

MEMORY RECORDER/ANALYZER**EDX-2000B****SOFTWARE****INSTRUCTION MANUAL**

Thank you for purchasing KYOWA's product EDX-2000B Memory Recorder/Analyzer.

Read this Instruction Manual carefully in order to make full use of the high performance capabilities of the product.

Do not use the product in methods other than described in this Manual.

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NOTATIONS USED IN THE INSTRUCTION MANUAL

For convenience, the following notations are used in this Instruction Manual for operating the EDX-2000B Memory Recorder Analyzer (hereinafter referred to as the EDX-2000B).

Precautions

Precautions for safe operation and reference information for correct handling are expressed as follows.

Example

Note

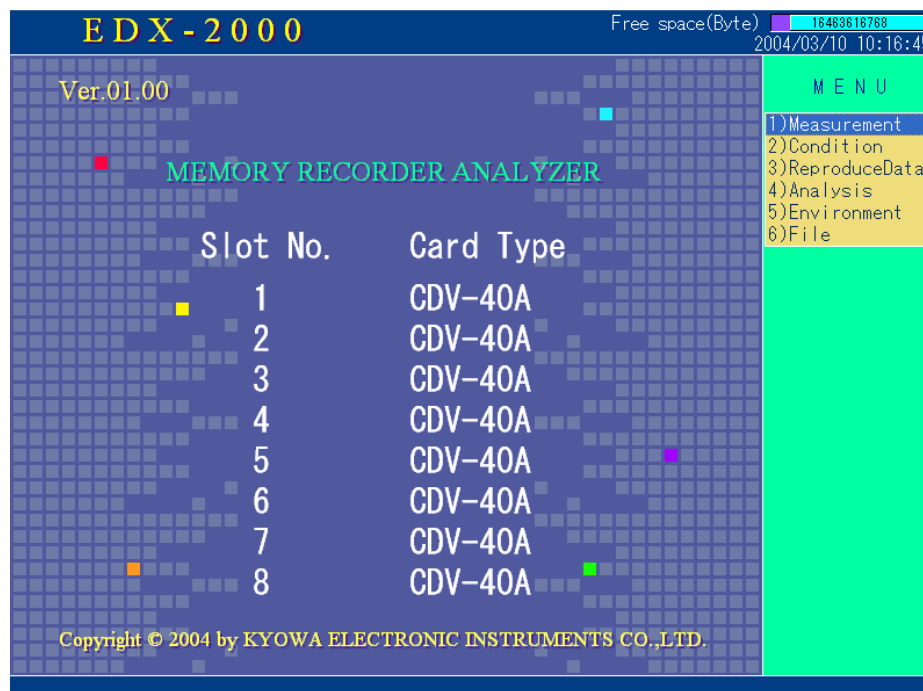
Essential instructions for handling the EDX-2000B are described.

MEMO

Reference information items for handling the EDX-2000B are described.

1. OUTLINE OF EDX-2000B

- The EDX-2000B is an all-in-one type Memory Recorder/Analyzer that is capable of displaying, recording, as well as analyzing data.
- Menu items for operating the EDX-2000B are always displayed on the screen right at all times. Select the menu item to move to the required function. History of the selected menu is displayed on the upper menu that allows easy handling and operation of the EDX-2000B.
- For recording data, the EDX-2000B starts measurement according to preset measuring conditions. Then, the measured data is monitor displayed and stored in the haddisk at the same time. In addition, since the EDX-2000B is capable of conducting histogram processing while recording data, whether the measurement is sufficient or not can be determined in real-time.
- While recording data, measurement available time is indicated on a bar on the upper screen that allows you to focus on the measurement without worry.
- The recorded data file is subjected to various processing such as displaying on a graph, editing, cutting out, etc. Moreover, since the measured data is converted into CSV format file data, it can be read by commercially available software.
- Analysis processing is classified into 4 types such as arithmetic operations, FFT analysis, histogram analysis, and differential/integral analysis. The recorded data is processed and confirmed as soon as it is recorded.
- Measuring and analysis conditions are saved in the respective files. By loading the previously saved files, you can conduct the desired processing with the same conditions at a later date.
- If you have any questions on operating the EDX-2000B, press [HELP] key and refer to the instructions for the required items.



Description of Main Menu Items (Basic Functions of the EDX-2000B)

Power ON to start up the EDX-2000B and the main menu screen appears as shown in the previous page.

The menu column has 6 basic menu items enabling you to select the desired menu for operating the EDX-2000B. (See Chapter 2 for how to select menu items.)

Here, functional outline of main menu is described.

- 1) <Measurement> Menu See Chapter 3
The <Measurement> menu serves to actually record data after setting measuring conditions of the next item.
Selecting the <Measurement> menu starts monitoring data and starts manual or automatic measurement at any time.
In addition, setting items that are frequently used during the measurement such as sampling frequency and monitor graph display conditions are set and changed by selecting the <Measurement> menu without selecting measuring condition menu in the next section.
- 2) <Conditions> Menu See Chapter 4.
The <Conditions> menu serves to set various measuring conditions, for example, input type, measuring range, filter, calibration coefficient, automatic measuring conditions, comment, etc.
- 3) <ReproduceData> Menu See Chapter 5.
The <Reproduce Data> menu is used for confirming recorded data on numeric or graphic display, editing data, cutting out data to be saved in a different file, converting data into CSV or Excel format files.
- 4) <Analysis> Menu See Chapter 6.
<Analysis> menu is capable of conducting the following 4 analyses processing to the recorded data.
 - (1) Arithmetic operations (4 Basic Operations)
Conducts arithmetic and functional operations between arbitrary channels in maximum 2 recorded data files.
The calculated results can be considered as the new data channel in the same manner as the general measurement recording channels.
 - (2) FFT Analysis See Chapter 7.
Conducts frequency analysis to the recorded data.
 - (3) Histogram Analysis See Chapter 8.
Conducts histogram processing to the recorded data.
 - (4) Differential/Integral Analysis See Chapter 9.
Conducts differential, integral, digital filter processing to the recorded data.
- 5) <Environment> Menu See Chapter 10.
The <Environment> menu serves to set basic environment such as setting default data folder, time and the like for operating the EDX-2000B.
- 6) <File Manage> Menu See Chapter 11.
Various data, for example, recorded data, setting condition parameters, analysis results, etc. are saved in the EDX-2000B as data files. The <File Manage> menu copies, deletes, changes, the above files.

Note

When using the EDX-2000B via Ethernet.

- The EDX-2000B is especially designed to serve as the measuring instrument solely by itself. Therefore, it is not equipped with defensive functions against computer virus, etc. and malicious software. When operating the EDX-2000B via Ethernet, do not forget to secure safety in the network system before use.

When using the EDX-2000B with USB port

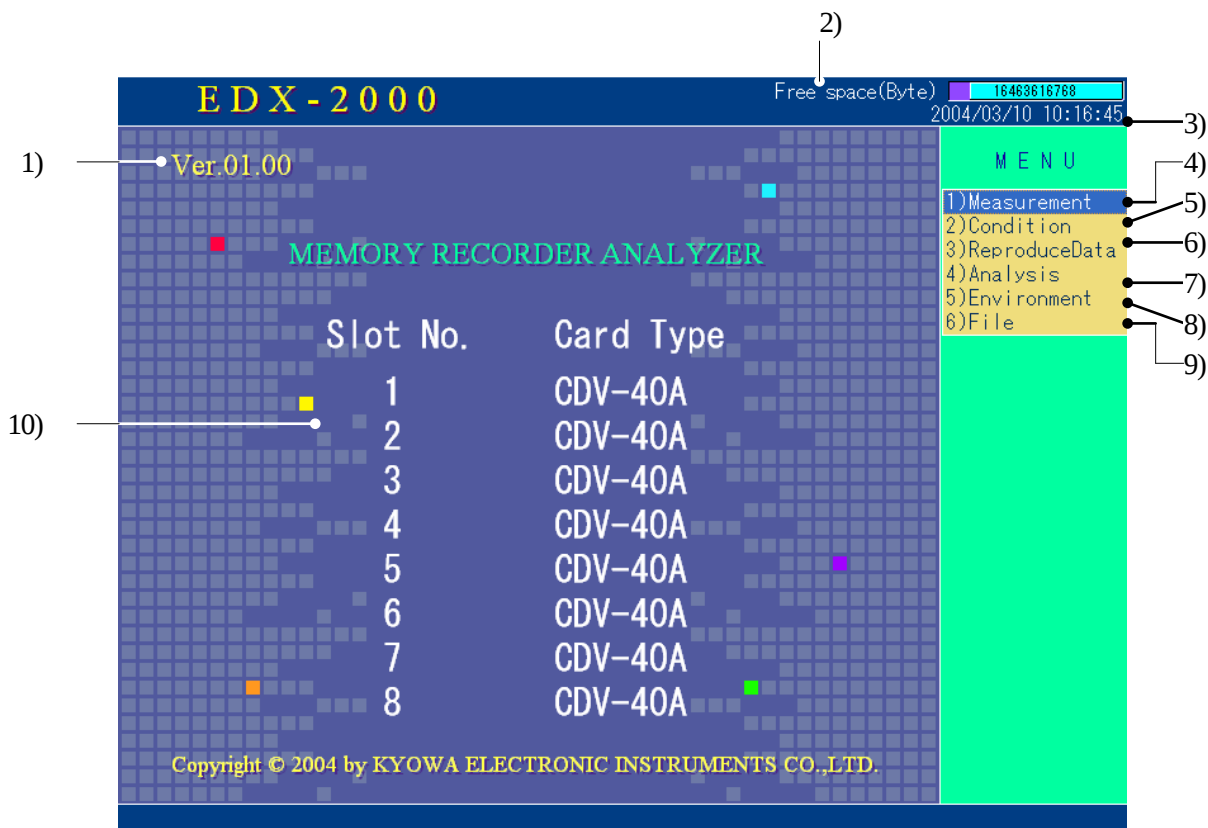
- USB port of the EDX-2000B is equipped based on the assumption that it is connected with general external memory units, for example, HDD, MO, etc. It should be noted that when connecting external devices (USB mouse, USB keyboard, etc.) other than the external memory unit, you cannot use the product that requires to assemble the new driver software. In addition, during the measurement, do not install or uninstall the external memory unit or external input operation device that are connected to the USB port. Or, measuring operation may be adversely affected to cause faulty operation.

2. DESCRIPTION OF COMMON OPERATION

This chapter is related to operations commonly used for the EDX-2000B.

2-1 MAIN MENU

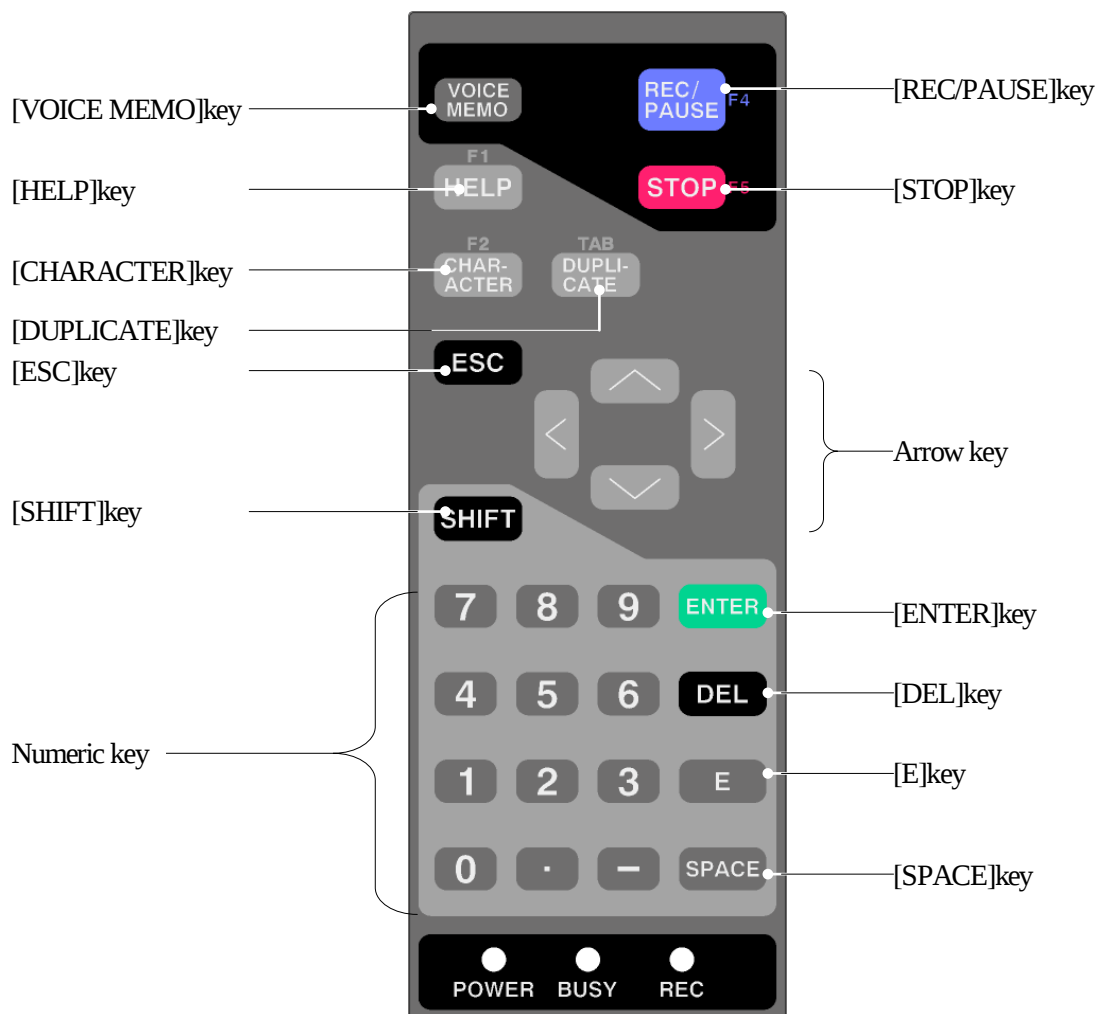
Power ON the EDX-2000B and the main menu appears. The main menu has 6 menu items, <Measurement>, <Conditions>, <ReproduceData>, <Analysis>, <Environment>, and <File Manage>. Select the required menu and move to the operating screen of the selected function. When the selected function is terminated, it returns to the main menu screen once again.



- 1) Software version
- 2) Free Space Indicate free space of the built-in hardware disk.
- 3) Current date and time. Can be changed by selecting <Environment> main menu.
- 4) <Measurement> Conduct measurement.
- 5) <Condition> Set various conditions for measurement.
- 6) <ReproduceData> Graphically displays or edits the recorded data.
- 7) <Analysis> Conduct arithmetic operations, FFT analysis, histogram analysis, and differential/integral analysis to the recorded data
- 8) <Environment> Set environment for operating the EDX-2000B.
- 9) <File> Conduct recording data file operation.
- 10) Conditioner card names that are inserted into each of the slots.
The slot with “***” displayed means that the conditioner is not installed.

2-2 DESCRIPTION OF PANEL KEYS

■ External View of Panel Keys



■ Various Applications of Panel Keys

- [VOICE MEMO] key Only when pressing this key while recording data, voice recording is allowed. In addition, pressing this key while reproducing data allows to play back the voice data.
- [REC/PAUSE] key Starts or pauses recording data. When using the external keyboard, the 'F4' key is relevant to this key.
- [STOP] key Stops recording data. When using the external keyboard, the 'F5' is relevant to this key.
- [HELP] key Pressing this key with the cursor on the menu displays a help screen corresponding to the menu. When using the external keyboard, 'F1' key is relevant to this key.
- [CHARACTER] key Pressing this key when entering character string displays a window that can select alphanumeric symbols. In addition, pressing this key when displaying the window clears the window. When using the external keyboard, 'F2' is relevant to this key.

[DUPLICATE] key..... When entering items, item of the cursor position is copied to the next line.
When using the external keyboard, TAB' key is relevant to this key.

[ESC] key..... Cancels the current item and shifts up to one menu above.

Arrow keys..... Moves the cursor.

[SHIFT] key..... Pressing [SHIFT] key together with the other keys enables to expand the
operating function. For example, press this key together with arrow keys when
moving the cursor and the cursor moving amount is increased.

Numeric key Used for entering numeric values.

[ENTER] key..... Used for determining as well as selecting items.

[DEL] key When entering characters, pressing this key deletes one character on the cursor
position.

[E] key..... Used for entering calibration coefficient, exponents, etc.

[SPACE] key When entering character strings, press this key to input a blank.

2-3 HOW TO OPERATE SCREENS

This section details basic operations commonly used in each of the operating screens.

There are 2 ways to operate the EDX-2000B, that is, operation from panel keys and operation from the keyboard (separately sold).

2-3-1 How to Select the Menu

How to select the desired menu is described.

■ Selection by Arrow Keys

Move the cursor to the desired item with [↑] or [↓] key and press [ENTER] key.

■ Selection by Alphanumeric Keys

Press an alphanumeric key located on the head of the desired item.

Note that you cannot input alphabets from the panel keys.

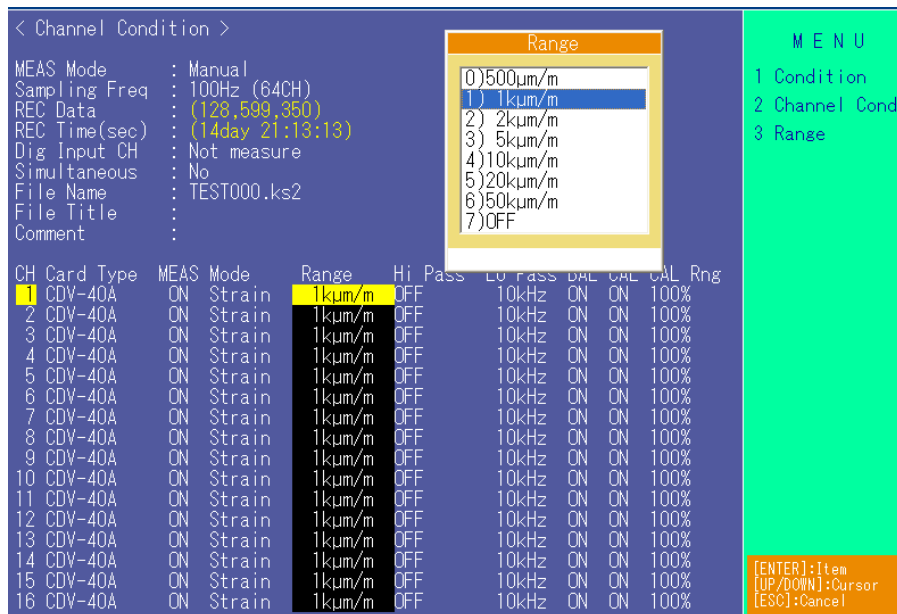
■ Other Methods

Press [0] or [ESC] key to move to the menu one step above.

2-3-2 How to Select Window Displayed Item

How to select items listed on the window is described.

■ How to Select Character Strings on the Window



1) Move the cursor to the desired item with arrow keys and press [ENTER] key.

Or, input alphanumeric displayed on the item head.

2) Note that you cannot input alphabets from the panel keys. (Alphabets are allowed only from the external keyboard.)

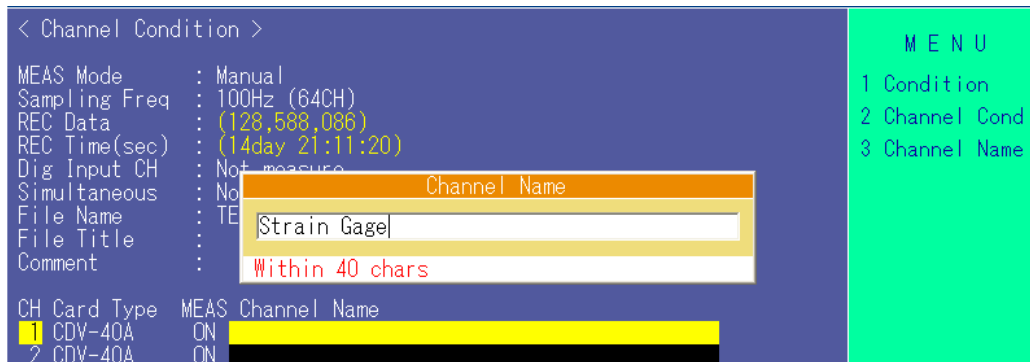
An item selected from the listed items on the window is displayed on the cursor position on the screen.

2-3-3 How to Input Character String

How to input character strings of a file title, comments, etc. is described.

■ How to Input Character Strings

- 1) Before entering the character strings, move the cursor to the desired item with [↑] or [↓] key and press [ENTER] key or input the desired character string in the following input window that is displayed by selecting the input items.



