

INSTRUCTION MANUAL
WAVEFORM RECORDING CARD
SA-78WR



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Organization of this manual

This manual describes the features and operation of the Waveform Recording Card SA-78WR. The manual contains the sections listed below. Please also consult the Instruction Manual of the 2-Channel Compact FFT Analyzer SA-78.

Outline

Gives basic information on the SA-78WR card.

Controls and Functions

Briefly identifies and explains all parts of the SA-78 that are used for the waveform recording function provided by the SA-78WR card.

Power-On/Off

Explains how to turn the SA-78 on and off.

Card Insertion/Removal

Explains how to insert and remove the SA-78WR card.

Installation

Explains how to permanently install the program provided on the SA-78WR card in the SA-78.

Preparations

Explains how to prepare the SA-78 for use as Waveform Recorder SA-78WR and how to utilize CompactFlash in the SA-78WR.

Display Explanation

Briefly explains the items shown on the main display of the SA-78WR.

Waveform Recording

Explains the steps to take for waveform recording.

Recall

Explains how to call up recorded data.

Troubleshooting

Lists points to check in case of a problem.

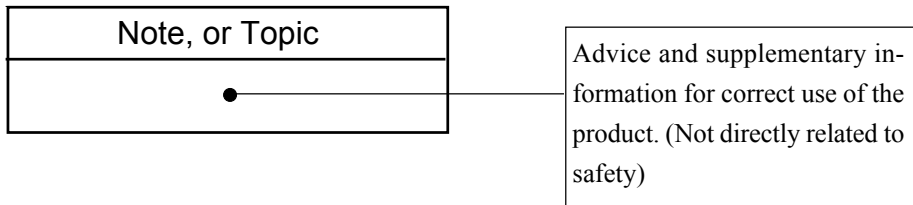
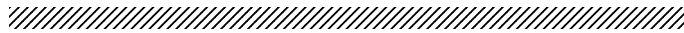
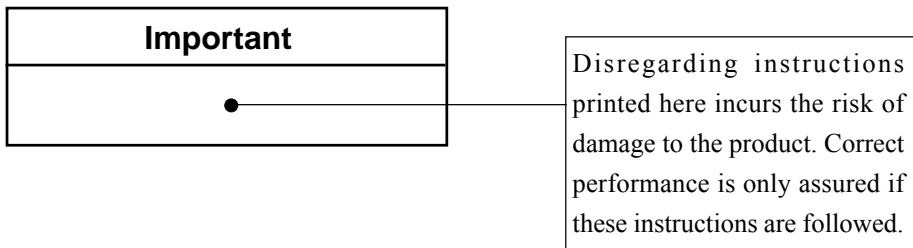
Specifications

Lists the technical specifications of the unit.

- * Company names and product names mentioned in this manual are usually trademarks or registered trademarks of their respective owners.

FOR SAFETY

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



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Handling Precautions

- The SA-78WR is a CompactFlash containing program data which allow the 2-Channel Compact FFT Analyzer SA-78 to function as a Waveform Recorder.
- Operate the card only as described in this manual.
- Take care not to drop the card and protect it from shocks and vibration.
- The permissible ambient temperature and humidity range for operation of the card is 0 to +40°C, 90% R. H. or less.
Do not use or store the card in locations that may be subject to extreme temperature or humidity, to splashes of water, high levels of dust, or to direct sunlight. Also avoid air with high salt or sulphur content, gases, and the vicinity of stored chemicals.
- Do not remove the CompactFlash during recording or during initialization. Otherwise the card may be damaged and data may be lost.
- The waveform recording function cannot be used if a CompactFlash is inserted in the SA-78 which contains data that were not recorded with the SA-78WR. If there are files on the card that were saved using a computer, or if there are data that were recorded with the SA-78 in its standard mode (not as SA-78WR), a message will appear prompting you to initialize the card. Be sure to perform this procedure before using the card for the SA-78WR.
- Do not initialize this card in a computer. Use the initialize function of the SA-78 when wishing to erase data on the card.
- Exposure of the card to static electricity or to water may result in loss of program data and stored data. If there is a possibility that your body carries static electricity, first touch a grounded metal object or discharge static electricity by other suitable means before handling the card.
- Never insert any object such as pieces of wire, conductive plastic etc. into the card connector, to prevent the risk of damage.

- Do not disassemble the card or attempt internal alterations.
- The Data Monitoring Software for the SA-78 is not compatible with the waveform recording function. Use this software only with the SA-78 in its standard mode (not as SA-78WR).

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Outline

The SA-78WR is a CompactFlash containing program data which add a time waveform recording function to the 2-Channel Hand-held FFT Analyzer SA-78. By permanently installing the data from the SA-78WR in the SA-78, the standard functions of the SA-78 (also referred to as "standard mode" in this manual) are augmented by a waveform recording mode. After installation is complete, the CompactFlash can be initialized and used as a memory card for storing waveform data.

Waveform recording function

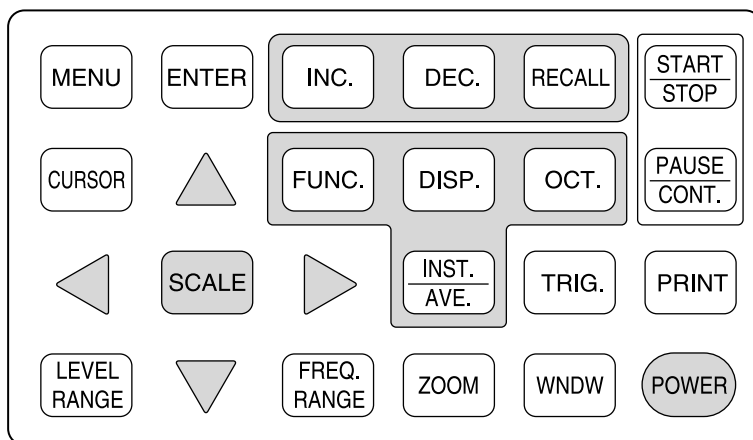
- The signal representing sound, vibrations etc. is stored as a WAVE file on the CompactFlash. Using optional waveform processing software, the data in the WAVE file can then be analyzed on a computer.
- Frequency range and number of channels can be selected according to the purpose of the measurement. With a frequency range setting of 20 kHz and using one channel, approximately 20 minutes worth of waveform signals can be recorded on a 128 MB CompactFlash.

This document explains how to add the waveform recording function to the SA-78 (installation procedure), and how to use the function after it has been installed. Basic operation steps are similar to other functions of the SA-78, but some keys and menus as well as the trigger operation will be different. For information on the standard functions of the SA-78, refer to the Instruction Manual that came with the unit.

Controls and Functions

Operation panel of SA-78

This section explains only the keys that are used for the waveform recording function. For information on the other keys, refer to the SA-78 Instruction Manual.



MENU key

Calls up the menu screen.

ENTER key

Confirms (enters) a setting selected with the ◀, ▶ keys on a menu screen.

INC. key, DEC. key

Select the index number for recording or recalling data. (See "Selecting the index number" on page 27 and "Selecting the index number for recall" on page 36.)

RECALL key

Serves for activating the recall mode and viewing settings and bar graph operation for recorded data. (See "Recall" on page 35.)

START/STOP key

Serves to start or stop recording, and to start or stop bar graph operation in recall mode.

