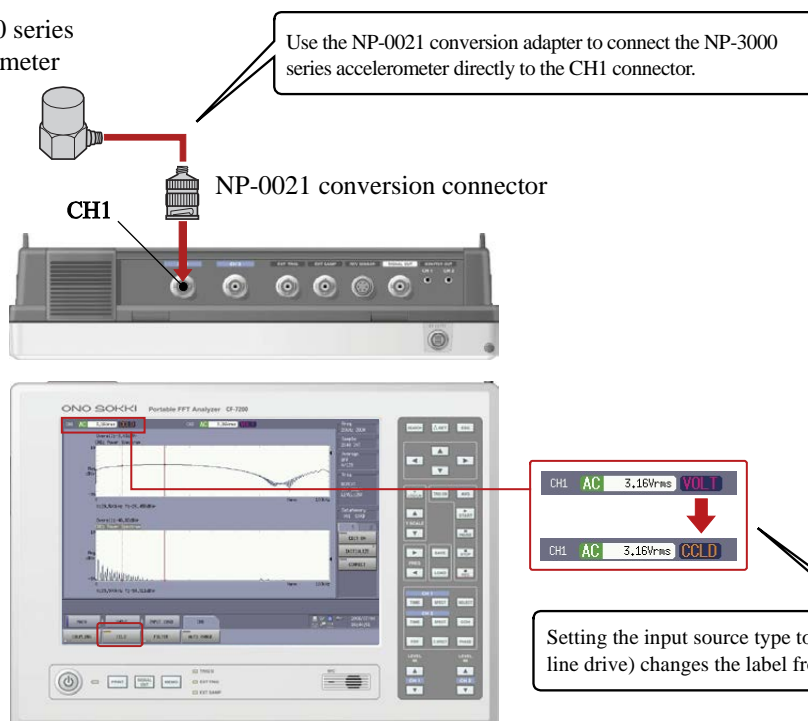# Portable FFT Analyzer Model CF-7200
Vibration analysis procedure

This document describes the general operational procedure for vibration analysis to use the NP-3000 series accelerometer.

Throughout this document, the name of any soft key on the screen will be presented in square brackets (e.g., [MAIN]), and the name of any operation button on the panel will be enclosed by single quotation marks (e.g., 'START'). In the text, "key" means a soft key on the screen and "button" means an operation button on the panel.
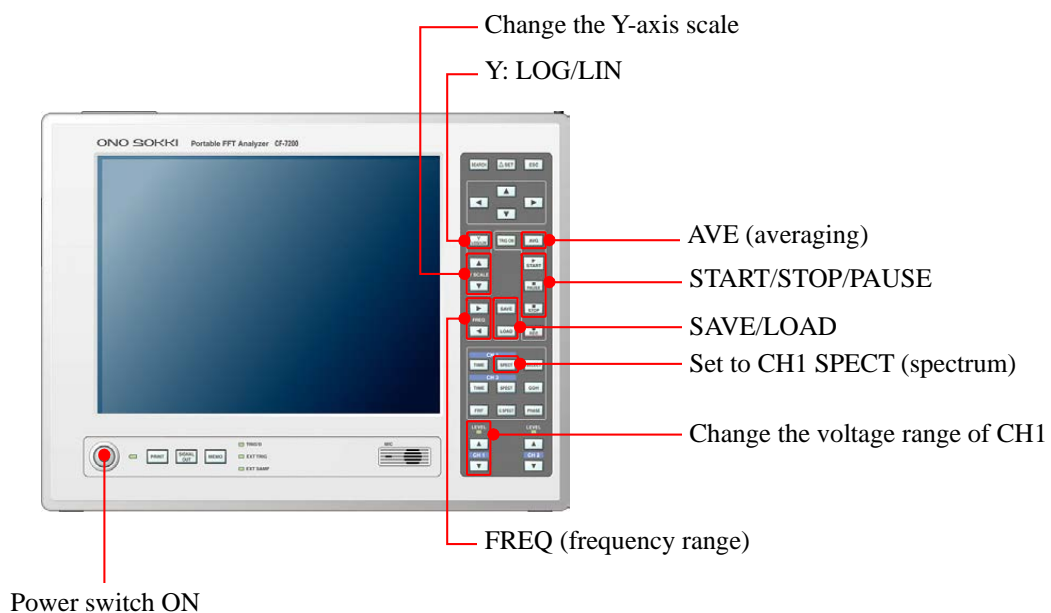
■ System Configuration

NP-3000 series accelerometer

Use the NP-0021 conversion adapter to connect the NP-3000 series accelerometer directly to the CH1 connector.

NP-0021 conversion connector

CH1

Setting the input source type to CCLD (constant current line drive) changes the label from VOLT to CCLD.

■ Operation Flow

[1] Power ON

[2] Spectrum display

[3] Setting the frequency range

[4] Setting the voltage range

[5] Y-axis LIN

[6] Unit Calibration

[7] Measurement and averaging

[8] Displacement display (double integration)

[9] Reading data

[10] Saving data

[11] Reproducing data

[12] Copying saved data to a USB memory device

[13] How to cancel the functions that have been set

[14] Dual window display

[15] Power OFF

■ Buttons on Operation Panel

Change the Y-axis scale

Y: LOG/LIN

AVE (averaging)

START/STOP/PAUSE

SAVE/LOAD

Set to CH1 SPECT (spectrum)

Change the voltage range of CH1

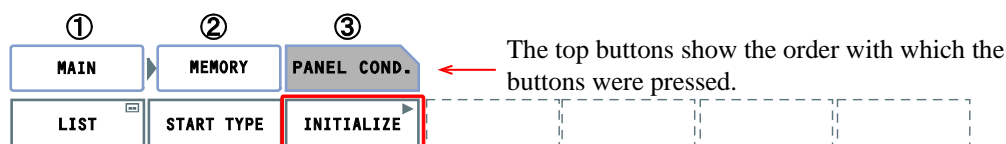FREQ (frequency range)

Power switch ON

■ Operation Procedure

1. Power ON

Press and hold the POWER switch for at least 1 second.
When turning off power, similarly press and hold the power button.

-1. Press the keys in the order [MAIN]> [MEMORY]> [PANEL COND]> [INITIALIZE].

①	②	③
MAIN	MEMORY	PANEL COND.
LIST	START TYPE	INITIALIZE

The top buttons show the order with which the buttons were pressed.