● Key Operations of Character Input Window

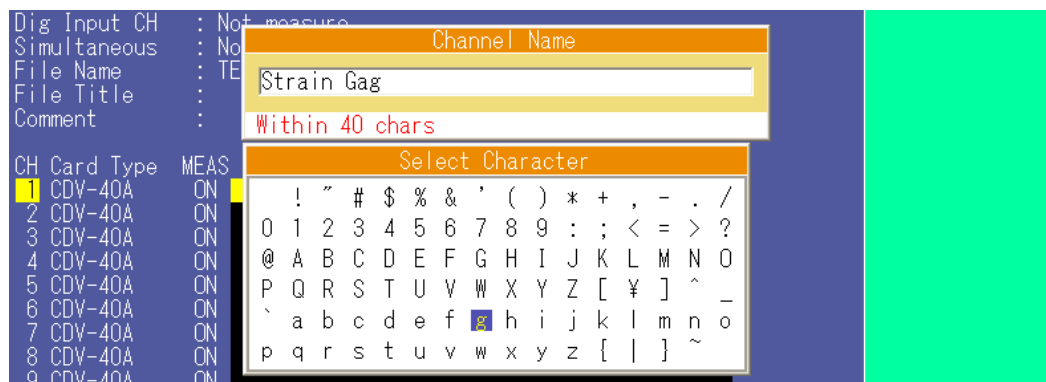
Arrow keys..... Moves the cursor.

[ENTER] key..... Select characters on the cursor position.

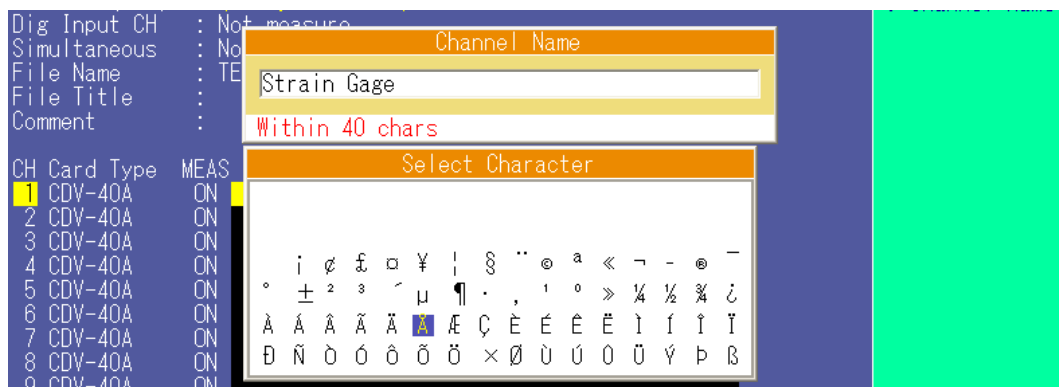
[ESC] key..... Cancels the character input window and returns to the item selection screen.

[DEL] key..... Deletes 1 character on the cursor position in the character input window.

- 2) When entering alphabets or symbols that are not on the panel keys, press [CHARACTER] key while the above window is displayed. Then, the following character string input windows appears.



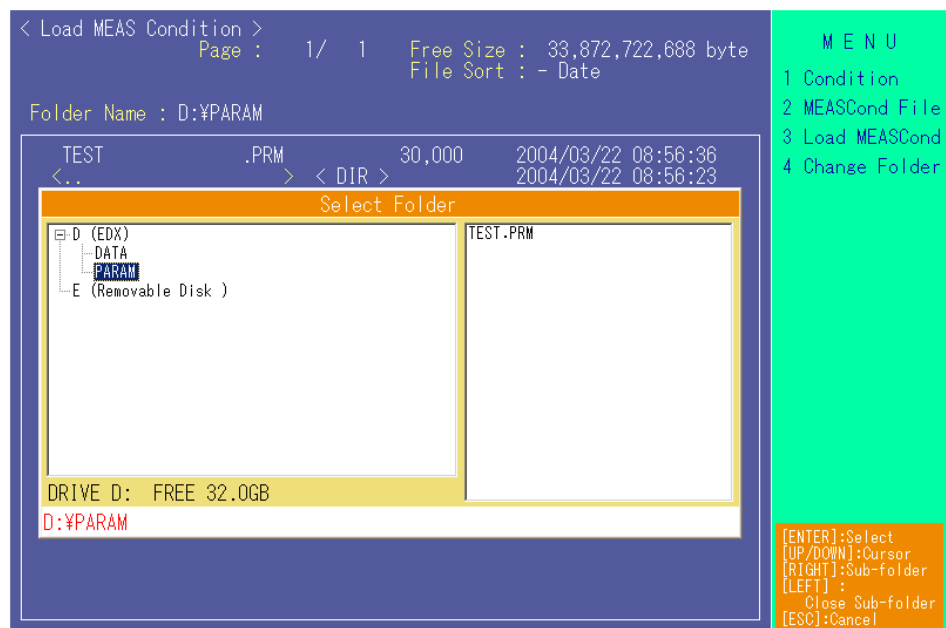
In addition, press [CHARACTER] key once again to select symbols.



- 3) Move the cursor to the desired character with arrow keys and press [ENTER] key.
The selected character is displayed on the character input window.

■ How to Select/Change Folder Name

- 1) Press [SHIFT] + [CHARACTER] key with a folder name input window displayed. The following “Select Folder” window appears.
- 2) Move the cursor to the target folder name with [↑] or [↓] key and press [ENTER] key.



2-3-4 How to Copy Character String

How to copy the entered or selected character string is displayed.

■ How to Copy Character String

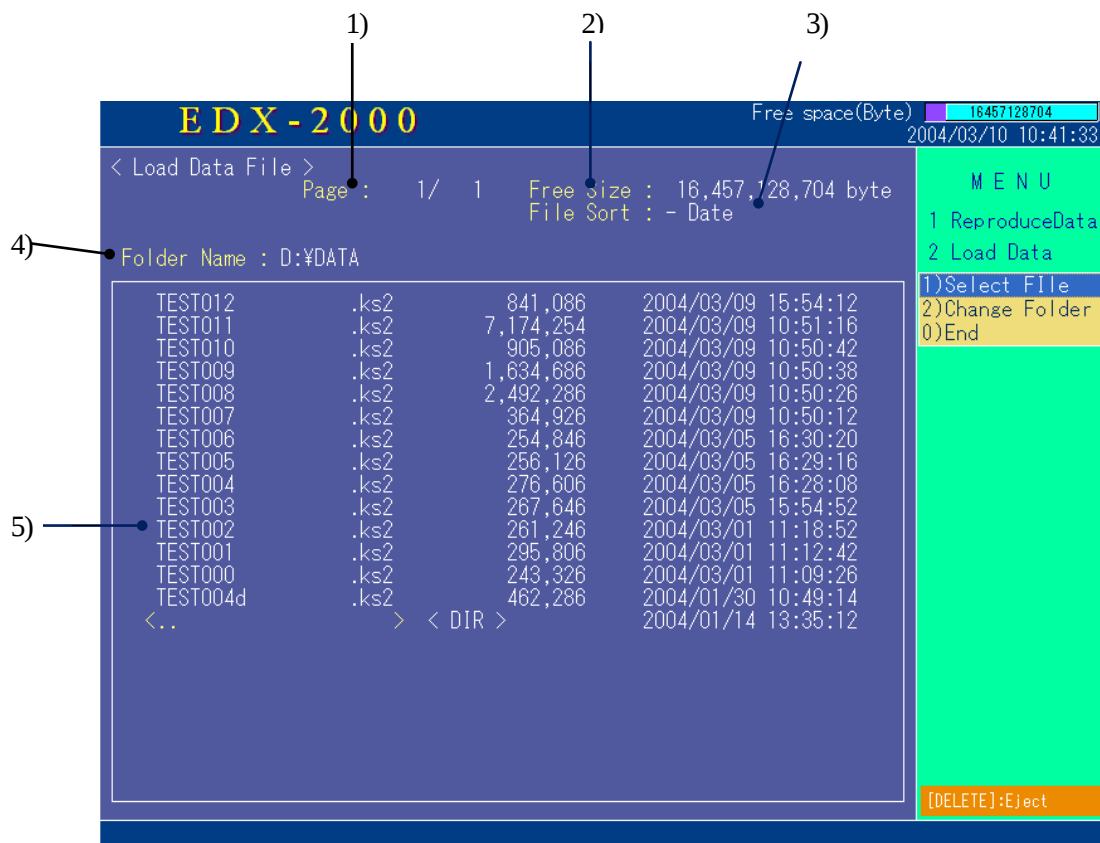
- 1) When the character select window or input window is displayed, press [ESC] key and close the window.
- 2) Move the cursor to the desired position with [↑] or [↓] key.
- 3) Press [DUPLICETE] key and desired contents of the cursor position is copied to an item (1 step below) in the next channel and the cursor moves to 1 line below.

2-3-5 How to Select the File

How to select files such as measured data file, condition file, etc. is described.

■ File Selecting Base Screen

Ex. Data File Selecting Screen



- 1) "Page" Current page/all pages. "1/5" means that 1 page out of total 5 pages is currently displayed.
- 2) "Free Size" Free space of the drive on the panel.
- 3) "File Sort" Sorting conditions for display order in the "File List"
- 4) "Folder Name" Folder name displaying the "File List."
- 5) "File List" List up all files in the "Folder Name."

■ How to Select Files

How to select files is described by taking Data File Selecting screen of <ReproduceData> menu for example.

Description is made by taking the following screen as an example.

- 1) Select <Load Data> menu.
- 2) The above file list screen appears. Move the cursor to the desired file on the above file list screen with [↑] or [↓] key and press [ENTER] key to determine the selection.

■ Displaying File Information

On the File List screen, press [CHARACTER] key with the cursor located on the measured data file with extension “KS2.” Then, file information of the target data file appears on the screen.

Data Information of TEST011.ks2

[Header Information]

```

Blocks       : 5
MEAS Mode    : Manual
MEAS CHs     : 64
Sampling Rate : 1000 Hz
File Title   :
Comment      :
            
```

[Block Information]

No.	MEAS Start Time	MEAS Data Nos
1	2004/03/09 10:50:51	8,100
2	2004/03/09 10:50:54	3,600
3	2004/03/09 10:50:56	12,200
4	2004/03/09 10:51:01	9,800
5	2004/03/09 10:51:05	13,900

[Test Information]

Items	Contents
1 : Gage100	: Type1-A
2 : Gage101	: Type1-B
3 : Gage102	: Type1-C
4 : Gage103	: Type1-D
5 : Gage104	: Type2-A
6 : Gage105	: Type2-B
7 : Gage106	: Type2-C

M E N U

1 File

2 Copy File

[UP/DOWN]:Scroll

[SHIFT+UP/DOWN]:Page

[ESC]:End

2-4 Changing Next Page/Previous Page

■ Changing Next Page/Previous Page

If the number of measuring channels is larger than 16, menu items <Next Page> and <Prev Page> are displayed on the menu.

- <Next Page> Displays 16 items of the next page.
- <Prev Page> Displays 16 items of the previous page.

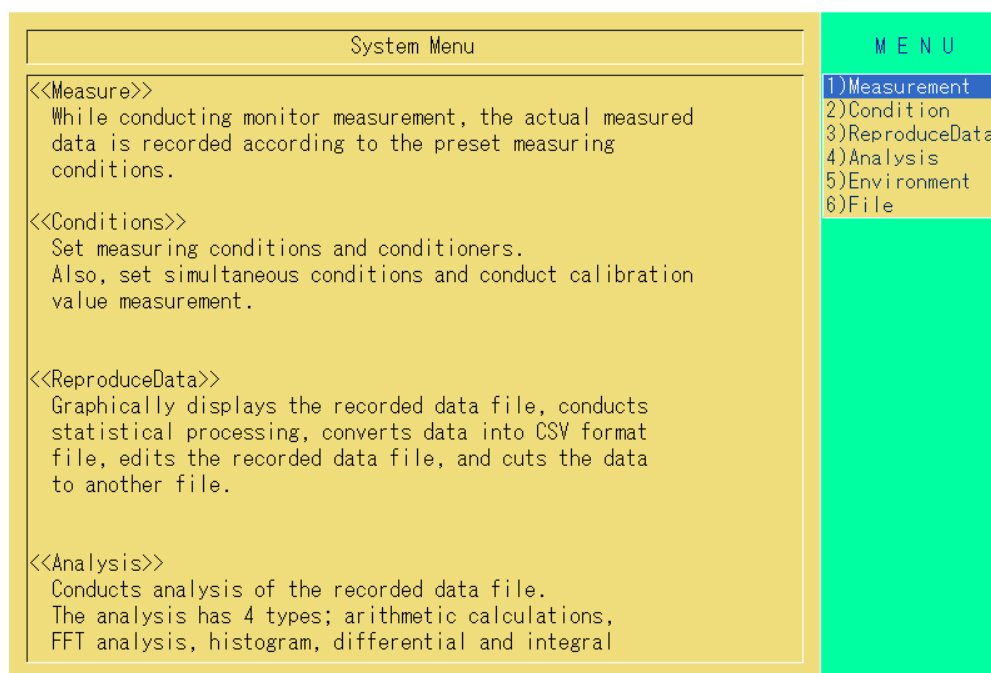
2-5 Help Window

How to display the “Help” window as well as how to operate the “Help” window are described.

■ How to Display the “Help” Window

- 1) Press [Help] key with main menu displayed on each of the operating screens.

Then, the “Help” screen that is corresponding to the respective operations are displayed.



■ How to Operate

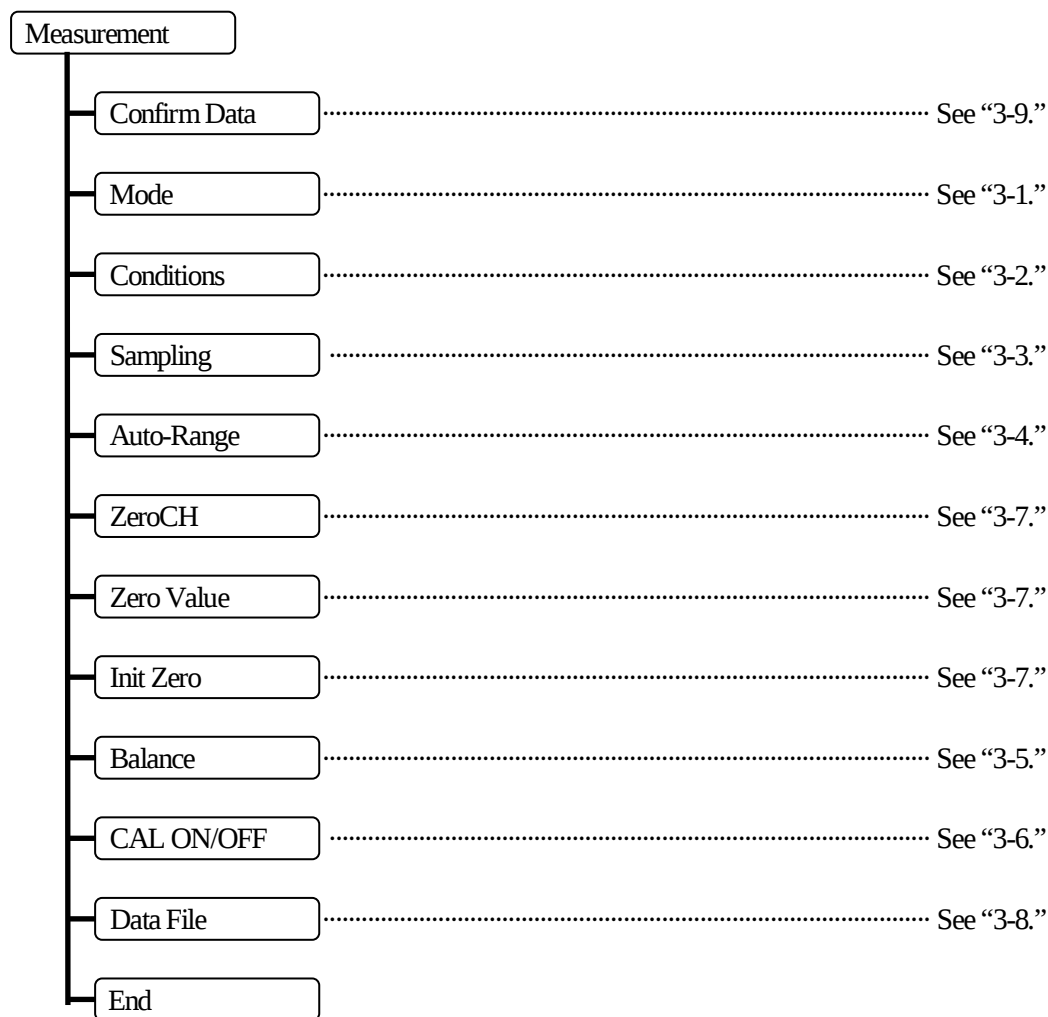
- [↑] or [↓] key..... Scroll the screen.
- [SHIFT] + [↑] keys Display the previous page.
- [SHIFT] + [↓] keys Display the next page.
- [ESC] key..... End the “Help” screen

3. MEASUREMENT [Measurement]

This Chapter describes various functions available from the <Measurement> menu.

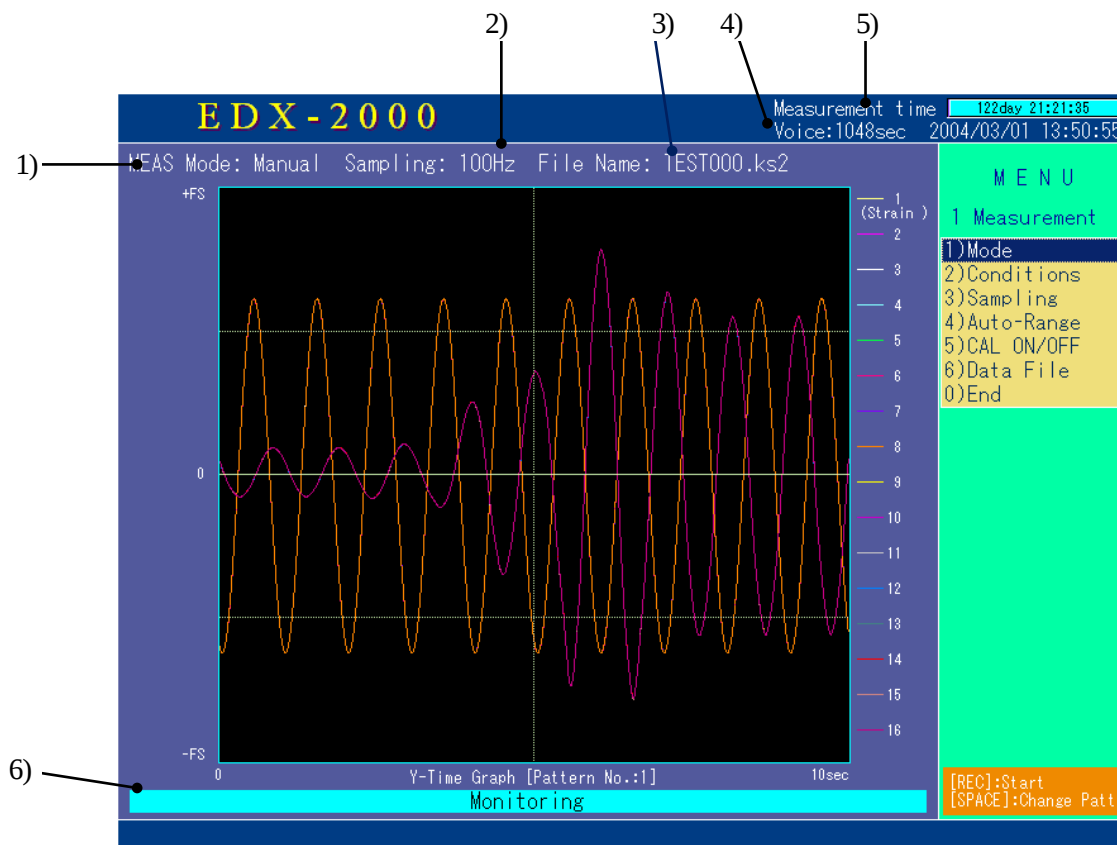
While monitoring the measured data, the data is subjected to recording operation according to the preset measuring conditions.

Flow of measurement is described in the following.



Measured data is subjected to recording according to the preset measuring conditions as shown in the following screen.
 Select <Measurement> from the main menu to display the <Measurement> screen.
 Also, measured data is automatically monitored at the same time when the <Measurement> screen is started up.

