

CF-7200 Portable FFT Analyzer
Noise analysis procedure

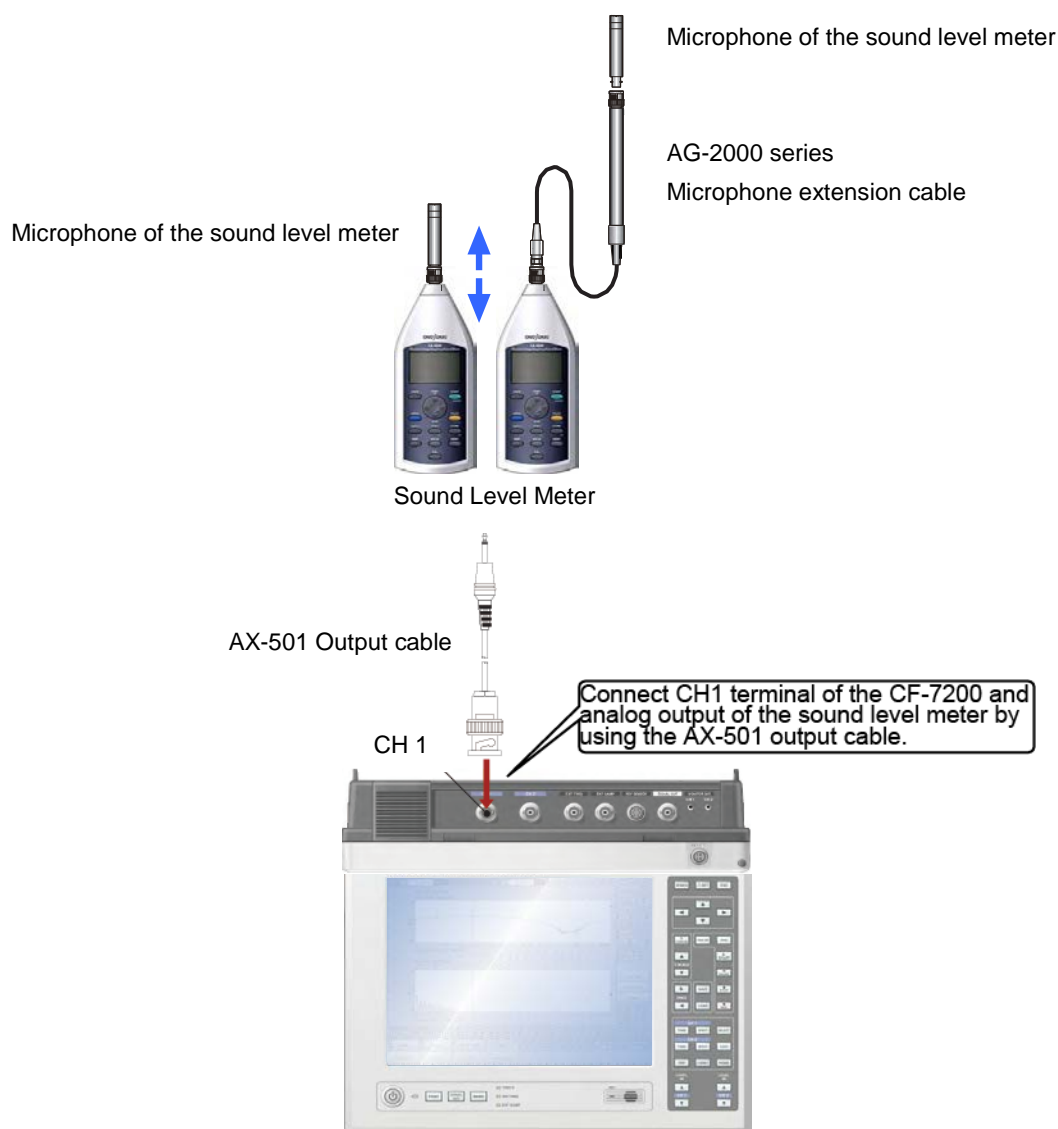
CF-7200 Portable FFT Analyzer

Noise analysis procedure

To perform noise analysis by using the AC out terminal of the sound level meter, operate unit calibration to enable reading the same unit as the sound level meter. This document describes the simple calibration method using the CAL signal [1 kHz, 94dB] from the sound level meter. This document also describes the simple method of power spectrum averaging measurement, octave display, and 3D display. The unit calibration in this document, the analog output of the sound level meter is connected to the CH1 of the CF-7200 and the level range is selected as 100 dB.

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.

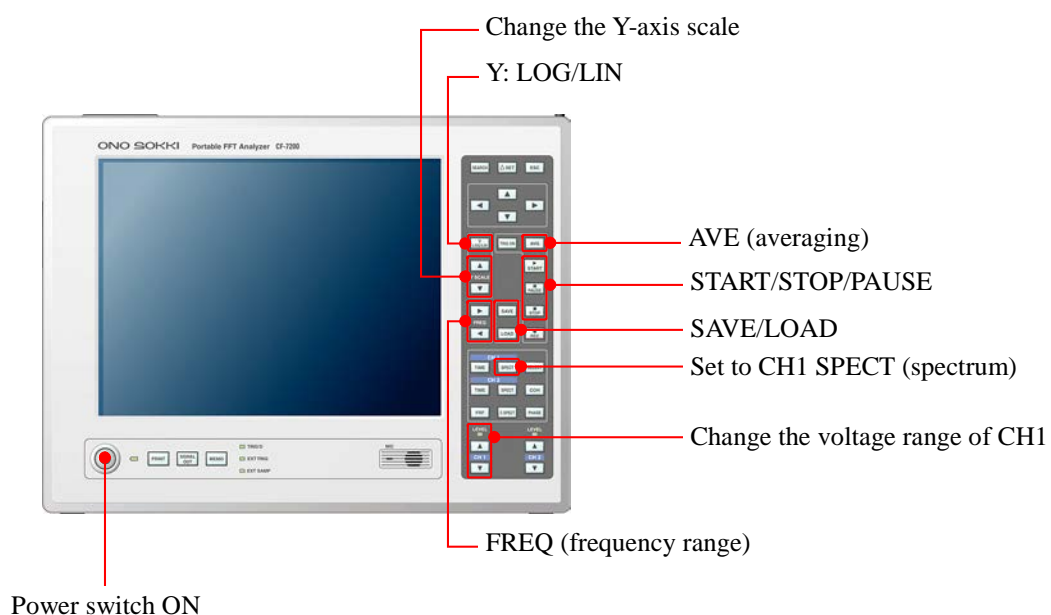
■ System Configuration



■ Operation Flow

- [1] Input the CAL signal of the Sound Level Meter
- [2] Turn on the START button
- [3] Display the spectrum
- [4] Setting the voltage range and frequency range
- [5] Unit calibration
- [6] Measurement and averaging
- [7] Dual window display
- [8] Octave display
- [9] Data reading by search-Peak list
- [10] Saving data
- [11] Reproducing data
- [12] Copying saved data to a USB memory device
- [13] 3D display
- [14] Useful functions

■ Buttons on Operation Panel



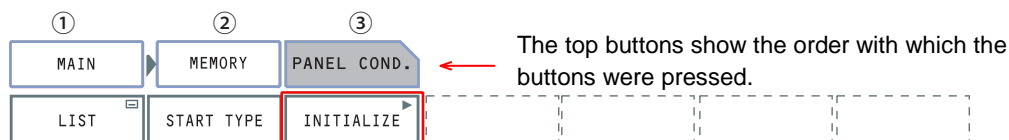
■ Operation Procedure

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].



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.

2. Connecting the Sound Level Meter

Connect the analog output of the sound level meter to the CH1 of the CF-7200 and select C-weighting, then press CAL button of the sound level meter.

The sound level meter outputs the internal calibration signal. The CAL signal of the sound level meter is frequency 1 kHz in general. The signal of -6dB is outputted according to the upper limit value of the selected level range and the dB value of it is displayed. The level range of the sound level meter is selected as 100dB, so -6dB of it is 94dB. The unit calibration of the CF-7200 is to match the overall value of the power spectrum and the displayed value (94dB) on the sound level meter.