When the "Yes No" screen is displayed, press "Yes". After a while, the screen will be set up in the default configuration and the data will be displayed.

-2. Press the 'START' button on the operation panel to set it in the measuring mode. The lamp on the button will turn on. When any setting is changed, the screen will be promptly updated, facilitating checking of the setting results.

-3. Set the input source to CCLC in the following procedure. This enables the connection of a constant current line drive (CCLD) sensor (4 mA, 24 VDC).

①. Connect a NP-3000 series accelerometer.
②. Press the keys in the order [MAIN], [INPUT], [INPUT COND], and [CH1 (or CH2)], and set [CCLD] to ON. Setting CCLD to ON will start supplying the drive current to the sensor and select the AC coupling mode.

①	②	③	④
MAIN	INPUT	INPUT COND	CH1(CH2)
COUPLING	CCLD	FILTER	AUTO RANGE
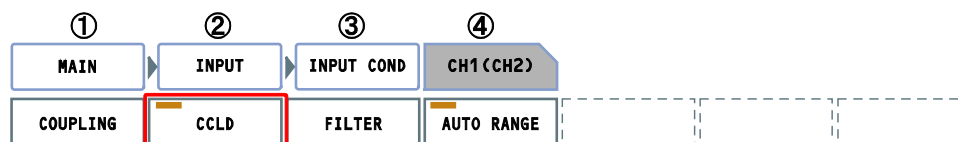
2. Spectrum display

Press the 'SPECT' button of CH1 in the DISPLAY section on the operation panel to display the spectrum.

3. Setting the frequency range

Use the up and down arrow buttons in the FREQ section of the operation panel to select the desired frequency range as indicated in the upper right corner of the screen. You should first select a wider frequency range to check the entire spectrum before selecting a suitable range.

4. Setting the voltage range

Use the up and down arrow buttons in the CH1 section on the operation panel to select a proper voltage range in such a way that the 'RANGE OVER' lamp does not turn on and the green lamp is on.

5. Y-axis LIN

Press the 'Y LOG' button in the SEARCH section of the operation panel to turn off the lamp and set the vertical scale (Y-axis) to the linear scale (m/s^2) instead of the previous dBm/s^2 scale.

6. Unit calibration

To measure directly in the unit of m/s^2, set the EU value according to the sensitivity of the NP-3000 series accelerometer to be used. To find the sensitivity value of the NP-3000 series accelerometer, check the inspection sheet attached to the sensor. It should show the sensitivity value such as "Voltage sensitivity: $1.05mV/ms^{-2}$".

-1. Press the keys in the order [MAIN] > [INPUT] > [EU] > [Y EU] > [CH1] > [V/EU] to open the EU reference calibration screen ("CH1 EU/V Value" dialog box).

EU value reference calibration key
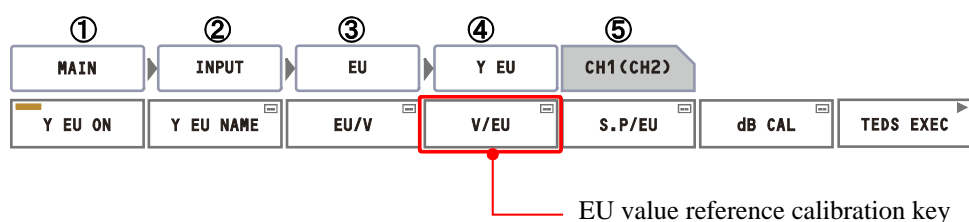
-2. Here, the EU value shall be entered in the unit of 1 V (i.e., 0 dBEU).
For example, press the down arrow key and enter "0.00105" if the sensitivity is 1.05mV/EU.
After the entry, press the CLOSE button to close the window.

Note: Check that it shows "V/EU," instead of "EU/V".

Click
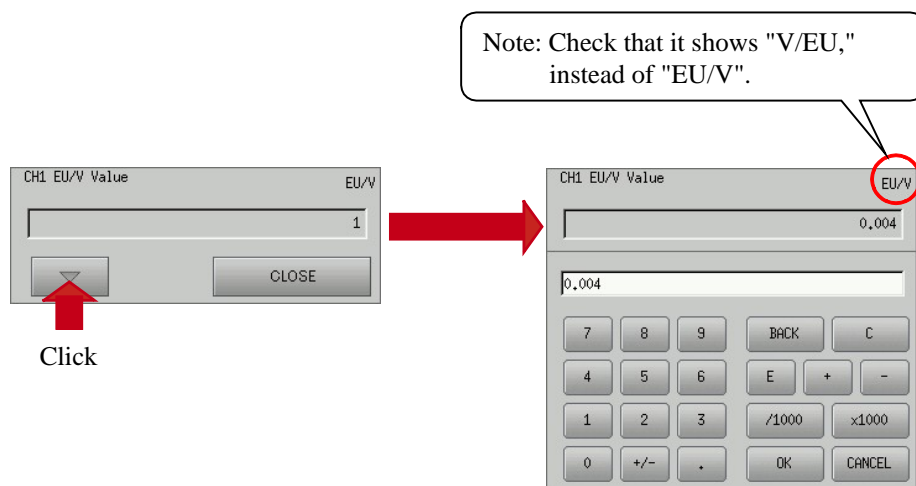
-3. Turn on the [Y EU ON] key (i.e., to enable the EU function).

> Note:
> If it is desired to display the displacement after performing double integration, you can use the mm unit conversion function when you set the double integration parameters.
> This is enabled by setting the acceleration (m/s^2) per 1 V in the previous section 6-2 and selecting 'm/s2' for the unit in the next section 6-4.