■ <Measurement> General Screen



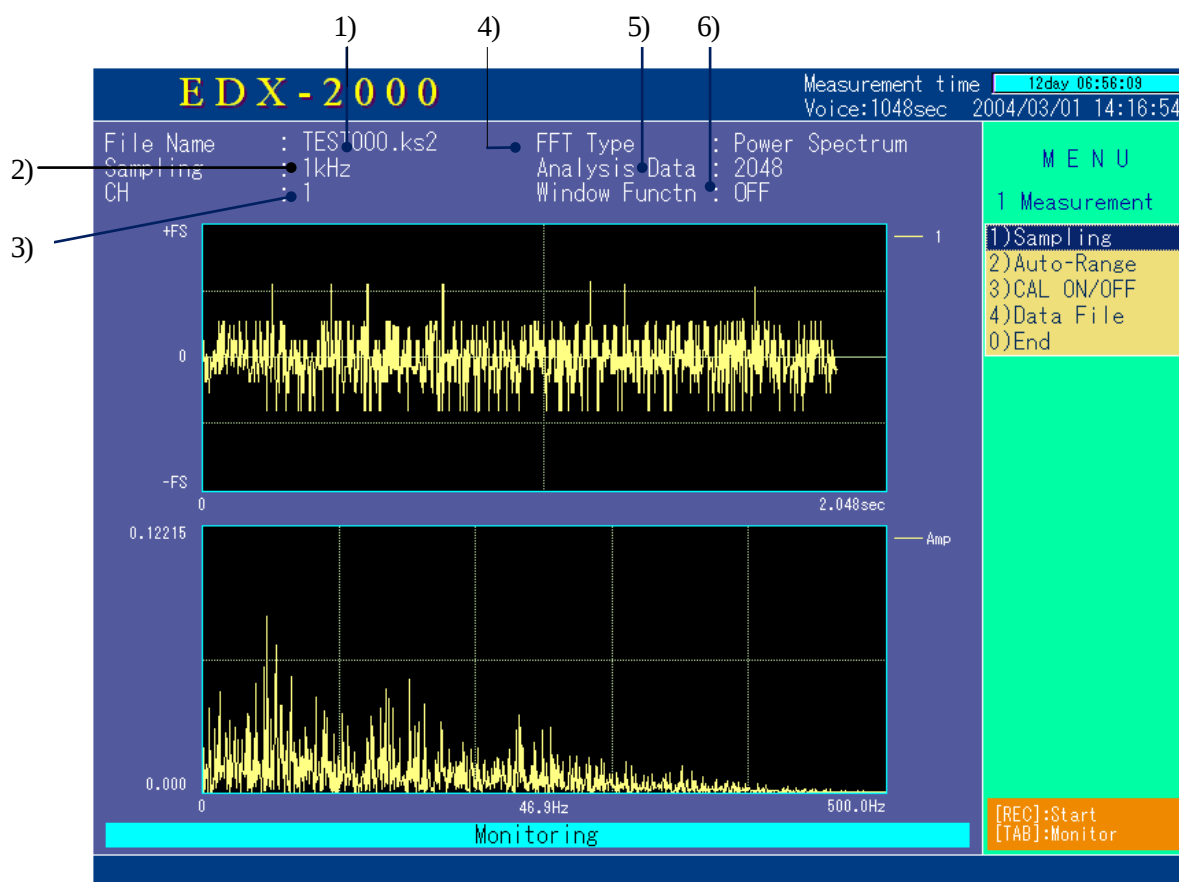
- 1) "MEAS" Mode Current measuring mode.
- 2) "Sampling" Sampling frequency.
- 3) "File Name" File name for saving the recorded data.
 Note) Data file name indicated on the screen slightly varies with data file format.
 Individual format XXXXn.ks2 (n denotes File No.)
 Additional format XXXXn[m].ks2 (m denotes Data Block No.)
- 4) "VOICE" Residual capacity of voice recording.
 Numbers indicated in this item represents the number of seconds available for data recording in 1 measurement ("REC" to "STOP").
 In addition, maximum 255 times of voice recording is available for 1 measurement.
- 5) "MEAS Time" Measurement available time with the current sampling frequency.
- 6) Current operating state.

■ Operating Keys

- [REC/PAUSE] key Start/pause recording data
- [STOP] key End recording data..
- [SPACE] key Change display patterns.
- [←] or [→] key Change screen display time (X axis).

■ <Measurement> Simultaneous Processing “FFT” Screen

The following measurement screen is displayed by selecting <FFT> from <Simultaneous> menu on <Condition> main menu.



- 1) “File Name” File name for saving the recorded data.
- 2) “Sampling” Current sampling frequency.
- 3) “CH” Current target analysis channel.
- 4) “FFT Analysis Type” Current FFT analysis type.
- 5) “Analysis Data” The number of analysis data points of FFT analysis.
- 6) “Window Functn” Window function in use.

■ Operating Keys

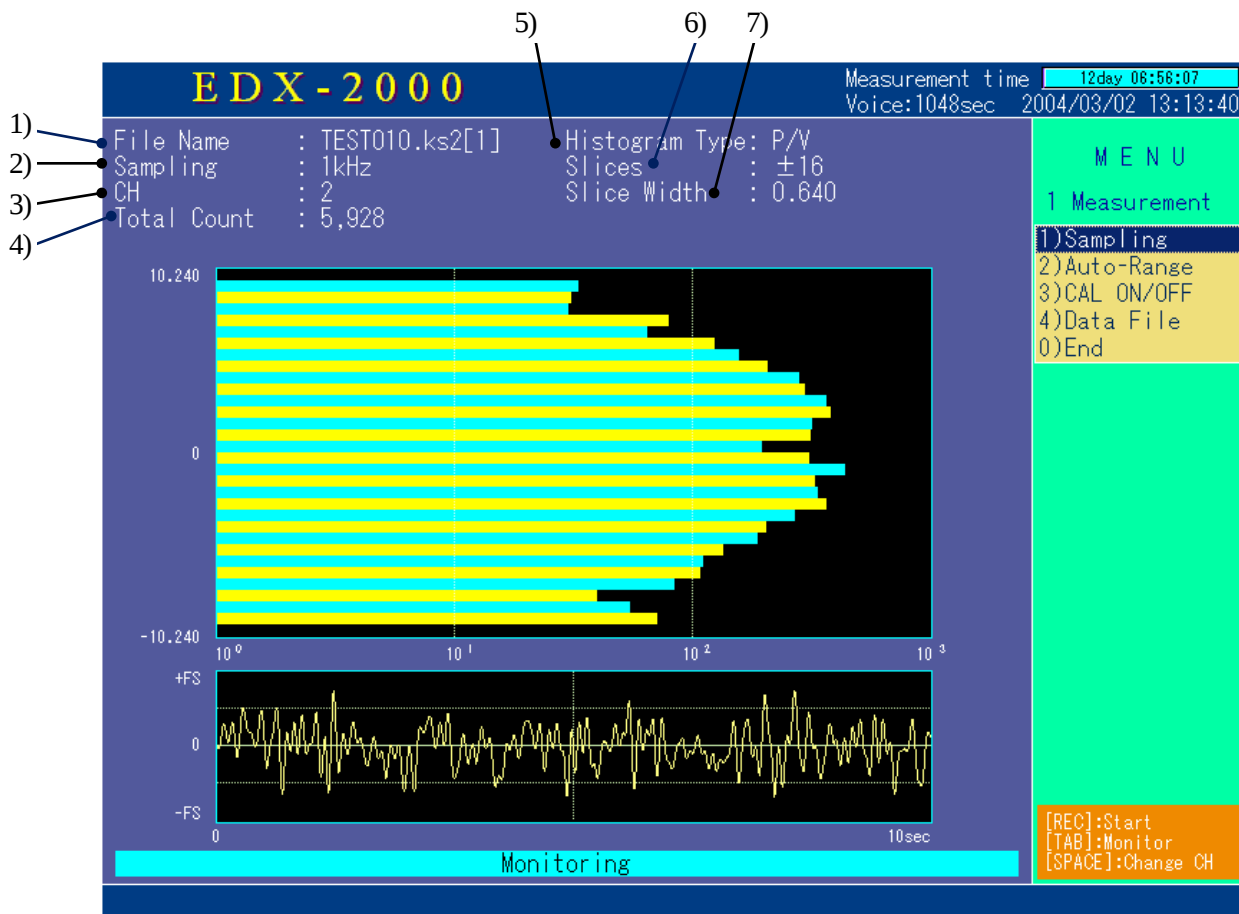
- [REC/PAUSE] key Start/pause recording data.
- [STOP] key End recording data.
- [DUPLICATE] key ([TAB]key) Change FFT screen to/from Monitor screen.
- [←] or [→] key Change screen display time (X axis).

Note

Simultaneous measurement (Histogram and FFT analyses) is available only in manual mode measurement with 10 kHz or less. In addition, since results of simultaneous FFT analysis that are confirmed on the screen are merely for checking, and therefore, not saved in the file. To save the results of the FFT analysis, conduct the FFT analysis to the recorded data in “Chapter 7. FFT Analysis.”

■ <Measurement> Simultaneous Processing “Histogram” Screen

The following measurement screen is displayed by selecting <Histogram> from <Simultaneous> menu on <Condition> main menu.



- 1) “File Name” File name for saving the recorded data.
- 2) “Sampling” Current sampling frequency.
- 3) “CH” Currently displayed channel.
- 4) “Total Count” Count value added with all slices of the current channel.
- 5) “Histogram Type” Type of histogram analysis.
- 6) “Slices” The number of slices of histogram analysis.
- 7) “Slice Width” Slice width of the histogram in physical value.

■ Operating Keys

- [REC/PAUSE] key Start/pause recording data.
- [STOP] key End recording data..
- [DUPLICATE] key (TAB) Change Histogram screen to/from general Monitor screen.
- [←] or [→] key Change screen display time (X axis).

Note

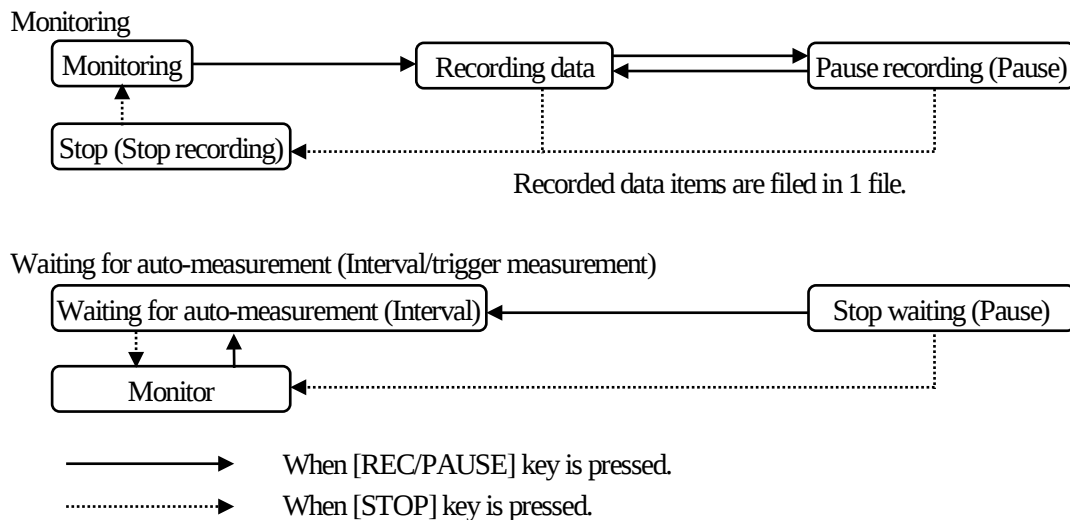
Simultaneous measurement (Histogram and FFT analyses) is available only in manual mode measurement with 10 kHz or less. Results of simultaneous histogram measurement are always saved in the file.

In addition, the following points are restricted for the simultaneous histogram measurement.

- Even if the measurement available time lowers to '0,' only the simultaneous histogram measurement is capable of continuing the measurement until the [STOP] key is pressed.
- At the point when a certain slice count value reaches 4 billion (4G), the simultaneous histogram measurement forcibly ends.

■ Base Operation

Operations when pressing panel keys [REC/PAUSE] and [STOP] are described in the following.



● Record/Stop Operation in Manual Mode

- 1) Press the [REC/PAUSE] while monitoring data to start recording data.

In addition, pressing [VOICE MEMO] key only in the manual mode starts recording data by interlocking with [VOICE MEMO] key.

- 2) Press [REC/PAUSE] key while recording data to pause the recording.
- 3) Press [STOP] key while recording data to end recording data and to be in monitoring state. If the data is in individual format data file, measured data recorded until then shall be filed in 1 file. If the data is in additional format file, the data shall be filed as 1 block data.

- 4) Press [REC/PAUSE] key while pausing recording to restart recording data.

- 5) Press [STOP] key while pausing recording to end the pausing and to be in monitoring state.

In addition, if the data is in individual format data file, the measured data recorded until then shall be filed in 1 file, If the data is in additional format file, the data shall be filed as 1 block data.

- Record/Stop Operation in Interval/Trigger Mode

- 1) Press [REC/PAUSE] key while monitoring data to be in a state waiting for starting interval/trigger mode measurement.

When interval/trigger conditions are satisfied, it automatically starts the measurement.

In addition, if data is in individual format file data, the data shall be filed in 1 file, and if it is in additional format file data, the data shall be filed as 1 block data.

- 2) Press [STOP] key while waiting for interval/trigger measurement or while recording data to end the recording and it becomes in data monitoring state.

At this time, data is filed in 1 file even if it is in individual or additional format data file.

MEMO

- Voice recording

Voice is recorded only when the [VOICE MEMO] key is pressed.

- Individual format file

In individual format measurement, measured data is recorded individually in different data files by pressing the [STOP] key. At this time, file Nos. are automatically added one after another.

(Ex. "TEST-001.ks2" → "TEST-002.ks2" → "TEST-003.ks2" ..., etc.).

- Additional format file

In additional format measurement, measured data that is recorded until then shall be filed as 1 block data by pressing the [STOP] key. Measured data is recorded as block data in the same file name. At this time, block Nos. of the recorded file are automatically added one after another.

("TEST-001[1].ks2" → "TEST-001[2].ks2" → "TEST-001[3].ks2" ..., etc.).

3-1 SETTING DISPLAY MODE [Measurement/Mode]

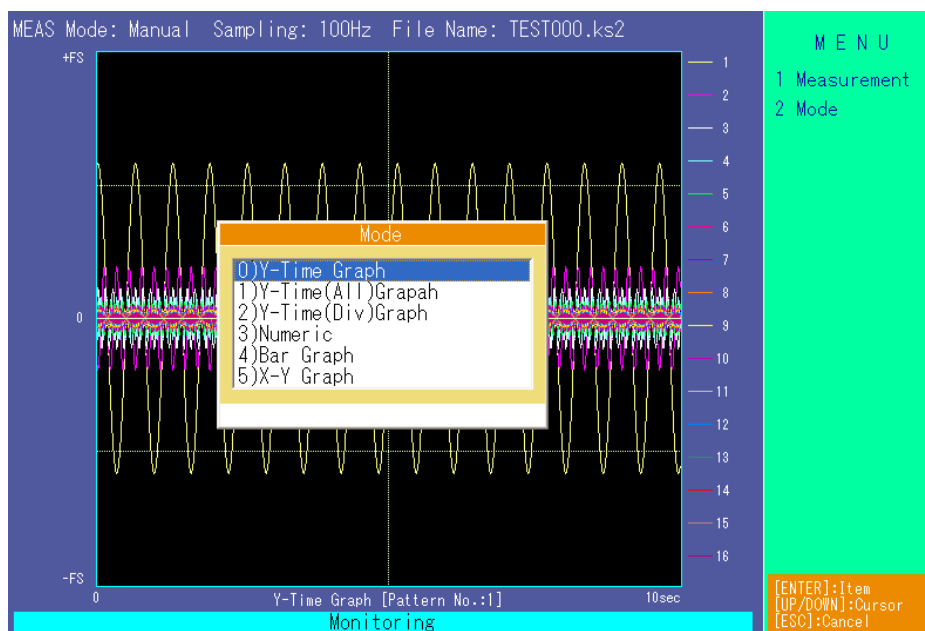
This section is related to setting of display mode (graph type) of monitor data.

■ Options

- “Y-Time Graph”
- “Y-Time (All) Graph”
- “Y-Time (Div) graph”
- “Numeric”
- “Bar Graph”
- “X-Y Graph”

■ Operation Method

- 1) Select <Mode> from <Measurement> main menu.
- 2) The following “Mode” selecting window appears. Select the desired display mode.



- 3) Display mode can be changed every time the [CHARACTER] (F2) is pressed.
- 4) Display pattern of the display mode changes every time [SPACE] key is pressed (See “3-2 Setting Display Conditions.”).
- 5) Display time (lateral axis) is changed every time [←] or [→] is pressed.

MEMO

• Display pattern

Display channels, etc. on the screen are defined as display pattern for every display mode (graph type). (See “3-2 Setting Display Conditions.”) By setting display patterns in advance, desired channels can be changed during the measurement with [SPACE] key.

Display patterns can be changed on the following graphs.

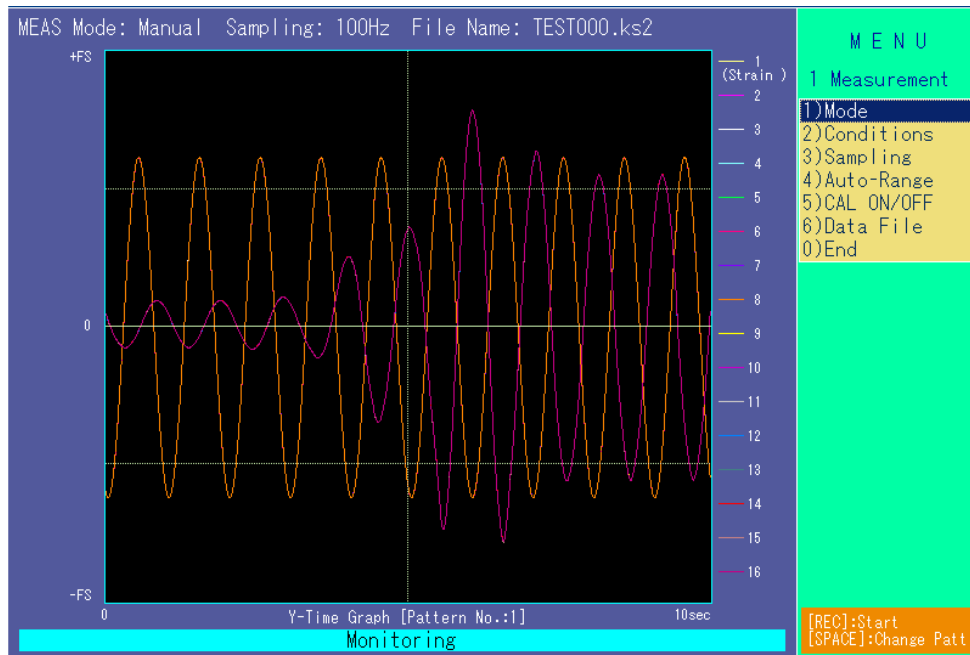
- “Y-Time Graph”
- “Y-Time (Div) Graph”
- “X-Y Graph”

Note

In the following display mode, when sampling mode is set to 2 kHz or more, monitor graph is displayed behind the actual measurement.

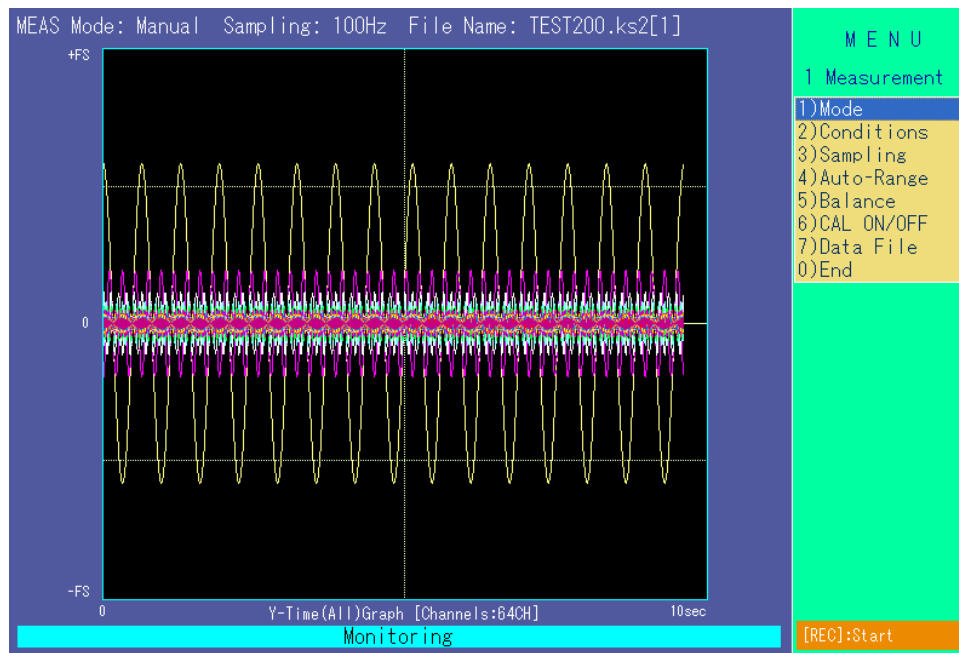
- “Y-Time Graph”
- “Y-Time (All) Graph
- “Y-Time (Div) Graph”
- “X-Y Graph”

■ Y-Time Graph



Waveform of measured data of maximum 16 channels are displayed one one screen. The number of graphs displayed on 1 screen is 4 types. For setting the Y-Time Graph, see “3-2-1.”