Notes:

When 1 kHz of calibration signal (sine wave) is used for the calibration, the calibrated value are the same whichever of the frequency weighting of A, C or Z (flat) is selected. This is because 1 kHz is reference frequency and 0dB is a reference of the frequency weighting. When you perform calibration with the 250Hz calibrator, select the frequency weighting of C or Z.

3. Spectrum display

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

4. Setting the frequency range

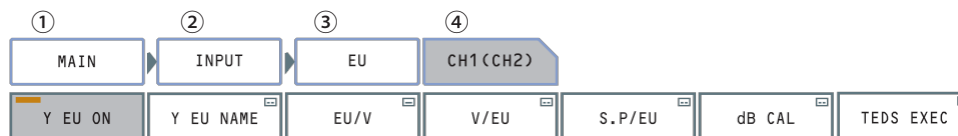
Use the up and down arrow buttons in the FREQ section of the operation panel to select the desired frequency range as indicated in the upper right corner of the screen. You should first select a wider frequency range to check the entire spectrum before selecting a suitable range.

5. Setting the voltage range

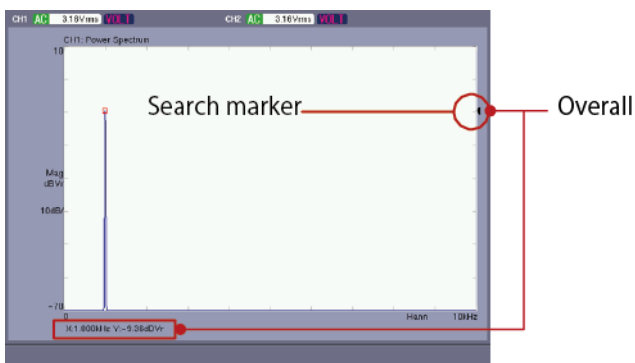
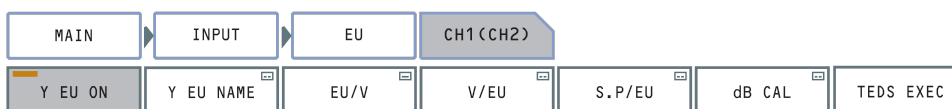
Use the up and down arrow buttons in the CH1 section on the operation panel to select a proper voltage range in such a way that the 'RANGE OVER' lamp does not turn on and the green lamp is on. (If you consider about the max. voltage output, it becomes 1 Vr range.)

6. Unit calibration

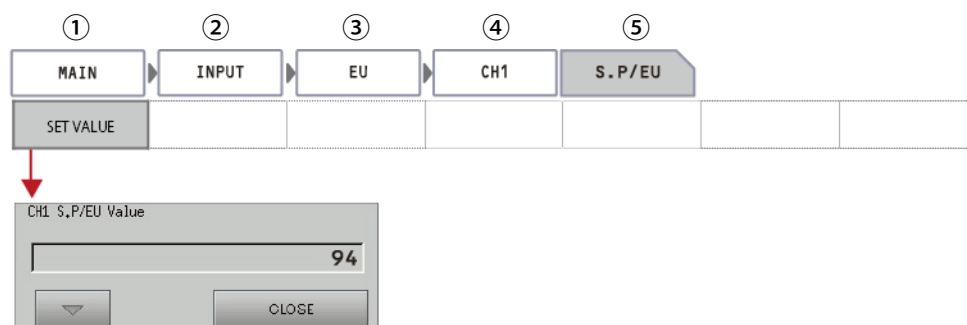
- 1. Press the keys in the order [MAIN] > [INPUT] > [EU] > [CH1] to turn ON the [Y EU ON] to enable the unit calibration function. (Default value of unit calibration value is 1.)



- 2. Press the keys in the order [MAIN] > [INPUT] > [EU] > [CH1] > [SP/EU] to open the SP/EU calibration screen.

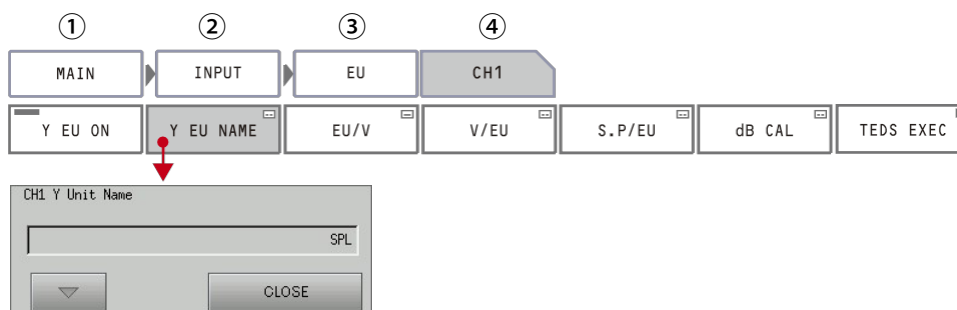


- 3. Turn ON the 'SEARCH' button on the operation panel and adjust the search marker to the overall value using the cross key. (See above figure)
- 4. Press the keys in the order [MAIN] > [INPUT] > [EU] > [CH1] > [SP/EU] to open the [SET VALUE] setting screen and input "94 (dB)" which is same as the displayed value on the sound level meter.



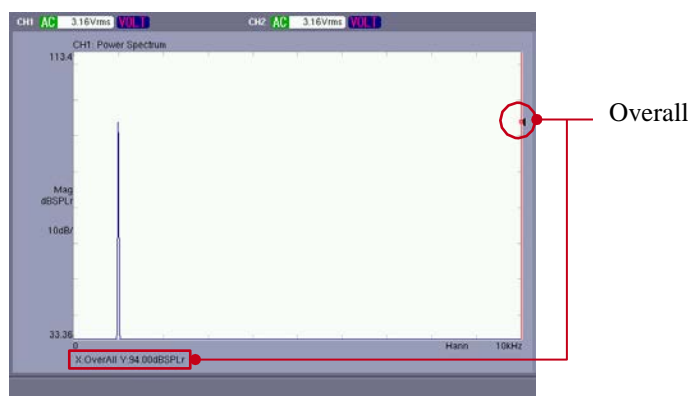
The overall value of the calibration screen is changed into “94 dBEU”. Click [CLOSE] to close the setting screen and return to the power spectrum measurement screen.

- 5. Press the keys in the order [MAIN] > [INPUT] > [EU] > [CH1] to open the [Y EU NAME] and input the arbitrary text, such as [spl (Sound Pressure Level)].



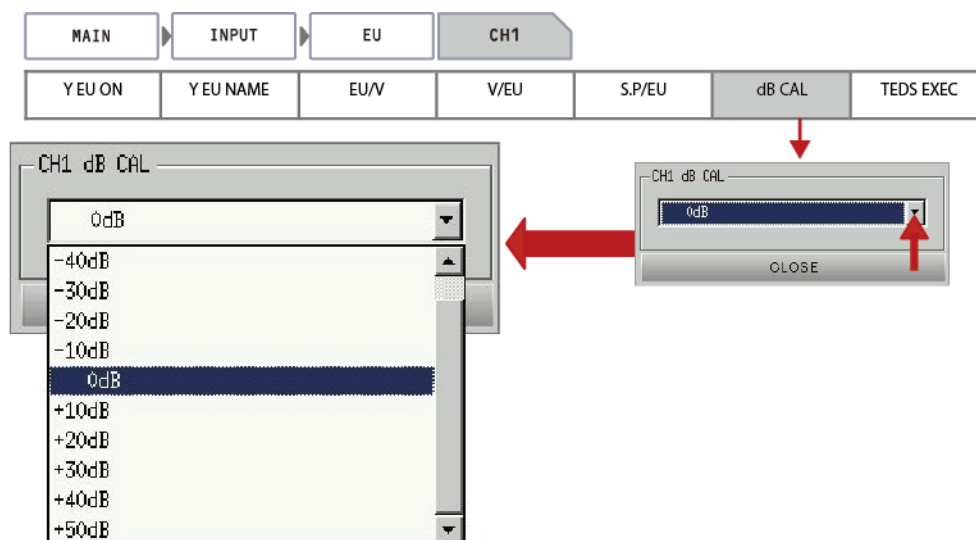
Click the [CLSE] button to close the setting screen. The display of [94 dBSPLr] and EU are changed to SPL. (SPLr of r stands for effective value. When nothing is entered to the Y EU NAME, r is not displayed. In this case, it displays 94 dB.)