▲, ▼ (Up/Down) keys

Serve to move up or down among menu items.

◀, ▶ (Left/Right) keys

Serve to change the value of menu setting items and the level range and frequency range settings.

PAUSE/CONT key

Pauses recording temporarily. Pressing the key again resumes recording.

LEVEL RANGE key

Serves to set the input level range.

FREQ. RANGE key

Serves to set the frequency range.

POWER key

Hold down this key for about two seconds to switch the unit on or off.

PRINT key

Serves to produce hard copy of the screen display contents when an optional printer is connected.

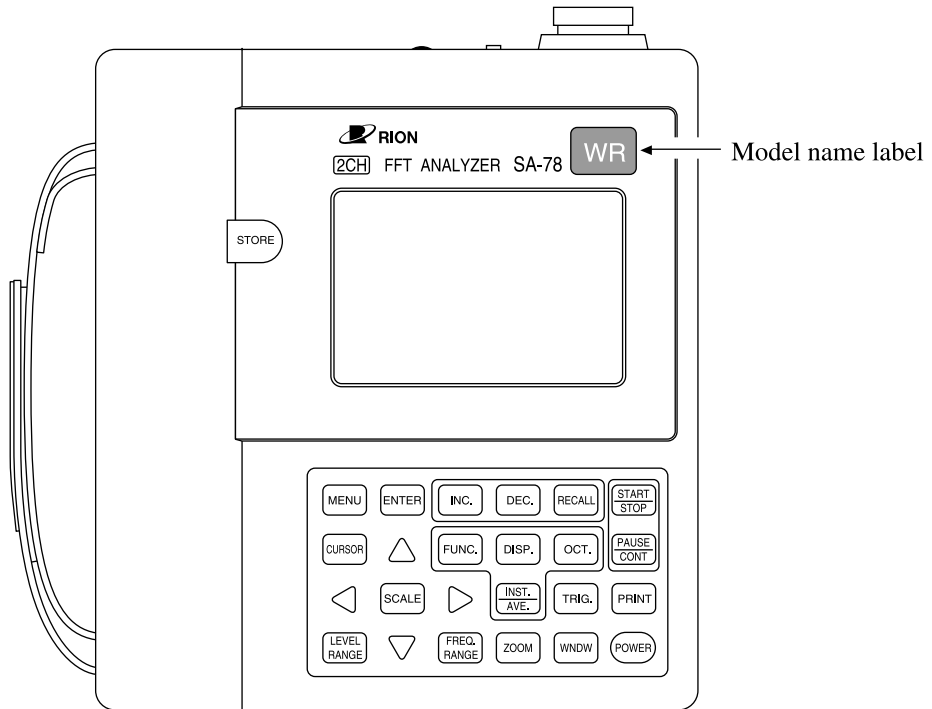
TRIG. key

Serves to make settings for trigger mode.

Note
All other keys are inactive.

Model name label

Attach the additional model name label to the unit as shown below.

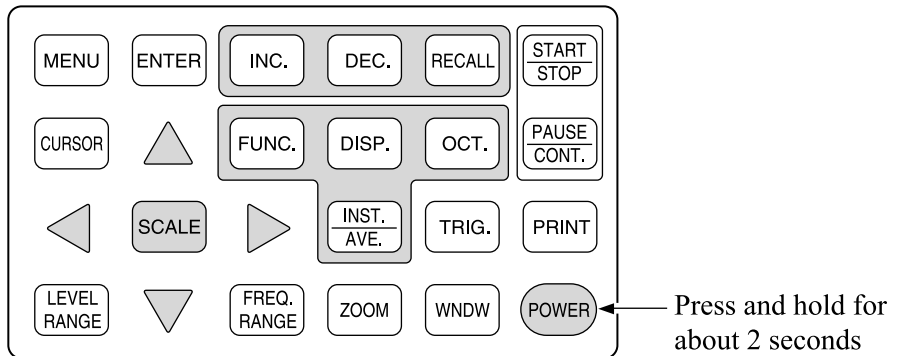


SA-78

Power-On/Off

Power-on

Hold down the POWER key for about two seconds, until the screen shown below appears.



Displayed screen

Important

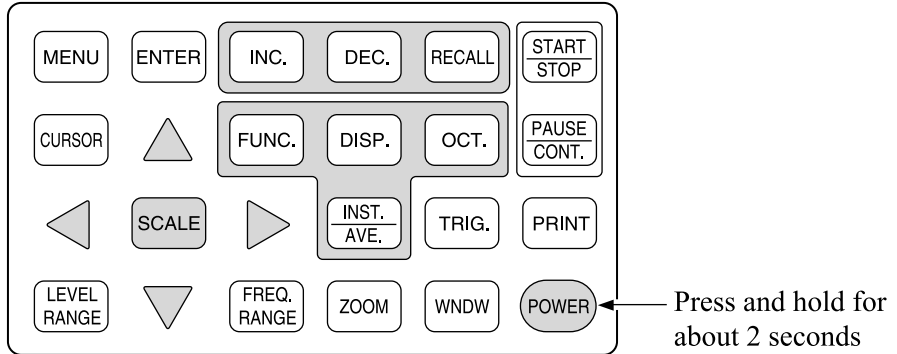
If you release the POWER key before the above screen appears, power does not come on. After turning the unit off, wait at least 5 to 6 seconds before turning the unit on again. Power will not come on if you press the POWER key immediately.

Note

Upon power-on, the SA-78 standard mode screen appears. To use the waveform recording function, a selection must be made from a menu. For details, refer to pages 14 and 27.

Power-off

Hold down the POWER key for about two seconds, until the screen shown below appears.



Displayed screen

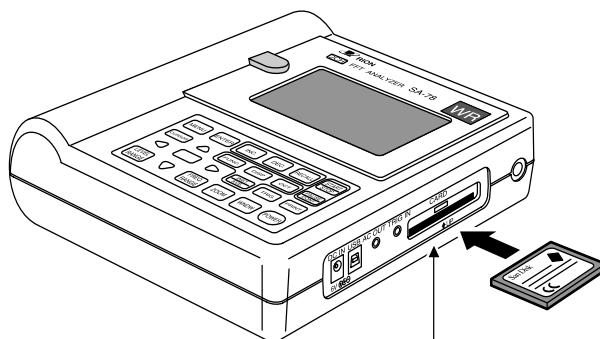
CompactFlash Insertion/Removal

Inserting the CompactFlash

Important

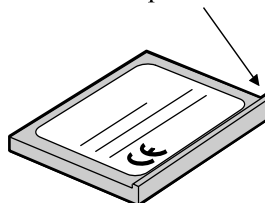
Before inserting or removing the CompactFlash, power to the SA-78 must be turned off.

1. Open the card slot cover of the SA-78.
2. As shown in the illustration below, insert the CompactFlash into the card slot with the ridge of the CompactFlash facing up. Insert the CompactFlash all the way into the card slot.



Slide cover upwards to insert CompactFlash
Close cover when not using CompactFlash.

Ridge at rear of CompactFlash should point up.



CompactFlash

Note
To prevent damage to the CompactFlash, protect it from static electricity, water, etc.
The CompactFlash will not operate correctly if not inserted fully.
Operation is not assured when using CompactFlash other than those provided by Rion.