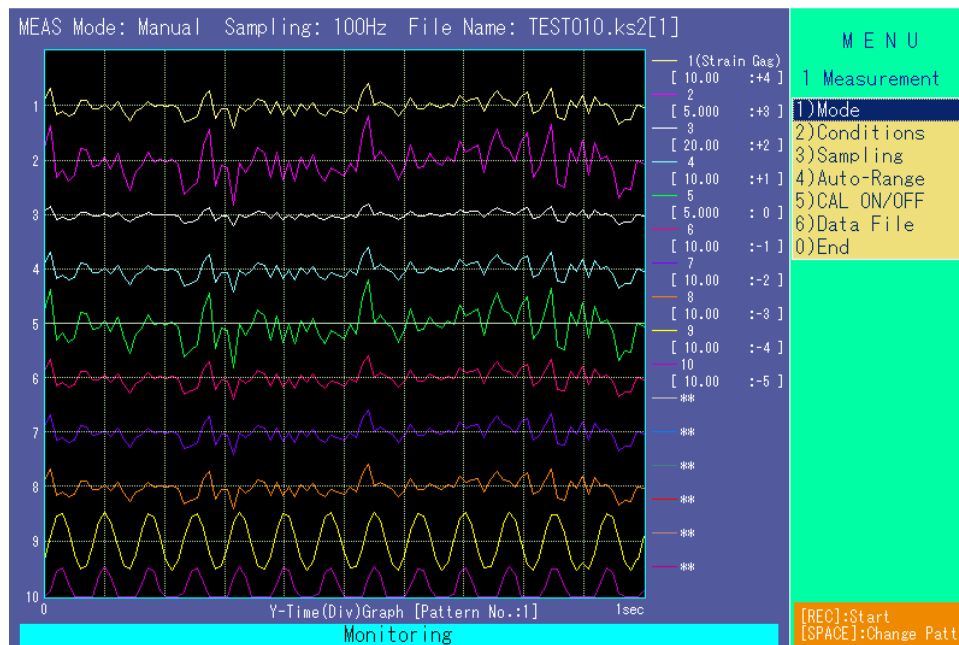
■ Y-Time (All) Graph



Y-Time (All) graph is a superimposed graphs of all channels. However, display channel has restrictions according to sampling frequency. For setting the Y-Time (All) Graph, see “3-2-2.”

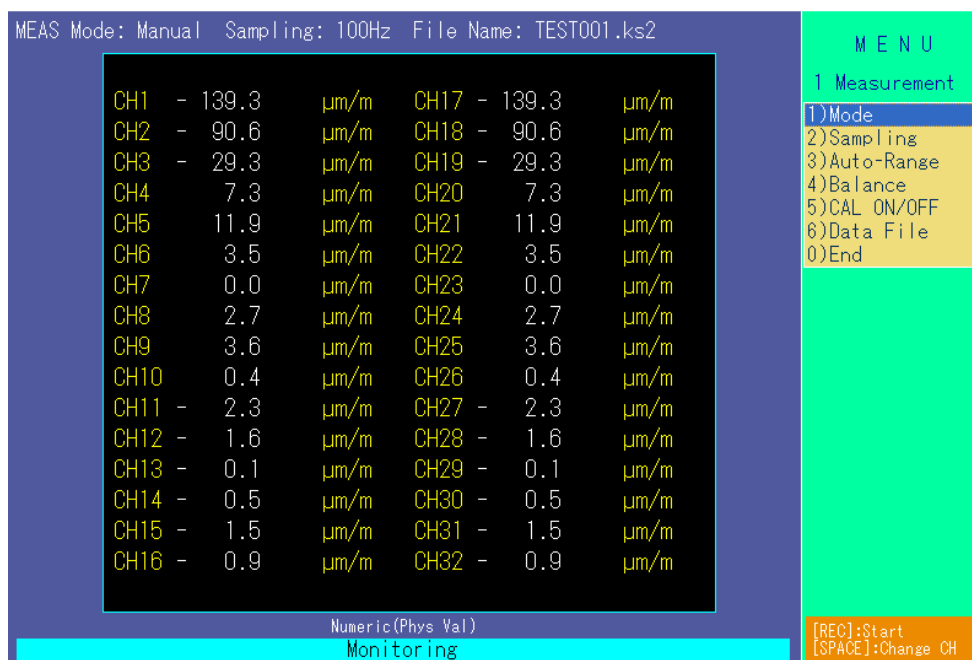
- 16 channels With sampling frequency 10 kHz or more
- 32 channels With sampling frequency 5 kHz or more
- 64 channels With sampling frequency 2 kHz or less

■ Y-Time (Div) Graph



Y-Time (Div) Graph is a graph that enables to set 0 point of channels to Y axis direction as well as independently set Y axis display scale. Waveform of measured data of maximum 16 channels is displayed on one screen. For setting the Y-Time (Div) Graph, see “3-2-3.”

■ Numeric Display



Numeric display screen displays the current numeric values of measured data in real time.

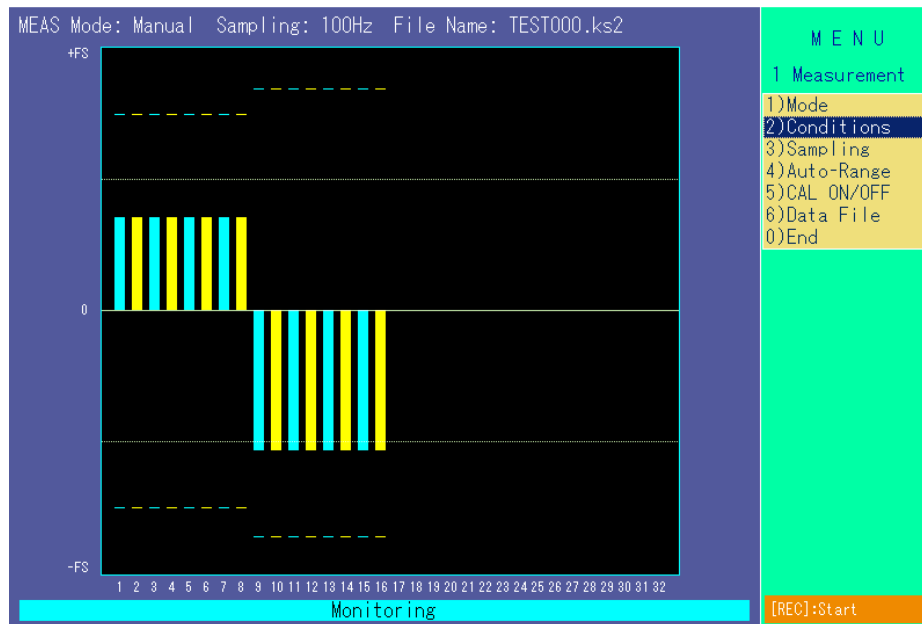
Every time [←] or [→] key is pressed, display format is changed from 8 to 32 CHs.

When 8 CH is selected, channel Nos. change every time the [SPACE] is pressed.

Note

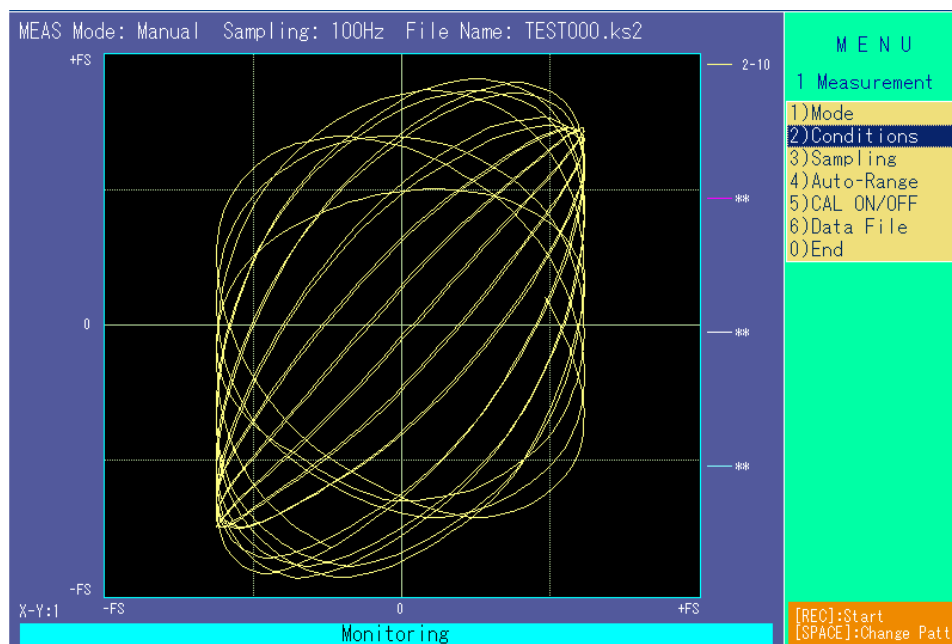
Note that only when the unit size of the EDX-2000Bis a 64-CH type, the display format changes from '1 to 32 CHs' → from '33 to 64 CHs' every time the [SPACE] key is pressed.

■ Bar Graph



Values of all channels are displayed on bar graphs.
For setting the Bar Graph, see “3-2-4.”

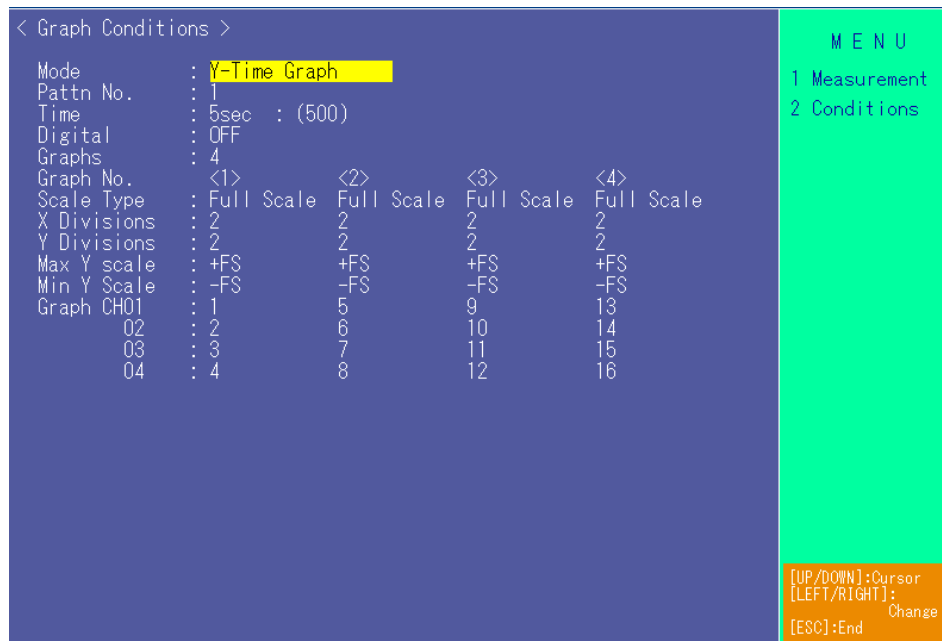
■ X-Y Graph



The X-Y graph is an X-Y axis relative graph. Waveform of maximum 8 sets of X-Y axes related measured data is displayed on the screen. Maximum 4 types of display patterns are provided by considering 8 sets of display as 1 display pattern.
For setting the X-Y Graph, see “3-2-5.”

3-2 SETTING DISPLAY CONDITIONS [Measurement/Conditions]

Setting of required conditions for monitor display is described.

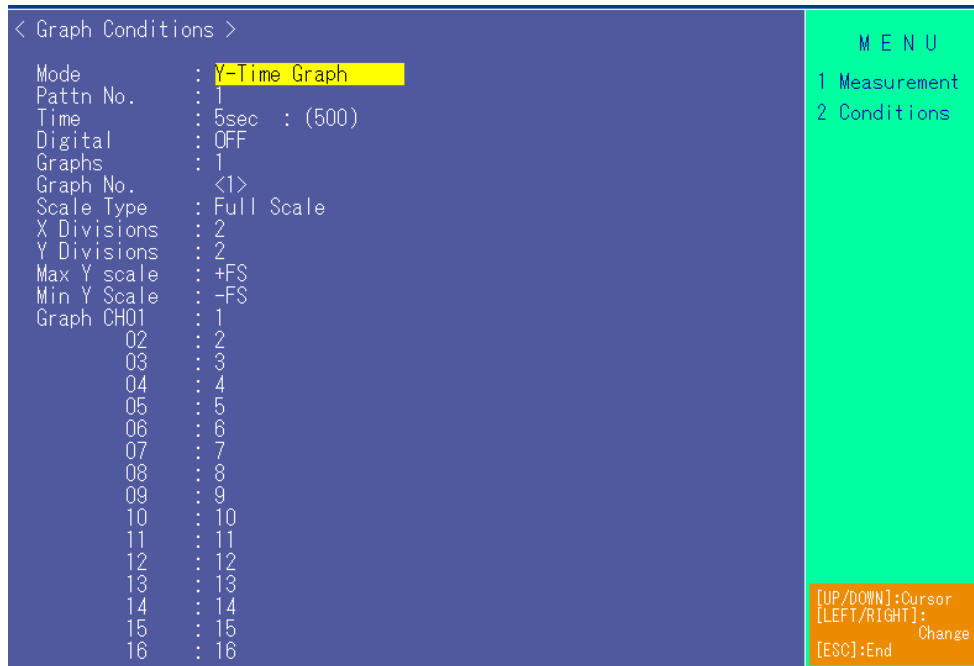


■ Operation Method

- 1) Select <Conditions> from t<Measurement> main menu.
- 2) Various graph setting screens that are selected on “3-1 SETTING DISPLAY MODE” are displayed.
The above screen is an example when 4 graphs of Y-Time graph is selected as the graph type.
- 3) Move the cursor to the desired setting items with [↑] or [↓] key and set details of items.
- 4) When the number of graphs is more than 2, press [ENTER] key to determine the setting item. Then, the cursor moves to the next item.
- 5) For setting graph display channels, the following key operations are available.

- Numeric keyDirectly input 2-digit numeric values (01 to 64) to set desired display channel.
- [DEL] key.....For a channel that does not require to display waveform data, press [DEL] key.
Then “**” appears and waveform data of the graph channel is not displayed.
- [.] key.....When the scale type is displayed in physical value, set maximum and minimum value of Y scale to 1000 and -1000, respectively.

3-2-1 Setting “Y-Time Graph”



Mode	Y-Time
Pattern No.	1 to 4
Time	10msec, 20msec, 50msec, 100msec, 200msec, 500msec, 1sec, 2sec, 5sec, 10sec, 20sec, 30sec, 1min, 2min, 5min, 10min (Note 1)
Digital	ON/OFF (Note 2)
Graphs	1~4 (Note 3)
Scale Type	Range full scale, Phys value
X Divisions	1 to 10 (Note 4)
Y Divisions	1 to 10 (Note 4)
Max Y Scale	Range full scale -FS/2, -FS/5, -FS/10, 0, +FS/10, +FS/5, +FS/2, +FS Phys Value Select with [←] or [→] key. (Note 5)
Min Y Scale	Range full scale -FS, -FS/2, -FS/5, -FS/10, 0, +FS/10, +FS/5, +FS/2 Phys Value Select with [←] or [→] key. (Note 5)
Graph CH	01 to 16(For 1 graph) 01 to 08(For 2 graphs) 01 to 05(For 3 graphs) 01 to 04(For 4 graphs) } Set any channel No. in measuring channels. (Note 6)

(Note 1) These values vary with sampling frequency and the number of measuring channels.

In addition, a value in parenthesis in the above screen is the number of display data.

Ex.1) When the number of measurement available channels is 64

10 kHz 50 msec to 5 sec

100 Hz 1 sec to 5 min

Ex.2) When the number of measurement available channels is 32

10 kHz 50 msec to 10 sec

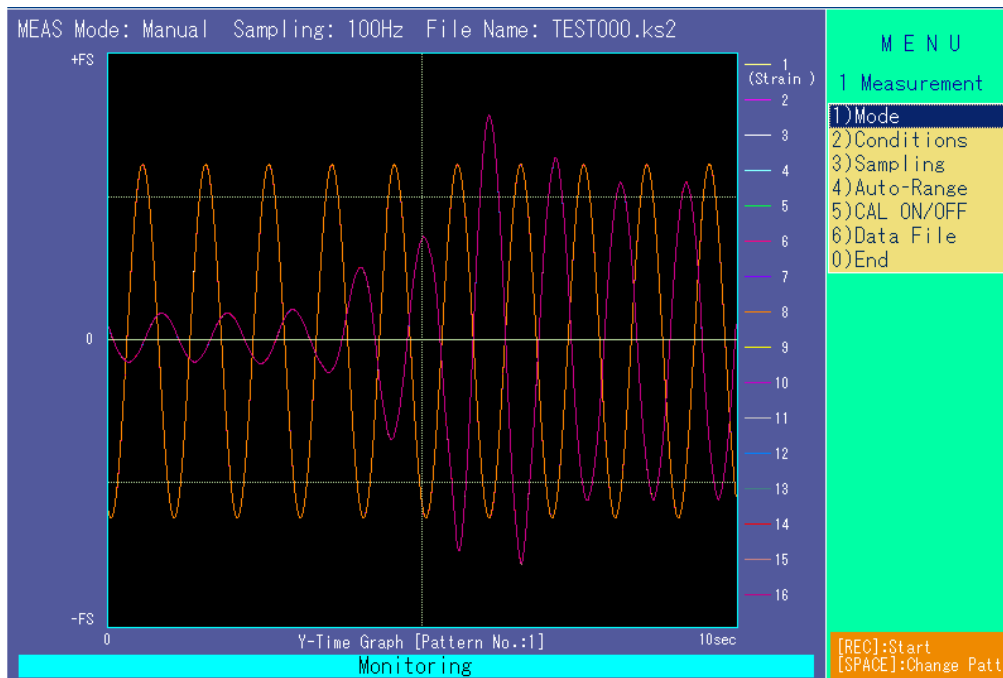
100 Hz 1 sec to 10 min.

(Note 2) Selecting ON/OFF is available only when “Measurement” is selected in <Digital Input> in <Channel Cond> menu of <Conditions> main menu. Other than the above, it is set to “OFF.”

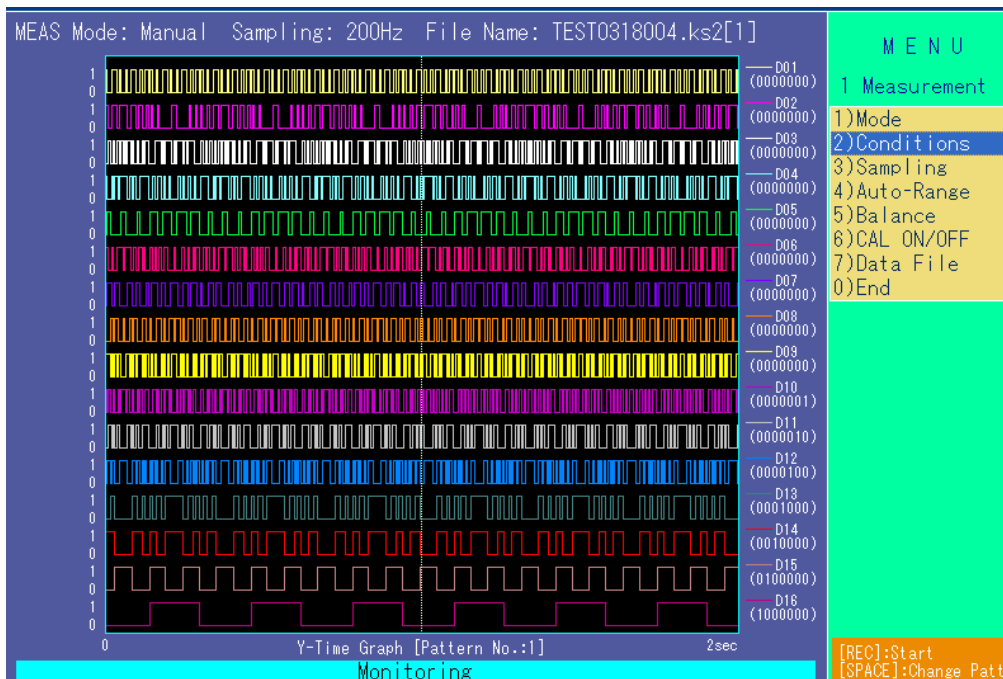
(Note 3) The number of graphs. Graph Nos. in the above screen indicate the graph Nos displayed on the screen. (Counted from the upper screen as 1, 2, 3, and 4)

For reference, difference in graph display according to the number of graphs are described in the following.