- 6. Adjust the search marker to the overall and check that the value is changed to [94dBSPLr] in the measurement screen as well.



- 7. Press the CAL button of the sound level meter to turn OFF the calibration signal and return to the measurement state. Set the frequency weighting (A, C or FLAT) and time weighting (FAST) of the sound level meter for analyzing. There is an analog signal which passes through the frequency weighting (A, C or FLAT) depending on the type of sound level meter. Be careful with this matter.
- 8. When changing the level range of the sound level meter while measuring
When the level range of the sound level meter is changed after the unit calibration, it is necessary to change the range of the CF-7200 as well. For example, when the range is changed from 100 dB to 90 dB, the AC out is amplified by +10 dB and outputted. Set the correction value in the following operation to “-10dB”. Without this operation, 10dB larger than original value is displayed. It is necessary to perform this correction operation or another unit calibration when you change the range of the sound level meter. If you perform correction operation, please do not forget to return to the correction value to 0 dB for the next measurement.

Press the key in the order [MAIN] > [INPUT] > [EU] > [CH1] to open the [dB CAL] setting screen. Select [-10dB] from the pull-down menu and click [CLOSE] button to close the setting screen. -10 B correction has been made to the displayed data.



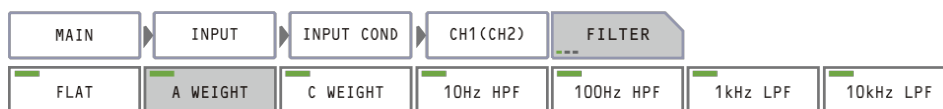
-9. How to apply the A-weighting filter

It is possible to apply A-weighting filter to the CF-7200 side instead of applying it to the sound level meter. There are two methods as follows. Please be careful not to apply frequency weighting to both sides of sound level meter and CF-7200.

Operation 1: Applying A-weighting filter to the input signal (Analog filter)

The input signal is AD converted by passing through the A-weighting filter.

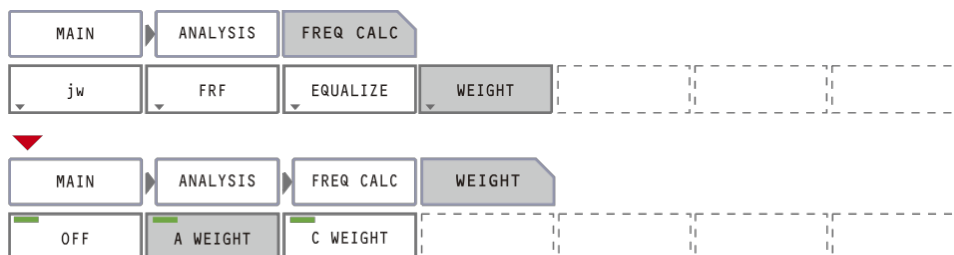
Press the keys in the order [MAIN] > [INPUT] > [INPUT COND] > [CH1] > [FILTER] and turn ON the [A WEIGHT].

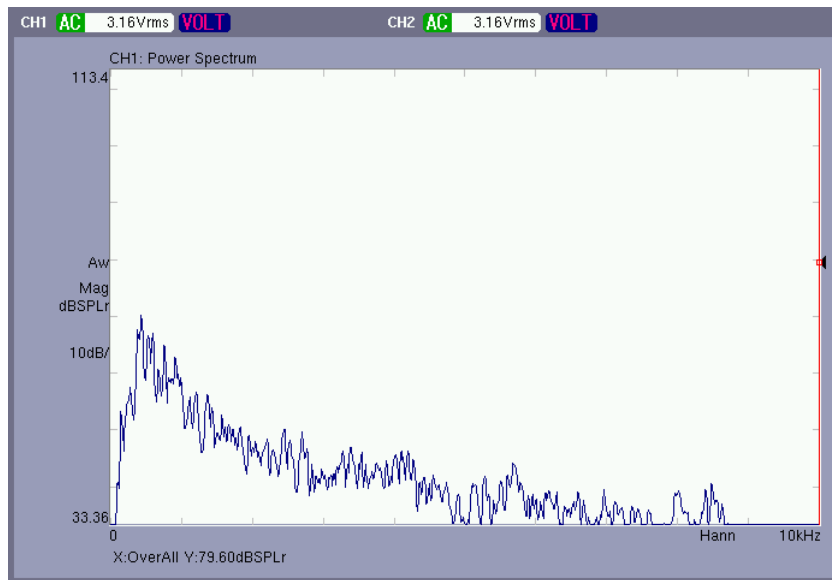


Operation 2: Applying A-weighting to the power spectrum (Digital filter)

Switching of the display which applies A/ C weighting or not applied any filter is possible in the power spectrum.

Press the keys in the order [MAIN] > [ANALYSIS] > [FREQ CALC] > [WEIGHT] to turn ON the [A WEIGHT]. This function is valid for the octave display in the following explanation.





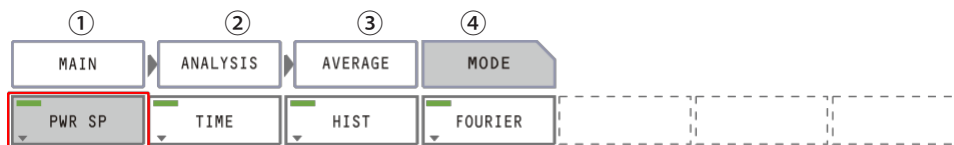
Frequency A-weighting setting waveform

- 10. Start the measurement with the 'START' button on the operation panel and stop the measurement with the 'STOP' button. Perform analysis in the arbitrary frequency range.

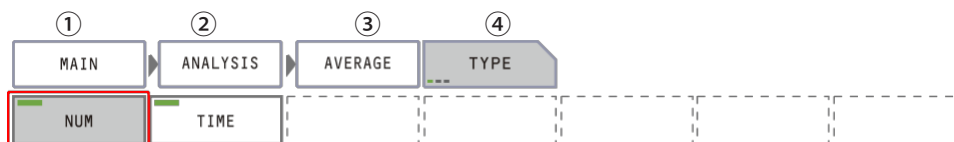
7. Measurement and averaging

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

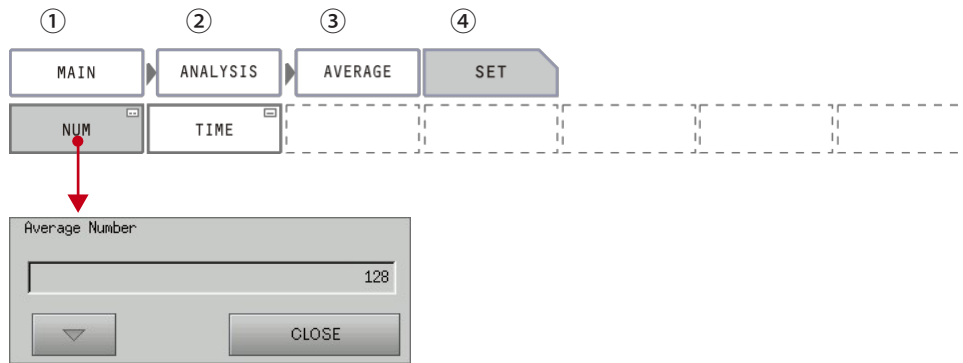
- 1. Press the soft keys in the order [MAIN] > [ANALYSIS] > [AVERAGE] > [MODE], and set [PWR SP] to ON.