-4. Set the Y-axis calibration unit's name. Press the [Y EU NAME] key to display the "CH1 Y Unit Name" dialog box. Then on this dialog, press the down arrow key and enter the calibration unit (here, m/s2) for the Y-axis. After the entry, press the CLOSE button to close the dialog box. Because the superscript "2" of the unit m/s^2 cannot be displayed on the screen as a superscript, it is shown as "m/s2".
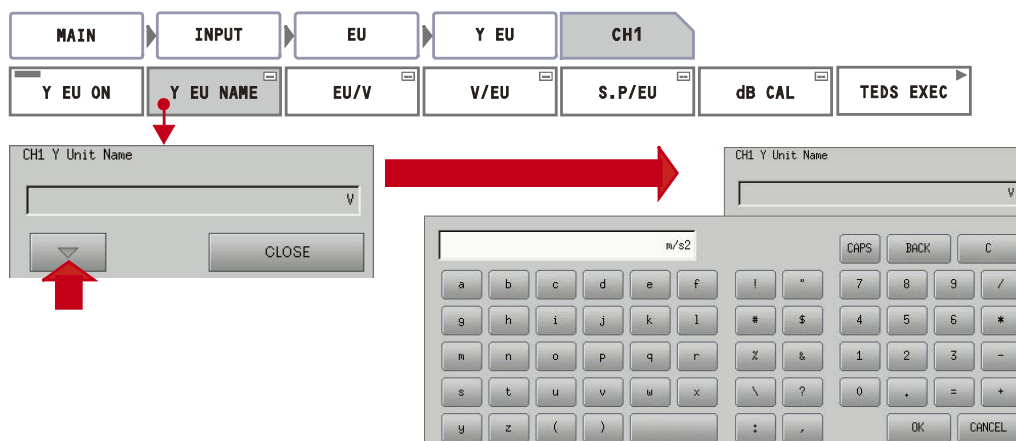

7. Measurement and averaging

The following description assumes that the measurement will be made using the power spectrum arithmetic averaging function.

-1. Press the soft keys in the order [MAIN] > [ANALYSIS] > [AVERAGE] > [MODE], and set [PWR SP] to ON.
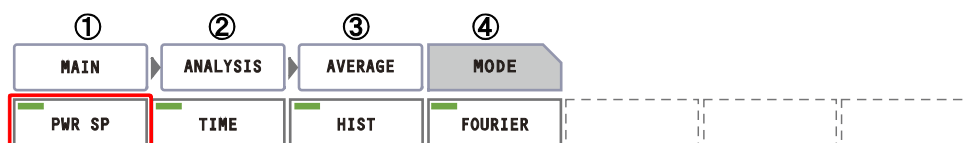
-2. Press the keys in the order [MAIN] > [ANALYSIS] > [AVERAGE] > [TYPE], and set [NUM] to ON.
If the averaging is to be specified by the number of averaging times, press the [NUM] key. If it is to be specified by the time, press the [TIME] key to set it on.

①   ②   ③   ④

MAIN	ANALYSIS	AVERAGE	TYPE
NUM	TIME		
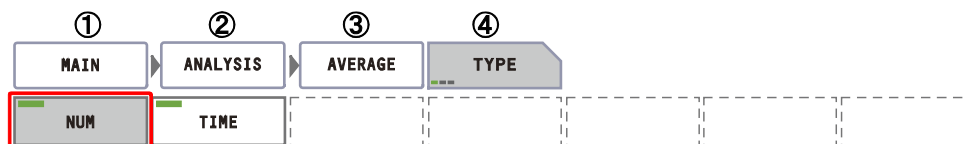
-3. Enter the number of averaging times in the "Average Number" dialog box, which is displayed when [NUM] is set to ON after pressing the soft keys in the order [MAIN] > [ANALYSIS] > [AVERAGE] > [SET].

①   ②   ③   ④

MAIN	ANALYSIS	AVERAGE	SET
NUM	TIME		

Average Number

128

▽   CLOSE
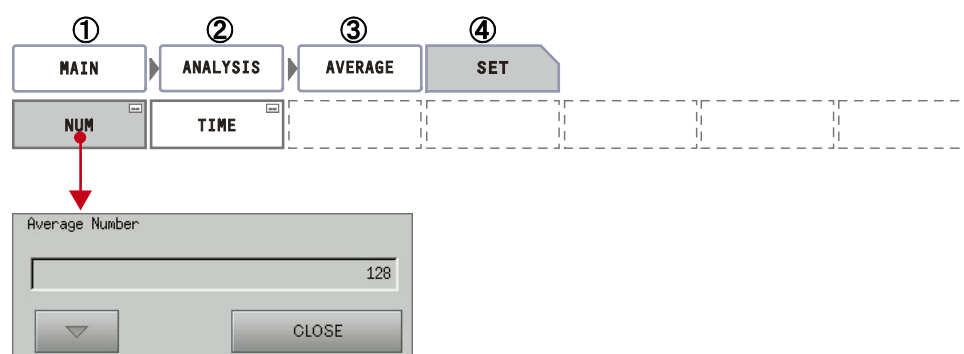
-4. Turn on the 'AVG' button on the operation panel, and then press the 'START' button to start the measurement.
When the specified number of averaging times has reached, the measurement will stop. When the lamp on the 'AVG' button is on, it indicates that averaging is enabled. Press the 'STOP' button to interrupt the measurement.

Shows the progress of the averaging process
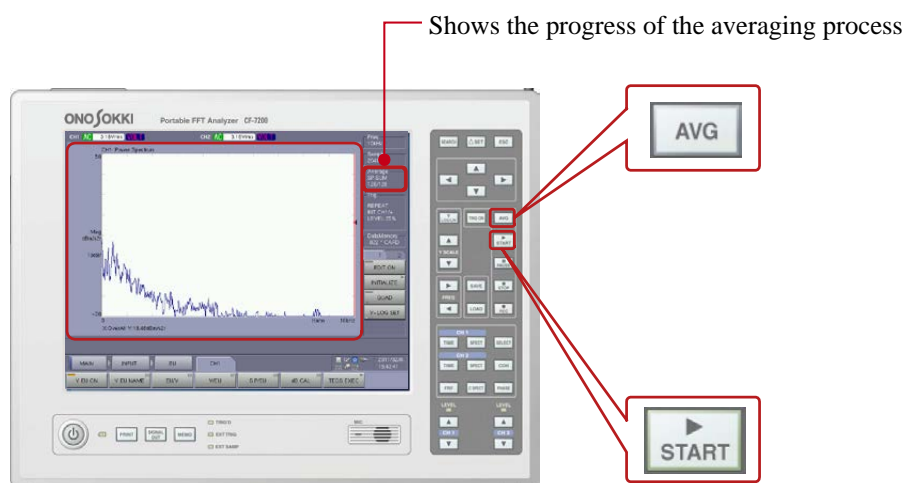
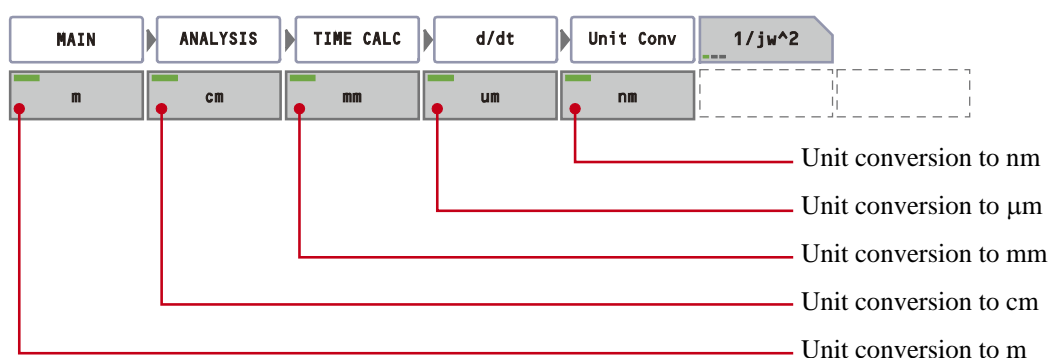-5. Pressing the 'START' button will repeat the measurement.

