INSTRUCTION MANUAL

2ch 1/3 Octave Band

Real-Time Analyzer

SA-30

RION CO., LTD.

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http://www.rion.co.jp/english/

Organization of this manual

This manual describes the features and operation principles of the 2-Channel 1/3 Octave Band Real-Time Analyzer SA-30. To ensure safe and accurate use, be sure to read this manual thoroughly. The manual is divided into the following sections.

Outline

Gives basic information on configuration and features of the unit.

Panel Explanation

Briefly identifies and explains all controls, indicators, keys, connectors and other parts of the unit.

Preparations

Describes how to make power cord and other connections and how to load the backup batteries and the printer paper.

Display Explanation

Explains the various display functions of the unit.

Using the Menus

Explains the operation flow for using the menu screens.

Basic Operation

Explains basic operation principles that need to be understood before starting a measurement.

Current Processing Selection

Explains the various current processing functions available with the unit.

Display Processing

Explains the various display processing functions available with the unit.

Trigger Functions

Explains the various trigger functions available with the unit.

Store Functions

Describes how to store data.

Recall Functions

Describes how to recall stored data.

File Operations

Describes how to save and manage various measurement data.

Level Conversion

Describes how to perform level conversion of measured data.

Remote Control

Describes how to use the supplied remote control.

Error Messages

Lists and explains error messages that may be shown during operation of the unit.

Current Recall Processing

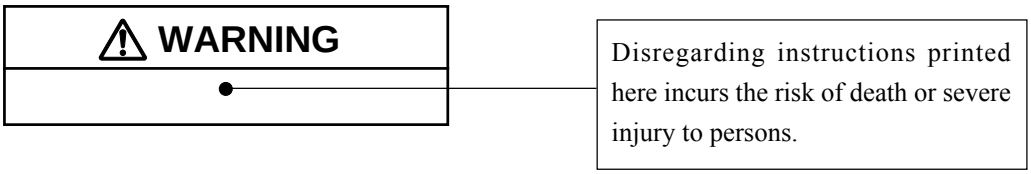
Explains processing principles used by the unit.

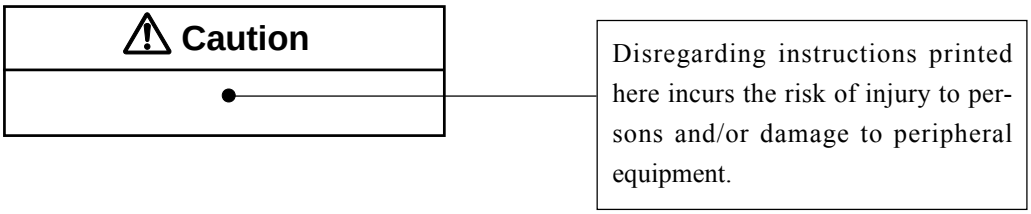
Specifications

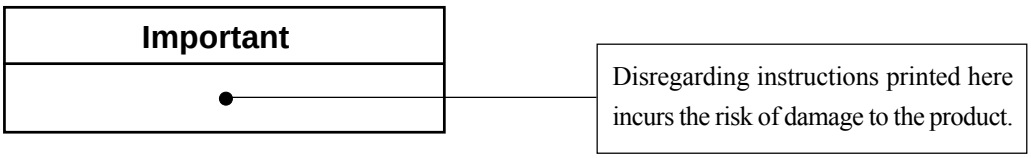
Lists the technical specifications of the unit.

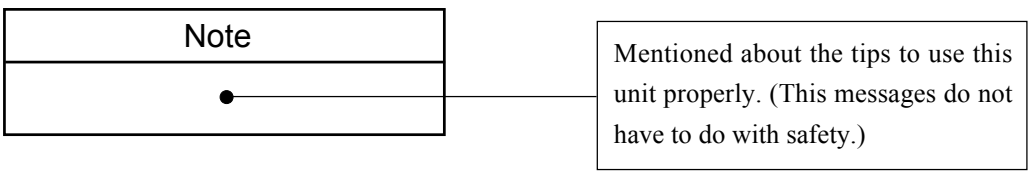
FOR SAFETY

In this manual, important safety instructions are specially marked as shown below. To prevent the risk of death or injury to persons and severe damage to the unit or peripheral equipment, make sure that all instructions are fully understood and observed.









Precautions

- Carefully read the documentation and operate the unit only as described in this manual.
- Do not install or store the unit in locations which
  - may be subject to splashes of water or to direct sunlight, or
  - may be subject to high temperature, humidity, dust, or air with high salt or sulphur content, or
  - do not provide a firm, level support without danger of vibrations or shock (also during transport), or
  - may be subject to gases or are in the vicinity of stored chemicals, or
  - may be subject to strong magnetic fields or radiation.
- Observe the following precautions before using the unit:
  - Check the setting of all switches and controls, and make sure that the unit is operating normally.
  - Make sure that all connections are properly established.
- The permissible ambient temperature range for operation of the unit is 0 to +40ºC. Relative humidity must be below between 10 and 80% (no condensation).
- After use, turn the unit off and remove the batteries.
- When disconnecting cables, always hold the plug and do not pull the cable.
- Do not disassemble the unit or attempt internal alterations.
- In case of malfunction, do not attempt any repairs. Note the condition of the unit clearly and contact the supplier.
- Turn the unit off before inserting or removing a memory card.
- The surface of the LCD screen is very delicate. Take care not to scratch it with a pencil, screwdriver, or similar.
- Never attempt to clean the unit with cleaning alcohol or other solvents.
- Use only the specified paper (TP-31A) for the built-in printer.

Contents

Outline

The SA-30 is a general-purpose spectrum analyzer that uses digital signal processing. From a single input, 1/1 octave band and 1/3 octave band measurements can be made concurrently. The unit carry out analysis of two channels simultaneously.

The unit has four frequency analysis ranges for 1/3 octave analysis, with center frequencies from 0.4 Hz to 630 Hz (LOW 1), 1.6 Hz to 2.5 kHz (LOW 2), 12.5 Hz to 20 kHz (MID), and 50 Hz to 80 kHz (HIGH). (The HIGH range is a factory optional feature.)

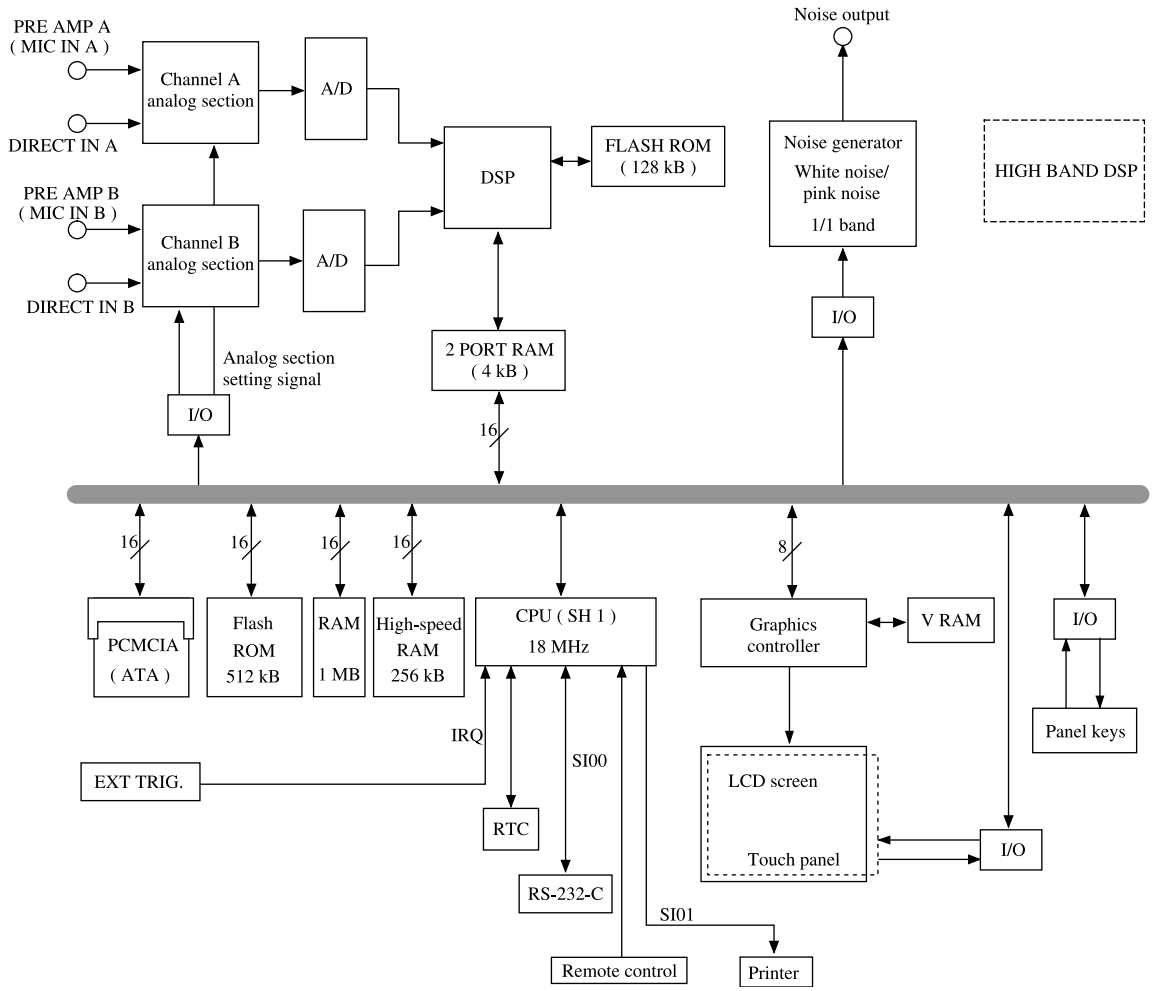
Available measurement functions are *P*ave, *P*sum, Max, Min, L_1, L_5, L_{10}, L_{50}, L_{90}, L_{95}, and L_{99}. Up to six functions can be selected for simultaneous measurement.

Analysis conditions can be set independently for each channel, and analysis results are shown in color on the LCD screen. Display modes include spectrum bar graph, spectrum numeric list, and level-time. Combining two display types in a split-screen indication and overlaying of background data is also possible. Results for the six selected measurement functions can be shown together as line graphs.

Using a large-capacity internal memory, measurement results can be stored either manually or automatically in continuous mode. User-defined frequency weighting functions and measurement settings are also stored in memory. An ATA type memory card slot on the side of the unit allows transferring internally stored data to a memory card, and loading of data from a memory card into the unit. Files on memory cards are in DOS format, allowing easy use on an PC compatible computer, without the need for special software.

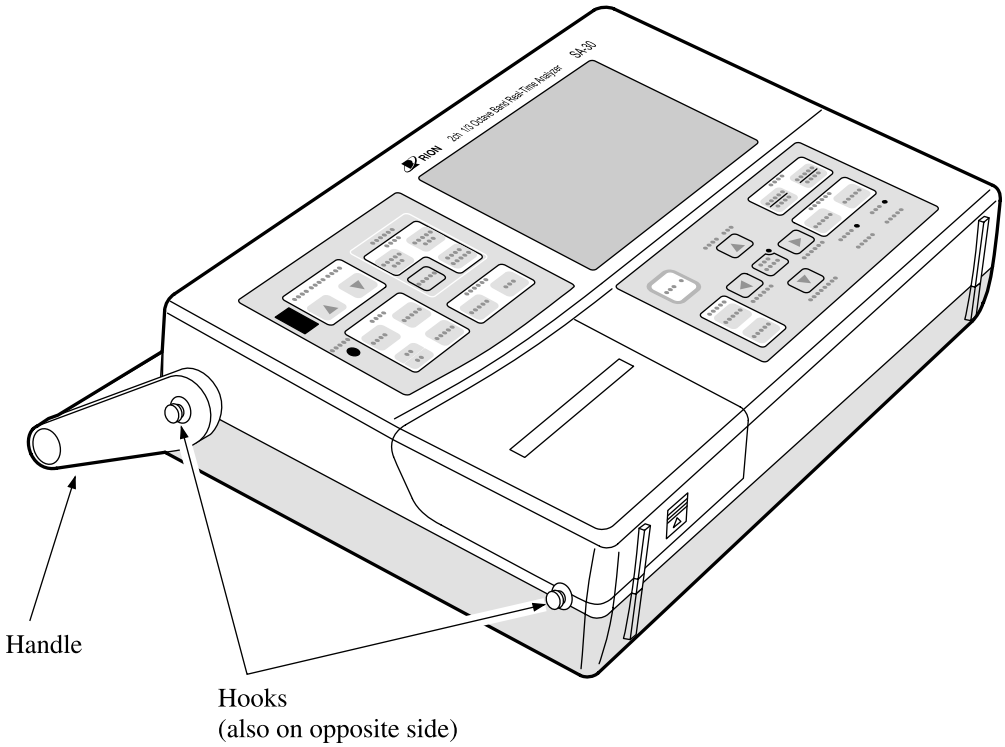
Besides the main control keys on the unit, touch keys appear on the display, making operation easy and intuitive.
A built-in generator for white noise and pink noise is convenient for building acoustic and other applications. Either wide band noise or 1/1 octave band noise can be output.

A built-in printer makes it easy to produce hard copy of measurement results in the field. An RS-232-C interface as well as an infrared port for optical communication are available for interfacing with a computer. The SA-30 is powered by six IEC R20 (size D) batteries or the AC adapter NC-93. At an ambient temperature of about 20ºC, the unit can be operated continuously for about five hours on alkaline batteries.



Block diagram of 2-Channel 1/3 Octave Band Real-Time Analyzer SA-30

Panel Explanation



External view of 2-Channel 1/3 Octave Band Real-Time Analyzer SA-30

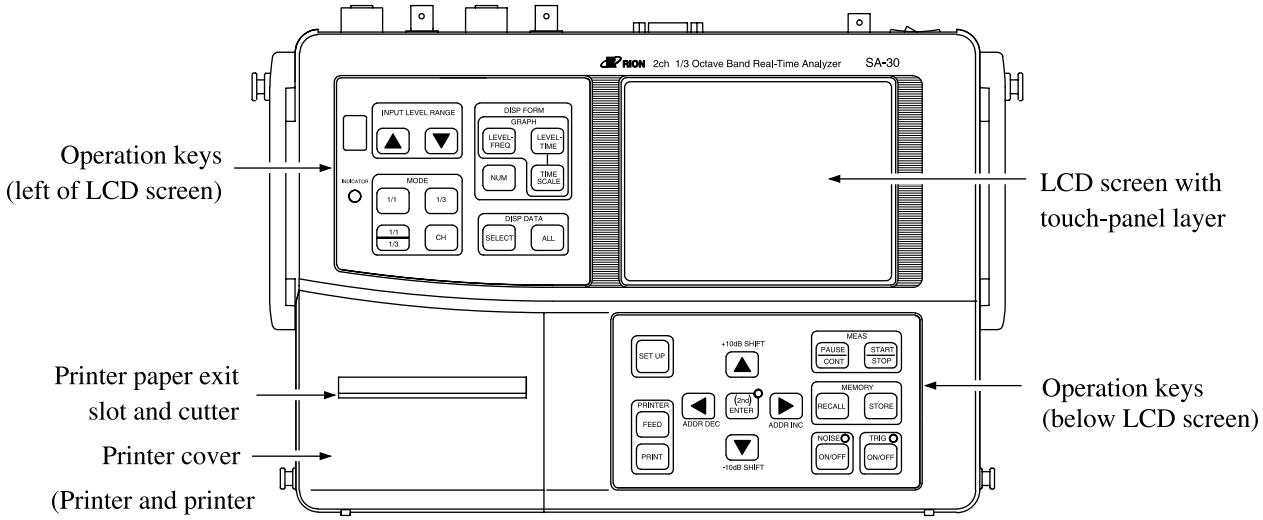
Handle

For easy carrying of the unit. Also supports the unit in a slanted position for operation.

Hooks

Allow attaching a strap for carrying the unit suspended around the neck (see page 21).

Top Panel



Top panel

LCD screen

Color display with backlight

Touch panel

Mounted over the LCD screen. Serves for selecting measurement parameters and making other settings.

Operation keys (below LCD screen)

Serve for start and stop of measurement, and for controlling the memory and printer. (See "Operation keys (below LCD screen)" on page 5.)

Operation keys (left of LCD screen)

Serve for controlling the signal input, filter output, display mode, and other functions. (See "Operation keys (left of LCD screen)" on page 7.)

Printer paper exit slot

The printer paper emerges here.

Cutter

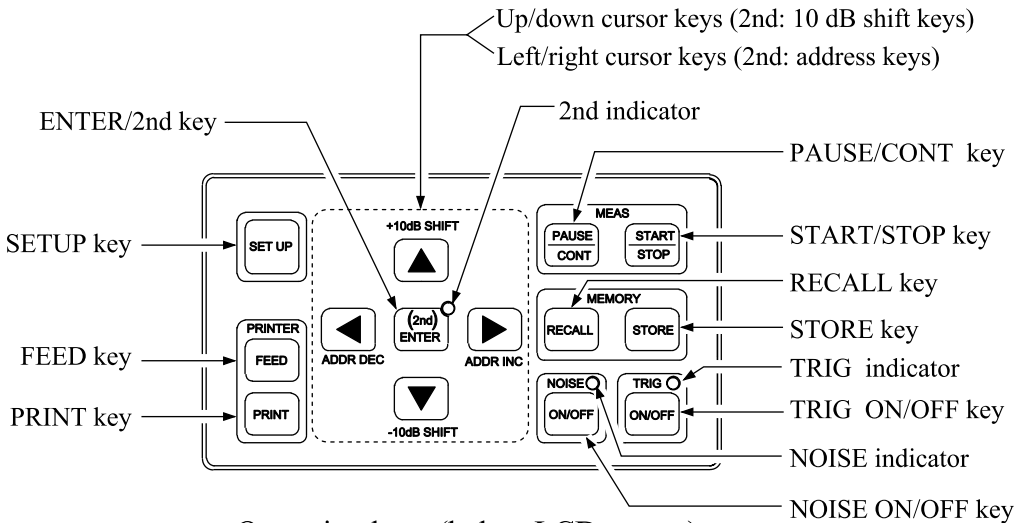
Serves for cutting off the printer paper.

⚠ CAUTION
The cutter is made of plastic, but it is sharp enough to cause cuts on fingers if handled improperly.

Printer cover

Opening this cover gives access to the printer paper.

Operation keys (below LCD screen)



Operation keys (below LCD screen)

ENTER/2nd key

Measurement screen: Switches between normal and 2nd key function. In normal mode (2nd indicator out), the four keys marked with arrows serve as cursor keys. In 2nd key function mode (2nd indicator lit), the four keys marked with arrows serve as 10 dB shift keys and address keys.

Menu screen: The setting of the currently selected touch key is accepted.

2nd indicator

Lights up when the 2nd key function mode is activated.

Up/down cursor keys (2nd: 10 dB shift keys)

2nd indicator out: The keys move the marker up and down.

2nd indicator lit: Measurement reading is shifted by 10 dB without changing the range.

Left/right cursor keys (2nd: address keys)

2nd indicator out: The keys move the marker left and right. On a menu screen, the keys move the touch key focus.

2nd indicator lit: The keys switch the memory address.

PAUSE/CONT key

Serves to pause and resume the display or a processing function.

START/STOP key

Serves to start and stop the measurement.

RECALL key

Serves to switch between current mode and recall mode.

STORE key

Serves to store values in memory.

TRIG indicator

Lights up when the trigger function is activated.

TRIG ON/OFF key

Serves to switch the trigger on and off.

NOISE indicator

Lights up when the noise generator is turned on.

NOISE ON/OFF key

Serves to switch the noise generator on and off.

SETUP key

Activates the touch-panel menu. When pressed while a menu is being shown, the display reverts to the measurement screen.

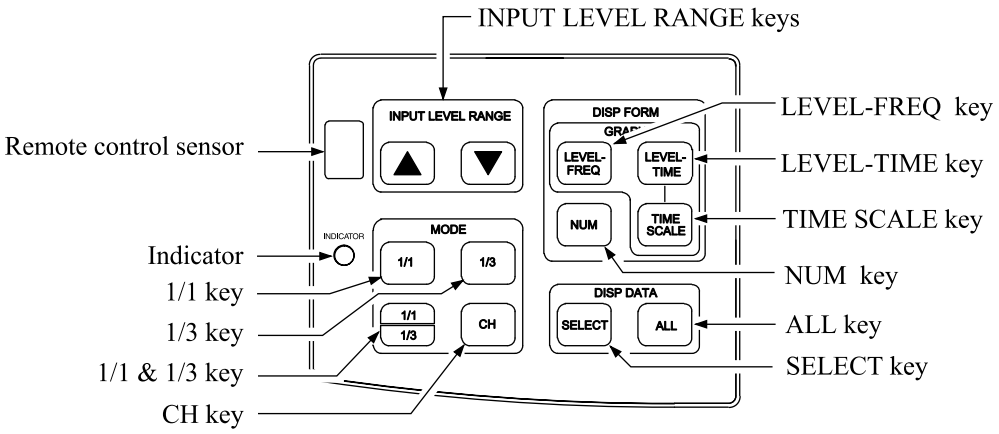
FEED key

Keeping this key depressed advances the printer paper.

PRINT key

Activates printout. When pressed during printing, the key cancels printing.

Operation keys (left of LCD screen)



Operation keys (left of LCD screen)

INPUT LEVEL RANGE keys

Switch the level range in 10-dB steps for the displayed channel in which the cursor is active.

LEVEL-FREQ key

Switches the measurement screen to a level vs. frequency graph.

LEVEL-TIME key

Switches the measurement screen to a level vs. time (level vs. address) graph or to a level/ frequency and level/time display.

TIME SCALE key

Controls the X axis range of the level/time display.

NUM key

Switches the measurement screen between numeric display and graph + numeric display for the level vs. frequency indication.

ALL key

Displays the processing results for all selected items simultaneously.

SELECT key

Switches the processing result to be shown on the screen for the selected processing mode.

CH key

Selects the channel for analysis. With each push of the key, the unit cycles through the following settings: A ch (channel A) → B ch (channel B) → A/B ch (channel A and B)

1/1 & 1/3 key

Activates simultaneous display of 1/1 octave and 1/3 octave band analysis.

1/3 key

Activates display of 1/3 octave band analysis.

1/1 key

Activates display of 1/1 octave band analysis.

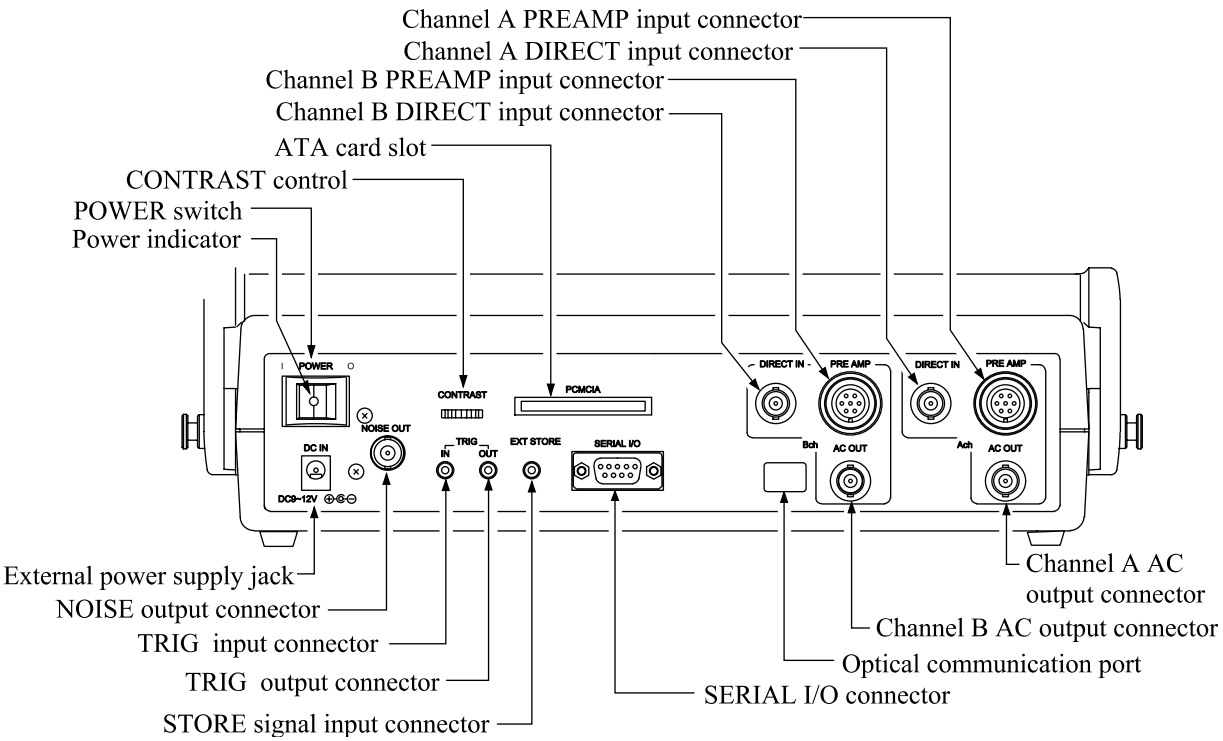
Indicator

During measurement:	flashes in 1-second intervals
When remote control signal is received:	flashes 3 times in 0.2-second intervals
When overload has occurred:	lit permanently

Remote control sensor

The signals from the supplied remote control are received here.

Rear Panel



Power indicator

Lights up when the unit is turned on.

POWER switch

Pressing the "I" side of the switch turns the power on and pressing the "O" side turns it off.

CONTRAST control

Serves to adjust the display screen contrast.

ATA card slot

Accepts ATA type memory cards.

Channel B DIRECT input connector

The AC output of a vibration level meter or similar can be connected here, using the supplied BNC-BNC cable.

Channel B PREAMP input connector

The output of a microphone preamplifier can be connected here.

Channel A DIRECT input connector

The AC output of a vibration level meter or similar can be connected here, using the supplied BNC-BNC cable.

Channel A PREAMP input connector

The output of a microphone preamplifier can be connected here.

Important
Only connect the specified types of equipment to the PREAMP input connectors for channel A and B. Connecting other equipment can lead to damage.

⚠ WARNING
Never touch the input pins with sharp metallic objects such as wires or metal clips, to prevent the possibility of electric shock.

Channel A AC output connector

The AC signal for channel A appears at this connector.

Channel B AC output connector

The AC signal for channel B appears at this connector.

Optical communication port

This port allows data transfer with a PC equipped with a compatible optical port, using an infrared link.

SERIAL I/O connector

This is the connector for the RS-232-C interface.

STORE signal input connector

A negative logic CMOS level (0 to 5 V) signal can be input here, to start the store process at the falling edge of the signal.

TRIG output connector

Internally generated trigger information is output here, using negative logic.

TRIG input connector

A negative logic CMOS level signal can be input here, to activate the trigger at the falling edge of the signal.

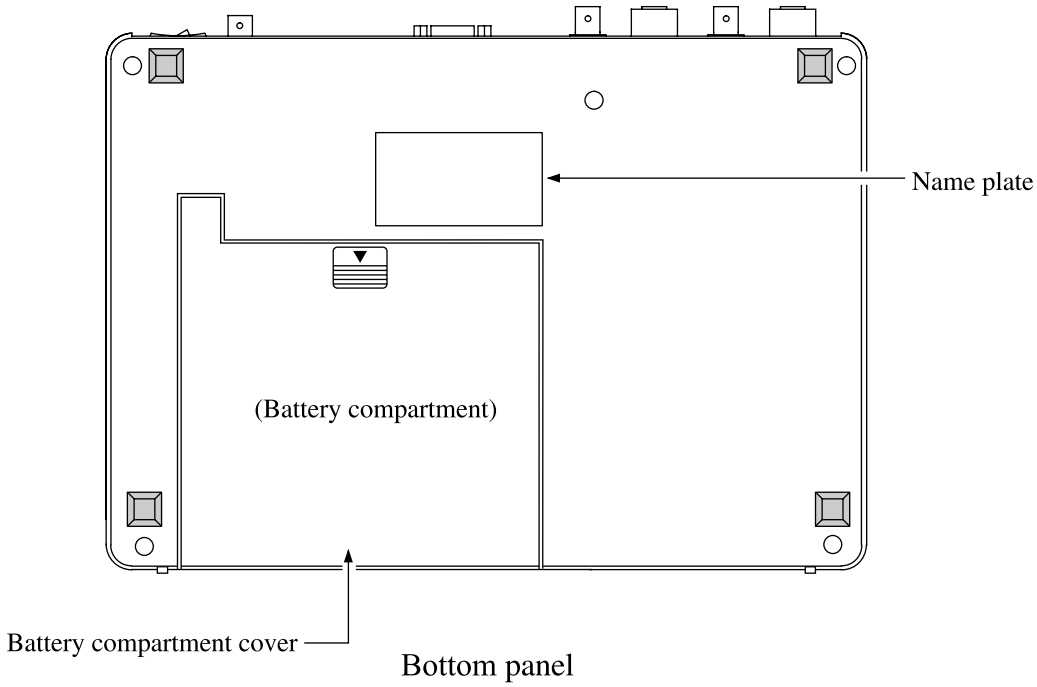
NOISE output connector

White noise and pink noise, either wide-band or 1/1 octave band is available from this connector. The center frequencies of the band noise are as follows.
16, 31.5, 63, 125, 250, 500, 1 k, 2 k, 4 k, 8 k, 16 k (Hz)

External power supply jack

The optional AC adapter NC-93 is to be connected here.
Do not use any other kind of AC adapter, to prevent the possibility of damage.

Bottom Panel



Bottom panel

Name plate

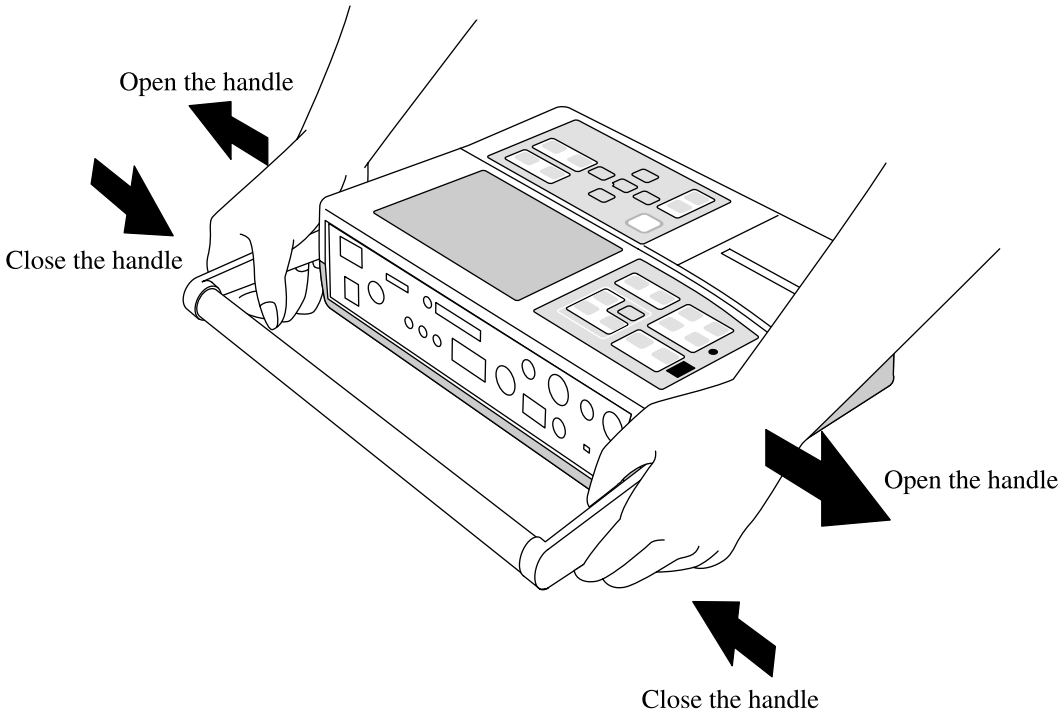
Indicates the model name, type, and serial number.

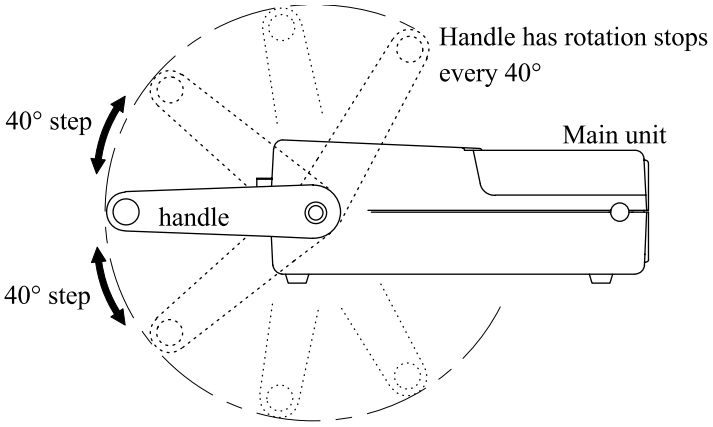
Battery compartment cover

The batteries are contained in this compartment. The compartment holds six IEC R20 (size D) batteries and one memory backup battery (CR 1/3N).

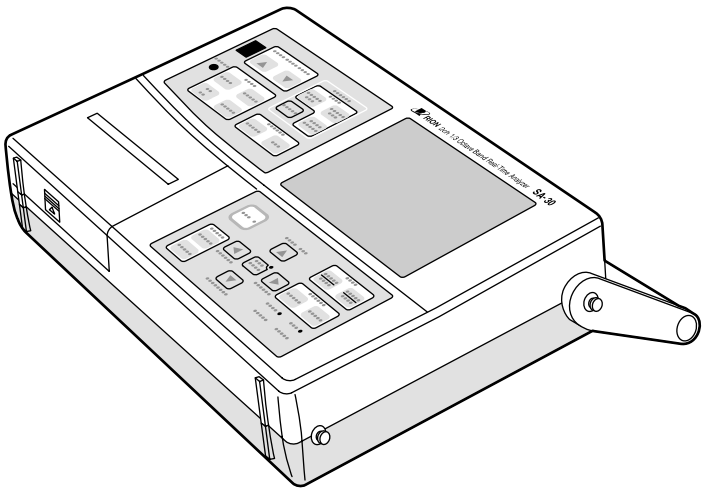
Carrying Handle

To turn the handle, first pull it out sideways, as shown in the illustration below. The handle has a stop at every 40 degrees of inclination. At each stop, the handle can be pushed in again to fasten it. Make sure that the handle is secured at a stop position.





The handle should be rotated for example when wishing to use the unit in a slanted position as shown at right, and before inserting the unit in the carrying case.

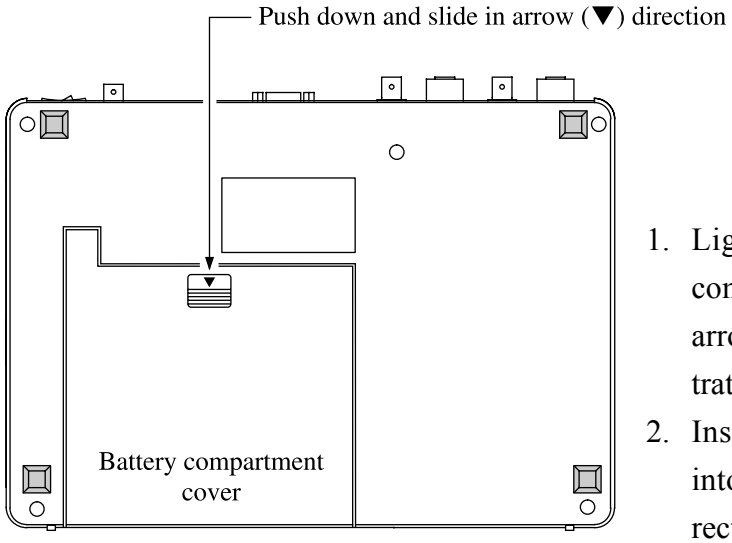


Preparations

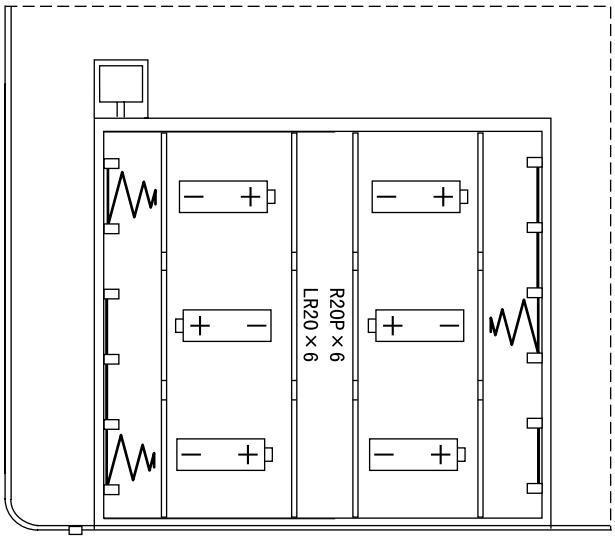
Power Supply

This unit is powered from six IEC R20 (size D) batteries (alkaline or manganese), or from the AC adapter NC-93. Before inserting or replacing batteries and before connecting the AC adapter, be sure to set the POWER switch of the SA-30 to OFF.

Battery operation



1. Lightly press the tab on the battery compartment cover and slide it in the arrow direction, as shown in the illustration.
2. Insert six IEC R20 (size D) batteries into the compartment, observing correct polarity as shown.
3. Replace the cover.

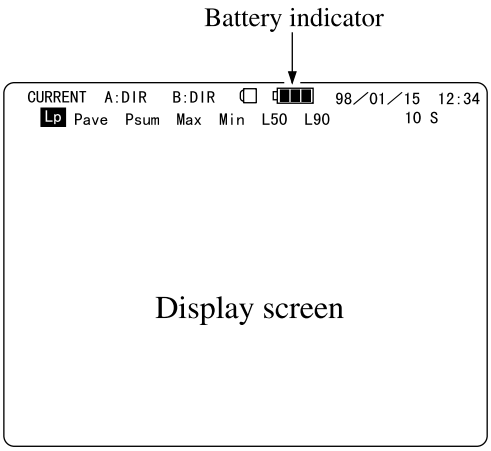


Battery life will depend on usage conditions and the type of battery. Alkaline batteries will allow approximately 5 hours of continuous operation (at an ambient temperature of about 20ºC). When features such as the display backlight and the printer are used, battery life will be shorter.

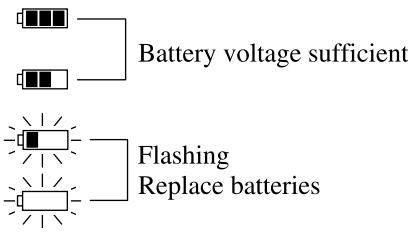
Important
Take care not to mix up [+] and [-] polarity when inserting the batteries. Replace all six batteries at the same time, and do not mix battery types. When not in use, remove the batteries from the unit.

Battery indicator

When operating the unit on batteries, use this indicator to verify the battery condition. The black segments will decrease as the batteries are depleted. When the display starts flashing, replace the batteries as soon as possible.



Battery indicator function

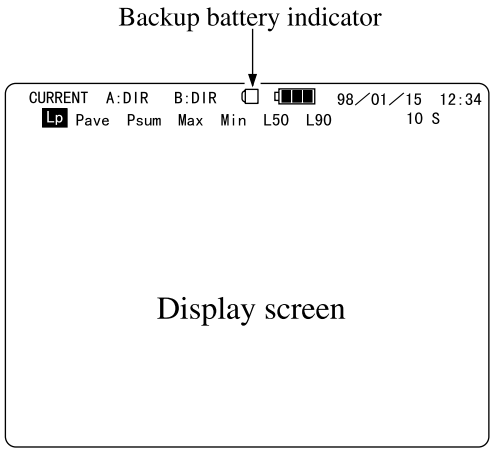


Backup battery (lithium battery)

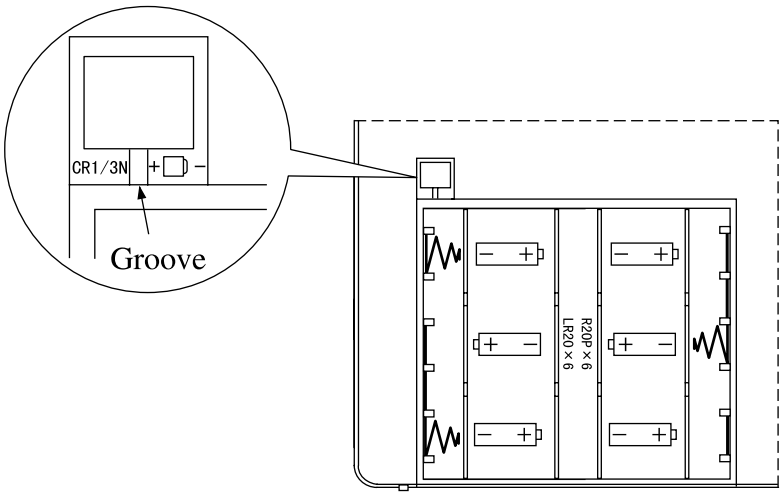
The internal lithium battery serves as backup for the unit settings and the data stored in the internal memory. Settings will be maintained and data will not be lost even if the unit is turned off.

When no backup battery is inserted, or when its voltage is low, the backup battery indicator appears. In this case, you should replace the backup battery as soon as possible.

When the battery is exhausted or removed, stored data and settings will be lost when the unit is turned off.



1. Turn the unit on.
2. Lightly press the tab on the battery compartment cover and slide it in the arrow direction, as shown in the illustration on page 13.
3. Insert a miniature screwdriver (blade size 1 to 1.5 mm) into the groove and remove the old battery.
4. Insert a new battery, taking care to observe correct polarity as shown in the slot.
5. Replace the battery compartment cover.
6. Turn the unit off and then on again. Verify that the backup battery indicator is no longer shown on the screen.

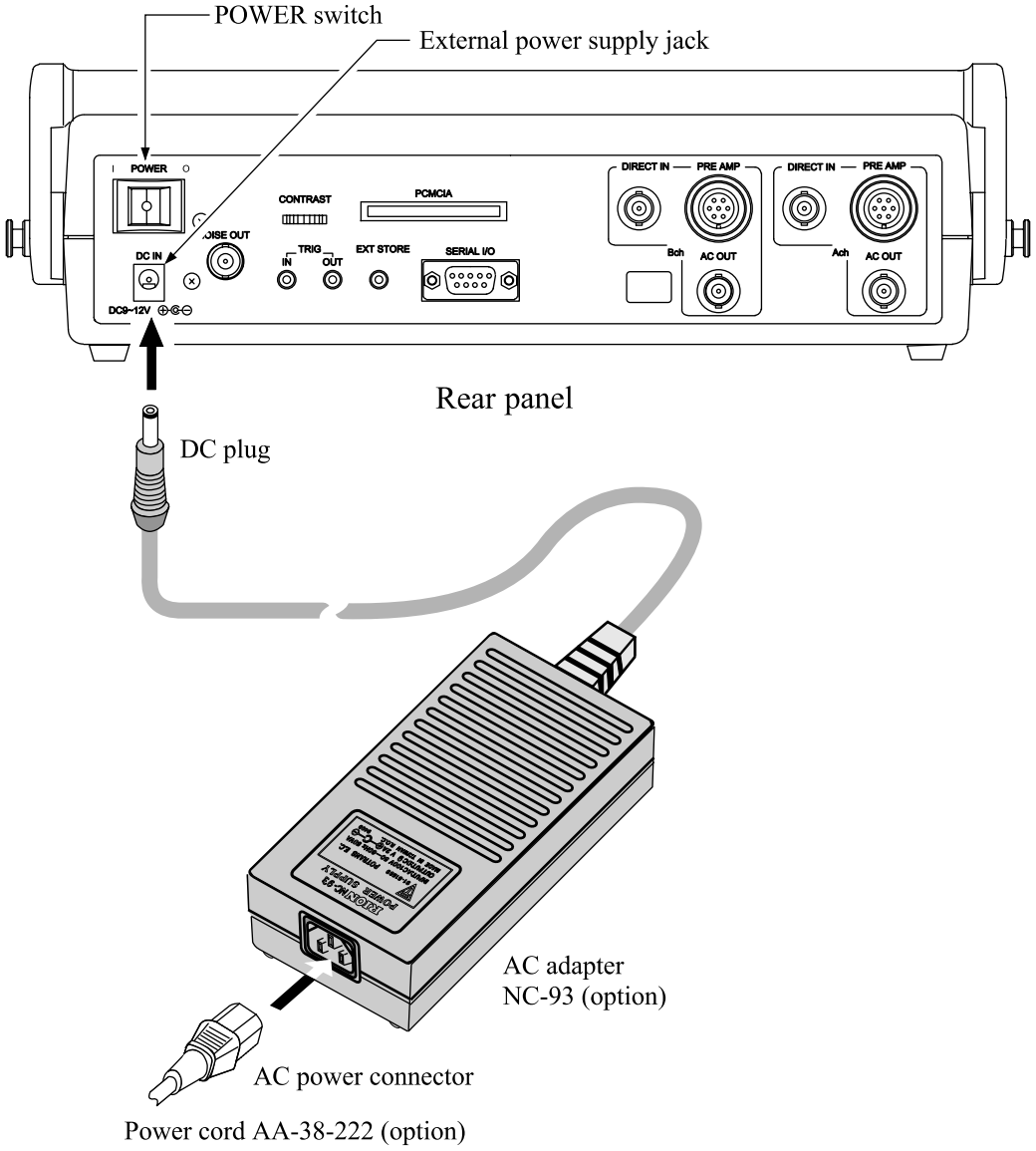


Note

If the backup battery is replaced while the unit is turned off, stored data and settings will be lost.