- 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.

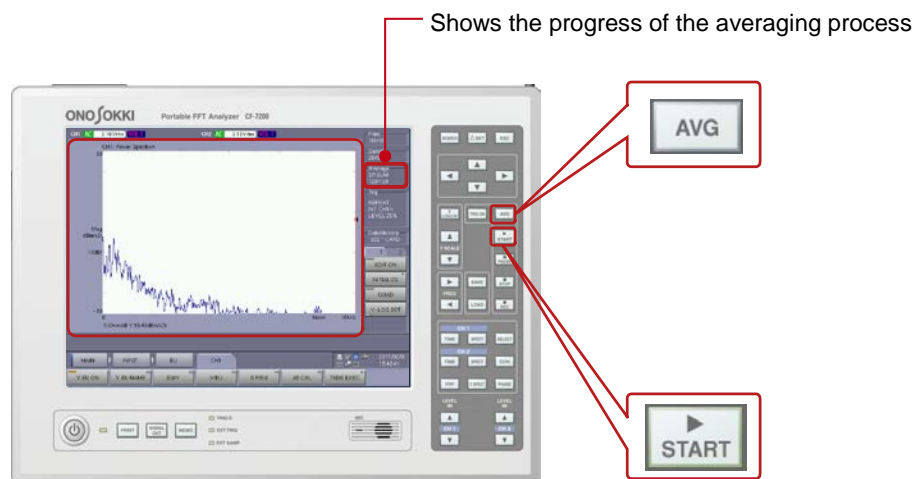


- 3. Enter the number of averaging times in the "Average Number" dialog box, which is displayed when [NUM] is set to ON after pressing the soft keys in the order [MAIN] > [ANALYSIS] > [AVERAGE] > [SET].



- 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.

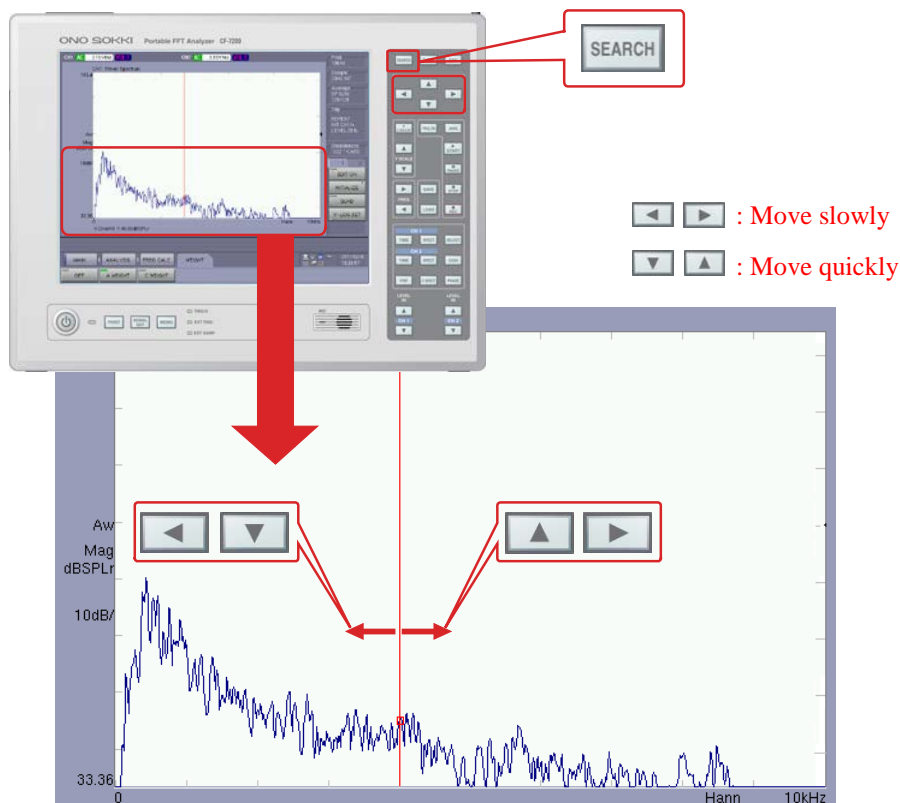


- 5. Pressing the 'START' button will repeat the measurement.

8. Reading data

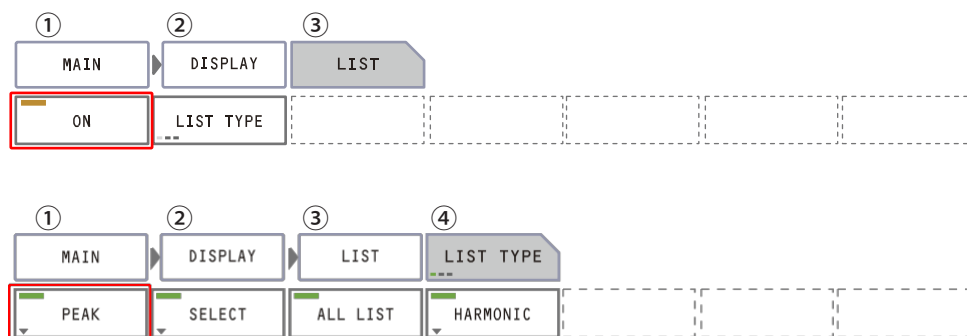
-1. Reading by searching

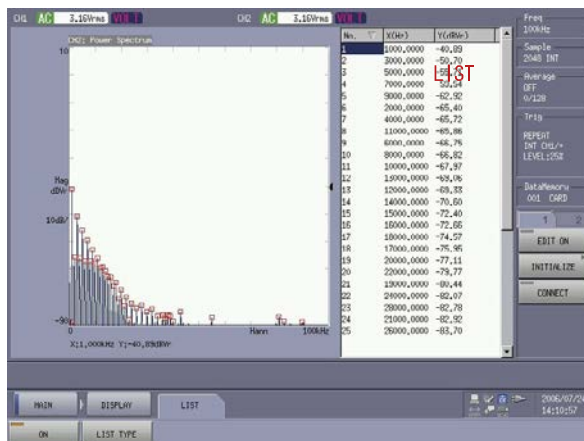
Press the 'SEARCH' button on the operation panel and use the right and left arrow buttons to move the search point. The X and Y values of the search point will be displayed. The up and down arrow buttons are used to more quickly move the search point.



-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.





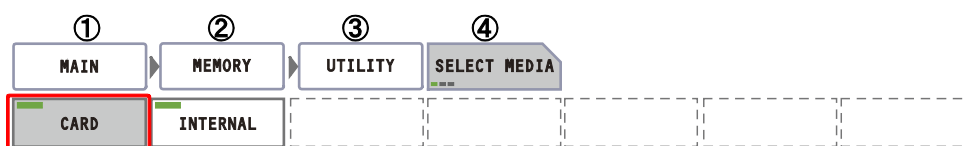
9. Saving data

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.

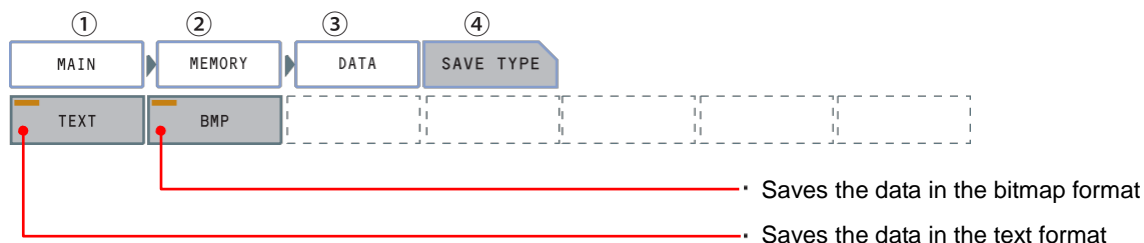
The memory function of the model CF-7200 has been significantly improved. It is now compatible with the CF (extension .dat), txt, and bitmap formats as well as voice memo and image snapshot functions. For details, refer to the reference guide.