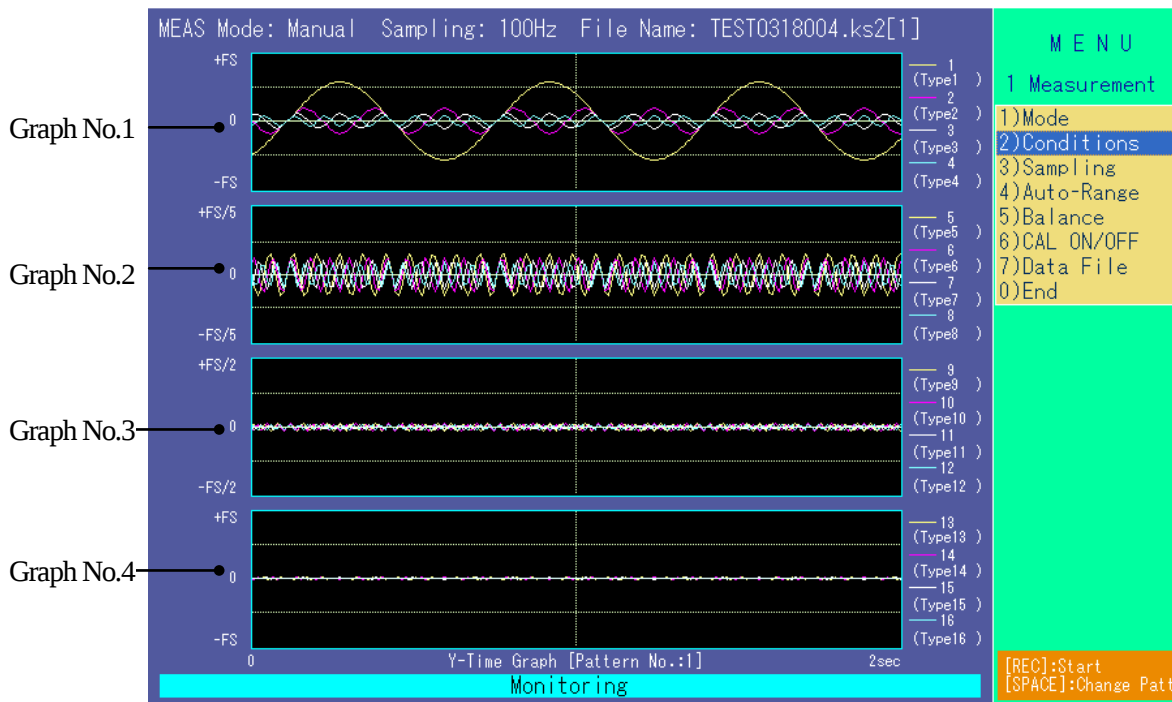
■ When the number of graphs is ‘1’



■ When the number of graphs is ‘1’ and <Digital> is set to ON.



- When the number of graphs is '4'



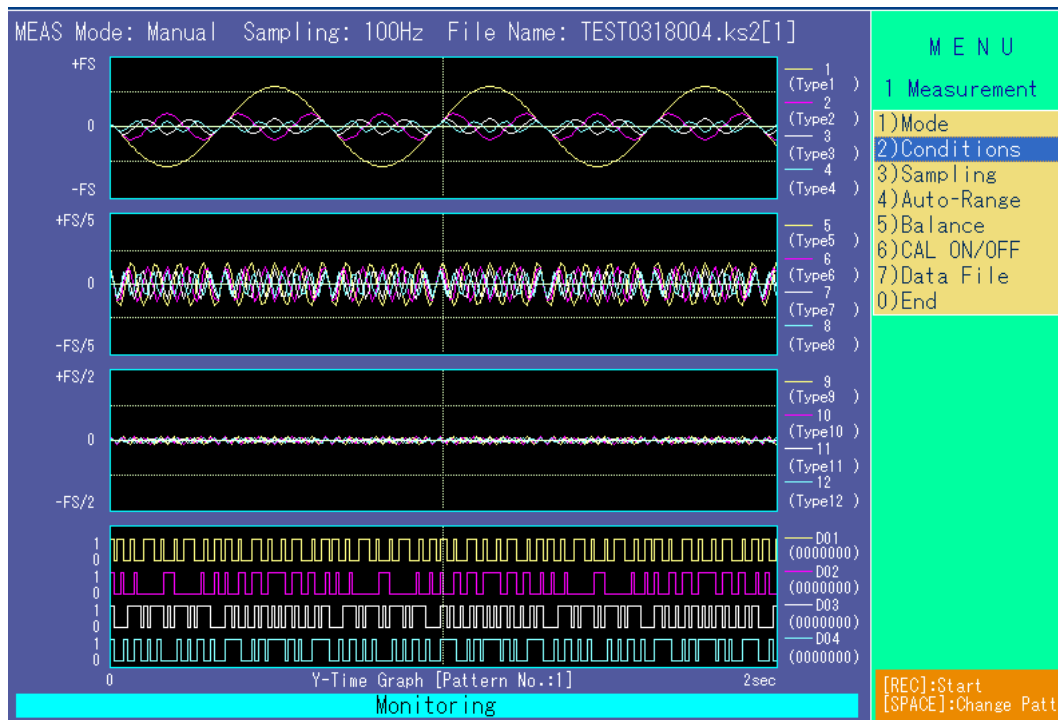
(Note 4) The number of division lines of axes

(Note 5) +FS/-FS means full-scale value of the measuring range.

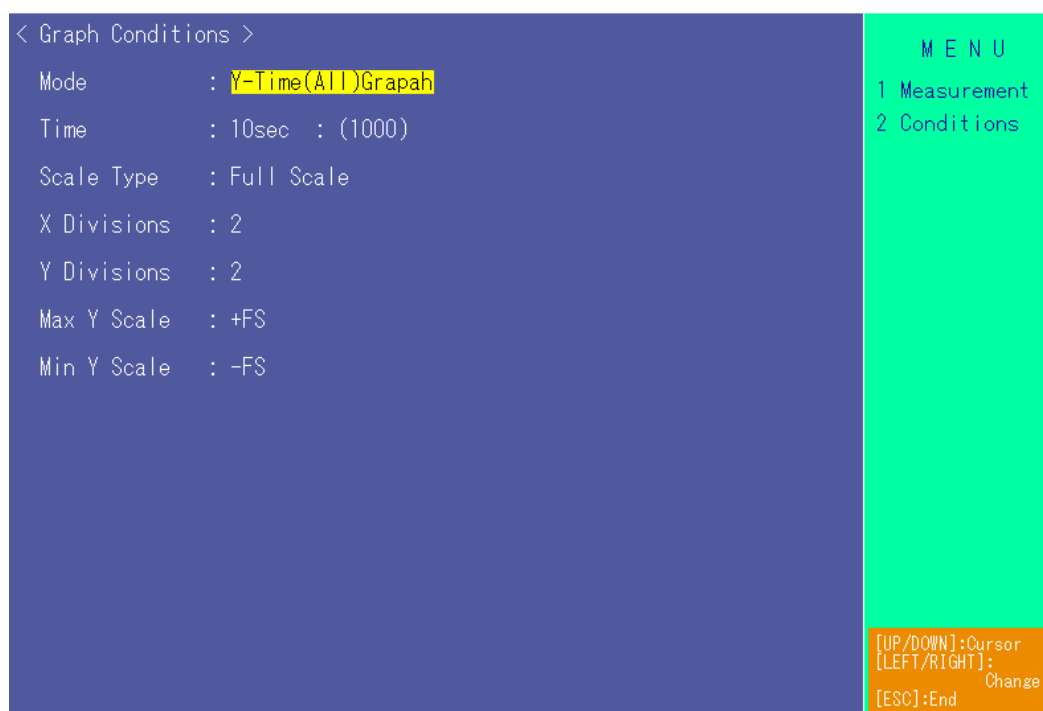
(Note 6) When <Digital> is set to "ON," contents of the graph channel slightly varies with setting items of digital input channel.

Graph setting is conducted for every graph pattern.

- When the number of graphs is '4' and <Digital> is set to ON



3-2-2 Setting “Y-Time (All) Graph”.



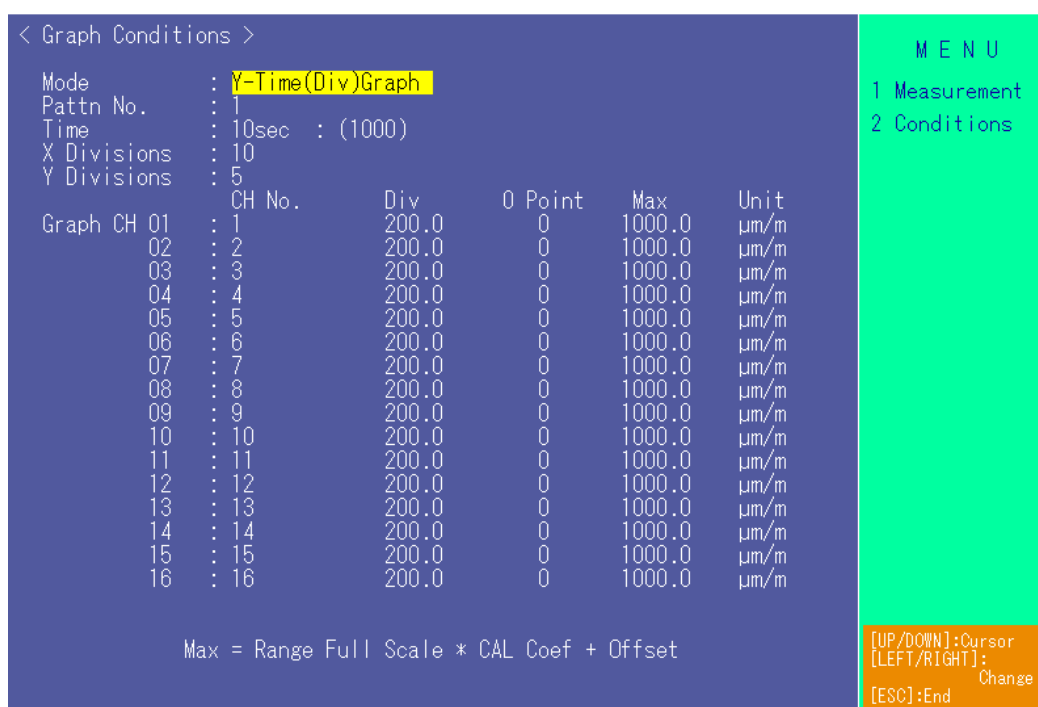
Mode	Y-Time(All)
Time (X axis)	10msec, 20msec, 50msec, 100msec, 200msec, 500msec, 1sec, 2sec, 5sec, 10sec, 20sec, 30sec, 1min, 2min, 5min, 10min (Note 1)
Scale Type	Range full scale, Phys Value
X Divisions	1 to 10 (Note 2)
Y Divisions	1 to 10 (Note 2)
Max Y Scale	Range full scale -FS/2, -FS/5, -FS/10, 0, +FS/10, +FS/5, +FS/2, +FS Phys Value Set with [←] or [→] key. (Note 3)
Min Y Scale	Range full scale -FS, -FS/2, -FS/5, -FS/10, 0, +FS/10, +FS/5, +FS/2 Phys Value Set with [←] or [→] key. (Note 3)

(Note 1) These values vary with sampling frequency and the number of measuring channels.

(Note 2) The number of division lines of axes.

(Note 3) +FS/-FS means full-scale value of the measuring range.

3-2-3 Setting “Y-Time (Div) Graph”



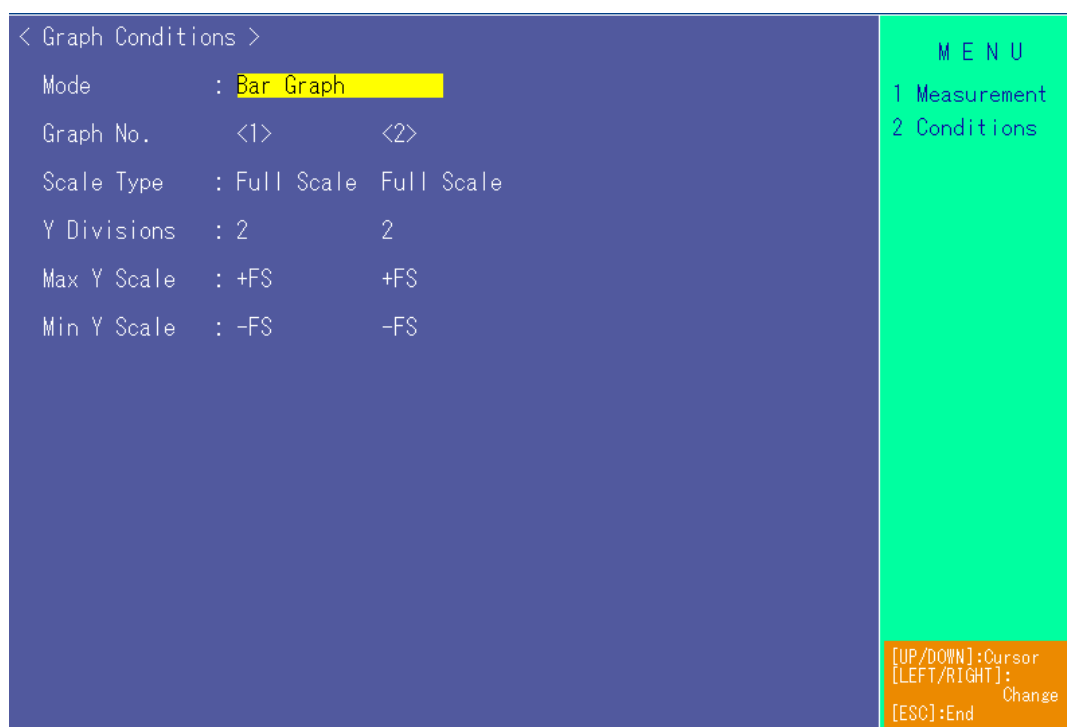
Mode	Y-Time (Div)
Pattern No.	1 to 4
Time	10msec, 20msec, 50msec, 100msec, 200msec, 500msec, 1sec, 2sec, 5sec, 10sec, 20sec, 30sec, 1min, 2min, 5min, 10min (Note 1)
X Divisions	1 to 10 (Note 2)
Y divisions	1 to 10 (Note 2)
Graph CH	CH No. Set optional channel No. of measuring channel.
Div	Set distance of division lines. Changes with [←] or [→] key.
Zero Point	Set Zero point from the division line position (center line). Changes with [←] or [→] key.
Maximum value	Determined with values in setting items in <Channel Cond.> menu of <Conditions> main menu. Maximum value = Range full scale × CAL Coefficient + Offset
Unit	Set desired unit by selecting <Unit> from <Channel Cond> in <Conditions> main menu.

(Note 1) These values vary with sampling frequency and the number of measuring channels.

(Note 2) Number of division lines of axes.

Graph setting is conducted for every graph pattern.

3-2-4 Setting “Bar Graph”



Mode	Bar graph
Graph Nos.	1, or 2 (Fixed) (Note 1)
Scale Type	Range full scale, Phys Value
Y Divisions	1 to 10 (Note 2)
Max Y Scale	Range full scale -FS/2, -FS/5, -FS/10, 0, +FS/10, +FS/5, +FS/2, +FS Phys Value Set with [←] or [→] key. (Note 3)
Min Y Scale	Range full scale -FS, -FS/2, -FS/5, -FS/10, 0, +FS/10, +FS/5, +FS/2 Phys Value Set with [←] or [→] key. (Note 3)

(Note 1) The number of bar graphs varies with EDX-2000B unit size.

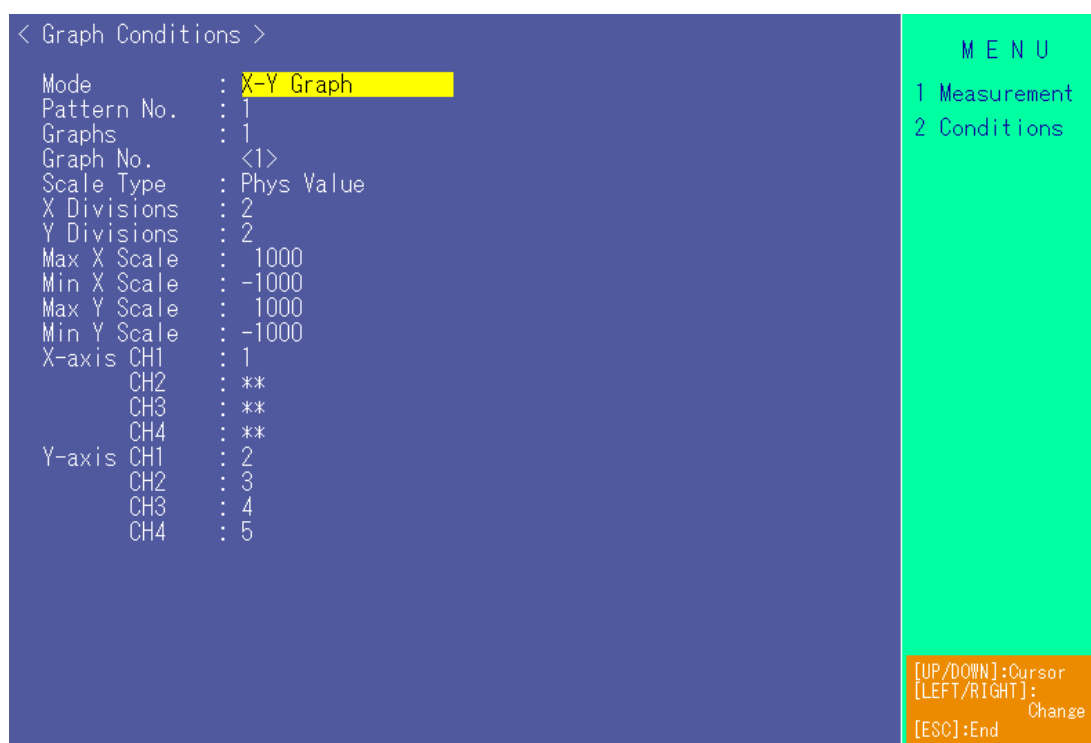
32-CH type 1 graph

64-CH type 2 graphs

(Note 2) The number of division lines of axes.

(Note 3) +FS/-FS means full-scale value of the measuring range.

3-2-5 Setting “X-Y Graph”



Mode	X-Y Graph
Pattern No.	1 to 4
Graph Nos.	1, 2
Scale Type	Range full- scale, Phys Value
X Divisions	1to 10 (Note 1)
Y Divisions	1 to 10 (Note 1)
Max X Scale	Range full scale -FS/2, FS/5, -FS/10,0, +FS/10, +FS/5, +FS/2, +FS Phys Value Set with [←] or [→] key.(Note 2)
Min X Scale	Range full scale -FS/2, FS/5, -FS/10,0, +FS/10, +FS/5, +FS/2, +FS Phys Value Set with [←] or [→] key.(Note 2)
Min Y Scale	Range full scale -FS/2, -FS/5, -FS/10,0, +FS/10, +FS/5, +FS/2 Phys Value Set with [←] or [→] key. (Note 2)
Min Y Scale	Range full scale -FS, -FS/2, -FS/5, -FS/10,0, +FS/10, +FS/5, +FS/2 Phys Value Set with [←] or [→] key. (Note 2)
X axis CH1 to CH4	Set any channel No. of measuring channels.
Y axis CH1 to CH4	Set any channel No. of measuring channels.

(Note 1) The number of division lines of axes.

(Note 2) +FS/-FS means full-scale value of the measuring range.

Graph setting is conducted for every graph pattern.

3-3 SETTING SAMPLING FREQUENCY [Measurement/Sampling]

This section is related to setting of sampling frequency.

Note

- While recording measured data or pausing the recording, <Sampling> menu is not displayed. Therefore, settings of sampling frequency is not available.
- If sampling frequency is changed, <MEAS Cond> is also changed/updated.
- Sampling frequency is set to all channels together at a time and not for every channel.

■ Options

Table 3-1 Types of Sampling Frequency

Sampling Frequency	Options of Sampling Frequency
1, 2, 5 system clock	1, 2, 5, 10, 20, 50, 100, 200, 500, 1k, 2k, 5k 10k, 20k, 50kHz, 100k, 200kHz [*1]
2n system clock	1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1.024k, 2.048k, 4.096k, 8.192k 16.384k, 32.768k, 65.536kHz
External clock	Conducts external clock measurement.

Note

Sampling frequency of “2n system clock” is used when frequency resolution of the FFT analysis results are required to be a value with fractions omitted.