AC adapter operation

When using the optional AC adapter NC-93 to power the unit, connect it as shown below.

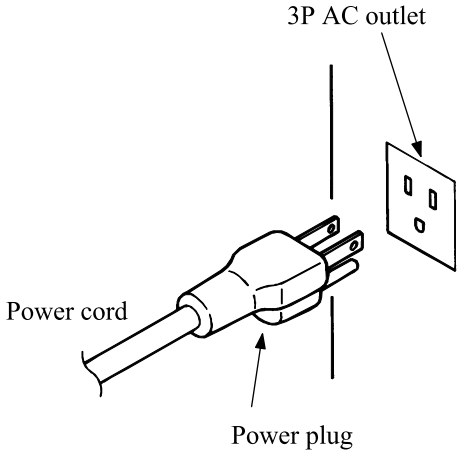


⚠ CAUTION

Do not use a different AC adapter other than the model NC-93. Otherwise overheating and damage may occur.

Do not cover the AC adapter with paper, cloth, or other objects, to prevent heat buildup.

Power the AC adapter only from an outlet rated for 100 V AC to 250 V AC.
After use, be sure to disconnect the power plug from the outlet.



⚠ CAUTION

Do not coil or stack the power cord during use of the AC adapter.

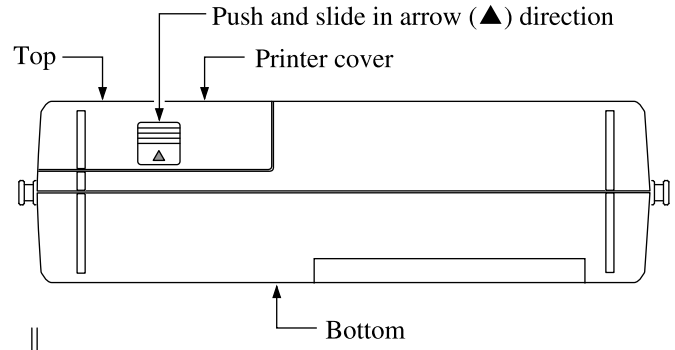
Do not cover the power cord with paper, cloth, or other objects, to prevent heat buildup.

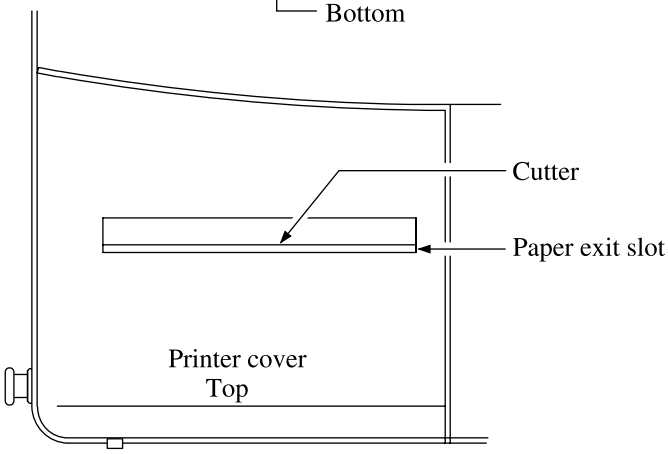
⚠ WARNING

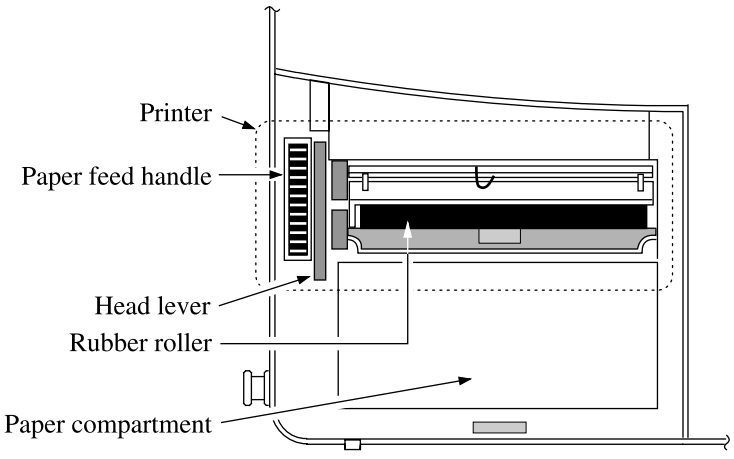
To prevent the possibility of electric shock, use a grounded outlet.

Loading the Printer Paper

When the printer cover is opened, the printer and paper compartment become accessible, as shown in the illustration.

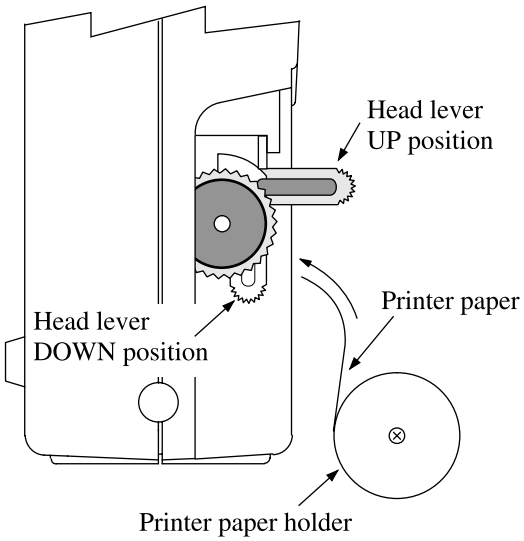


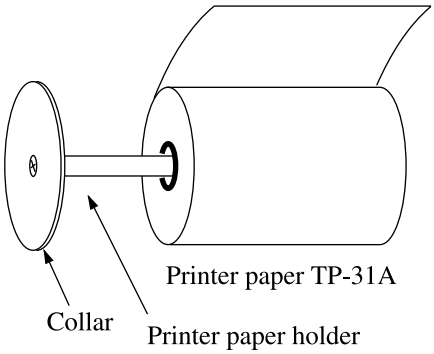


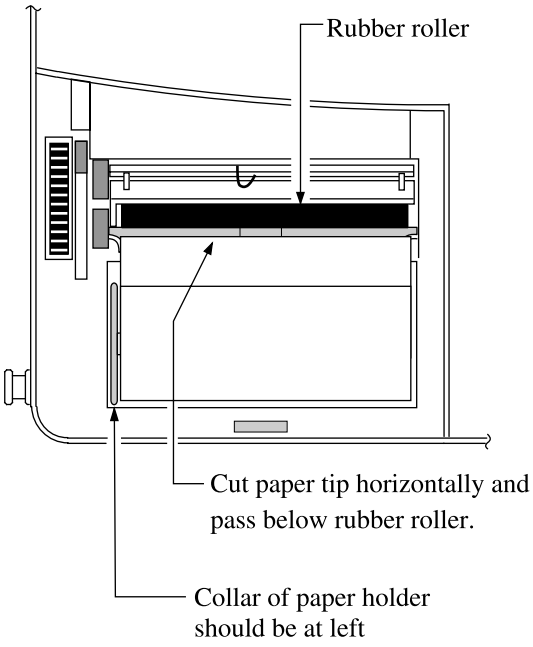


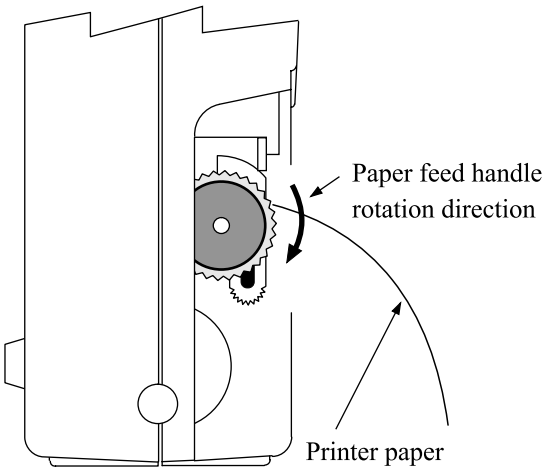
⚠ CAUTION

The cutter is made of plastic, but it is sharp enough to cause cuts on fingers if handled improperly.









1. Set the head lever of the printer to the UP position.
2. Pass the tip of the paper under the rubber roller.

   Orient the paper roll as shown in the illustration at top right. If inserted the wrong way around, nothing will print.

3. Set the head lever to the DOWN position.
4. Turn the paper feed handle in the arrow direction until the tip of the paper emerges by about 20 cm.

   Do not pull out the paper further, to prevent the possibility of damage.

5. Pass the tip of the paper through the paper exit slot from the inside.
6. Close the printer cover.

Auto-loading

If printer paper is inserted while the unit is ON, the paper is automatically wound in step 2 and will emerge for 2 to 3 cm on the top of the rubber roller. Then proceed to step 3.

Note

Use only the specified printer paper TP-31A. Using other paper may result in inferior print quality and paper feed problems.

The thermal paper used by the printer of this unit may be subject to discoloring during long storage. When wishing to archive measurement results, we recommend making photocopies of the printouts.

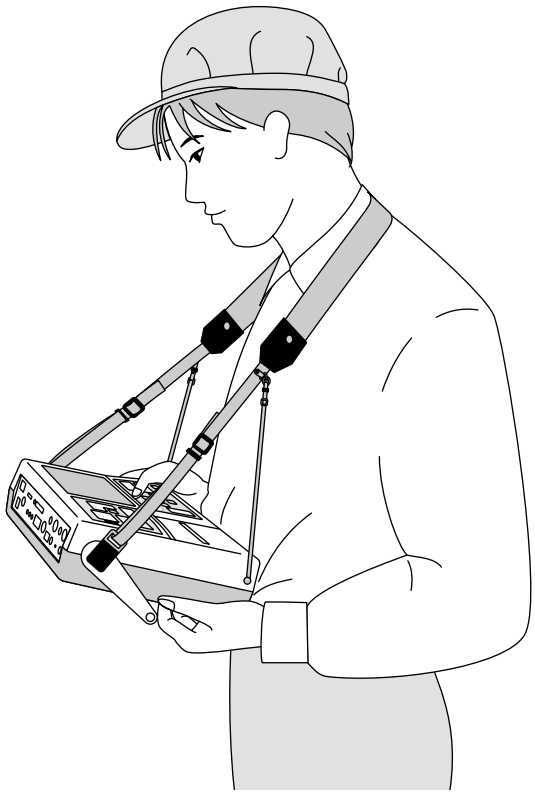
Do not bring organic or volatile substances such as cleaning alcohol into contact with the printer paper, because this will cause discoloration.

Do not pull out the printer paper by force, to prevent damage to the printer head and mechanism.

When the paper roll is nearing the end, a red stripe will be visible along the edge. Insert a new paper roll.

Using the carrying strap

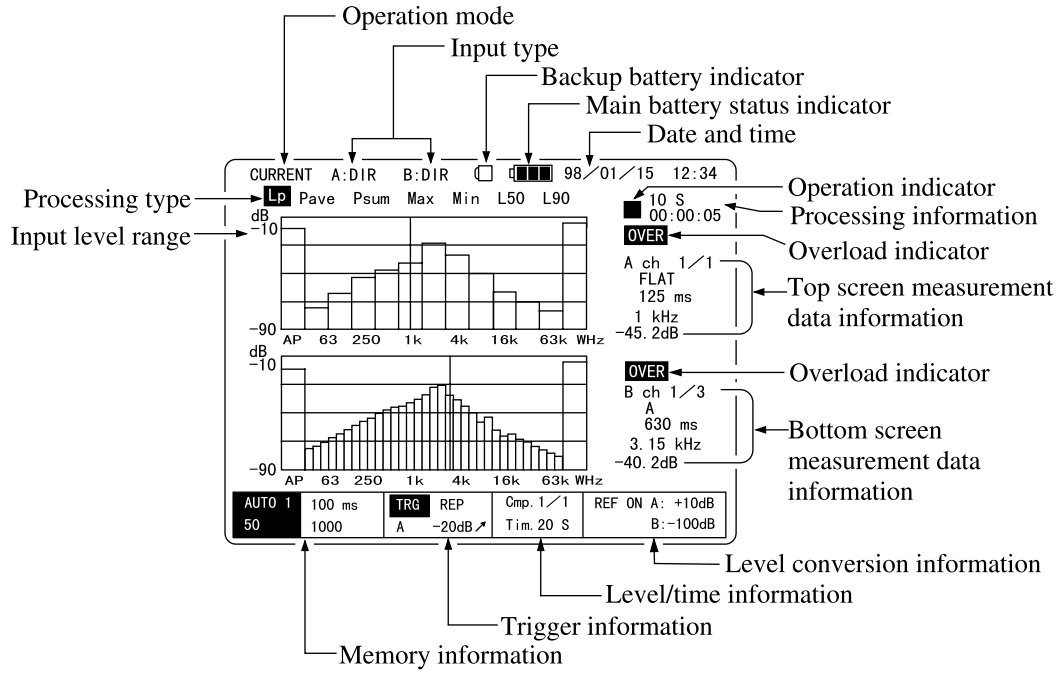
The supplied carrying strap can be used to suspend the unit from the neck during use in the field, as shown in the illustration. Use the hooks on both sides of the unit to secure the strap.



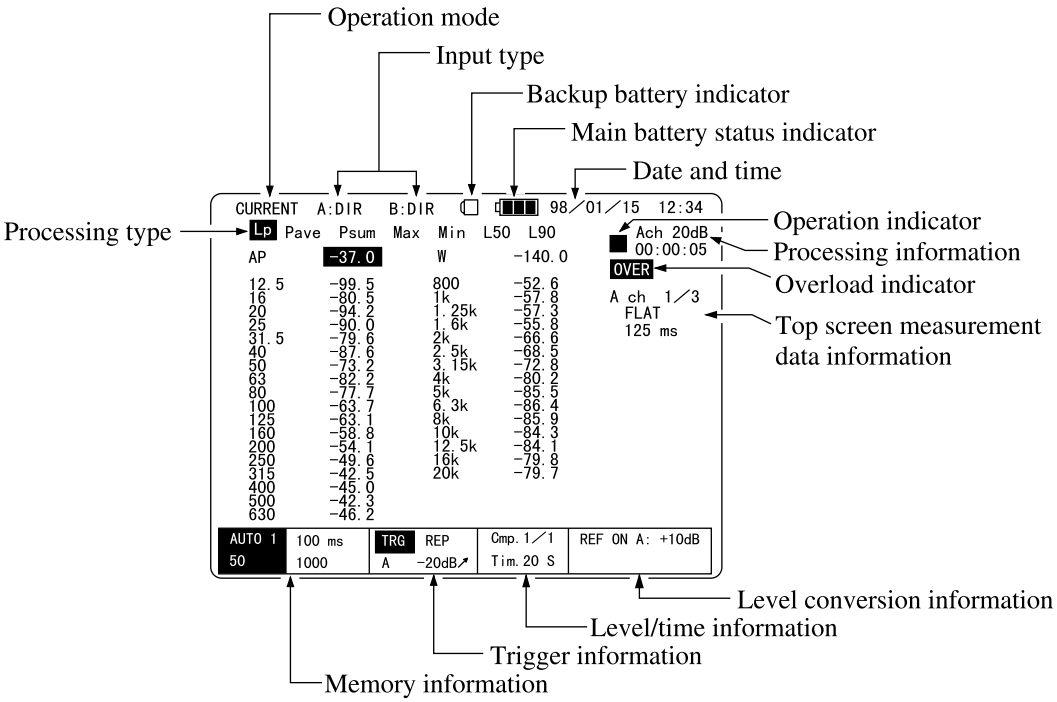
Display Explanation

Display example

The display content will differ according to the measurement conditions and settings. A representative example is shown below. The display font and appearance may also be slightly different on the actual unit.



Display example for graph display



Display example for numeric display

Operation mode

CURRENT: Measurement is currently being carried out.

RECALL: Data stored in memory are being recalled and shown on the display.

Input type

DIR: Direct input is selected.

PRE: Preamplifier input is selected.

Backup battery indicator

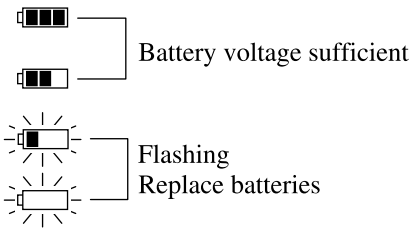
Appears when the voltage of the memory backup battery in the unit drops to the lower limit.

When this indicator appears, replace the backup battery as soon as possible.

Main battery status indicator

Shows the status of the main batteries in the unit. The black segments will decrease as the batteries are used up. When the display starts flashing, replace the batteries as soon as possible.

During AC adapter operation, the indicator shows the "OK" condition.

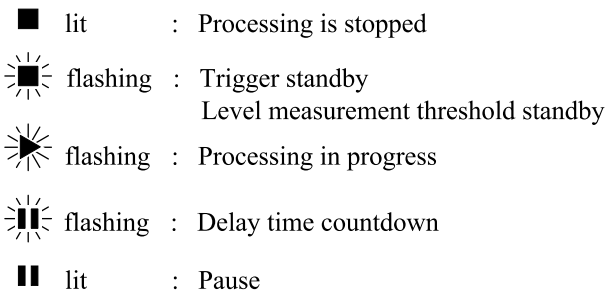


Date and time

The current date and time are shown here. Before starting a measurement, verify that the date and time indication is correct.

Operation indicator

The indicator shows the follows conditions.



Processing information

Time measurement mode:

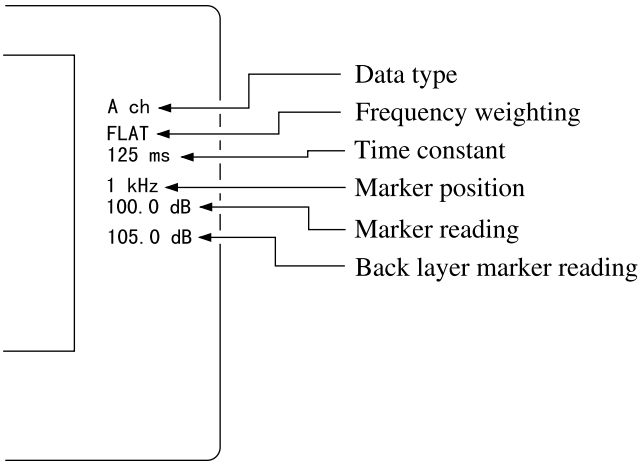
Shows the processing time setting and elapsed processing time.

Level measurement mode:

Shows the level monitoring channel, threshold level, and accumulated processing time.

Measurement data information

Shows various measurement settings.



Measurement data information

Data type

Normal operation	"A ch" or "B ch"
Back layer data differential processing	"DIFF"
Recall data processing	"CALC"

Frequency weighting

No indication in differential and recall processing modes

Time constant

No indication in differential and recall processing modes

Marker position

When X axis is frequency	"*** Hz"
When X axis is address	"ADR ****"
When X axis is time	"**** S **** mS"
	"*** M ** S"
	"*** H ** M"
	"*** D ** H"

Marker reading

When logarithmic operation is specified "***.* dB"

When linear operation is specified "*.**e - * mV"

"*.**e - * V"

Asterisks (***) stand for numerals.

Back layer marker reading

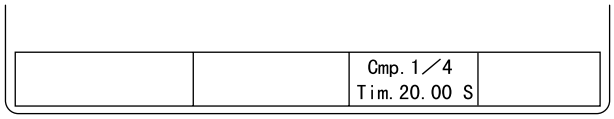
Shows when overlay display is selected or a second marker is used.

Level/time information

Shown during level/time operation.

CURRENT: Time amplitude for display

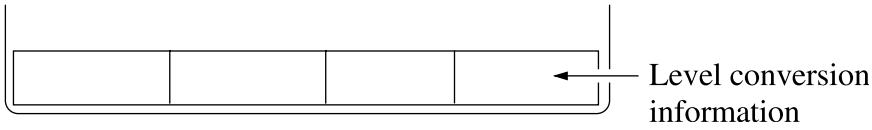
RECALL: Compression ratio



Level conversion information

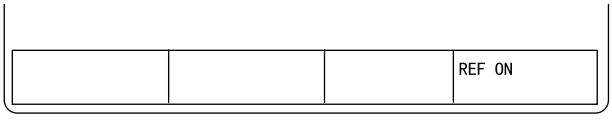
At the bottom right of the screen, information is shown on any level conversion or shifting that is being applied.

The information is shown in the same format also for recalled data, depending on the measurement settings.

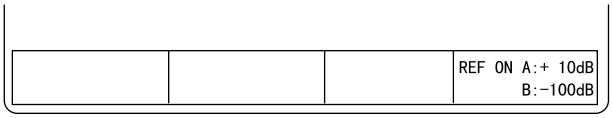


When level conversion is OFF, nothing is shown.

When level conversion is ON and the level shift amount is 0 dB, the indication is as follows.



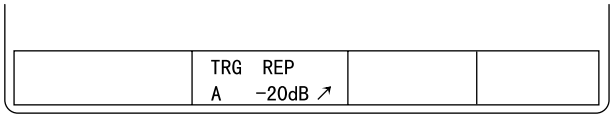
When level conversion is ON and the level shift amount is not 0 dB, the indication is as follows.



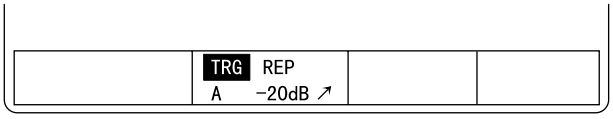
Shift indication format: +XXX dB or -XXX dB

Trigger information

When trigger is OFF, nothing is shown.
When trigger is ON, the respective setting is shown.



When repeat is ON, the indication "REP" is shown.



When measurement was started and the unit waits for the trigger event, the "TRG" indication is shown in reverse video. When the trigger event occurs, the indication is returns to normal.

Memory information

CURRENT:

Store type, address, Lp store period (only shown when instantaneous values were stored), store data count are shown.

While storing is in progress (delay time end), the store type and address are shown in reverse video.

During manual store, the display briefly is shown in reverse video.

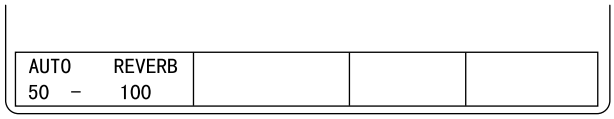
RECALL:

When recall processing is OFF

Store type, address, and processing type are shown.

When recall processing is ON

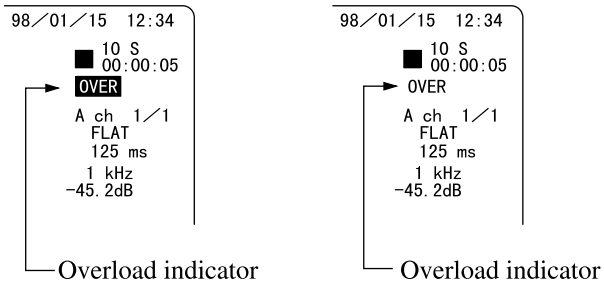
Store type, processing address range, and processing type are shown.



Overload indicator

When the input signal voltage exceeds the preset input level range by a certain amount, the overload indication comes on.

In such a case, measurement results will not be correct. Increase the level range setting until the overload indication does not appear.



CURRENT:

When overload has occurred during measurement, the indicator is shown in reverse video for one second.

Instantaneous value display: Indicator disappears after one second.

Processing value display: Indicator goes back to normal, but remains on screen until the start of the next processing operation.

STORE:

Instantaneous value display: Overload condition of instantaneous data is shown.

Processing value display: If overload has occurred within the processing time range, the overload information is stored.

RECALL:

For measurement data and processing data where overload has occurred during store, the overload indication is shown during recall.

Processing type information

Display example for Lp and maximum of six processing modes:

Lp Lave Psum Max Min L50 L90

When three processing modes are selected:

Lp L5 L50 L95

Input level range

The level range is switched in 10-dB steps for each channel separately.

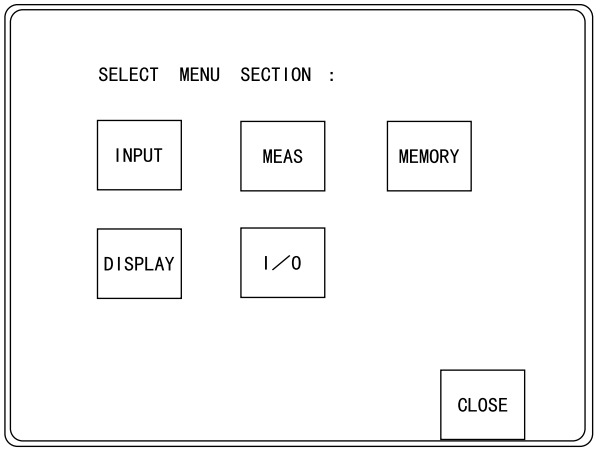
The following table shows messages that may appear on the screen during operation. Follow the instructions, as indicated.

Message	Meaning
Loading Now... DO NOT REMOVE CARD !	Data are being loaded from memory card. Do not remove the memory card.
Writing Now... DO NOT REMOVE CARD !	Data are being written to memory card. Do not remove the memory card.
Operating Now... DO NOT REMOVE CARD !	Processing is being carried out. Do not remove the memory card.
Panel Condition Load ?	Should panel settings be loaded ?
Block Data Delete ?	Should this block of data be deleted ?
Display Data > Back Layer Data	Display data are being stored as back layer data for differential processing.
!!! Already Exist. Overwrite ?	Data already exist at the specified address. Should the data be overwritten ?
!!! Format Card（ALL DATA DELETE）!!!	Memory card will be formatted. All data on the card will be lost.

Using the Menus

Menu Operation Steps

When the SETUP key is pressed, the touch-panel top menu appears. From this menu, all other menus can be accessed by touching the respective selection fields.

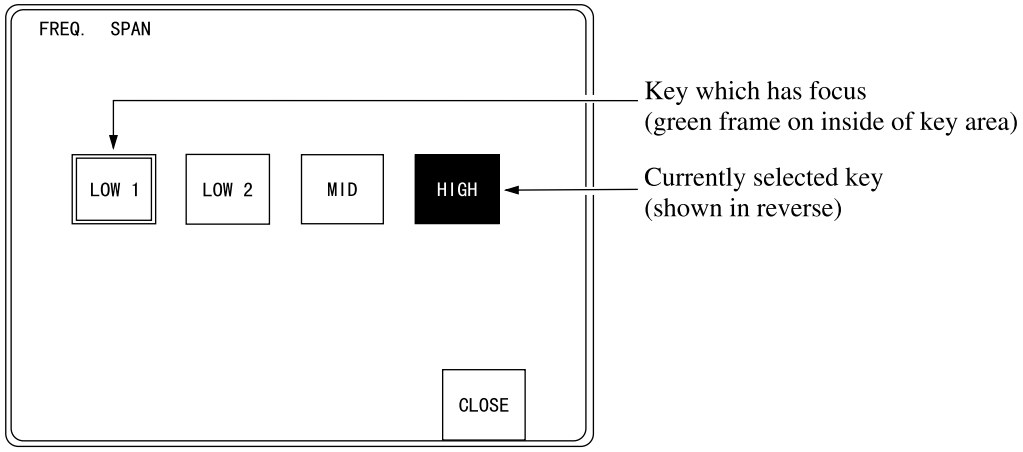


Top menu

To return to the measurement screen, touch [CLOSE], [OK], [CANCEL] in sequence, or press the SETUP key again.

Menu operation steps

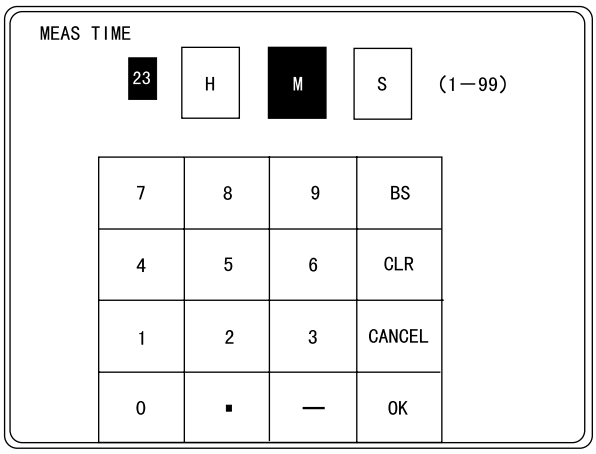
When a menu opens, the currently selected key is shown in reverse. The key which currently has focus is indicated by a green border (see below).



When a key area is touched, the area momentarily is shown in reverse. If the beep setting is ON, a beep sound will also be heard.
If the selected key has a submenu, this will appear when the key is touched. Otherwise the choices [OK] and [CANCEL] will be shown. Touching [OK] confirms the selection. Touching [CANCEL] returns to the previous step.

The focus can be moved with the right and left cursor keys on the operation key panel below the screen. Select the desired item and press the ENTER/2nd key to confirm.

Numeric setting menus



The currently selected key is shown in reverse. The numeric setting being altered is also shown in reverse.

Setting example for measurement time

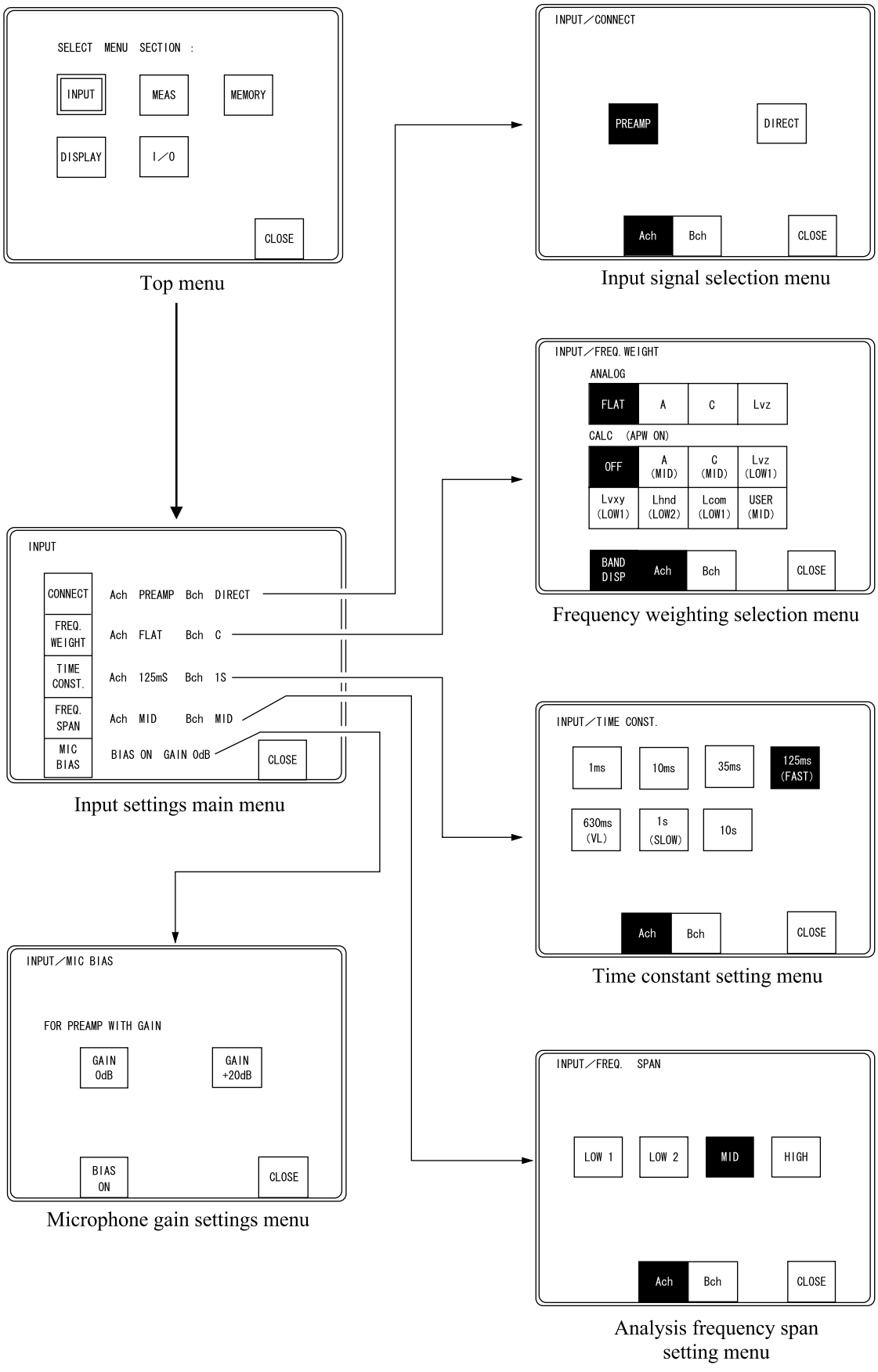
Procedure

1. Select the item to change (hours, minutes, seconds).
2. Enter the desired numerals.
3. Touch [OK].
   To correct the most recently entered number, touch [BS] (backspace). To start over, press [CLR] (clear).
   If an invalid (out-of-range) number is entered, the setting will not be accepted also when [OK] is touched. If the beep setting is ON, three short beeps will be heard.
   To abort the input and return to the previous screen, touch [CANCEL].

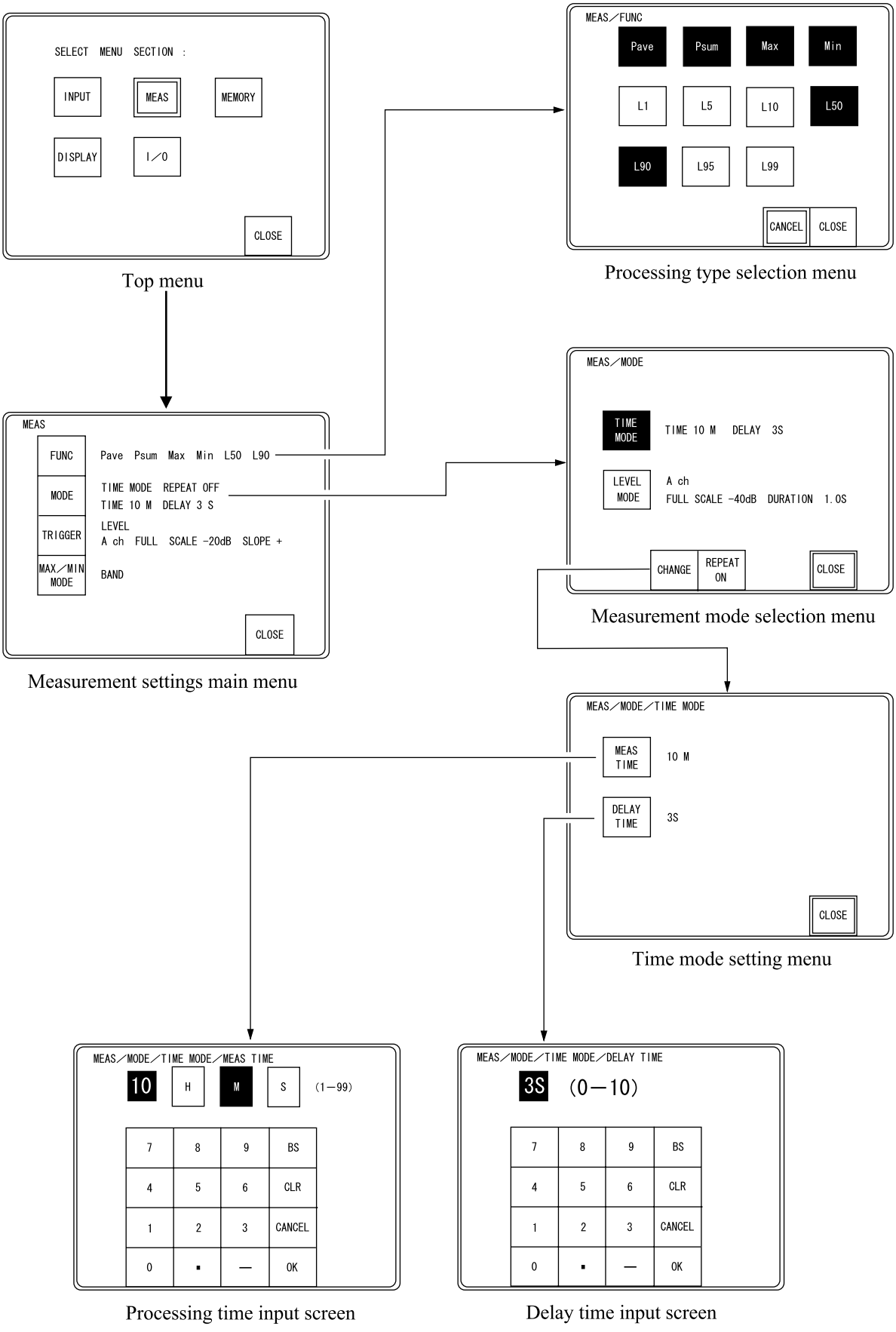
Menu Flow Index

Menu Flow

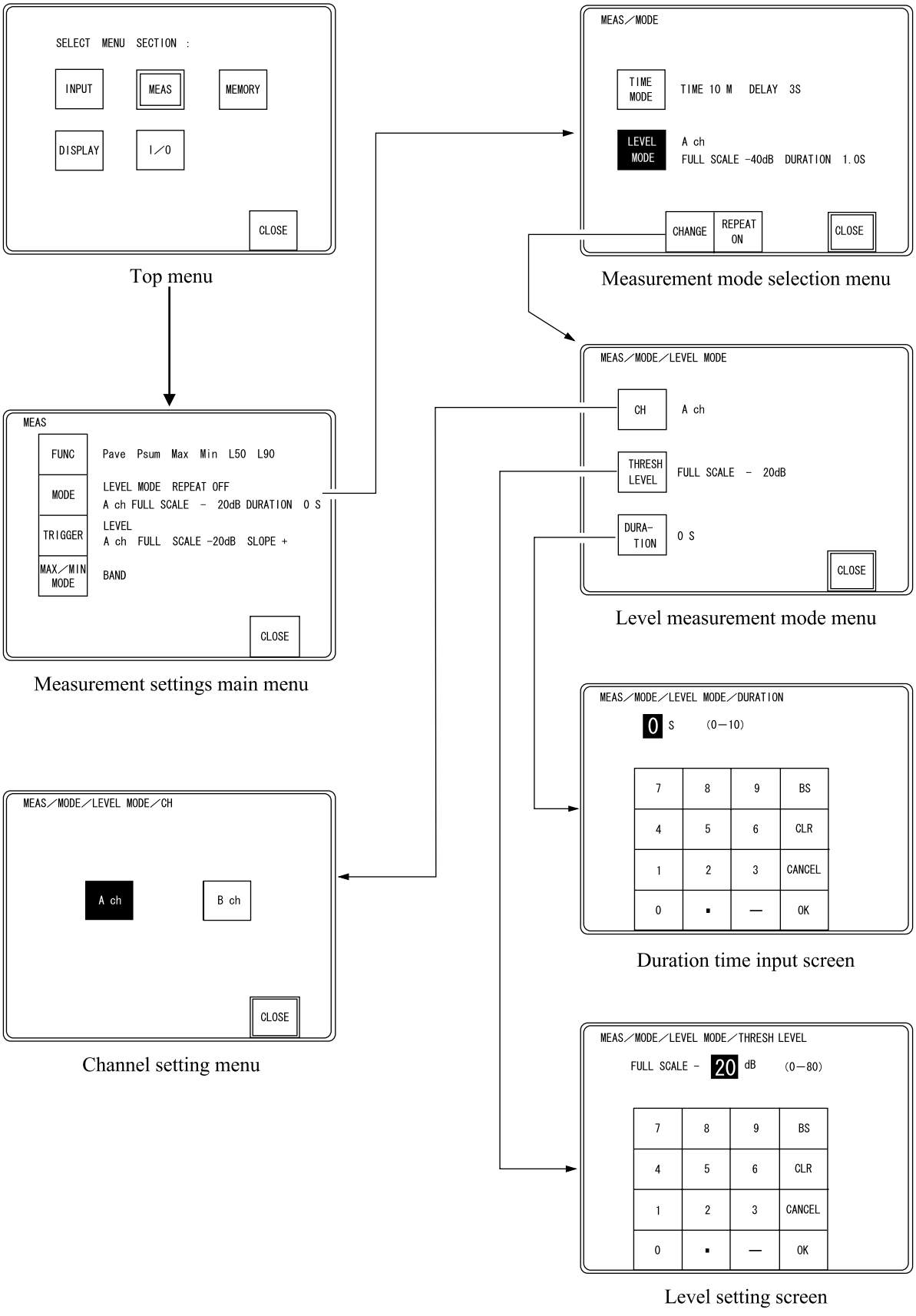
Input settings (INPUT)



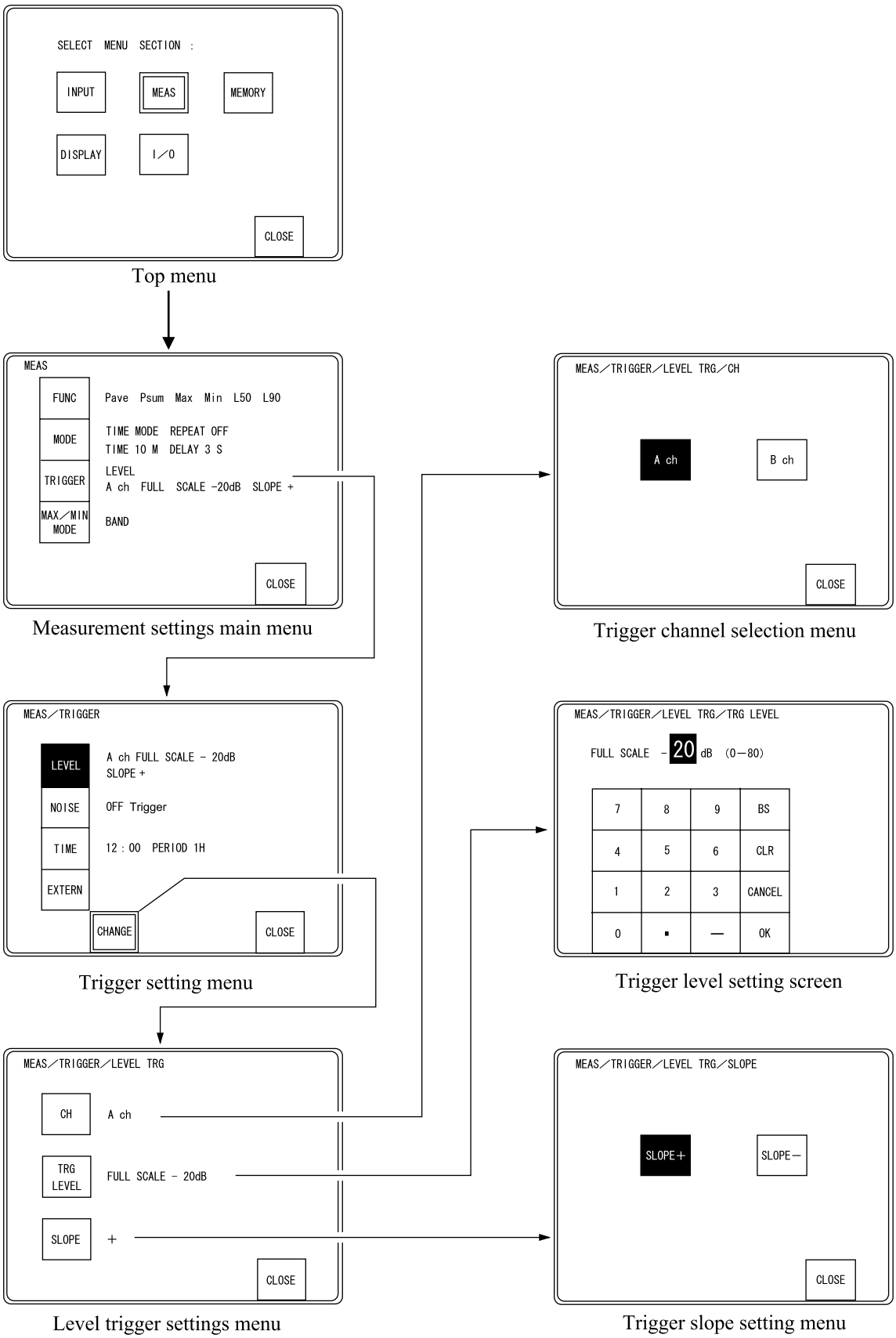
Measurement settings (FUNC, TIME MODE)