Removing the CompactFlash

1. Pull the CompactFlash out using the protruding ridge.
2. Close the card slot cover.

SA-78WR program card (CompactFlash) insertion/ removal during installation


Important
Before inserting or removing the SA-78WR program card, power to the SA-78 must be turned off.

For information on the installation procedure, proceed to the section "Installation" on page 9.

Installation

This section describes how to install the SA-78WR program data permanently in the SA-78.

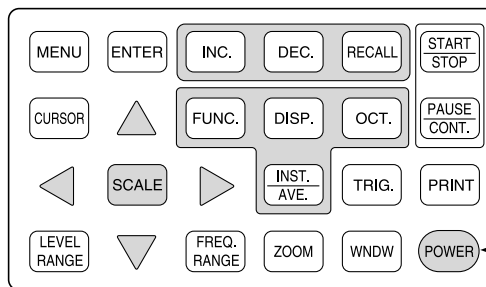
Important

Before starting the installation procedure, make sure that the batteries have sufficient capacity. At least three segments of the battery indicator must be lit ().

If the installation procedure is started while battery capacity is low, the procedure may not complete successfully, and the unit may subsequently fail to start.

Installation procedure

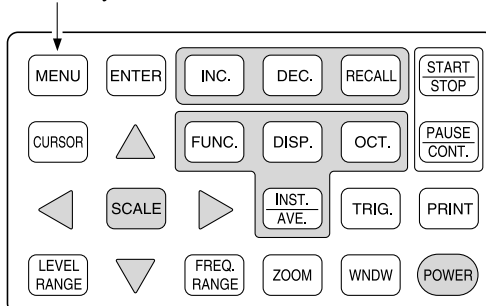
1. Verify that power to the SA-78 is turned off.
2. Insert the SA-78WR program card (CompactFlash) into the SA-78.
3. Hold down the POWER key for about two seconds to turn power on.



Press and hold for about 2 seconds

4. Press the MENU key to bring up the main menu.

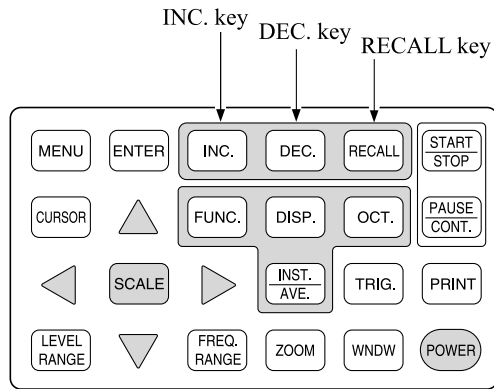
MENU key



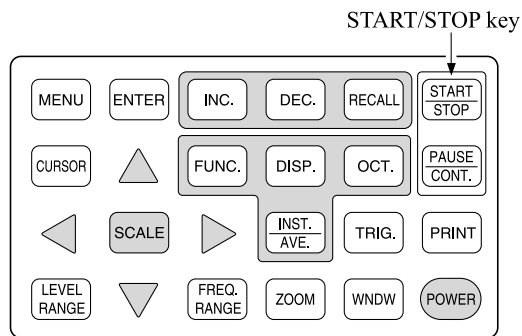
MENU	
INPUT	TRIGGER
ANALYSIS	STORE
DISPLAY(1)	SETUP MEMORY
DISPLAY(2)	DATE/TIME
CALIBRATION	

Main menu screen

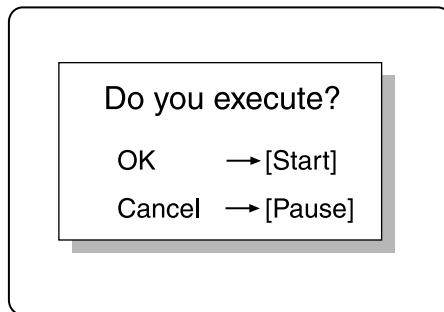
- Press the following keys in sequence:
INC. key → DEC. key → RECALL key



- Press the START/STOP key three times.

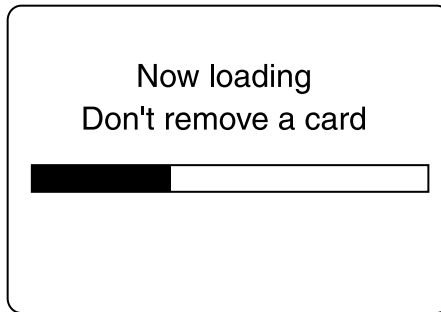


- The following message appears. Pressing the START/STOP key once more starts the installation.



Installation confirmation screen

8. The installation takes about five minutes.



Screen shown during installation

When installation is complete, power to the unit is automatically turned off.

Note

Once the installation has been performed, the SA-78WR functions will be incorporated in the SA-78 and can be used at any time. Repeated installation is not necessary. Also, please note that the SA-78WR program card can only be used for one installation process. We recommend to use the CompactFlash afterwards for storing data.

Checking the version

1. Press the MENU key to bring up the menu screen.
2. Press the following keys in sequence:
INC. key → DEC. key → RECALL key
3. Press the OCT. key three times. The version is shown.

Preparations

This section describes the various settings and preparations that should be made before using the SA-78WR waveform recording function. For information on other menu items and setting procedures, refer to the SA-78 Instruction Manual.

Inserting the CompactFlash to be used for data recording

Insert a CompactFlash for recording waveform data into the card slot of the SA-78.

Adjusting the date and time

Before using the unit for the first time, the date and time must be set. Also, if the unit was not used for an extended period, the date and time may no longer be correct. Be sure to check the date and time before each use.

For information on how to set the date and time, refer to the section "Preparations" on page 30 of the SA-78 Instruction Manual.

Making input settings

Use the INPUT section accessed from the main menu screen to make appropriate settings for input coupling (COUPLING), sensor power supply (CCLD), low-pass filter, and high-pass filter. For details, refer to the section "Basic Operation" of the SA-78 Instruction Manual.

Calibration

Use the CALIBRATION section accessed from the main menu screen to set the calibration values for channel A and channel B. For details, refer to the section "Calibration" of the SA-78 Instruction Manual.

Note

The menu items ANALYSIS, DISPLAY (1), DISPLAY (2), and STORE of the SA-78 are used only for the standard functions. There is no need to make settings for these items when using the waveform recording function. The existing settings for these four items will not affect waveform recording conditions.

Trigger function

Single trigger can be used for recording.

For information on how to set trigger conditions, see the section "Trigger Function" of the SA-78 Instruction Manual.

Note

Any settings for TRIGGER MODE and TRIGGER POSITION are disregarded.

When using an external trigger for recording, the first occurrence of the trigger signal will release the trigger standby condition and the second occurrence will terminate recording. After starting recording with the first trigger, the second trigger occurrence is only valid after 1 frame (4096 samples) of data have been recorded.

Approximate frame durations for various settings

20 kHz	1 ch.	80 ms
10 kHz	2 ch.	80 ms
10 kHz	1 ch.	160 ms
100 kHz	2 ch.	8 s
100 kHz	1 ch.	16 s

The repeat trigger function is not used for waveform recording.

