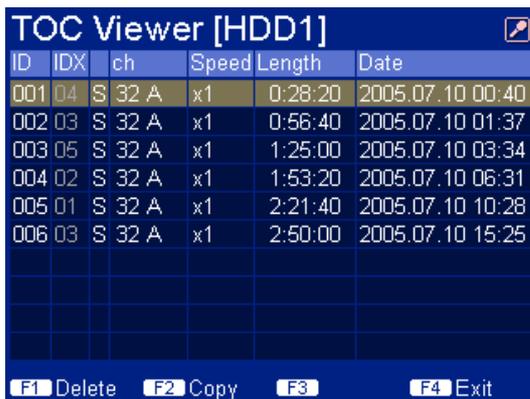
14-8-1. Viewing the TOC List

In the TOC Viewer, a list of the TOC is displayed.

In the TOC list, you can check the recording statuses of the recording medias.
ID/INDEX number search can be made for a selected ID or INDEX.

- 1 Press the F2 key in the Measurement screen.

The TOC list is displayed.



ID	IDX	ch	Speed	Length	Date
001	04	S 32 A	x1	0:28:20	2005.07.10 00:40
002	03	S 32 A	x1	0:56:40	2005.07.10 01:37
003	05	S 32 A	x1	1:25:00	2005.07.10 03:34
004	02	S 32 A	x1	1:53:20	2005.07.10 06:31
005	01	S 32 A	x1	2:21:40	2005.07.10 10:28
006	03	S 32 A	x1	2:50:00	2005.07.10 15:25

F1 Delete F2 Copy F3 F4 Exit

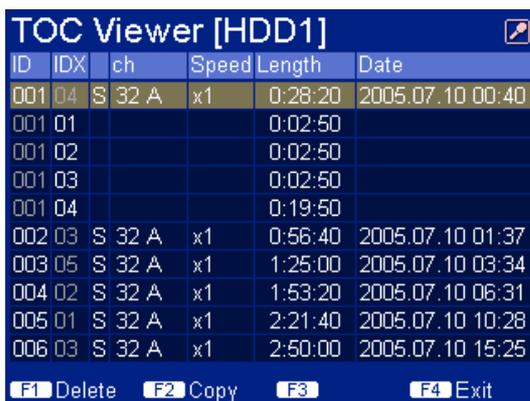
To exit the TOC Viewer, press the F4 key.

14-8-2. Detailed INDEX List including IDs

- 1 Use the Δ / ∇ key to select ID.

- 2 Press the \triangleright key.

The INDEX for selected ID are deployed and displays on the screen.

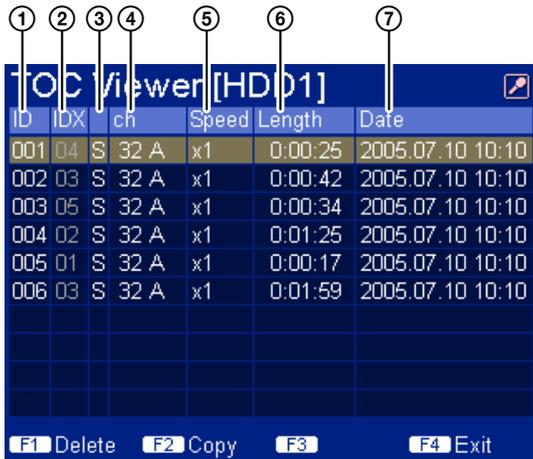


ID	IDX	ch	Speed	Length	Date
001	04	S 32 A	x1	0:28:20	2005.07.10 00:40
001	01			0:02:50	
001	02			0:02:50	
001	03			0:02:50	
001	04			0:19:50	
002	03	S 32 A	x1	0:56:40	2005.07.10 01:37
003	05	S 32 A	x1	1:25:00	2005.07.10 03:34
004	02	S 32 A	x1	1:53:20	2005.07.10 06:31
005	01	S 32 A	x1	2:21:40	2005.07.10 10:28
006	03	S 32 A	x1	2:50:00	2005.07.10 15:25

F1 Delete F2 Copy F3 F4 Exit

To close the detailed list, press the \triangleleft key.

14-8-3. TOC Screen Elements



Selecting the ID: Δ / ∇ key

Selected ID or INDEX search: SEARCH key

Operation	Key	Description
Delete	F1	Erases the data for the selected ID <small>(CAUTION 1)</small>
Copy	F2	Copies the data for the selected ID and pastes it to the end of the recording <small>(CAUTION 2)</small>

CAUTION

- Only when the start ID is selected, the erasure with the F1 key can be executed.
When “S” marking start ID is deleted, the manually increment ID that make addition under the start ID (That ID is not indicated “S” mark of the ③ Start ID on the TOC screen) is also deleted.
The remaining space in the recording media does not increase when a start ID is erased unless it is the endmost start ID.
- When IDs are created by copying, the recording start time is the time that copying was performed.
When an incremented ID is copied, a start ID is attached, and the number of indexes is displayed as “01”.
The original value remains in the data, and the original index number at recording and the recording time are displayed when played back.

① ID

This is the data ID number.

② IDX

This is the number of indexes in the IDs.

③ Start ID

An S is displayed if the ID is the recording start point.

④ ch

This is the ID recording conditions (Number of channels: Analog input A, Digital input D).

⑤ Speed

This is the recording speed.

⑥ Length

The address value at recording is displayed.

⑦ Date

This is the recording start date and time.

15. Data Recording/Playback

Be sure to check the settings before starting recording.

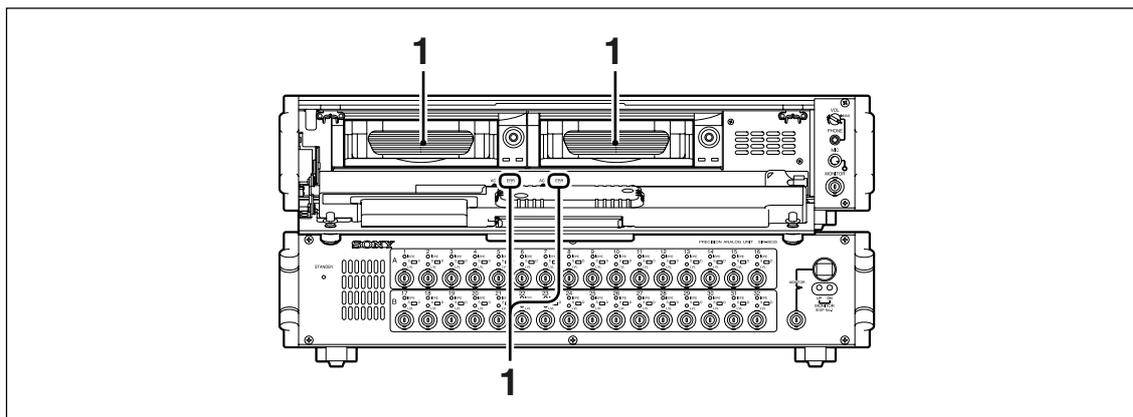
15-1. Data Recording

- 1 Insert two cartridges in the same recording state.

When the HDD is recognized normally, the recording media access lamp is lit green. When an error occurred with the HDD, the recording media error lamp is lit or blinks red.

CAUTION

If the two cartridges are not in the same recording state, the system switches to media maintenance mode.



- 2 Press the REC key.

This enters E-E mode. The input signal can be monitored on the LCD screen without recording data on the recording media. Also, the signal can be output from the monitor output connector and OUTPUT connectors.

- 3 Recheck the settings for the input format, recording/playback speed, number of channels, input range, input DC offset, and other parameters (see section 4-6).

- 4 Press the REC key and FWD key at the same time.

This enters recording mode.

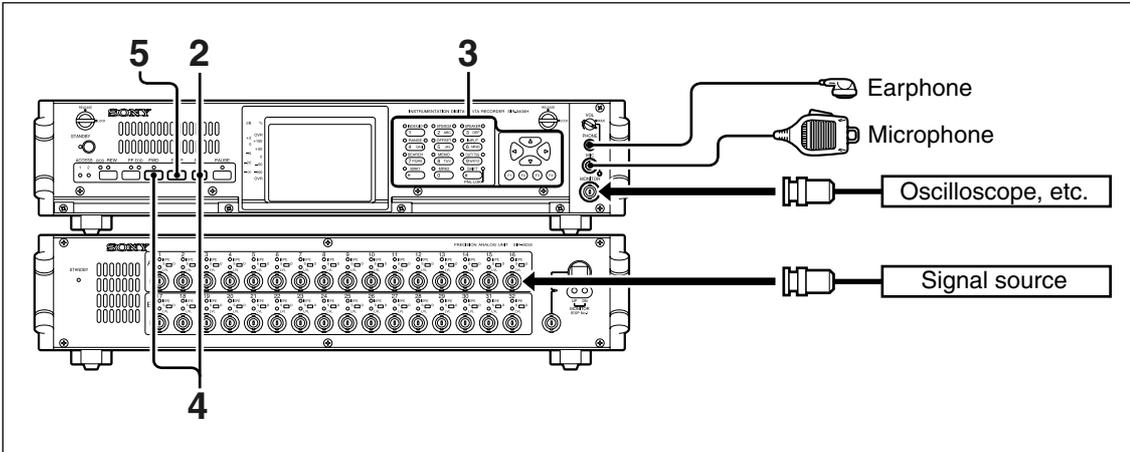
Note

- In the recording unit default settings, Overwrite is set to OFF. When Overwrite is set to OFF, data is recorded in the blank space regardless of the media position.
- The ID number increments each time recording starts, and a new ID number is assigned for the next recording. In addition, a start ID is also attached each time recording starts to allow start ID search. The INDEX number increments each time the INDEX/ID key is pressed during recording. The INDEX numbers can be used to find specific locations.

Stopping Recording

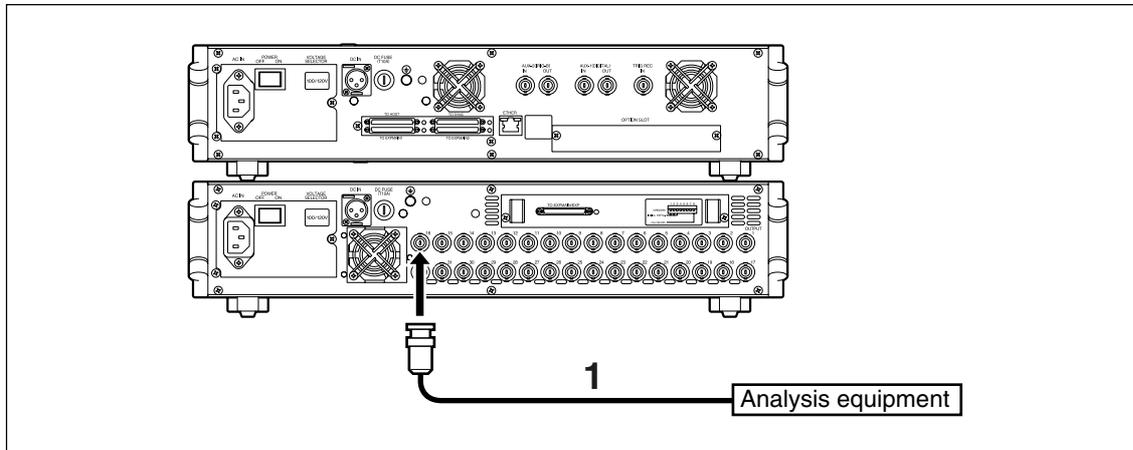
5 Press the STOP key.

This stops recording, writes a TOC (and EOD) to that position, and then the EOD lights.



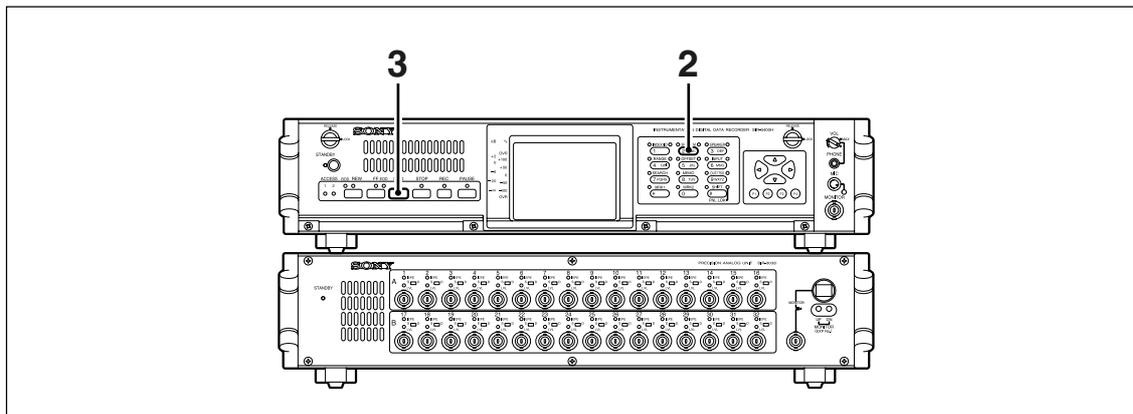
15-2. Data Playback

- 1 Use BNC cables (sold separately) to connect the channel OUTPUT connectors and the analysis equipment. A load impedance of 10 kΩ or more is recommended.



- 2 Select the playback speed with the SPD/BCM key. The selected speed appears on the LCD screen.
- 3 Insert the recorded media into the recording unit, and press the FWD key. This starts FWD (playback) mode and plays the data on the recording media.

The speed during recording appears in the speed display area, and the recording media position information appears in the recording media position information display area of the LCD screen. The input setting and recording media speed set during recording is also played back simultaneously. This makes it easy to check the conditions set during recording.



CAUTION

- Noise may be generated if data between recording blocks is played back.
- It takes max. 2 seconds from the start of playback when to set input setting the same as the settings recorded on the recording media.

15-3. Recording and Playback Voice Annotations

The unit can record and play back voice annotations along with analog data signals simultaneously. Bandwidths for the voice channels are as below.

Recording/Playback speed	Bandwidth
4	0.2 to 76.8 kHz
2	0.2 to 38.4 kHz
1 (normal speed)	0.2 to 19.2 kHz
1/2	0.2 to 9.6 kHz
1/4	0.2 to 4.8 kHz
1/8	0.2 to 2.4 kHz
1/16	0.2 to 1.2 kHz

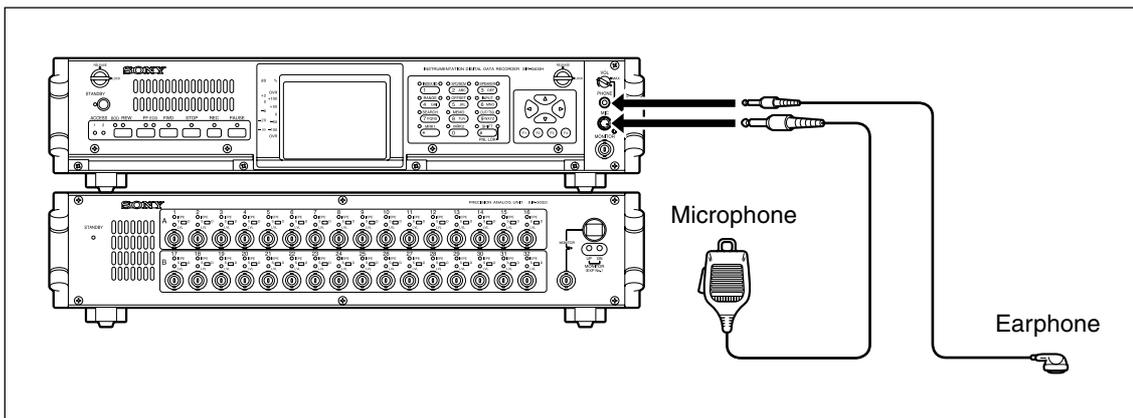
The unit's speaker has frequency response of 0.2 to 5 kHz.