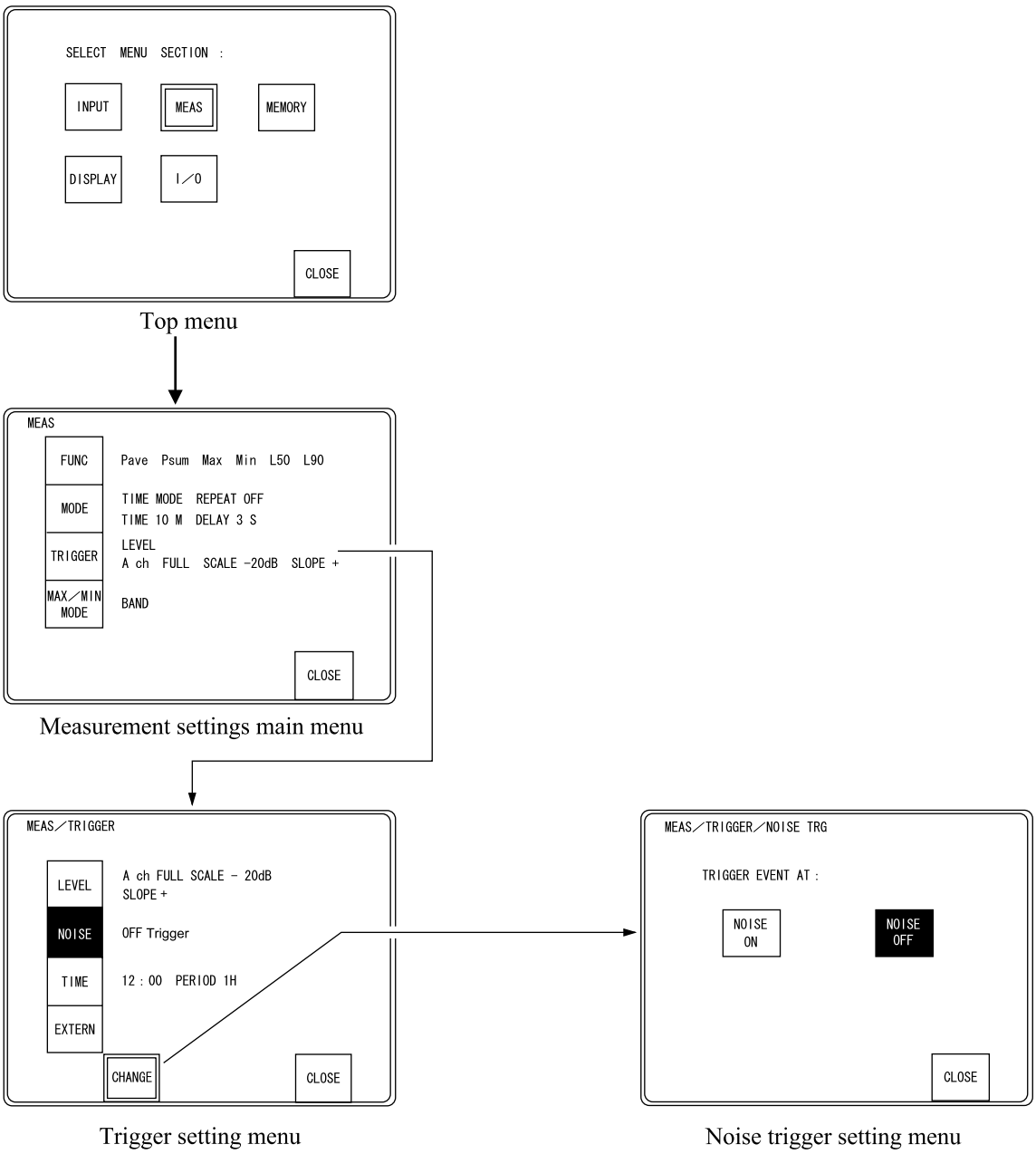
Measurement settings (LEVEL MODE)



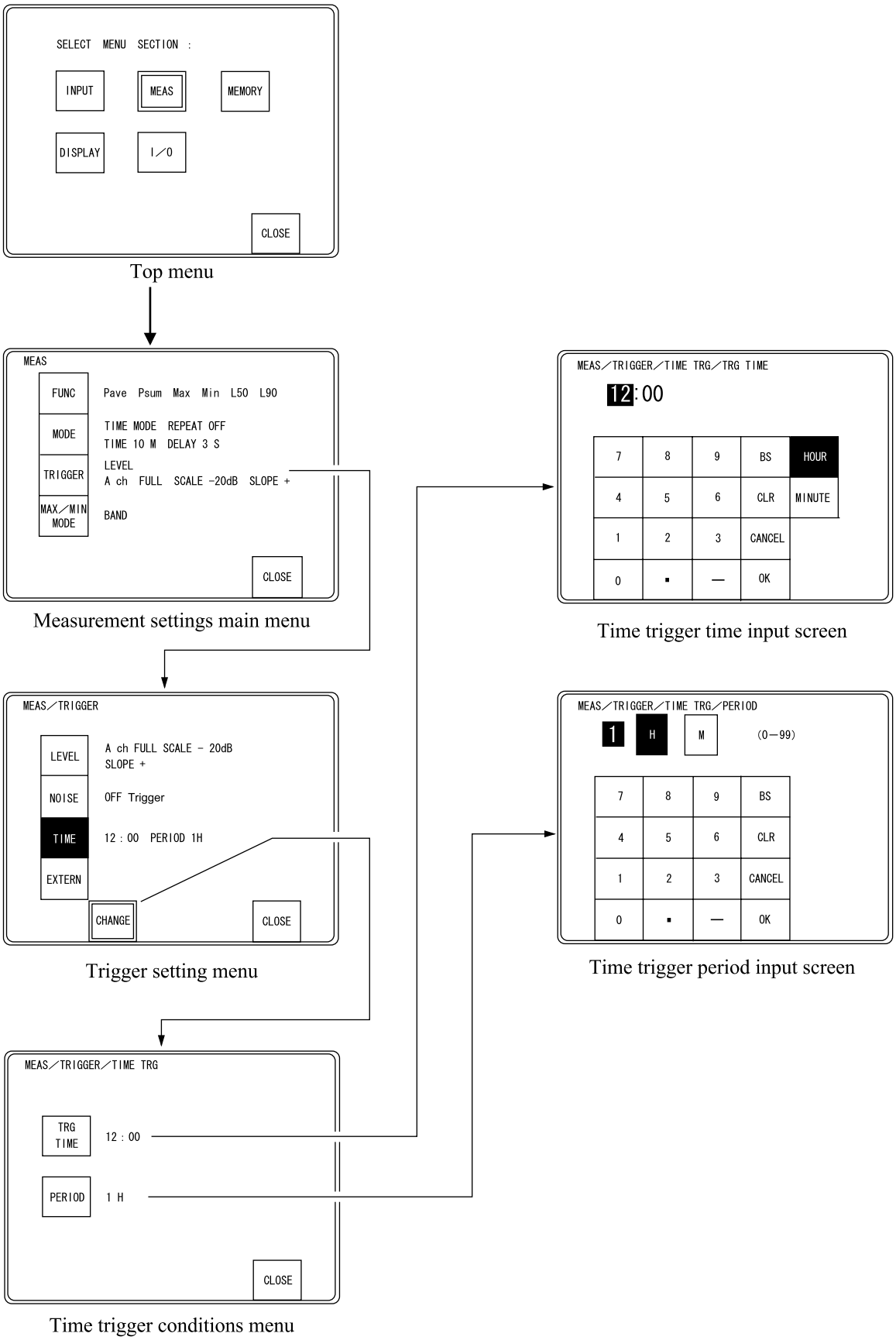
Measurement settings (LEVEL TRIGGER)



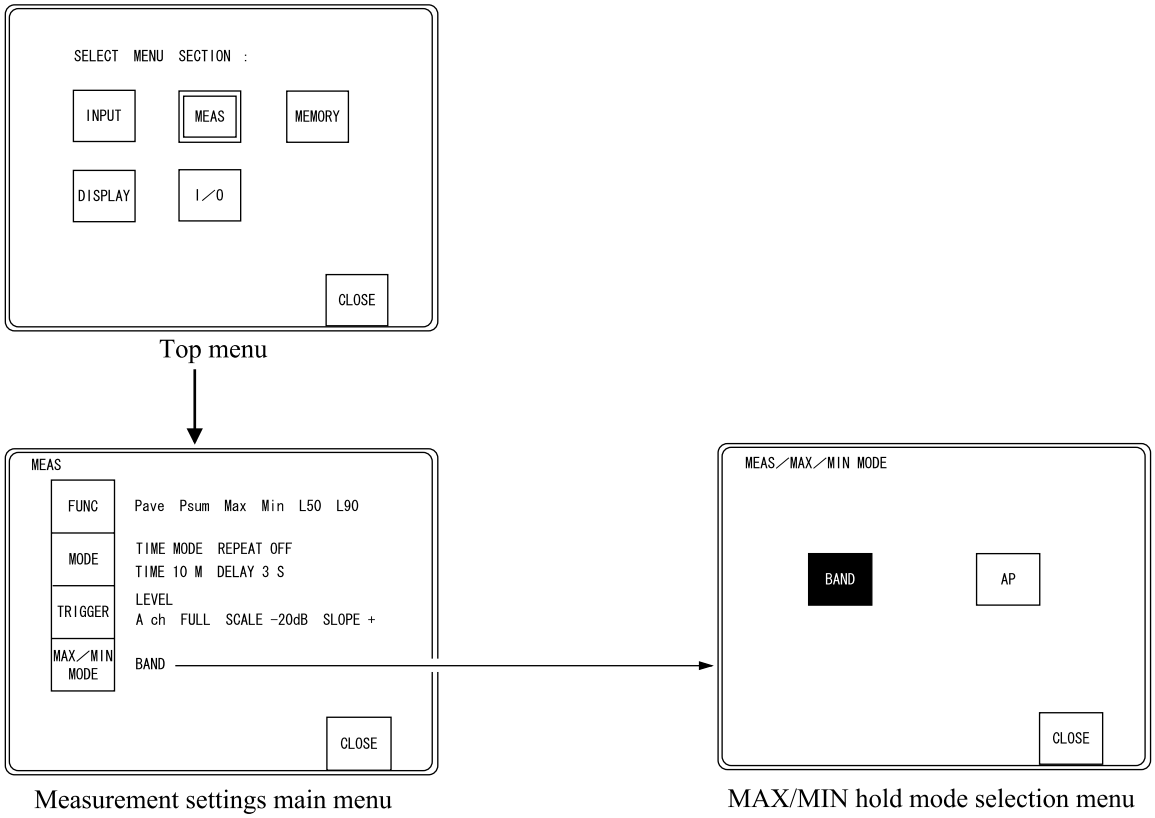
Measurement settings (NOISE TRIGGER)



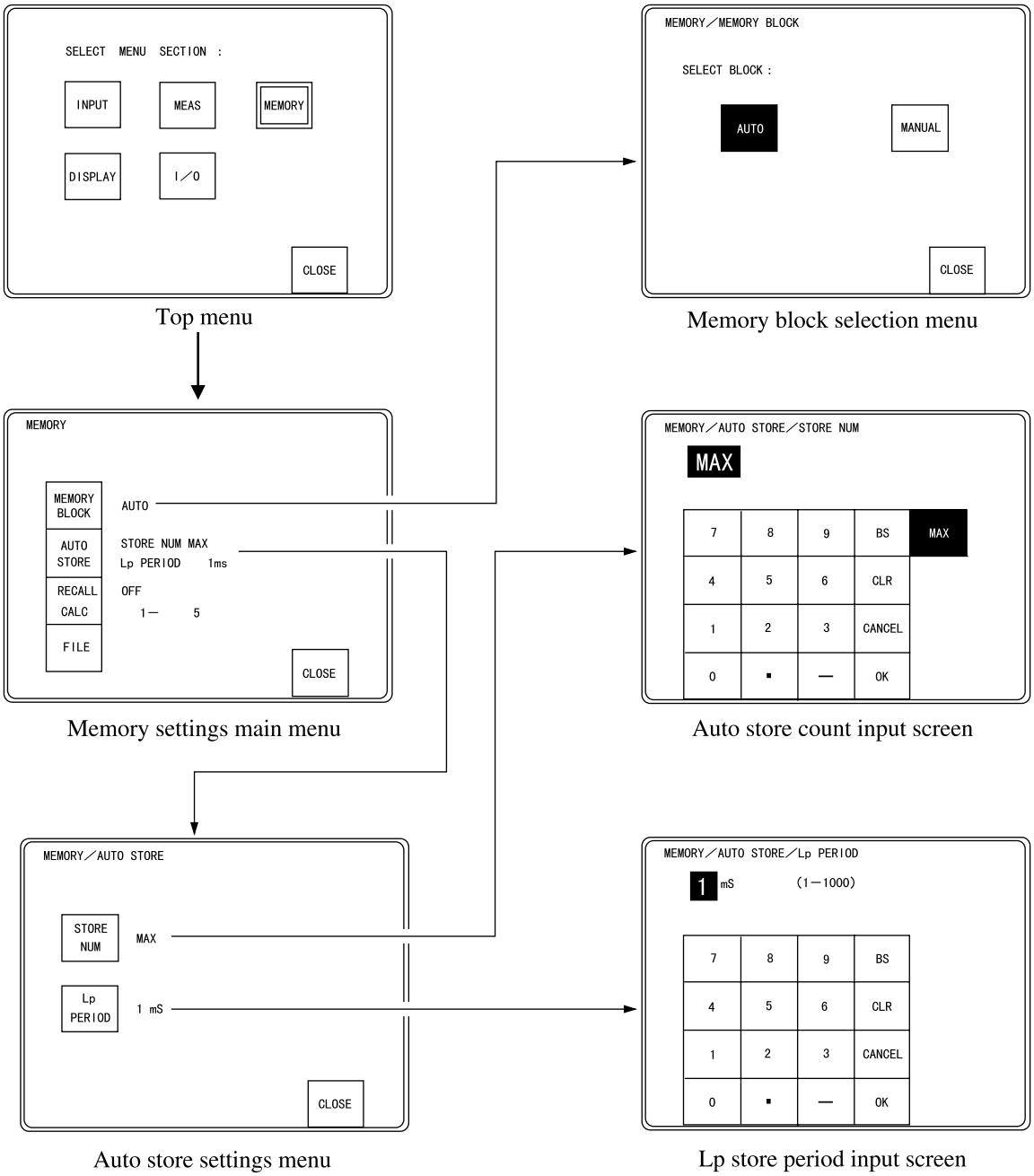
Measurement settings (TIME TRIGGER)



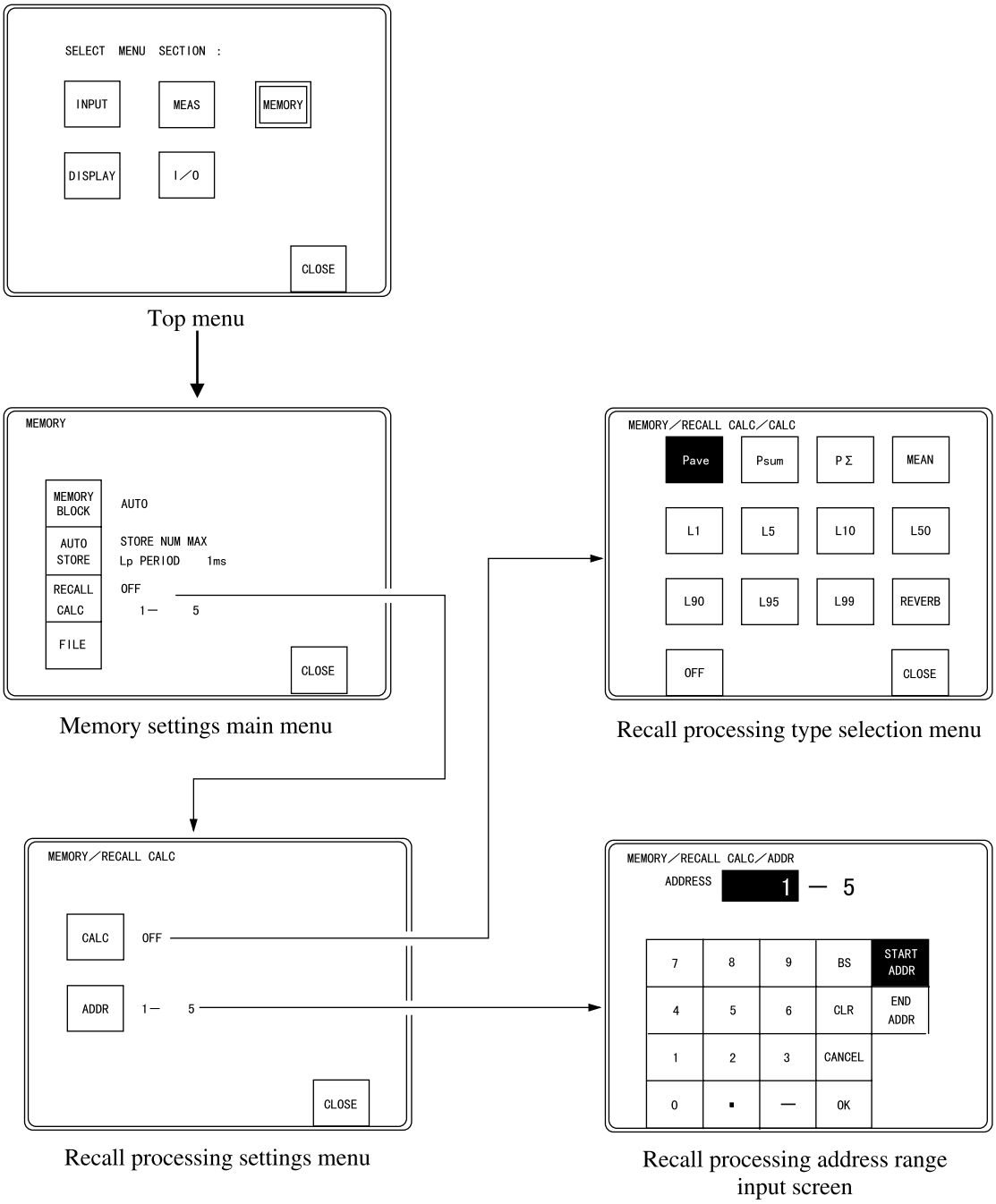
Measurement settings (MAX/MIN MODE)



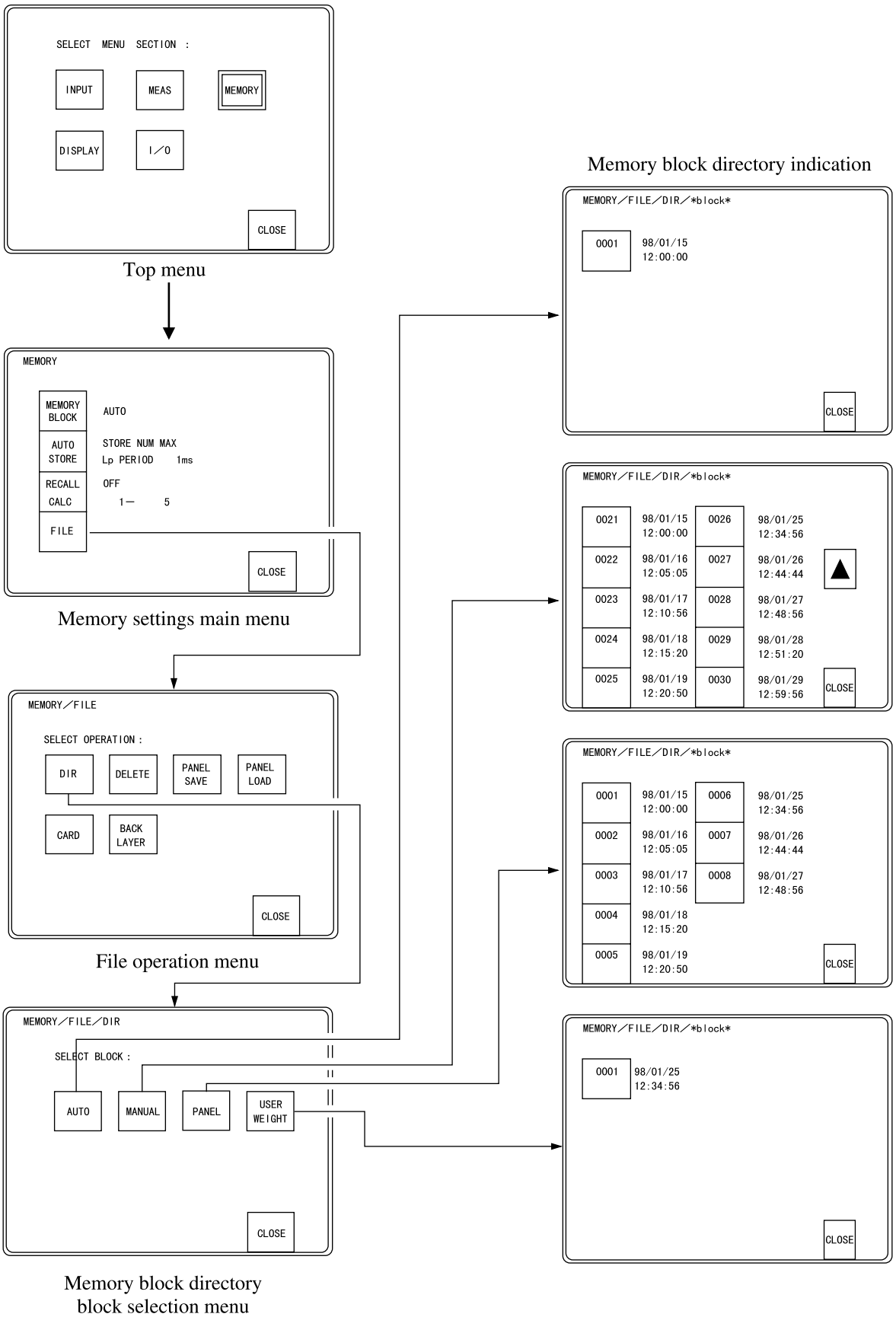
Memory settings (MEMORY BLOCK, AUTO STORE)



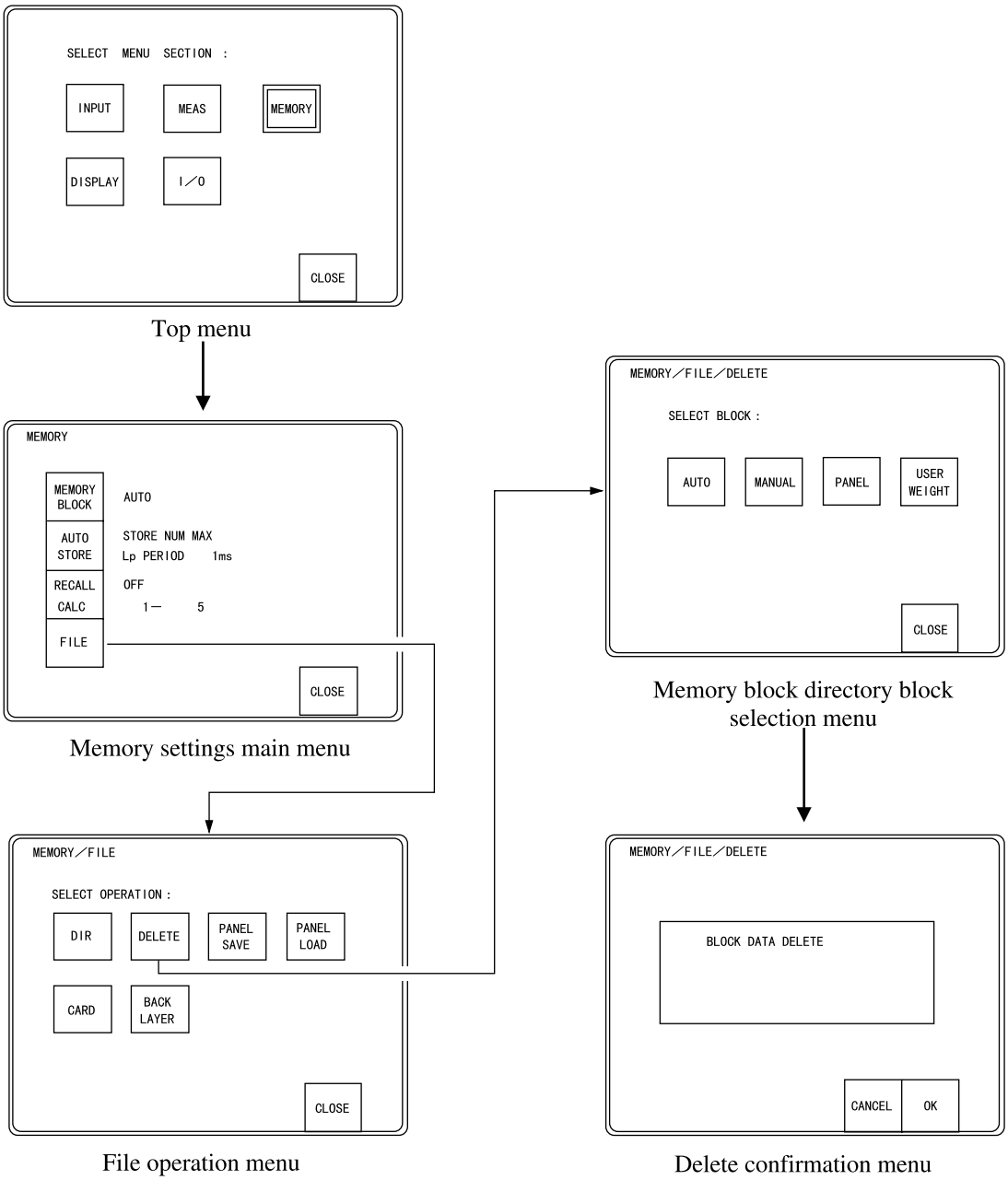
Memory settings (RECALL CALC)



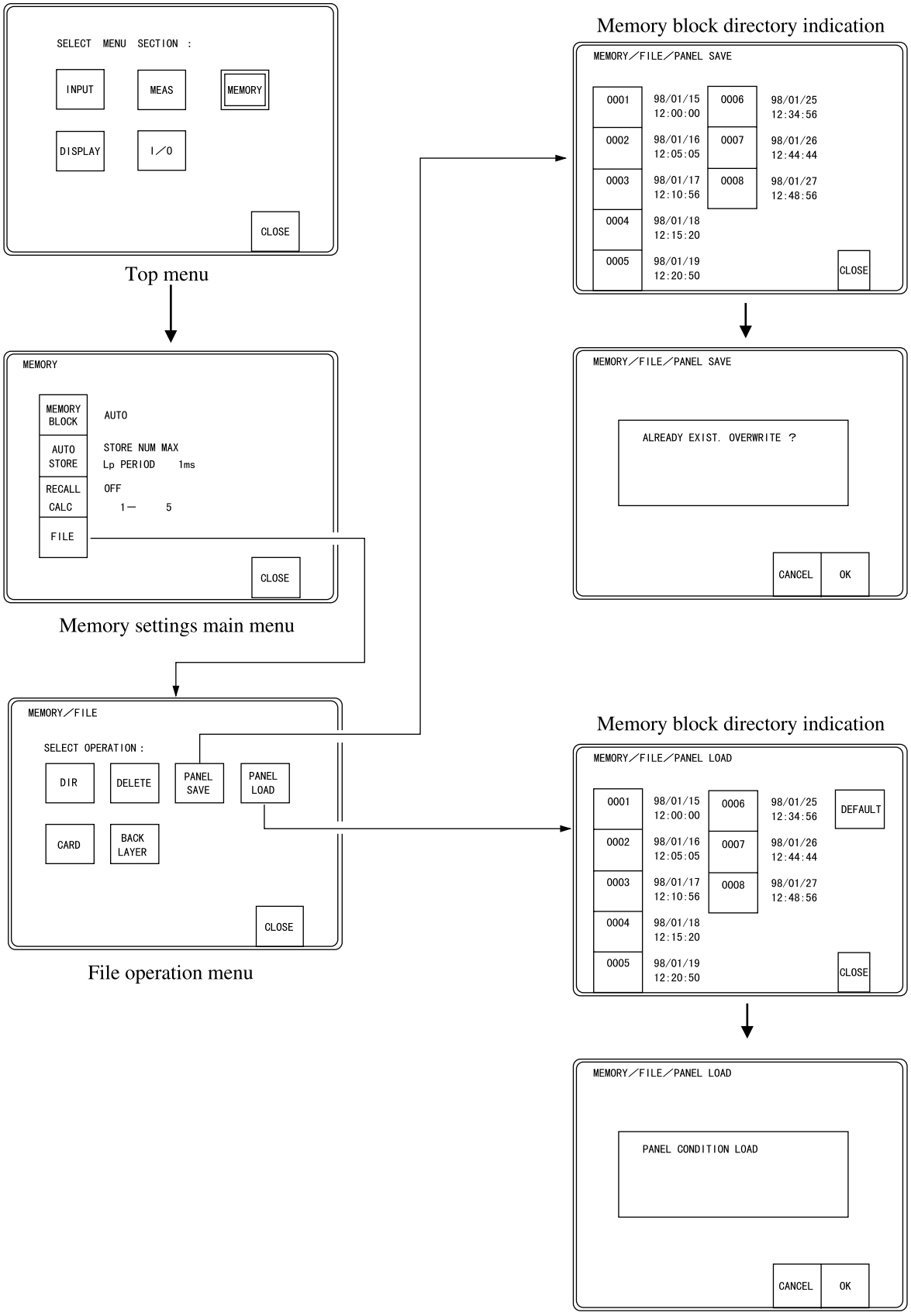
Memory settings (FILE / DIR / AUTO, MANUAL, PANEL, USER WEIGHT)



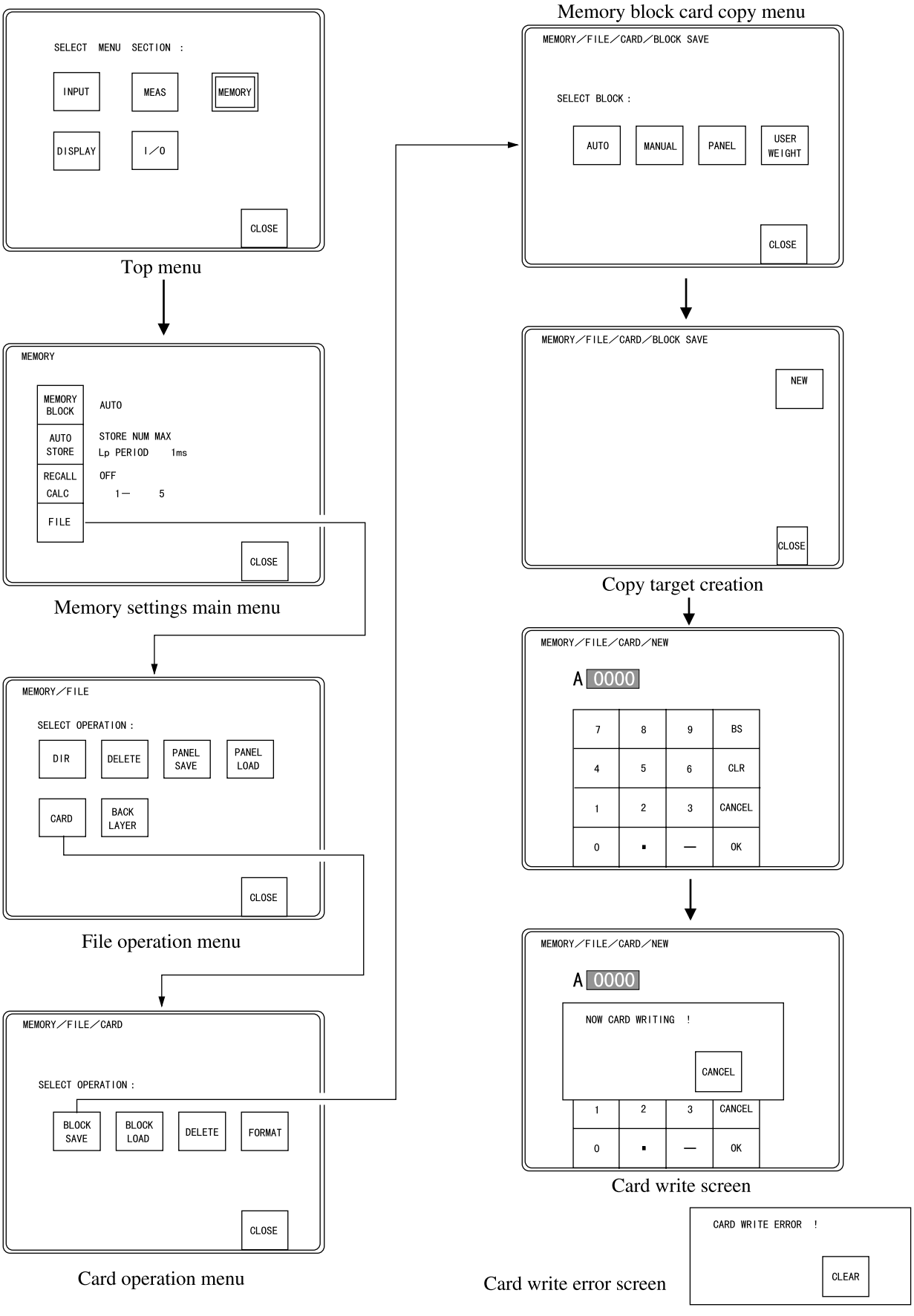
Memory settings (FILE / DELETE)



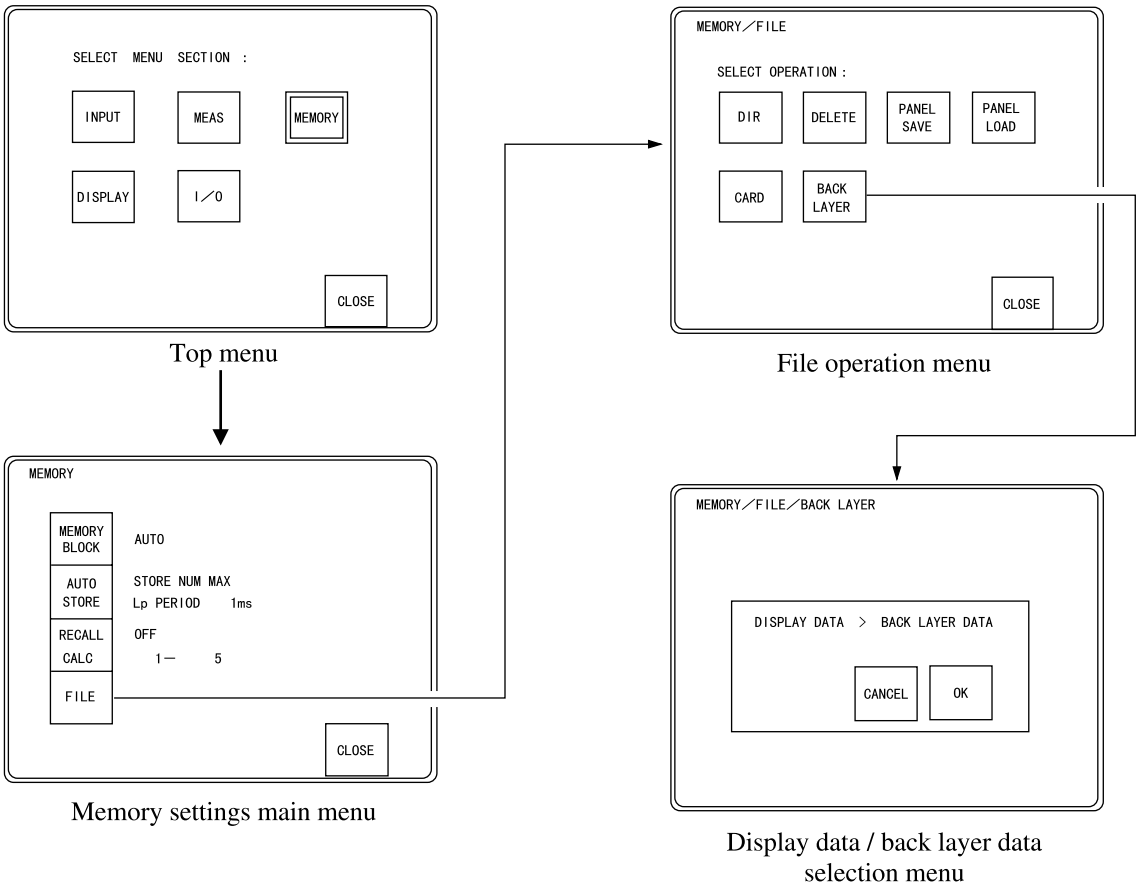
Memory settings (FILE / PANEL SAVE, PANEL LOAD)



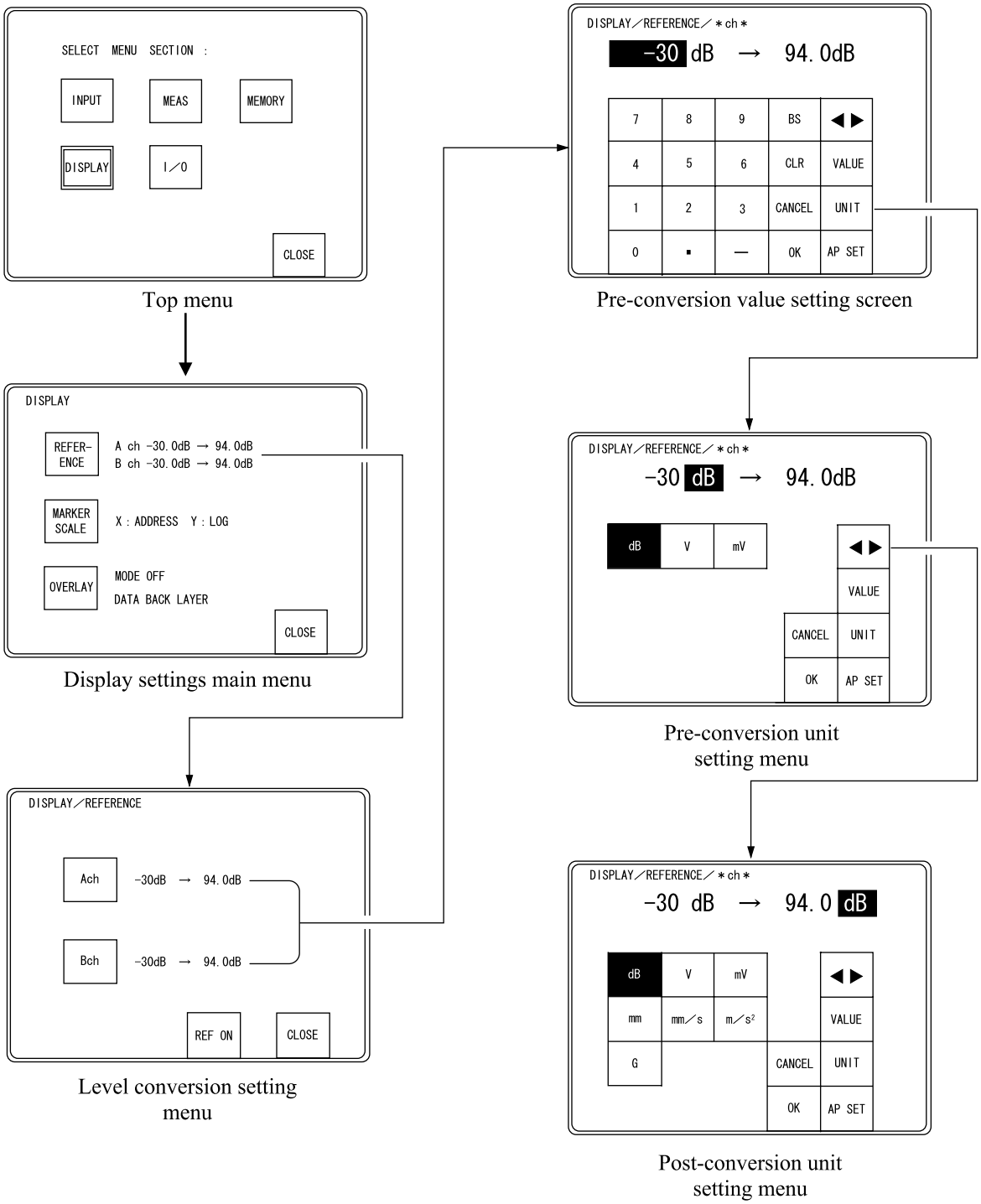
Memory settings (FILE / CARD)