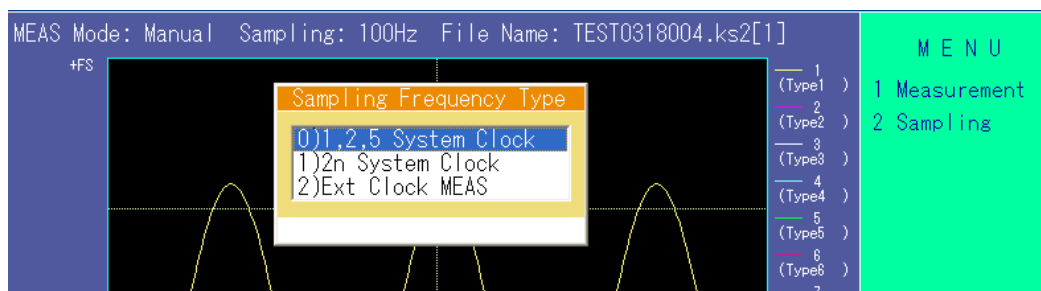
Sampling Frequency	Resolution of Results of FFT (2048) Analysis
4.096 kHz	1.0000 Hz
5.000 kHz	1.2207 Hz

[*1] Restrictions between the sampling frequency and the number of maximum measuring channels

50 kHz Maximum 64 measuring channels
 100 kHz Maximum 32 measuring channels
 200 kHz Maximum 16 measuring channels

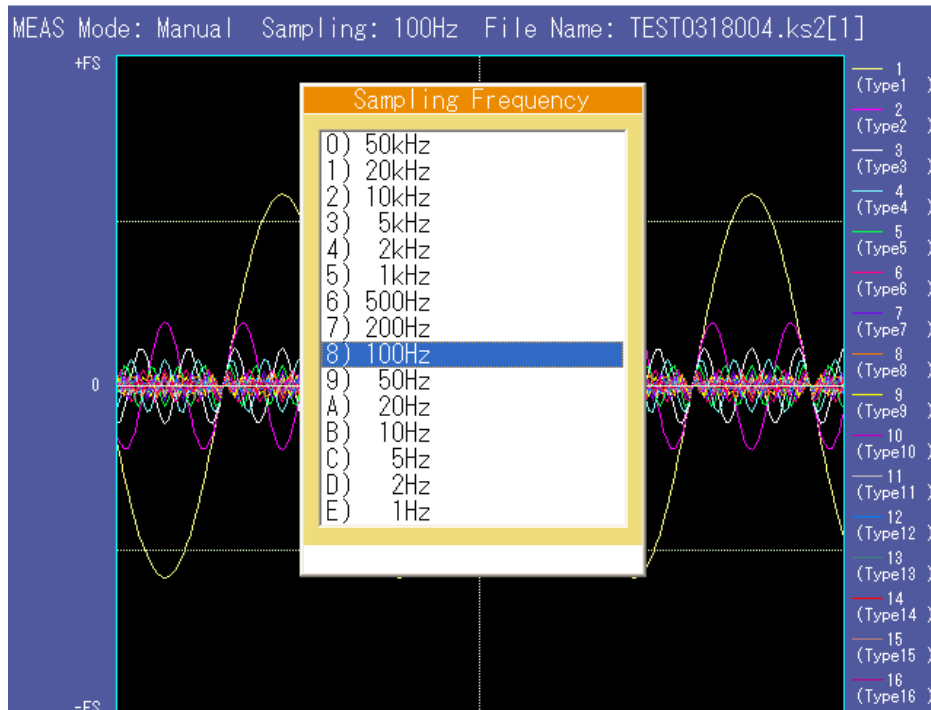
■ Operation Method

- 1) Select <Sampling> from <Measurement> main menu during monitor mode measurement.
- 2) The following sampling frequency setting window appears.
Set appropriate type of sampling frequency.



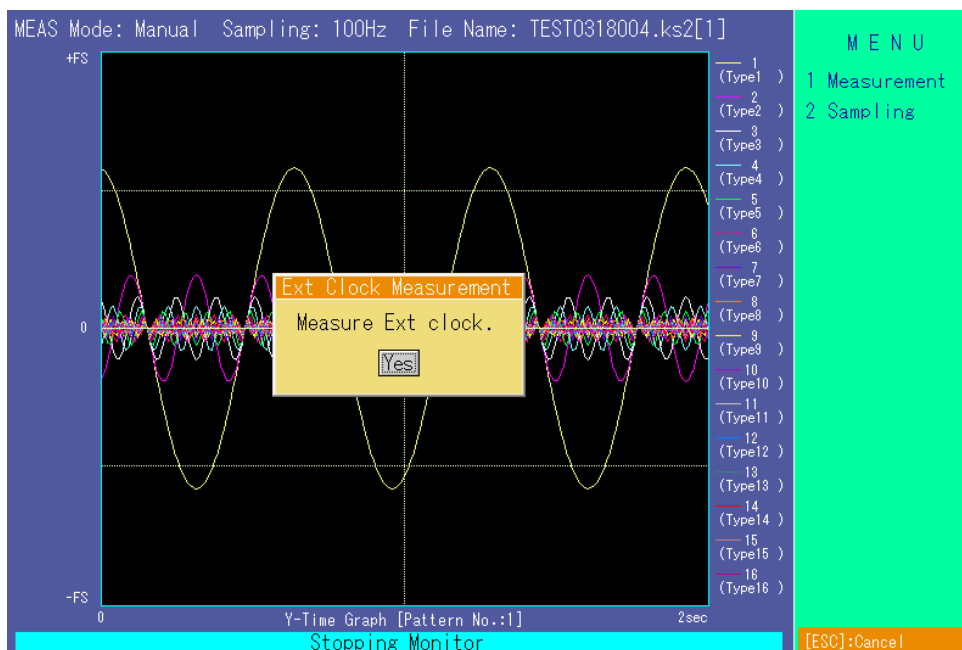
■ Selecting “1, 2, 5 System Clock” or “2n System Clock”

Select <Sampling> from <Measurement> main menu. The following sampling frequency setting window appears. Select the desired sampling frequency. Following is an example when “1, 2, 5 system clock” is selected.



■ Selecting “Ext Clock”

- 1) Select <Sampling> from <Measurement> main menu during monitor measurement.
- 2) A sampling frequency setting window appears.
- 3) Select “Ext ClockMeas” from the sampling frequency setting window and the following window appears to confirm the selection.
- 4) If external clock measurement is OK, press [ENTER] key and if not, press [ESC] key and continue the operation. When [ENTER] key is pressed, it automatically starts external clock measurement.



3-4 AUTO-RANGE [Measurement/Auto-Range]

This section describes auto-range function that automatically sets conditioner range of channels by measuring the actual input level.

Actual load is applied but when input levels of channels are not clear, use this auto-range function that automatically sets the most appropriate measuring range.

Note

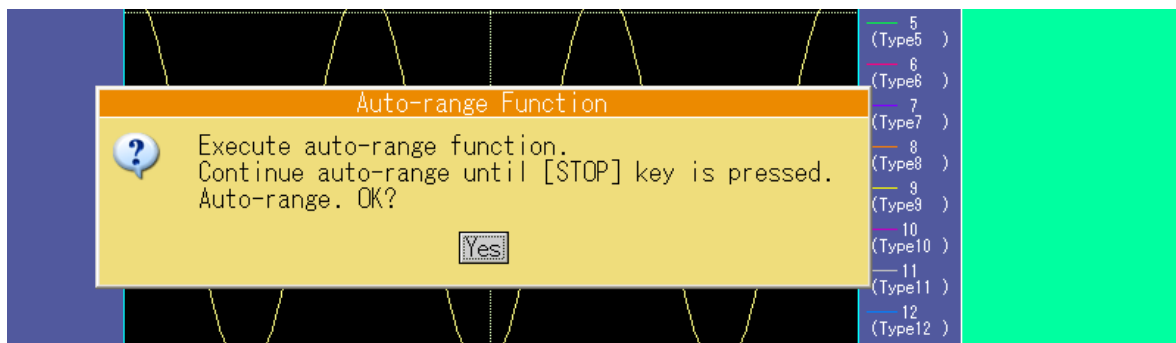
- Only while monitoring measured data, the <Auto-Range> menu is displayed and used.
- The auto-range function is available only when sampling frequency is 10 kHz or less.

■ Operation Method

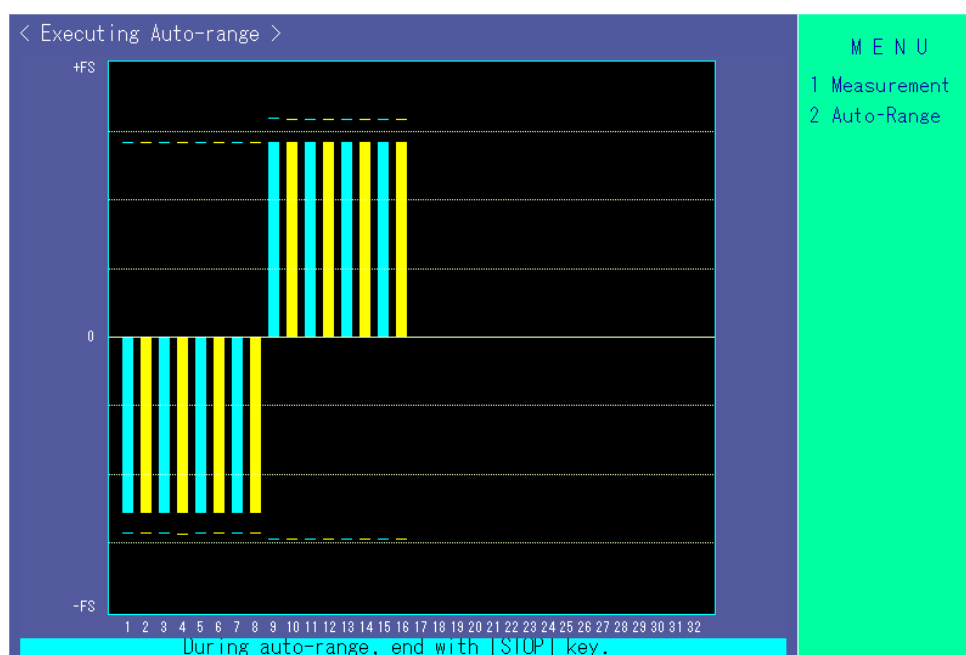
- 1) Select <Auto-Range> from <Measurement> main menu during monitor measurement.
- 2) The following window appears to confirm execution of the auto-range function.

To conduct the auto-range function[ENTER] key

To stop the auto-range function.....[ESC] key



- 3) While operating the auto-range function, monitor display shall be a bar graph as shown in the following.



- 4) While operating the auto-range function, apply the actual load to channels. After confirming that the actual load level is applied, press [STOP] key. Then, the following auto-range determining results of channels are displayed. Maximum 32 channels of auto-range results can be viewed on 1 screen. If it is required to observe on and after the 32 channel, press [SPACE] key.

Value of each range is automatically set to a range not exceeding approximately 77% of maximum value of the measured data that is detected while operating the auto-range function.

< Auto-Range Result >							M E N U	
CH	Max	Old Rng	New Rng	CH	Max	Old Rng	New Rng	
1	-7.3475	10.0V	10.0V	17	0.006875	0.1V	0.1V	1 Measurement
2	-7.3450	10.0V	10.0V	18	0.0065625	0.1V	0.1V	2 Auto-Range
3	-7.3475	10.0V	10.0V	19	0.008125	0.1V	0.1V	0)End
4	-7.3500	10.0V	10.0V	20	0.008125	0.1V	0.1V	
5	-7.3453	10.0V	10.0V	21	0.0084375	0.1V	0.1V	
6	-7.3441	10.0V	10.0V	22	-0.00625	0.1V	0.1V	
7	-7.3438	10.0V	10.0V	23	0.0078125	0.1V	0.1V	
8	-7.3475	10.0V	10.0V	24	0.0071875	0.1V	0.1V	
9	8.1213	10.0V	10.0V	25	***	***	***	
10	8.1181	10.0V	10.0V	26	***	***	***	
11	8.1166	10.0V	10.0V	27	***	***	***	
12	8.1144	10.0V	10.0V	28	***	***	***	
13	8.1194	10.0V	10.0V	29	***	***	***	
14	8.1194	10.0V	10.0V	30	***	***	***	
15	8.1159	10.0V	10.0V	31	***	***	***	
16	8.1181	10.0V	10.0V	32	***	***	***	
							[SPACE]:Change CH	

- 5) Select <End> from <Measurement> main menu. And the following window appears to confirm the range setting.

< Auto-Range Result >							M E N U	
CH	Max	Old Rng	New Rng	CH	Max	Old Rng	New Rng	
1	-7.3475	10.0V	10.0V	17	0.006875	0.1V	0.1V	1 Measurement
2	-7.3450	10.0V	10.0V	18	0.0065625	0.1V	0.1V	2 Auto-Range
3	-7.3475	10.0V	10.0V	19	0.008125	0.1V	0.1V	0)End
4	-7.3500	10.0V	10.0V	20	0.008125	0.1V	0.1V	
5	-7.3453	10.0V	10.0V	21	0.0084375	0.1V	0.1V	
6	-7.3441	10.0V	10.0V	22	0.1V	0.1V	0.1V	
7	-7.3438	10.0V	10.0V	23	0.1V	0.1V	0.1V	
8	-7.3475	10.0V	10.0V	24	0.1V	0.1V	0.1V	
9	8.1213	10.0V	10.0V	25	***	***	***	
10	8.1181	10.0V	10.0V	26	***	***	***	
11	8.1166	10.0V	10.0V	27	***	***	***	
12	8.1144	10.0V	10.0V	28	***	***	***	
13	8.1194	10.0V	10.0V	29	***	***	***	
14	8.1194	10.0V	10.0V	30	***	***	***	
15	8.1159	10.0V	10.0V	31	***	***	***	
16	8.1181	10.0V	10.0V	32	***	***	***	
							[SPACE]:Change CH	

- Confirming Appropriate Range by Auto-Range Function

Range value of the auto-range results is automatically selected to a value that does not exceed approximately 77% of the maximum measured value obtained during the auto-range function.

Therefore, when using the auto-range function, it is operated in a state as near as possible with the actual test. For example, if the auto-range function is operated with no input (no-load) state, it may be set to maximum sensitivity range and the correct range may not be selected.

3-5 BALANCE [Measurement/Balance]

Initial unbalance of strain bridge is adjusted to conditioners.

Select <Channel Cond> from <Conditions> main menu. Then, select “BAL ON/OFF” from the <Channel Cond> menu.

A “BAL ON/OFF” setting window appears. Among input channels that are connected to a strain gage or strain gage transducer, a channel with “BAL ON/OFF” set to “ON” is subjected to balancing.

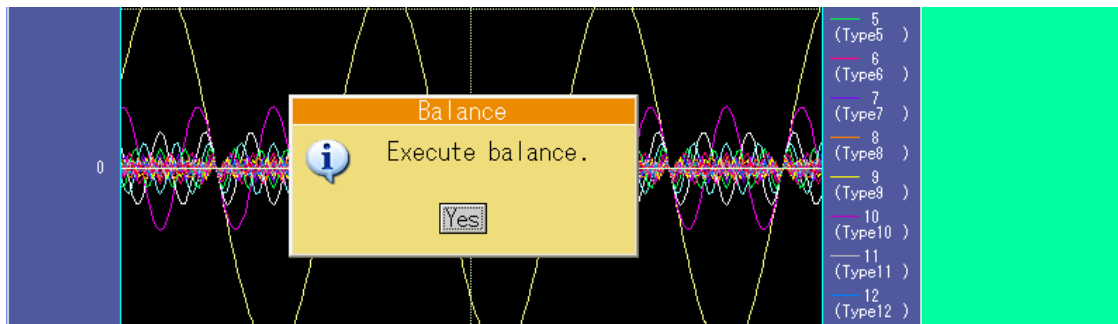
Executing of balancing is verified (OK/NG) with balance standard value (with a rate of 0.1 to 50 % to full scale).

Note

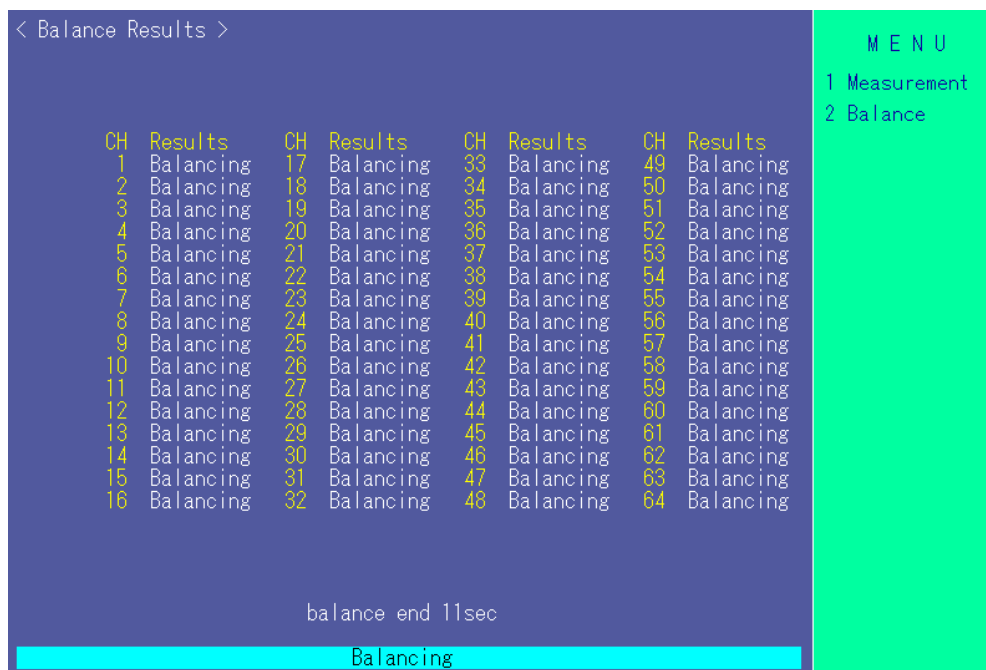
- While recording measured data, the <Balance> menu is not displayed and not used.

■ Operation Method

- 1) Select <Balance> from <Measurement> main menu during monitor measurement.
- 2) The following balance executing window appears.
To conduct balance.....[ENTER] key
To stop the balance.....[ESC] key



- 3) After a while, the balance operation automatically ends and the balance results appear on the screen.
The following is a screen in the course of balancing.



The following is a screen displaying the balance results.

Here, channel with “NG” indicates that bridge unbalance results are exceeding the balance standard value.

Re-check sensors and connection cables of the relevant channel and remove the cause and conduct balance once again.

In addition, when the <Balance Standard> determined in <Environment> main menu becomes an excessively small value, the channel may be indicated with “NG” due to noise level of sensors at measurement site.

< Balance Results >

CH	Results	CH	Results	CH	Results	CH	Results
1	OK	17	NG	33	OK	49	NG
2	OK	18	OK	34	OK	50	OK
3	NG	19	NG	35	OK	51	OK
4	NG	20	OK	36	NG	52	OK
5	OK	21	NG	37	OK	53	NG
6	OK	22	OK	38	OK	54	OK
7	NG	23	OK	39	NG	55	NG
8	OK	24	NG	40	NG	56	NG
9	NG	25	OK	41	NG	57	OK
10	NG	26	NG	42	OK	58	NG
11	NG	27	OK	43	OK	59	NG
12	OK	28	NG	44	OK	60	OK
13	NG	29	OK	45	NG	61	NG
14	OK	30	NG	46	NG	62	NG
15	OK	31	OK	47	NG	63	OK
16	NG	32	NG	48	OK	64	NG

M E N U

1 Measurement

2 Balance

[ESC]:Menu

- 4) After confirming that all the channels are indicated with “OK,” press [ESC] key and return to the monitor screen.

3-6 CALIBRATION [Measurement/CAL ON/OFF]

This section describes details of calibration.

Calibration is a function that forcibly input analog amount that is relevant to 50% or 100% of setting range to input of channels. Since calibration value is input with sensors connected to the EDX-2000B, calibration value is input in a form having calibration value added to the sensor output.

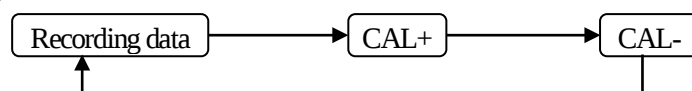
Select <Channel Cond> from <Conditions> main menu. Then, select <CAL ON/OFF> from the <Channel Cond> menu. A channel that is set to “ON” in the above <CAL ON/OFF> menu is a calibration value output available channel. Select <Channel Cond> from <Conditions> main menu. Then, select <CAL range> from the <Channel Cond> menu. Calibration value (relevant to 50% or 100% of selected range) determined by selecting the above <CAL Range> menu is output.