CAUTION

- The signal output from the voice channel cannot be used for data analysis because it is prepared for voice annotations.
- The recording level is automatically adjusted by the AGC function.
- As the voice channel is for voice annotation, use the voice channel within the audible frequency range even if it is in the above frequency bandwidth.

15-3-1. Connecting the Microphone and Earphone

- 1 Connect the microphone (supplied) to the MIC jack on the front panel.
- 2 Connect the earphone (sold separately) to the PHONE jack on the front panel.



15-3-2. Recording Voice Annotations

- 1 When the switch on the left side of the microphone is pressed, this function is ON, and when released it goes OFF. This makes it possible to record only the necessary sounds.
- 2 The brightness of the MIC lamp (lamp at the bottom right of the MIC jack) changes based on the microphone input level.

Note

- The recording level can be adjusted automatically with the recording unit's AGC function.
- Sound cannot be output from the speaker in the REC mode or while the earphone is being used.

15-3-3. Playback Voice Annotations

When  (voice annotation) is selected with the SPEAKER key, voice annotations recorded to the recording media are played back from the speaker (or earphone when using the PHONE jack). Adjust the volume with the VOL knob.

⚠ WARNING

Be careful that you do not listen to earphone (sold separately) at a high volume for extended periods of time.

Note

- When  (voice annotation) is selected with the SPEAKER key, the data signal of the monitor channel is played back from the speaker or earphone.
- When the speed during recording and playback differ, the pitch (signal frequency) of voice annotations differs from the pitch at recording.
- The existence of voice annotations can be checked by the light of MIC lamp while the VOL knob is in the minimum position.

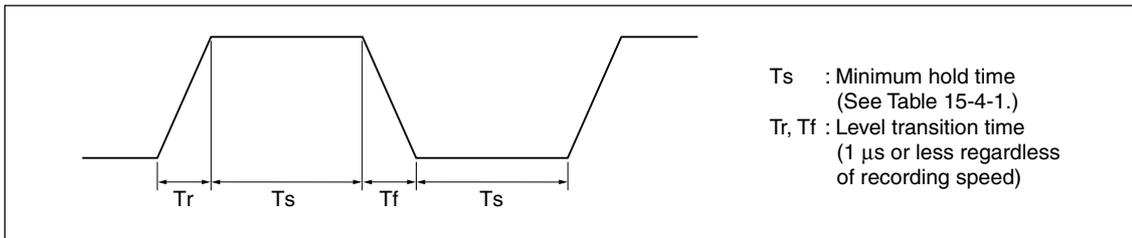
15-4. Recording and Playback AUX Digital Data

The unit can record and play back AUX digital data signals and analog data signals simultaneously. The rotating pulse and trigger pulse can be recorded and played back as the AUX digital data signal. Internal sampling frequencies for the AUX digital channels are as follows.

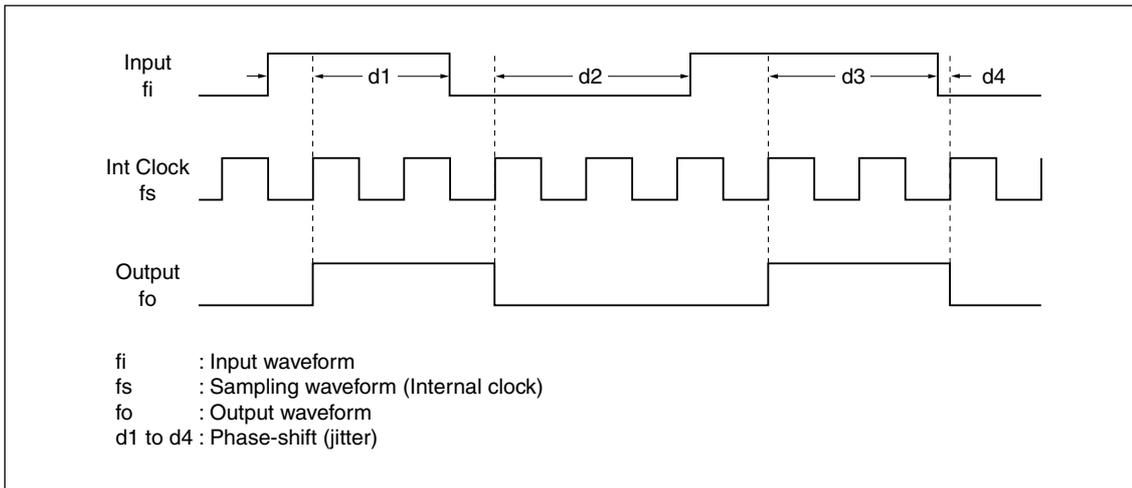
Recording/Playback speed	Sampling frequencies	Ts
4	1536 kHz	Approx. 1.5 μs
2	768 kHz	Approx. 3 μs
1 (normal speed)	384 kHz	Approx. 6 μs
1/2	192 kHz	Approx. 12 μs
1/4	96 kHz	Approx. 25 μs
1/8	48 kHz	Approx. 50 μs
1/16	24 kHz	Approx. 100 μs

Table 15-4-1

When make a recording on the AUX digital channel, the signal should conform to the following conditions:



Jitter up to a maximum of one sampling cycle occurs in the rising or falling phases of the original signals recorded by sampling. Use at an input frequency range where this effect can be ignored.



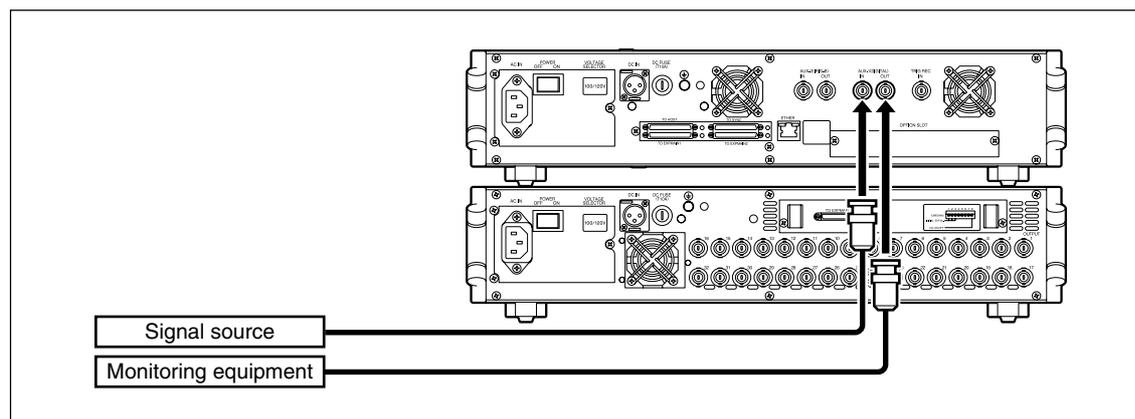
Example of phase shift caused by sampling

15-4-1. Connecting the AUX Digital Data

Use a BNC cable (sold separately) to connect the AUX-1 (DIGITAL) IN connector on the rear panel and the signal source.

If necessary, use a BNC cable to connect monitoring equipment to the AUX-1 (DIGITAL) OUT connector on the rear panel.

When AUX digital data is input (high and low occur repeatedly within a set interval) in the E-E, REC-PAUSE or REC mode, the input state is displayed in the status display area of the LCD screen. If it is not displayed, check the cable connections.



CAUTION

- Do not input simultaneously a signal with a different ground level than those of the analog data signals.
- The input/output level is TTL.

15-4-2. Recording AUX Digital Data Signals

When recording starts, the AUX digital data signal input to the AUX digital channel is recorded on the recording media simultaneously along the main data signals.

Also, when an input signal is detected, the input state is displayed in the status display area of the LCD screen.

15-4-3. Playback AUX Digital Data Signals

When playing back a recording media on which an AUX digital data signal has been recorded, the AUX digital data signal is output from the AUX-1 (DIGITAL) OUT connector on the rear panel.

Also, when a playback signal is detected, existence of the input signal during recording is displayed in the status display area of the LCD screen.

15-5. Recording and Playback AUX Analog Data

The recording unit is equipped with the main analog channel of measuring unit and the AUX-2 (IRIG-B) channel as a sub-analog channel. In this channel, the real-time clock in the unit is mainly synchronized with the inputted IRIG-B format time code and the IRIG-B time code can be recorded or played back as an analog signal simultaneously when the main analog data signal is recorded or played back.

Besides the IRIG-B time code, it can be recorded or played back as a general analog signal.

CAUTION

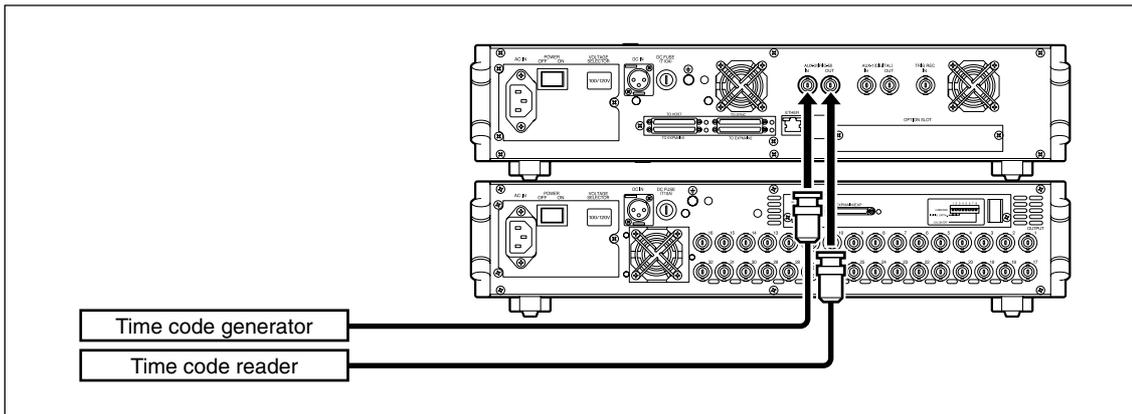
The AUX analog data input is AGC-controlled.

15-5-1. Recording and Playback IRIG-B Time Code Signal

Connecting a IRIG-B Time Code Signal

The following IRIG-B time code signal can be connected.

Code	: Amplitude modulation code (AC code)
Carrier frequency	: 1 kHz
Voltage range	: ± 1 to ± 10 Vpk
Modulation amplitude ratio	: 1:3



- 1 Set the IRIG timecode to On. (See section 8-2-6.)
- 2 Use a BNC cable (sold separately) to connect the AUX-2 (IRIG-B) IN connector on the rear panel and the IRIG-B time code signal from an IRIG time code generator.
If necessary, use a BNC cable (sold separately) to connect the AUX-2 (IRIG-B) OUT connector on the rear panel and IRIG time code reader.

CAUTION

When the IRIG timecode is set to Off, it is not handled as an IRIG-B timecode signal.

Recording IRIG-B Time Code Signal

When an IRIG-B time code signal is input to the recording unit in each mode of the E-E, REC-PAUSE or in the STOP mode and then detected properly, the input state is displayed in the status display area of the LCD screen. When it is synchronized with the real-time clock inside the recording unit, the IRIG-B timecode is loaded to the real-time clock.

When recording starts, the IRIG-B time code signal input to the AUX analog channel is recorded on the recording media along with the main data.

Also, the recording unit's real-time clock to which the IRIG time has been loaded changes to the S-TIME (xxxxYxxMxxD/xxHxxMxxS), and is recorded on the recording unit along with the main data. This information can be used as accurate position data for search, playback and data transfer.

Note

- Being properly detected, the 3-digit date (001 to 366) of the IRIG-B time code data is converted to “-YxxMxxD” (normal year) and combined with the year value “xxxxY” of the recording unit's real-time clock at the time or recording to form the S-TIME information (xxxxYxxMxxD).
- When the IRIG time has been loaded to the real-time clock, the clock proceeds at crystal accuracy when the IRIG-B time code signal is removed.
- IRIG time code can input the clock signal irrespective of any mode setting status such as E-E or STOP mode, when the signal is detected correctly, the internal clock is updated.
- When the input status is not displayed on the LCD screen, the clock information for the IRIG-B time code is not recorded.

Playback IRIG-B Time Code Signal

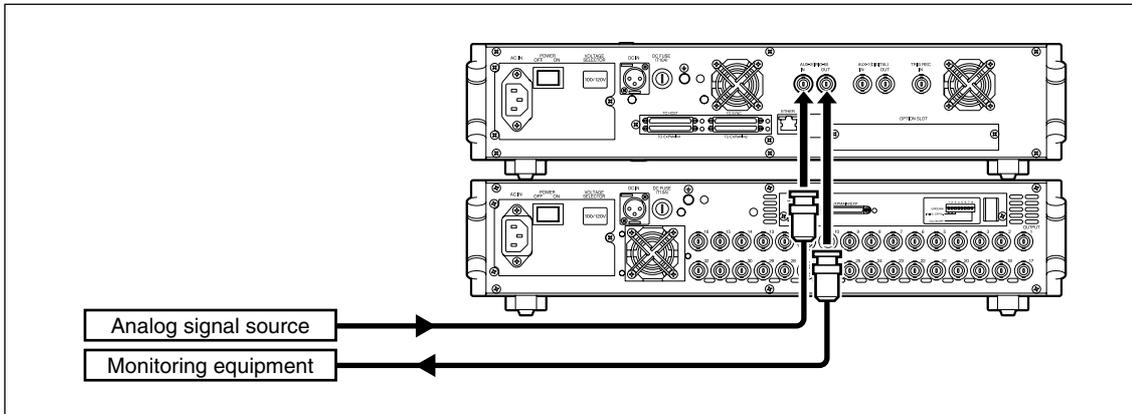
When a recording media recorded with an IRIG-B time code signal in the AUX-2 (IRIG) channel is played back, the input state at recording is displayed in the status display area of the LCD screen.

Further, the raw IRIG-B time code signal recorded on the recording media can be output from the AUX-2 (IRIG-B) OUT connector on the rear panel, and can be read by an IRIG time code reader.

For the R-TIME information in the recording media position display area during playback, the recording unit's real-time clock value (xxYxxMxxD/xxHxxMxxS) recorded on the recording media is displayed. This value corresponds to the IRIG time recorded on the recording media.

15-5-2. Recording and Playback AUX Analog Data

Connecting the AUX Analog Signals



- 1** Set the IRIG timecode to Off. (See section 8-2-6.)
- 2** Use a BNC cable (sold separately) to connect the AUX-2 (IRIG-B) IN connector on the rear panel and the AUX analog data signal from the AUX analog signal source.
If necessary, use a BNC cable (sold separately) to connect the AUX-2 (IRIG-B) OUT connector on the rear panel and monitoring equipment.
When the AUX analog data signal is input, the input state is displayed in the status display area of the LCD screen in the mode each of E-E, REC, REC-PAUSE. If it is not displayed, check the cable connections.