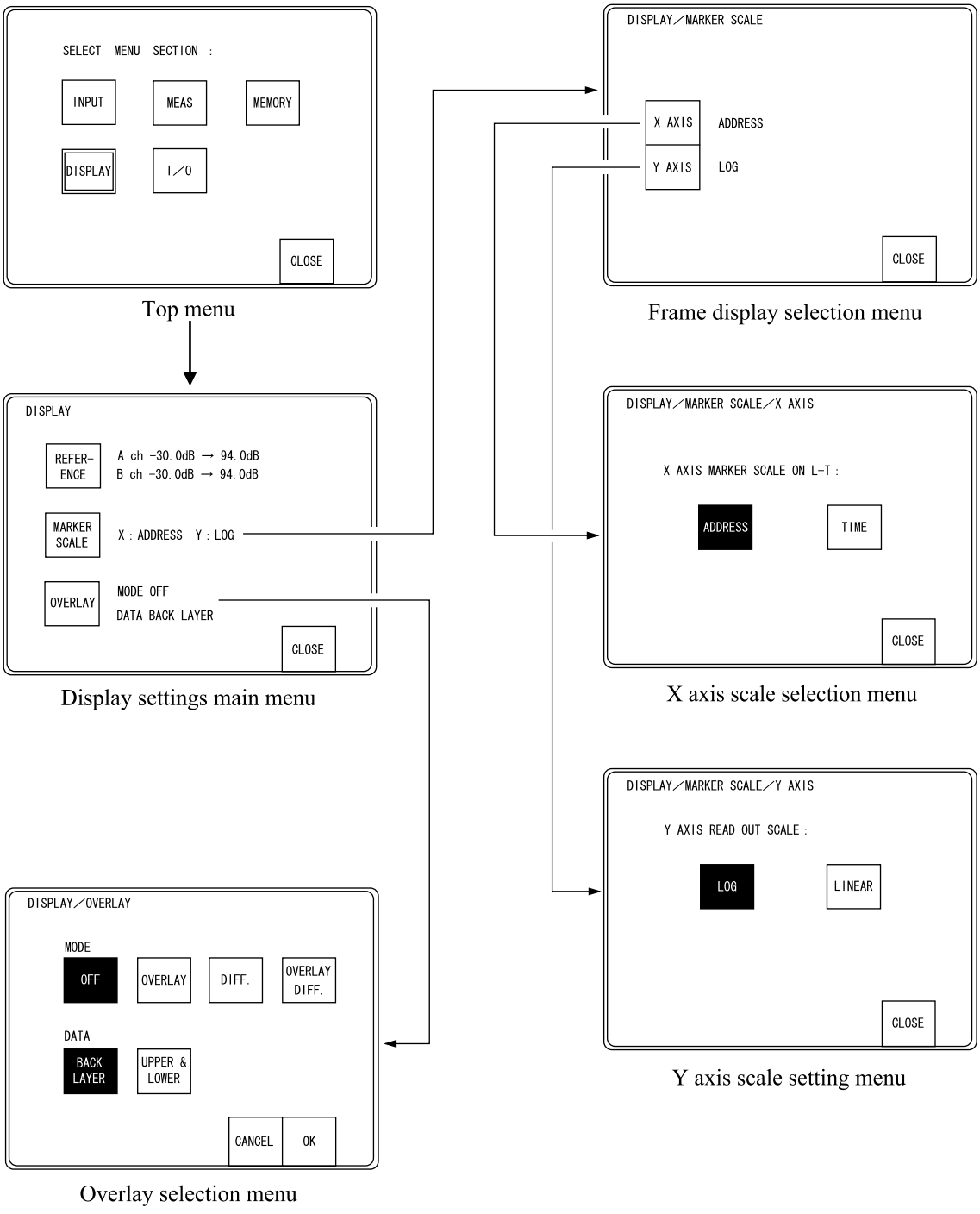
Memory settings (FILE / BACK LAYER)



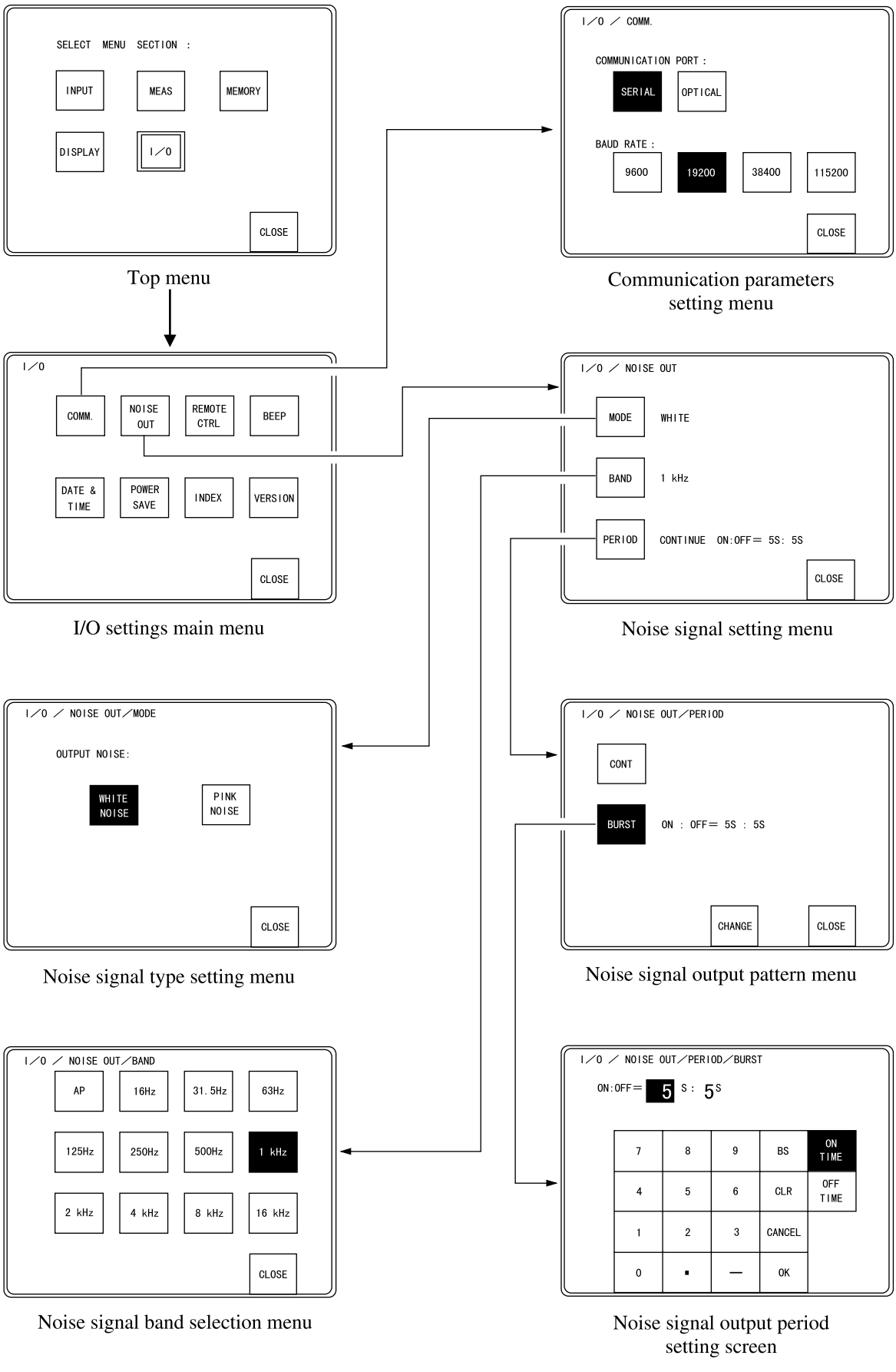
Display settings (DISPLAY / REFERENCE)



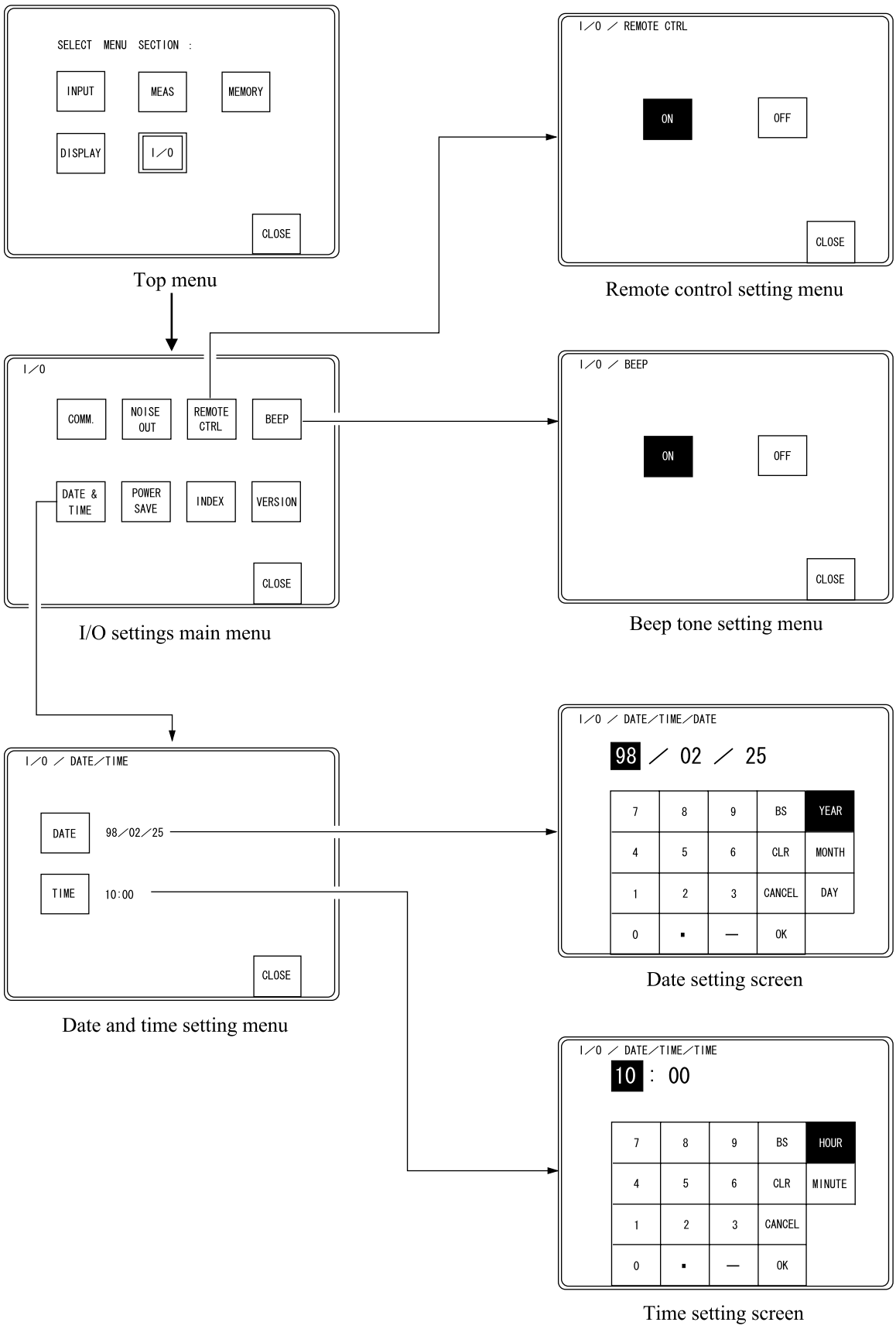
Display settings (DISPLAY / MARKER SCALE & OVERLAY)



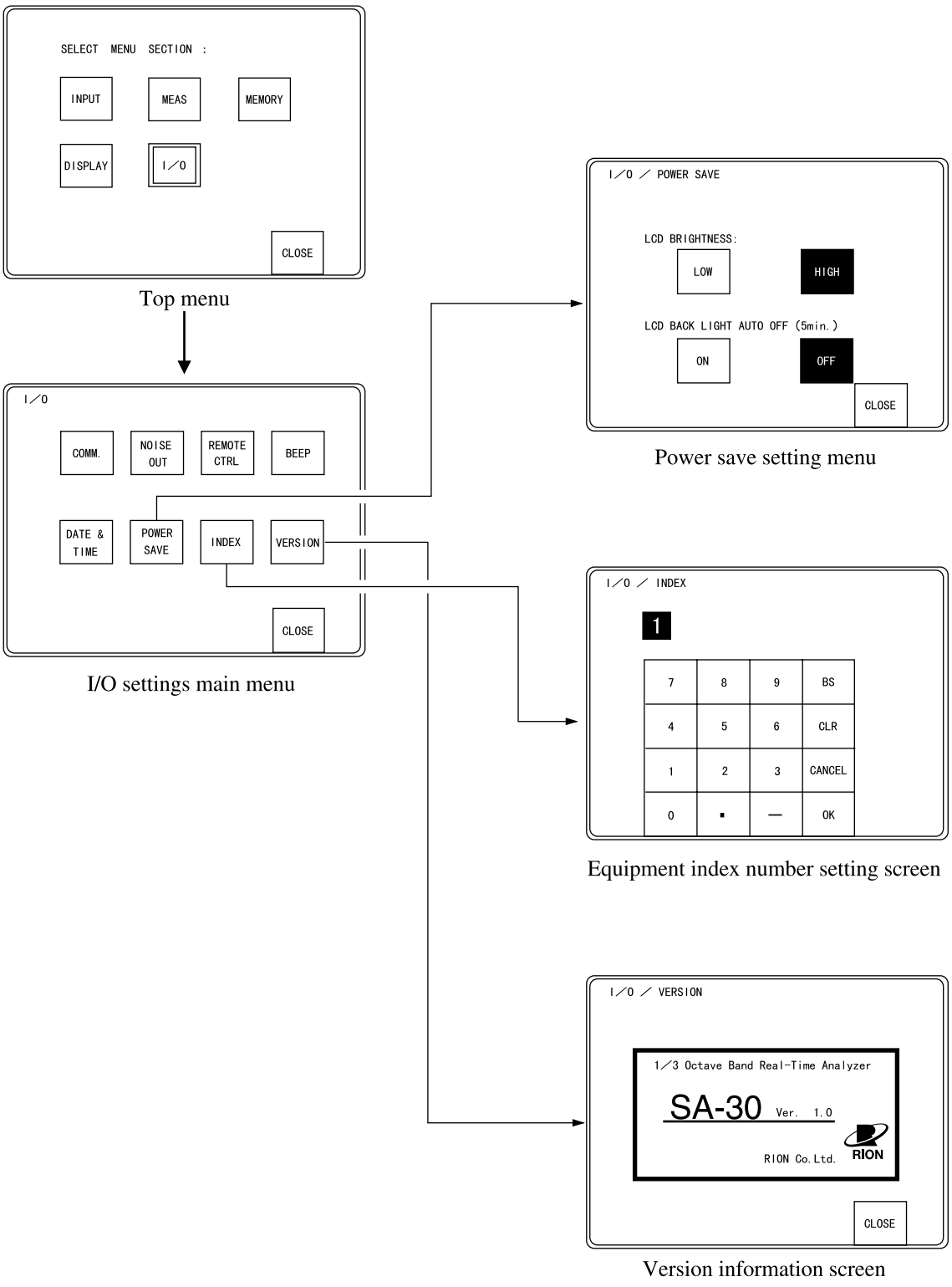
I/O settings (COMM. / NOISE OUT)



I/O settings (REMOTE CTRL, BEEP, DATE & TIME)

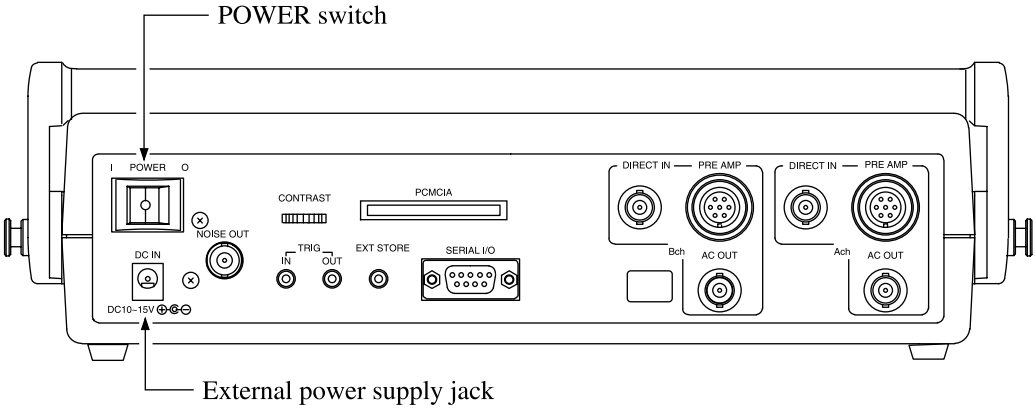


I/O settings (POWER SAVE, INDEX, VERSION)



Basic Operation

Power-On



Rear panel

The SA-30 can be powered by six IEC R20 (size D) batteries or the optional AC adapter NC-93. Pressing the "I" side of the POWER switch on the rear of the unit turns the power on and pressing the "O" side turns it off. At power-up, an initialization message appears, and after a few seconds the measurement screen is shown.

When the unit is turned on, most settings are the same as during the last use, except for the items listed below.

Last use	Next power-on
Pause	Pause released
Trigger ON	Trigger standby (before start)
Storing	Store canceled
Processing	Processing stopped
Menu screen	Measurement screen
Recall processing ON	Recall processing OFF
Communication remote mode	Communication local mode
Noise ON	Noise OFF

All Reset

If a function error has occurred or the unit has locked up (keys do not work), turn power to the unit on while keeping the START/STOP key depressed. All settings will be returned to the default condition.

Important
When All Reset is performed, all measurement data, panel settings, user-defined weighting settings, and back layer data stored in memory will be lost.

Setting the Date and Time

Set the current date and time as follows.

Open the date/time setting menu.

1. Press the SETUP key on the operation key panel below the screen.
2. Press the [I/O] key shown on the menu screen, then select [DATE&TIME]. The date and time setting menu opens.

   [DATE]: Opens the date setting menu.

   [TIME]: Opens the time setting menu.

Setting the date

Select the [DATE] key.

SETUP → [I/O] → [DATE&TIME] → [DATE]

The current setting is shown in reverse.

[YEAR]: Press to set the year.
To set the year 2000, enter "00". To set the year 2001, enter "01".

[MONTH]: Press to set the month.

[DAY]: Press to set the day.

Numeric field: Serves to input the actual numbers.

[OK]: Press to accept and terminate the setting.

Setting the time

Select the [TIME] key.

SETUP → [I/O] → [DATE&TIME] → [TIME]

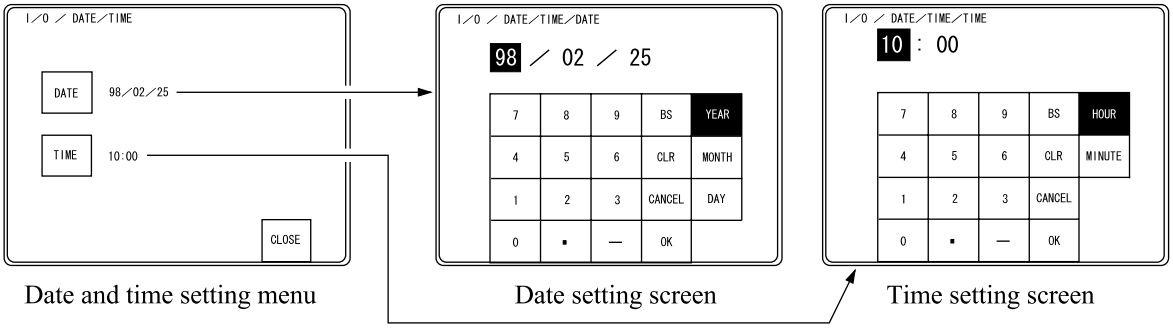
The current setting is shown in reverse.

[HOUR]: Press to set the hours.

[MINUTE]: Press to set the minutes.

Numeric field: Serves to input the actual numbers.

[OK]: Press to accept and terminate the setting.



Date and time setting menu　　Date setting screen　　Time setting screen

Input and Analysis Function Settings

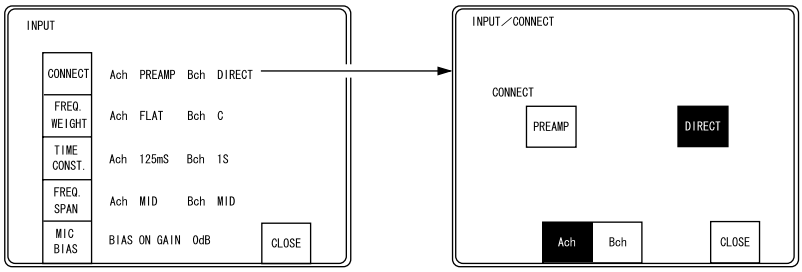
Input signal selection

For each channel, you can select either PREAMP input or DIRECT input. When using the microphone UC-34P with the PREAMP input, you can select BIAS ON, GAIN 0 dB, or GAIN +20 dB.

Open the input signal selection menu.

1. Press the SETUP key on the operation key panel below the screen.
2. Press the [INPUT] key shown on the menu screen, then select [CONNECT]. The current setting is shown in reverse.

[A ch], [B ch]:	Selects the channel to which the setting should apply.
[PREAMP]:	Selects the PREAMP input.
[DIRECT]:	Selects the DIRECT input.
[CLOSE]:	Closes the menu and returns to the previous screen.

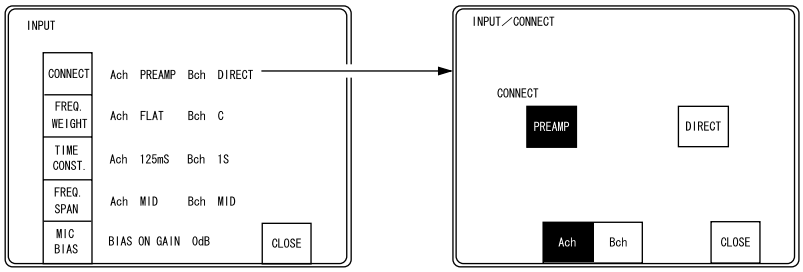


Input settings main menu　　Input signal setting menu

In the above example, the DIRECT input is selected.
Select the channel for which the setting should apply by pressing [A ch] (channel A) or [B ch] (channel B).

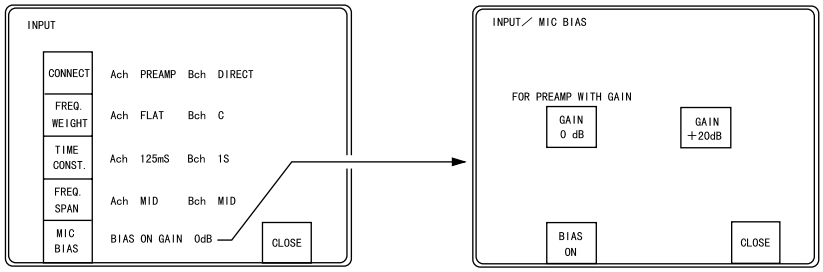
When PREAMP was selected

1. Select [PREAMP] and the channel.



Input settings main menu　　Input signal setting menu

2. Press [CLOSE] to return to the input parameters main menu.
3. Press [MIC BIAS] to open the microphone gain setting menu.



Input settings main menu　　Microphone gain setting menu

[GAIN 0 dB]: Sets the preamp gain to 0 dB.
[GAIN +20 dB]: Sets the preamp gain to +20 dB.
[BIAS ON]: Sets bias voltage to ON.
[CLOSE]: Closes the menu and returns to the previous screen.

The [GAIN 0 dB] and [GAIN +20 dB] keys apply to the gain setting when using the microphone UC-34P with preamplifier. Depending on the type of preamplifier and microphone, make the setting as follows.

- When UC-34P is connected to input
  Activate [BIAS ON] (reverse display) and set MIC BIAS to [GAIN 0 dB] or [GAIN +20 dB].
- When microphone other than UC-34P is connected to input
  - When the microphone bias voltage is +200 V or +60 V, activate [BIAS ON] (reverse display) and set MIC BIAS to [GAIN 0 dB] or [GAIN +20 dB].
  - When the microphone bias voltage is +30 V, activate [BIAS ON] (reverse display) and set MIC BIAS to [GAIN +20 dB].
  - When using a microphone that does not require a bias voltage, this menu setting is not necessary.

Analysis Channel and Analysis Band Setting

This setting determines whether channel A or channel B or both channels together are displayed on the screen. It also selects 1/1 octave analysis, 1/3 octave analysis, or 1/1 & 1/3 octave analysis.

1. Select the channel to be analyzed.
   Pressing the CH key on the operation key panel left of the screen cycles through the settings "A ch" → "B ch" → "A&B ch" → "A ch" etc.
2. Select the analysis mode.
   Use the 1/1, 1/3, and 1/1 & 1/3 keys on the operation key panel left of the screen to select the analysis mode.
   - 1/1 key: Selects 1/1 octave analysis mode.
   - 1/3 key: Selects 1/3 octave analysis mode.
   - 1/1 & 1/3 key: Selects dual analysis mode (1/1 octave and 1/3 octave). When this key is pressed for A & B channel measurement, the 1/1 octave analysis mode and 1/3 octave analysis mode are toggled between the upper and lower half of the screen.

   When dual analysis mode (1/1 octave and 1/3 octave) is selected and one channel only is used, the data for that channel are analyzed with both octave band settings. When two channels are used, the data for one channel are analyzed with the 1/1 octave band setting and the data for the other channel with the 1/3 octave band setting.
   During auto store, processing, recall, overlay, and differential processing, these keys are inactive.

Note

- After A & B channel measurement, the measured data can be displayed on the analysis screen for each channel separately by pressing the [CH] key.
- After dual analysis measurement, the measured data can be displayed as 1/1 octave and 1/3 octave data by pressing the [1/1] or [1/3] key respectively.
- After measurement in 1/1 octave analysis mode or 1/3 octave analysis mode, it is not possible to switch the data to a different bandwidth for display.
- Do not change the analysis mode, channel, or other settings during pause.

Input Level Range Setting and Overflow Indication

The input level range can be set for each channel separately, in 10-dB steps.

The INPUT LEVEL RANGE keys on the operation key panel left of the screen set the range for the channel that is currently active on the screen.

When the input signal voltage exceeds the preset input level range by a certain amount, the overload indication comes on. In such a case, measurement results will not be correct. Increase the level range setting until the overload indication does not appear.

The SA-30 monitors the input signal waveform to detect overload. If overload is shown for a processing result, overload has occurred at one point during the interval whose data were used for processing.

Analysis Frequency Span

The analysis frequency span setting selects a frequency range that is used for analysis. The following settings are available.

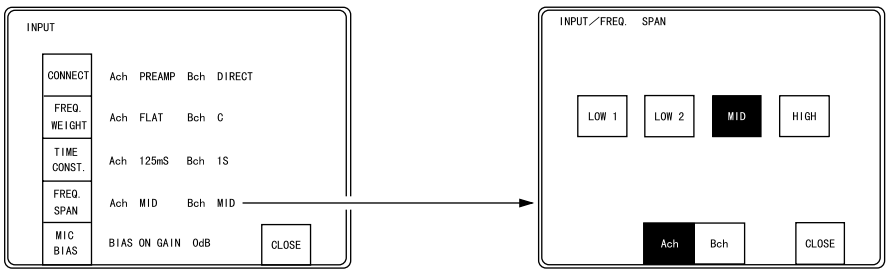
Analysis frequency span	1/1 oct (Hz)	1/3 oct (Hz)	Remarks
LOW 1	0.5 Hz - 500 Hz	0.4 Hz - 630 Hz	
LOW 2	2 Hz - 2 kHz	1.6 Hz - 2.5 kHz	
MID	16 Hz - 16 kHz	12.5 Hz - 20 kHz	
HIGH	63 Hz - 63 kHz	50 Hz - 80 kHz	Option

The analysis frequency span can be set for each channel separately. During overlay processing, the setting cannot be changed.

Open the analysis frequency span selection menu.

1. Press the SETUP key on the operation key panel below the screen.
2. Press the [INPUT] key shown on the menu screen, then select [FREQ.SPAN].

[LOW 1]: Selects the low frequency range 1.
[LOW 2]: Selects the low frequency range 2.
[MID]: Selects the medium frequency range.
[HIGH]: Selects the high frequency range.
[A ch], [B ch]: Selects the channel to which the setting should apply.
[CLOSE]: Closes the menu and returns to the previous screen.



Input settings main menu

Analysis frequency span setting menu

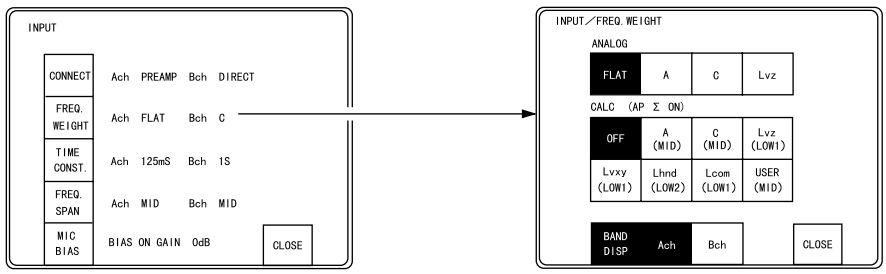
Frequency Weighting

Frequency weighting can be applied to the analysis data for each frequency band separately. In the SA-30, weighting can be applied in two ways, either analog or through digital processing.

Open the frequency weighting selection menu.

1. Press the SETUP key on the operation key panel below the screen.
2. Press the [INPUT] key shown on the menu screen, then select [FREQ.WEIGHT].

- Frequency weighting by analog circuitry
  - [FLAT]: Selects flat frequency response.
  - [A]: Sound level meter A characteristics
  - [C]: Sound level meter C characteristics
  - [Lvz]: Vibration level perpendicular characteristics
- Frequency weighting by processing circuitry
  - [OFF]: Frequency weighting disabled.
  - [A] (MID): Sound level meter A characteristics
  - [C] (MID): Sound level meter C characteristics
  - [Lvz] (LOW1): Vibration level perpendicular characteristics
  - [Lvxy]: Vibration level horizontal characteristics (only selectable in the LOW 1 range)
  - [Lhnd]: Hand-held tool vibration level meter characteristics (only selectable in the LOW 2 range)
  - [Lcom]: Vibration level combine (only selectable in the LOW 1 range)
  - [USER]: User-defined weighting (only selectable for frequency ranges selected at setup)
  - [BAND DISP]: Activates band display of frequency weighting results.
  - [A ch], [B ch]: Selects the channel to which the setting should apply.
  - [CLOSE]: Closes the menu and returns to the previous screen.



Input settings main menu

Frequency weighting setting menu

- When a frequency weighting setting other than OFF is selected, the APW level is shown on the measurement screen. This is the power sum level of the weighted values in each frequency band.

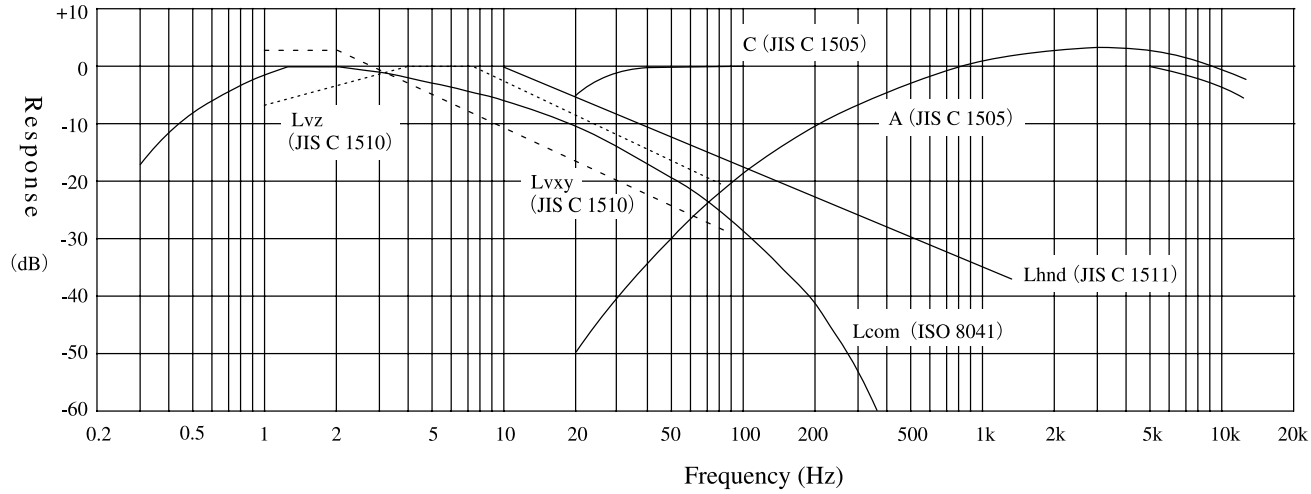
Note

- It is not possible to change the analog circuit frequency weighting during data display after measurement.
- It is possible to change the mathematical processing frequency weighting during data display after measurement. However, this is not possible when displaying recalled data.
- For information on frequency weighting using the processing circuit, see the section "Mathematical processing frequency weighting values" (page 152).

Important

The SA-30 incorporates two kinds of weighting tools, one realized through analog circuitry and one through digital processing. If weighting of both kinds is selected, dual weighting will apply. However, the all-pass level (AP) shown at the left end of the graph is not affected by digital frequency weighting.

Because digital frequency weighting performs level compensation at the center of each frequency band, compensation precision varies depending on the width of the band. At the 1/1 octave setting, digital compensation precision does not fulfill standard specifications and should only be used for general information. At the 1/3 octave setting, digital compensation precision for A weighting does not fulfill standard specifications at the low end of the spectrum and should only be used for general information. For precise A weighting, use the analog circuitry incorporated in the input section.



Frequency weighting characteristics

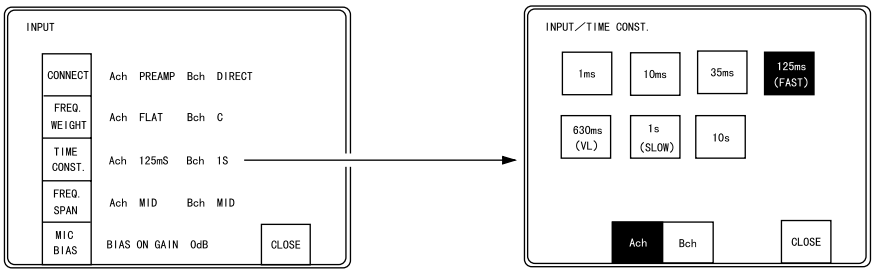
Time Constant Setting

The unit has seven settings for the time constant: 1 ms, 10 ms, 35 ms, 125 ms, 630 ms, 1 s, 10 s.

Open the time constant selection menu.

1. Press the SETUP key on the operation key panel below the screen.
2. Press the [INPUT] key shown on the menu screen, then select [TIME CONST.].

[1 ms]:	Time constant is set to 1 millisecond.
[10 ms]:	Time constant is set to 10 milliseconds.
[35 ms]:	Time constant is set to 35 milliseconds.
[125 ms]:	Time constant is set to 125 milliseconds.
[630 ms]:	Time constant is set to 630 milliseconds.
[1 s]:	Time constant is set to 1 second.
[10 s]:	Time constant is set to 10 seconds.
[A ch], [B ch]:	Selects the channel to which the setting should apply.
[CLOSE]:	Closes the menu and returns to the previous screen.



Input settings main menu

Time constant setting menu

Band frequencies

The center frequencies for each analysis band are listed below.

1/3 octave bands

No.	LOW 1	LOW 2	MID	HIGH
1	AP	AP	AP	AP
2	0.4	1.6	12.5	50
3	0.5	2	16	63
4	0.63	2.5	20	80
5	0.8	3.15	25	100
6	1	4	31.5	125
7	1.25	5	40	160
8	1.6	6.3	50	200
9	2	8	63	250
10	2.5	10	80	315
11	3.15	12.5	100	400
12	4	16	125	500
13	5	20	160	630
14	6.3	25	200	800
15	8	31.5	250	1 k
16	10	40	315	1.25 k
17	12.5	50	400	1.6 k
18	16	63	500	2 k
19	20	80	630	2.5 k
20	25	100	800	3.15 k
21	31.5	125	1 k	4 k
22	40	160	1.25 k	5 k
23	50	200	1.6 k	6.3 k
24	63	250	2 k	8 k
25	80	315	2.5 k	10 k
26	100	400	3.15 k	12.5 k
27	125	500	4 k	16 k
28	160	630	5 k	20 k
29	200	800	6.3 k	25 k
30	250	1 k	8 k	31.5 k
31	315	1.25 k	10 k	40 k
32	400	1.6 k	12.5 k	50 k
33	500	2 k	16 k	63 k
34	630	2.5 k	20 k	80 k
35	APW	APW	APW	APW

1/1 octave bands

No.	LOW 1	LOW 2	MID	HIGH
1	AP	AP	AP	AP
2	0.5	2	16	63
3	1	4	31.5	125
4	2	8	63	250
5	4	16	125	500
6	8	31.5	250	1 k
7	16	63	500	2 k
8	31.5	125	1 k	4 k
9	63	250	2 k	8 k
10	125	500	4 k	16 k
11	250	1 k	8 k	31.5 k
12	500	2 k	16 k	63 k
13	APW	APW	APW	APW

AP: All-pass
APW: All-pass after frequency weighting

Print Function

The built-in printer can deliver a hard copy of the currently shown screen content.

Pressing the PRINT key on the operation key panel below the screen activates printout. During printing and paper feed, the display goes out.
While processing or auto store is in progress, printing is not possible.

Pressing the FEED key on the operation key panel below the screen activates paper feed. With each push, the paper is advanced by about 1 line. During printing, this key is inactive.

Noise Output Setting

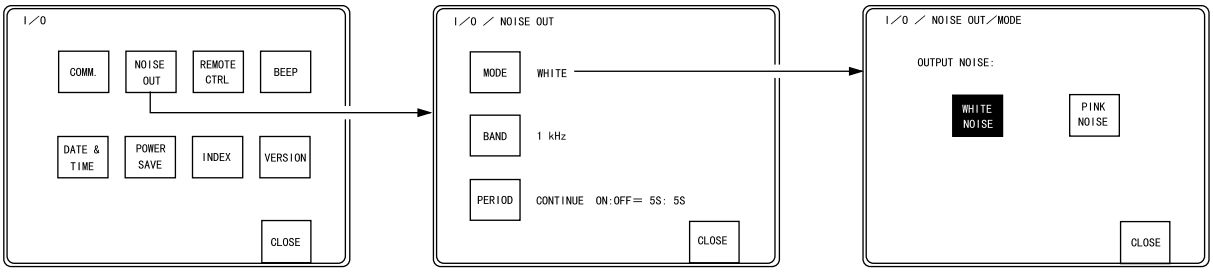
The NOISE output on the rear of the unit can provide white noise, pink noise, or band noise. The band noise uses 1/1 octave bands with the center frequencies 16, 31.5, 63, 125, 250, 500, 1 k, 2 k, 4 k, 8 k, 16 k (Hz).
Output can be selected to be continuous or intermittent (burst). In burst mode, the pattern determined by the ON TIME and OFF TIME setting is repeated.

1. Open the noise output selection menu.

   1-1. Press the SETUP key on the operation key panel below the screen.
   1-2. Press the [I/O] key shown on the menu screen, then select [NOISE OUT]. The noise generator menu appears.

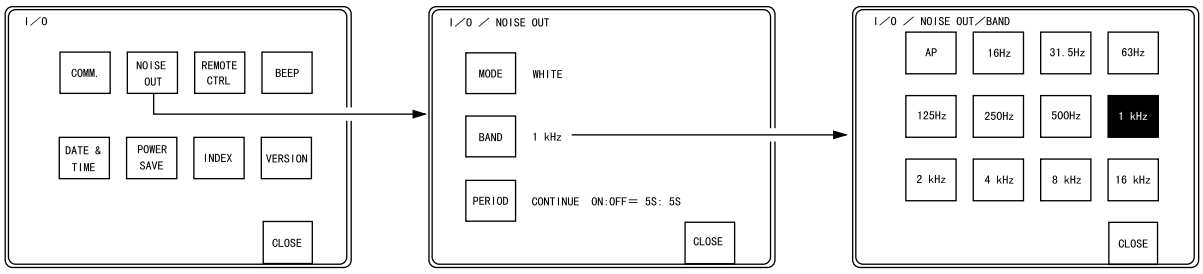
   [MODE]: Activates the noise generator mode menu.
   [BAND]: Activates the noise generator band menu.
   [PERIOD]: Activates the noise generator time pattern menu.

2. Make the required settings on the noise generator mode menu. Press the [MODE] key.
   SETUP → [I/O] → [NOISE OUT] → [MODE]
   [WHITE NOISE]: Selects white noise.
   [PINK NOISE]: Selects pink noise.



I/O settings main menu | Noise signal setting menu | Noise signal type setting menu

3. Make the required settings on the noise generator band menu. Press the [BAND] key.
   SETUP → [I/O] → [NOISE OUT] → [BAND]
   [AP]: White noise or pink noise is output as is.
   [16 Hz] to [16 kHz]:
   Noise output is routed through an octave band filter with the selected frequency.



I/O settings main menu　　Noise signal setting menu　　Noise signal band selection menu

4. Make the required settings on the noise generator time pattern menu. Press the [PERIOD] key.

   SETUP → [I/O] → [NOISE OUT] → [PERIOD]

   [CONT]: Selects continuous output.

   [BURST]: Selects burst output.

   [CHANGE]: Activates the burst settings menu.

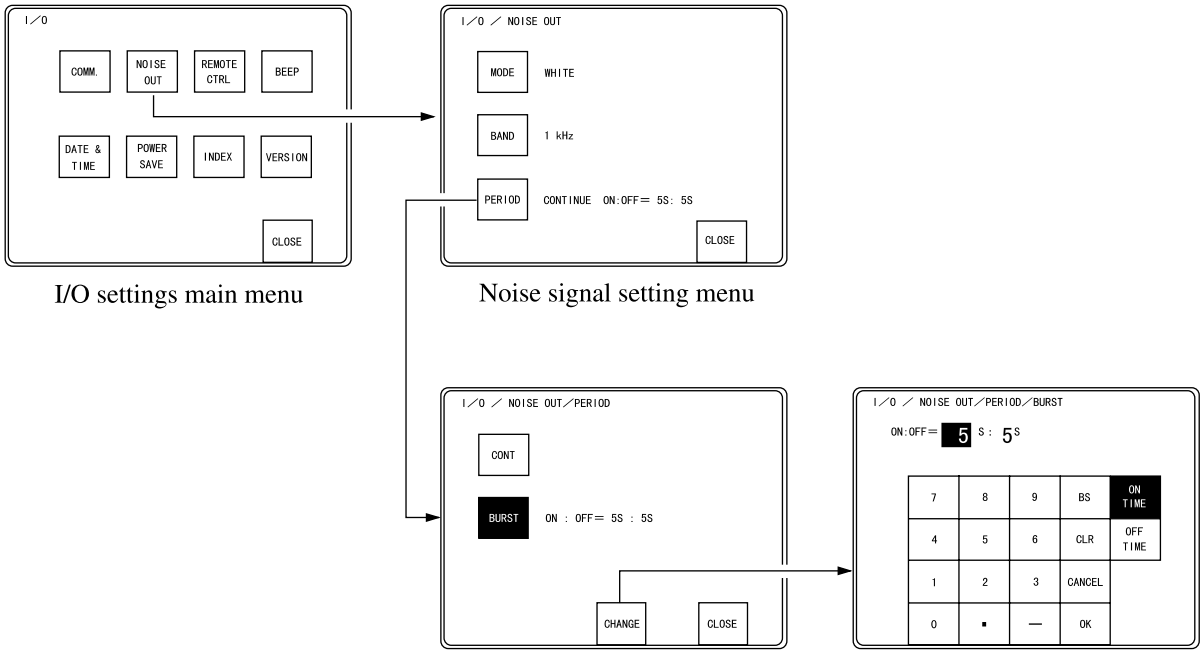
5. Make the required settings on the burst settings generator time pattern menu. Press the [BURST] and then the [CHANGE] key.

   SETUP → [I/O] → [NOISE OUT] → [BURST] → [CHANGE]

   [ON TIME]: Allows setting the noise ON interval.

   [OFF TIME]: Allows setting the noise OFF interval.

   Numeric field: Serves to input the actual numbers.



I/O settings main menu　　Noise signal setting menu

Noise signal output pattern menu　　Noise signal output period setting screen

Beep Tone Setting

This setting determines whether a beep tone is produced as confirmation when keys are operated and when an error has occurred.

Open the beep tone setting menu.

1. Press the SETUP key on the operation key panel below the screen.
2. Press the [I/O] key shown on the menu screen, then select [BEEP].

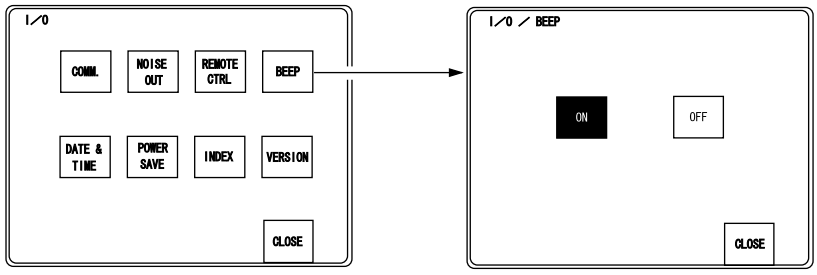
   [ON]: Beep tone is active.

   [OFF]: Beep tone is turned off.

   When the beep tone is activated, the following beep patterns are used.

Condition	Beep tone
Operation panel key or touch panel key is operated	Single short beep (0.1 s)
Processing or store is completed	Single long beep (1 s)
Invalid operation or error	Three short beeps (0.2 s intervals)

Processing or auto store start is not indicated by a beep, also when the beep tone is set to ON.