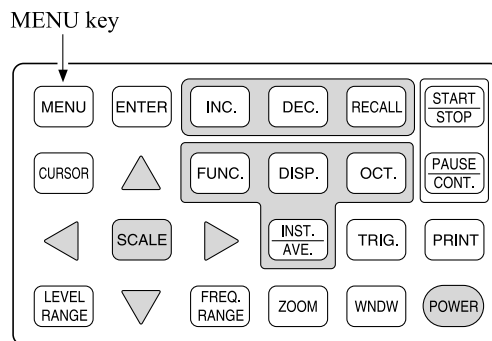
Turning the waveform recording function ON

After power-on, the SA-78 will be in standard mode. To use the waveform recording function, proceed as described below.

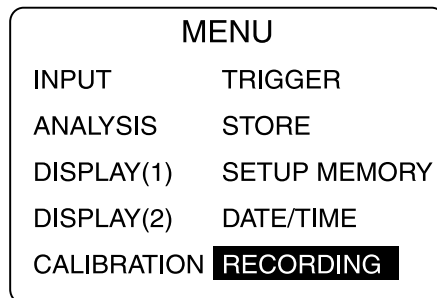
Note

Perform these steps after installation of the SA-78WR program data has been completed.

1. Press the MENU key. The main menu screen appears.

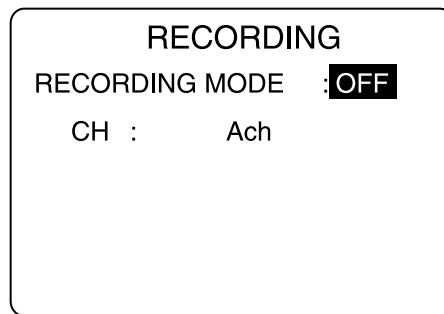
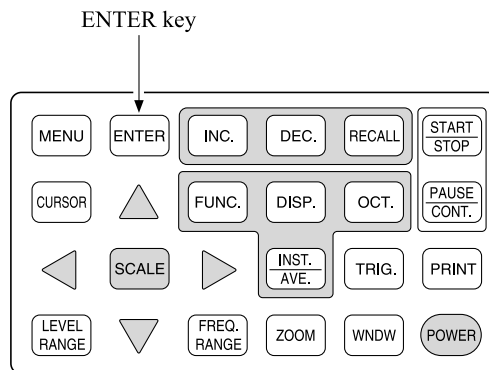


2. Use the ▲ and ▼ keys to move the highlight cursor to the RECORDING item.



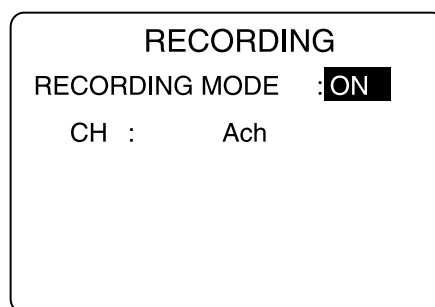
Main menu screen

3. Press the ENTER key. The RECORDING screen appears.



RECORDING screen

4. Use the ◀ and ▶ keys to set the RECORDING MODE item to ON.

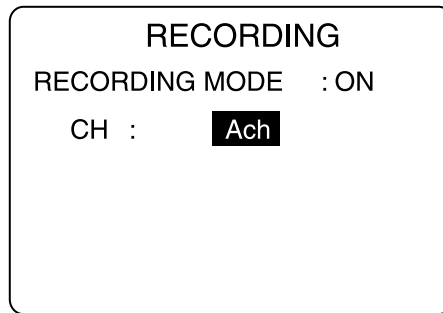


RECORDING screen

5. Press the ENTER key.

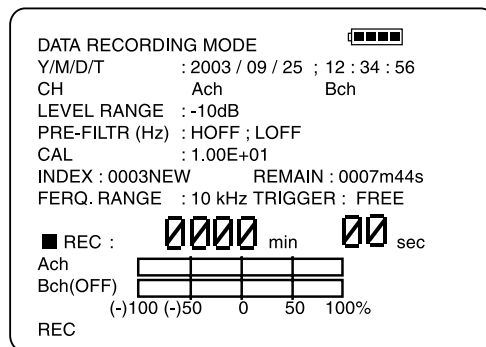
- Select the channel for recording.

Use the ▲ and ▼ keys to move the highlight cursor to the CH item.



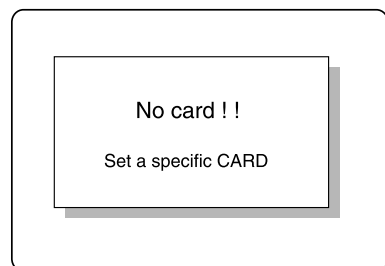
RECORDING screen

- Use the ◀ and ▶ keys to select one of the following settings: "A ch" (channel A) → "B ch" (channel B), → "A ch & B ch" (channels A and B)
- Press the ENTER key.
- Press the MENU key twice to close the main menu screen and go to the SA-78WR main screen.



SA-78WR main screen

If no card is inserted, the indication shown at right appears.



Note

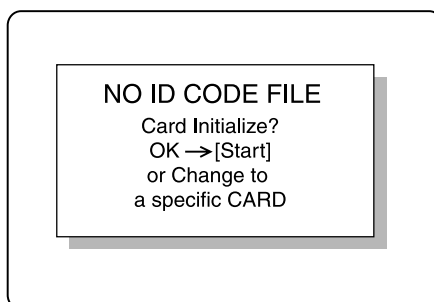
The waveform recording mode will remain active only until you turn power to the SA-78 off. The next time you turn power on, the SA-78 will again be operating in standard mode. To use the waveform recording function, you must perform the above procedure every time.

If a card is inserted when you go to the SA-78WR main screen, one of the following indications appears.

Note

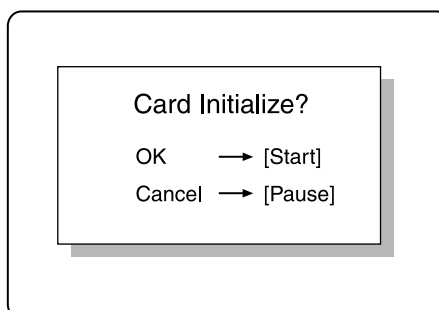
Insert the CompactFlash to use for waveform recording while the SA-78WR main screen is displayed.

If the inserted card does not have a waveform recording ID code, the following is shown:



Card initialization screen

If the inserted card already has a waveform recording ID code, the following is shown:



Card initialization select screen

Subsequent operation steps for the two cases are described on the following pages.

If CompactFlash has no waveform recording ID code

The following types of CompactFlash will not have a waveform recording ID:

- New CompactFlash
- CompactFlash used for storing data in SA-78 standard mode (CompactFlash not previously used for waveform recording)
- CompactFlash with files written on a computer
- SA-78WR program card after installation was performed

When one of the above types of card is inserted while the SA-78WR main screen is displayed, the initialization screen as shown on page 17 will appear.

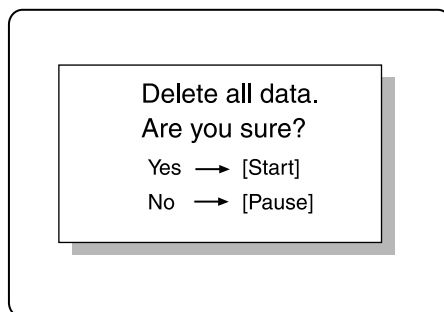
To use such a CompactFlash for storing data with the SA-78WR, it must be initialized first.

Important
The initialization process will permanently delete any previous data present on the CompactFlash.