CAUTION

- The AUX analog signal is AGC-controlled.
- The rated input level of AUX analog data signals is ± 2 Vpk.
The maximum input level is approximately ± 3 Vpk.

Recording AUX Analog Data Signal

When recording starts, the AUX analog data signal input to the AUX analog channel is recorded on the recording media simultaneously along the main data signals.

Playing Back AUX Analog Data Signal

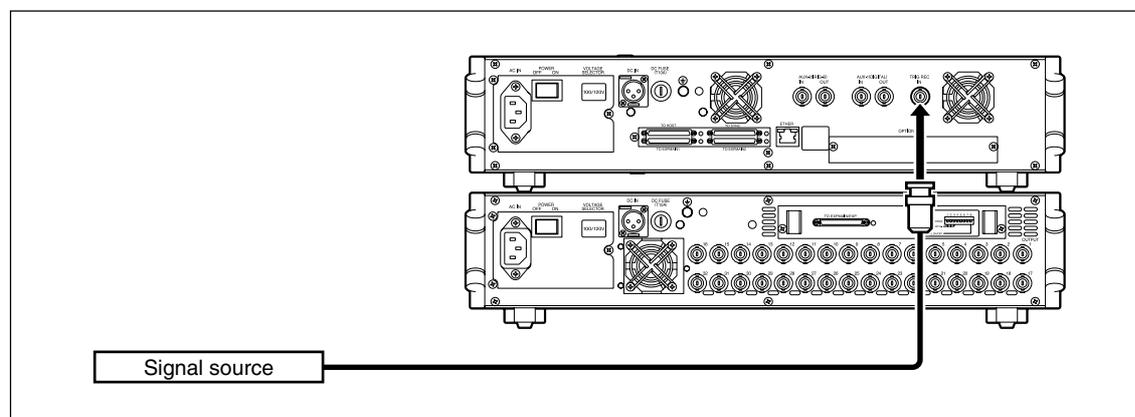
When a recording media recorded with an AUX analog data signal is played back, the AUX analog data signal is output from the AUX-2 (IRIG-B) OUT connector on the rear panel.

15-6. Trigger Recording

15-6-1. Connecting the Trigger Signal

- 1 Set the trigger mode Single or Multi according to the purpose. (See section 8-1.)
 - In REC-PAUSE mode -
 - <When set to Single>
 - Recording starts when the trigger input signal changes from High to Low, and it continues recording until the STOP key is pressed.
 - <When set to Multi>
 - Recording starts when the trigger input signal changes from High to Low, and the mode changes to REC-PAUSE when the signal changes from Low to High.

- 2 Use a BNC cable (sold separately) to connect the TRIG REC IN connector on the rear panel and the trigger signal.



CAUTION

- If the ADDRESS duration is less than 2 seconds, the next signal may not start up.
- The input voltage level should be TTL level.

15-6-2. Trigger Recording

- 1 Set the recording unit to REC-PAUSE mode.
- 2 Input the trigger signal from the trigger signal source, or press the PAUSE key to cancel REC-PAUSE mode.

Recording is started.

<When pre-trigger recording is set to On>

Recording is performed according to the preset pre-trigger time based on the recording speed.

CAUTION

Before the trigger signal is input, if REC-PAUSE mode is not held for the pre-trigger time, the entire pre-trigger data cannot be recorded. If the recording speed is set to 1/2, 1/4, and so on, the pre-trigger time becomes 2×, 4×, and so on respectively by comparison of 1× (approx. 2 seconds) pre-trigger time.

<When pre-trigger recording is set to Off>

Data is recorded immediately after being triggered.

* See section 8 for pre-trigger recording.

15-6-3. Playback of the Pre-trigger Data

The pre-trigger data is played back with the ADDRESS “-000H00M00S”.

16. Search

The target data on the recording media can be quickly accessed using the search function. The following searches are available.

Search type	Control	
	Front panel	Host computer
Start ID	○	○
ID/INDEX number	○	○
Mark	○	×
Address	×	○
Real-time clock or IRIG time	×	○

The lamp display during ID/INDEX number search and Mark search modes are shown below.

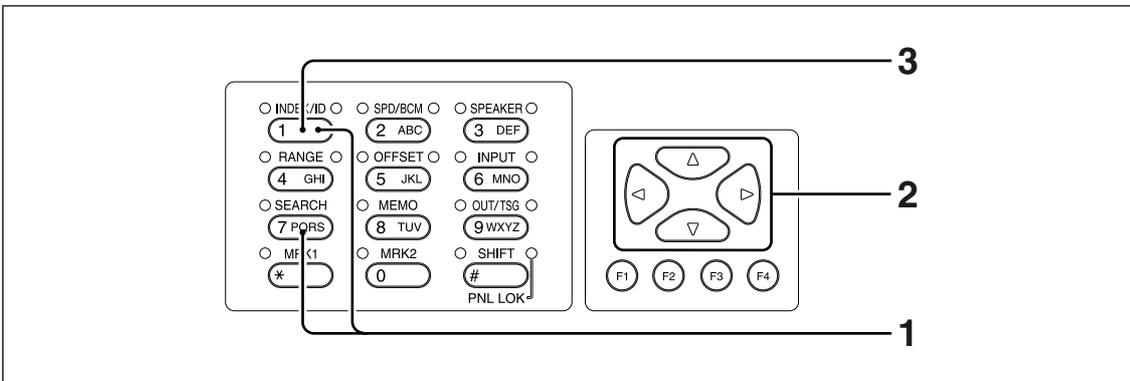
Search operation	Lamp		
	SEARCH	INDEX/ID	Mark1, Mark2
SEARCH key pressed	Lit	Blinking	Blinking
Searching	Blinking	Lamp of selected mode lit	
FOUND (ends normally)	Off	Off	Off
NOT FOUND (target not found)	Off	Off	Off

16-1. ID/INDEX Number Search

This sets the target ID/INDEX number and searches the start.
The search stops after the target point is found.

16-1-1. Searching with the SEARCH key

- 1** Press the SEARCH key in STOP mode, and then press the INDEX/ID key.
ID/INDEX number search mode is started.
- 2** Use the ◀ / ▶ / ▲ / ▼ keys to set the target ID/INDEX number.
- 3** Press the INDEX/ID key.
This searches for the start point of the target ID/INDEX and then stops.



16-1-2. Searching with the TOC Viewer (see 14-8)

- 1** Use the TOC Viewer to select the target ID/INDEX number.
- 2** Press the SEARCH key.
This searches for the start point of the target ID/INDEX and then stops.

16-2. Start ID Search

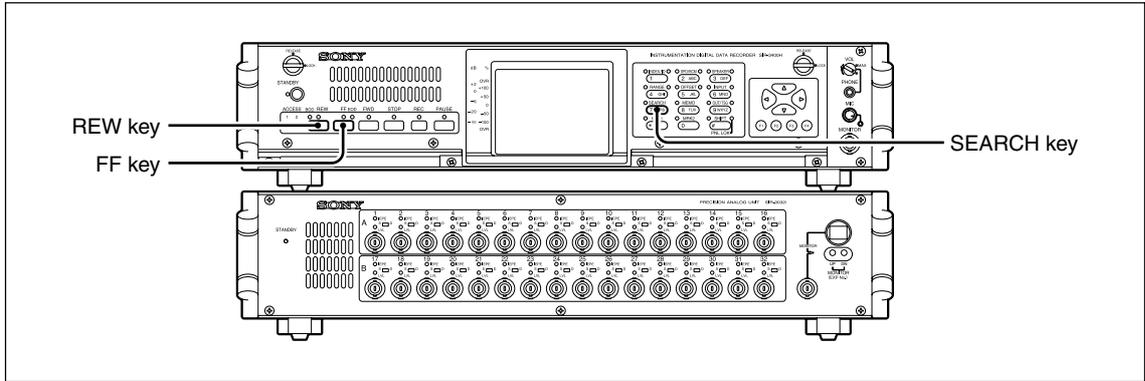
This searches the ID at the start position for each recording.
The search stops after the target point is found.

16-2-1. Searching at the Next Recording Start Position

Press the SEARCH key in STOP mode, and then press the FF key.
This skips to and stops at the start point of the next recording from the current position.

16-2-2. Searching at the Current Recording Start Position

Press the SEARCH key in STOP mode, and then press the REW key.
 This returns to and stops at the start point of the current recording.



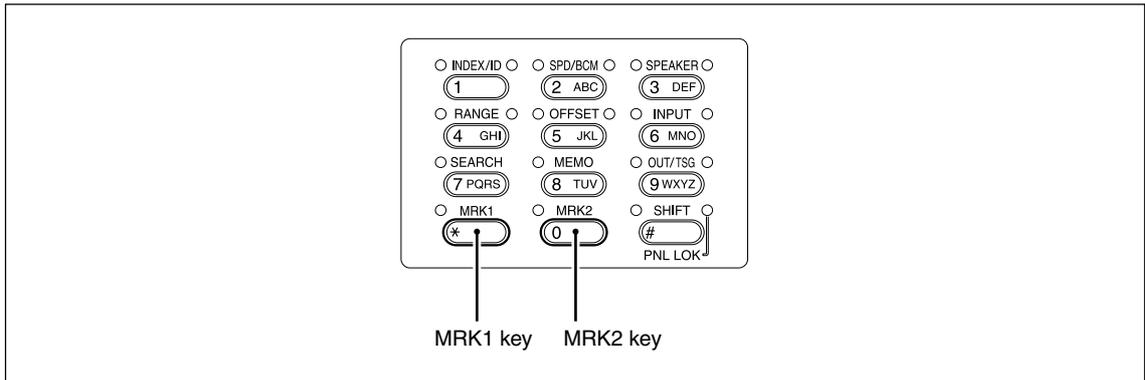
16-3. Mark Search

Pressing the MRK1/MRK2 key at any recording media position, allows that position to be searched later.
 The search stops after the target point is found.
 For details about the mark setting, see section 12-12.

Press the SEARCH key, and then press the Mark key for either MRK1 or MRK2 for whichever mark you want to find.
 This searches for the preset mark and stops at that location.

CAUTION

- The recording media position information changes each time the MRK1/MRK2 key is pressed.
- When searches are made at a slow speed (1/4, 1/8, 1/16), the marked points and target may be displaced by up to three seconds from the real-time clock value.



16-4. Address Search

This function searches target by the address value.
 It is controlled from the host computer by Telnet (See section 17).

16-5. Real-time Clock Search

This function searches target by the real-time clock value recorded on the recording media. It is controlled from the host computer by Telnet (See section 17).

16-6. Manual Search

Forward or reverse searches can be performed manually regardless of the ID or INDEX.

Forward search

- 1 While pressing the FWD key, press the FF key.
The contents fast-forward while the keys are held down (16×-speed fast forward).
* When the FF key is released, the mode changes to FWD.

Reverse search

- 1 While pressing the FWD key, press the REW key.
The contents rewind while the keys are held down (16×-speed rewind).
* When the REW key is released, the mode changes to FWD.

17. Control by Telnet

The ETHER (RJ45) connector on the rear panel of the unit uses a signal format compliant with TCP/IP. This enables control from a host computer by connecting a LAN cable (sold separately).

CAUTION

Use a cross cable if the LAN cable is connected directly to another computer.

When controlling a recording unit using Telnet, use the ERR? and ALM? commands to monitor the recording unit status.

TCP/IP (Telnet) connection

HOST IP address : 192.168.1.100 (default setting)

Port no. : 23

Login : xxxx

Password : sms

After entering this information, the commands can be executed.

Type "quit" to disconnect from Telnet.

17-1. Command Overview

Setting Commands

The command, that can be output to the recording unit from a host computer are as follows:

Command	Function	Comments
BAR :	Bar meter control	
CAL :	Calibration	
CHA :	Channel mode setting	
FMT :	Recording media formatting	
FTP :	Frequency type setting	
IDS :	ID increment	
INP :	Input format setting	
MEM :	Recording memo setting	
MOD :	Transport mode setting	
MON :	Monitor channel selection	
OFS :	Input DC offset setting	
OPL :	Output level selection	
PNL :	Panel lock	
RNG :	Input range setting	
RPT :	Auto repeat	
SCH :	Search	
SLF :	Diagnostics	
SPD :	Recording/playback speed setting	
SYN :	Selecting synchronous playback	
TIM :	Real-time clock setting	
TRG :	Trigger setting	
TRM :	Terminator selection	
TSG :	Test signal selection	
UTL :	Utility mode setting	Only during stop

Status Commands

When a status request is received from a host computer, the recording unit sends back the following setting value or status contents:

Command	Function	Comments
ADR?	Recording media ADDRESS	
ALM?	Alarm status	
AUX?	Front panel status	
BAR?	Bar meter setting readout	
CAC?	Calibration Protect Status	
CAL?	Calibration status	
CHA?	Channel mode setting readout	
CFG?	Unit configuration	
CMD?	Command check	
ERR?	Error check	
FMT?	Recording media formatting execution status	
FTP?	Frequency type readout	
IDS?	Recording media ID number readout	
INP?	Input format setting readout	
LVA?	Signal level readout (text format)	
LVB?	Signal level readout (binary format)	
MEM?	Recording memo readout	
MOD?	Transport mode readout	
MON?	Monitor channel setting readout	
OFS?	Input DC offset value readout	
OPL?	Output level setting readout	
PNL?	Panel lock status readout	
RNG?	Input range setting value readout	
RPT?	Auto repeat status readout	
SCH?	Search status	
SLF?	Diagnostics status	
SPD?	Recording media speed readout	
STA?	Status A	
STH?	Hard disk status	
SYN?	Synchronous playback status	
TIM?	Real-time clock readout	
TOC?	TOC data readout	
TRG?	Trigger setting status	
TRM?	Terminator selection status (returned strings)	
TSG?	Test signal selection status	
UTL?	Utility mode setting readout	
VOL?	Recording media volume readout	

17-2. Command Details

Setting Commands

All commands use ASCII code. Each command ends with an LF (line feed), CR (carriage return) or CR + LF.

<>: This is the command parameter, and represents one English character.

/[]: This enables commands to be specified for individual recording units when multiple recorders are connected such as during synchronous operation. The / [] parameter specifies any one ID number. This specification can be omitted when only one recording unit is connected or when the target is the recording unit with ID=0.

When performing synchronous operation with two recording units, the master is ID=0 and the subordinate is ID=1.