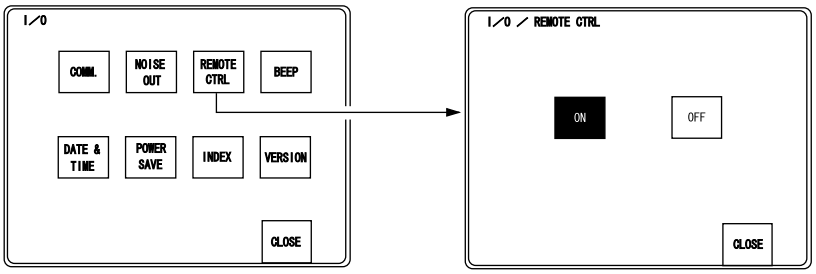
I/O settings main menu Beep tone setting menu

Operation by Infrared Remote Control

The SA-30 can be operated with the supplied infrared remote control. When a signal from the remote control is received, the indicator flashes three times in 0.2-second intervals. When the beep tone is set to ON, a beep tone is heard in the same way as when operating a key on the main unit.

Open the remote control setting menu.

1. Press the SETUP key on the operation key panel below the screen.
2. Press the [I/O] key shown on the menu screen, then select [REMOTE CTRL].
   [ON]: Remote control is active.
   [OFF]: Remote control is turned off.



I/O settings main menu　　Remote control setting menu

Power Save Function

This function controls the brightness of the LCD screen and automatic backlight shut-down, in order to preserve power. When this setting is activated, the backlight will go off after about 5 minutes of inactivity (if no control key on the unit or the remote control is pressed and no data transfer is carried out). Operation of the unit such as processing and store functions continue unaffected. The indicator of the ENTER/2nd key lights up to show that the unit is operating.

While the backlight is turned off, the indicator of the ENTER/2nd key is flashing. Pressing the ENTER/2nd key turns the backlight on again.

When the remote control feature is enabled, the "2nd" key on the remote control also turns the backlight on again.

Open the power save setting menu.

1. Press the SETUP key on the operation key panel below the screen.
2. Press the [I/O] key shown on the menu screen, then select [POWER SAVE].

Screen brightness

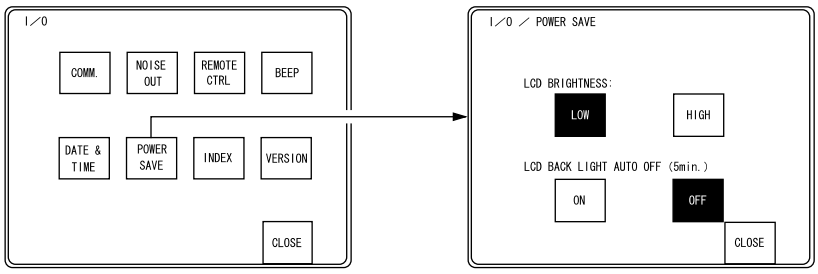
[LOW]: Screen brightness is reduced.

[HIGH]: Screen brightness is at highest level.

Backlight shutdown

[ON]: Backlight auto-shutdown feature is enabled.

[OFF]: Backlight auto-shutdown feature is disabled.



I/O settings main menu

Power save setting menu

Serial Data Transfer

The SA-30 incorporates a RS-232-C interface and an optical port, for serial communication with a computer. For details on data transfer, please refer to the separate serial interface manual.

Communication specifications are as follows.

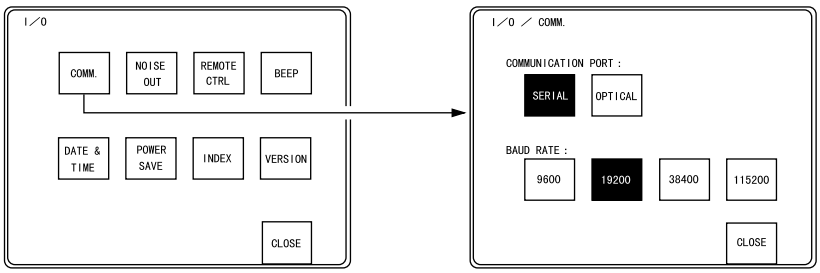
Principle	RS-232-C	Infrared port
Flow control	RTS/CTS control	None
Format	1:N (1 ≤ N ≤16)	1:1
Transfer rate	9600, 19200, 38400, 115200 bps	
Data word length	8 bits	
Stop bits	1	
Parity	None	
Transmission	Half-duplex	
Protocol	Rion-specific packet transfer	
Receive timeout	5 seconds	
Error correction method	Packet resend (max. 3 times)	
Max. packet size	1024 bytes	

Open the communications setting menu.

1. Press the SETUP key on the operation key panel below the screen.
2. Press the [I/O] key shown on the menu screen, then select [COMM.].

Communication port
[SERIAL]: RS-232-C interface is used.
[OPTICAL]: Infrared port is used.

Transfer rate
[9600 bps]: Transfer rate set to 9600 bps.
[19200 bps]: Transfer rate set to 19200 bps.
[38400 bps]: Transfer rate set to 38400 bps.
[115200 bps]: Transfer rate set to 115200 bps.



I/O settings main menu

Communication parameters setting menu

Using Several SA-30 Units

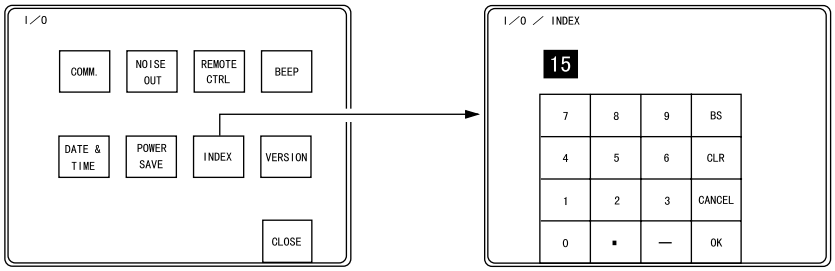
Using the RS-232-C interface, several SA-30 units can be controlled from a computer. In this case, each SA-30 must be assigned a unique index number. The computer then uses that index number to specify which SA-30 to control.

The available index number range is 1 to 16. The multi-channel interface adapter SC-31 (option) is required for connecting more than one SA-30 units.

If several SA-30 units are set to the same index number, correct operation is not assured.

Open the index number setting menu.

1. Press the SETUP key on the operation key panel below the screen.
2. Press the [I/O] key shown on the menu screen, then select [INDEX].
   Numeric field: Serves to input the index number.



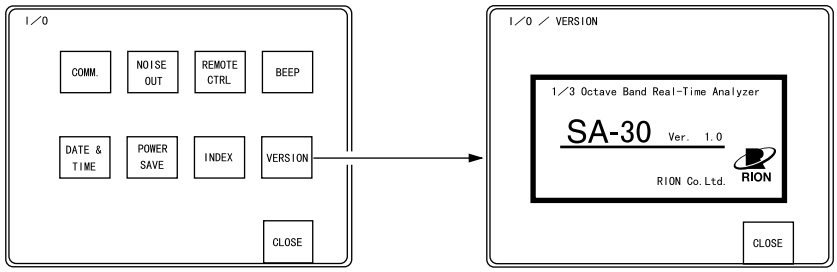
I/O settings main menu

Equipment index number setting screen

Version Information

Version information about the unit can be displayed as follows.

1. Press the SETUP key on the operation key panel below the screen.
2. Press the [I/O] key shown on the menu screen, then select [VERSION].



I/O settings main menu　　Version information screen

Current Processing Selection

Instantaneous value

The instantaneous value is the actual value of the waveform at a given moment. These data form the basis for calculating other items.

Processing settings menu

Open the processing settings menu screen by pressing the SETUP key and then selecting [MEAS].

The following choices appear on the screen.

[FUNC]: Opens the current processing settings menu.

[MODE]: Opens the measurement mode settings menu.

[TRIGGER]: Opens the trigger settings menu.

[MAX/MIN MODE]:
Opens the maximum and minimum value hold mode settings menu.

Current processing types

The following current processing types are available. Besides these values, the instantaneous value is available at all times and can be shown on the screen.

Processing type	Content	Screen display
Power average	Sample data power average	Pave
Power sum	Sample data power sum, taking sampling cycle into account	Psum
Maximum value	Sample data maximum value (updated for each band or AP)	Max
Minimum value	Sample data minimum value (updated for each band or AP)	Min
Statistical processing value	Sample data time percentile value	L1, L5, L10, L50, L90, L95, L99

Up to six of these processing types can be selected, to form the current processing setting. Selected processing types are indicated at the top of the screen and will be used for display and for storing.

Current processing settings menu: SETUP → [MEAS] → [FUNC]

[Pave]: Power average

[Psum]: Power sum

[Max]: Maximum level

[Min]: Maximum level

[L1] to [L99]: Time percentile level

Press one of the above keys to select the processing type. When the maximum of six is reached, a selection must be turned off first before another one can be activated.

The selected processing types are indicated at the top of the screen.

Display mode switching

The keys in the DISP DATA section serve to select the display indication.

[SELECT]: Switch the processing type to be shown on the display.

[ALL]: Show all processing types simultaneously.

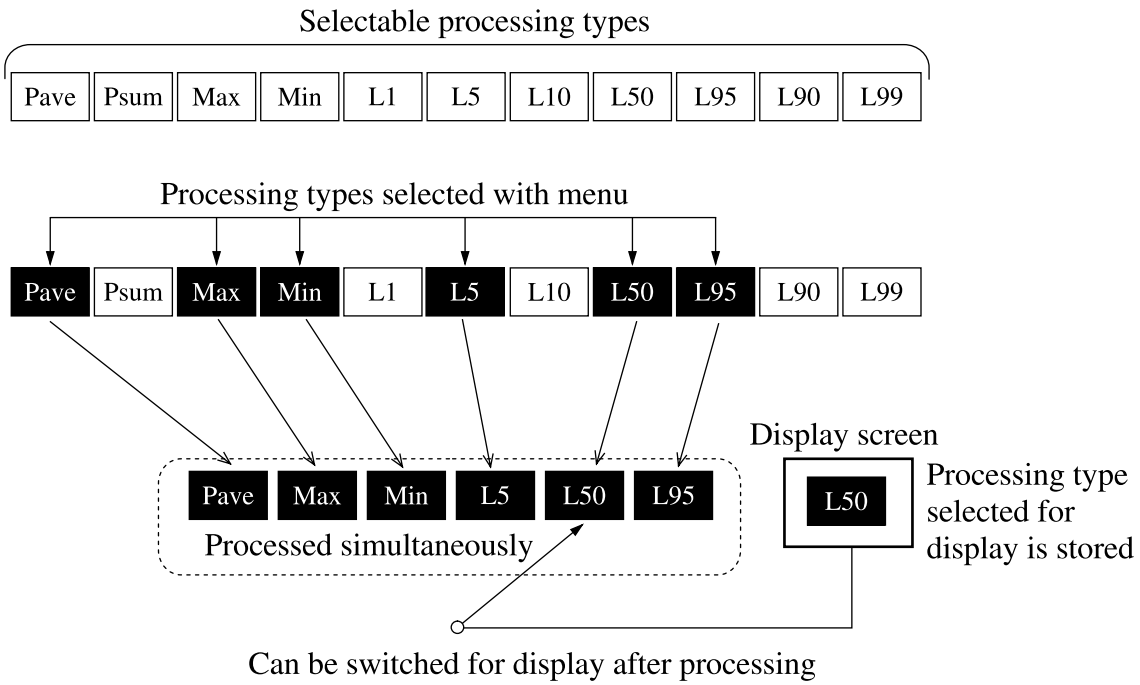
Processing types selected for display are shown in reverse at the top of the screen.

Also after processing is completed, it is possible to switch the display mode and show the results using a different processing type.

Relation between current processing and display mode

The items for display can be selected among the current processing types. After processing is finished, the results can be displayed in various ways by switching the display mode, but processing types that were not selected during processing cannot be displayed also after processing is finished.

When store is carried out, only the results according to the currently selected display mode are stored.



Processing start/stop

Use the START/STOP key to initiate and terminate processing.

- The selected current processing types are all executed simultaneously.
- After processing has started, the elapsed processing time is displayed and updated in the processing parameter display section.
- During processing, an indicator in the left side of the display flashes in 1-second intervals. When processing is completed, the indicator disappears.

Pause

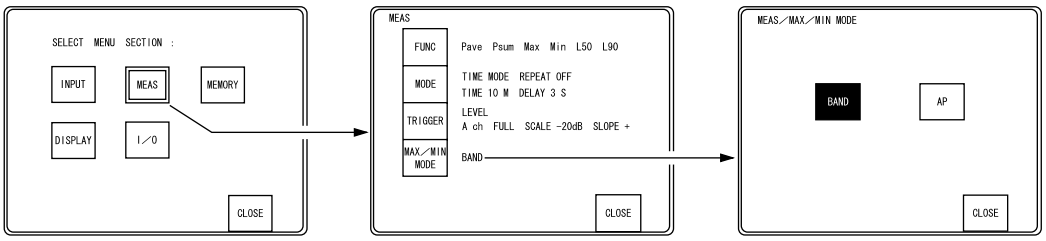
Use the PAUSE/CONT key to pause and resume processing.

- During pause, the processing indicator changes to ❙❙.
- During pause, any trigger condition is disregarded.

Hold types

The hold function for maximum and minimum values can be set to either look at each band separately or use the all-pass (AP) level. When the former setting is selected, the maximum and minimum level for each band during the measurement interval is relevant. When the latter setting is selected, the maximum and minimum AP value during the measurement interval is relevant.

Hold type setting menu: SETUP → [MEAS] → [MAX/MIN MODE]



Top menu | Measurement parameters main menu | MAX/MIN hold mode selection

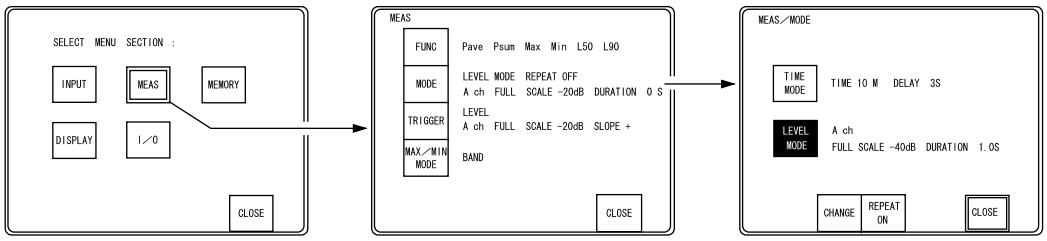
[BAND]: Enables the band-separate setting.

[AP]: Enables the all-pass setting.

Measurement mode

The SA-30 has a time measurement and level measurement mode.

Measurement mode setting menu: SETUP → [MEAS] → [MODE]



Top menu | Measurement parameters main menu | Measurement mode selection menu

[TIME MODE]: Enables time measurement mode.

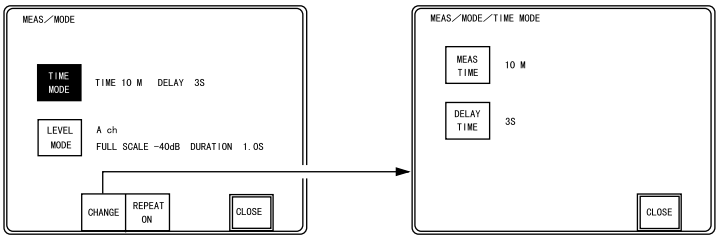
[LEVEL MODE]:
Enables level measurement mode.

[CHANGE]: Opens a detailed setting menu for the selected measurement mode.

Time measurement mode

In time measurement mode, measurement is carried out for a preset time.

Time measurement mode setting menu:
SETUP → [MEAS] → [MODE] → [TIME MODE]



Measurement mode selection menu | Time mode setting menu

[MEAS TIME]: Opens the measurement time input screen.

[DELAY TIME]: Opens the delay time input screen.

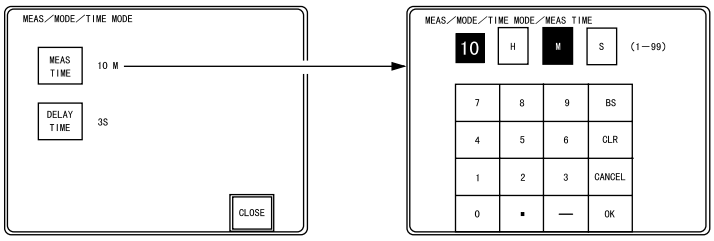
Processing time

This setting determines the processing time in time measurement mode. The processing time is the interval from the start of processing to the end of processing. Intervals during which the unit was set to pause are not counted as processing time.

The processing time shown on the display during measurement is updated in 1-second steps.

Measurement time setting menu

SETUP → [MEAS] → [MODE] → [TIME MODE] → [MEAS TIME]



Time mode setting menu　　Processing time input screen

[H]: Serves to set the hours.

[M]: Serves to set the minutes.

[S]: Serves to set the seconds.

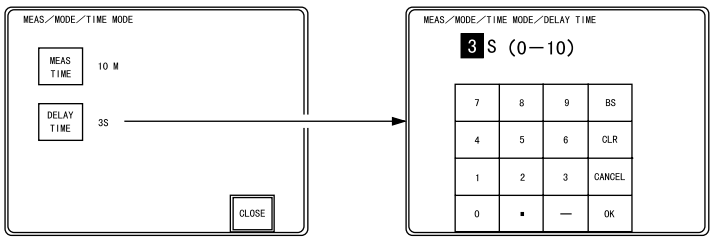
Numeric field: Serves to input the actual numbers.

Delay time

This setting determines the delay time in time measurement mode. The delay time is an interval starting at the point the start key is pressed or the trigger is activated until the actual start of processing.

Delay time setting menu

SETUP → [MEAS] → [MODE] → [TIME MODE] → [DELAY TIME]

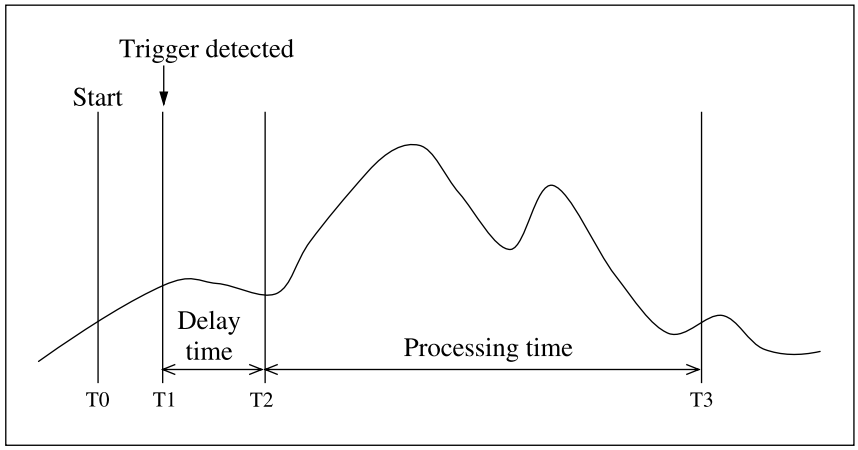


Time mode setting menu　　Delay time input screen

Numeric field: Serves to input the delay time.

Processing operation

The actual processing operation in time measurement mode is shown below.



T0: Start key is pressed. Unit goes into trigger standby mode.
T1: Trigger is detected. Delay time starts.
T2: Delay time has elapsed. Processing starts.
T3: Processing time has elapsed. Measurement ends.

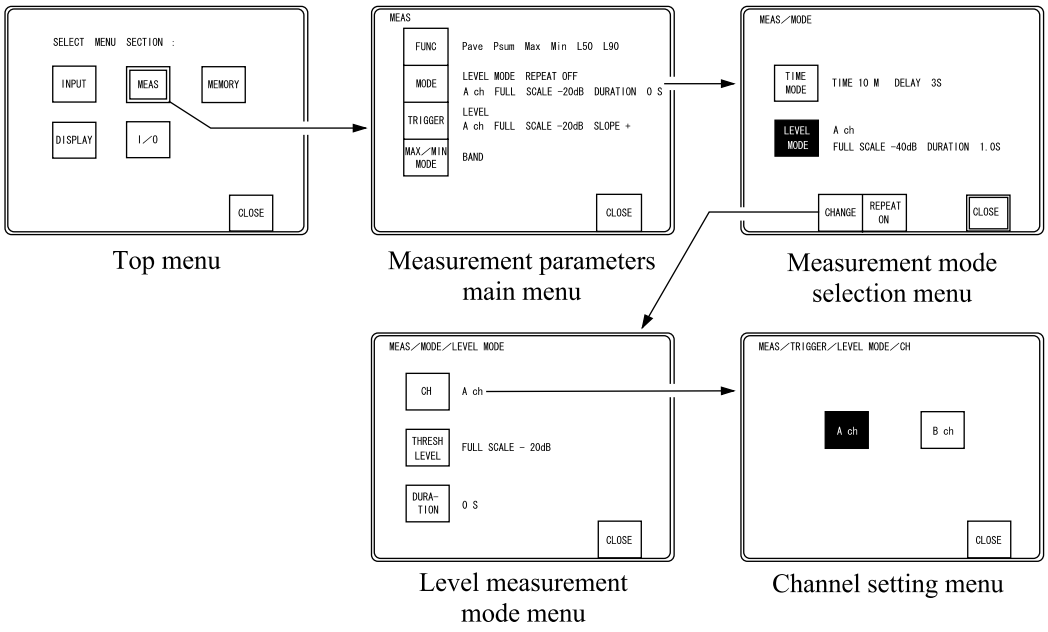
- When trigger is OFF, T0 = T1.
- When delay time = 0, T1 = T2.

Level measurement mode

In level measurement mode, processing is carried out while the level exceeds a certain threshold. Processing start and continuation is controlled by level monitoring. This level monitoring differs from the level trigger conditions (used in time measurement mode).

Level measurement mode detail menu

SETUP → [MEAS] → [MODE] → [LEVEL MODE] → [CHANGE]



[CH]: Opens the menu for setting the channel to be monitored.

[THRESH LEVEL]:
Opens the menu for setting the threshold value.

[DURATION]: Opens the menu for setting the duration time.

Monitor channel

Selects the channel whose signal is to be monitored.

Monitor channel setting menu

SETUP → [MEAS] → [MODE] → [LEVEL MODE] → [CHANGE] → [CH]

[A ch]: Channel A is monitored.

[B ch]: Channel B is monitored.

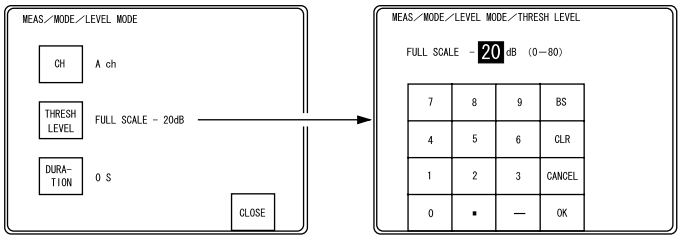
Threshold level

Sets the level that is to be used for controlling the start and end of processing.

The level is expressed in decibels below the top edge (full-scale) level on the measurement screen.

Threshold level setting menu

SETUP → [MEAS] → [MODE] → [LEVEL MODE] → [CHANGE] → [THRESH LEVEL]



Level measurement mode menu — Level setting screen

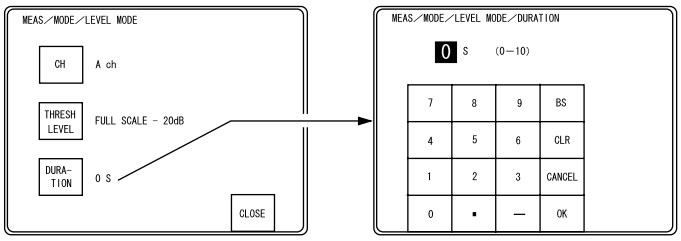
Numeric field: Serves to input the threshold level.

Duration time

Determines the time for which the threshold level must be crossed in order to make the start/stop operation valid.

Duration time setting menu

SETUP → [MEAS] → [MODE] → [LEVEL MODE] → [CHANGE] → [DURATION]

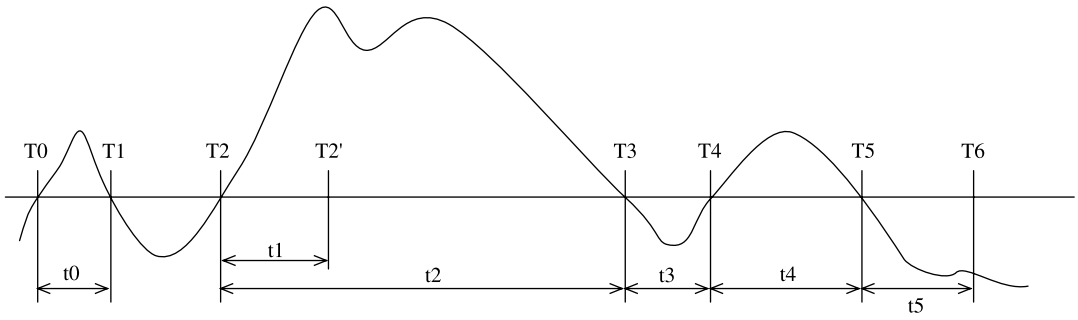


Level measurement mode menu — Duration time input screen

Numeric field: Serves to input the duration time.

Processing operation

The actual processing operation for one measurement in level measurement mode is shown below.



The following conditions apply to the above graph:
t0 < duration time
t1 ≥ duration time
t3 < duration time
t5 ≥ duration time

Before T0:	Level monitoring in progress
T0:	Signal exceeds threshold level. Processing starts.
T1:	Signal falls below threshold level before duration time is up. Processing results are discarded, and level monitoring resumes.
T2:	Signal exceeds threshold level. Processing starts again.
T2':	Signal has exceeded threshold level for longer than duration time. Processing results from T2 are valid.
T3:	Signal falls below threshold level. Measurement stop standby is activated.
T4:	Signal again exceeds threshold level before duration time is up. Measurement stop standby is discarded and measurement continues.
T5:	Measurement stop standby is activated.
T6:	Signal has stayed below threshold level for longer than duration time. Measurement stop at T5 is validated, data for interval after T5 are discarded, and measurement stops. If auto store is selected, this result is stored.

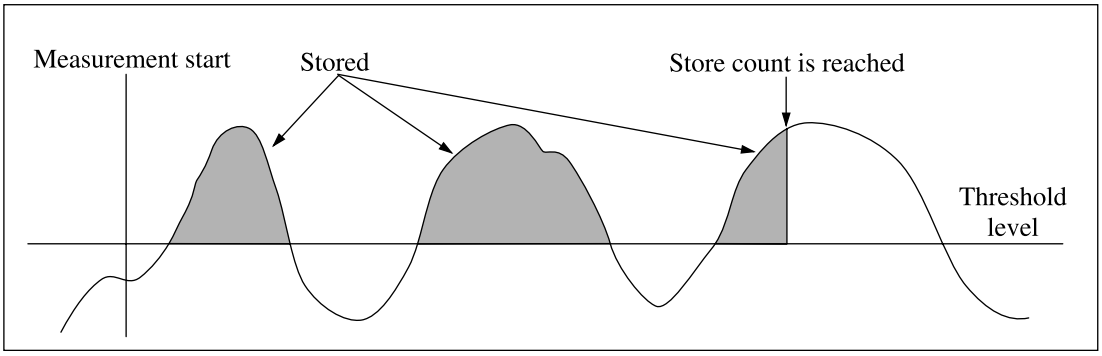
In the above example, the processing interval is from T2 to T5, and the processing time is t2 + t3 + t4. When auto store is active, level monitoring resumes after the data have been stored, and the process is repeated until the last address.
In level measurement mode, no delay time is inserted.

Operation with instantaneous values

When the display mode is set to instantaneous value, data are stored immediately when the signal exceeds the threshold level. Duration time evaluation is not performed.

The store interval and store count are determined by the instantaneous value auto store settings.

For Pave and other processing functions, one section exceeding the threshold level is taken as one processing result (stored in one address). For instantaneous value, multiple data sampled at the store interval are stored.



Important
Limitations in level measurement mode Data obtained in level measurement mode were stored with a different processing time for each data. Time-based recall processing operations therefore may not be correct. For data stored in level measurement mode, the X axis cannot be a time axis in recall processing. It functions only as an address axis.

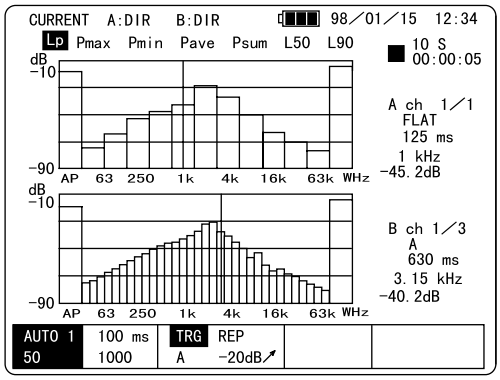
Display Processing

Display Modes

The following types of display functions are available.

Level/frequency graph (bar graph)

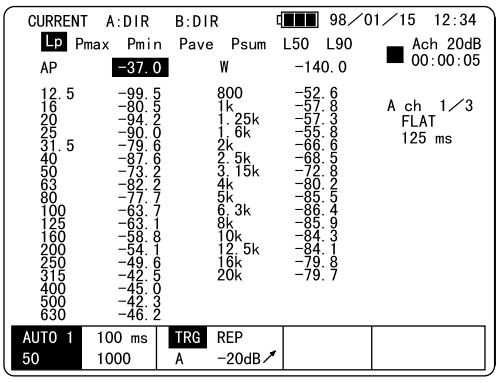
On the bar graph screen, the X axis represents the band frequency and the Y axis is the level shown in bar graph form. This display function can be activated using the LEVEL-FREQ. key and the MODE keys in the operation key panel left of the screen.



Bar graph display example

Level/frequency display (L-F numeric display)

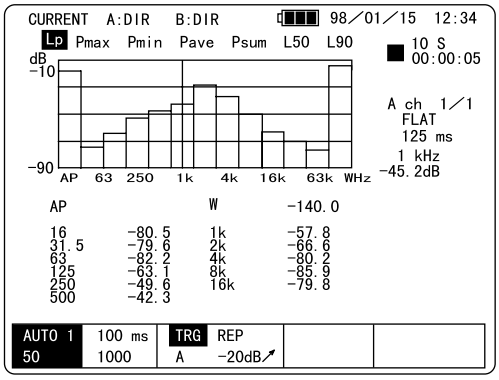
This display function can be activated using the NUM key and the MODE keys in the operation key panel left of the screen.



Numeric display example

Bar graph & numeric display

On the numeric display, the level for each frequency band is shown in numeric form. Pressing the NUM key in the operation key panel left of the screen once more activates the bar graph & numeric display. Each push of the NUM key then toggles between bar graph & numeric display and numeric only display. In the bar graph & numeric display, the bar graph is shown in the top half of the screen and the numeric values in the bottom half.

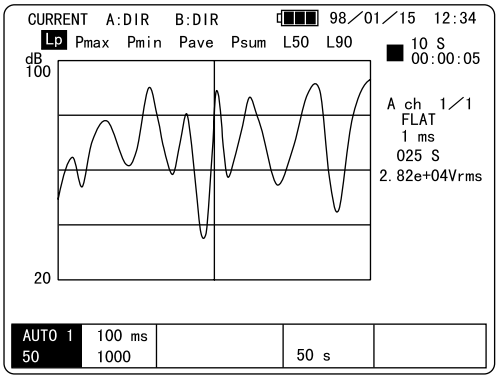


Bar graph & numeric display example

In this display mode, not all frequencies may fit on one screen. In this case, the ◀ and ▶ keys in the operation key panel below the screen can be used to scroll the display.

Level/time graph (level/time display)

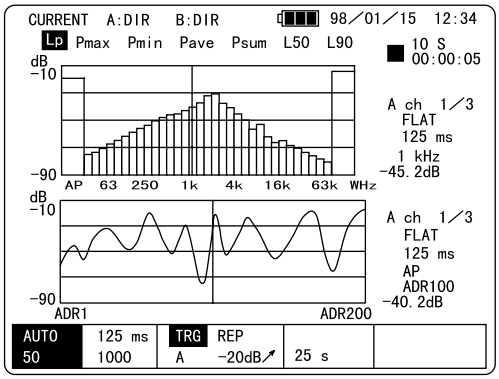
Pressing the LEVEL-TIME key in the operation key panel left of the screen calls up this display format. The TIME SCALE key can then be used to switch the time scale or address range for the X axis.



Level/time display example

In recall mode, when the marker is moved on the graph display, the level/time display for that frequency is called up.

Bar graph & level/time display



Bar graph & level/time display example

When performing analysis of channel A or channel B only, each push of the LEVEL-TIME key toggles between the level/time display and the bar graph & level/time display.

- On the level/time display, the X axis can be the time or address for the selected frequency and the Y axis shows the level as a line graph.
- In recall mode, when the marker is moved on the graph display, the level/time display for that frequency is called up.

Level/time display in current mode

- Time changes of all-pass instantaneous value data are shown. Display frequency cannot be changed.
- Data interval zoom for instantaneous value data can be changed.
- When the level/time screen has been filled, data start to scroll from right to left. (New data appear on the right.)
- When the X axis is set to time display, the left edge is the "0" time point.

Level/time display in recall mode

- Only auto store data can be used for level/time display.
- Data are shown with current memory address as the left edge.
- When the X axis is set to time display, the address 1 data are at the "0" time point.

Time units ms (milliseconds), s (seconds), M (minutes), H (hours), D (days)

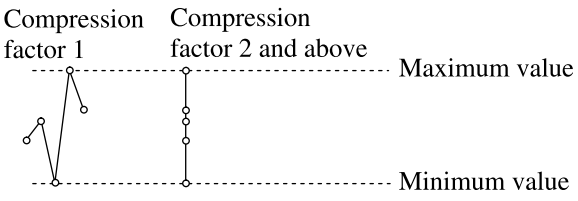
Display data for level/time display and bar graph & level/time display

Processing mode	Bar graph display	Level/time display
Current mode	Display processing mode data	Instantaneous value AP data
Recall mode	Memory address data of display processing mode	Specified frequency data of display processing mode with memory address as left edge

Compressed display

The measurement data shown on the measurement screen can be compressed along the X axis. Each push of the TIME SCALE key cycles through compression ratio settings in the order ×1 → ×2 → ×4 → ×8 → ×16 → ×32 → ×1 etc.

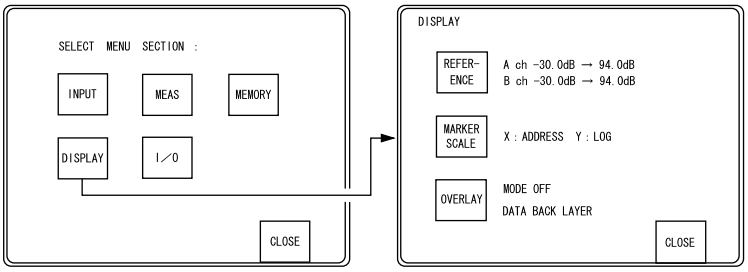
When compression is set to ×2 and above, one data is expressed as points on a line between the maximum and minimum value for that data interval.



- For fixed data (including pause), compression cannot be changed.
- When data compression is used, the recall processing address range extends from the lowest address in the data at the left cursor position to the highest address in the data at the right cursor position.

Display settings menu

SETUP → [DISPLAY]



Top menu Display settings main menu

[REFERENCE]: Opens the menu for the level conversion settings.
[MARKER SCALE]: Opens the menu for marker scale settings.
[OVERLAY]: Opens the menu for overlay settings.

Level conversion

The level conversion function allows conversion of readings for matching with a sensor or measurement equipment connected to the input. It also allows unit conversion.

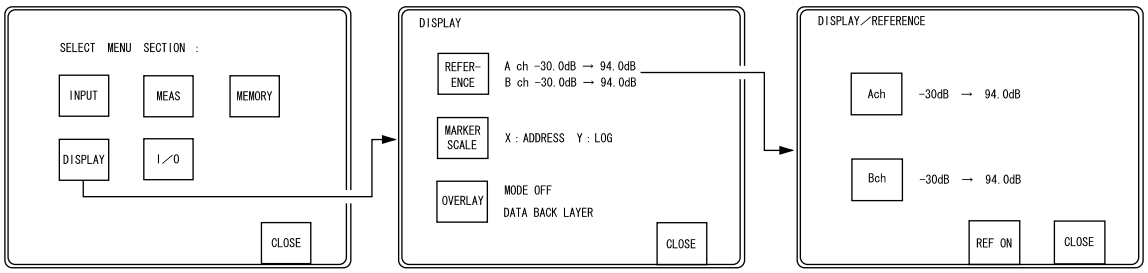
The value before and after conversion as well as the unit can be set separately for each channel.

SETUP → [DISPLAY] → [REFERENCE]

[A ch]: Opens the menu for channel A.

[B ch]: Opens the menu for channel B.

[REF ON]: Activates the level conversion function.



Top menu | Display settings main menu | Level conversion setting menu

Value before/after conversion

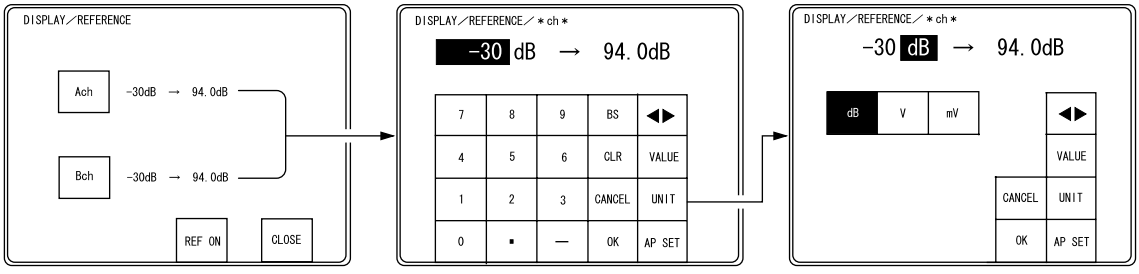
Units before conversion can be dB, V, or mV.

Units after conversion can be dB, V, mV, G, mm, mm/s, or m/s².

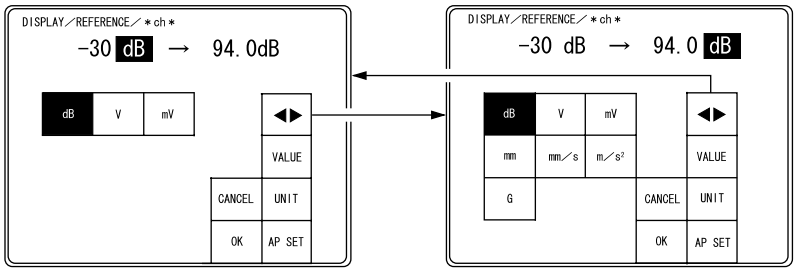
Numerals can be real numbers with max. 4 effective digits.

Menu for value settings before/after conversion

SETUP → [DISPLAY] → [REFERENCE] → [Ach] → [Bch]



Level conversion setting menu | Pre-conversion value setting screen | Pre-conversion unit setting menu



Pre-conversion unit setting menu | Post-conversion unit setting menu

Pre-conversion value settings

[◀ ▶]: Move to previous and next setting.
[VALUE]: Go to value input screen.
[UNIT]: Go to unit input screen.
[APSET]: Use AP as pre-conversion value.

Pre-conversion unit settings

[◀ ▶]: Move to previous and next setting.
[VALUE]: Go to value input screen.
[UNIT]: Go to unit input screen.
[APSET]: Use AP as pre-conversion value.
[dB]: Set unit to dB (decibel).
[V]: Set unit to V (volt).
[mV]: Set unit to mV (millivolt).

Setting value range

-199.9 dB to +199.9 dB

-999.9 (V, mV, mm, mm/s, m/s^2, G) to +999.9 (V, mV, mm, mm/s, m/s^2, G)

Post-conversion value settings

[◀ ▶]: Move to previous and next setting.
[VALUE]: Go to value input screen.
[UNIT]: Go to unit input screen.
[APSET]: Use AP as pre-conversion value.

Post-conversion unit settings

[◀ ▶]: Move to previous and next setting.
[VALUE]: Go to value input screen.
[UNIT]: Go to unit input screen.
[APSET]: Use AP as pre-conversion value.
[dB]: Set unit to dB (decibel).
[V]: Set unit to V (volt).
[mV]: Set unit to mV (millivolt).
[mm]: Set unit to mm (millimeter).
[mm/s]: Set unit to mm/s (millimeter per second).
[m/s^2]: Set unit to m/s^2 (meter per second square).
[G]: Set unit to G.

Setting value range

-199.9 dB to +199.9 dB

-999.9 (V, mV, G, mm, mm/s, m/s^2) to +999.9 (V, mV, G, mm, mm/s, m/s^2)

Automatic setting of all-pass value

The automatic setting of all-pass value can be used to read in the pre-conversion value. In this case, the unit automatically becomes dB.

Level conversion shift function

The level conversion shift function allows changing the value after conversion in steps of 10 dB. It is effective only when conversion is ON.

This is useful for example when an external measurement device is connected to the input, and the level range of the device is switched. Without shift, the level of the external device and the SA-30 would become mismatched.

Range of external measurement device	Level shift at SA-30
Raised by 10 dB	+10 dB shift key (2nd indicator lit)
Lowered by 10 dB	-10 dB shift key (2nd indicator lit)

Shift range: -120 dB to +120 dB

How level conversion works

- The conversion level is calculated from the settings for the value before conversion and after conversion. When using linear units, 1 Vrms, 1 G, 1 mm, 1 mm/s, 1 m/s^2 are taken as 0 dB.

  Conversion level = post-conversion level - pre-conversion level

- Level conversion is performed for each of the current frequency bands. During storing the post-conversion level is stored.

  Post-conversion level = pre-conversion level + conversion level

- When "linear" is selected for the display cursor, the following principle applies.

  When post-conversion unit is dB:

  antilogarithm is applied to pre-conversion level and voltage is displayed.

  When post-conversion unit is linear:

  antilogarithm is applied to post-conversion level and linear unit is displayed.

Conversion unit	Conversion level Δ [dB] calculation	Linear display unit	Linear calculation method
A[dB]→B[dB]	B - A	[V]	$10^{(\text{post-conversion level - conversion level})/20}$
A[V]→B[dB]	B - 20Log(A/1)	[V]	$10^{(\text{post-conversion level - conversion level})/20}$
A[dB]→ B[LIN]	20Log (B/reference value) - A	[LIN]	(reference value) × $10^{(\text{post-conversion level})/20}$
A[V]→ B[LIN]	20Log (B/reference value) - 20Log (A/1)	[LIN]	(reference value) × $10^{(\text{post-conversion level})/20}$

Example 1

-20 dB → 94 dB conversion, 0.5 V input

Conversion level: Δ = 94 - (-20) = 114 [dB]

Pre-conversion level: 20 Log (0.5/1) = -6 [dB]

Post-conversion level: -6 + 114 = 108 [dB]

Linear display: $10^{(108-114)\ /\ 20} = 0.5$ [V]

Example 2

0.5 V → 0 dB conversion, 0.8 V input

Conversion level: Δ = 0 - 20 Log (0.5/1) = 6 [dB]

Pre-conversion level: 20 Log (0.8/1) = -2 [dB]

Post-conversion level: -2 + 6 = 4 [dB]

Linear display: $10^{(4-6)\ /\ 20} = 0.8$ [V]

Example 3

-20 dB → 1 G conversion, 0.5 V input

Conversion level: Δ = 20 Log (1/1) - (-20) = 20 [dB]

Pre-conversion level: 20 Log (0.5/1) = -6 [dB]

Post-conversion level: -6 + 20 = 14 [dB]

Linear display: $10^{14\ /\ 20} = 5$ [G]

Example 4

0.5 V → 1 G conversion, 0.8 V input

Conversion level: Δ = 20 Log (1/1) - 20 Log (0.5/1) = 6 [dB]

Pre-conversion level: 20 Log (0.8/1) = -2 [dB]

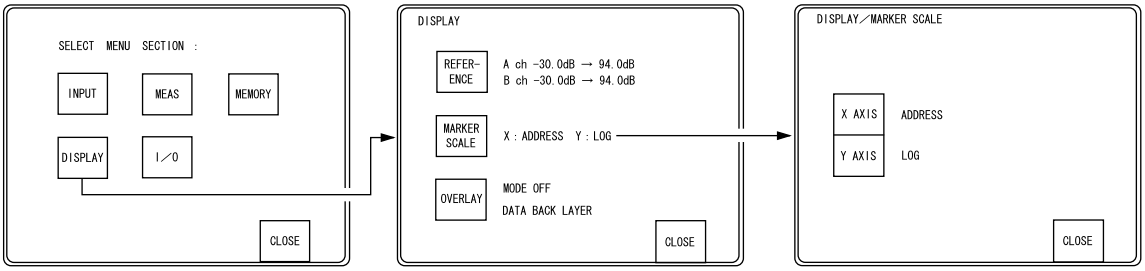
Post-conversion level: -2 + 6 = 4 [dB]

Linear display: $10^{4\ /\ 20} = 1.6$ [G]

Measurement screen coordinate setting

Measurement screen coordinate setting menu

SETUP → [DISPLAY] → [MARKER SCALE]



Top menu　　Display settings main menu　　Coordinate setting

[X AXIS]: Opens the X axis menu.