Note
Once the SA-78WR program card has been used for installation, it cannot be used again for another installation. It is recommended to initialize the CompactFlash and use it for storing data.

When not wishing to initialize the inserted CompactFlash, remove the card and insert another CompactFlash.

To proceed with initialization, press the START/STOP key. The following message is shown.



Confirmation screen

Pressing the START/STOP key again starts the initialization process, and an ID code for waveform recording will be written to the card. Without this ID code, waveform recording is not possible.

Important
Never remove the CompactFlash during the initialization process. Otherwise the card may be damaged.

Note
We recommend to manage CompactFlash used for data storage in SA-78 standard mode separately from CompactFlash used for the waveform recording function.

If CompactFlash already has a waveform recording ID code

If the CompactFlash was previously used for storing waveform recording data, it will already have an ID code.

Note

If a CompactFlash was used for the waveform recording function but later was used for another purpose except storing waveform recording data, it will be treated as a card that has no ID code.

Even if a card was initialized with the SA-78WR, be sure to initialize it again if it was used for storing data in SA-78 standard mode or if files were written to it using a computer.

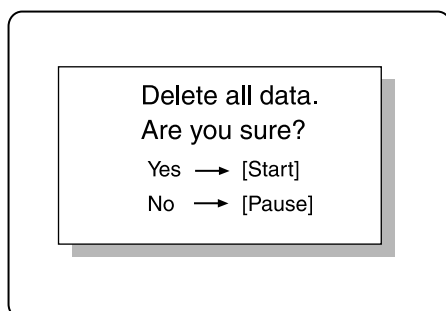
When such a card is inserted while the SA-78WR main screen is displayed, the initialization select screen as shown on page 17 will appear.

If you want to retain the existing data on the CompactFlash and continue to add data to it, press the PAUSE/CONT. screen. In this case, the CompactFlash is not initialized.

Note

Take care not to overwrite data in existing index numbers. For details, see "Selecting the index number" on page 27.

If you want to erase the existing data on the CompactFlash and initialize it, press the START/STOP screen. In this case, the following message appears.



Confirmation screen

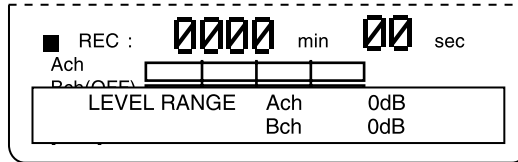
Pressing the START/STOP key again starts the initialization process, and a new ID code will be written to the CompactFlash.

Important
Never remove the CompactFlash during the initialization process. Otherwise the card may be damaged.
Initializing a CompactFlash will permanently erase all data on it.

Note
We recommend to manage CompactFlash used for data storage in SA-78 standard mode separately from CompactFlash used for the waveform recording function.

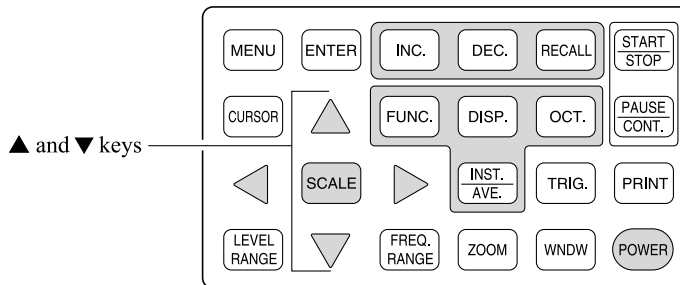
Changing the level range

1. When you press the LEVEL RANGE key, the level range setting window comes up.

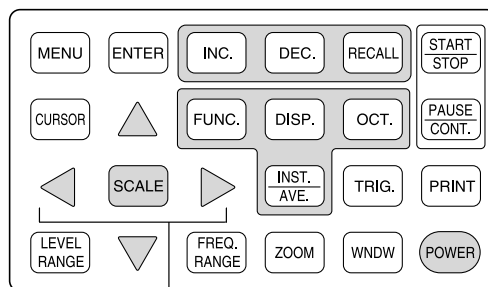


Level range setting window

2. Use the ▲ and ▼ keys to select the channel for which to set the level range.



3. Use the ◀ and ▶ keys to set the level range.

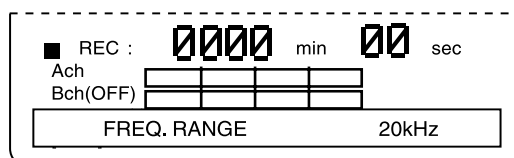
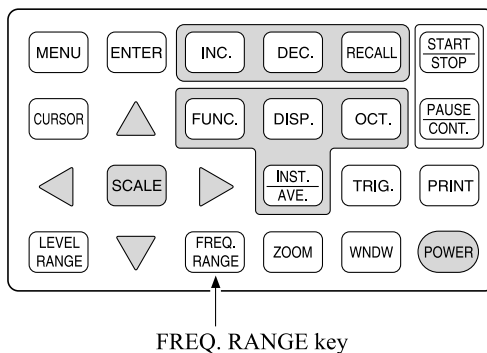


◀ and ▶ keys

4. When the setting is complete, press the LEVEL RANGE key once more to return to the previous screen.

Changing the frequency range

1. When you press the **FREQ. RANGE** key, the frequency range setting window comes up.



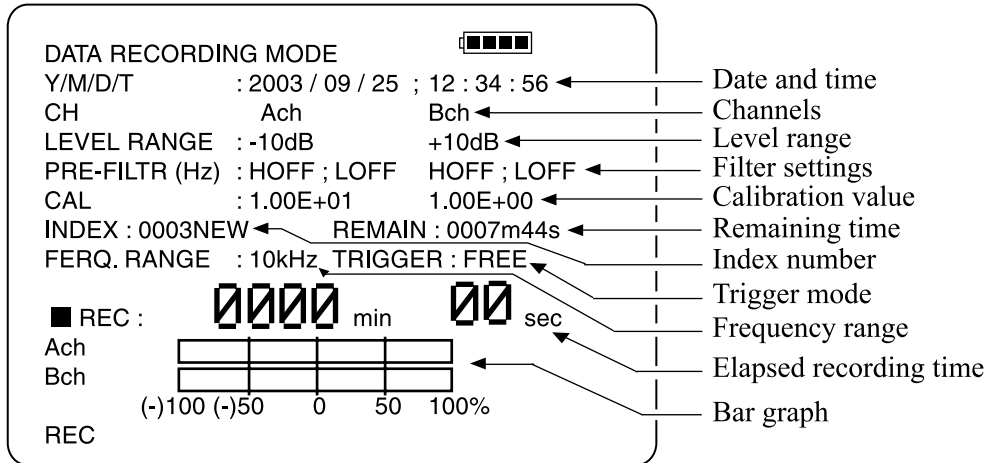
2. Use the ◀ and ▶ keys to set the frequency range.
3. When the setting is complete, press the **FREQ. RANGE** key once more to return to the previous screen.

Note

For waveform recording, the 50 kHz and 80 kHz frequency range cannot be selected. 20 kHz with 2 ch also cannot be selected.

Display Explanation

This section explains only the display items that are used for the waveform recording function. For information on other items, refer to the SA-78 Instruction Manual.



SA-78WR main screen

Y/M/D/T

Shows the date and time. In recall mode, the date and time when the data were recorded are shown.