Command	Contents
BAR : Command format	<p>Bar meter control BAR : <1><2>/[] <1> : 0=Real-time, 1=Peak hold <2> : 0=Unidirectional, 1=Bidirectional Ex.) BAR : 01 — Real-time and bidirectional set. BAR : 11/1 — Peak hold and bidirectional set for recorders Master=0, Subordinate=1. Related command : BAR?</p>
CAL : Command format	<p>Calibration CAL : <1>/[] <1> : 0=Calibration stop, 1=Calibration start The results can be viewed using the CAL? command. Related command : CAL?</p>
CHA : Command format	<p>Channel mode setting CHA : <1><2>/[] <1> : Analog channel code <2> : Digital channel code 0=OFF 0=OFF 1=RSV 1=1 ch (Async) 2=RSV 2=2 ch (Async) 3=RSV 3=4 ch (Async) 4=RSV 4=8 ch (Async) 5=16 ch (SIR-1000/1000i) 5=RSV 6=32 ch (SIR-1000/1000i/3400H/3100T) 6=RSV 7=64 ch (SIR-1000/1000i/3400H/3100T) 7=RSV 8=128 ch (SIR-1000/1000i/3400H/3100T) 8=RSV 9=RSV 9=RSV A=RSV A=1 ch (Sync) B=2 ch (SIR-1000W) B=2 ch (Sync) C=4 ch (SIR-1000W) C=4 ch (Sync) D=8 ch (SIR-1000W) D=8 ch (Sync) E=16 ch (SIR-1000W) E=RSV F=RSV F=RSV</p> <p>Note Analog and digital channel modes can be used together in only certain combinations. In this mode, the digital channel can be set. Related command : CHA?</p>
FMT : Command format	<p>Recording media formatting FMT : <1><2><3><4>/[] <1> : 0=RSV, 1=Formatting start <2><3><4> : ID number at formatting (001)</p> <p>Note This command logically erases all pre-recorded data. Related command : FMT?</p>
FTP : Command format	<p>Frequency type setting FTP : <1> <1> : 0=48 k sampling, 1=65.536 k sampling</p>

Command	Contents
IDS : Command format	ID increment IDS : <1> <1> : 0=RSV, 1=ID increment The recording unit ID is incremented each time the IDS : 1 command is issued. Related command : IDS?
INP : Command format	Input format setting INP : <1><2>...<17>/[] <1> : Measuring unit ID number 0=Measuring unit 1 1 to 16 CH 1=Measuring unit 1 17 to 32 CH 2=Measuring unit 2 33 to 48 CH 3=Measuring unit 2 49 to 64 CH 4=Measuring unit 3 65 to 80 CH 5=Measuring unit 3 81 to 96 CH 6=Measuring unit 4 97 to 112 CH 7=Measuring unit 4 113 to 128 CH <2> : Input format for CH1 0=DIRECT-DC coupling 1=DIRECT-AC coupling 2=IEPE 3=TEDS <3> : Input format for CH2 : <17> : Input format for CH16 Related command : INP?
MEM : Command format	Recording memo setting MEM : <1><2>...<96>/[] <1><2>...<96>: ASCII characters (20h to FFhex) up to maximum 96 characters Ex.) MEM:MEASUREMENT-1 — (Annotation character string “MEASUREMENT-1” set.) Related command : MEM?
MOD : Command format	Transport mode setting MOD : <1>/[] <1> : 0=STOP, 1=FWD, 2=E-E, 3=REC, 4=FWD-PAUSE, 5=REC-PAUSE, 6=FF, 7=RSV, 8=REW, 9=RSV, A=EJECT Ex.) MOD : 1 — FWD mode Related command : MOD?
MON : Command format	Monitor channel selection MON : <1><2>/[] <1> : Measuring unit ID number 0=Measuring unit 1 1 to 16 CH 1=Measuring unit 1 17 to 32 CH 2=Measuring unit 2 33 to 48 CH 3=Measuring unit 2 49 to 64 CH 4=Measuring unit 3 65 to 80 CH 5=Measuring unit 3 81 to 96 CH 6=Measuring unit 4 97 to 112 CH 7=Measuring unit 4 113 to 128 CH <2> : Channel code 0=CH 1 1=CH 2 2=CH 3 3=CH 4 4=CH 5 5=CH 6 6=CH 7 7=CH 8 8=CH 9 9=CH 10 A=CH 11 B=CH 12 C=CH 13 D=CH 14 E=CH 15 F=CH 16 Related command : MON?

Command	Contents
OFS : Command format	Input DC offset setting OFS : <1><2>...<33>/[] <1> : Measuring unit ID number (0=Recording unit) 0=Measuring unit 1 1 to 16 CH 1=Measuring unit 1 17 to 32 CH 2=Measuring unit 2 33 to 48 CH 3=Measuring unit 2 49 to 64 CH 4=Measuring unit 3 65 to 80 CH 5=Measuring unit 3 81 to 96 CH 6=Measuring unit 4 97 to 112 CH 7=Measuring unit 4 113 to 128 CH <2><3> : CH 1 DC offset <4><5> : CH 2 DC offset .. <32><33> : CH 16 DC offset The DC offset value is expressed as a 2-digit hexadecimal number. Ex.) OFS : 000100022334500FFCE2345220034A1FB 00 : 0 % 01 : 1 % 10 : 16 % 32 : 50 % 64 : 100 % FF : -1 % CE : -50 % 9C : -100 % Related command : OFS?
OPL : Command format	Output level selection OPL : <1><2>...<17> <1> : Measuring unit ID number (0=Recording unit) 0=Measuring unit 1 1 to 16 CH 1=Measuring unit 1 17 to 32 CH 2=Measuring unit 2 33 to 48 CH 3=Measuring unit 2 49 to 64 CH 4=Measuring unit 3 65 to 80 CH 5=Measuring unit 3 81 to 96 CH 6=Measuring unit 4 97 to 112 CH 7=Measuring unit 4 113 to 128 CH <2> : CH 1 output level code <3> : CH 2 output level code .. <17> : CH 16 output level code Output level code 0=RSV, 1=RSV, 2=5 V, 3=2 V, 4=1 V, 5=RSV, 6=RSV, 7=RSV, 8=RSV, 9=RSV, Variable values (Hex) for A=5 or higher. Related command : OPL?
PNL : Command format	Panel lock PNL : <1>/[] <1> : 0=Panel lock canceled, 1=Panel lock set Related command : PNL?
RNG : Command format	Input range setting RNG : <1><2>...<17>/[] <1> : Measuring unit ID number 0=Measuring unit 1 1 to 16 CH 1=Measuring unit 1 17 to 32 CH 2=Measuring unit 2 33 to 48 CH 3=Measuring unit 2 49 to 64 CH 4=Measuring unit 3 65 to 80 CH 5=Measuring unit 3 81 to 96 CH 6=Measuring unit 4 97 to 112 CH 7=Measuring unit 4 113 to 128 CH <2> : CH 1 input range code <3> : CH 2 input range code .. <17> : CH 16 input range code Input range code 0=RSV, 1=10 V, 2=5 V, 3=2 V, 4=1 V, 5=0.5 V, 6=0.2 V, 7=0.1 V Related command : RNG?

Command	Contents
RPT : Command format	Auto repeat RPT : <1>/[] <1> : 0=Auto repeat stop, 1=Auto repeat start Related command : RPT?
SCH : Command format	Search SCH : <1><2>...<N>/[] ID number search <1> : 0 <2><3><4> : 001 to 999 or 000 Real-time clock search <1> : 1 <2><3>...<13> : YYMMDDhhmmss Address search <1> : 2 <2><3>...<8> : hhhmmss Start ID search <1> : 3 <2> : 0=Forward, 1=Backward Ex.) SCH : 0100 — Target : ID=100 SCH : 1050506120000 — Target : 2005, May 6, 12:00:00 Related command : SCH? Note When searching the ID increment, the search stops at the position of offset from the start ID. The address and the time code before one second are displayed.
SLF : Command format	Diagnostics SLF : <1>/[] <1> : 0=Diagnostics stop, 1=Diagnostics start Related command : SLF?
SPD : Command format	Recording/playback speed setting SPD : <1> <1> : 0=1 × (normal speed), 1=1/2 ×, 2=1/4 ×, 3=1/8 ×, 4=1/16 ×, A=×2, B=×4, F=EXT Related command : SPD?
SYN : Command format	Selecting synchronous playback SYN : <1>/[] <1> : 0=The master playback while the subordinate stops. (Default) 1=Both the master and the subordinate restart synchronous play back. Related command : SYN?
TIM : Command format	Real-time clock setting TIM : <1><2>...<12> <1><2> : Year (last 2 digits) <3><4><5><6> : Month and date <7><8><9><10><11><12> : Hours, minutes and seconds Related command : TIM?
TRG : Command format	Trigger setting TRG : <1> <1> : 0=RSV 1=Pre-trigger single mode (low: start) 2=Pre-trigger multi mode (low: start, high: stop) 3=Normal single mode (low: start) 4=Normal multi mode (low: start, high: stop) Related command : TRG?
TRM : Command format	Terminator selection TRM : <1> <1> : 0=CR + LF, 1=CR, 2=LF This sets the break code for replies from the recording unit. The default is (CR + LF). Related command : TRM?

Command	Contents
TSG : Command format	Test signal selection TSG : <1>/[] <1> : Test signal selection Analog channel 0=OFF 1=AC 2=+DC 3=-DC 4=GND 5=RSV Related command : TSG?
UTL: Command format	Utility mode setting UTL : <1><2><3><4><5><6><7> <1> : 0=None 1=Rebuild <2> : 0=Contents in the drive 1 is reflected on the drive 2. 1=Contents in the drive 2 is reflected on the drive 1. <3> : 0=None 1=The specified ID is deleted. <4> : 100 digits ID <5> : 10 digits ID <6> : 1 digit ID <7> : RSV CAUTION In case of <1> and <3>, when one is set to "1", be sue to set the other to "0". Ex.) OK <1> : 1, <3> : 0 NG <1> : 1, <3> : 1 Related command : UTL? CAUTION When not selecting the mode, it all sets to ZERO.

Status Commands

Status commands are used to request status information from the recording unit. When the recording unit receives a status command, it sends the corresponding status information.

Note

The `/[]` parameter specifies any one ID number, and can be omitted when only one recording unit is connected or when the target is the recording unit with ID=0. When performing synchronous operation, the master is ID=0 and the subordinate is ID=1.

Command	Contents
ADR? Command format Returned format	Recording media ADDRESS ADR?/[] ADR : <1><2>...<14> Recording media ADDRESS <1><2><3> : hhh (hour) <4><5> : mm (minutes) <6><7> : ss (seconds) Remain <8><9><10> : hhh (hour) <11><12> : mm (minutes) <13><14> : ss (seconds) Ex.) ADR? (current recording media ADDRESS requested) ADR?/1 (current recording media ADDRESS for recording unit with ID=1 requested)
ALM? Command format Returned format	Alarm status ALM?/[] ALM : <1><2><3><4> <1> : 0=Normal, 1=Power supply voltage drop <2> : 0=Normal, 1=Condensation <3> : 0=Normal, 1=Recording/playback error (buffer over/underflow) <4> : 0 (other)
AUX? Command format Returned format	Front panel status AUX?/[] AUX : <1><2><3> Status of AUX1 0=RSV Status of AUX2 0=OFF 1=ON Status of EXT TC 0=OFF 1=ON Ex.) AUX : 100 AUX1=ON AUX : 010 AUX2=ON AUX : 001 EXT TC=ON
BAR? Command format Returned format	Bar meter setting readout BAR?/[] BAR : <1><2> <1> : 0=Real-time, 1=Peak hold <2> : 0=Unidirectional, 1=Bidirectional Related command : BAR
CAC? Command format Returned format	Calibration protect status CAC?/[] CAC : <1> <1> : 0=The measuring unit can be calibrated. 1=The calibration of the measuring unit is inhibited.
CAL? Command format Returned format	Calibration status CAL?/[] CAL : <1> <1> : 0=Calibration finished normally 1=Calibration finished abnormally 2 to 7=Value other than 01 Related command : CAL

Command	Contents
ERR? Command format Returned format	Error check ERR? ERR : <1><2>...<5> <1> : Power supply system 0=No error, 1=Error <2> : DSP system 0=No error, 1=Error <3> : Analog system 0=No error, 1=Error <4> : Recording system 0=No error, 1=Error <5> : Peripherals 0=No error, 1=Error Related commands : CAL, SLF
FMT? Command format Returned format	Recording media formatting execution status FMT?/[] FMT : <1><2><3><4> <1> : 0=Other than below (after power-on or STOP command execution, etc.) 1=Recording media formatting underway 2=Recording media formatting finished normally (becomes "0" after FMT?) 3=Recording media formatting finished abnormally (becomes "0" after FMT?) <2><3><4> : ID number (001 to 999) Related command : FMT
FTP? Command format Returned format	Frequency type readout FTP?<1>/[] FTP : <1> <1> : 0=48 k sampling 1=65.536 k sampling
IDS? Command format Returned format	Recording media ID number readout IDS?/[] IDS : <1><2><3> <1><2><3> : ID number (000 to 999) Related command : IDS
INP? Command format Returned format	Input format setting and readout INP?<1><2>/[] INP : <1><2>...<18> <1> : 0=Recording unit setting data, 1=Recording media data <2> : Measuring unit ID number 0=Measuring unit 1 1 to 16 CH 1=Measuring unit 1 17 to 32 CH 2=Measuring unit 2 33 to 48 CH 3=Measuring unit 2 49 to 64 CH 4=Measuring unit 3 65 to 80 CH 5=Measuring unit 3 81 to 96 CH 6=Measuring unit 4 97 to 112 CH 7=Measuring unit 4 113 to 128 CH <3> : Input format for CH1 0=DIRECT-DC coupling 1=DIRECT-AC coupling 2=IEPE 3=TEDS <4> : Input format for CH2 : <18> : Input format for CH16 Related command : INP

Command	Contents
LVA? Command format Returned format	Signal level readout (text format) LVA? <1>/[] <1> : Measuring unit ID number (0=Recording unit) LVA : <1><2>...<32> during unidirectional (related to BAR command) <1><2> : CH 1 data (2-digit hexadecimal) ... <31><32> : CH 16 data (2-digit hexadecimal) 7F=MAX and overload (OVR) 00=MIN LVA : <1><2>...<64> during bidirectional (related to BAR command) <1><2> : CH 1 MAX data (2-digit hexadecimal) <3><4> : CH 1 MIN data (2-digit hexadecimal) ... <61><62> : CH 16 MAX data (2-digit hexadecimal) <63><64> : CH 16 MIN data (2-digit hexadecimal) 7F=MAX and overload (OVR), +100 % = 60 80=MIN and overload (OVR), -100 % = A0
LVB? Command format Returned format Returned format	Signal level readout (binary format) LVB? <1>/[] <1> : Measuring unit ID number (0=Recording unit) LVB : <1><2>...<16> during unidirectional (related to BAR command) <1> : CH 1 data (binary) ... <16> : CH 16 data (binary) 7F=MAX and overload (OVR) 00=MIN LVB : <1><2>...<32> during bidirectional (related to BAR command) <1> : CH 1 MAX data <2> : CH 1 MAX data ... <31> : CH 16 MAX data <32> : CH 16 MAX data 7F=MAX and overload (OVR) 80=MAX and overload (OVR)
MEM? Command format Returned format	Recording memo readout MEM? <1>/[] <1> : 0=Recording unit setting data, 1=Recording media data MEM : <1><2>...<96> <1><2>...<96>: Text characters up to maximum 96 characters Related command : MEM
MOD? Command format Returned format	Transport mode readout MOD? /[] MOD : <1><2> <1> : 0=STOP, 1=FWD, 2=E-E, 3=REC, 4=FWD-PAUSE, 5=REC-PAUSE, 6=FF, 7=RSV, 8=REW, 9=RSV, A=EJECT <2> : S=During STOP transition P=During PAUSE transition 0=The end of transition F=During FWD Transition Related command : MOD