[Y AXIS]: Opens the Y axis menu.

X axis setting

Sets the X axis scale for the level/time display marker to address or time.

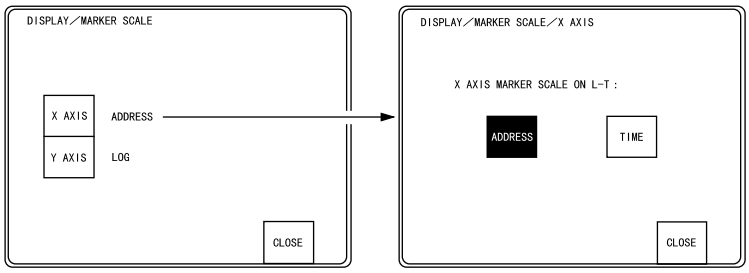
When set to "address", the data unit position at the left edge of the screen in current mode is "1" and at the right edge "200".

In recall mode, the data address indicating the marker is displayed.

When the time axis is selected, the reference point is the left edge of the measurement screen in current mode, and the data at address 1 in recall mode.

X axis setting menu

SETUP → [DISPLAY] → [MARKER SCALE] → [X AXIS]



Coordinate setting　　X axis scale setting menu

[ADDRESS]: X axis is set to address axis.

[TIME]: X axis is set to time axis.

Y axis marker scale setting

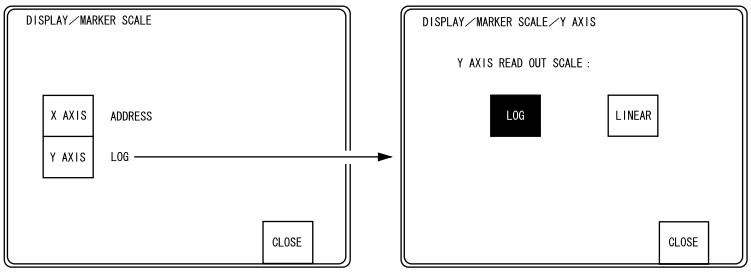
This setting determines whether the marker reading displayed at the right edge of the screen uses a logarithmic or linear scale.

The graph display on the measurement screen, the numeric indication and level/time indication always uses a logarithmic scale regardless of this setting.

The linear scale represents voltage when the post-conversion unit for level conversion has been set to dB. With other settings, it represents the selected unit.

Y axis marker scale setting menu

SETUP → [DISPLAY] → [MARKER SCALE] → [Y AXIS]



Coordinate setting　　Y axis scale setting menu

[LOG]: Marker position value is read with logarithmic scale.

[LINEAR]: Marker position value is read with linear scale.

Overlay and differential display

Overlay display serves to show two sets of measurement data on one screen. It can be used for example to compare data.

- The data in the foreground are called the front layer data, and the data in the background the back layer data.
- Overlay can be performed with the contents of the back layer buffer, or by using the data of the top screen half (in dual-screen display) as front layer data and the data of the lower screen half as back layer data.
- In top/bottom screen overlay/differential processing display, the data of the original bottom screen are used as back layer data.
- In differential processing display mode, [front layer data] - [back layer data] is calculated for each frequency band and the result is shown.
  ("front layer data" - "back layer data" or "upper screen data" - "lower screen data")

To use overlay/differential display with back layer buffer data

Procedure

1. Store data in the back layer buffer.
2. In the menu, specify the back layer as back layer data for overlay display.
3. In the menu, select overlay display mode.
4. Close the menu.

To use overlay/differential display with top/bottom screen

Procedure

1. Display necessary data for top/bottom screen.
2. In the menu, specify the top/bottom as back layer data for overlay display.
3. In the menu, select overlay display mode.
4. Close the menu.

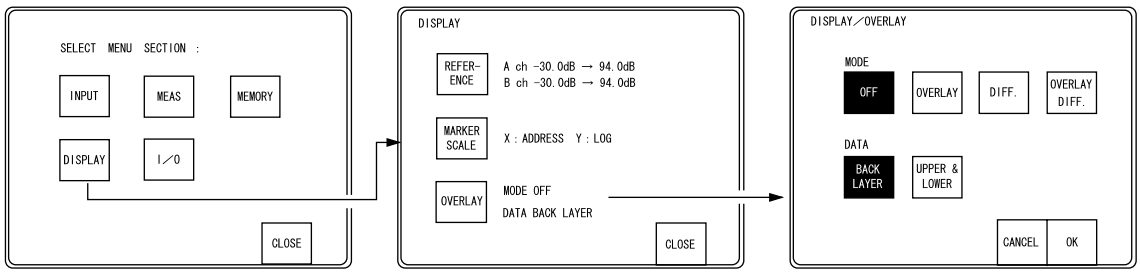
Display types

The following four display types are selectable.

Display type	Display content
Normal display	Non-overlay normal display
Overlay display	Front layer data are shown over back layer data
Differential display	Differential result between overlaid data is shown
Overlay display & differential display	Top half of screen shows overlay display, bottom half shows results of differential processing

Overlay display settings menu

SETUP → [DISPLAY] → [OVERLAY]



Top menu | Display settings main menu | Overlay display menu

[OFF]: Normal display is selected.

[OVERLAY]: Overlay display is selected.

[DIFF]: Differential display is selected.

[OVERLAY DIFF]: Overlay & differential display is selected.

[BACK LAYER]: Overlay/differential display of back layer buffer data is selected.

[UPPER & LOWER]: Overlay and differential display is selected for upper and lower half of screen.

Note

In the following cases, overlay display cannot be used:

- When ALL processing mode display is selected.
- When level/time display is selected.
- In recall mode.

Data expression in overlay display

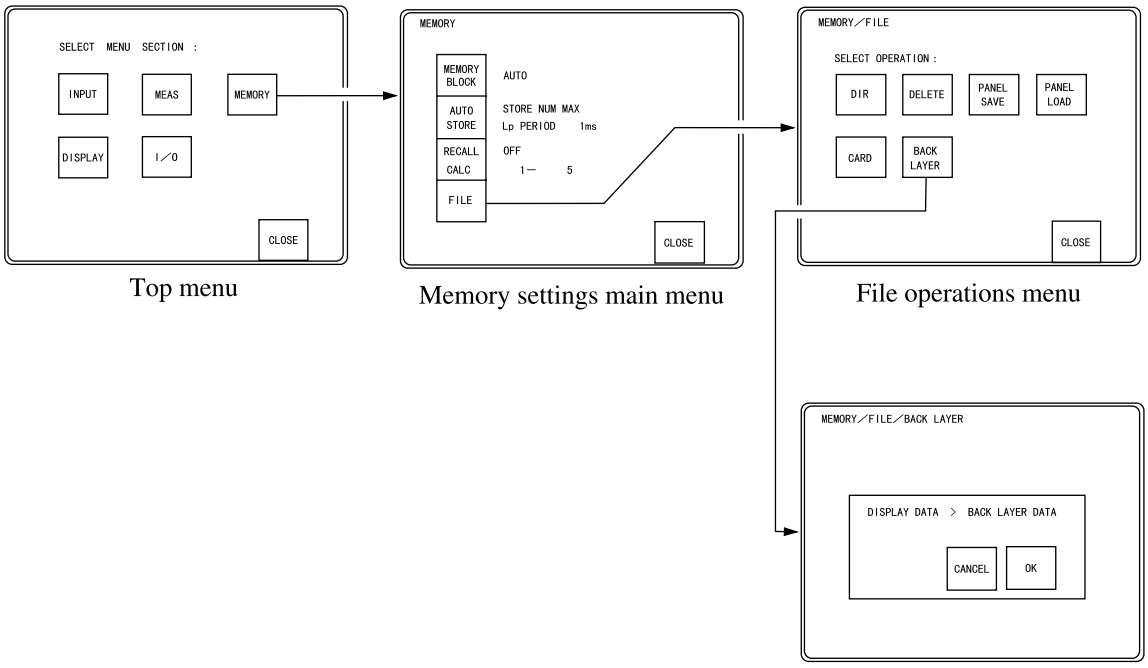
When overlay display is used, the level range, level conversion setting, and level shift setting of the back layer data are active. In differential display, the value is calculated after these settings are applied. These settings return to the original values when overlay display is set to OFF.

Back layer storing

Measurement data to be used as back layer data are stored in the back layer buffer.

Procedure

1. Bring the measurement data you want to store up on the display. When using current instantaneous value data, press the pause key.
2. Select back layer store from the menu.
   SETUP → [MEMORY] → [FILE] → [BACK LAYER]
3. A confirmation message appears. Select [OK] to store, or [CANCEL] to abort the process.



Top menu

Memory settings main menu

File operations menu

Back layer data set menu

Important

When level/frequency graph and numerical display or level/frequency graph & level/time display is selected, only the level/frequency graph 1 in the top half of the screen is stored.

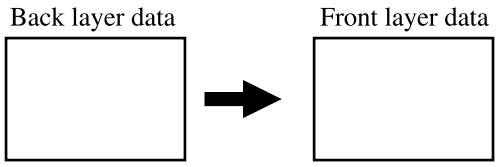
The following data are not stored as back layer data:

- Data being processed or stored in current mode
- Level/time screen data
- Data displayed with ALL setting of display mode
- Overlay data

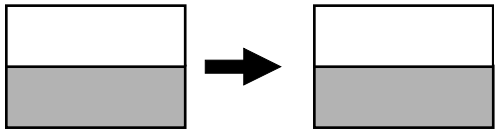
Back layer overlay

Number of screens and activation callup procedure.

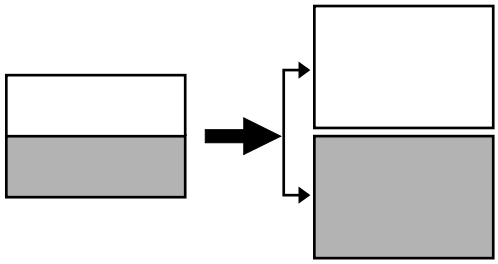
When there is one set each of back layer data and front layer data, the back layer data are superimposed on the front layer data.



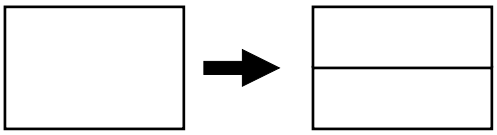
When there are two sets each of back layer data and front layer data, overlay is carried out on the top half and bottom half of the screen respectively.



When there are two sets of back layer data and one set of front layer data, overlay is carried out on the top half of the screen if the front layer data are in channel A and in the bottom half of the screen if the front layer data are in channel B.



When there is one set of back layer data and two sets of front layer data, overlay is carried out on the top half and bottom half of the front layer data screen.

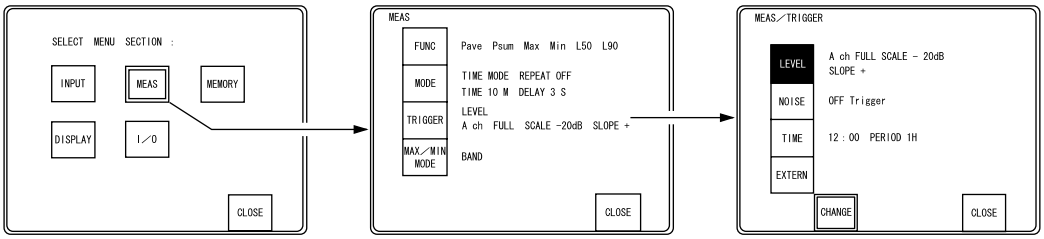


Trigger Functions

Internal trigger functions of the SA-30 include a level trigger, noise trigger, and time trigger which can be selected by the user. Using an external signal to trigger processing and store start/stop is also possible.

1. Open the trigger menu.

   1-1. Press the SETUP key on the operation key panel below the screen.
   1-2. Press the [MEAS] key shown on the menu screen, then select [TRIGGER].



Top menu | Measurement parameters main menu | Trigger settings menu

[LEVEL]: Selects level trigger.
[NOISE]: Selects noise trigger.
[TIME]: Select time trigger.
[EXTERN]: Selects external trigger.
[CHANGE]: Opens the menu for detailed trigger settings.

2. Press the [CHANGE] key to make settings for the trigger as selected in step 1-2.
3. Press the TRIG ON/OFF key on the unit to turn the trigger ON.
4. Press the START/STOP key on the unit to start the measurement.
   Alternatively, press the STORE key to start the store procedure.

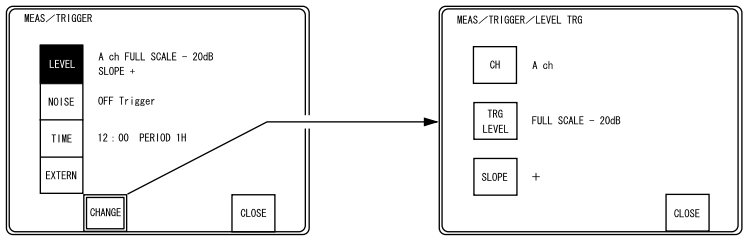
When measurement is started, the unit goes into the trigger standby condition. When the trigger condition is fulfilled, processing or store starts.
In the trigger standby condition, the indication TRG is shown in reverse at the bottom of the screen. When the trigger condition is fulfilled, the indication returns to normal.

Note
To use these trigger functions, set the measurement mode to time measurement.

Level Trigger

The level trigger is triggered by the edge of the all-pass input signal. The channel, level, and slope can be set.

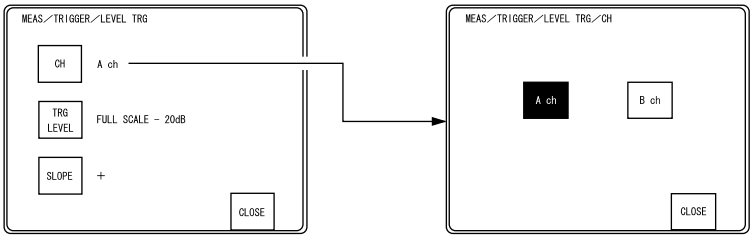
1. Open the level trigger settings menu.
   1-1. Press the SETUP key on the operation key panel below the screen.
   1-2. Press the [MEAS] key shown on the menu screen, then select [TRIGGER].
   1-3. Press [LEVEL] and then [CHANGE].



Trigger settings menu　　Level trigger settings menu

[CH]: Opens the menu for selecting the channel to be monitored.
[TRG LEVEL]: Opens the trigger level setting menu.
[SLOPE]: Opens the slope setting menu.

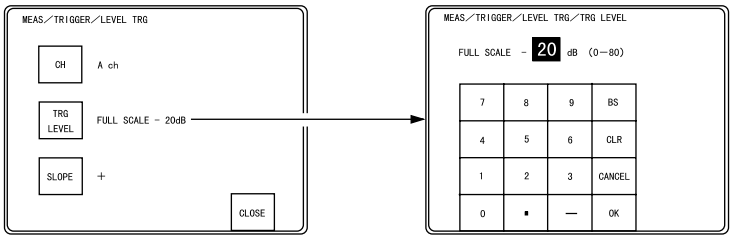
2. Open the trigger channel settings menu.
   Press [CH] after the above step.
   SETUP → [MEAS] → [TRIGGER] → [LEVEL] → [CHANGE] → [CH]



Level trigger settings menu　　Trigger channel settings menu

[A ch]: Activates the trigger for channel A.
[B ch]: Activates the trigger for channel B.

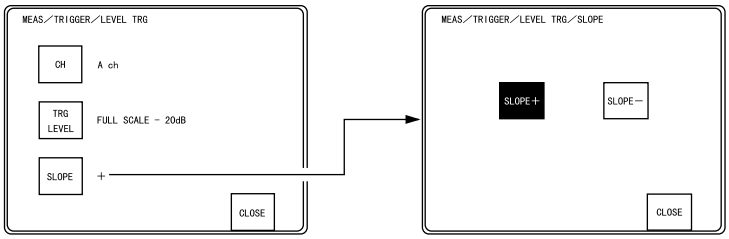
3. Open the trigger level setting menu.
   Press [LEVEL] after step 1.
   SETUP → [MEAS] → [TRIGGER] → [LEVEL] → [CHANGE] → [LEVEL]



Level trigger settings menu — Trigger level setting screen

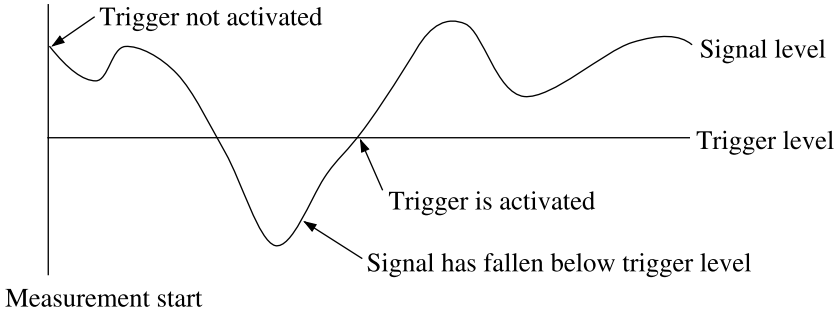
Numeric field: Serves to input the trigger level in 1-dB steps.

4. Open the trigger slope setting menu.
   Press [SLOPE] after step 1.
   SETUP → [MEAS] → [TRIGGER] → [LEVEL] → [CHANGE] → [SLOPE]

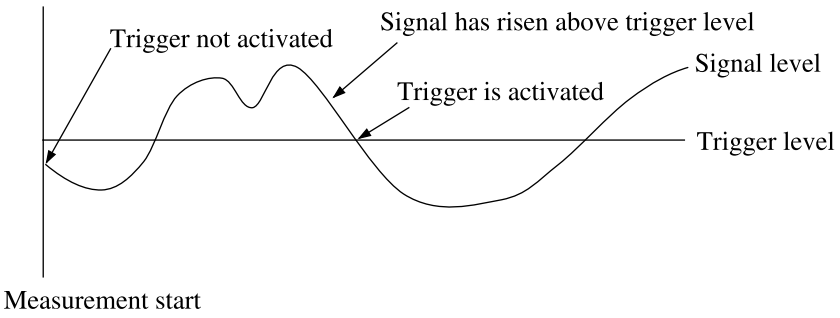


Level trigger settings menu — Trigger slope setting menu

[SLOPE+]: Trigger is activated when signal crosses trigger level in ascending direction.



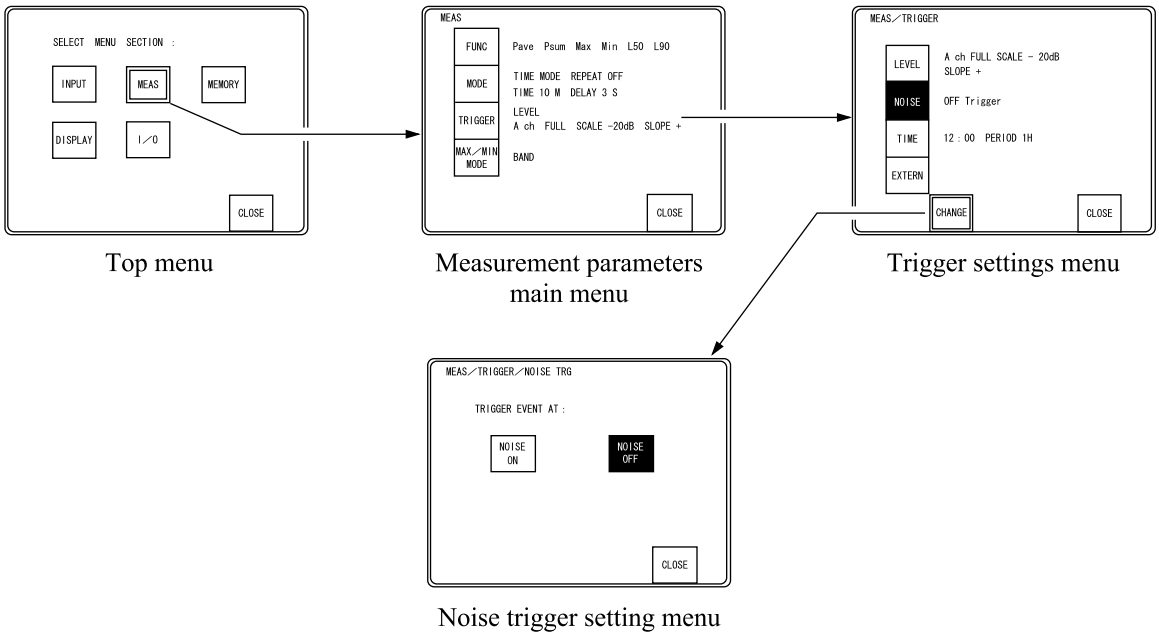
[SLOPE-]: Trigger is activated when signal crosses trigger level in descending direction.



Noise Trigger

The internal noise generator is used to activate the trigger. The activation type can be selected.

1. Open the trigger settings menu.
   1-1. Press the SETUP key on the operation key panel below the screen.
   1-2. Press the [MEAS] key shown on the menu screen, then select [TRIGGER].
   1-3. Press [NOISE] and then [CHANGE].
   SETUP → [MEAS] → [TRIGGER] → [NOISE] → [CHANGE]



Top menu

Measurement parameters main menu

Trigger settings menu

Noise trigger setting menu

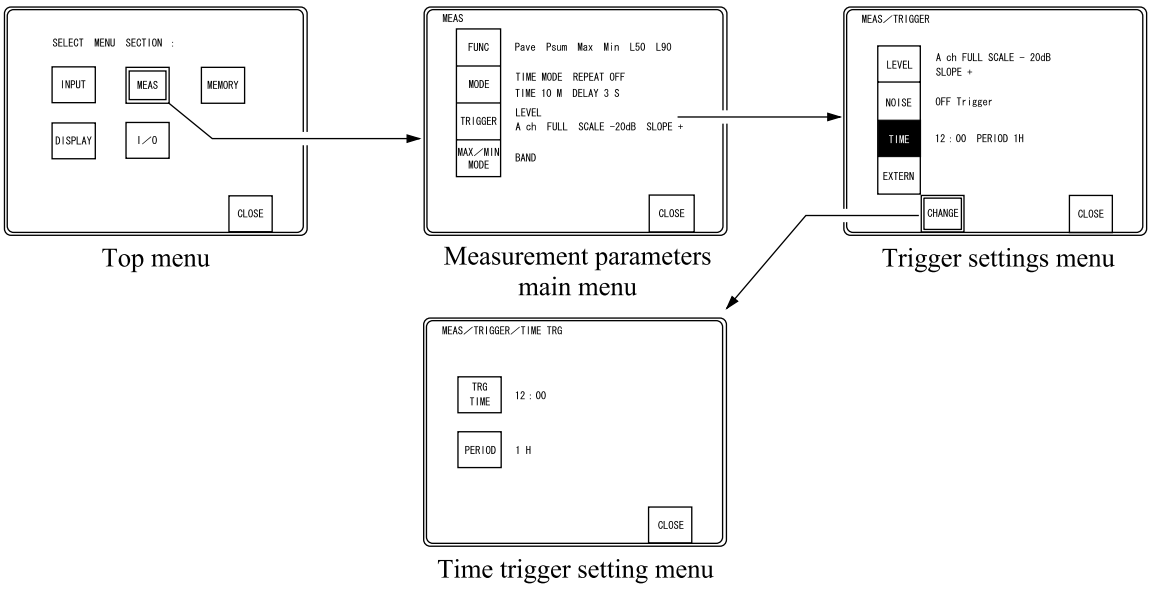
[NOISE ON]: Trigger is activated at the OFF-to-ON edge of the noise.
[NOISE OFF]: Trigger is activated at the ON-to-OFF edge of the noise.

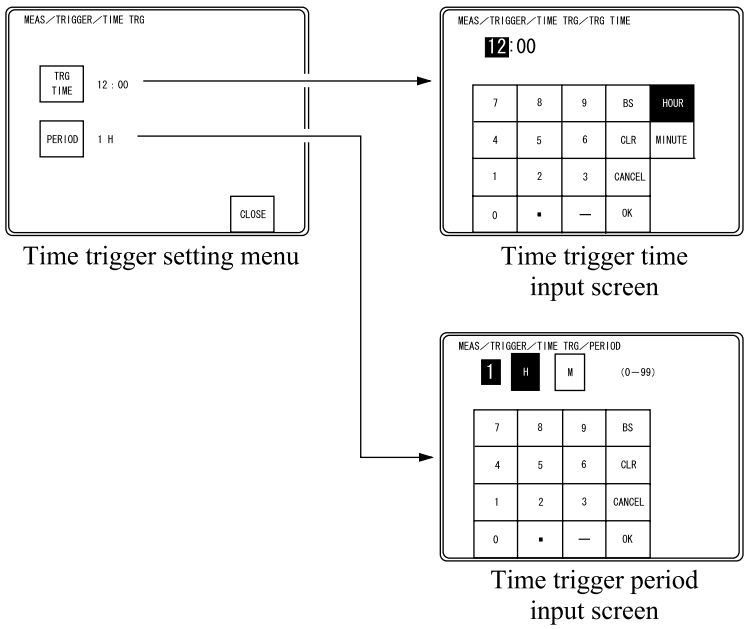
Time Trigger

Trigger time and period

The trigger time and period settings are made using the internal clock function. The time trigger period setting is effective only when the trigger repeat function is ON.

1. Open the time trigger settings menu.
   1-1. Press the SETUP key on the operation key panel below the screen.
   1-2. Press the [MEAS] key shown on the menu screen, then select [TRIGGER].
   1-3. Press [TIME] and then [CHANGE].
   SETUP → [MEAS] → [TRIGGER] → [TIME] → [CHANGE]





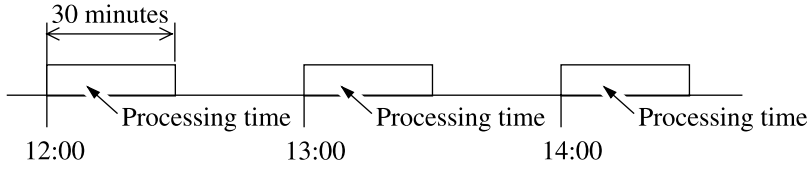
[TRG TIME]: Opens the menu for input of time trigger start time.

[PERIOD]: Opens the menu for input of time trigger repeat period time.

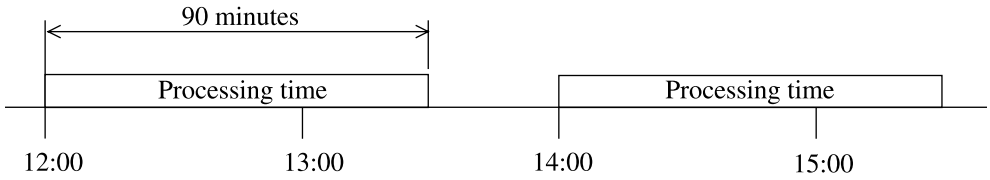
Time trigger setting example

When trigger repeat is ON

Trigger time 12:00, processing time 30 minutes, period 1 hour



Trigger time 12:00, processing time 90 minutes, period 1 hour

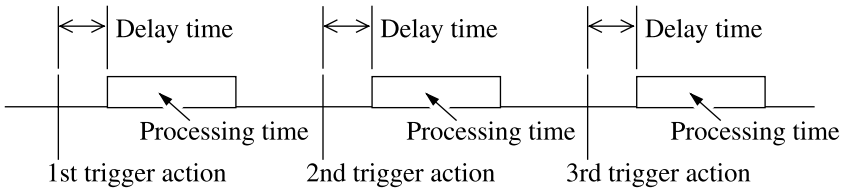


Note
When the period of the time trigger is set to "0", the effect is the same as when it is set to OFF.

Delay Time

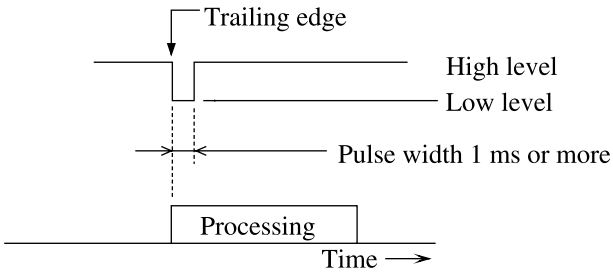
The delay time setting has the effect shown below.

Immediately after the trigger has been activated for the first time, the delay time is inserted, and then processing starts. Subsequent trigger actions do not use the delay time.



External Trigger Input

Triggering is performed at the trailing edge of the signal input to the TRIG.IN connector on the rear panel.

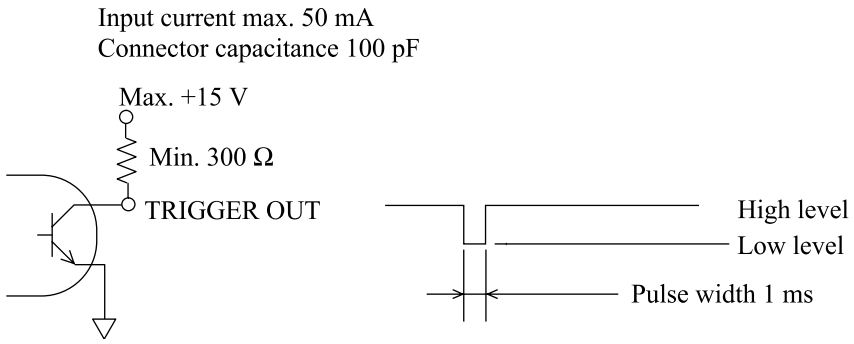


Use the optional BNC to RCA phono plug cable CC-24 to connect the trigger source equipment (trigger pulse generator) to the TRIG. IN connector.

Trigger Output

The TRIG. OUT connector on the rear panel supplies a pulse signal in sync with the action of the internal trigger. The signal is output from this connector only in time measurement mode, when the trigger has been set to ON. In level measurement mode, no signal is output.

The output is a negative logic, open-collector output.



Trigger Repeat Function

When auto store of processing results is completed and the trigger repeat function is activated, triggering with the same conditions starts again.

Trigger repeat	Processing operation	Processing data auto store operation	Instantaneous value auto store operation
OFF	Stop after processing end	After processing end and store, next processing starts immediately (Fig. 1)	Storing occurs at instantaneous value store period
ON	Trigger standby after processing end (until user stop)	After processing end and store, trigger standby (Fig. 2)	Storing occurs each time trigger is activated

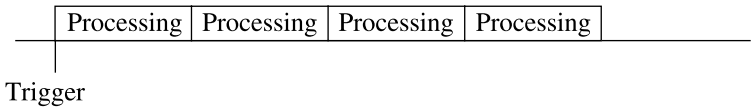


Fig. 1

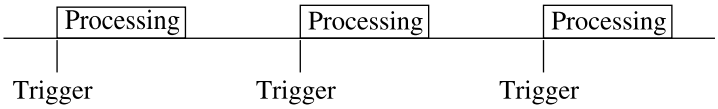


Fig. 2

Store Functions

Measurement data and processing data obtained in current mode can be stored in the internal memory of the unit. Two store functions are available: auto store where processing data store and is automatically repeated, and manual store of the current data into the currently displayed address.
Auto store data and manual store data are stored in separate areas of the internal memory.

- Open the memory settings menu.
  1. Press the SETUP key on the operation key panel below the screen.
  2. Press the [MEMORY] key shown on the menu screen.

[MEMORY BLOCK]: Opens the memory block selection menu.
[AUTO STORE]: Opens the auto store setting menu.
[RECALL CALC]: Opens the recall processing settings menu.
[FILE]: Opens the file operations menu.

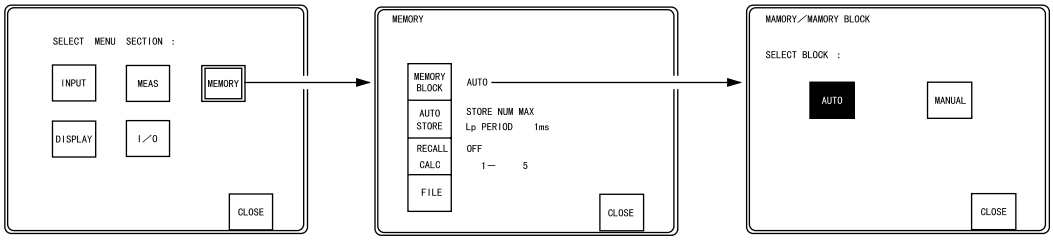
Memory block selection menu
SETUP → [MEMORY] → [MEMORY BLOCK]
[AUTO]: Selects auto store.
[MANU]: Selects manual store.

Auto store setting menu
SETUP → [MEMORY] → [AUTO STORE]
[STORE NUM]: Opens the auto store count input screen.
[Lp PERIOD]: Opens the Lp store period input screen.

Auto Store

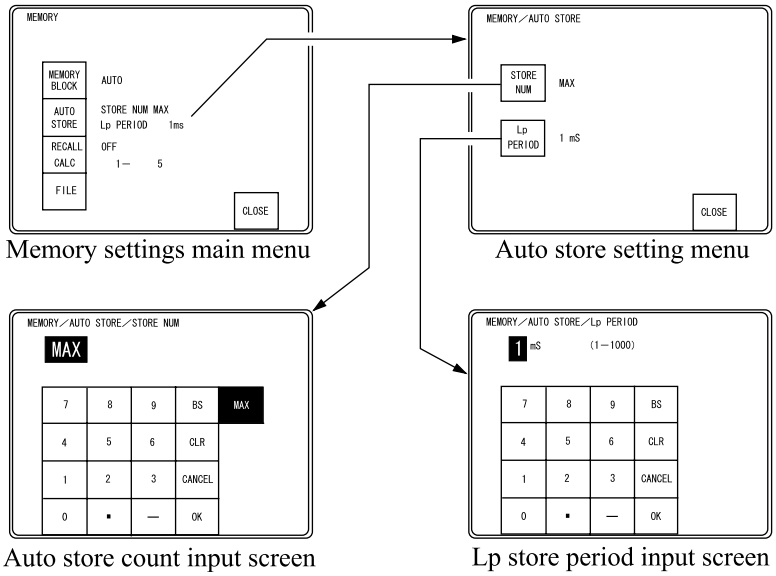
Auto store procedure

1. Select [AUTO] on the memory block settings menu.



Top menu | Memory settings main menu | Memory block selection menu

2. On the memory parameters main menu, select [AUTO STORE] to open the auto store mode menu.
3. Select [STORE NUM] to open the auto store count input screen. Enter the desired count number and press [OK].



Memory settings main menu | Auto store setting menu

Auto store count input screen | Lp store period input screen

The actual auto store count when the "MAX" setting was selected is shown on the next page.

4. Select [Lp PERIOD] to open the Lp store period input screen, and enter the desired store period.
5. Return to the measurement screen (by pressing the SETUP key).
6. Press the STORE key. Auto store operation starts.
   To terminate the operation, use the START/STOP key.

   To display stored data, activate the recall mode, light the 2nd indicator (by pressing the 2nd/ENTER key) and then use the ◀, ▶ keys to select the memory address.

Stored screens	Stored processing sets	1/1oct	1/3oct	1/1oct & 1/3oct
1	1	6000	2400	——
	2	3000	1200	——
	3	2000	800	——
	4	1500	600	——
	5	1200	500	——
	6	1000	400	——
2	1	3000	1200	1200
	2	1500	600	600
	3	1000	400	400
	4	700	300	300
	5	600	200	200
	6	500	200	200

Maximum auto store count when MAX was selected

Note

Display of instantaneous value data during auto store
When instantaneous value data are stored with a store interval of 1 ms, the display may sometimes not be updated properly, but store is carried out normally.

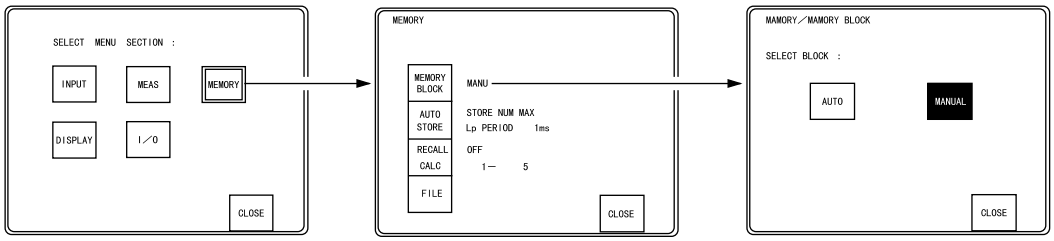
Note

When recalling data that were stored with user-defined frequency weighting, the same user-defined frequency weighting as during store must be set.

Manual Store

Manual store procedure

1. Select [MANUAL] on the memory block settings menu.



Top menu | Memory settings main menu | Memory block selection menu

2. Select [STORE NUM] to open the auto store count input screen. Enter the desired count number and press [OK].
3. Select [Lp PERIOD] to open the Lp store period input screen, and enter the desired store period.
4. Return to the measurement screen (by pressing the SETUP key).
5. Press the STORE key. Data are stored every time you press the key.

   To display stored data, activate the recall mode, light the 2nd indicator (by pressing the 2nd/ENTER key) and then use the ◀, ▶ keys to select the memory address.

Note
When recalling data that were stored with user-defined frequency weighting, the same user-defined frequency weighting as during store must be set.

Recall Function

The recall function serves to read data that have been stored in the internal memory and to perform processing using a specified address range.

Switching between current mode and recall mode has the following effects.

Recall mode activated from current mode	
Memory block	Address value
Auto	Address 1 is selected
Manual	When address is between 2 and highest address, -1 is selected (to view most recently stored data)

Current mode activated from recall mode	
Memory block	Address value
Auto	Store data number
Manual	When address is between 1 and highest address, +1 is selected (to compensate for the -1 change)

- Overlay display and differential display are OFF.
- Display type becomes as follows.

Before switching	After switching
Graph	Graph
Numeric	Numeric
Graph & numeric	Graph & numeric
Level/time	Graph
Graph & level/time	Graph

- Noise is set to OFF.

Selecting the recall address

Recalled data are specified by the address. To specify the address, activate the 2nd function (LED lit) and then use the left and right keys to switch the address.

Recall processing function

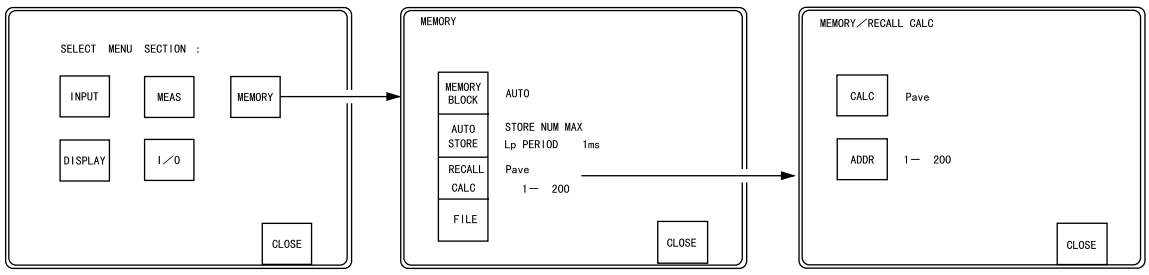
Recall processing is a function that allows processing using stored data. The processing type and the address range to be processed can be specified.

Results of statistical processing are shown as a graph screen and numeric screen for each band. Because reverb time processing can only be carried out for one frequency band, the results are shown as a level/time graph. (The results for the current frequency band are shown in the bottom center of the screen.)

Recall processing procedure

1. Store measurement data, as described in the section "Store Functions".
2. Press the RECALL key to activate the recall mode.
3. Set the recall parameters on the recall processing parameters menu.

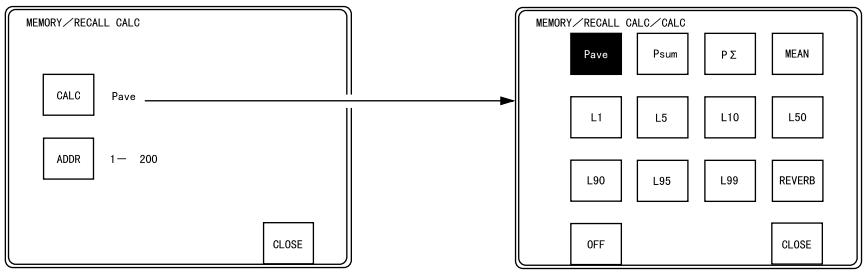
Recall processing parameters menu
SETUP → [MEMORY] → [RECALL CALC]
[CALC]: Opens the recall processing type selection menu screen.
[ADDR]: Opens the recall processing address range input screen.



Top menu | Memory settings main menu | Recall processing settings menu

Recall processing type selection menu

SETUP → [MEMORY] → [RECALL CALC] → [CALC]



Recall processing settings menu

Recall processing type selection menu screen

[Pave]: Selects power average processing.

[Psum]: Selects power sum 1 processing.

[PΣ]: Selects power sum 2 processing.

[L1] - [L99]: Selects statistical (time percentile level) processing.

[REVERB]: Selects reverb time processing (instantaneous value only).

[OFF]: Turns statistical processing OFF.

Processing type	Content	Display
Power average	Power average of stored data	Pave
Power sum 1	Power sum of stored data, with regard to sampling period Assumed to be 1 second for manual data	Psum
Power sum 2	Power sum of stored data, without regard to sampling period	PΣ
Arithmetic mean	Average of decibel value of stored data	MEAN
Reverb time ※	60 dB attenuation time based on regression line	REVERB
Statistical processing	Time percentile level calculated using stored data	L1, L5, L10, L50, L90, L95, L99

* Reverb time can be calculated only from instantaneous value data collected in time measurement mode with auto store.

Note
The recall processing APW level is the power sum level of the recalled (weighted) values in each frequency band.

Address range setting for recall processing

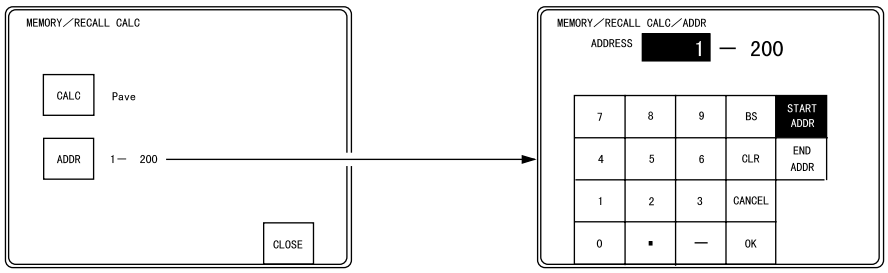
The address range for recall processing can be set from a menu or on the level/time screen.