8. Displacement display (double integration)

To display the displacement, double integration is made to convert acceleration to displacement.

-1. Press the soft keys in the order [MAIN] >[ANALYSIS] >[FREQ CALC] >[jω] > [TYPE], and set [1/jω^2] to ON to enable the double integration function. Pressing the [OFF] key disables the double integration function.

① ② ③ ④ ⑤

MAIN	ANALYSIS	FREQ CALC	jw	TYPE
OFF	jw	jw^2	1/jw	1/jw^2
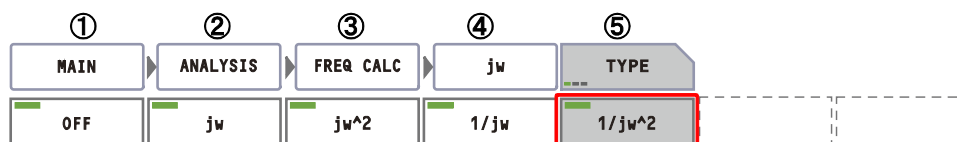
-2. To automatically convert the unit after the following operation for double integration, set the acceleration (m/s^2) per 1 V in EU/V and set "m/s2" as the unit in the above Section 6-4 for the unit calibration operation. (As the superscript "2" of "m/s2" cannot be displayed, simply enter as "m/s2".)

MAIN	ANALYSIS	TIME CALC	d/dt	Unit Conv	1/jw^2
m	cm	mm	um	nm	

Unit conversion to nm
Unit conversion to μm
Unit conversion to mm
Unit conversion to cm
Unit conversion to m

> Note:
> When integrating or double-integrating the acceleration value to obtain the speed or displacement data, you can complete the calibration using the acceleration value (m/s^2) only, without being required to calibrate again after the integration, thus, the speed or displacement can be directly read out. In this, it also displays the engineering unit after the conversion. The calibration of acceleration is valid only for the data being analyzed (i.e., after started), and it will not affect the any data already recorded or of which measurement is not being made. In addition, calibration of acceleration cannot be applied to any data already recorded.

-3. When double integration is made, the resulting factor of 1/(2πf^2) causes the lower frequency data to be more prominent. If the DC component (0 Hz) is too prominent, the DC removal function can be used. By enabling this function before the measurement, the resulting DC component will be suppressed.
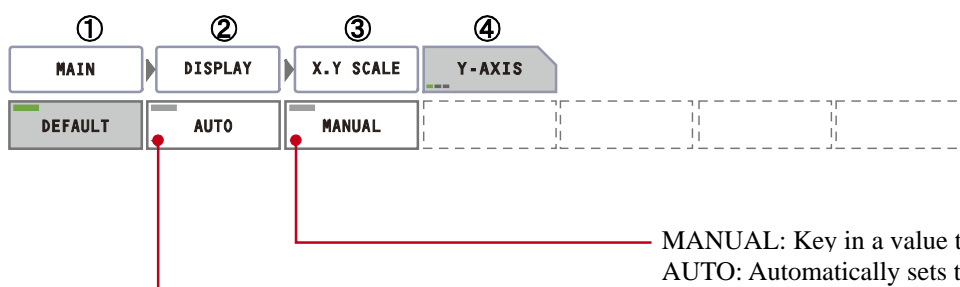
MAIN	INPUT	TIME PRE	CH1(CH2)
DC CANC	TREND SUPRESS	SMOOTH	ABSOLUTE	POL.CHG	d/dt //dt
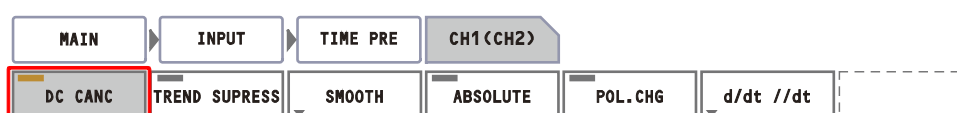
-4. Press the 'START' button on the operation panel to start the measurement. If the measurement is started with the 'AVG' button turned on, averaging will be made for the measurement.
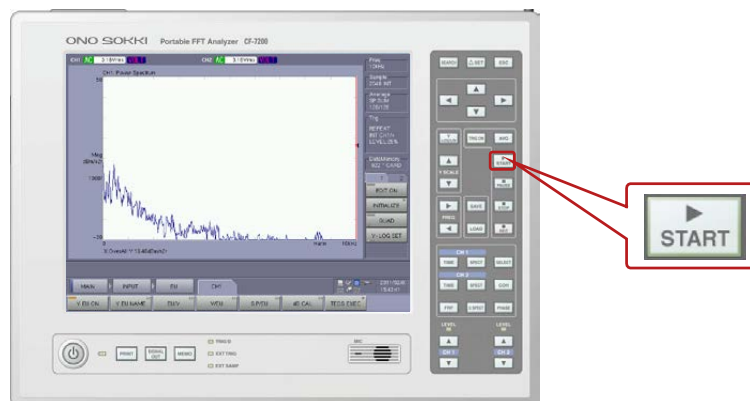

-5. Performing double integration will reduce the value significantly. The following operation can be used to freely change the vertical (Y-axis) scale.

①. Press the keys in the order [MAIN] >[DISPLAY] >[X.Y SCALE] >[Y-AXIS], and turn on [AUTO] or [MANUAL] to change the Y-axis scale.


MANUAL: Key in a value to set the scale
AUTO: Automatically sets the scale according to the condition when the key is pressed.

②. Instead of the above operation (Step 8-5), you can also use the [Y SCALE] up and down arrow buttons to change the vertical scale to display enlarged waveforms.