- 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.



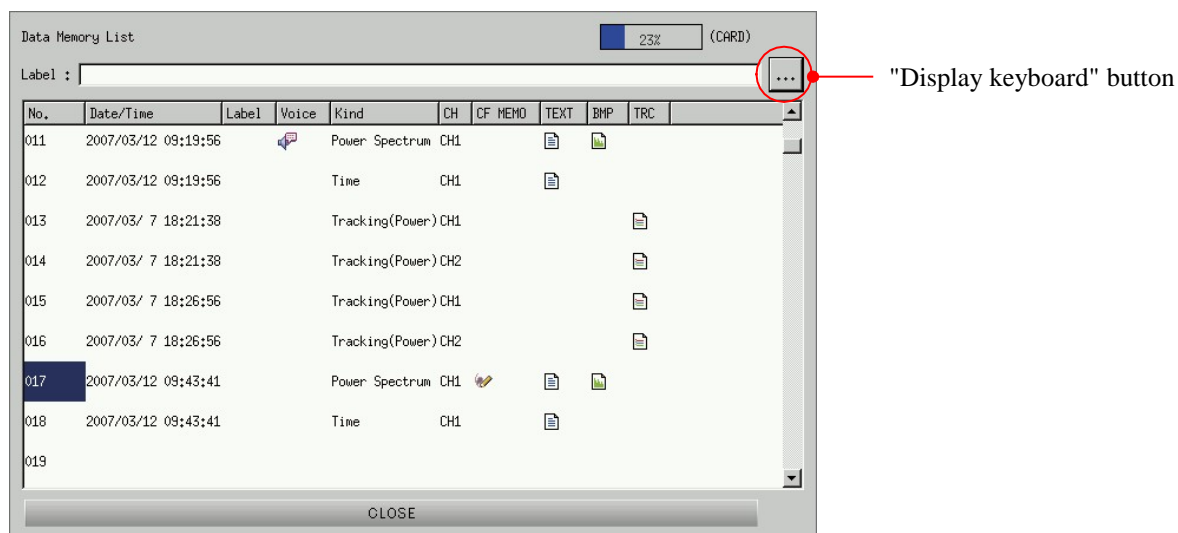
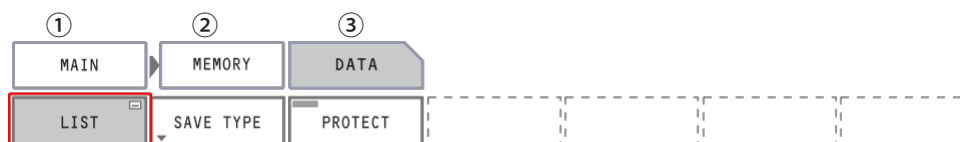
- 3. Select the type of the data to be saved.

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.



- 4. List display of the saved data

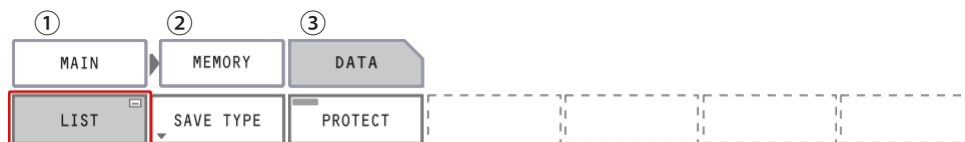
Press the keys in the order [MAIN] > [MEMORY] > [DATA]. Then, turn on the [LIST] key. This operation will display the list of the data files saved.



- 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.

10. 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

Data Memory List								(CARD)
No.	Date/Time	Voice	Kind	CH	CF MEMO	TEXT	BMP	
001	2006/07/26 17:50:54		Power Spectrum	CH1				
002	2006/07/26 17:50:54		Time	CH1				
003	2006/07/26 17:50:56		Power Spectrum	CH1				
004	2006/07/26 17:50:56		Time	CH1				
005	2006/07/26 17:50:58		Power Spectrum	CH1				
006	2006/07/26 17:50:58		Time	CH1				
007	2006/07/26 18:35:16		Time	CH1				
008	2006/07/26 18:35:18		Power Spectrum	CH1				
009	2006/07/27 09:41:20		Time	CH1				
010	2006/07/27 09:41:20		Power Spectrum	CH2				

The line which displayed icon shows that there is a data. In this example, the data is saved in both TXT and BITMAP formats. The data always saved in CF format (.dat).

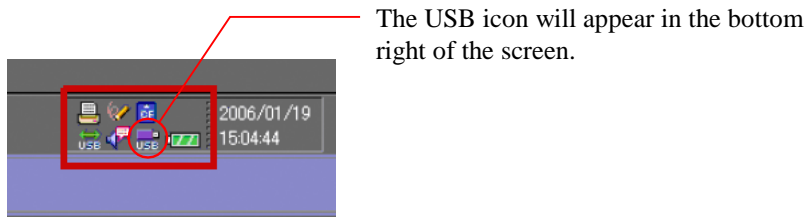
- 2. Click the data number of the data to be reproduced.
- 3. Press the 'LOAD' button on the operation panel. The data will be reproduced on the screen.

11. 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.

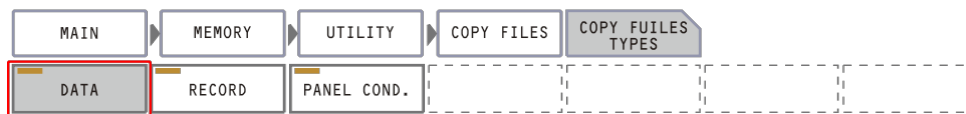
Manufacturer	Model	Capacity
Transcend	TS1GJF110	1 GB
Sandisk	SDCFH-2048-903	2 GB

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



- ## -2. Saving all data

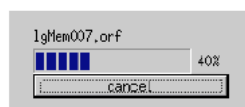
- ①. Press the keys in the order [MAIN] > [MEMORY] > [UTILITY] > [COPY FILES] > [COPY FILES TYPES]. Then, turn on [DATA].



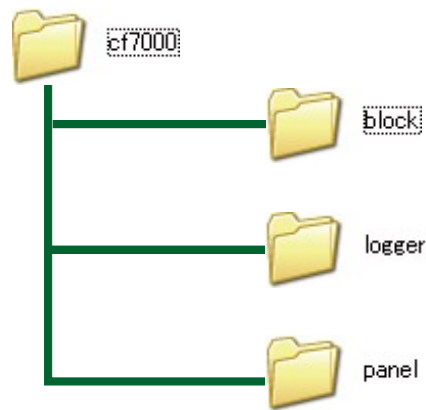
- ②. In the confirmation dialog box that appears when the [CARD => USB] key is set to ON after pressing the keys in the order [MAIN] > [MEMORY] > [UTILITY] > [COPY FILES], click [Yes] to start copying the files.



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.

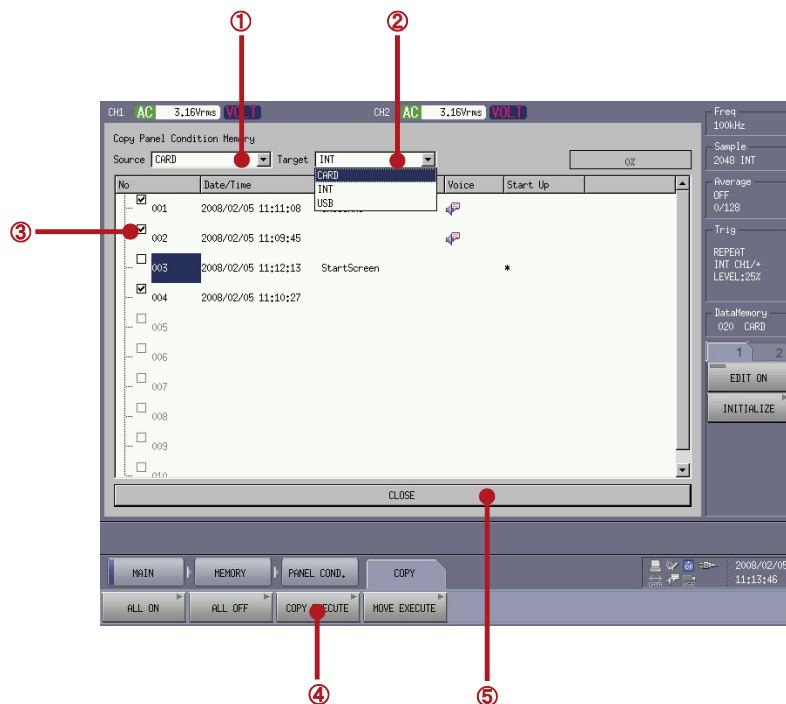


-3. Saving selected data sets

- 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.