Setting the address range for recall processing

Using the menu

Recall processing address range setting menu

SETUP → [MEMORY] → [RECALL CALC] → [ADDR]



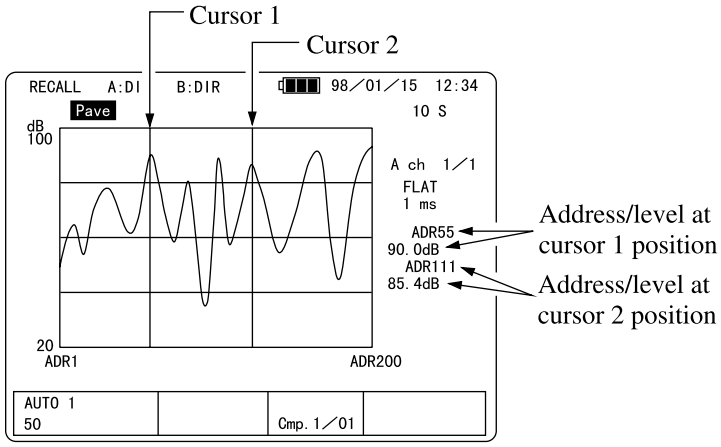
Recall processing settings menu

Recall processing address range input screen

Using the level/time graph screen

The range enclosed by the two cursors becomes the processing address range.

1. Select the cursor to move with the up/down cursor keys.
2. Use the left/right cursor keys to move the cursor.



Level/time recall screen display example

To specify a range that exceeds the currently displayed range, use the TIME SCALE key to bring the entire range on the display. In this case, some data at the cursor have multiple addresses, but the address range will be chosen to include all of these data.

Data collected with manual store are included in the range for processing if all of the conditions below are matched. The inclusion extends to the first data address that does not qualify (minimum 1 address).

- Number of screens
- Processing mode
- Analysis band and analysis frequency span

3. Press the START/STOP key.
   The processing result is shown on the screen.
4. When the processing type and/or address range was changed, press the START/STOP key once more. Until then, the previous processing result remains on the screen.

Reverb time calculation

Reverb time calculation and display of the result can be carried out only on the level/time screen. As source data, only instantaneous value collected with auto store in time measurement mode can be used.

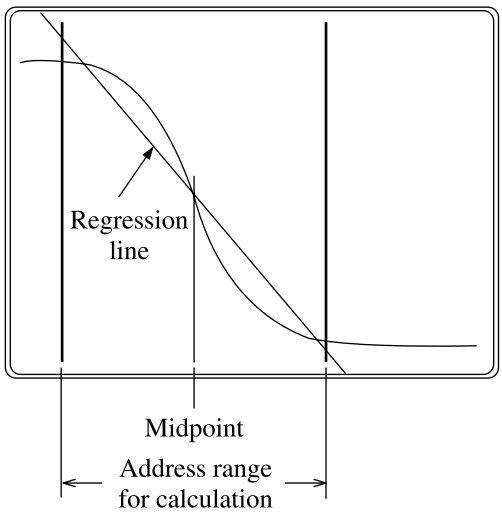
Regression line of calculated reverb time

When reverb time is calculated, the regression line is shown on the level/time screen. The inclination of this line is calculated using the least square method on the specified address range. In this range, the line passes through the data midpoint. (It does not necessarily pass through the start and end points.)

Reverb time is calculated from the inclination of the regression line. It is possible to visually judge the line to see whether it is appropriate.

Display format

Unit	Seconds
Calculation range	0.00 - 327.67 s
Calculation result display format	Centered on X axis
Regression line display format	Inclination : Determined by least square method on address range Display position : Passing through data midpoint of address range
When result is out of range	Display : "---.-s" Regression line : not shown



Note

In recall operation, the level conversion settings on the input and measurement parameters menu are the same as used when the data were stored. These settings can be checked during recall, but they cannot be changed.

File Operations

The various kinds of data handled by the SA-30 are stored in the following areas.

Store target	Content	Store capacity
Auto memory block	Measurement data collected with auto store	Variable (see section on maximum store data numbers)
Manual memory block	Measurement data collected with manual store	200
Panel settings memory block	Panel settings established with menus and operation keys	8
User-defined weighting memory block	User-defined frequency weighting data	1
Back layer buffer	Back layer data for overlay display	1
ATA card	Various memory blocks from SA-30 (except back layer buffer)	—

These stored data can be handled using various file operations. The following file operations are possible.

Operation	Content	Handled block type
Auto store	Auto storing of current measurement data	Auto memory block
Manual store	Manual storing of current measurement data	Manual memory block
Show directory	Display address numbers and creation date of files in memory block	Auto memory block Manual memory block Panel settings memory block User-defined weighting memory block
Block data delete	Deleting the contents of a memory block	Auto memory block Manual memory block Panel settings memory block User-defined weighting memory block
Panel save	Storing menu and operation key settings	Panel setting memory block
Panel load	Recalling menu and operation key settings	Panel setting memory block
Unit and card operations	Storing block contents from unit on card Calling up data from card Deleting a directory Formatting a card	Auto memory block Manual memory block Panel settings memory block User-defined weighting memory block
Back layer store	Storing currently displayed measurement data as back layer data	Back layer buffer

File operations menu

SETUP → [MEMORY] → [FILE]

[DIR]: Open directory display screen.

[DELETE]: Open block delete screen.

[PANEL SAVE]: Open panel settings save screen.

[PANEL LOAD]: Open panel settings load screen.

[CARD]: Open ATA card operations screen.

[BACK LAYER]: Open back layer data store screen.

Show directory

Shows addresses and creation dates for data stored in the memory blocks of the SA-30.

Procedure

1. Select directory display screen from menu.
2. Select memory block from menu.
   Information for the selected memory block is shown, including data creation date and time.
   Up/down scroll keys on menu can be used to scroll through addresses.

Note
Because the auto memory block handles data for all addresses as a single file, only one file is shown. The creation date and time shown for data in the auto memory block and manual memory block is the date and time when processing started.

Block delete

Allows deleting the contents of an entire memory block.

Procedure

1. Select block delete from the menu.
2. Select the memory block to delete from the menu.
3. Select [OK] on the confirmation message to carry out the delete operation. Select [CANCEL] to abort the delete operation.

⚠ Caution
Once data are deleted, they cannot be restored. Take care not to accidentally delete data that are still needed. It is not possible to delete specified addresses only.

Panel save

Allows storing menu and operation key settings. Up to eight different settings can be stored.

Procedure

1. Establish the desired settings using the menus and operation keys of the unit.
2. Select panel save from the menu.
3. Select the store target memory number.
   If a setting is already stored in that number, a confirmation message will appear, asking you whether to overwrite the existing setting. Select [OK] to overwrite or [CANCEL] to abort.

Panel recall

Allows recalling stored menu and operation key settings and making them active.

Procedure

1. Select panel recall from the menu.
   (The recalled settings will replace the current unit settings. If you want to retain the current settings, store these first as described in the previous paragraph.)
2. Select the memory number in which the desired settings were stored. A confirmation message will appear, asking you whether to recall the settings. Select [OK] to recall or [CANCEL] to abort.

Important
When panel settings are recalled, currently displayed measurement data will also be lost. However, data stored in the various memory blocks are retained. If the recalled panel settings are different from the current unit configuration (such as when the high frequency band option has been installed), the recall is invalid and the unit will restart with the default panel settings.

Selecting [DEFAULT] will establish the factory default settings.

ATA cards

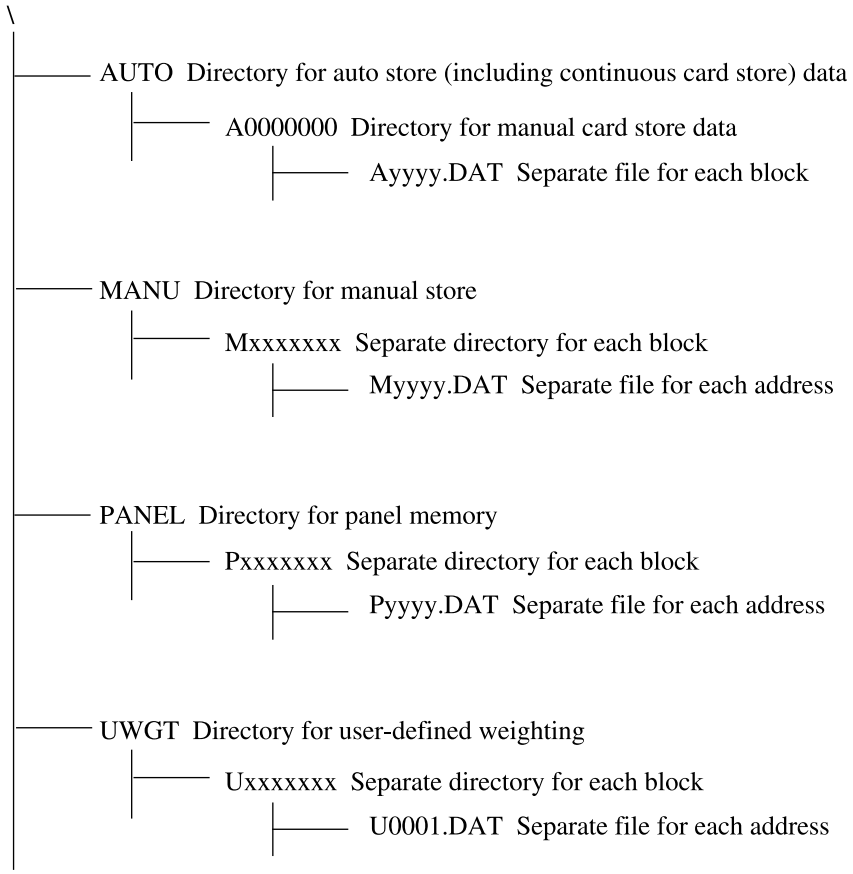
Card operations menu

SETUP → [MEMORY] → [FILE] → [CARD]

[BLOCK SAVE]: Allows storing memory block contents on memory card.
[BLOCK LOAD]: Allows loading memory block contents from memory card.
[DELETE]: Allows deleting directories from the memory card.
[FORMAT]: Serves for formatting the memory card.

Organization of files on a memory card

- Data from the SA-30 are saved in the form of files on the memory card.
- Files are MS-DOS compatible and arranged as shown below. The target directory and file name convention depends on the type of data that are stored.



(xxxxxxx, yyyy are unique numbers for each directory and file.)

- For information on the file format of the various files, please refer to the section "File format".

⚠ Caution

Do not remove a memory card while it is being accessed. Otherwise data on the card may be destroyed.

AUTO directory

- This is a directory for auto memory block files.
- Auto store data for all addresses are stored in a single file (in block units).
- When block save of auto store data has been selected from the menu, the file is stored under \AUTO\A0000000 with the file name Ayyyy.DAT. yyyy is a new number for each save operation.
- To perform block load, specify the file name Ayyyy.DAT. This will load the data into the unit.
- To delete a card directory, specify the file name Ayyyy.DAT.

MANU directory

- This is a directory for manual memory block files.
- Manual store data are stored in a single file for each address.
- When block save of manual store data has been selected from the menu, a directory named \MANU\Mxxxxxxx is created, and the file is stored in this directory with the name Myyyy.DAT. xxxxxxx is a new number for each save operation, and yyyy is the address.
- To perform block load, specify the directory Mxxxxxxx. This will load the data into the unit.
- To delete a card directory, specify the directory Mxxxxxxx.

PANEL directory

- This is a directory for panel setting memory files.
- Panel setting data are stored in a single file for each address number.
- When block save of panel setting data has been selected from the menu, a directory named \PANEL\Pxxxxxxx is created, and the file is stored in this directory with the name Pyyyy.DAT. xxxxxxx is a new number for each save operation, and yyyy is the address number for the panel setting.
- To perform block load, specify the directory Pxxxxxxx. This will load the data into the unit.
- To delete a card directory, specify the directory Pxxxxxxx.

UWGT directory

- This is a directory for user-defined frequency weighting data files.
- User-defined frequency weighting data are stored in a single file for each address number.
- When block save of user-defined frequency weighting data has been selected from the menu, a directory named \UWGT\Uxxxxxxx is created, and the file is stored in this directory with the name U0001.DAT. xxxxxxx is a new number for each save operation.

- To perform block load, specify the directory Uxxxxxxx. This will load the data into the unit.
- To delete a card directory, specify the directory Uxxxxxxx.

Block save of data from SA-30 on memory card

The data in a memory block of the SA-30 can be saved on memory card in one operation, as described below.

Procedure

1. Insert the memory card.
2. Select block save from the card operations menu.
3. Select the memory block to be saved on the card.
4. Select the store target number. Numbers not shown on the screen can be accessed by using the up/down scrolling keys.
5. When a number is selected, an overwrite confirmation message will appear. Select [OK] to overwrite or [CANCEL] to abort.

   To store in a new number, select [NEW] and specify the desire number. If the number has not been used before, the store process will be carried out when [OK] is pressed. If the number has been used before, an overwrite confirmation message will appear. Select [OK] to overwrite or [CANCEL] to abort.

Memory block to be stored (SA-30)	Store target (card)	Store operation
Auto memory block	\AUTO\A0000000\Ayyyy.DAT	Data for all addresses are stored in one file
Manual memory block	\MANU\Mxxxxxxx\	Address 1 → M0001.DAT Address 2 → M0002.DAT ⋮ Address 200 → M0200.DAT
Panel setting memory block	\PANEL\Pxxxxxxx\	Address 1 → P0001.DAT Address 2 → P0002.DAT ⋮ Address 8 → P0008.DAT
User-defined weighting memory block	\UWGT\Uxxxxxxx\	User-defined frequency weighting data → U0001.DAT

"xxxxxxx" and "yyyy" are store numbers as selected from the menu.

Block load of data from memory card to SA-30

The data stored in directories and files on the memory card can be loaded into the SA-30 in one operation, as described below.

Procedure

1. Insert the memory card.
2. Select block load from the card operations menu.
3. Select the memory block type to be loaded from the card.
4. Select the number to be loaded. Numbers not shown on the screen can be accessed by using the up/down scrolling keys.
5. When a number is selected, a load confirmation message will appear. Select [OK] to load or [CANCEL] to abort.

Load target memory block (SA-30)	Load source (card)	Load operation
Auto memory block	\AUTO\A0000000\Ayyyy.DAT	Data for all addresses are loaded from one file
Manual memory block	\MANU\Mxxxxxxx\	M0001.DAT→Address 1 M0002.DAT→Address 2 ⋮ M0200.DAT→Address 200
Panel setting memory block	\PANEL\Pxxxxxxx\	P0001.DAT →Address 1 P0002.DAT →Address 2 ⋮ P0008.DAT →Address 8
User-defined weighting memory block	\UWGT\Uxxxxxxx\	U0001.DAT → User-defined frequency weighting data

"xxxxxxx" and "yyyy" are store numbers as selected from the menu.

Card directory delete

Directories/files can be deleted from a memory card, as follows.

Procedure

1. Insert the memory card.
2. Select delete from the card operations menu.
3. Select the memory block directory to be deleted from the card.
4. Select the number to be deleted. Numbers not shown on the screen can be accessed by using the up/down scrolling keys.
5. When a number is selected, a delete confirmation message will appear. Select [OK] to delete or [CANCEL] to abort.

> **⚠ Caution**
>
> Data in all addresses corresponding to one memory block are deleted together. It is not possible to delete only a specified address.
>
> Once data are deleted, they cannot be restored. Take care not to accidentally delete data that are still needed.

Card directory selected for deletion	Delete operation
Auto memory directory	\AUTO\A0000000\Ayyyy.DAT is deleted
Manual memory directory	\MANU\Mxxxxxxx\ is deleted
Panel setting memory directory	\PANEL\Pxxxxxxx\is deleted
User-defined weighting memory directory	\UWGT\Uxxxxxxx\ is deleted

"xxxxxxx" and "yyyy" are store numbers as selected from the menu.

Card format

A memory card can be formatted as follows.

Procedure

1. Insert the memory card.
2. Select format from the card operations menu.
3. A confirmation message appears. Select [OK] to format the card or [CANCEL] to abort.

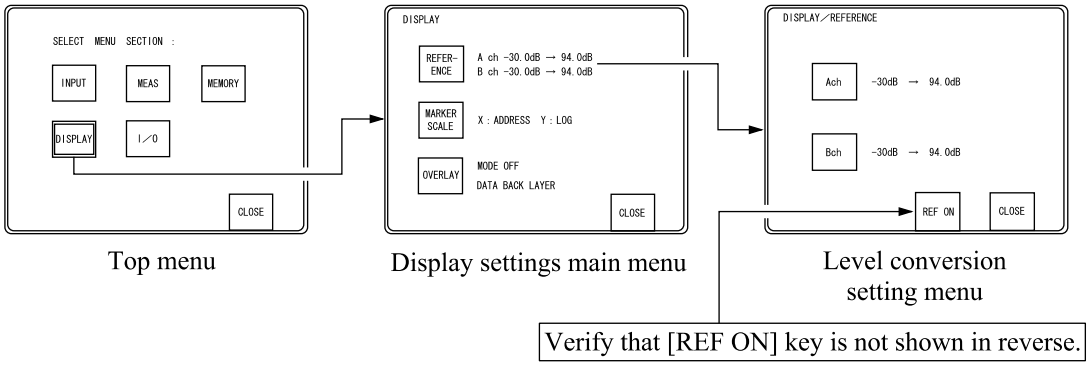
> **⚠ Caution**
>
> Formatting will erase all data on the memory card.

Level Conversion

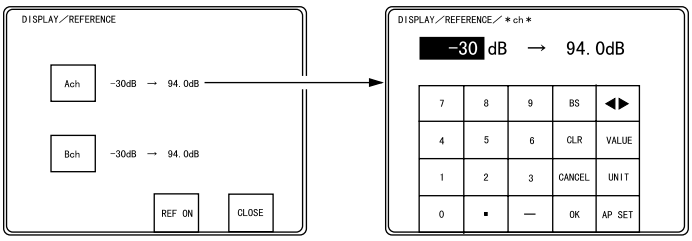
To allow use as a general-purpose analyzer, the SA-30 is designed to display a reading of 0 dB with an input signal of 1 Vrms. If the AC output of a sound level meter or vibration level meter is input to the SA-30, the reading of the SA-30 therefore will not match the reading on the source equipment. Normally, it will be desirable to match the readings, which can be achieved by using the level conversion function.

Operation

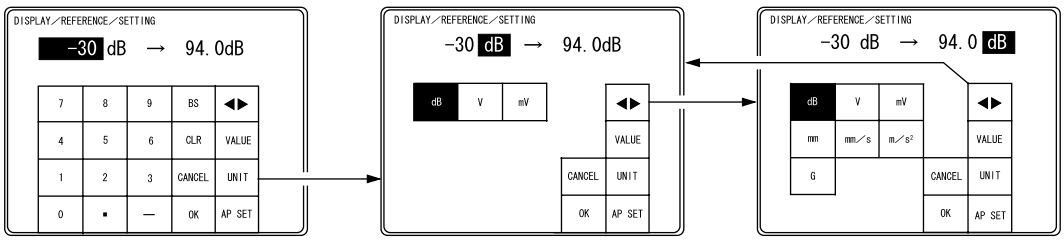
Press SETUP → [DISPLAY] → [REFERENCE] to call up the REFERENCE menu. Make sure that the [REF ON] key is currently not selected (not shown in reverse). If the key is selected (shown in reverse), press the key to turn it off.



1. Select the desired channel. For example, select [A ch] for channel A.
2. Use the [◀ ▶] and [VALUE] keys to move the cursor to the left.
3. Enter the value to serve as a reference for level conversion (pre-conversion value). When wishing to use the all-pass level as reference, press the [AP SET] key. The current all-pass level will be automatically set.



4. To set the unit for the reference value, press the [UNIT] key. The unit setting menu comes up.
5. After choosing the desired unit, press the [OK] key. The numeric input screen comes up.
6. Use the [◀ ▶] and [VALUE] keys to move the cursor to the right, and enter the desired new (post-conversion) value.
7. To set the unit for the post-conversion value, press the [UNIT] key. The unit setting menu comes up.

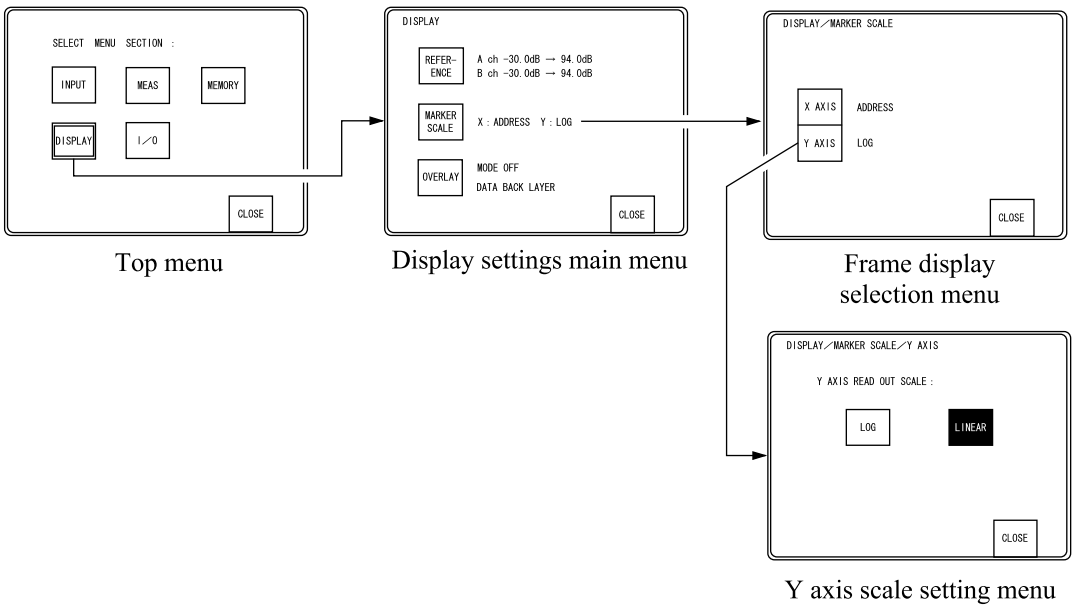


Pre-conversion value setting screen

Pre-conversion unit setting menu

Post-conversion unit setting menu

8. When the settings are as desired, press the [OK] key to accept the settings.
9. Press [OK] on the numeric setting screen to return to the level conversion settings menu screen. Now press the [REF ON] key so that it is shown in reverse. This will enable the function.
10. To read the cursor value on the Y axis with a linear scale, press the [MARKER SCALE] key on the display parameters main menu. The frame display selection menu opens. Press [Y AXIS] and then [LINEAR].



Top menu

Display settings main menu

Frame display selection menu

Y axis scale setting menu

<Example 1> Sound level meter is connected

The following description assumes the use of the calibration signal of a sound level meter. Figure 1 shows the condition when the calibration signal is input without level conversion. Figure 2 shows the input of reference value and post-conversion value, using the steps described in the preceding section. The post-conversion level for the calibration signal is set to 94 dB. Figure 3 shows the condition when the [REF ON] key is activated (shown in reverse). The sound level meter indication and the indication on the SA-30 are now matched.

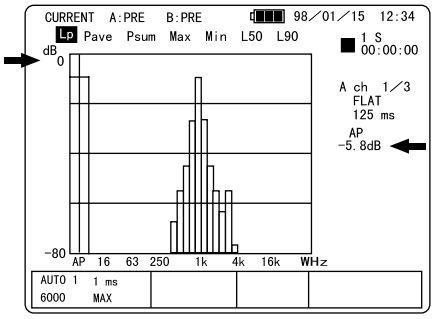


Fig. 1

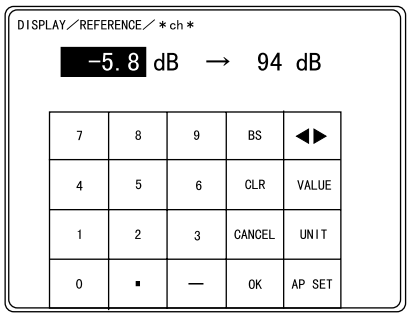


Fig. 2

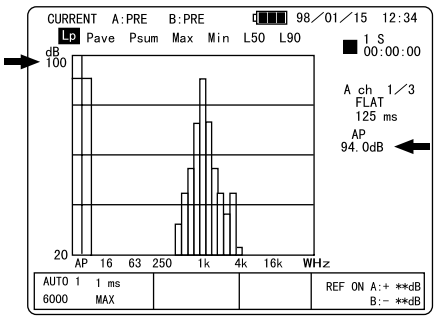


Fig. 3

<Example 2> Vibration level meter is connected

The following description assumes the use of the calibration signal of the vibration level meter VM-52.

Figure 4 shows the condition when the calibration signal of the VM-52 is input without level conversion. Figure 5 shows the input of reference value and post-conversion value, using the steps described in the preceding section. The post-conversion level uses the input range setting of the VM-52 (here 100 dB). Figure 6 shows the condition when the [REF ON] key is activated (shown in reverse). The vibration level meter indication and the indication on the SA-30 are now matched.

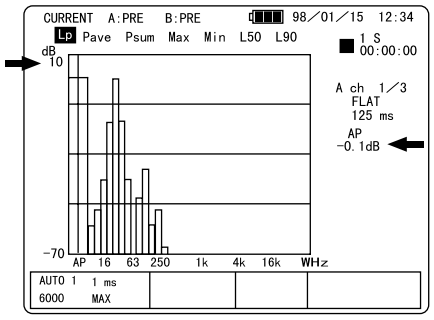


Fig. 4

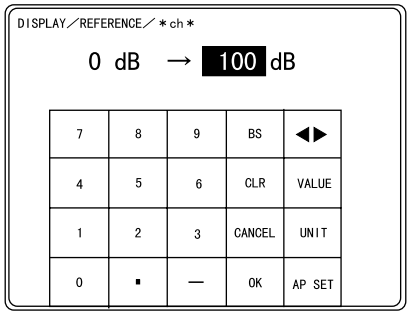


Fig. 5

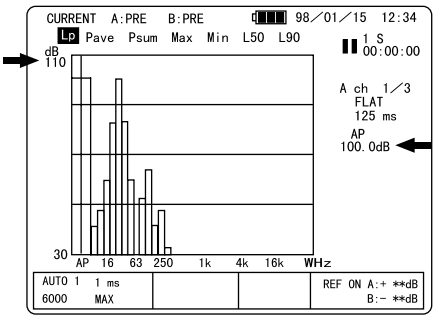


Fig. 6

<Example 3> Microphone is connected to preamp input

The following description assumes the use of the pistonphone NC-72 for calibration, in order to perform sound pressure level measurement.

Figure 7 shows the condition without level conversion. Figure 8 shows the input of reference value and post-conversion value, using the steps described in the preceding section. The post-conversion level uses the output level of the pistonphone NC-72 (114.2 dB)*. Figure 9 shows the condition when the [REF ON] key is activated (shown in reverse). The indication on the SA-30 now matches the sound pressure level as measured by the microphone.

* Individual sound pressure level of pistonphone NC-72

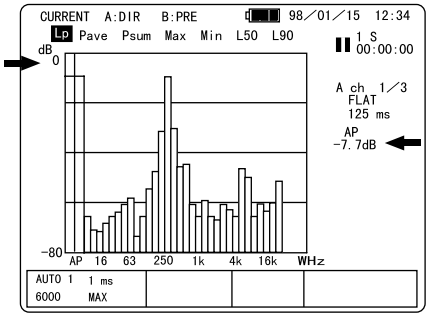


Fig. 7

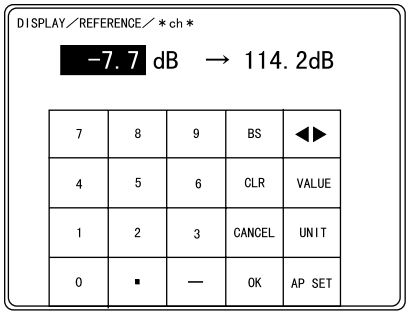


Fig. 8

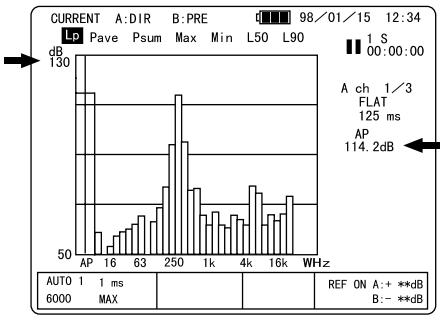


Fig. 9

<Example 4> General-purpose vibration meter is connected

When cursor reading on Y axis is set to linear

The following description assumes the use of the general-purpose vibration meter VM-82, set to acceleration measurement and an input range of max. 10 m/s^2. At this setting, the AC output of the meter is 1 Vrms when measuring an acceleration of 10 m/s^2. Figure 10 shows the input of reference value and post-conversion value, using the steps described in the preceding section. Figure 11 shows the condition when the [REF ON] key is activated (shown in reverse). The vibration meter indication and the indication on the SA-30 are now matched.

The display example shows the case when the AC output signal of the general-purpose vibration meter VM-82 is input to the SA-30 calibrated as described. The output supplied by the vibration calibrator VE-10 at 160 Hz, 14.14 m/s^2 acceleration can be read directly.

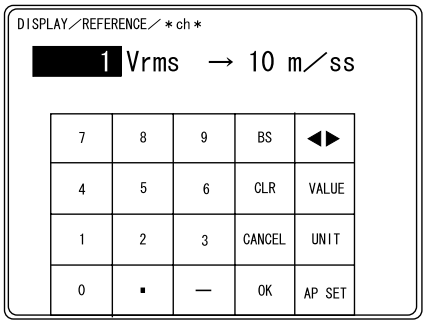


Fig. 10

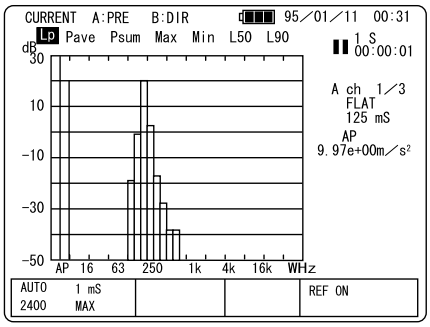


Fig. 11

<Example 5> General-purpose vibration meter is connected

When cursor reading on Y axis is set to dB

The following description assumes the use of the general-purpose vibration meter VM-82, set to acceleration measurement and an input range of max. 10 m/s^2. When 10 m/s^2 is taken as basis for logarithmic 10^{-5} m/s^2, the reading is 120 dB. At this setting, the AC output of the VM-82 is 1 Vrms when measuring an acceleration of 10 m/s^2. 1 Vrms corresponds to 0 dB on the SA-30 without level conversion.

Figure 12 shows the input of reference value and post-conversion value, using the steps described in the preceding section. When the [REF ON] key is activated (shown in reverse), the vibration meter indication and the indication on the SA-30 are matched.

Figure 13 shows the condition when the vibration calibrator VE-10 is connected as accelerometer of the general-purpose vibration meter VM-82, and when the SA-30 is calibrated as described. The output supplied by the vibration calibrator VE-10 can be directly read as an acceleration level of 160 Hz, 120 dB.

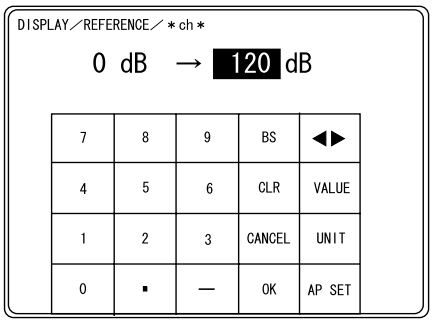


Fig. 12

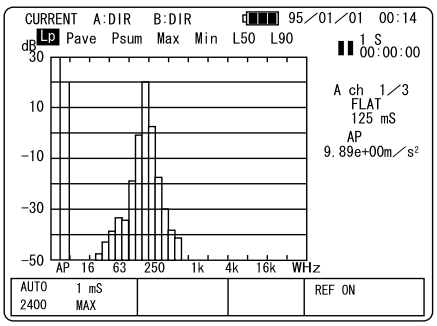


Fig. 13

<Example 6> Vibration meter preamp VP-26C is connected to preamp input

The following description assumes the use of the vibration meter preamp VP-26C connected to the preamp input of the SA-30.

The vibration meter preamp VP-26C converts 1 pico-Coulomb (1 pC) of input charge into 1 mVrms.
When an accelerometer with a sensitivity of 1 pC/(1 m/s²) is connected to the VP-26C, 1 m/s² of acceleration is converted to 1 mVrms of voltage change by the VP-26C.

Figure 14 shows the input of reference value and post- conversion value, using the steps described in the preceding section. When the [REF ON] key is activated (shown in reverse), the SA-30 is calibrated to the accelerometer sensitivity.

Figure 15 shows the condition when the vibration calibrator VE-10 is connected as accelerometer of the general-purpose vibration meter VM-82, and when the SA-30 is calibrated as described. The output supplied by the vibration calibrator VE-10 can be directly read as an acceleration of 160 Hz, 10 m/s².

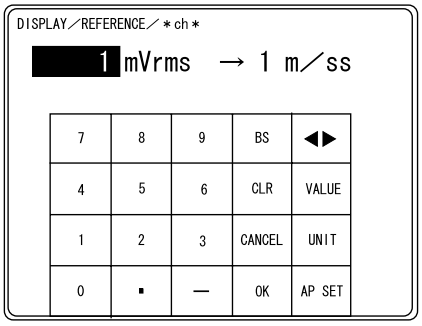


Fig. 14

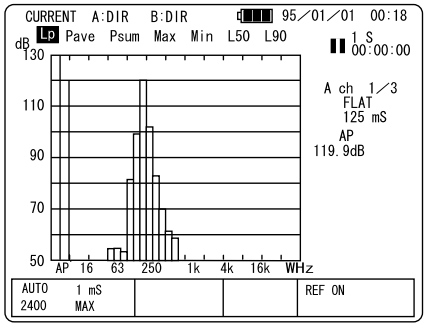


Fig. 15

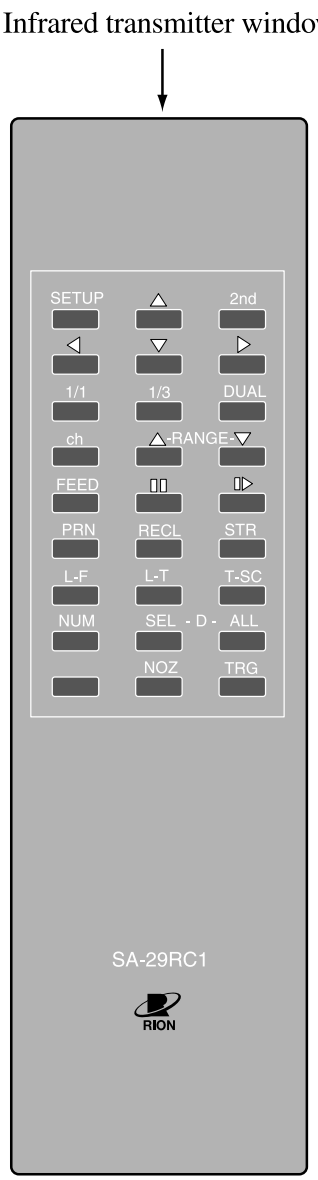
Level shift

When a sound level meter or vibration meter or similar equipment with the capacity for input level range switching is used, and the SA-30 was calibrated using the level conversion feature, the reading will no longer be matched after the input level range of the source equipment is switched. In such a case, use the shift keys on the front panel of the SA-30 to adjust the reading.

<Example>
Source equipment input level range is raised by 10 dB
Press ENTER/2nd key (to light 2nd indicator), then press +10 dB shift key once
Source equipment input level range is lowered by 10 dB
Press ENTER/2nd key (to light 2nd indicator), then press - 10 dB shift key once

Remote Control

The supplied infrared remote control (SA-29RC1) can be used to operate the unit and change measurement settings. The maximum distance for operation is about 3 meters.



Top view

SETUP key

Serves to open the touch-panel menu. Pressing the key while a menu is displayed switches back to the measurement screen.

ENT/2 key

Measurement screen:

Switches between normal and 2nd key function. In normal mode (2nd indicator out), the four keys marked with arrows serve as cursor keys. In 2nd key function mode (2nd indicator lit), the four keys marked with arrows serve as 10 dB shift keys and address keys.

Menu screen:

The setting of the currently selected touch key is accepted.

△, ▽(up/down) keys (2nd 10 dB shift keys)

2nd indicator out:

The keys move the marker up and down.

2nd indicator lit:

Measurement reading is shifted by 10 dB without changing the range.

◁, ▷ (left/right) cursor keys (2nd address keys)

2nd indicator out:

The keys move the marker left and right. On a menu screen, the keys move the touch key focus.

2nd indicator lit:

The keys switch the memory address.

1/1 key

Activates 1/1 octave analysis display.

1/3 key

Activates 1/3 octave analysis display.

DUAL key

Activates 1/1 and 1/3 octave analysis display.

ch key

Selects the channel for analysis.

Each push of the key cycles through the settings: channel A → channel B → channel A/B → channel A etc.

△ - RANGE - ▽ keys

Switch the level range in 10-dB steps for the displayed channel in which the cursor is active.

FEED key

Keeping this key depressed advances the printer paper.

▯▯ key

Pauses and resumes the display or an operation.

▯▷ key

Starts and stops processing.

PRN (PRINT) key

Activates the printer. A hard copy of the currently displayed screen only is produced.

RECL (RECALL) key

Switches between current mode and recall mode.

STR (STORE) key

Serves to start and stop the process of storing values in memory.

L-F (LEVEL-FREQ.) key

Switches the measurement screen to a level vs. frequency graph.

L-T (LEVEL-TIME) key

Switches the measurement screen to a level vs. time (level vs. address) graph or to a level/frequency and level/time display.

T-SC (TIME SCALE) key

Controls the X axis range of the level/time display.

NUM key

Switches the measurement screen between numeric display and bar graph & numeric display for the level vs. frequency indication.

SEL-D (DATA SELECT) key

Switches the processing result to be shown on the screen for the selected processing mode.

D-ALL (DATA ALL) key

Displays the processing results for all selected items simultaneously.

NOZ (NOISE ON/OFF) key

Switches the noise output on an off.

TRG (TRIG. ON/OFF) key

Switches the trigger function on an off.

Insert two IEC R6P (size AA) batteries into the battery compartment on the rear of the remote control.

1. Push the battery compartment lid in the ▽ direction and slide it open.
2. Insert two IEC R6P (size AA) batteries, taking care to observe correct [+] and [-] polarity.
3. Replace the battery compartment lid.

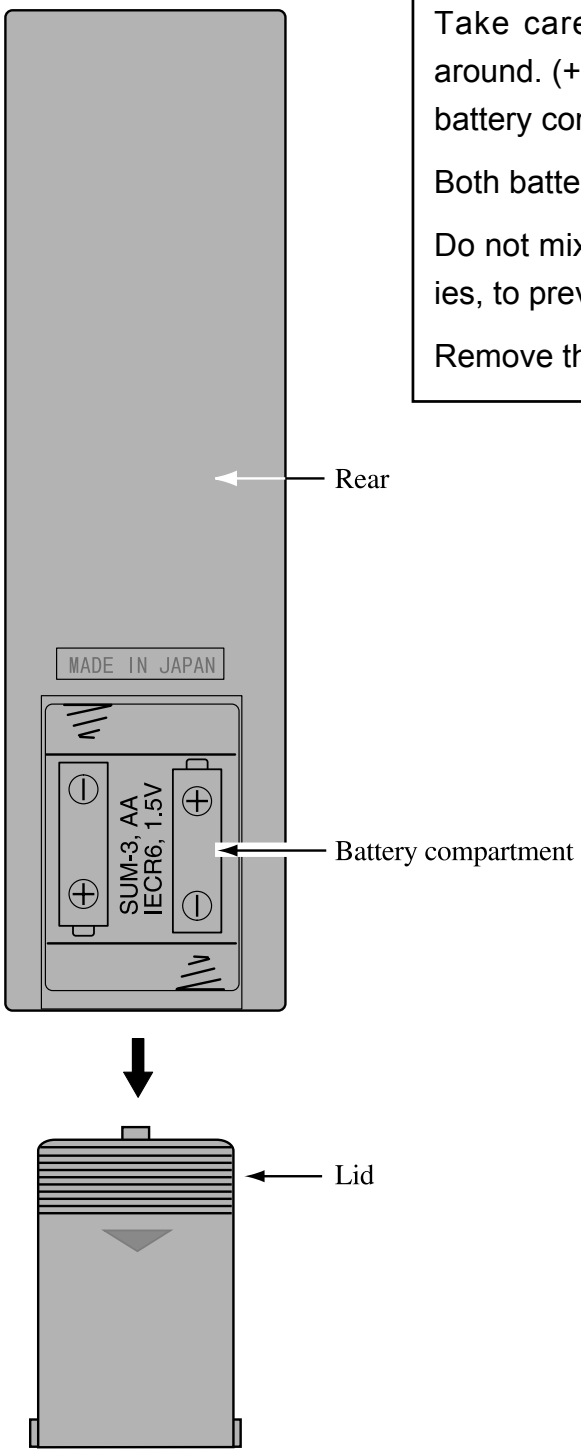
Important

Take care not to insert the batteries the wrong way around. (+) and (-) are marked on the batteries and in the battery compartment.

Both batteries must be of the same type.

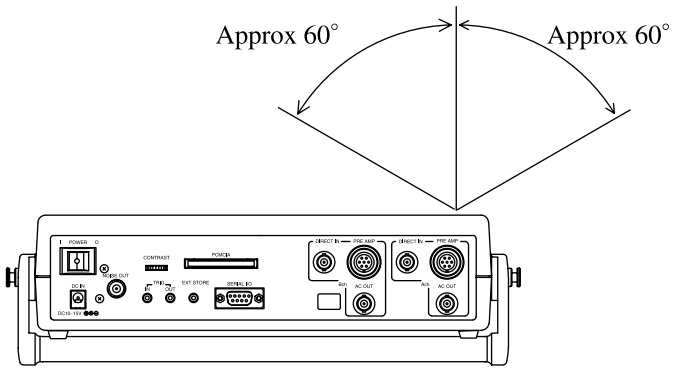
Do not mix different battery types or fresh and old batteries, to prevent the possibility of damage.

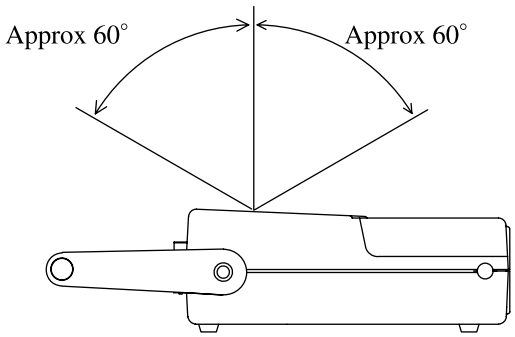
Remove the batteries from the unit when not in use.



Remote control operation angle

The allowable angle for the infrared remote control is shown control. The SA-30 will receive signals sent from up to about 60 degrees off axis in either direction. The maximum distance is about 3 meters.





Memory Card Files

The user should not change the contents as written by the SA-30 on a memory card (file name and location, file contents, directory or file deletion, etc.). Otherwise the data may not be recognized properly when they are loaded again into the unit.

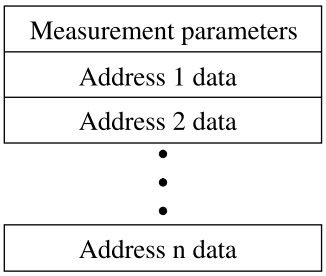
For deletion of card contents, use only the menu on the SA-30.

When wishing to make use of the data in the files, copy the files first to the computer and then open them.

Auto store file content

File name: Ayyyy

Data configuration: Measurement parameters (1 set) + measurement data (number of addresses)

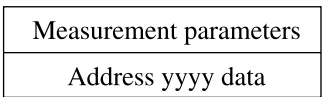


Using auto store, data for all addresses are stored in one file. The measurement parameters apply to all addresses.

Manual store file content

File name: Myyyy.DAT

Data configuration: Measurement parameters (1 set) + measurement data (1)



Using manual store, data for one address are stored in one file.

The yyyy in the file name corresponds to the address. One directory will normally contain multiple files. The measurement parameters apply only to the address in the file.