Change the Y-axis scale
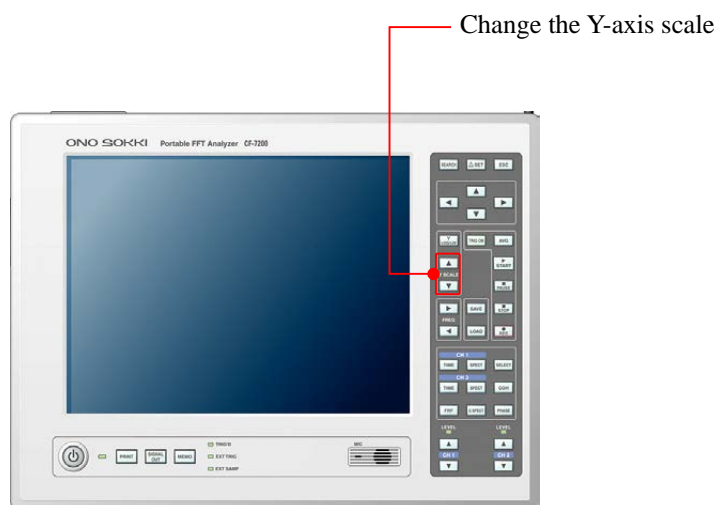
## 9. Reading data

-1. Reading by searching

Press the 'SEARCH' button on the operation panel and use the right and left arrow buttons to move the search point. The X and Y values of the search point will be displayed. The up and down arrow buttons are used to more quickly move the search point.

◄ ► : Move slowly

▼ ▲ : Move quickly
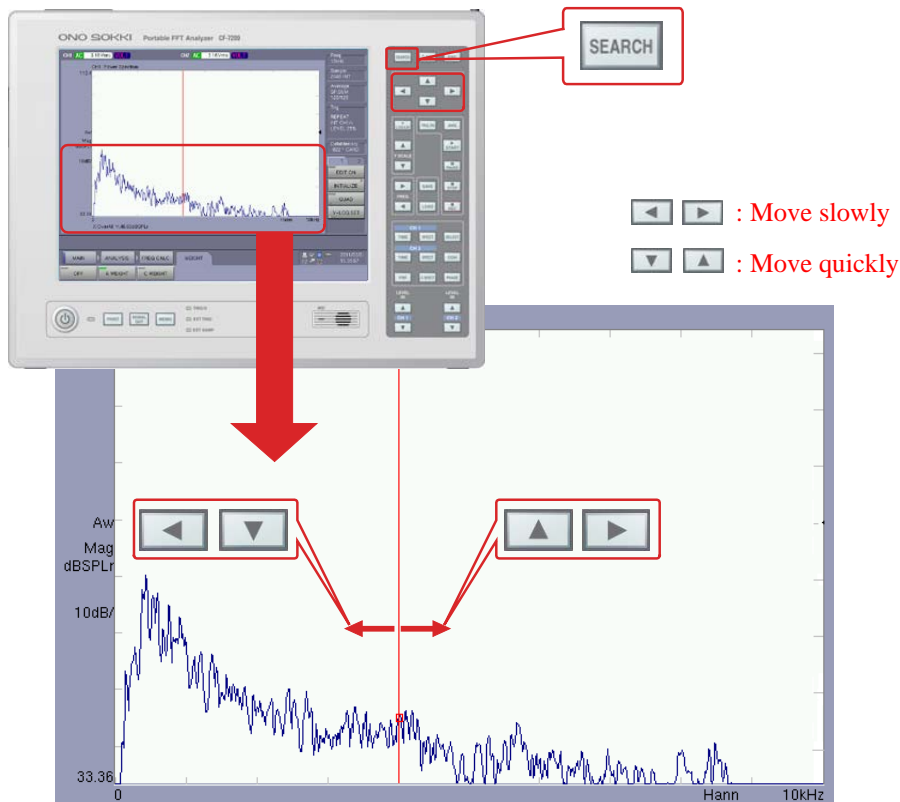
-2. Peak list display

Press the soft keys in the order [MAIN] >[DISPLAY] >[LIST], and turn on the [ON] key. The set of spectrum data will be presented in a list. Press the keys in the order [MAIN] >[DISPLAY] >[LIST] >[LIST TYPE], and turn on [PEAK] to show the peak list.
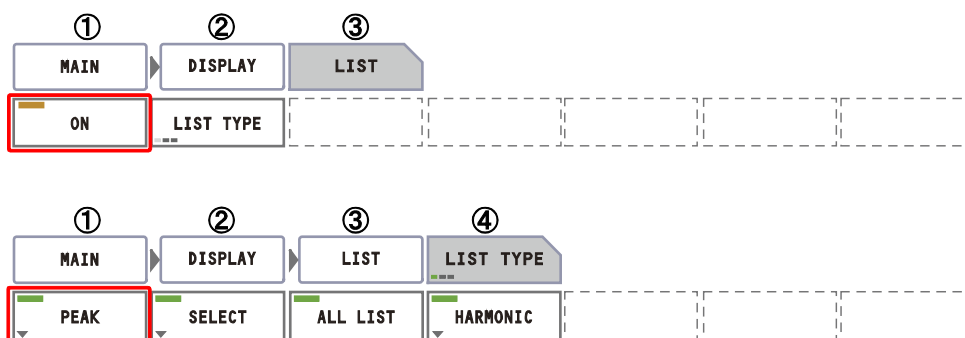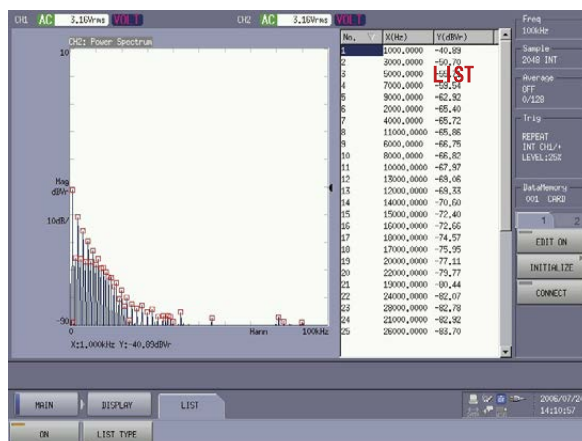
10. Saving data

In principle, you can use a compact flash card (CF card) to save the data. You can save the data in the txt or bitmap format and open the file on a PC and copy the data to a USB memory as appropriate. If your PC has a CF card interface, you can also open the saved file directly from the CF card.