Example: 2003 / 09 / 25 12:34:56

CH

Shows the channel setting.

LEVEL RANGE

Shows the input level range setting for each channel. No information is shown for a channel that is set to OFF.

PRE-FLTR

Shows the filter setting.

HOFF:	High-pass filter OFF
H 20:	High-pass filter 20 Hz
H 100:	High-pass filter 100 Hz
LOFF:	Low-pass filter OFF
L 1k:	Low-pass filter 1 kHz
L 20k:	Low-pass filter 20 kHz

No information is shown for a channel that is set to OFF.

CAL

Shows the calibration value. For details, refer to the SA-78 Instruction Manual.

Information about the calibration value is stored as a WAVE file chunk.

No information is shown for a channel that is set to OFF.

INDEX

Shows the index number that will be used for next recording. In recall mode, the index number where the data were recorded is shown.

REMAIN

Shows the available remaining recording time.

FREQ. RANGE

Shows the frequency range setting.

TRIGGER

Shows the current trigger mode.

REC (min, sec)

Shows the elapsed recording time. In recall mode, the indication "RECALL" is shown here.

Bar graph

Shows the waveform +/- maximum at regular update intervals.

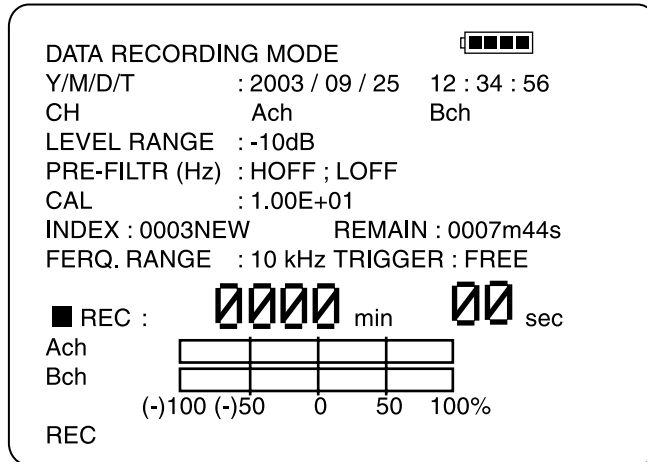
REC

The indication "REC" at the bottom shows that recording is possible. In recall mode, the indication "RECALL" is shown here.

Note
The update interval for the elapsed recording time indication, remaining recording time indication, and bar graph during recording depends on the selected frequency range and number of channels. At a frequency range setting of 100 Hz with 1 channel operating, the update interval is about 16 seconds.

Waveform Recording

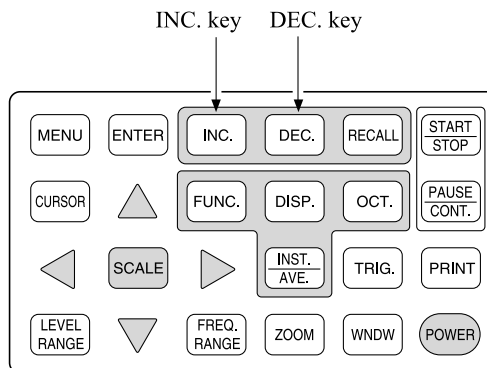
First, verify that the SA-78WR main screen is being shown. If not, refer to "Turning the waveform recording function ON" on page 14 and bring up the SA-78WR main screen.



SA-78WR main screen

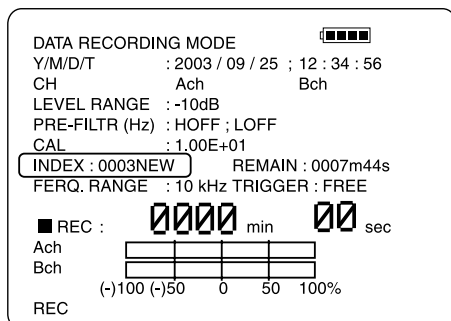
Selecting the index number

Use the INC. and DEC. keys to select an index number under which to store recorded data.



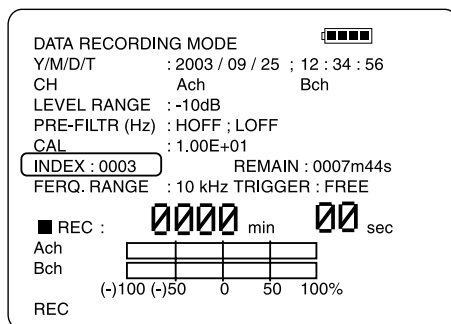
If "NEW" is shown at the end of the index number

This means that there are currently no data saved under this index number. The newly recorded data will be saved under it.



If only the index number is shown

This means that there are currently data saved under this index number. When choosing such a number, the newly recorded data will overwrite the existing data (which will be erased).

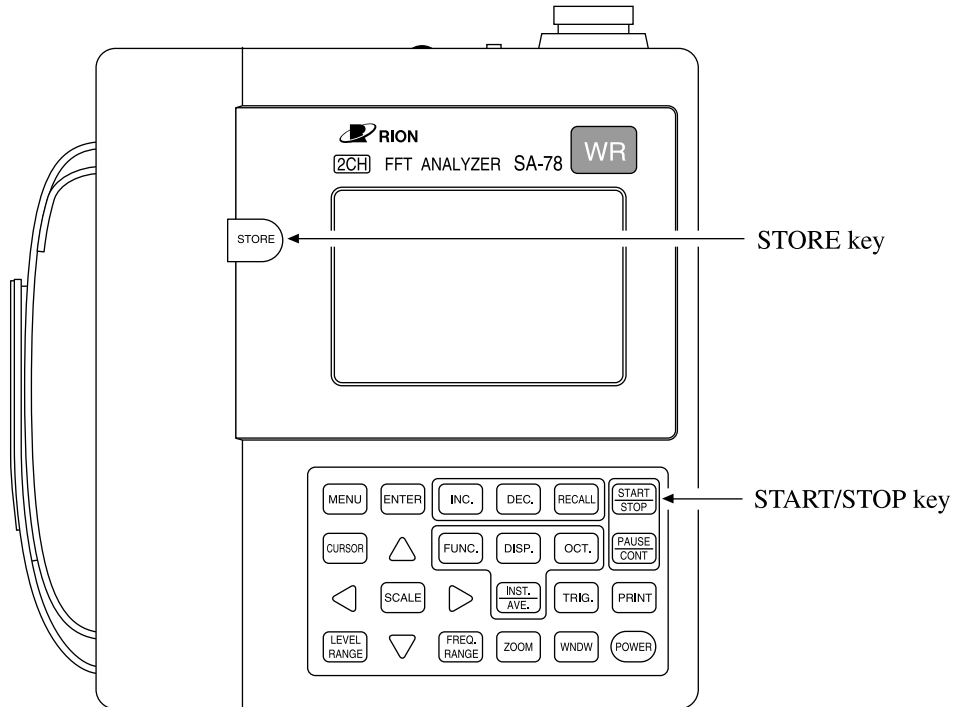


For example, if pressing the INC. or DEC. key repeatedly cycles through the indications "0001" → "0002" → "0003NEW", pressing the START/STOP key while "0001" is displayed will result in the data currently saved under "0001" and "0002" being lost. The newly recorded data will have the index number "0001".