Command	Contents
RNG? Command format Returned format	Input range setting value readout RNG? <1><2>/[] <1> : 0=Recording unit setting value, 1=Recording media data <2> : Measuring unit ID number 0=Measuring unit 1 1=Measuring unit 1 2=Measuring unit 2 3=Measuring unit 2 4=Measuring unit 3 5=Measuring unit 3 6=Measuring unit 4 7=Measuring unit 4 RNG : <1><2>...<16> <1> : CH 1 input range code <2> : CH 2 input range code ... <16> : CH 16 input range code Input range code 0=RSV, 1=10 V, 2=5 V, 3=2 V, 4=1 V, 5=0.5 V, 6=0.2 V, 7=0.1 V Related command : RNG
RPT? Command format Returned format	Auto repeat status readout RPT? /[] RPT : <1> <1> : 0=Other than below 1=Auto repeat — recording 2=Auto repeat — rewinding Related command : RPT
SCH? Command format Returned format	Search status SCH? /[] SCH : <1> <1> : 0=Other than below (after power-on STOP command execution) 1=Search underway 2=Search finished (FOUND) 3=Search finished (NOT FOUND) Related command : SCH
SLF? Command format Returned format	Diagnostics status SLF? /[] SLF : <1> <1> : 0=Other than below (after power-on STOP command execution) 1=Diagnostics underway 2=Diagnostics finished (OK) 3=Diagnostics finished (NG) Related command : SLF Related command : ERR?
SPD? Command format Returned format	Recording media speed readout SPD? <1>/[] <1> : 0=Recording unit setting value, 1=Recording media data SPD : <1> <1> : 0=1 x, 1=1/2 x, 2=1/4 x, 3=1/8 x, 4=1/16 x, A=x2, B=x4, F=EXT Related command : SPD

Command	Contents
STA? Command format Returned format	Status A STA? /[] STA:<1><2>...<7> <1>: Tape loading status 0 = Tape not loaded 1 = Loading underway 2 = Loading finished (tape loaded) 3 = Eject underway <2>: Tape position 0 = Other than below 1 = BOD 2 = EOD 3 = EOM <3>: Reserve 0 <4>: Reserve 0 <5>: Write protect 0 = Protect OFF 1 = Protect ON <6>: Reserve 0 <7>: Tape format 0 = Standard
STH? Command format Returned format	Hard disk status STH? /[] STH : <1><2> <1> : HDD1 0=Ready, 1=Busy, 2=Error <2> : HDD2 0=Ready, 1=Busy, 2=Error
SYN? Command format Returned format	Synchronous playback status SYN? /[] SYN : <1> <1> : 0=The master playback while the subordinate stops. 1=After ID search, both the master and the subordinate play back. Related command : SYN
TIM? Command format Returned format	Real-time clock readout TIM? <1>/[] <1> : 0=Recording unit setting value, 1=Recording media data TIM : <1><2>...<12> <1><2> : Year (last 2 digits) <3><4><5><6> : Month and date <7><8><9><10><11><12> : Hours, minutes and seconds Related command : TIM

Command	Contents
TOC? Command format Returned format	TOC data readout TOC? <1><2><3>/[] <1><2><3>: ID number TOC : <1><2>...<25> <1> : Start ID 0=Not start ID 1=Start ID <2> : REC mode 0=16 ch analog mode (standard) 1=Full analog mode 2=Full digital mode (when SBS-10A/S is used) 3=Analog + digital mode <3> : CH code When <2> is 0, 1, or 3, which means analog CH mode. 1=2 ch, 2=4 ch, 3=8 ch, 4=16 ch, 5=32 ch, 6=64 ch, 7=96 ch, 8=128 ch When <2> is 2, which means digital CH mode. 1=1 ch, 2=2 ch, 3=4 ch, 4=8 ch <4> : Recording speed 0=1 x (normal speed), 1=1/2 x, 2=1/4 x, 3=1/8 x, 4=1/16 x, A=2 x, B=4 x, C=8 x, F=EXT <5> : Reservation Always 0 <6>...<17> : Recording start time <6><7> : Year (last 2 digits) <8><9><10><11> : Month and date <12><13><14><15><16><17> : Hours, minutes and seconds <18> : Existence of pre-trigger recording 0=No pre-trigger recording 1=Pre-trigger recording <19> : Existence of recording error 0=No write error 1=Write error <20><21><22><23><24><25> : Actual recording length hhmmss Related command : VOL?
TRG? Command format Returned format	Trigger setting status TRG? /[] TRG : <1> <1> : 0=RSV 1=Pre-trigger single mode (low: start) 2=Pre-trigger multi mode (low: start, high: stop) 3=Normal single mode (low: start) 4=Normal multi mode (low: start, high: stop) Related command : TRG
TRM? Command format Returned format	Terminator selection status (returned strings) TRM?/[] TRM : <1> <1> : 0=CR + LF, 1=CR, 2=LF Related command : TRM
TSG? Command format Returned format	Test signal selection status TSG? /[] TSG : <1> <1> : Test signal selection Analog channel 0=OFF 1=AC 2=+DC 3=-DC 4=GND Related command : TSG

Command	Contents
UTL? Command format Returned format	Utility mode setting readout UTL? / [] UTL : <1><2>...<7> <1> : 1=Rebuild is being executed 2: Rebuild NG 0: An event other than the events mentioned at left side <2> : RSV <3> : 1=Delete is being executed 2: Delete NG 0: An event other than the events mentioned at left side <4>...<7> : RSV Related command : UTL
VOL? Command format Returned format	Recording media volume readout VOL? / [] VOL : <1><2>...<32> <1> : Format 0=Standard <2> : SIR type 0=SIR-1000 1=SIR-1000W 2=SIR-1000i 3=SIR-3400H 4=SIR-3100T <3><4><5><6> : Total IDs (max. 1000) <7><8><9> : Total IDs inside MIC (max. 100) <10><11><12><13><14> : TOC recording position (record number) <15><16><17><18><19><20> : Last recorded SIR serial number <21><22> : Last recorded year (last 2 digits) <23><24><25><26> : Last recorded month and date <27><28><29><30><31><32> : Last recorded hours, minutes and seconds Related command : TOC?

18. Errors and Error Messages

18-1. Warning Messages

When a malfunction occurs in the recording unit, the warning marks shown below blink in the status display area of the LCD screen, and a buzzer will sound. Contact service engineer if the warning indicator is still displayed after performing the measures below.

Warning marks	Error description	Cause	Countermeasures									
	Low DC voltage	The voltage of the external DC power supply has fallen below the prescribed lower limit (11 V).	Be sure to supply the specified external DC voltage (11 to 30 V). CAUTION If you continue usage when this mark is displayed, a malfunction may occur. Be sure to take the above measures as soon as possible.									
	Dew condensation	When the DEW function is ON, condensation occurs in the recording media area if a cold recording unit is transferred to warm places.	Leave the standby key at ON. The warmup operation is performed. Wait until the mark no longer appears before operating. CAUTION <ul style="list-style-type: none"> In environment where the temperature or humidity may change, be sure to turn ON the condensation detection function. To prevent media damage due to condensation during storage, be sure to always remove the recording media after usage, and then set the standby key to OFF. Leave a space of at least 50 mm between both sides of the unit and any other object. <table border="1"> <thead> <tr> <th>LCD message</th> <th>Recording unit status</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>60S to 00S</td> <td>Detecting the condensation</td> <td>The remaining time in detecting the condensation is displayed</td> </tr> <tr> <td>Warming Up 600S to 000S</td> <td>Condensation was detected Dissipating condensation</td> <td>Displayed during warmup operation Displays the remaining time until condensation is dissipated</td> </tr> </tbody> </table>	LCD message	Recording unit status	Remarks	60S to 00S	Detecting the condensation	The remaining time in detecting the condensation is displayed	Warming Up 600S to 000S	Condensation was detected Dissipating condensation	Displayed during warmup operation Displays the remaining time until condensation is dissipated
LCD message	Recording unit status	Remarks										
60S to 00S	Detecting the condensation	The remaining time in detecting the condensation is displayed										
Warming Up 600S to 000S	Condensation was detected Dissipating condensation	Displayed during warmup operation Displays the remaining time until condensation is dissipated										
	Recording/Playback error Recording error Playback error	The data supply to the recording media cannot catch up and the FIFO memory becomes full. (FIFO overflow) The playback data contains an error that cannot be corrected, and re-reading (retry) of the relevant section was repeated. As a result, the FIFO memory became empty, and the output data is interrupted. * During this retry operation, the data remaining in the FIFO memory is output until the correct data is read. If the correct data is read before the FIFO memory is emptied, playback continues normally and the mark is not displayed.	<ol style="list-style-type: none"> If the mark is displayed frequently, the unit is possibly being subjected to vibrations, jolts, extreme temperatures, dust or other adverse environmental conditions. Re-check the installation environment. (See section 22-1-8) If the countermeasure in 1 does not fix the problem, the recording media may be faulty. Replace the recording media with a new one. If the countermeasure in 2 does not fix the problem, contact service engineer. 									

18-2. Error Code

When the recording unit malfunctions during diagnostics, calibration, recording or playback operation, the error code is displayed on the LCD screen. Take the appropriate measure based on the table below.

When using the recorder in a dusty surrounding, the data could not be played back (or verified during recording) and also an error code is displayed. In such a case, perform a play back inside a room. If the error code does not disappear after the appropriate measure has been taken or if the displayed error code is not listed in this manual, contact service engineer.

-HDD-	EH03	0C01	Drive 1 write retries have exceeded the designated limit
		0C02	Drive 2 write retries have exceeded the designated limit
		1101	Drive 1 read retries have exceeded the designated limit
		1102	Drive 2 read retries have exceeded the designated limit
		3001	Drive 1 format is not correct
		3002	Drive 2 format is not correct
	EH04	0001	Hard disk not installed in drive 1
		0002	Hard disk not installed in drive 2
		4401	Drive 1 is faulty
		4402	Drive 2 is faulty
	EH90	0001	Formatting of drive 1 failed
		0002	Formatting of drive 2 failed
	EH91		No TOC found
EH92		An invalid TOC was detected.	
EH93		Communication error occurred on HDD board	
EH95		Error occurred in peripherals	
		File system error	
		IDE controller error	
		StarFabric control error PCI control error	
EH96		An unknown error occurred	
-ADA-	EA20	00xx	A/D calibration error occurred. xx is the channel.
	EA30	00xx	D/A calibration error occurred. xx is the channel.
	EA60	0001	ADA flash memory error CAL data was not found
		0002	Unable to access
	EA70		Measuring unit ID error
	EA80		ADA board error
	EA90		DMA timed out in REC
	EA91		DMA timed out in PB
-Power Supply/ Battery-	EP03		Power failure
	EP10		Battery voltage is low
-Communication-	Ed50		Communication error occurred between the IF board and ADA board
	Ed60		Communication error occurred between the DSP board and ADA board
	Ed70		Communication error occurred between the IF board and DSP
	Ed80		Telnet communication error
	ES30		Error occurred between DPR board and DR board
	ES40		Error occurred between DPR board and IF board
	ES50		Error occurred between DR board and IF board
-Synchronizing-	EX30		Sync Setting error/cable error
	EX31		Sync No target/sync playback data
	EX32		Sync Recording/playback error
	EX33		Sync target is recording alone

-System Error-	ETA0	The condensation data is not set
-System Caution-	DISK FULL	No available space in HDD
	ERA OFF	Unable to overwrite
	PNL OPN	The front panel is open
	OVR FLOW	Data overflowed during recording
	UDR FLOW	Data was dropped during playback

18-3. Remedies for Operation Errors

18-3-1. When Power does not Turn On when Standby Switch is Held Down for Two Seconds, or Key Operation is Disabled

1. Set the POWER switch to OFF.
2. Wait at least 15 seconds, and then set the POWER switch to ON.
3. Hold down the standby switch for two seconds again.

If operation is still not restored, set the POWER switch to OFF, unplug the power cable, and then contact service engineer.

19. Connecting the Recording Unit and Measuring Unit

19-1. Attaching the Recording Unit and Measuring Unit

The recording unit can be integrated with the measuring unit by using the fixture supplied with the measuring unit. If attaching and using due to a specific application or operating environment, use the procedure below to attach.

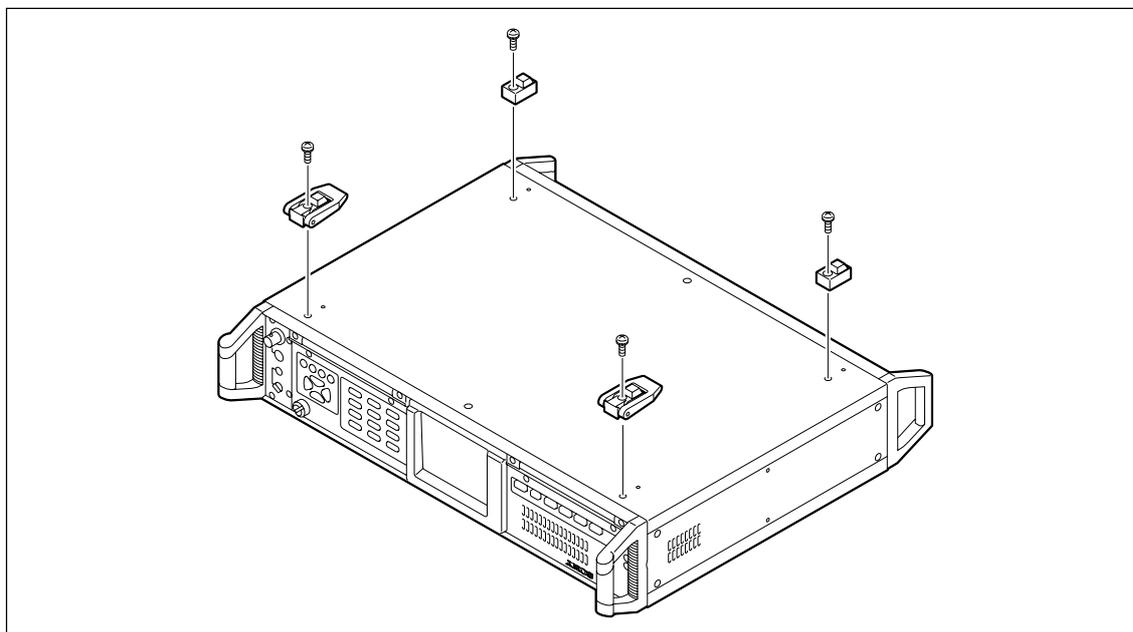
⚠ CAUTION

The mass of the recording unit is approximately 10.5 kg, and the mass of the measuring unit 7.5 kg. This operation should be performed by two or more people while being careful that no one gets injured.