The data in the CF format (with the file extension of .dat) can be opened by other FFT analyzers, using the DS-0221 FFT analysis software, for example.

The memory function of the model CF-7200 has been significantly improved. It is now compatible with the CF (extension .dat), txt, and bitmap formats as well as voice memo and image snapshot functions. For details, refer to the reference guide.

-1. After the measurement, display the data to be saved on the screen.

-2. Press the soft keys in the order [MAIN] > [MEMORY] > [UTILITY] >[SELECT MEDIA], and turn on the [CARD] key.
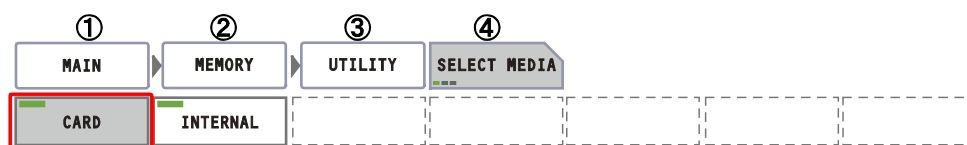
-3. Select the type of the data to be saved.

Press the keys in the order [MAIN] > [MEMORY] > [DATA] > [SAVE TYPE]. Then, turn on the [TEXT] and [BMP] keys. By this, the data will be saved in the txt and bitmap formats, in addition to the CF format, which is always used for the storage.

Saves the data in the bitmap format
Saves the data in the text format
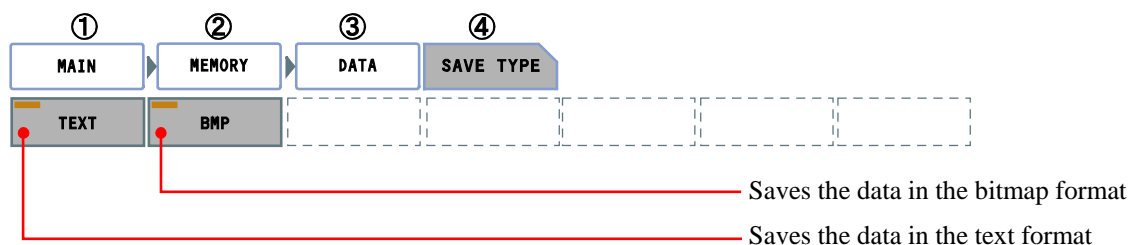
-4. List display of the saved data

Press the keys in the order [MAIN] > [MEMORY] > [DATA]. Then, turn on the [LIST] key. This operation will display the list of the data files saved.

"Display keyboard" button
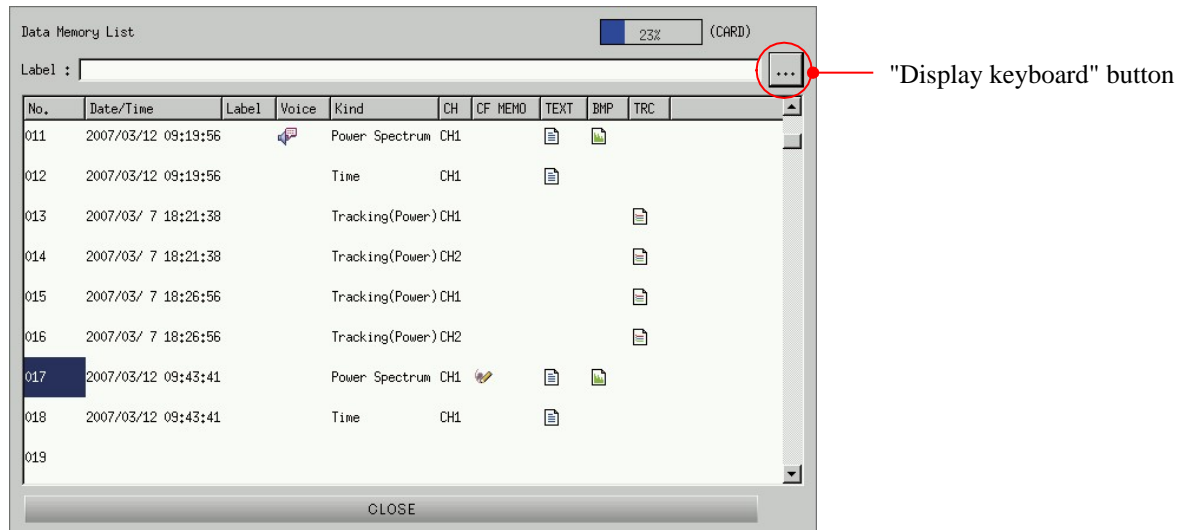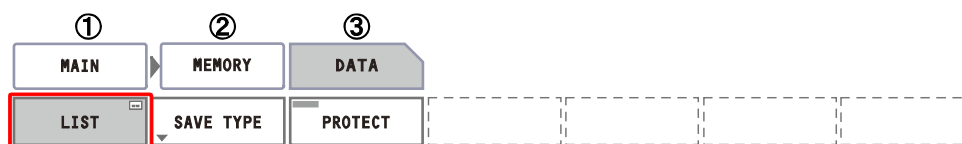
-5. Click on the lowest unused number to move the selection cursor (the files will be saved to this location).

-6. Click the "Display Keyboard" button to open the keyboard, and enter a note after "Label:" as appropriate (the label can be changed after saving the data).

-7. Click the 'SAVE' button to save the data.

-8. Click the [CLOSE] key to close the list window.

11. Reproducing data

-1. Press the keys in the order [MAIN] > [MEMORY] > [DATA]. Then, turn on the [LIST] key. This operation will display the list of the data files saved.