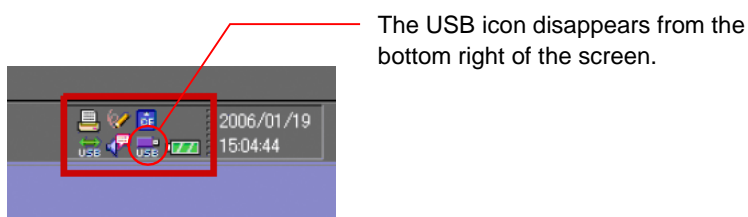
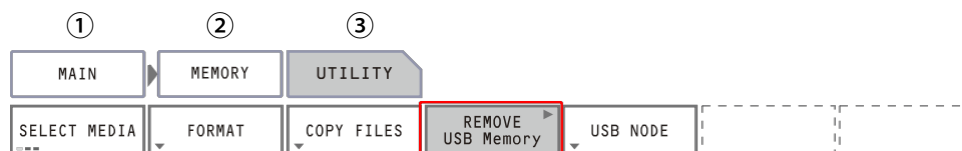
- ②. First, click to open the [Source] menu (CARD/INT/USB) on the "Copy Data Memory" window and select "CARD" from the menu. Then, click to open the [Target] menu (CARD/INT/USB) on the "Copy Data Memory" window and select "USB" from the menu. Lastly, click the data list number (No.) for the data to be 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.



12. 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:

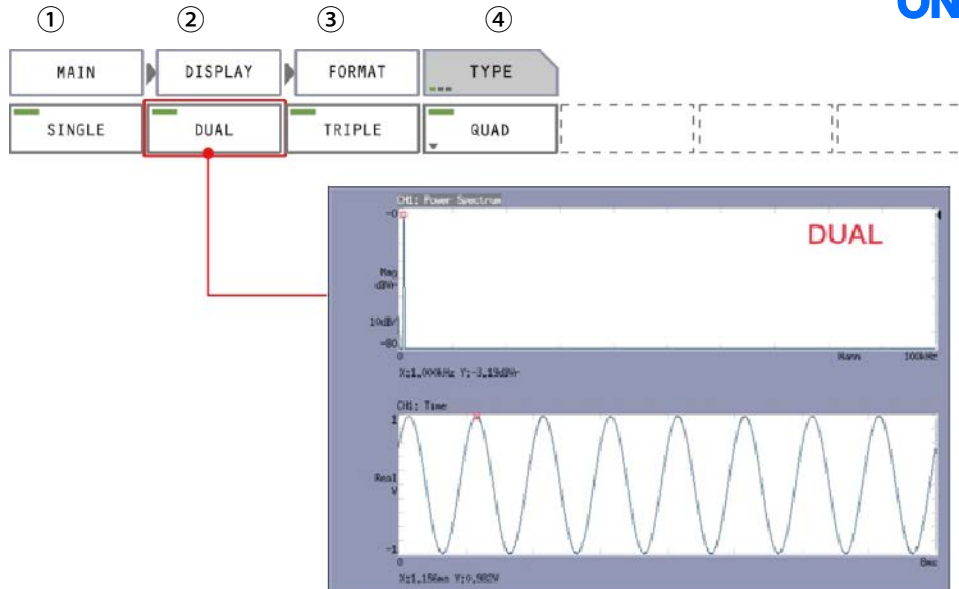
● Operation 1

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.

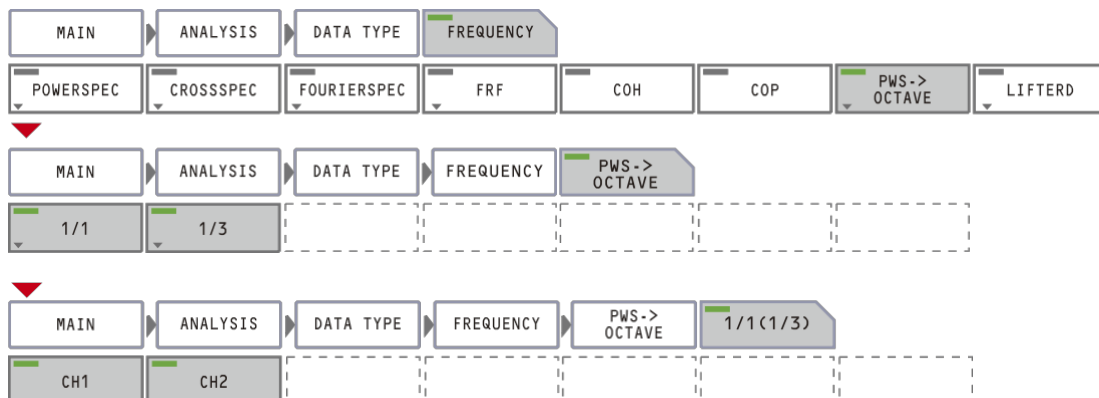


13. 1/3 octave display

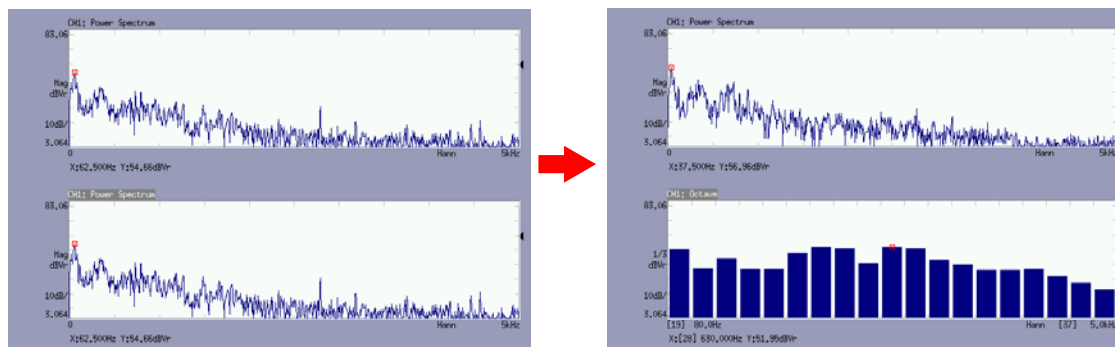
Octave display function is to display the bundled to 1/3 octave or 1/1 octave data which is based on the power spectrum. The displayed band (frequency band) is changed depending on the frequency range. Also, the displayed highest and lowest bands are insufficient data, so they are for reference.

-1 Press [SELECT] button to activate the lower screen (Check the indication of the SELECT button.) or touch the lower screen of the data area.

-2 Press keys in the order [MAIN] > [ANALYSIS] > [DATA TYPE] > [FREQUENCY] > [PWS] > [OCTAVE] > [1/1] or [1/3] to turn ON [1/3].



The following figure shows the 1/3 octave display in the lower screen and power spectrum in the upper screen.



-3 Saving the octave display data

Please refer to the “9. Saving data”. When the octave data is saved, an extension of “.dat” is saved the original data of power spectrum. “.txt” is saved octave data, but octave data cannot save as “.dat” data.