Items required for attachment (Measuring unit accessories)

Channel	Quantity
Unit joint fixtures (black)	4
Washers (ø4)	16
Spring washers (ø4)	16
Hexagonal socket head bolts (M4: black)	16
L wrench (for M4)	1

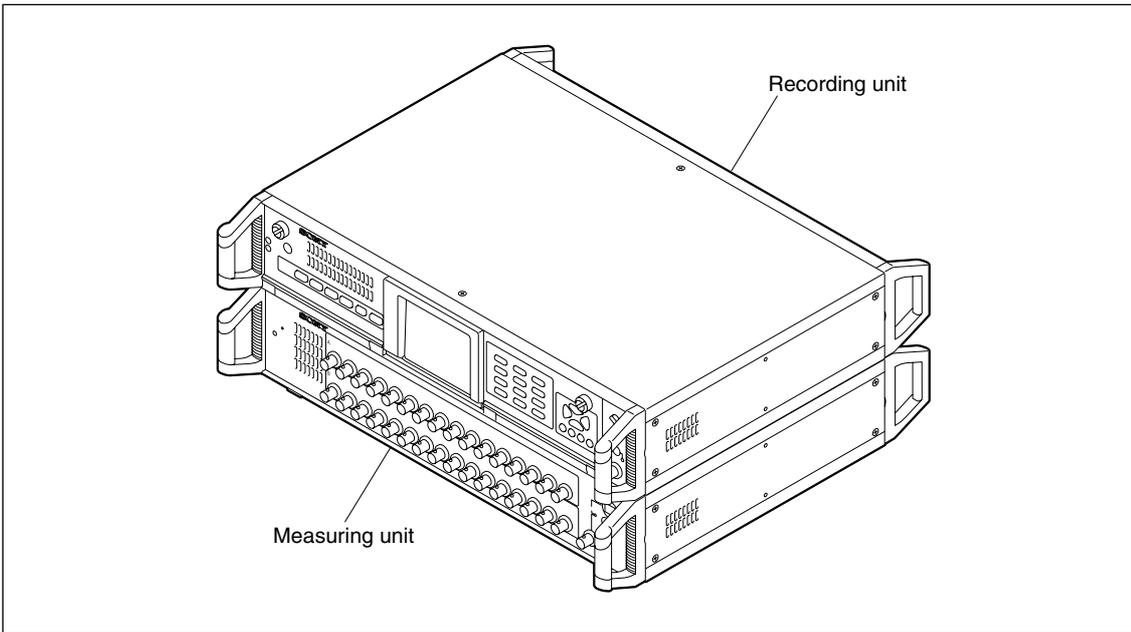
- 1 Remove the four bottom feet from the bottom of the recording unit.



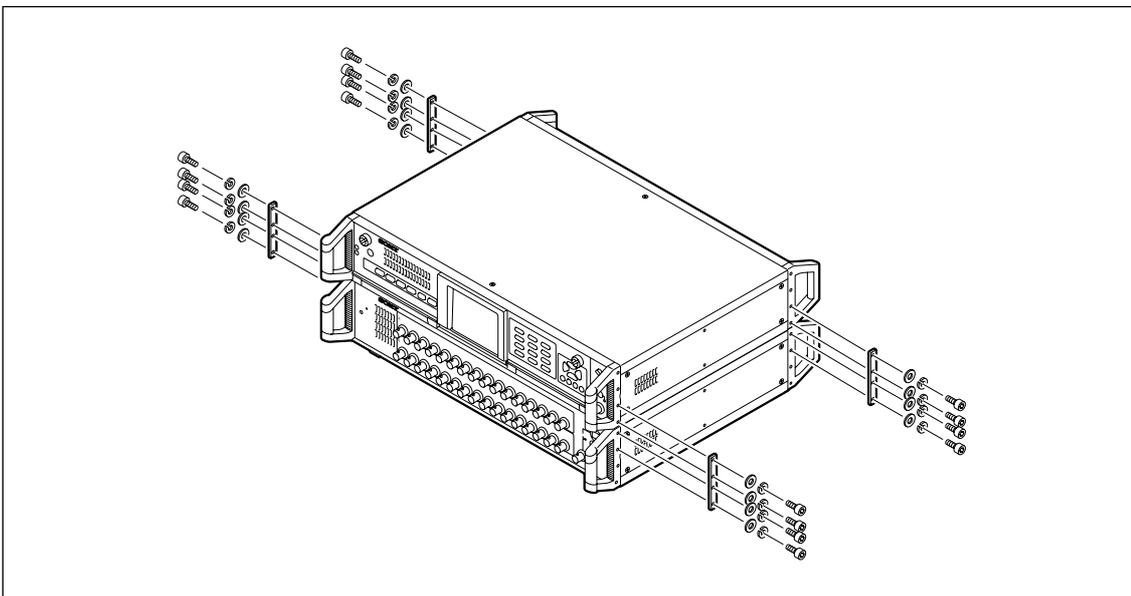
CAUTION

Leave the bottom feet on the measuring unit.

2 Place the recording unit on top of the measuring unit.

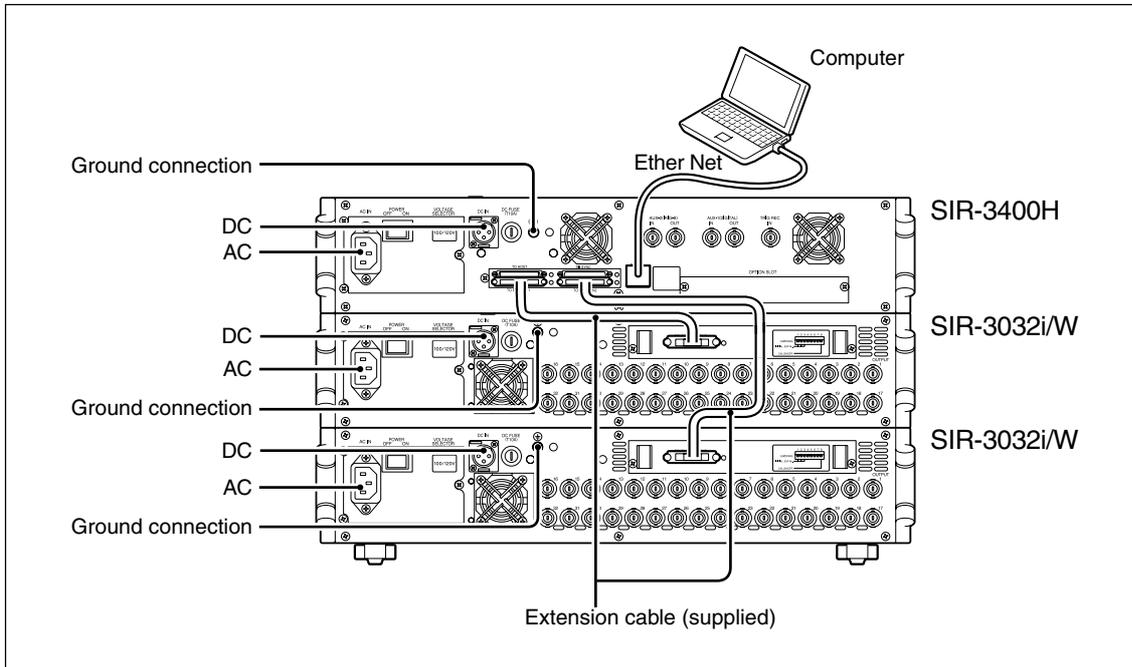


3 Use the 4 fixtures supplied with the measuring unit (black), 16 washers (ø4), 16 spring washers (ø4: black), 16 hexagonal socket head bolts (M4: black), and L wrench (for M4) to attach the measuring unit and recording unit.

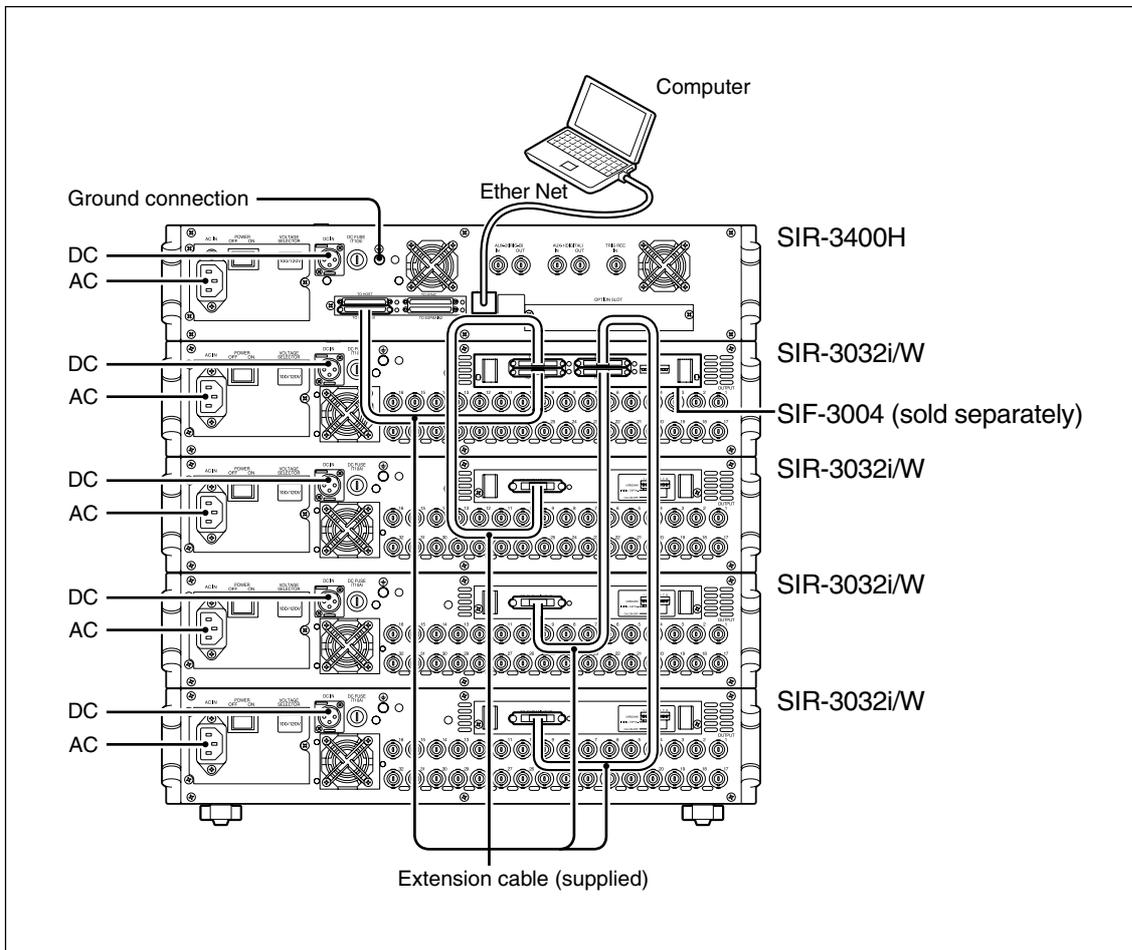


19-2. Cable Connections

64 Channel Configuration



128 Channel Configuration



20. Installing the Shock Mount Adaptor

Installation of the Shock Mount Adaptor SSM-3010 (sold separately) boosts the vibration dampening properties of the recording/measuring unit.

20-1. Before Usage

After securing the shock mount adaptor to the installation location, secure the recording/measuring unit to the adaptor.

Use the 8 supplied bolts with hexagonal holes (M8) and 8 spring washers (ø8) to secure the shock mount adaptor to the installation location.

After securing the shock mount adaptor, use the 8 supplied bolts with hexagonal holes (M4) and 8 spring washers (ø4) to secure the recording/measuring unit.

⚠ CAUTION

The mass of the recording unit is approximately 10.5 kg, and the mass of the measuring unit 7.5 kg. This operation should be performed by two or more people while being careful that no one gets injured.

Shock mount adaptor packing contents

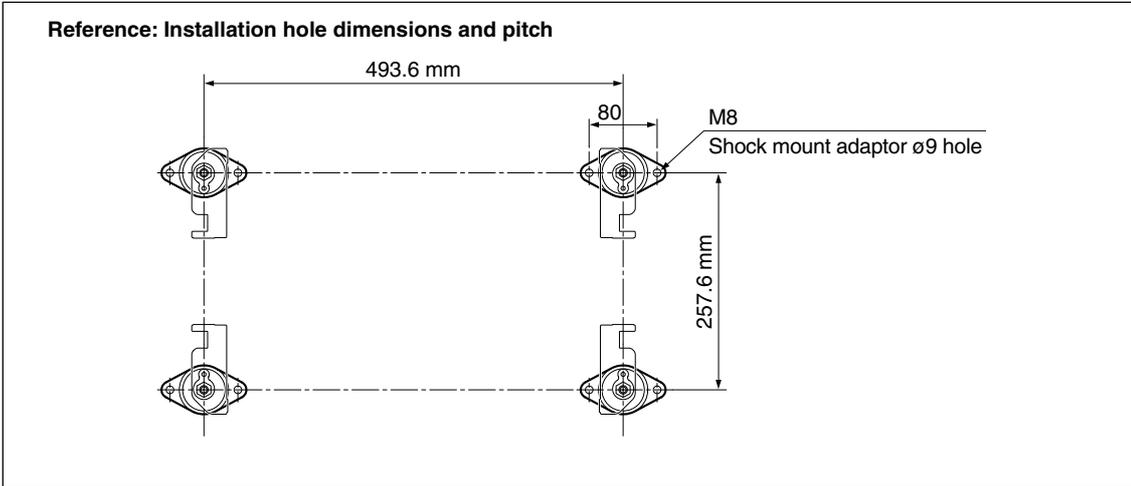
Name	Quantity
Shock mount adaptor	4
L wrench (for M4)	1
L wrench (for M8)	1
Hexagonal socket head bolts (M4)	8
Spring washers (ø4)	8
Bolts with hexagonal holes (M8)	8
Spring washers (ø8)	8
Instruction manual	1

20-2. Installation Procedure for Shock Mount Adaptor

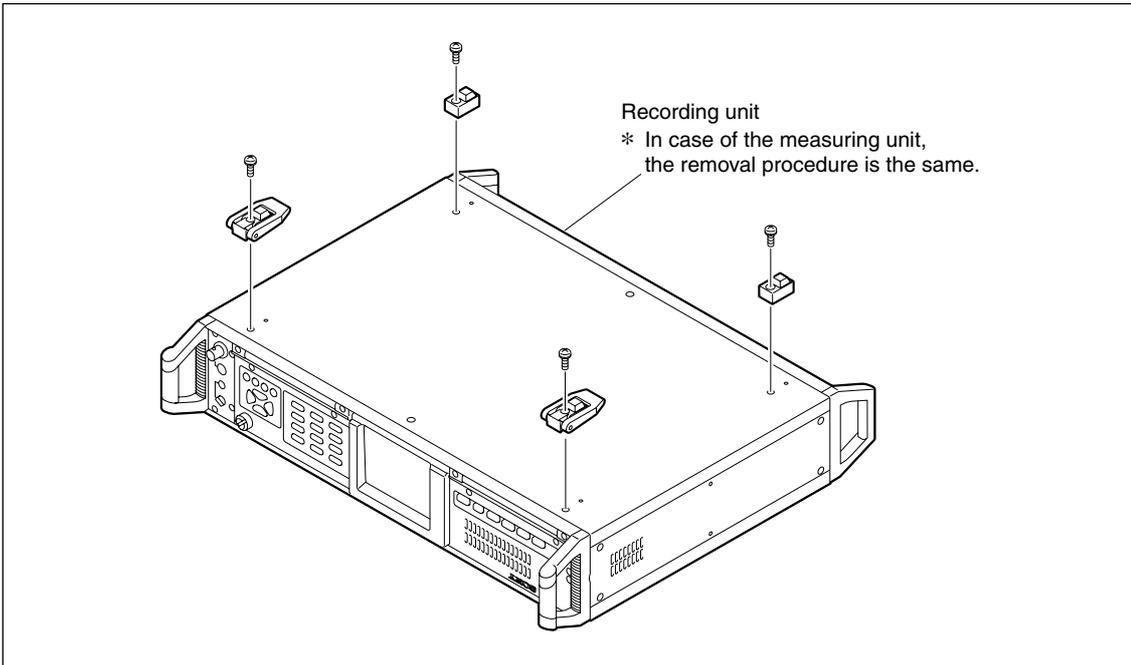
- 1 Use the supplied hexagonal socket head bolts (M8), spring washers (ø8), and L wrench (for M8) to secure the shock mount adaptor to the unit installation location.