Selection cursor
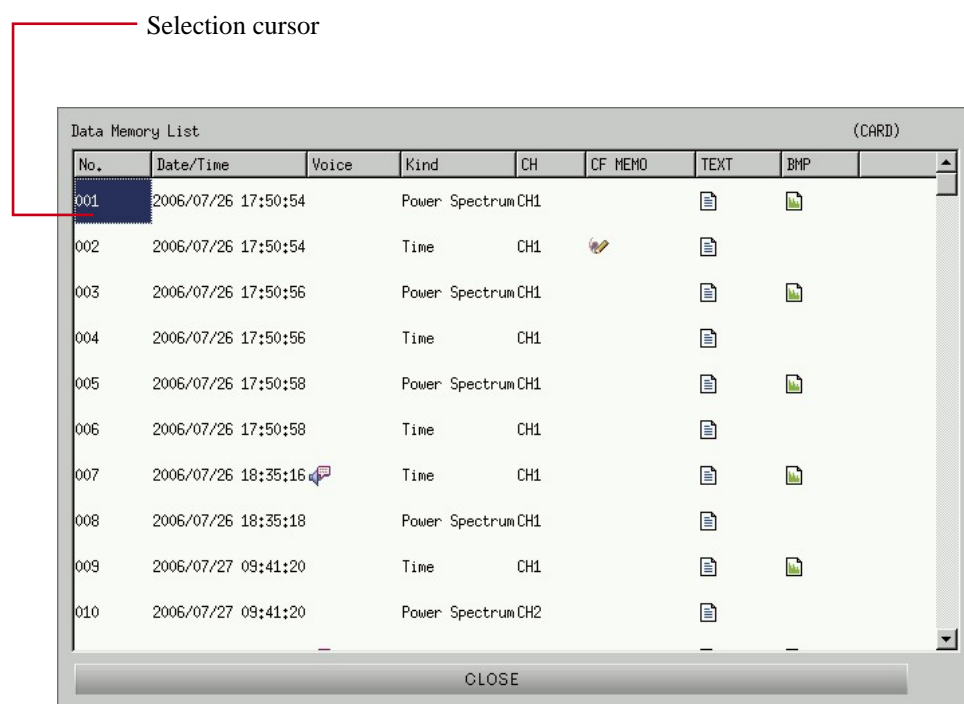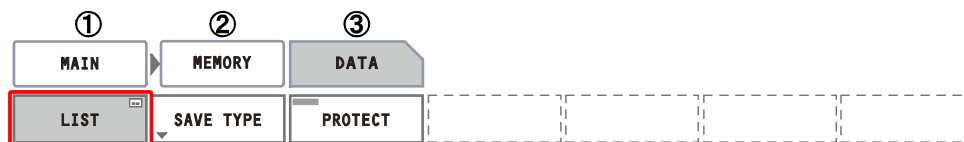
-2. Click the data number of the data to be reproduced.

-3. Press the 'LOAD' button on the operation panel. The data will be reproduced on the screen.

12. Copying saved data to a USB memory device

When copying the data in the CF card to a USB memory device, the data can be copied either selectively or entirely. Be sure to use a USB memory device type that has been verified for normal operation.
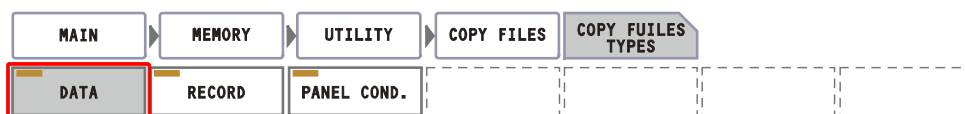
Manufacturer	Model	Capacity
Transcend	TS512MJF110	512 MB
Transcend	TS1GJF110	1 GB

-1. Insert the USB memory device. The USB icon will appear.

The USB icon will appear in the bottom right of the screen.
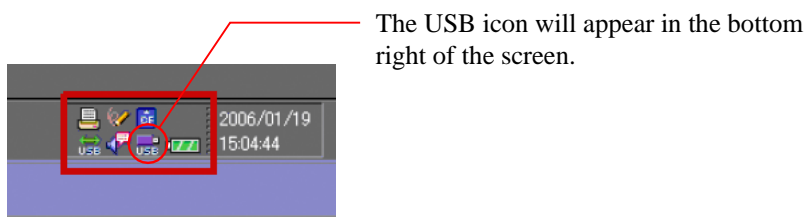
-2. Saving all data

①. Press the keys in the order [MAIN] > [MEMORY] > [UTILITY] > [COPY FILES] > [COPY FILES TYPES]. Then, turn on [DATA].


②. In the confirmation dialog box that appears when the [CARD => USB] key is set to ON after pressing the keys in the order [MAIN] > [MEMORY] > [UTILITY] > [COPY FILES], click [Yes] to start copying the files.

The following message will be shown while the files are being copied. Clicking the 'CANCEL' button will stop copying the data.

③. The following folders will be created in the USB memory device, and the data will be stored in the "block" folder.
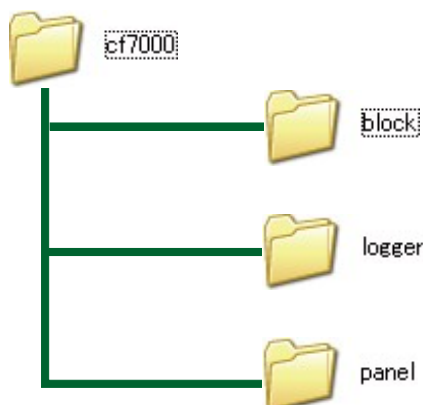
-3. Saving selected data sets

①. Press the keys in the order [MAIN] > [MEMORY] > [DATA]. Then, turn on the [COPY] key to show the "Copy Data Memory" window, which is used to copy the memory data.


②. First, click to open the [Source] menu (CARD/INT/USB) on the "Copy Data Memory" window and select "CARD" from the menu.
Then, click to open the [Target] menu (CARD/INT/USB) on the "Copy Data Memory" window and select "USB" from the menu. Lastly, click the data list number (No.) for the data to be copied. To cancel the selection, click again on the same number. You can select more than one data list numbers.
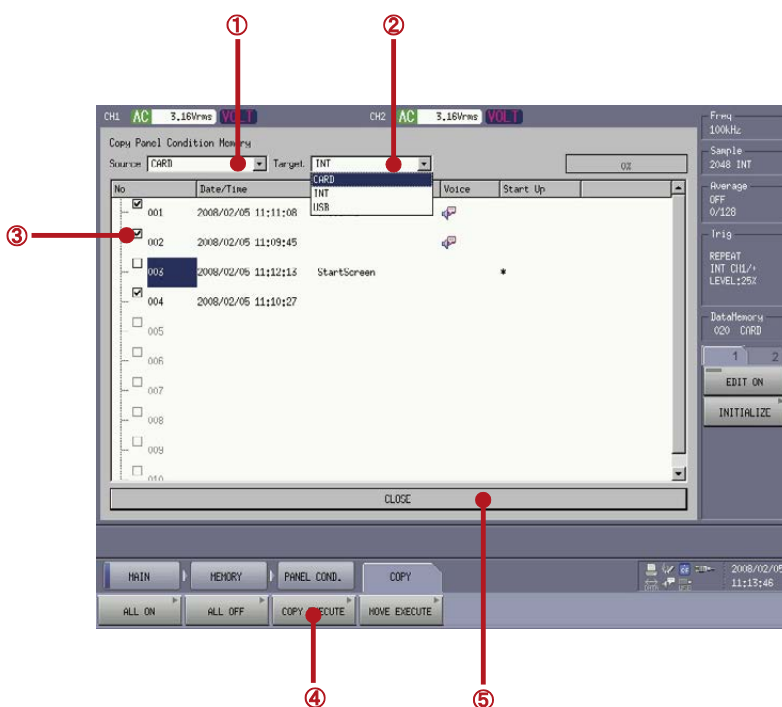
③. Click the [COPY EXECUTE] key to start copying the data.