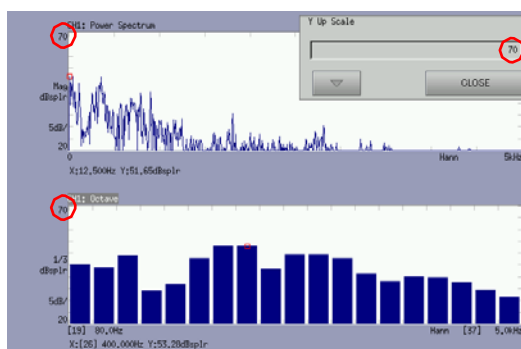
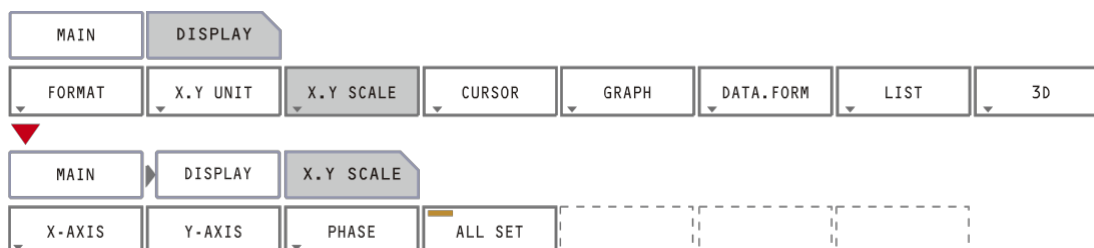
-4 How to cancel the octave display

After activating the octave screen by the [SELECT] button (with the indication of SELECT button), press [SPECT] button of CH1, and turn off the indication of the SELECT button.

14. Arbitrary setting of Y-axis scale

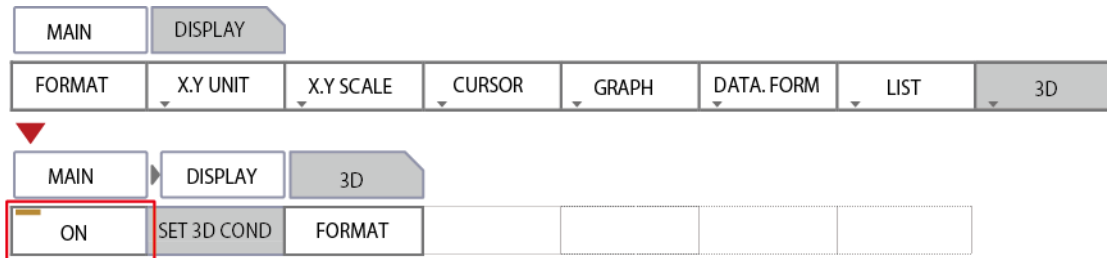
The following description assumes that the upper limit as 70dB and lower limit as 20dB.

Press the keys in the order [MAIN] > [DISPLAY] > [X Y SCALE] > [Y-AXIS] > [MANUAL] > [UP SCALE] / [LOW SCALE] to input upper limit value to 70 and lower limit value to 20.



15. 3D display

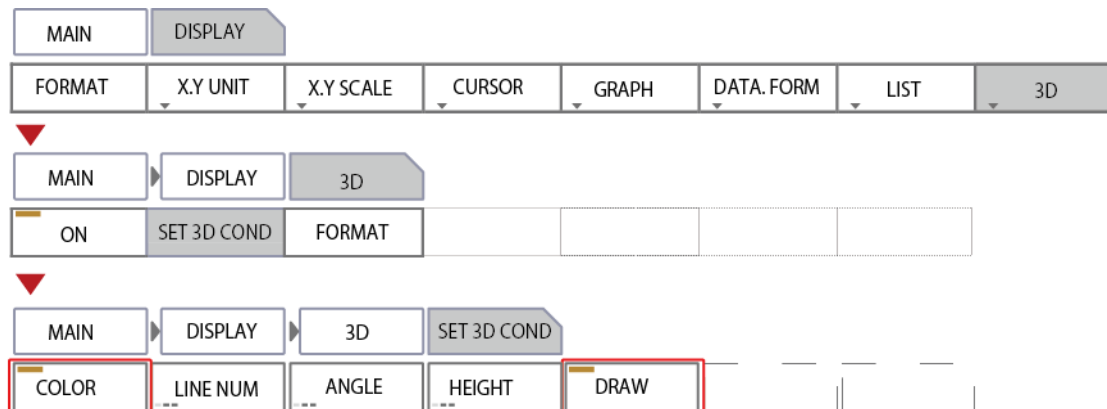
- 1. Display the power spectrum or 1/3 octave by referring the operation procedure 12.
- 2. Turn OFF the green light of the 'AVG' button of the operation panel to cancel the averaging function. When the 'AVG' is turned ON, the averaged data is 3D displayed.
- 3. Stop the measurement by pressing the 'STOP' button on the operation panel.
- 4. Press the keys in the order [MAIN] > [DISPLAY] > [3D] > [ON] to turn ON the 3D display.



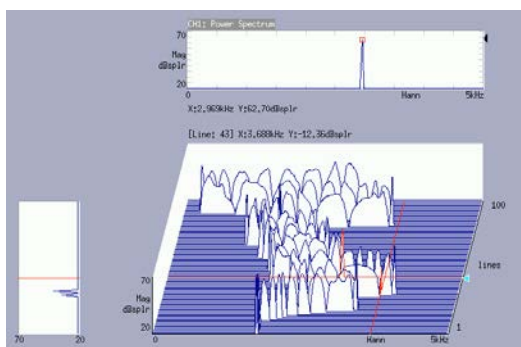
- 5. Turn ON the 'START' button on the operation panel and start measurement. The data is displayed in 3D.

- 6. The display method can be changed according to your requirement.

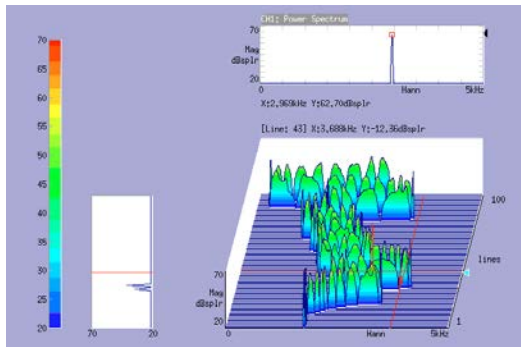
Press the keys in the order [MAIN] > [DISPLAY] > [3D] > [SET 3D COND] to select the display method with [COLOR] and [DRAW].



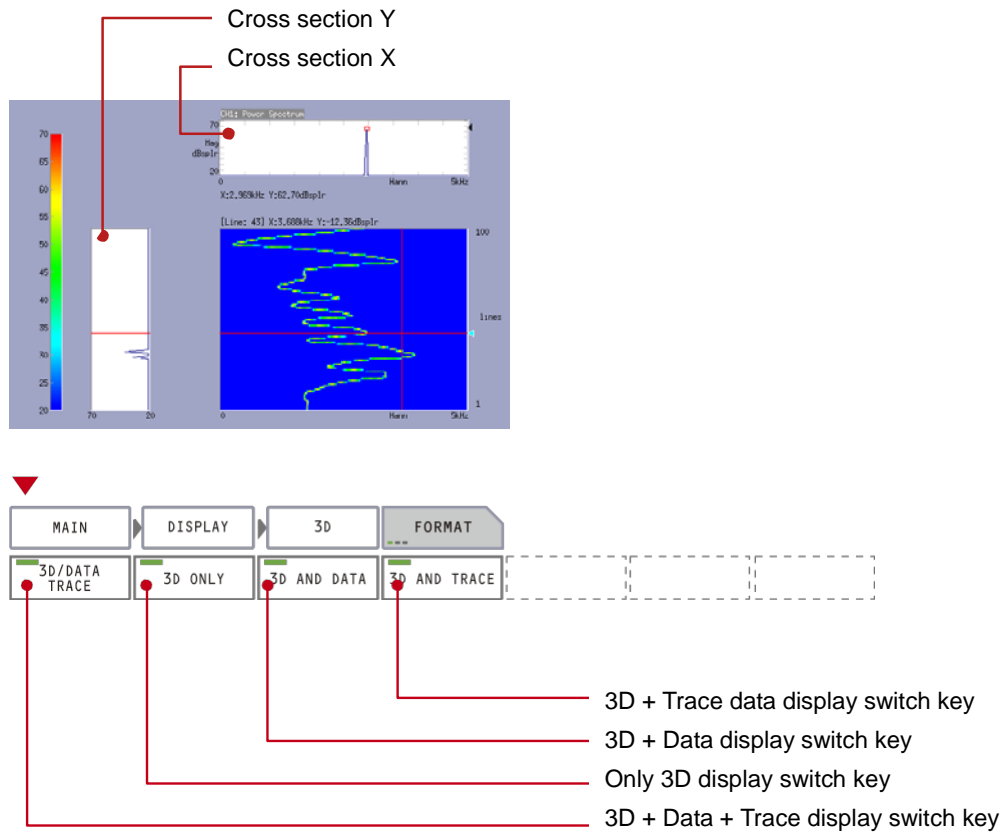
Example 1: Display of 'COLOR' OFF, and 'DRAW' OFF