■ Operation Method

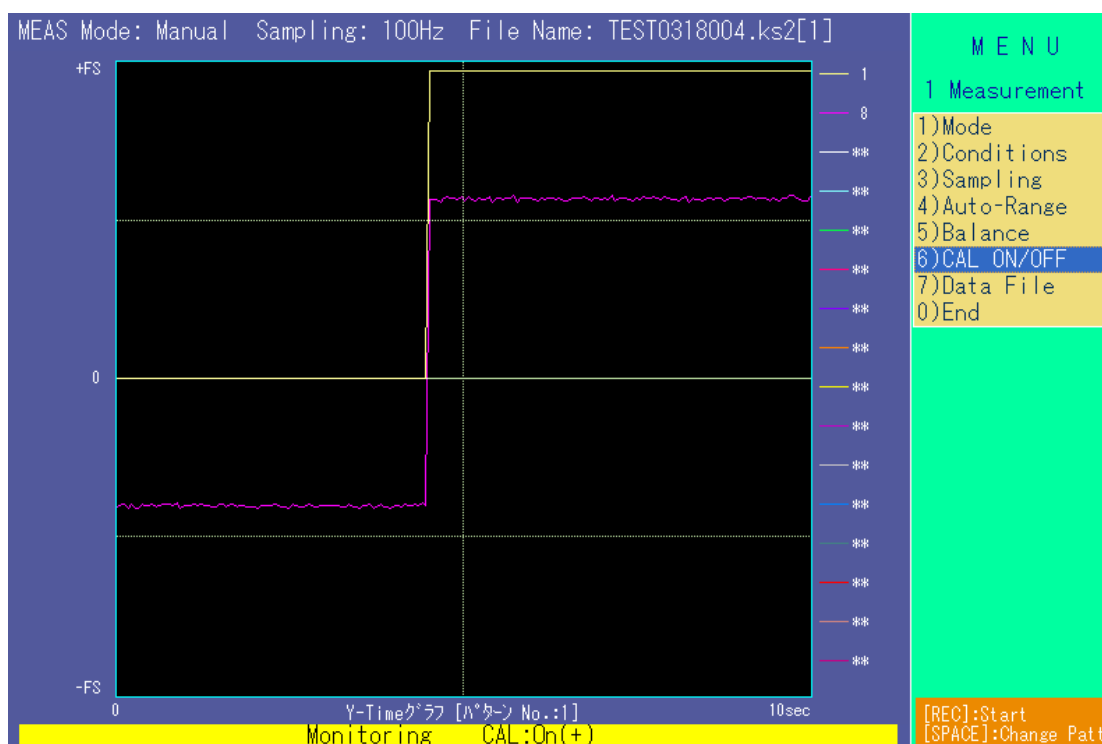
- 1) Select <CAL ON/OFF> from <Measurement> menu. Then select “CAL ON/OFF” from the <Channel Cond> menu.
- 2) During the monitor measurement, every time [ENTER] key is pressed, the following operations are repeatedly conducted.



- 3) If <CAL ON/OFF> menu is selected while recording data, every time [ENTER] key is pressed, the following operations are repeatedly conducted. In addition, while recording data, calibration value is recorded to the recorded data. For reference, while recording data, calibration is available only when it is in “manual measuring mode.”



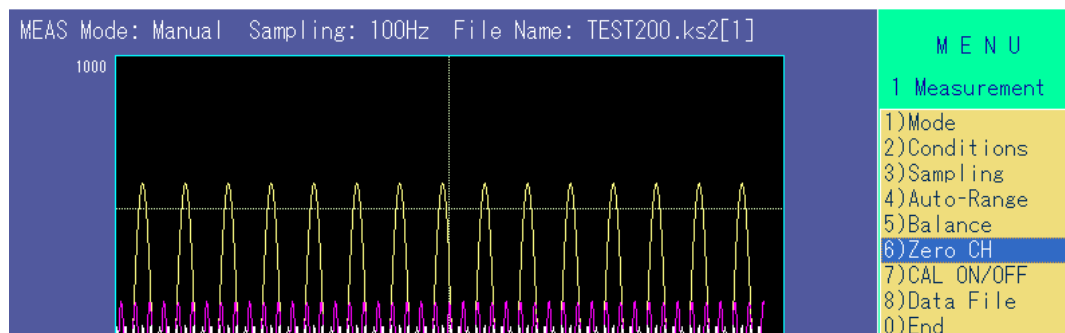
■ Ex.) CAL is set to ON (+) while monitoring data



3-7 SETTING OFFSET ZERO VALUE

“Offset Zero value setting” is a function that forcibly sets the current value to Zero. A value that is forcibly subtracted from the current measured value to have Zero is set to “Offset” of calibration coefficient.

Here, procedures for setting and initializing the offset Zero value are described.



Note

This menu item is available when “Yes” is selected in <Zero Value> in <Environment> main menu. In addition, the offset value operation is available when setting “Phys Value” in <Scale Axis> by selecting <Conditions> from <Measurement> main menu.

I) Setting Offset Zero Value

■ Operation Method

- 1) Select<Zero CH> from<Measurement> main menu. A “Select Zero CH” setting window appears.

Here, set a measuring channel to set the offset Zero value.

[ENTER] keySwitch ON/OFF

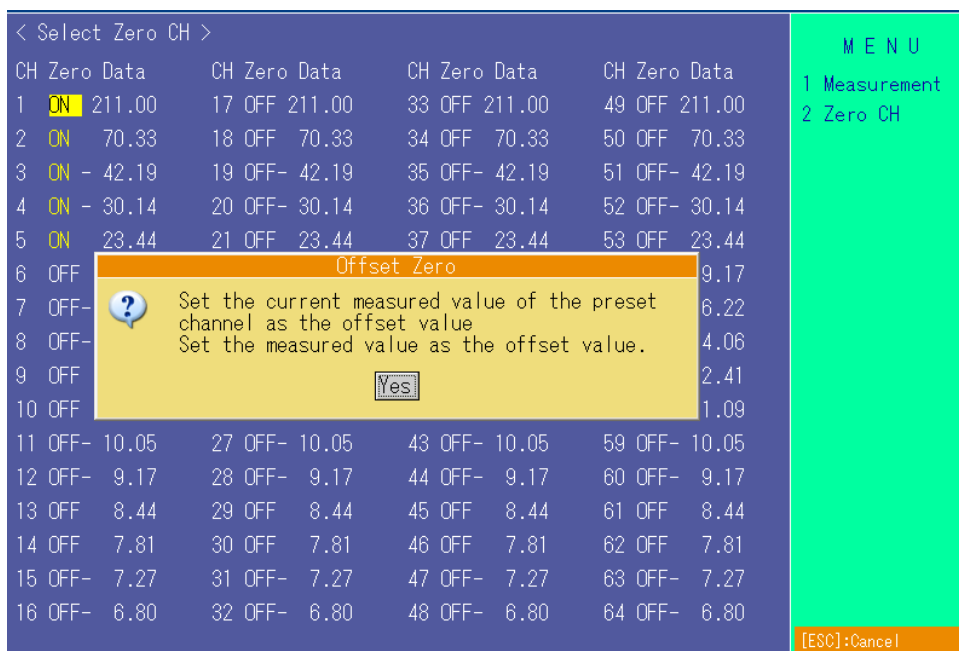
[SHIFT] + [ENTER] keysExecute

[ESC] keyCancel

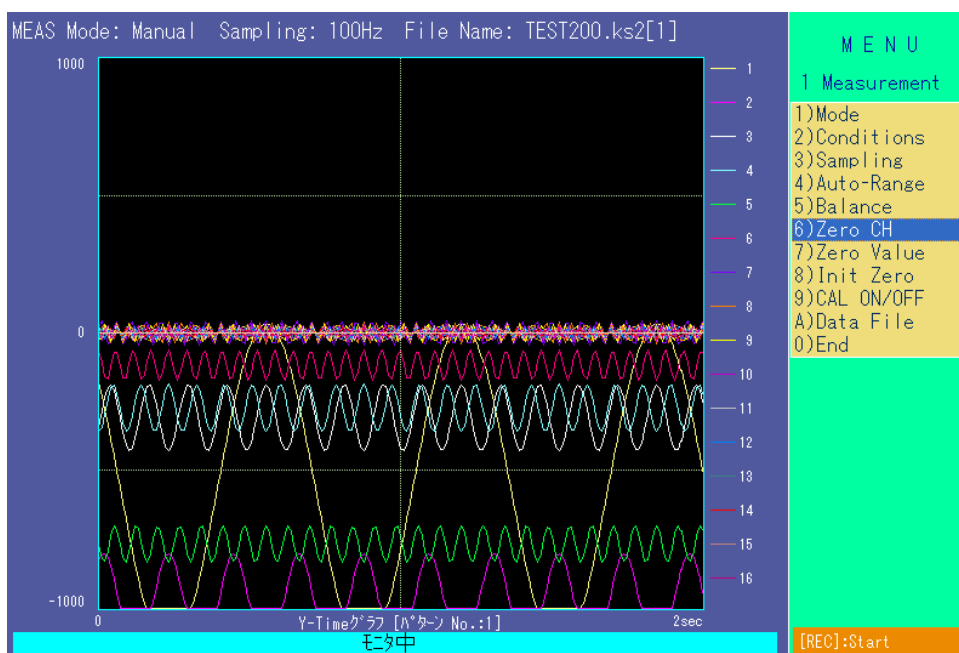
< Select Zero CH >				MENU	
CH Zero Data				1 Measurement	
1 ON -292.67	17 OFF-292.67	33 OFF-292.67	49 OFF-292.67	2 Zero CH	
2 ON 82.70	18 OFF 82.70	34 OFF 82.70	50 OFF 82.70		
3 ON - 33.16	19 OFF- 33.16	35 OFF- 33.16	51 OFF- 33.16		
4 ON 8.31	20 OFF 8.31	36 OFF 8.31	52 OFF 8.31		
5 ON 6.45	21 OFF 6.45	37 OFF 6.45	53 OFF 6.45		
6 OFF 15.06	22 OFF- 15.06	38 OFF- 15.06	54 OFF- 15.06		
7 OFF 19.08	23 OFF 19.08	39 OFF 19.08	55 OFF 19.08		
8 OFF- 19.50	24 OFF- 19.50	40 OFF- 19.50	56 OFF- 19.50		
9 OFF 17.20	25 OFF 17.20	41 OFF 17.20	57 OFF 17.20		
10 OFF- 13.05	26 OFF- 13.05	42 OFF- 13.05	58 OFF- 13.05		
11 OFF 7.89	27 OFF 7.89	43 OFF 7.89	59 OFF 7.89		
12 OFF- 2.52	28 OFF- 2.52	44 OFF- 2.52	60 OFF- 2.52		
13 OFF- 2.33	29 OFF- 2.33	45 OFF- 2.33	61 OFF- 2.33		
14 OFF 6.13	30 OFF 6.13	46 OFF 6.13	62 OFF 6.13		
15 OFF- 8.55	31 OFF- 8.55	47 OFF- 8.55	63 OFF- 8.55		
16 OFF 9.44	32 OFF 9.44	48 OFF 9.44	64 OFF 9.44		

[UP/DOWN]:Cursor
[ENTER]:ON/OFF
[SHIFT+ENTER]:Zero
[ESC]:Cancel

- 2) After channel setting is completed, press [SHIFT] and [ENTER] keys to conduct the offset Zero setting operation.
If there is no problem, press [ENTER] key to conduct the offset Zero setting operation and press [ESC] to cancel the operation.



- 3) Then, the obtained offset Zero value is set to the above channel and the current measured value becomes Zero.



Note

When it is required to obtain the offset Zero value once again, since ON/OFF CH in <Select Zero CH> is stored in the EDX-2000B, setting of Zero value is available. However, for changing the Zero value set channels, select <Zero CH> from the <Measurement> main menu.

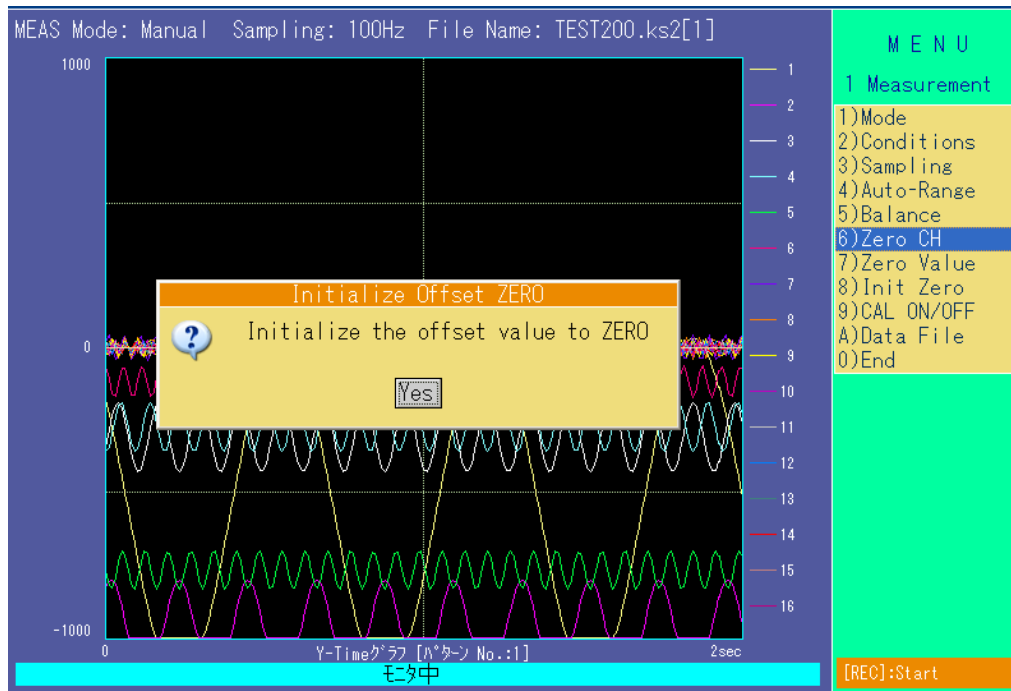
II) Initializing Offset Zero Value

After setting the offset Zero value, the offset Zero initializing menu appears.

The Initialize offset Zero is a function to that cancels the determined offset Zero value (Zeros the “Offset” value of calibration coefficient).

■ Operation Method

- 1) Select<Init Zero> from <Measurement> main menu. The offset Zero initializing menu appears.
Press [ENTER] key to initialize the offset Zero and press [ESC] key to cancel



- 2) With the above operation, all the offset Zero values of channels are returned to '0,' and the measured value of the channel returns to a state before the offset Zero setting operation.

3-8 SETTING DATA FILE [Measurement/Data File]

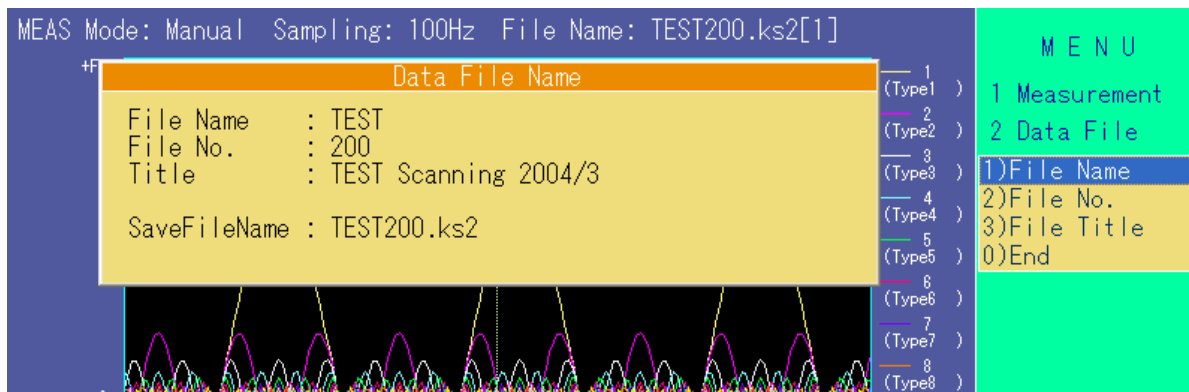
This section describes setting of recorded data file name, etc.

Note

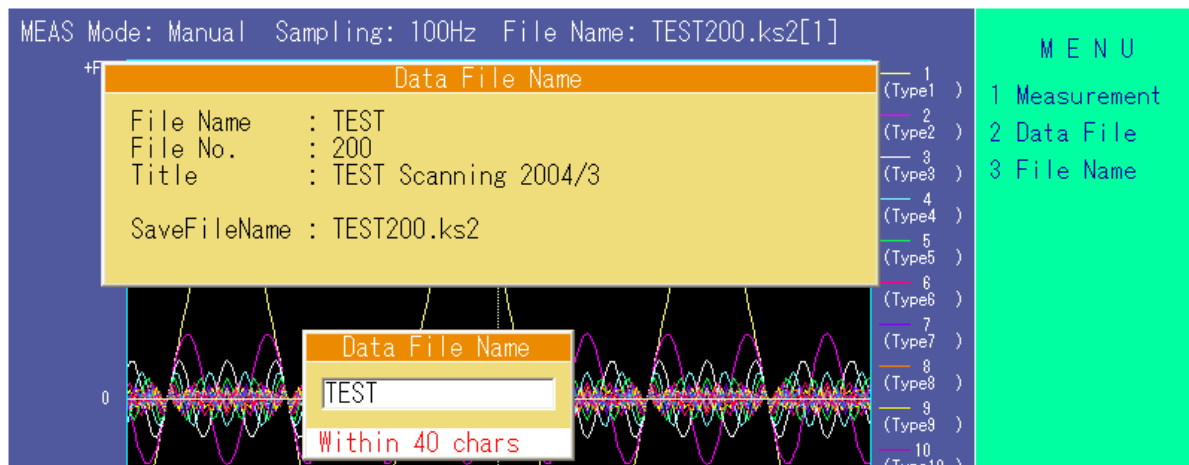
- While recording the measured data, <Data File> menu is not displayed and not used.

■ Operation Method

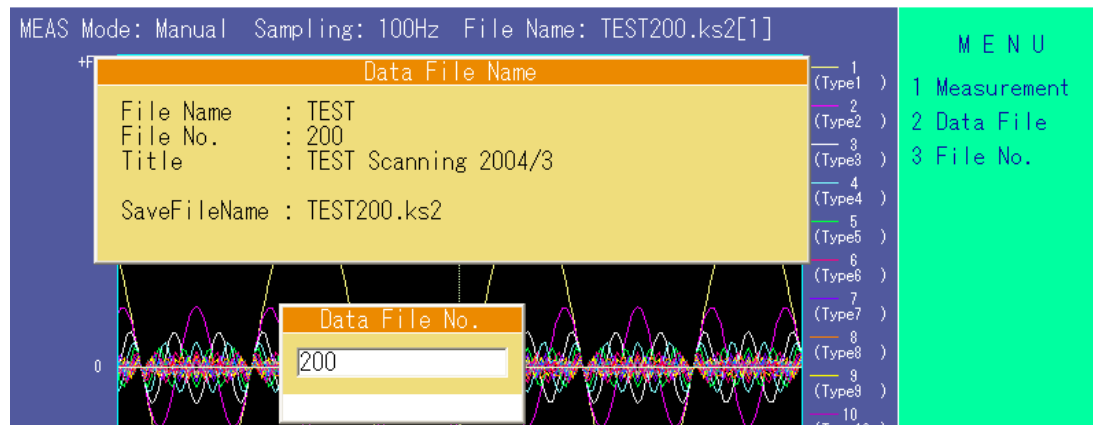
- 1) Select<Data File> from <Measurement> main menu.
- 2) A “Data File Name” setting window appears.



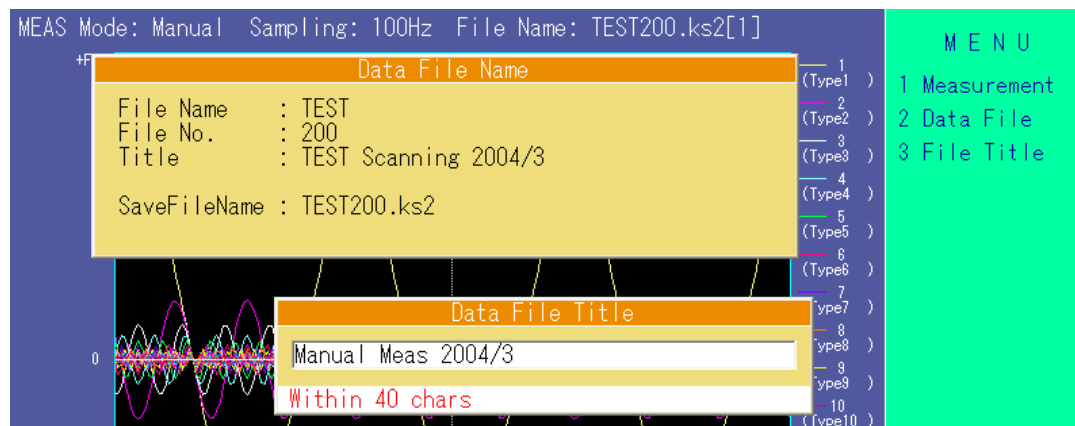
- 3) Select <File Name> from <Data File> menu. A “Data File Name” setting window appears.
Input the desired file name of recorded data within 40 characters.
After correctly entering the file name, press [ENTER] key to determine the file name.



- 4) Select <File No.> from the <Data File> menu. A “Data File No.” setting window appears.
Input the desired file No. of the recorded data within input range of any numeric value from 0 to 999.
After correctly entering the desired file No., press [ENTER] key to determine the file No.