Pressing the START/STOP key while "0003NEW" is displayed will preserve the data currently saved under "0001" and "0002". The newly recorded data will have the index number "0003" and following.

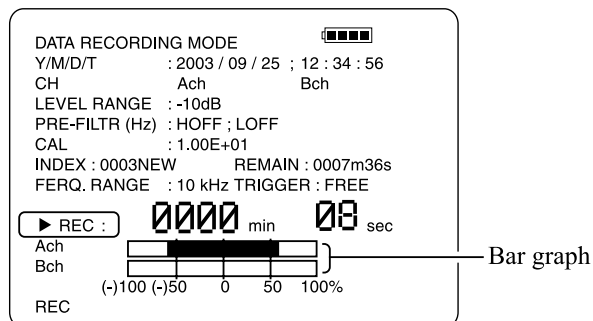
Recording start

After the index number has been selected, press the START/STOP key or the STORE key on the top side of the case.



The ► symbol to the left of the "REC" indication will flash. The recording count starts to run, and recording is carried out using the measurement conditions as shown on the display.

The bar graph operates only while recording.



Important

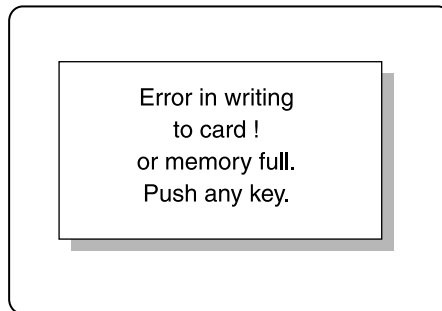
Never remove the CompactFlash during the recording process. Otherwise the card may be damaged and data may be lost.

Waveform recording is not possible if other data exist on the CompactFlash.

CompactFlash on which files were stored using a computer, or CompactFlash on which data were stored in SA-78 standard mode must be initialized before they can be used for waveform recording. When such a card is inserted, a message asking whether to perform initialization appears. Be sure to do this first. For details, refer to "If CompactFlash has no waveform recording ID code" on page 18.

When there is no more space on the CompactFlash

If the CompactFlash becomes full during recording, the following message appears. Press any key and insert a new card.



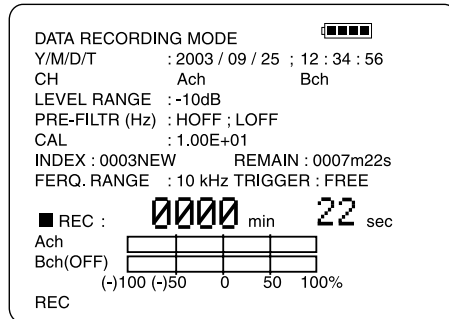
Card full indication

Note

The settings for INPUT, CALIBRATION, TRIGGER, and DATE/TIME using the menus of the SA-78 in standard mode will also apply to the waveform recording function.

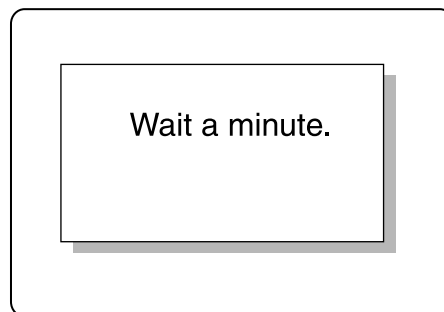
Recording stop

Press the START/STOP key to stop recording. The ► symbol changes to a ■ symbol, and the recording count stops.



The following message appears. This indicates that the file is currently being written. Do not remove the CompactFlash or turn the power off during this interval.

Recording stop screen

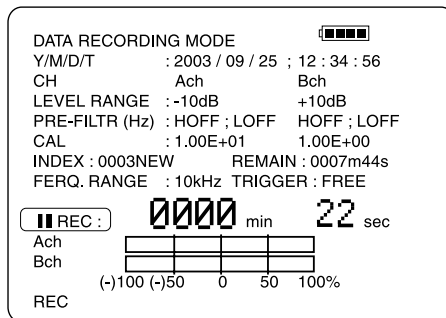
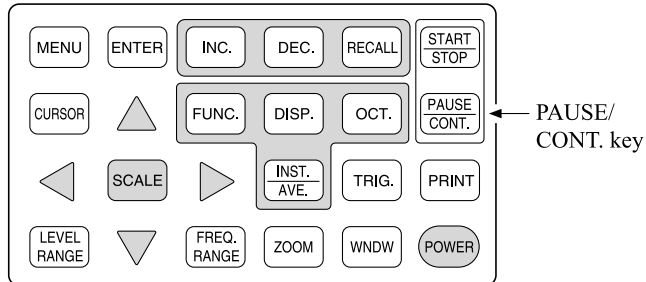


Recording stop

During stop (■ shown), the bar graph retains the condition at the point when recording was stopped.

Recording pause

To temporarily pause the recording, press the PAUSE/CONT. key. The ► symbol changes to a || symbol, and the recording count stops.



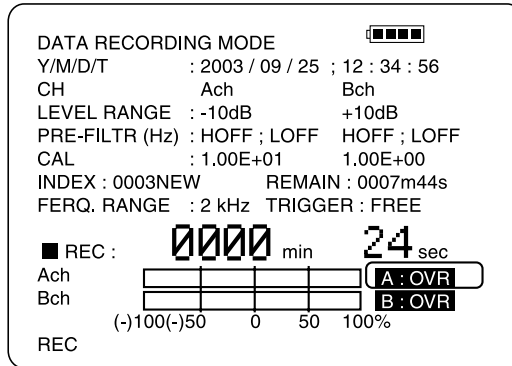
To resume recording, press the PAUSE/CONT. key once more. If you press the START/STOP key during pause (while the || symbol is displayed), the recording process is stopped entirely.

Note

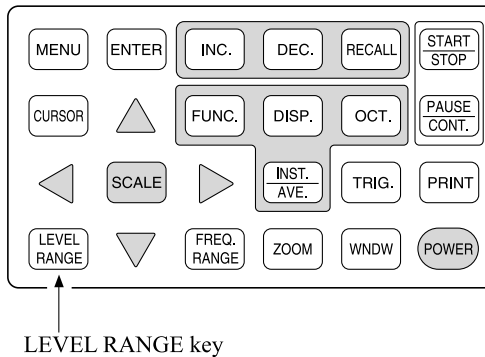
If the batteries are exhausted while the unit is in pause mode, the SA-78WR automatically closes the file, so that recording data up to the pause point are saved.

Overload

If the input signal level is too high during recording, thereby causing overload, the indication **OVR** appears to the right of the bar graph.



In such a case, press the START/STOP key to stop recording, and then choose a higher level range setting with the LEVEL RANGE key.



Recall

Waveform data stored on memory card can be recalled at any time, letting you check for the presence of a signal, using the selected measurement parameters and bar graph operation.

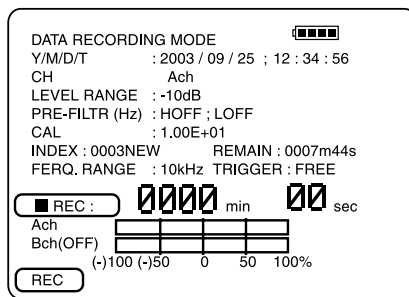
Note

This is not a playback function. No signal is supplied from the AC OUT connector.