-4. Removing the USB memory device

Press the keys in the order [MAIN] > [MEMORY] > [UTILITY]. Then, turn on the [REMOVE USB Memory] key to disconnect the USB memory device and turn off the USB icon in the bottom right of the screen.

The USB icon disappears from the bottom right of the screen.
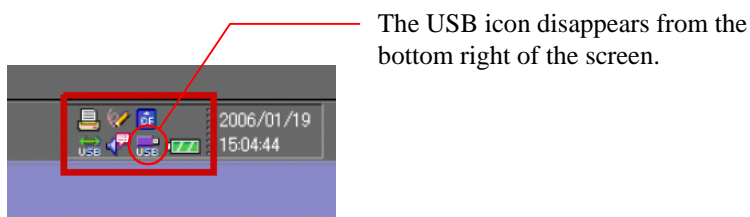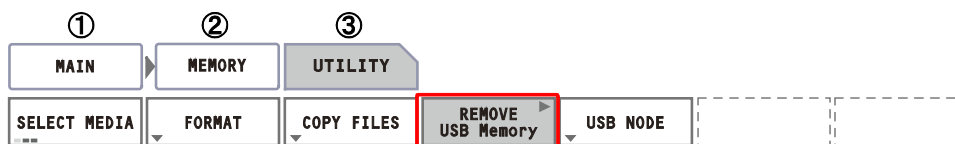
13. How to cancel the functions that have been set

In the above described operations, specific soft keys are turned on to enable various functions. If any function is to be canceled, click the corresponding key to turn it off. You can check the current settings from the parameters displayed in the periphery of the screen. To return to the default setting, refer to the operation procedures (Section 1-1).

14. Dual window display

You can display both time waveforms and spectrum using two windows. Use either of the following two methods for a dual window display:

● **Operation 1**
Press the buttons in the order 'SPECT' > SELECT' > 'TIME'. Press the SPECT button of CH1 to show the spectrum in one window. Further press the SELECT button to divide the window into two sub-windows. After that, press the TIME button of CH1 to display the time waveform. It results in the dual window of time and spectrum. In this way, you can use two windows (channels) to measure the data.

Note that touching on the upper window area will make the upper window active. When any saved data is reproduced, it will be displayed in the active window.
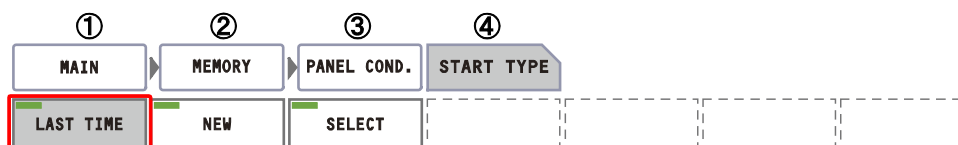
● **Operation 2**

Press the soft keys in the order [MAIN] > [DISPLAY] > [FORMAT] > [TYPE]. Then, turn on [DUAL] to show two windows. Make the upper window active and press the 'SPECT' button. Then, make the lower window active and press the 'TIME' button to obtain the dual window display of spectrum and time waveform.
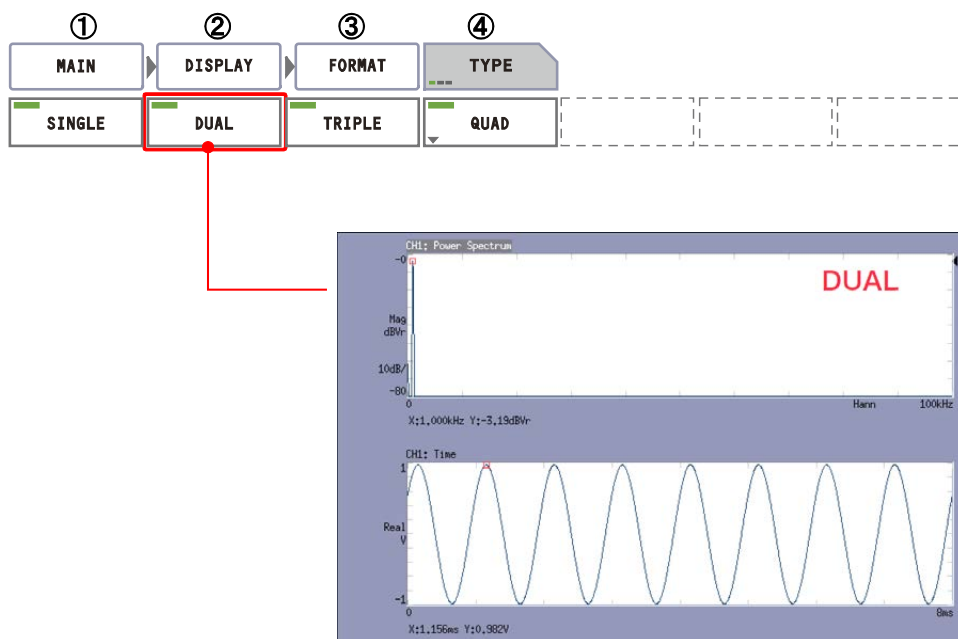
15. Power off

Press and hold the power button to finish the measurement. Note that the last measurement conditions will be reproduced when the power is turned on the next time.

Press the keys in the order [MAIN] > [MEMORY] > [PANEL COND] > [START TYPE]. Turn on the [LAST TIME] key and then turn off power.

The [NEW] key can be used to select the default setting. The default condition will be used when the [NEW] key is on. In this case, the system will be started up as described in the operation procedures in Step 1-1.