CAUTION

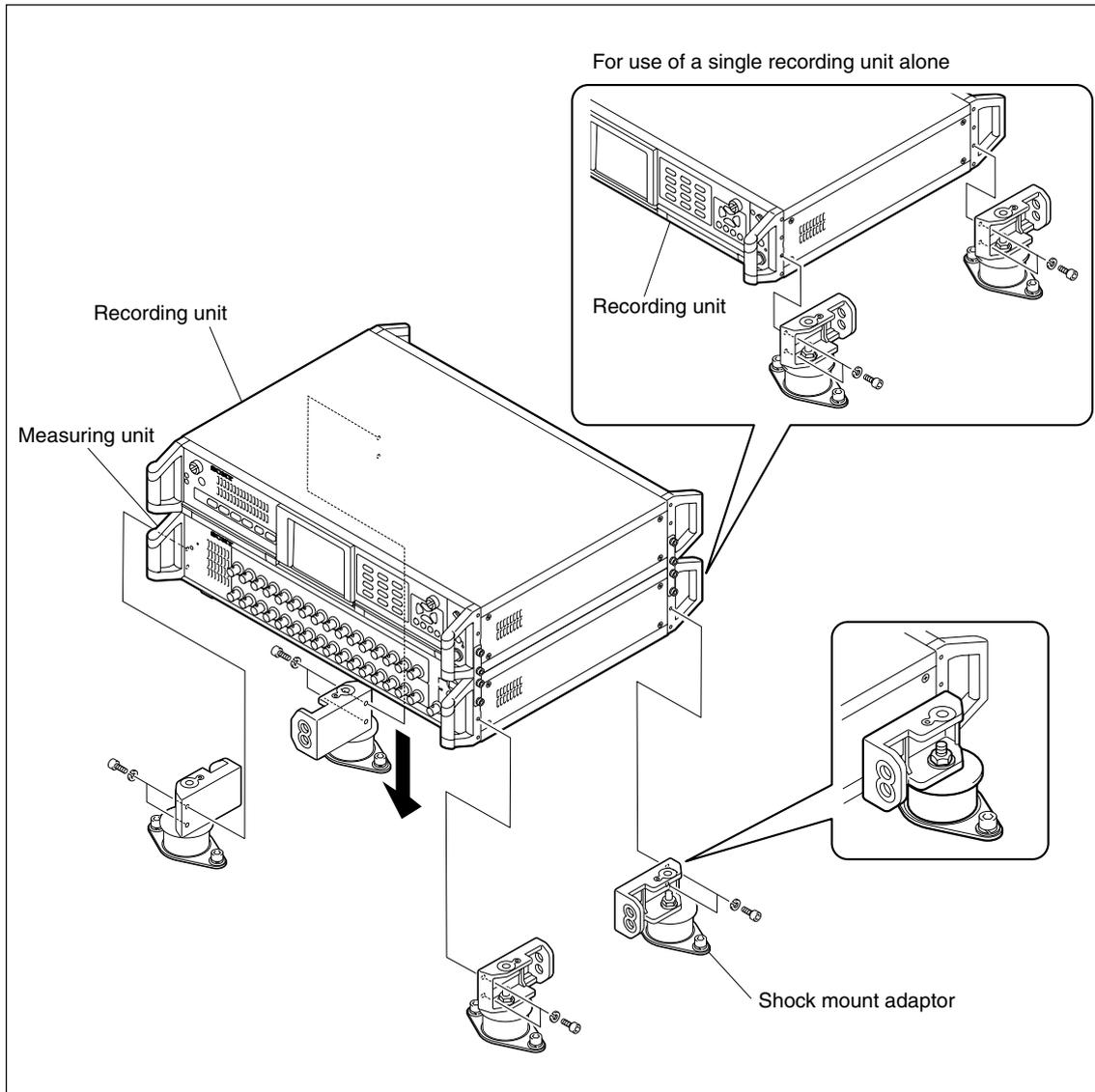
When securing, orient so that the notches of the shock mount adaptor face the inner side.



- 2 Remove the legs from the bottom of unit.



- 3** Use the supplied hexagonal socket head bolts (M4), spring washers ($\phi 4$), and L wrench (for M4) to secure the unit to the shock mount adaptor.



21. Attaching the Rack Mount Adaptor

The Rack Mount Adaptor SRT-3010 (sold separately) can be attached to enable installation of a 19-inch rack for the recording/measuring unit.

21-1. Before Use

⚠ WARNING

The cover of the unit is removed before securing the rack mount adaptor, and so there is a danger of electrical shock or other accident. Attachment should not be performed by the customer. If attachment is required, please contact Sony Manufacturing Systems Corporation.

Rack mount adaptor packing contents

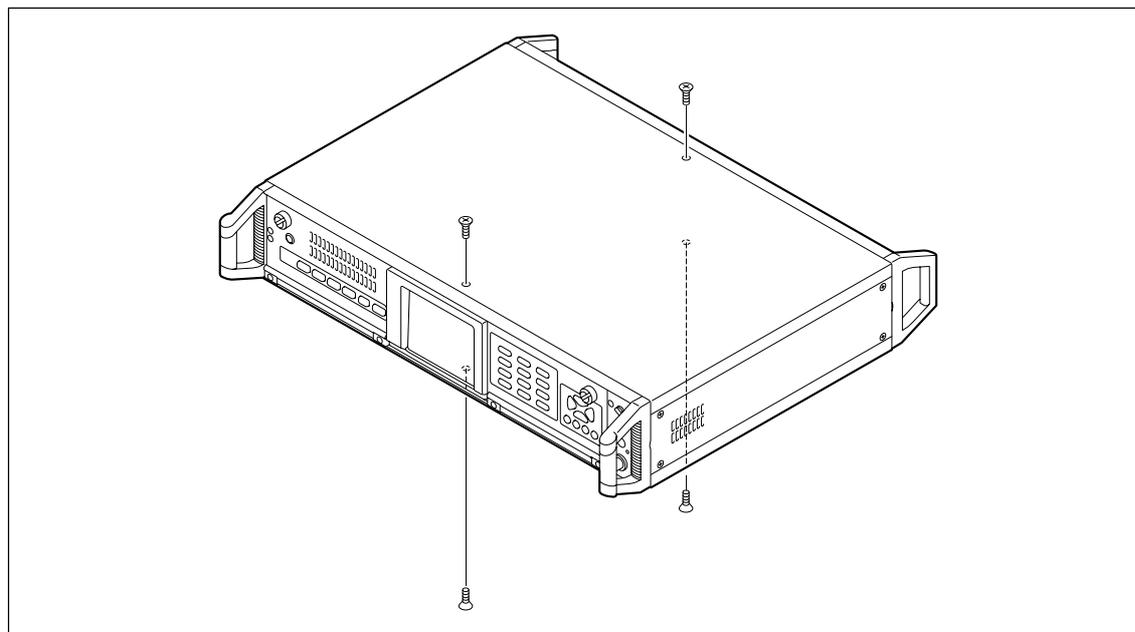
Channel	Quantity
Rack mount adaptors	2
Instruction manual	1

21-2. Attachment Procedure for Rack Mount Adaptor

⚠ WARNING

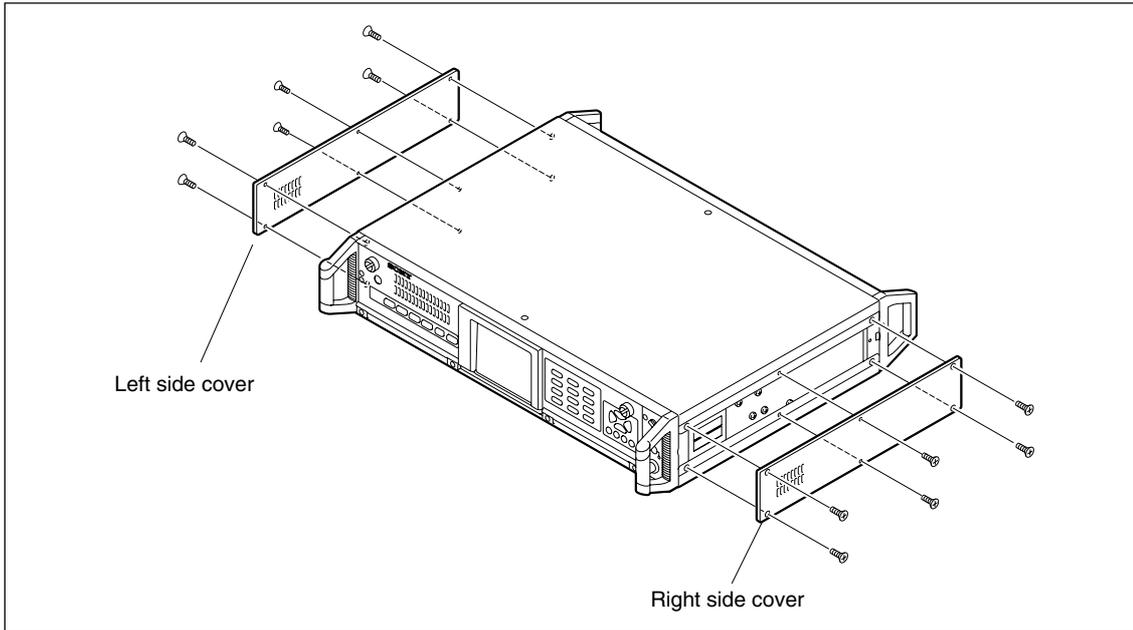
The cover of the unit is removed before securing the rack mount adaptor, and so there is a danger of electrical shock or other accident. Be sure to first disconnect the AC and DC power cords before performing any operations.

- 1 Remove the four M3 × 10 (black) Philips-head countersunk screws from the top cover and bottom cover of the unit.

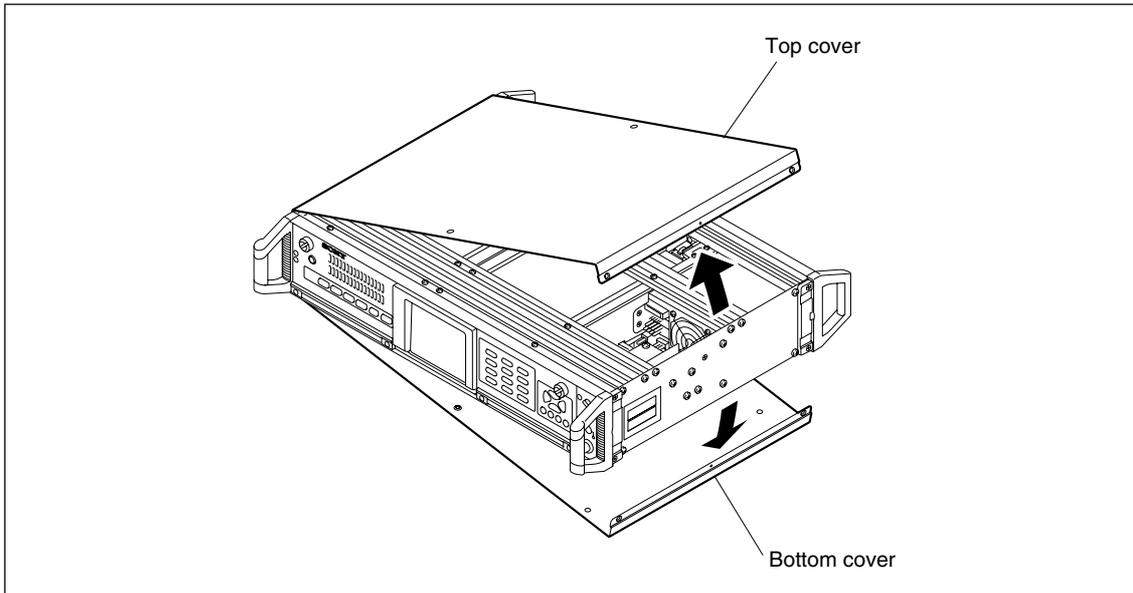


21. Attaching the Rack Mount Adaptor

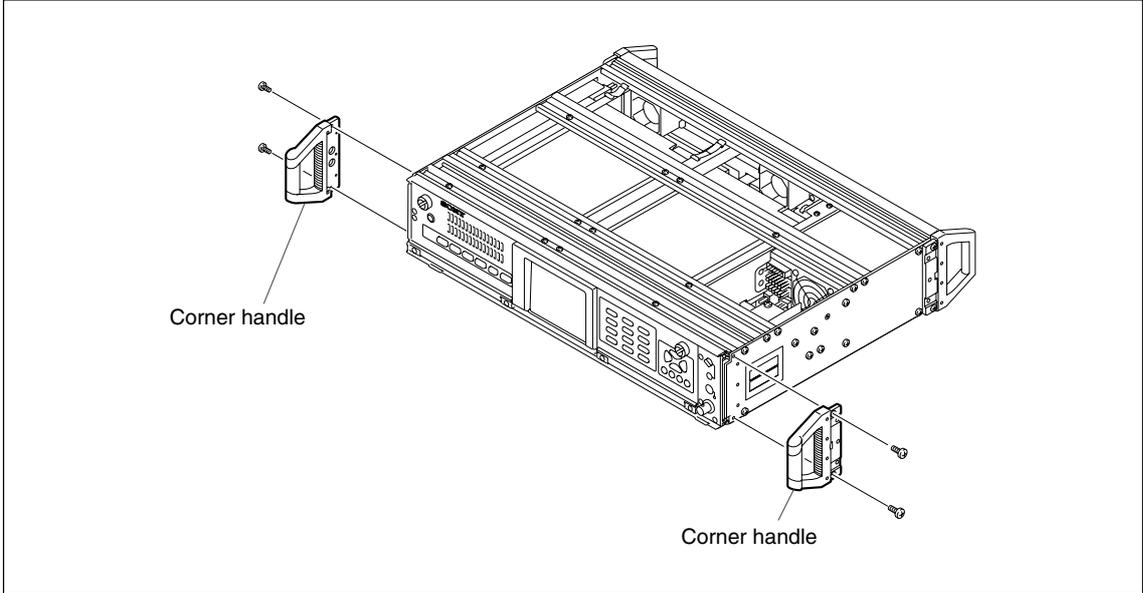
- 2** Remove the four M3 × 10 (black) Philips-head countersunk screws and precision screws two M2 × 2 (black) from each side cover (right and left), and then take off the right and left side covers.