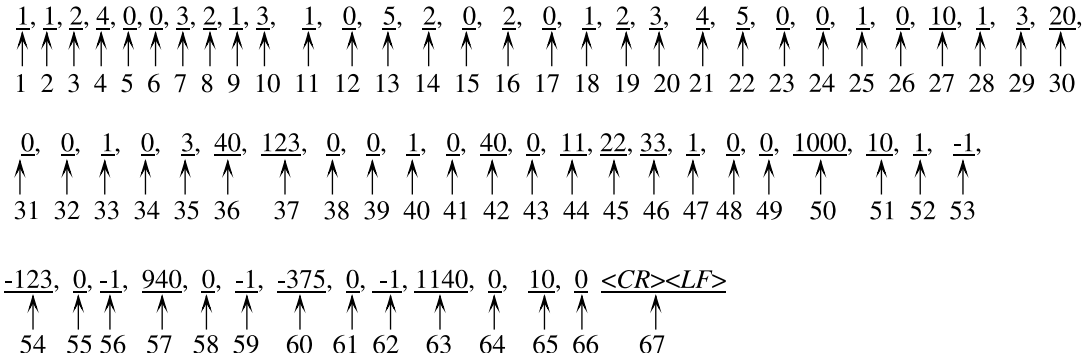
Measurement parameters

Output example (ASCII format)

(<*CR*> and <*LF*> stand for the hexadecimal codes 0DH and 0AH.)

```
1,1,2,4,0,0,3,2,1,3,1,0,5,2,0,2,0,1,2,3,4,5,0,0,1,010,1,3,20,0,0,1,0,3,40,123,0,0,1,0,
40,0,11,22,33,1,0,0,1000,10,1,-1,-123,0,-1,940,0,-1,-375,0,-1,1140,0,10,0 <CR><LF>  1 line
```

One line of data is output.



No.	Item	Content	Sample meaning
1	Address number	Number of address	1
2	Measurement parameter format number	1 (fixed)	1
3	Input signal (ch. A)	0: OFF 1: preamp input 2: direct input	Direct
4	Level range (ch. A)	0:-40dB 1:-30dB 2:-20dB 3:-10dB 4:0dB 5:10dB 6:20dB	0 dB
5	Analog frequency weighting (ch. A)	0:FLAT 1:A 2:C 3:Lvz	FLAT
6	Digital frequency weighting (ch. A)	0:OFF 1:A 2:C 3:Lvz 4:Lvxy 5:Lhnd 6:Lcom 7:User	OFF
7	Time constant (ch. A)	0:1 mS 1:10 ms 2:35 ms 3:125 ms 4:630 ms 5:1 s 6:10 s	125 ms
8	Analysis frequency span (ch. A)	0:LOW1 1:LOW2 2:MID 3:HIGH	MID
9	Input signal (ch. B)	0: OFF 1: preamp input 2: direct input	Preamp
10	Level range (ch. B)	0:-40dB 1:-30dB 2:-20dB 3:-10dB 4:0dB 5:10dB 6:20dB	-10 dB
11	Analog frequency weighting (ch. B)	0:FLAT 1:A 2:C 3:Lvz	A
12	Digital frequency weighting (ch. B)	0:OFF 1:A 2:C 3:Lvz 4:Lvxy 5:Lhnd 6:Lcom 7:User	OFF
13	Time constant (ch. B)	0:1 ms 1:10 ms 2:35 ms 3:125 ms 4:630 ms 5:1 s 6:10 s	1 s
14	Analysis frequency span (ch. B)	0:LOW1 1:LOW2 2:MID	MID
15	Analysis band	0: 1/1 oct 1: 1/3 oct 2: top 1/1 oct, bottom 1/3 oct 3: top 1/3 oct, bottom 1/1 oct	1/1 oct
16	Channel mode	0:ch.A 1:ch.B 2:ch.A & B	ch.A & B
17	Frequency weighting display	0:OFF 1:ON	OFF
18	Selected processing type 0 (instantaneous value)	1: Lp (fixed)	Lp
19	Selected processing type 1	0:None 2:Pave 3:Psum 4:Max 5:Min 6:L1 7:L5 8:L10 9:L50 10:L90 11:L95 12:L99	Pave
20	Selected processing type 2	Same as above	Psum
21	Selected processing type 3	Same as above	Max
22	Selected processing type 4	Same as above	Min
23	Selected processing type 5	Same as above	None
24	Selected processing type 6	Same as above	None
25	Display processing mode	0 - 6: number of selected processing type	0 (Lp)
26	Measurement mode	0: Time measurement mode 1: Level measurement mode	Time measurement
27	Processing time value	1-99	10 minutes
28	Processing time unit	0: hours 1: minutes 2: seconds	
29	Delay time	0-5 S	3 seconds
30	Threshold level	0 - 80: full scale -XX dB	Full scale -20 dB
31	Duration time	0 - 10: 0(none) - 10 seconds	0 seconds
32	Level measurement monitor channel	0: ch. A 1: ch. B	ch. A
33	Max./min. hold type	0: AP 1: Band	Band
34	Elapsed processing time / hour	0-99	0 hours
35	Elapsed processing time / minute	0-59	3 minutes
36	Elapsed processing time / second	0-59	40 seconds
37	Elapsed processing time / millisecond	0-999	123 milliseconds

No.	Item	Content	Sample meaning
38	Trigger mode	0:OFF 1:ON	OFF
39	Repeat mode	0:OFF 1:ON	OFF
40	Trigger source	1: Level trigger 2: Time trigger 3: Noise trigger 4: External trigger	Level trigger
41	Level trigger monitor channel	0: ch. A 1: ch. B	ch. A
42	Level trigger level	0 - 80: full scale - XX dB	Full scale -20 dB
43	Level trigger slope	0:+ 1:-	+
44	Time trigger time / hour	0-23	11 h
45	Time trigger time / minute	0-59	22 m
46	Time trigger period / value	0-99	33 m
47	Time trigger period / unit	0:hour 1:minute	
48	Noise trigger mode	0: ON trigger 1: OFF trigger	ON trigger
49	Memory block	0:AUTO 1:MANU	AUTO
50	Memory address	For auto store: total store count For manual store: same as address number	1000 sets
51	Instantaneous value auto store intervals	1 - 9 ms (1-ms units) 10 - 1000 ms (10-ms units)	10 milliseconds
52	Level conversion mode	0:OFF 1:ON	ON
53	Level conversion pre-conversion value exponent (ch. A)	Y when pre-conversion level is expressed as XXX × 10^{Y} (Example: pre-conversion level -12.3 = -123 × 10^{-1}, therefore -1)	-12.3 dB
54	Level conversion pre-conversion value mantissa (ch. A)	XXX when pre-conversion level is expressed as XXX × 10^{Y} (Example: pre-conversion level -12.3 = -123 × 10^{-1}, therefore -123)	
55	Level conversion pre-conversion unit	0:dB 1:Vrms 2:mVrms	
56	Level conversion post-conversion value exponent (ch. A)	Y when post-conversion level is expressed as XXX × 10^{Y} (Example: post-conversion level 94.0 = 940 × 10^{-1}, therefore -1)	94.0 dB
57	Level conversion post-conversion value mantissa (ch. A)	XXX when post-conversion level is expressed as XXX × 10^{Y} (Example: post-conversion level 94.0 = 940 × 10^{-1}, therefore 940)	
58	Level conversion post-conversion unit (ch. A)	0:dB 1:Vrms 2:mVrms 3:mm 4:mm/s 5:m/s² 6:G	
59	Level conversion pre-conversion value exponent (ch. B)	Y when pre-conversion level is expressed as XXX × 10^{Y} (Example: pre-conversion level -12.3 = -123 × 10^{-1}, therefore -1)	-37.5 dB
60	Level conversion pre-conversion value mantissa (ch. B)	XXX when pre-conversion level is expressed as XXX × 10^{Y} (Example: pre-conversion level -12.3 = -123 × 10^{-1}, therefore -123)	
61	Level conversion pre-conversion unit	0:dB 1:Vrms 2:mVrms	
62	Level conversion post-conversion value exponent (ch. B)	Y when post-conversion level is expressed as XXX × 10^{Y} (Example: post-conversion level 94.0 = 940 × 10^{-1}, therefore -1)	114.0 dB
63	Level conversion post-conversion value mantissa (ch. B)	XXX when post-conversion level is expressed as XXX × 10^{Y} (Example: post-conversion level 94.0 = 940 × 10^{-1}, therefore 940)	
64	Level conversion post-conversion unit (ch. B)	0:dB 1:Vrms 2:mVrms 3:mm 4:mm/s 5:m/s² 6:G	
65	Level shift (A ch)	-120 to +120 : dB (10 dB steps)	+10 dB
66	Level shift (B ch)	-120 to +120 : dB (10 dB steps)	0 dB
67	Carriage return/line feed	*<CR><LF>*	-

Address data (level vs. frequency)

Contents example

(<*CR*> and <*LF*> stand for the hexadecimal codes 0DH and 0AH.)

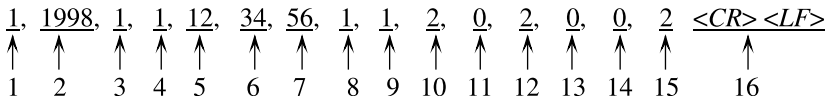
1,1998,1,1,12,34,56,1,1,2,0,2,0,0,2 <*CR*> <*LF*>	Line 1
-10.0,-20.0,-21.0,-22.0,-23.0,-24.0,-25.0,-26.0,-27.0,-28.0,-29.0,-30.0,-10.0 <*CR*> <*LF*>	Line 2
-10.0,-20.0,-21.0,-22.0,-23.0,-24.0,-25.0,-26.0,-27.0,-28.0,-29.0,-30.0,-10.0 <*CR*> <*LF*>	Line 3

Data for one address can be from 2 lines to 13 lines long. Line 1 contains measurement information, line 2 and following the frequency data. The number of frequency data lines is: number of screens × processing types.

The number of screens is 1 if the measurement information "bottom screen band" item is 0 (none), and 2 in case of other settings.

When there are 2 screens, the data for the bottom screen follow after all the processing data for the top screen. (In the example above, the number of screens is 1 and the number of processing types is 2, therefore there are 2 lines of frequency data.

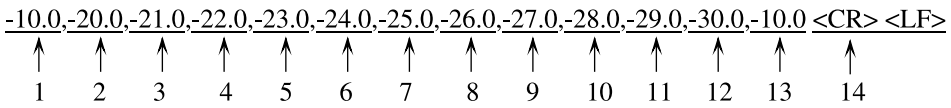
Line 1 (measurement information)



No.	Item	Content	Sample meaning
1	Address number	Number of address	1
2	Measurement date and time / year	1980 - 2079	1998
3	Measurement date and time / month	1 - 12	January
4	Measurement date and time / day	1 - 31	1st
5	Measurement date and time / hour	0 - 23 (24-hour format)	12
6	Measurement date and time / minute	0 - 59	34
7	Measurement date and time / second	0 - 59	56
8	Data category	1: measurement data	Measurement data
9	Top screen band	(0: none) 1: 1/1 oct 2: 1/3 oct	1/1 oct
10	Top screen frequency span	0: LOW 1 1: LOW 2 2: MID 3: HIGH	MID
11	Bottom screen band	0: none 1: 1/1 oct 2: 1/3 oct	None
12	Bottom screen frequency span	0: LOW 1 1: LOW 2 2: MID 3: HIGH	MID
13	Top screen overload	0: None 1: Yes	None
14	Bottom screen overload	0: None 1: Yes	None
15	Processing types	1 - 6 types	2 types
16	Carriage return/line feed	<*CR*> <*LF*>	—

- When the number of screens is 1 ("bottom screen band" set to 0), the values for "bottom screen band" and "bottom screen" are not defined.
- Information on actual processing type names can be obtained from "selected processing types" in "A. measurement parameters".
- For instantaneous values, "measurement date and time" indicates the point when the value occurred. For processing values, it indicates the processing start point.

Line 2 and later (frequency data)



One line contains the frequency data for one processing type in one measurement screen.

1/1 octave data format

No.	Frequency (Hz)				Content
	LOW 1	LOW 2	MID	HIGH	
1	AP	AP	AP	AP	-XXX.X : dB
2	0.5	2	16	63	-XXX.X : dB
3	1	4	31.5	125	-XXX.X : dB
4	2	8	63	250	-XXX.X : dB
5	4	16	125	500	-XXX.X : dB
6	8	31.5	250	1 k	-XXX.X : dB
7	16	63	500	2 k	-XXX.X : dB
8	31.5	125	1 k	4 k	-XXX.X : dB
9	63	250	2 k	8 k	-XXX.X : dB
10	125	500	4 k	16 k	-XXX.X : dB
11	250	1 k	8 k	31.5 k	-XXX.X : dB
12	500	2 k	16 k	63 k	-XXX.X : dB
13	APW	APW	APW	APW	-XXX.X : dB
14	Carriage return/line feed				*<CR> <LF>*

1/3 octave data format

No.	Frequency (Hz)				Content
	LOW 1	LOW 2	MID	HIGH	
1	AP	AP	AP	AP	-XXX.X : dB
2	0.4	1.6	12.5	50	-XXX.X : dB
3	0.5	2	16	63	-XXX.X : dB
4	0.63	2.5	20	80	-XXX.X : dB
5	0.8	3.15	25	100	-XXX.X : dB
6	1	4	31.5	125	-XXX.X : dB
7	1.25	5	40	160	-XXX.X : dB
8	1.6	6.3	50	200	-XXX.X : dB
9	2	8	63	250	-XXX.X : dB
10	2.5	10	80	315	-XXX.X : dB
11	3.15	12.5	100	400	-XXX.X : dB
12	4	16	125	500	-XXX.X : dB
13	5	20	160	630	-XXX.X : dB
14	6.3	25	200	800	-XXX.X : dB
15	8	31.5	250	1 k	-XXX.X : dB
16	10	40	315	1.25 k	-XXX.X : dB
17	12.5	50	400	1.6 k	-XXX.X : dB
18	16	63	500	2 k	-XXX.X : dB
19	20	80	630	2.5 k	-XXX.X : dB
20	25	100	800	3.15 k	-XXX.X : dB
21	31.5	125	1 k	4 k	-XXX.X : dB
22	40	160	1.25 k	5 k	-XXX.X : dB
23	50	200	1.6 k	6.3 k	-XXX.X : dB
24	63	250	2 k	8 k	-XXX.X : dB
25	80	315	2.5 k	10 k	-XXX.X : dB
26	100	400	3.15 k	12.5 k	-XXX.X : dB
27	125	500	4 k	16 k	-XXX.X : dB
28	160	630	5 k	20 k	-XXX.X : dB
29	200	800	6.3 k	25 k	-XXX.X : dB
30	250	1 k	8 k	31.5 k	-XXX.X : dB
31	315	1.25 k	10 k	40 k	-XXX.X : dB
32	400	1.6 k	12.5 k	50 k	-XXX.X : dB
33	500	2 k	16 k	63 k	-XXX.X : dB
34	630	2.5 k	20 k	80 k	-XXX.X : dB
35	APW	APW	APW	APW	-XXX.X : dB
36	Carriage return/line feed				*<CR> <LF>*

Panel memory file

File name: Pyyyy.DAT
Data configuration: Panel settings data (1 set)

Panel settings number yyyy data

The panel memory file contains the data for one set of panel settings. The yyyy part in the file name corresponds to the panel memory number. One directory will normally contain multiple files for the respective panel memory numbers. These files contain information on all setting aspects of the unit. Do not modify these files.

User-defined frequency weighting file

File name: U0001.DAT

Data configuration: User-defined frequency weighting data (1 set)

User-defined frequency weighting data

The directory Uxxxxxxx contains only the file U0001.DAT.

Contents example

(<*CR*> and <*LF*> stand for the hexadecimal codes 0DH and 0AH.)

1,1998,1,1,12,34,56,2 <*CR*> <*LF*>	Line 1
0.0,-10.0,-9.0,· · · · · · -9.0,-10.0,0.0 <*CR*> <*LF*>	Line 2

The file contains 2 lines. Line 1 contains weighting information, and line 2 the weighting data.

Line 1 (weighting information)

1, 1998, 1, 1, 12, 34, 56, 2, <*CR*> <*LF*>

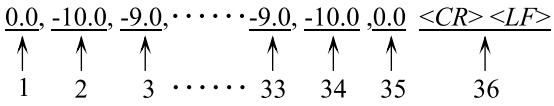
1 2 3 4 5 6 7 8 9

No.	Item	Content	Sample meaning
1	Address number	Number of address	1
2	Measurement date and time / year	1980 - 2079	1998
3	Measurement date and time / month	1 - 12	January
4	Measurement date and time / day	1 - 31	1
5	Measurement date and time / hour	0 - 23 (24-hour format)	12
6	Measurement date and time / minute	0 - 59	34
7	Measurement date and time / second	0 - 59	56
8	Frequency span	0: LOW 1 1: LOW 2 2: MID 3: HIGH	MID
9	Carriage return/line feed	<*CR*> <*LF*>	

Line 2 (weighting data)

Data are for 1/3 octave.

AP and APW data are dummy values.



No.	Frequency (Hz)				Content
	LOW 1	LOW 2	MID	HIGH	
1	AP	AP	AP	AP	-XXX.X : dB
2	0.4	1.6	12.5	50	-XXX.X : dB
3	0.5	2	16	63	-XXX.X : dB
4	0.63	2.5	20	80	-XXX.X : dB
5	0.8	3.15	25	100	-XXX.X : dB
6	1	4	31.5	125	-XXX.X : dB
7	1.25	5	40	160	-XXX.X : dB
8	1.6	6.3	50	200	-XXX.X : dB
9	2	8	63	250	-XXX.X : dB
10	2.5	10	80	315	-XXX.X : dB
11	3.15	12.5	100	400	-XXX.X : dB
12	4	16	125	500	-XXX.X : dB
13	5	20	160	630	-XXX.X : dB
14	6.3	25	200	800	-XXX.X : dB
15	8	31.5	250	1 k	-XXX.X : dB
16	10	40	315	1.25 k	-XXX.X : dB
17	12.5	50	400	1.6 k	-XXX.X : dB
18	16	63	500	2 k	-XXX.X : dB
19	20	80	630	2.5 k	-XXX.X : dB
20	25	100	800	3.15 k	-XXX.X : dB
21	31.5	125	1 k	4 k	-XXX.X : dB
22	40	160	1.25 k	5 k	-XXX.X : dB
23	50	200	1.6 k	6.3 k	-XXX.X : dB
24	63	250	2 k	8 k	-XXX.X : dB
25	80	315	2.5 k	10 k	-XXX.X : dB
26	100	400	3.15 k	12.5 k	-XXX.X : dB
27	125	500	4 k	16 k	-XXX.X : dB
28	160	630	5 k	20 k	-XXX.X : dB
29	200	800	6.3 k	25 k	-XXX.X : dB
30	250	1 k	8 k	31.5 k	-XXX.X : dB
31	315	1.25 k	10 k	40 k	-XXX.X : dB
32	400	1.6 k	12.5 k	50 k	-XXX.X : dB
33	500	2 k	16 k	63 k	-XXX.X : dB
34	630	2.5 k	20 k	80 k	-XXX.X : dB
35	APW	APW	APW	APW	-XXX.X : dB
36	Carriage return/line feed				*<CR> <LF>*

Error Messages

When an error occurs during operation of the unit, an error message such as shown below appears. In such a case, wait or take the appropriate steps and then repeat the operation.

Error message	Meaning
Can not operate now ! RECALL MODE	Action cannot be performed because unit is in recall mode
Can not operate now ! CALCURATING	Action cannot be performed because unit is calculating
Can not operate now ! OVERLAY DISPLAY	Action cannot be performed because overlay display is activated
Can not operate now ! DEFFERENT FREQ.BAND	Action cannot be performed because different frequency band is selected
Can not operate now ! OVERLAY DIFF DISPLAY	Action cannot be performed because overlay differential display is selected
Can not operate now ! LEVEL TIME DISPLAY	Action cannot be performed because level time display is selected
Can not operate now ! ALL DATA DISPLAY	Action cannot be performed because all data display is selected
Can not operate now ! INVALID DISPLAY TYPE	Action cannot be performed because display type is different
Can not operate now ! INVALID MEASURE DATA	Action cannot be performed because frequency span or band setting is different
Can not operate now ! NO BACKLAYER	Action cannot be performed because no back layer data are stored
Can not operate now ! INVALID DATA TYPE	Action cannot be performed because measurement data are different
Can not operate now ! DISPLAY CHANNEL	Action cannot be performed because display channel is different
Can not operate now ! NO CARD	Action cannot be performed because no memory card is inserted
Can not operate now ! INVALID CARD TYPE	Action cannot be performed because invalid memory card is inserted (not an ATA card, card containing different data)
Invalid Data File !	Data read from memory card are invalid (data check error)
Can not operate now ! NO SAVE DATA	There are no data in memory to save
Invalid Parameter !	Parameter settings are invalid or out of range
Not Available !	Key is not available on this unit
Card Read Error !	Data could not be read from memory card
Card Write Error !	There is not enough free space on the card, or a write error has occurred. Data could not be written. (See next page)

About <Card Write Error!>

When the maximum number of auto store data is written to a memory card, the size of one file will be approximately 500 to 700 kilobytes. Reference information about the number of blocks that can be stored on a memory card when saving auto store blocks only is shown in the table below. This number will vary according to the data type and value, and the card usage condition.

Card capacity	Maximum number of blocks
4MB	approx. 5 to 8
10MB	approx. 10 to 15
15MB	approx. 15 to 20

Manual blocks are written as one file per block. The size of one file is about 300 bytes to 1.5 kilobytes (depending on the data type and value).

Note
Remaining space on a memory card should be checked on a computer. If a card has become full, copy files you want to keep to the computer and then delete the files from the card (or format the card). Then it can be used for storing new data.

Default Values

The factory default values of the unit are listed below.

Item, menu	Default
INPUT LEVEL RANGE	0 dB
MODE	1/3
DISP FORM	LEVEL-FREQ.
TIME SCALE	25 sec
DISP DATA	SELECT(Lp)
START/STOP	STOP
PAUSE/CONT	CONT
NOISE	OFF
TRIG	OFF
ENTER/2nd	ENTER
[Top menu]	-
[INPUT] input parameters main menu	-
[CONNECT] input signal	CONNECT:DIRECT MIC BIAS:OFF
[FREQ. WEIGHT] frequency weighting	ANALOG:FLAT CALC:OFF BAND DISP:OFF
[TIME CONST] time constant	125 msec (FAST)
[FREQ. SPAN] frequency span	MID
[MEAS] measurement parameters main menu	-
[FUNC] processing functions	Pave Psum Max Min
[MODE] measurement mode	TIME MODE REPEAT:OFF
[TIME MODE] time measurement mode	-
[MEAS TIME] time measurement mode processing time	1 sec
[DELAY TIME] time measurement mode delay time	0 sec
[LEVEL MODE] level measurement mode	-
[THRESH LEVEL] level measurement mode threshold level	FULL SCALE -20 dB
[DURATION] level measurement mode duration time	0 sec
[MAX/MIN TYPE] maximum/minimum value hold type	BAND
[TRIGGER] trigger parameters	LEVEL
[LEVEL TRG] level trigger parameters	-
[TRG LEVEL] level trigger level	FULL SCALE -20 dB
[SLOPE] level trigger slope	SLOPE+
[NOISE TRG] noise trigger parameters	NOISE ON
[TIME TRG] time trigger parameters	-
[TRG TIME] time trigger time	00:00
[PERIOD] time trigger period	1 hour
[DISPLAY] display parameters main menu	-
[REFERENCE] level conversion setting	REFERENCE:OFF
Pre-conversion value	0
Pre-conversion unit	dB
Post-conversion value	0
Post-conversion unit	dB
[MARKER SCALE] frame display	-
[X AXIS] level/time display X axis scale	ADDRESS
[Y AXIS] Y axis reading scale	Log
[OVERLAY] overlay display	MODE:OFF DATA:BACK LAYER

[MEMORY] memory parameters main menu	-
[MEMORY BLOCK] memory block	AUTO
[AUTO STORE] auto store settings menu	-
[STORE NUM] store count	MAX
[Lp PERIOD] Lp store period	1 msec
[FILE] operations menu	-
[BACK LAYER] back layer data store	-
[DIR] memory block directory	-
[DELETE] memory block delete	-
[PANEL SAVE] panel settings save	-
[PANEL LOAD] panel settings load	-
[CARD] operations menu	-
[BLOCK SAVE] memory block save (select block)	-
[*block*] memory block save (select directory)	-
[NEW] Create new directory	-
[BLOCK LOAD] memory block load (select block)	-
[*block*] memory block load (select directory)	-
[DELETE] memory block delete (select block)	-
[*block*] memory block delete (select directory)	-
[FORMAT] format memory card	-
[RECALL CALC] recall processing	-
[CALC] Recall processing type	OFF
[ADDR] Recall processing address range	1 to 1
[I/O] input/output main menu	-
[COMM] communications parameters	PORT:SERIAL BAUDRATE:19200 bps
[NOISE OUT] noise output	-
[MODE] noise source mode	PINK NOISE
[BAND] noise frequency band	AP
[PERIOD] noise output pattern	CONT
[BURST] burst signal ON/OFF time	ON:1 sec OFF:1 sec
[REMOTE CTRL] remote control settings	OFF
[BEEP] beep sound settings	OFF
[DATE/TIME] date and time	-
[DATE] current date	Current date
[TIME] current time	Current time
[POWER SAVE] power save mode	BRIGHTNESS:HIGH BACKLIGHT AUTO OFF: OFF
[INDEX] index	1
[VERSION] version information	-

Current Recall Processing

The definition equations used by the SA-30 for processing are listed below.

Li: Sample data level
n: Number of samples
T: Sample cycle

- Power average Pave (current/recall)

$$Pave = 10 \log \frac{1}{n} \sum_{i=1}^{n} 10^{\frac{Li}{10}}$$

- Power sum 1 Psum (current/recall)

$$Psum = 10 \log T \sum_{i=1}^{n} 10^{\frac{Li}{10}}$$

- Power sum 2 PΣ (recall)

$$P\Sigma = 10 \log \sum_{i=1}^{n} 10^{\frac{Li}{10}}$$

- Arithmetic mean Mean (recall)

$$Mean = \frac{1}{n} \sum_{i=1}^{n} Li$$

- Statistical processing (time percentile level)
  Lx (current/recall)
  Level exceeded by X% out of all sample data

- Reverb time REVERB (recall)
  60 dB attenuation time, determined from inclination of regression line calculated with least square method

Mathematical Processing Frequency Weighting Values

A

Frequency (Hz)	Weighting (dB)
12.5	-63.4
16	-56.7
20	-50.5
25	-44.7
31.5	-39.4
40	-34.6
50	-30.2
63	-26.2
80	-22.5
100	-19.1
125	-16.1
160	-13.4
200	-10.9
250	-8.6
315	-6.6
400	-4.8
500	-3.2
630	-1.9
800	-0.8
1 k	0.0
1.25 k	0.6
1.6 k	1.0
2 k	1.2
2.5 k	1.3
3.15 k	1.2
4 k	1.0
5 k	0.5
6.3 k	-0.1
8 k	-1.1
10 k	-2.5
12.5 k	-4.3
16 k	-6.6
20 k	-9.3

C

Frequency (Hz)	Weighting (dB)
12.5	-11.2
16	-8.5
20	-6.2
25	-4.4
31.5	-3.0
40	-2.0
50	-1.3
63	-0.8
80	-0.5
100	-0.3
125	-0.2
160	-0.1
200	0.0
250	0.0
315	0.0
400	0.0
500	0.0
630	0.0
800	0.0
1 k	0.0
1.25 k	0.0
1.6 k	-0.1
2 k	-0.2
2.5 k	-0.3
3.15 k	-0.5
4 k	-0.8
5 k	-1.3
6.3 k	-2.0
8 k	-3.0
10 k	-4.4
12.5 k	-6.2
16 k	-8.5
20 k	-11.2

Lvz

Frequency (Hz)	Weighting (dB)
0.4	-19.5
0.5	-15.7
0.63	-12.3
0.8	-9.5
1	-6.0
1.25	-5.2
1.6	-4.3
2	-3.2
2.5	-2.0
3.15	-0.8
4	0.1
5	0.5
6.3	0.2
8	-0.9
10	-2.4
12.5	-4.2
16	-6.1
20	-8.0
25	-10.0
31.5	-12.0
40	-14.0
50	-16.0
63	-18.0
80	-20.0
100	-25.0
125	-29.4
160	-34.6
200	-40.2
250	-46.0
315	-52.0
400	-58.0
500	-63.9
630	-69.9

Lvxy

Frequency (Hz)	Weighting (dB)
0.4	-21.3
0.5	-15.3
0.63	-9.3
0.8	-3.3
1	3.3
1.25	3.2
1.6	2.9
2	2.1
2.5	0.9
3.15	-0.8
4	-2.8
5	-4.8
6.3	-6.8
8	-8.9
10	-10.9
12.5	-13.0
16	-15.0
20	-17.0
25	-19.0
31.5	-21.0
40	-23.0
50	-25.0
63	-27.0
80	-29.0
100	-35.0
125	-41.0
160	-47.0
200	-53.0
250	-59.0
315	-65.0
400	-71.0
500	-77.0
630	-83.0

Lcom

Frequency (Hz)	Weighting (dB)
0.4	-20.1
0.5	-12.8
0.63	-5.5
0.8	-3.1
1	-1.6
1.25	-0.9
1.6	-0.6
2	-0.6
2.5	-0.8
3.15	-1.2
4	-1.7
5	-2.5
6.3	-3.5
8	-4.7
10	-6.1
12.5	-7.7
16	-9.4
20	-11.3
25	-13.1
31.5	-15.1
40	-17.1
50	-19.2
63	-21.6
80	-24.4
100	-27.9
125	-32.4
160	-37.6
200	-43.2
250	-49.0
315	-55.0
400	-60.9
500	-66.9
630	-72.9

Lhnd

Frequency (Hz)	Weighting (dB)
1.6	-23.9
2	-20.0
2.5	-16.0
3.15	-12.1
4	-8.5
5	-5.2
6.3	-2.7
8	0.0
10	0.0
12.5	0.0
16	0.0
20	-2.0
25	-4.0
31.5	-6.0
40	-8.0
50	-10.0
63	-12.0
80	-14.0
100	-16.0
125	-18.0
160	-20.0
200	-22.0
250	-24.0
315	-26.0
400	-28.0
500	-30.0
630	-32.0
800	-34.0
1 k	-36.0
1.25 k	-39.5
1.6 k	-45.4
2 k	-50.6
2.5 k	-56.2

Specifications

Applicable standards

1/1 octave and 1/3 octave band filter

JIS C 1513:1983 TYPE III

IEC 61260:1995 CLASS 1

ANSI S1.11 TYPE 1D

Frequency weighting filters

Sound level meter A and C characteristics: JIS C 1505:1988

Vibration level perpendicular characteristics (*L*vz): JIS C 1510:1976

Input section

Number of channels: 2 (A and B)

Preamp input connector (7-pin connector) (same for both channels)

A: +12 V (preamplifier power supply)

B: Ground

C: Signal input

D: -12 V (preamplifier power supply)

E: +30 V (microphone bias power supply)

F: +60 V (microphone bias power supply)

G: +200 V (microphone bias power supply)

Direct input connector (BNC connector) (same for both channels)

Max. input signal voltage:

±20 Vp

Input impedance: 100 kΩ / 100 pF

Input level range

1 Vrms taken as 0 dB

-40, -30, -20, -10, 0, 10, 20 (dB)

Frequency weighting filters (analog filters)

FLAT

Attenuation 1 dB at upper and lower limit of passband.

Filter slope 18 dB/oct

Analysis range LOW 1: 0.25 Hz to 1 kHz

Analysis range LOW 2: 1 Hz to 4 kHz

Analysis range MID: 8 Hz to 32 kHz

Analysis range HIGH: 31.5 Hz to 125 kHz

Sound level meter A and C characteristics

Vibration level perpendicular characteristics (*L*vz)

Overload level

+3 dB of display full-scale point

A/D converter

20 bit

Analyzer section

Unit has 4 analysis ranges (LOW 1, LOW 2, MID, HIGH), each made up of 11 octaves.

Both 1/1 octave analysis and 1/3 octave analysis are realized in the digital domain.

Analysis ranges and analysis center frequencies

LOW 1 range

1/1 oct	0.5 Hz to 500 Hz
1/3 oct	0.4 Hz to 630 Hz

LOW 2 range

1/1 oct	2 Hz to 2 kHz
1/3 oct	1.6 Hz to 2.5 kHz

MID range

1/1 oct	16 Hz to 16 kHz
1/3 oct	12.5 Hz to 20 kHz

HIGH range (option, 1 channel only)

1/1 oct	63 Hz to 63 kHz
1/3 oct	50 Hz to 80 kHz

1/1 and 1/3 octave dual analysis

1/1 and 1/3 octave band dual analysis are carried out simultaneously for one input.

RMS detector section

RMS detection for analysis results and all-pass level is carried out in the digital domain.

Dynamic characteristics

1 ms, 10 ms, 35 ms, 125 ms (Fast), 630 ms (VL), 1 s (Slow), 10 s

Dynamic range

83 dB (overload 3 dB)

Measurement section

All-pass and analysis band level instantaneous value data are used for processing.

Measurement types

P_{ave}: Power average level in specified interval (corresponding to L_{eq} of sound level meter)

P_{sum}: Power sum in specified interval (corresponding to L_E of sound level meter)

Max: Maximum power level in specified interval

Min: Minimum power level in specified interval

L_x: Time percentile level in specified interval
x: 1, 5, 10, 50, 90, 95, 99

Power sum is derived from instantaneous value every 10 ms, and L_x from instantaneous value every 100 ms

Measurement time

1 to 99 seconds (1-second units)

1 to 99 minutes (1-minute units)

1 to 99 hours (1-hour units)

Simultaneous measurement

Up to 6 selected processing types out of 11 types can be performed simultaneously. (Example: P_{ave}, Max, Min, L_5, L_{50}, L_{95})

Measurement modes

Time measurement mode:
Measurement is performed at specified time intervals

Level measurement mode:
Measurement is performed when preset level is exceeded (level specified as full scale -** dB)

Display section

Display type

Backlit color LCD, 320 × 240 dots, with touch-panel layer

Display modes

Display update cycle:
250 ms

Bar graph display (L-F):
Vertical axis shows level and horizontal axis shows frequency analysis bands
Display range 80 dB

Numeric list display (NUM):
Analysis results are listed by band in numeric form

Level/time display (L-T):

Vertical axis shows level and horizontal axis uses internal memory addresses, showing time change analysis results as a line graph

Display range 80 dB

Display data

All-pass level, analysis band level, and synthesized analysis band level

A, C, L_{vz}, L_{vxy}, L_{hnd}, L_{com}, and user-defined weighting display

Frequency weighting characteristics such as L_{vxy} (vibration level horizontal characteristics, JIS C 1510), L_{hnd} (hand-held tool vibration level meter characteristics, JIS C 1511), L_{com} (vibration level combine, ISO 8041) can be applied to the analysis results. User-defined frequency weighting characteristics can also be applied.

Overlay display

Back layer overlay display: Overlay with back layer buffer data

Top/bottom overlay display: Overlay of top and bottom screen data

Differential display of overlay data

Display of level obtained by subtracting back layer data from front layer data

Simultaneous display of measurement results

Line graphs for up to 6 current processing types or stored measurement results can be displayed simultaneously

Cursor section

Level readings for vertical and horizontal line cursors

Units

Vertical axis: dB, mVrms, Vrms, mm/s, m/s^2, mm, G

Horizontal axis: frequency, time, memory address

Level conversion

Electrical output signal of sensor or other measuring equipment connected to input can be read in a different unit system

Trigger section

Functions to initiate measurement and data store

External trigger

Trailing edge of external input signal pulse is used to trigger measurement or data store

Negative logic CMOS level trailing edge (5 V to 0 V)

Pulse width: 1 ms or more

Level trigger

When input signal level exceeds a preset threshold, measurement or data store is triggered

Setting: +/- *** dB, slope +/-

Time trigger

When preset time is reached, measurement or data store is triggered

Setting: start time ** h ** m, repeat period ** m / ** h

Noise trigger

Triggering occurs when noise output signal goes ON or OFF

Setting: TRIG ON, TRIG OFF

Delay time

Preset delay interval between pressing of start key or trigger activation and actual measurement or data store start

Delay time setting: 0 to 10 seconds

Trigger output

Output terminals activated when any of above trigger conditions occurs

Negative logic pulse signal

Open collector output

Pulse width: 1 ms or more

Memory section

Memory blocks for user-defined frequency weighting, panel settings, manual store data, auto store data, and back layer data.

User-defined frequency weighting memory

Memory area for user-defined frequency weighting data

Data set capacity: 1

Panel settings memory

Memory area for panel settings

Data set capacity: 8

Manual store memory

Memory area for measurement data (as displayed on screen) stored using manual control or an external store pulse signal

Data set capacity: 200

Auto store memory

Memory area for measurement data stored using continuous automatic store at pre-set time intervals

Store intervals

Instantaneous value data: 1 to 1000 ms

Measurement results: measurement time interval

Number of steps: 100

Data capacity:

Number of screens	Processing data sets	1/1 oct	1/3 oct	1/1 oct & 1/3 oct
1	1	6000	2400	——
	2	3000	1200	——
	3	2000	800	——
	4	1500	600	——
	5	1200	500	——
	6	1000	400	——
2	1	3000	1200	1200
	2	1500	600	600
	3	1000	400	400
	4	700	300	300
	5	600	200	200
	6	500	200	200

Back layer memory

Memory area for back layer display data.

Data set capacity: 1

Recall processing

P_{ave}, P_{sum}, P$\sum$, Mean, L_x processing

Reverb time calculated with least square method from auto store instantaneous value data

Memory card

Compatible with ATA type memory cards. Internal data format compatible with DOS file format.

Noise generator

Noise types

White noise, pink noise, Full-band or 1/1 octave band noise

Band noise center frequencies

16, 31.5, 63, 125, 250, 500, 1 k, 2 k, 4 k, 8 k, 16 k

Output

Output connector:	BNC connector
Output impedance:	approx. 600 ohms
Output type:	continuous
Repeat output:	ON time ** s, OFF time ** s
	1 to 99 s

AC output

Output impedance:	approx. 600 ohms
Output level:	1 Vrms (at full-scale point)

Printer

Line printer:	paper width 80 mm (TP-31A)

For hard copy of display data

Serial interface

RS-232C standard interface

Half-duplex communication with protocol control

Transfer rate:	9600, 19200, 38400, 115200 bps

9-pin D-sub male connector

Optical port

Compatible with optical ports for infrared data transfer

Transfer rate:	9600, 19200, 38400, 115200 bps

Infrared remote control

Duplicates all panel key functions

Battery status indicator

Graphic 3-segment display

Power requirements

Six IEC R20 (size D) batteries
for about 5 hours of continuous operation (alkaline batteries, 20ºC)
AC adapter NC-93 (100 V AC to 250 V AC, 12 VA)

Ambient conditions for operation

0 to 40ºC, 10% to 80% relative humidity (no condensation)

Ambient conditions for storage

-10 to 50ºC, max. 85% relative humidity (no condensation)

Dimensions

210 (H) × 297 (W) × 75 (D) mm (excluding protruding parts)

Weight

Approx. 2.5 kg (including batteries)

Supplied accessories

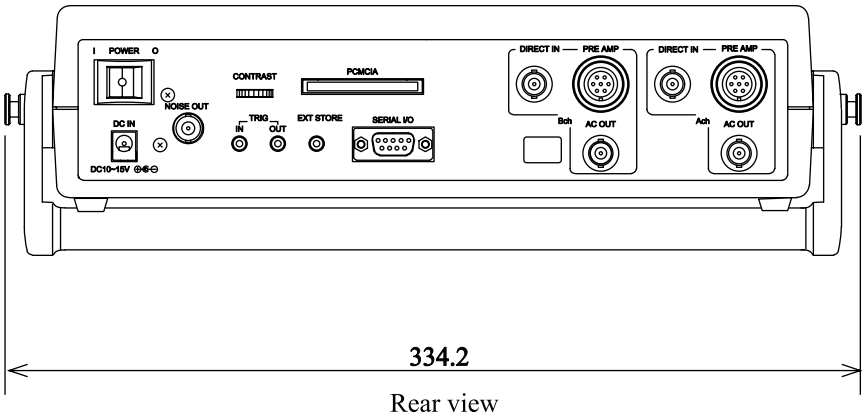
Printer paper holder	SA-29-S07	1
Case	SA-29-038	1
Carrying strap	SA-27-052	1
Support band	SA-27-053	2
BNC-BNC input/output cable	NC-39A	2
Infrared remote control	SA-29RC1	1
Thermal printer paper	TP-31A	1
Lithium battery	CR-1/3N	1
IEC R20 (size D) battery	LR20	6
IEC R6P (size AA) battery	R6P	2
Battery sticker	VA-10-020	1
Instruction manual		1
SA-29/30 serial interface manual		1
Test certificate		1

Optional accessories

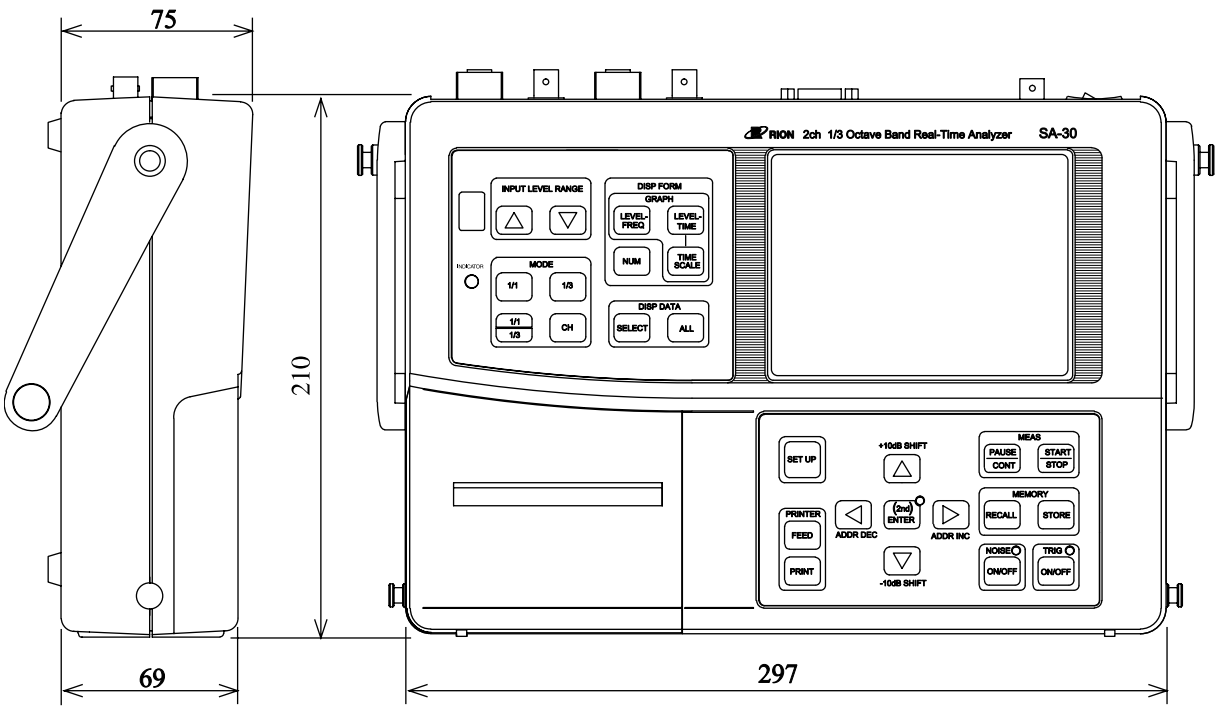
Power cord	AA-38-222
AC adapter	NC-93
Multi channel adapter, master	SC-31M
Multi channel adapter, slave	SC-31S
Hard case	SA-29-S06
Memory cards	
64MB Memory card	MC-64CF
128MB Memory card	MC-12CF1
256MB Memory card	MC-25CF1

* The above memory cards have been verified for compatibility with this unit. Operation with other memory cards is not assured. They are supplied with card adapter for PC card slot.

Dimensional Drawing of 2-Channel 1/3 Octave Band Real-Time Analyzer SA-30



Rear view



Side view Top view

Unit : mm

No. 27042 05-10