Example 2: Display of 'COLOR' OFF, and 'DRAW' ON



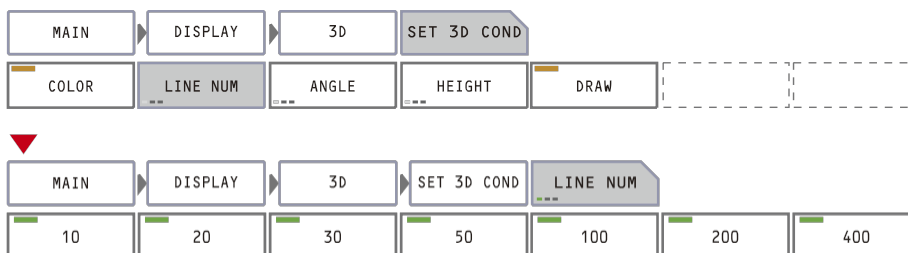
Example 3: Display of 'COLOR' ON (Both 'DRAW' ON/OFF are the same)



When the 3D data area is touched, the cross section of X and Y is displayed.

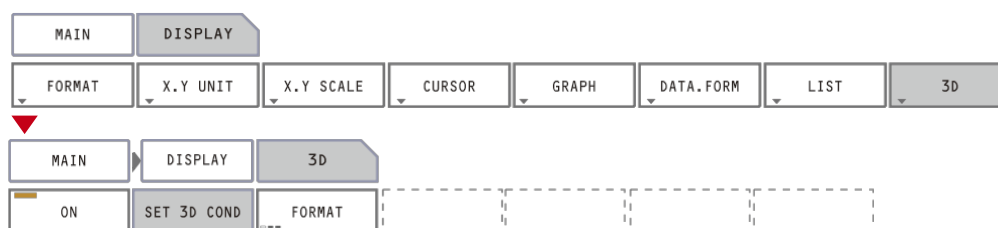
-7. Changing number of drawings

Press the keys in the order [MAIN] > [DISPLAY] > [3D] > [SET 3D COND] > [LINE NUM] to set the arbitrary line number (10 to 400).



-8. Switching the 3D data display format

Press the keys in the order [MAIN] > [DISPLAY] > [3D] > [FORMAT] to select the display condition.



-9. Saving the 3D data display is possible with “10. Saving data” operation. The spectrum data which is displayed in cross section is saved as “.dat” and “.txt” format, and the 3D data (multiple data) is saved as “.trc” format. “.trc” format can be opened in the 3D display.

Notes: 3D display of 1/3 octave data is possible but saving is not possible.

16. 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 of the parameters displayed in the periphery of the screen. To return to the default setting, refer to the operation procedures (Section 1-1).

17. Power off

Press and hold the power button to finish the measurement.

18. Other useful function

-1. How to start with the last measurement condition

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.

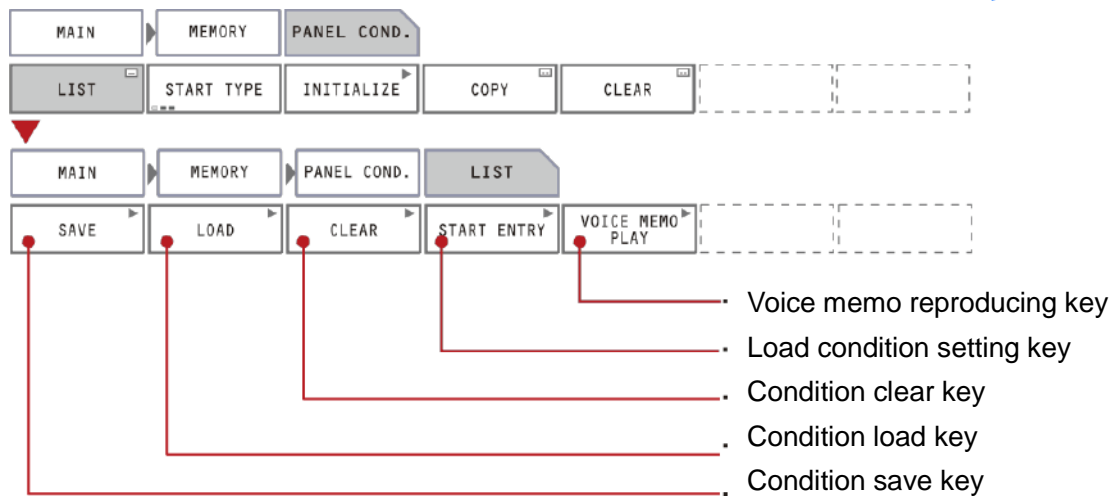


The [NEW] key can be used to select the default setting. The default condition will be used when the [NEW] key is on. In this case, the system will be started up as described in the operation procedures in Step 1-1.

-2. Saving the setting condition

Saving of the setting condition and reproducing are possible with the same operation as the “Saving data and reproducing”.

The setting condition is saved when press the keys in the order [MAIN] > [MEMORY] > [PANEL COND] > [LIST] > [SAVE]. Or the measurement setting condition is read out and set when you select “LIST” and press [LOAD] key.



-3 Shortcut key

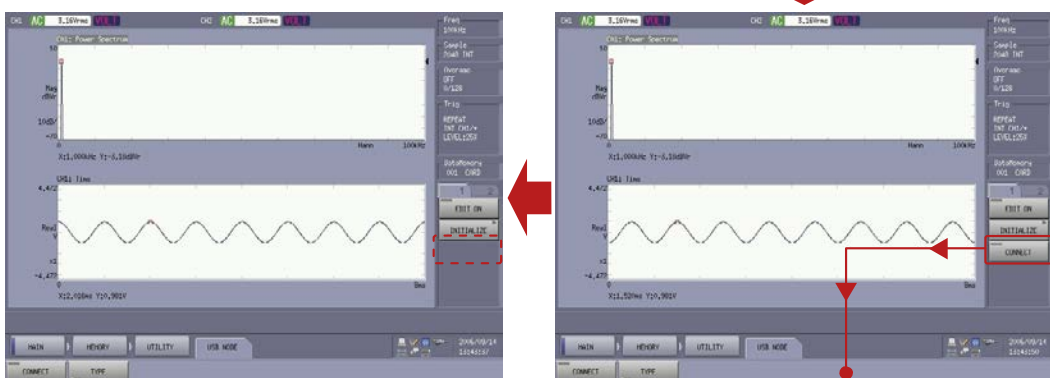
Registration of shortcut key in the panel screen is possible. It operates when you click the key which you registered. It is useful when you registered most frequently used key such as "INITIALIZE" key. There are two shortcut registration windows (1/2) in the CF-7200. Each of them can be registered up to 5 keys (10 in total). Those windows can be switched with the tab button.

Register the shortcut key



The key is registered when you drag it to the shortcut window.

Delete the shortcut key



Shortcut key is deleted when you drag it outside of frame.

<End>