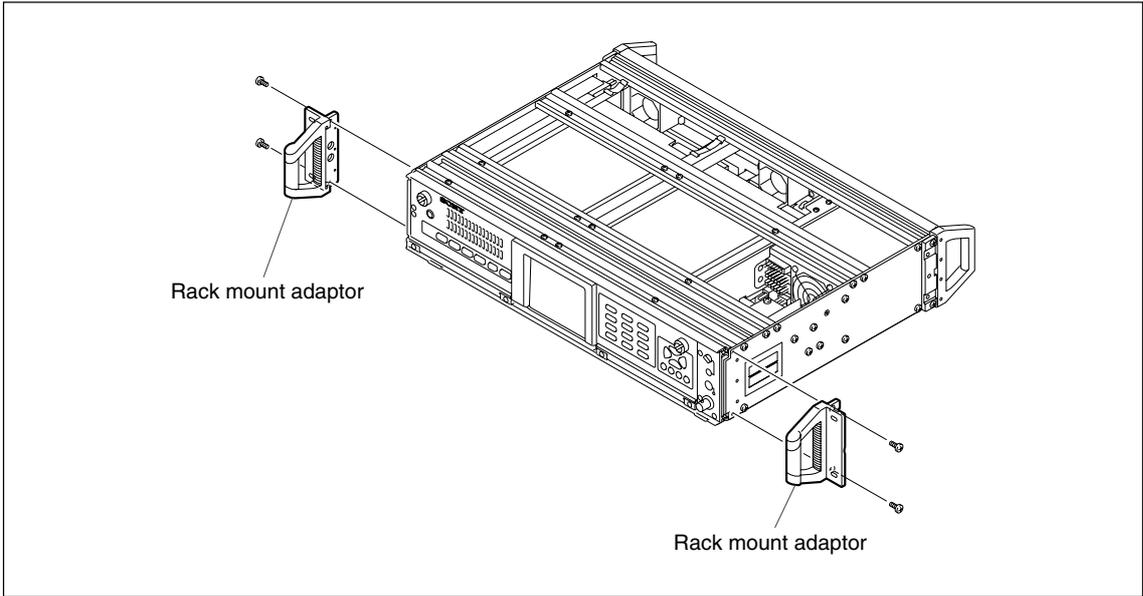
- 3** Lift up one side of the top cover and one side of the bottom cover.



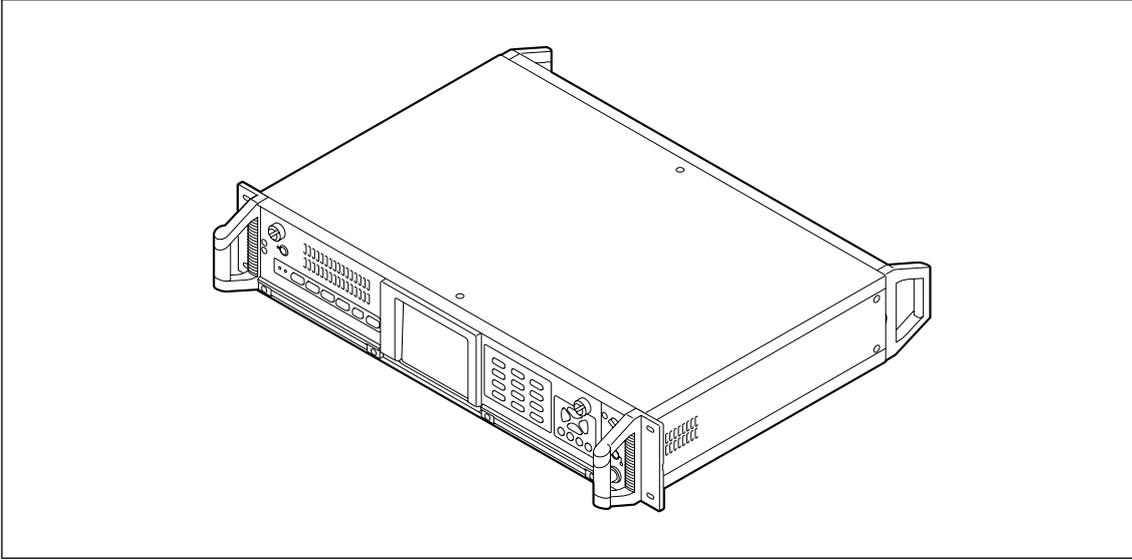
4 Remove the eight M4 × 10 (silver) screws from the unit, and then take off the corner handle.



5 Use the eight M4 × 10 (silver) screws removed in step 4 to attach the two rack mount adaptors and two corner blocks.



6 Attach the top cover and side cover removed in steps **1** to **3** by performing steps **1** to **3** in reverse order.



22. Specifications

22-1. Specifications (SIR-3400H)

22-1-1. Cartridges

Product name	: SMH-200
Cartridge external dimensions	: 62 (W) × 15 (H) × 95 (D) mm
Effective data capacity	: 200 GB

22-1-2. Voice Annotation Channel

Number of channels	: 1
Bandwidth	: 100 Hz to (19.2 kHz (×1 speed • 48 kHz sample) × speed ratio)
Input (MIC)	
Connector	: 1× standard jack
AGC	: ±30 dB
Impedance	: 10 kΩ
Output (PHONE)	
Connector	: 1× mini-jack
Applicable load	: 8 Ω or more
Output power	: Max. 400 mW @8 Ω
Output (speaker)	
Speaker response bandwidth	: 100 Hz to 5 kHz

22-1-3. Monitor Out

Number of channels	: 1
Bandwidth	: DC to 20 kHz × speed ratio
Connector	: 1× BNC
Transmission format	: Single-ended
Output level	: ±5 Vpk or less
Output impedance	: 50 Ω
Applicable load	: 10 kΩ or more

22-1-4. AUX Digital Channel (AUX-1)

Number of channels	: 1
Sampling frequency	: speed ratio × 384 kHz (×1 speed • 48 kHz sample)
Input	
Connectors	: 1× BNC (Single-ended)
Level	: TTL
Impedance	: 10 kΩ
Withstand voltage	: ±10 Vpk
Output	
Connectors	: 1× BNC (Single-ended)
Level	: TTL
Impedance	: 50 Ω
Applicable load	: 1 kΩ or more

22-1-5. AUX Analog Channel (AUX-2, IRIG-B Channel)

Number of channels	: 1
Sampling frequency	: speed ratio × 48 kHz
Input	
Connector	: 1 × BNC
Level (IRIG)	: ±1.0 to ±10 Vpk (detection range)
Impedance	: 10 kΩ
Withstand voltage	: ±50 Vpk
Output	
Connector	: 1 × BNC
Level (IRIG)	: Approx. ±1.5 Vpk (fixed)
Impedance	: 50 Ω
Applicable load	: 10 kΩ or more

22-1-6. Power Supply System

AC (∼)		
Voltage (rated)	: 100/120 V	220/240 V
Voltage (allowable range)	: 90 to 132 V	198 to 250 V
Band (rated)	: 50/60 Hz	50/60 Hz
Band (allowable range)	: 47 to 66/440 Hz	47 to 66 Hz
Power consumption	: 180 VA	180 VA
Standby power consumption	: 50 VA	55 VA
DC (—)		
Voltage (rated)	: 12 V	
Voltage (allowable range)	: 11 to 30 V	
Current consumption	: 13.5 to 5 A	
Battery		
Nickel-metal- hydride battery:	24 V 1.1 Ah	
Power supply priority	: AC > DC > internal backup battery	

22-1-7. External Dimensions/Mass

Dimensions	: 449 (W) × 88 (H) × 305 (D) mm (Excluding projections)
Mass	: Approx. 10.5 kg (Including two SMH cartridges)

22-1-8. Operating Environment

Recommended temperature/humidity for operation	: 0 to 40 °C, 20 to 80 % RH (non-condensating) (Be sure to warm up the recorder if it is operated under 5 °C.)
Recommended temperature/humidity for storage	: -10 to 50 °C, 10 to 90 % RH (non-condensating)
Recommended pressure for specifications	: 660 to 1060 hPa (Equivalent to the altitude of about 3000 m to -400 m)
Operating position	: Horizontal (front panel facing forwards)
Vibration resistance	: 4.9 m/s ² 5 Hz to 200 Hz (with SSM-3010 in horizontal position)
Shock resistance	: 392 m/s ² , 11 ms (while stored)
Polution degree	: II
Over voltage category	: II

22-1-9. Supplied Accessories

AC power cord	: ×1
Plug adaptor (3-pin to 2-pin)*	: ×1 (* for 100/120 V models only)
DC power cord	: ×1
Dynamic microphone	: ×1
SMH-200	: ×2
Instruction manual	: ×1
Inspection sheet	: ×1

CAUTION

When using a plug adaptor (3-pin to 2-pin) for the AC power cord, be sure to connect the green wire to earth.

22-2. Specifications (SIR-3032i/W)

22-2-1. Recording/Playback System

Number of channels : 32 ch (per unit)
 Bandwidth : DC to 20 kHz (× speed ratio)

Number of connected units and bandwidth

Number of connected units	1	2	3	4
Bandwidth	DC to 20 kHz (× speed ratio)	DC to 10 kHz (× speed ratio)	DC to 5 kHz (× speed ratio)	

Sampling frequency : $2.4 \times$ Bandwidth
 AD/DA conversion : 128-times over-sampling Δ - Σ modulation
 Quantization : 16-bit linear quantization
 Filters (recording side) : First-order RC + 121st-order FIR digital
 Filters (playback side) : Fourth-order RC + 121st-order FIR digital
 Over-range : $\pm 33\%$
 Analog characteristics (Input $\pm 133\%$)

AC characteristics :

SIR-3032i:	Range	± 0.1 Vpk	± 0.2 Vpk	± 0.5 to ± 1 Vpk	± 2 to 5 Vpk	± 10 Vpk
	Frequency characteristics	± 0.5 dB, 0 dB @200 Hz	± 0.5 dB, 0 dB @200 Hz	± 0.5 dB, 0 dB @200 Hz	± 0.5 dB, 0 dB @200 Hz	± 0.5 dB, 0 dB @200 Hz
	Dynamic range	82 dB or more	84 dB or more	86 dB or more	86 dB or more	86 dB or more
	Crosstalk	-82 dB or less	-84 dB or more	-86 dB or less	-86 dB or less	-86 dB or less
	Distortion rate	84 dB or less	84 dB or less	84 dB or less	84 dB or less	84 dB or less
	Phase difference between channels	Inside a single unit : 1° or less Between separate units : 2° or less (The same input/output condition Except sync mode)				

SIR-3032W:	Range	± 0.1 Vpk	± 0.2 Vpk	± 0.5 to ± 1 Vpk	± 2 to 5 Vpk	± 10 Vpk
	Frequency characteristics	± 1.0 dB, 0 dB @200 Hz	± 1.0 dB, 0 dB @200 Hz	± 1.0 dB, 0 dB @200 Hz	± 1.0 dB, 0 dB @200 Hz	± 1.0 dB, 0 dB @200 Hz
	Dynamic range	76 dB or more	78 dB or more	80 dB or more	80 dB or more	80 dB or more
	Crosstalk	-76 dB or less	-78 dB or more	-80 dB or less	-80 dB or less	-80 dB or less
	Distortion rate	74 dB or less	74 dB or less	74 dB or less	74 dB or less	74 dB or less
	Phase difference between channels	Inside a single unit : 3° or less (40 to 80 k) Between separate units : 5° or less (40 to 80 k) (The same input/output condition Except sync mode)				

* The 1.25 to 20 k bandwidth is identical to SIR-3032i.

DC characteristics :	Linearity	$\pm 0.1\%$ or less
	Drift	REC : $\pm 0.1\%$ or less /2 h PB : $\pm 0.1\%$ or less /2 h (30 minutes after power is turned on)

Input	: Connector	BNC × 32	
	Input format	Direct	IEPE
	Transmission format	Single-ended, Differential	Single-ended
	Sensor power supply	—	24 V/4 mA (Voltage drop of constant-current circuit is 2 V)
	Input coupling	DC, AC (0.5 Hz)	AC (0.5 Hz)
	Input range	±0.1, ±0.2, ±0.5, ±1, ±2, ±5, ±10 Vpk	
	Input DC offset	±100 % 1 % step (During coupling DC operation only)	—
	Input impedance	100 kΩ	
	Voltage-resistance	±50 Vpk	
	TEDS (IEEE1451•4)	—	Support

DIRECT input — Voltage input

IEPE input — Sensor input with built-in preliminary amplifier

Output	: Connector	BNC × 33 (Including 1 CH monitor in unit)	
	Transmission format	Single-ended	
	Output level	±1, ±2, ±5, Variable (±0.5 to ±5) Vpk	
	Output impedance	50 Ω	
	Adaptive load	Above 10 kΩ	

22-2-2. Operation System

MONITOR : Monitored channel selectable
 ID No. : Unit ID number setting (1 to 4)

22-2-3. Monitor System

Moni/ID : Displays Monitored channel/Unit ID number
 Level LED : Simultaneous indication for 1 to 32 channels, unidirectional indicator
 Power source : POWER
 Monitor : MONITOR CH is displayed : LED on
 Unit ID is displayed : LED off
 INPUT : IEPE input

22-2-4. Power Supply System

AC (∼)

Voltage (rated)	: 100/120 V	220/240 V
Voltage (allowable range)	: 90 to 132 V	198 to 250 V
Band (rated)	: 50/60 Hz	50/60 Hz
Band (allowable range)	: 47 to 66/440 Hz	47 to 66 Hz
Power consumption	: 215 VA	215 VA
Standby power consumption	: 50 VA	55 VA

DC (---)

Voltage (rated)	: 12 V
Voltage (allowable range)	: 11 to 30 V
Current consumption	: 15 to 5.5 A

Battery

Nickel-metal- hydride battery	: 24 V 1.1 Ah
Power supply priority	: AC > DC > internal backup battery (UPS function)

22-2-5. Dimensions and Mass

Dimensions	: 449 (W) × 88 (H) × 305 (D) mm (excluding projections)
Mass	: Approx. 7.5 kg

22-2-6. Operating Environment

Recommended temperature/humidity for operation	: 0 to 40 °C, 20 to 80 % RH (non-condensating) (Be sure to warm up the recorder if it is operated under 5 °C.)
Recommended temperature/humidity for storage	: -10 to 50 °C, 10 to 90 % RH (non-condensating)
Recommended pressure for specifications	: 660 to 1060 hPa (Equivalent to the altitude of about 3000 m to -400 m)
Operating position	: Horizontal (front panel facing forwards)
Vibration resistance	: 14.7 m/s ² 5 Hz to 200 Hz (horizontal position)
Shock resistance	: 392 m/s ² , 11 ms (while stored)
Polution degree	: II
Over voltage category	: II

22-2-7. Supplied Accessories

AC power cord	: ×1
Plug adaptor (3-pin to 2-pin)*	: ×1 (* for 100/120 V models only)
DC power cord	: ×1
Instruction manual	: ×1
Inspection sheet	: ×1
Unit joint fixtures (black)	: ×4
Washers (ø4)	: ×16
Spring washers (ø4)	: ×16
Bolts with hexagonal holes (M4: black)	: ×16
L wrench (for M4)	: ×1
Extension cable	: ×1

⚠ CAUTION

When using a plug adaptor (3-pin to 2-pin) for the AC power cord, be sure to connect the green wire to earth.

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