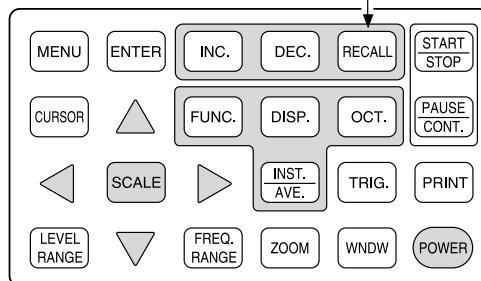
Activating the recall condition

Press the RECALL key to activate the recall condition. The indication "REC" in the lower left corner of the display changes to "RECALL".

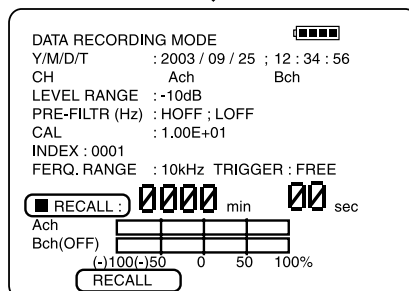
SA-78WR main screen



RECALL key

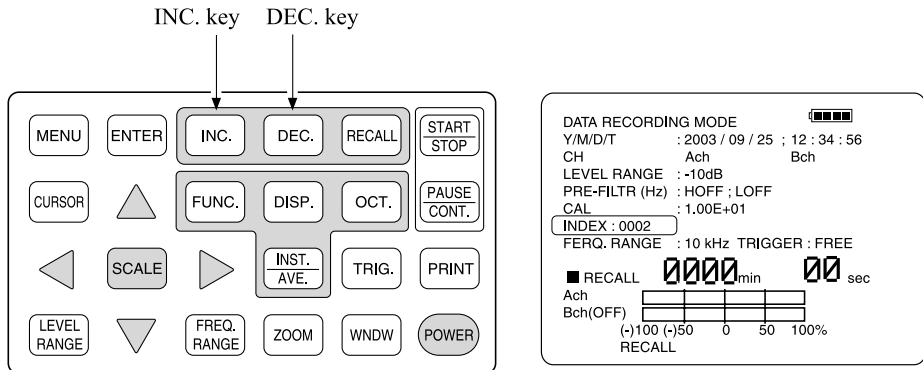


SA-78WR recall screen



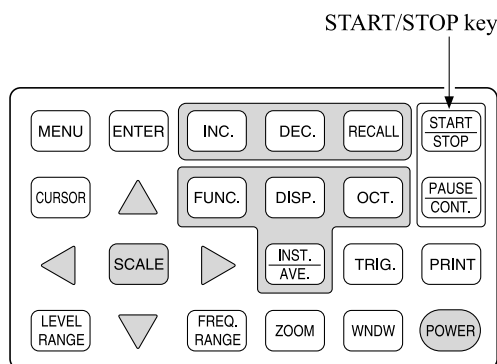
Selecting the index number for recall

Stored waveform data are managed using index numbers. Use the INC. and DEC. keys to select the desired index number. The level range and filter settings used when saving the data appear on the display.



Starting recall

Press the START/STOP key. The ■ symbol changes to a ► symbol. The RECALL count increases, and the bar graph operates. Because actual playback is not possible, there is no signal at the AC OUT connector.



Note

While the bar graph indication is active, it is not possible to quit the recall condition. Changing the index number is also not possible.

Stopping recall

Press the START/STOP key. The ► symbol changes to a ■ symbol, and the RECALL count and bar graph operation stop.

Canceling the recall condition

Press the RECALL key. The SA-78WR main screen returns. The indication "RECALL" in the lower left corner of the display changes to "REC".

Troubleshooting

Cannot change menu items

During recall or recording, the menu items can be called up, but the settings cannot be changed. This is normal.

Cannot get screen hard copy from printer

Printing is not possible during waveform recording and while the bar graph display has been activated by pressing the START/STOP key in the recall condition. This is normal.

Have lost waveform data

If the power is turned off or interrupted during waveform recording, the data for the current session will be lost.

Recording time indication and bar graph do not update

When the frequency range is set to a low setting, updating the recording time indication and bar graph requires considerable time. For example, at a frequency range setting of 100 Hz and 1 channel, the update interval is about 16 seconds.

Specifications

Product configuration

Media	128 MB CompactFlash (CompactFlash) Compliant with CFA (CompactFlash™ Association) specifications (Type I) Used for installation of SA-78WR software in SA-78, and for storing recorded waveform data
Installation	Installation of program data in SA-78, initiated by special key sequence (For installation, it takes 5 minutes)

Input section

(Same as SA-78, input coupling and filter settings can be selected)

Input coupling type

AC or DC (for 0.5 Hz/-3 dB for AC)

Input filters

High-pass filter: 20 Hz, 100 Hz (-1 dB point)

Low-pass filter: 1 kHz, 20 kHz (-1 dB point)
(Switchable)

3rd-order Butterworth filter with -18 dB/oct. slope

Overload

Range full-scale +2 dB

Overload warning indication on display

Recording performance

Frequency range settings

100 Hz, 200 Hz, 500 Hz, 1 kHz, 2 kHz, 5 kHz, 10 kHz,
20 kHz

Sampling frequency

Frequency range \times 2.56

Number of channels

1 or 2 (only 1 channel at 20 kHz)

Maximum recording time

Approx. 20 minutes (with 128 MB CompactFlash,
1 channel, frequency range 20 kHz)

Maximum recording times at various frequency range settings (with 128 MB CF card)

	100 Hz	200 Hz	500 Hz	1 kHz	2 kHz	5 kHz	10 kHz	20 kHz
1 channel recording	66 h 40 m	33 h 20 m	13 h 20 m	6 h 40 m	3 h 20 m	1 h 20 m	40 m	20 m
2 channel recording	33 h 20 m	16 h 40 m	6 h 40 m	3 h 20 m	1 h 40 m	40 m	20 m	—

Recording times are approximate

Data files

File format	WAVE file
Data format	16-bit PCM WAVE format (measurement parameter information encoded in chunk in proprietary format)
File names	SA****.wav (****: 4-digit integer) Starting from SA0001.wav, auto-incremented in steps of 1

Encoded measurement parameters

Number of channels, sampling frequency, recording time, waveform data word length, level range, LPF, HPF, trigger information, start time, overload yes/no, pause information, CCLD, calibration value (EU value per 1 bit, EU value per 1 V)

Recording controls	Start, stop, pause, continue Pause information encoded in WAVE file only consists of pause yes/no information (position information not included).
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Trigger

Trigger mode	Free-run (no trigger), single
Trigger source	Internal signal level or external trigger signal
Trigger slope	Rising edge (+) or falling edge (-)
Trigger level	-15/16 to +15/16 of range full-scale, in 1/16-steps
Pre-trigger/post-trigger	None

Card initialization Erases all data and creates dedicated ID code file

Display

Level monitor	Bar graph showing waveform +/- maximum at regular update intervals. (Update interval becomes longer for lower frequency range settings. Max. 16 seconds.)
Recall	Recall indication of recorded file data
Display	Index number, remaining recording time, elapsed recording time, bar graph indication during recall

Ambient conditions for operation

0 to +40°C, max. 90% R.H. or less

Supplied accessories	Instruction Manual	1
	Model name label	1
	Inspection certificate	1