- 5) Select <File Title> from the <Data File> menu. A “Data File Title” setting window appears.
Input a file title, contents, memo, etc. of the recorded data file within 40 characters.
After correctly entering the file title, press [ENTER] key to determine the file title.



MEMO

When data file format is in individual format, data recorded between [REC/PAUSE] and [STOP] keys shall be in 1 file. When it is in additional format, recorded data shall be in 1 block data within the same file.

In the individual format, '1' is added to the file No. In the additional format, '1' is added to the block No.

- Individual Format

Press the [STOP] key in the individual format file and the measured data is recorded to a different data file. At this time, file Nos. are automatically added one after another.

("TEST-001.ks2" "TEST-002.ks2" "TEST-003.ks2"etc.)

- Additional Format

Press the [STOP] key in the additional format and the measured data recorded until then shall be 1 block data.

In the additional format measurement, the measured data is recorded as block data in the same file. At this time, block Nos. of the recorded data are automatically added one after another.

("TEST-001[1].ks2" "TEST-001[2].ks2" "TEST-001[3].ks2"etc.).

- Block Data

When data file type is set to additional format, specify measured data to be additionally stored in the same file.

3-9 CONFIRMING DATA [Measurement/Confirm Data]

This section details the following procedures for confirming the recorded data just after the measurement.

- Waveform of measured data
- Waveform display of around 200 data by centering on maximum value of recorded data.
- Upper 5 ranks of measured value counting from waveform peak (maximum/minimum values)
- Histogram display of histogram result for simultaneous histogram measurement

Note

- <Confirm Data> menu is displayed only just after data recording.
- <Confirm Data> menu is displayed until <Measurement> menu or <REC Data> is conducted once again.
- Note that <Confirm Data> menu appears only in “Manual MEAS Mode.”

■ Operation Method

- 1) Press [REC/PAUSE] key to start measurement.
- 2) Press [STOP] key to end the measurement. The screen changes to monitoring state. Then, <Confirm Data> appears on the menu items.
- 3) Select <Confirm Data> menu to change the screen to data confirmation window as shown in the following.

■ Data Confirmation Standard Screen (Normal Time)

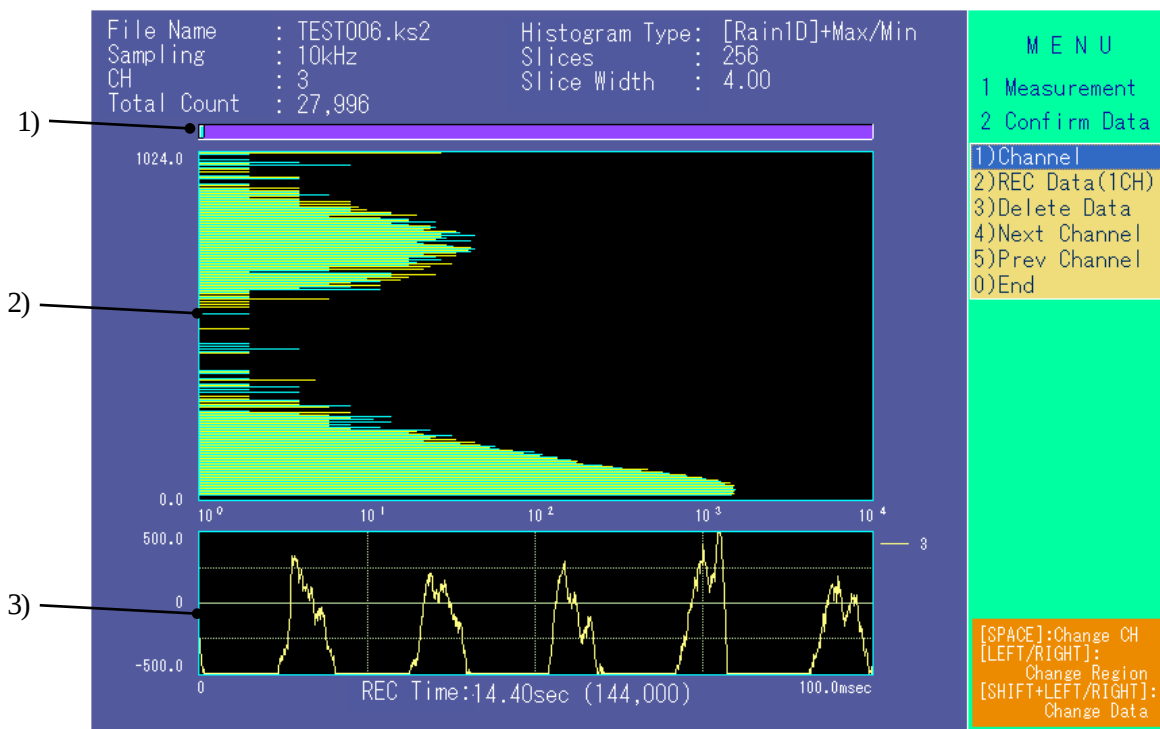


- 1)Currently displayed waveform range in the recording waveform is indicated in blue bar.
- 2)Waveform of target channel.
- 3)Waveform display around 200 data by centering on maximum value of the recorded data.
On the lower graph, up to 5 numeric values obtained by counting from maximum waveform are displayed.
- 4)Waveform display around 200 data by centering on minimum value of the recorded data.
On the lower graph, up to 5 numeric values obtained by counting from minimum waveform are displayed.

■ Operating Keys

- [SPACE] keyChange the current channel to the next channel.
 [←] or [→] keyChange the screen display area.
 [SHIFT] + [←] or [→] keyChange the number of display data.

■ Data Confirmation Standard Screen (Simultaneous Histogram Processing)



- 1)Currently displayed waveform range in the recording waveform is indicated blue-color bar.
- 2)Histogram result of the target channel.
- 3)Waveform of the target channel.

■ Operating Keys

- [REC/PAUSE] keyAfter confirming data (Data OK), start the next measurement.
 [DUPLICATE] key ([TAB] key)After confirming data (Data OK), move to the monitor screen.
 [SPACE] keyChange display channel.

3-9-1 Setting Display Channel [Measurement/Confirm Data/Channel]

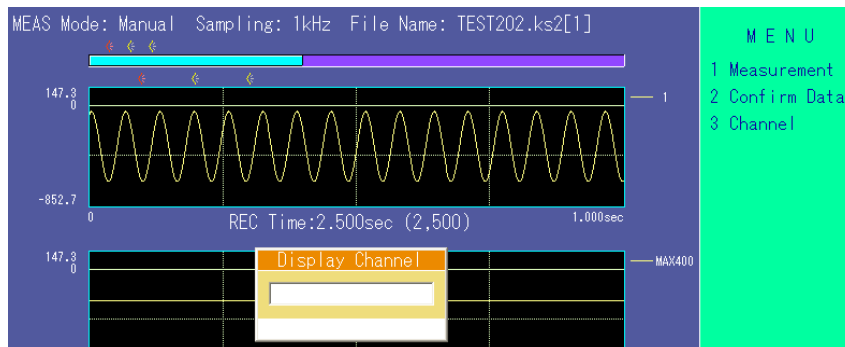
Set data confirmation display channel.

- Setting Range Measurement Channel with recorded data

- Operation Method

- 1) Select <Confirm Data> from <Measurement> menu.
- 2) Select <Channel> from the <Confirm Data> menu..
- 3) The following “Channel” setting window appears.

Input the desired channel No.



3-9-2 Deleting Measured Data [Measurement/Confirm Data/Delete Data]

After data confirmation is completed, unnecessary measured data is deleted for recording the data once again.

Note

Contents to be deleted vary with file type of recorded data.

- Additional formatThe latest block data shall be targeted for deleting.
- Individual formatTarget data file shall be targeted for deleting.

In addition, in either case, the related voice data is deleted.

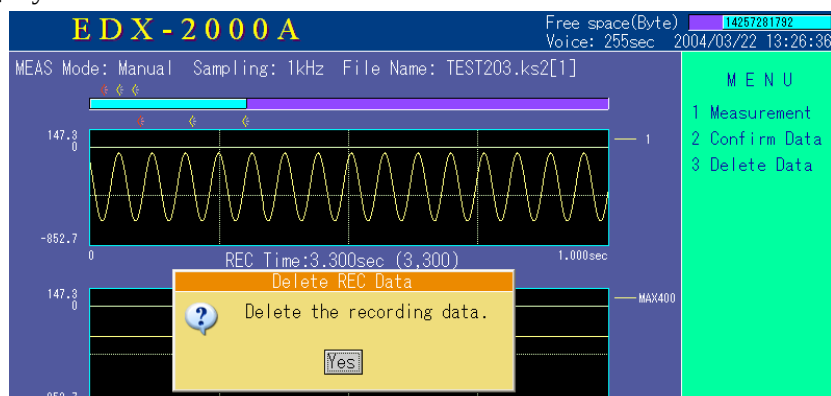
- Operation Method

- 1) Select <Confirm Data> from <Measurement> main menu
- 2) Select <Delete Data> from the <Confirm Data> menu.
- 3) Measured data delete confirmation window appears as shown in the following.

Follow instruction on the window.

[ENTER] key Deleting measured data

[ESC] key Cancel



MEMO

Block Data

When the additional format is specified for the data file type, measured data is specified to be additionally stored in the same file.

Block No of the recorded data is automatically added one after another.

(Ex. "Test-001[1]" → "TEST-001[2]" → "TEST-001[3]", etc.)

3-9-3 Displaying Next Channel/Previous Channel Data [Measurement/Confirm Data/Next Channel/Prev Channel]

Operation for displaying measured data of the next channel or previous channel is described.

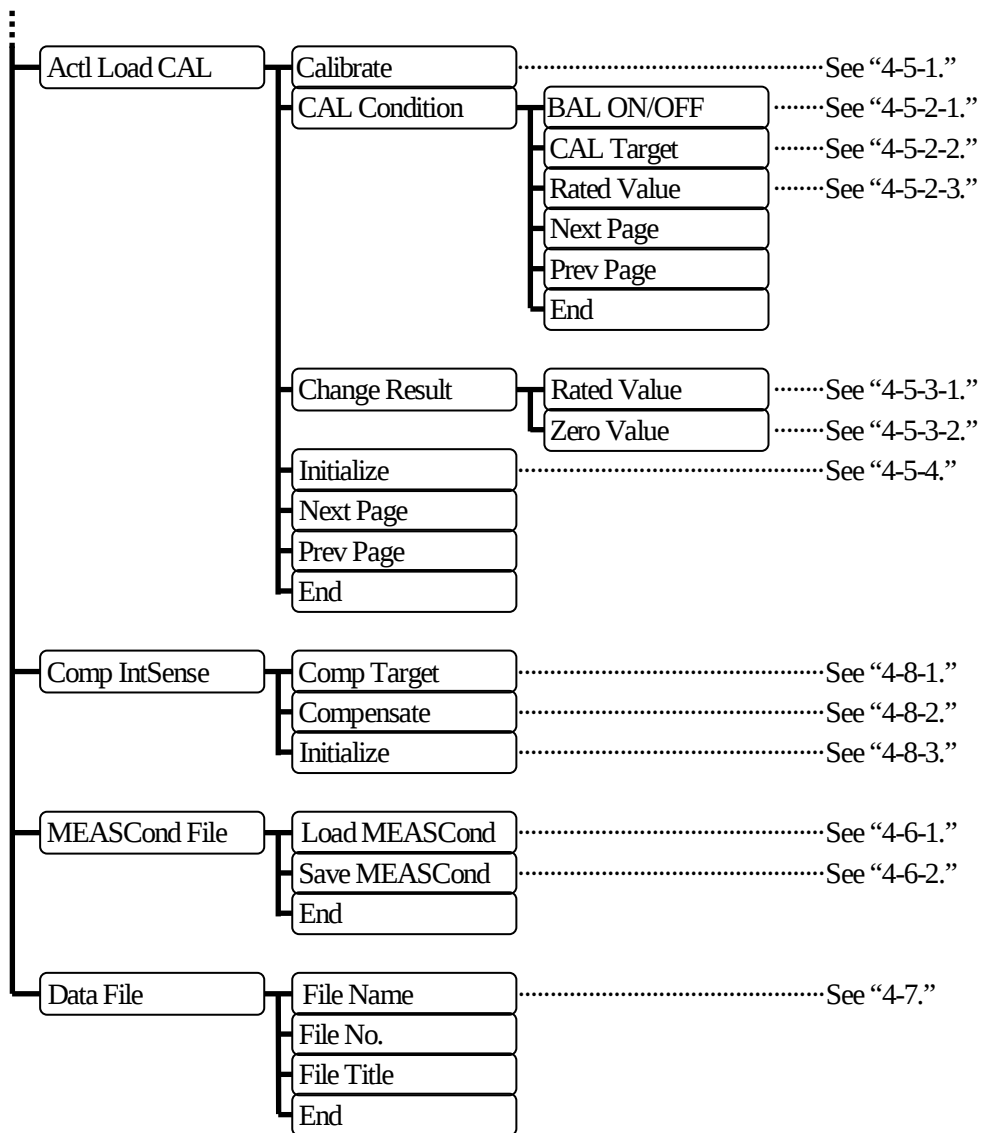
■ Operation Method

- 1) Select <Confirm Data> from <Measurement> main menu.
- 2) Select <Next Channel> or <Prev Channel> from the <Confirm Data> menu.
- 3) Data of the next channel or previous channel of the current channel is displayed.

4. SETTING MEASURING CONDITIONS [Condition]

This Chapter is related to settings of measuring conditions, simultaneous processing conditions, and conditioners. Also detail of actual load calibration is described in this Chapter.

Condition		
Channel Cond	MEAS Channel	See “4-1-1.”
	Mode	See “4-1-2.”
	Range	See “4-1-3.”
	Hi Pass	See “4-1-4.”
	Lo Pass	See “4-1-5.”
	BAL ON/OFF	See “4-1-6.”
	CAL ON/OFF	See “4-1-7.”
	CAL Range	See “4-1-8.”
	CAL Coef	See “4-1-9.”
	Offset	See “4-1-10.”
	Unit	See “4-1-11.”
	Channel Name	See “4-1-12.”
	Digital Input	See “4-1-13.”
	Next Page	
	Prev Page	
	End	
MEAS Cond	MEAS Mode	See “4-2-1.”
	Sampling	See “4-2-2.”
	Record Data	See “4-2-3.”
	Record Time	See “4-2-4.”
	Comment	See “4-2-5.”
	Interval Cond	See “4-2-7.”
	Trigger Cond	See “4-2-8 ~”
	Next Page	
	Prev Page	
	End	
Simlt Mode		See “4-3.”
Simlt FFT		See “4-3-1.”
Simlt Hist		See “4-3-2.”
Test Info	Item Name	See “4-4-1.”
	Contents	See “4-4-2.”
	Bit Name	See “4-4-3.”
	End	



Select <Condition> from the main menu to and the “Condition” setting screen appears.

■ How to Set Measuring Conditions

There are the following 2 methods for setting measuring conditions.

- 1) By loading the previously saved measuring condition file to set all the items together at a time (See “4-6-1”).
- 2) By setting measuring conditions for individual files. (See 4-1 to)

■ Basic Condition Setting Screen

< Conditions >

MEAS Mode : Manual
 Sampling Freq : 100Hz (64CH)
 REC Data : (128,823,862)
 REC Time(sec) : (14day 21:50:38)
 Dig Input CH : Not measure
 Simultaneous : No
 File Name : TEST000.ks2
 File Title : TEST Scanning 2004/3
 Comment :

CH	Card Type	MEAS Mode	Range	Hi Pass	Lo Pass	BAL	CAL	CAL Rng
1	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
2	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
3	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
4	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
5	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
6	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
7	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
8	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
9	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
10	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
11	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
12	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
13	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
14	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
15	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%
16	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%

M E N U

1)Condition Cond
 2)MEAS Cond
 3)Simlt Mode
 4)Test Info
 5)Actl Load CAL
 6)MEASCond File
 7)Data File
 8)Next Page
 9)Prev Page
 0)End

[SPACE]:Change CH
 [LEFT/RIGHT]:
 Change Item

1) 2) 3) 4) 5) 6) 7) 8) 9) 10)

- 1) “CH” Channel Nos. (1 to 64)
- 2) “Card Type” Types of built-in conditioner cards.
- 3) “Measurement” Indicate whether or not used for measurement.
- 4) “Mode” Measuring mode of conditioner card (Strain/Voltage).
- 5) “Range” Range set value of conditioner card.
- 6) “Hi Pass” High pass filter of conditioner card
- 7) “Lo Pass” Low pass filter of conditioner card
- 8) “BAL” Indicate whether balance is conducted for conditioner card.
- 9) “CAL” Indicate whether calibration is conducted for conditioner card.
- 10) “CAL Range” Calibration range of conditioner card
- 11) “Cal Coef” Engineering conversion coefficient that is corresponding to channel connected sensors.
- 12) “Offset” Offset value required when shifting a certain amount of measured value (engineering value).
- 13) “Unit” Engineering units.
- 14) “Channel Name” Input character strings of channel name.

- *1 See “Key Operations” on the next page for items from 11 to 14 that are not mentioned on the previous screen.
- *2 On the above screen, display format of the number of recorded data and contents of the record time may vary with setting items. For details, see “4-2-6.”

■ Key Operations

- [←] or [→] key
 - Press [ESC] key on the current setting windows to have the non-display state. Operating [←] or [→] key on the reverse displayed cursor enables to display selectable items one after another to allow the settings.
 - To display items that are not shown on the screen, press [←] or [→] key and scroll the screen to right and left.

[CH] [Card Type] [Meas] [Mode] [Range] [Hipass] [Lopass] [BAL] [CAL] [CALRng]

CH	Card Type	MEAS	Mode	Range	Hi Pass	Lo Pass	BAL	CAL	CAL Rng
1	CDV-40A	ON	Strain	1 μ m/m	OFF	10kHz	ON	ON	100%
2	CDV-40A	ON	Strain	1 μ m/m	OFF	10kHz	ON	ON	100%
3	CDV-40A	ON	Strain	1 μ m/m	OFF	10kHz	ON	ON	100%
4	CDV-40A	ON	Strain	1 μ m/m	OFF	10kHz	ON	ON	100%
5	CDV-40A	ON	Strain	1 μ m/m	OFF	10kHz	ON	ON	100%



[CH] [Card Type] [Meas] [Mode] [Range] [CAL Coef] [Offset] [Unit]

CH	Card Type	MEAS	Mode	Range	CAL Coef	Offset	Unit
1	CDV-40A	ON	Strain	1 μ m/m	1.0000	0.0000	μ m/m
2	CDV-40A	ON	Strain	1 μ m/m	1.0000	0.0000	μ m/m
3	CDV-40A	ON	Strain	1 μ m/m	1.0000	0.0000	μ m/m
4	CDV-40A	ON	Strain	1 μ m/m	1.0000	0.0000	μ m/m
5	CDV-40A	ON	Strain	1 μ m/m	1.0000	0.0000	μ m/m



[CH] [Card Type] [Meas] [Channel Name]

CH	Card Type	MEAS	Channel Name
1	CDV-40A	ON	Type1
2	CDV-40A	ON	Type2
3	CDV-40A	ON	Type3
4	CDV-40A	ON	Type4
5	CDV-40A	ON	Type5

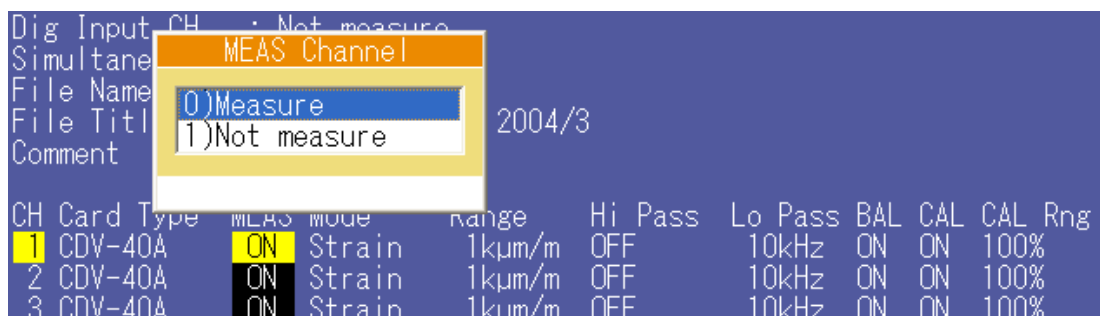


[No.] [Item s] [Contents] [Bit Name]

No.	Items	Contents	Bit Name
1	TEST1	Step0	
2	TEST2	Step1	
3	TEST3	Step2	
4	TEST4	Step3	
5	TEST5	Step4	

- [ENTER] key
 - Suppose <Channel Cond> menu is selected and various items setting windows are displayed. When moving the cursor to a desired channel, [ENTER] key can be used instead of [↓] key.

- [SPACE] key
 - Suppose <Channel Cond> menu is selected and various items setting window are displayed. When moving the cursor to the desired channel, [SPACE] key can be used instead of [↑] key. If the items setting window is cleared, the desired items can be displayed and set with [SPACE] key in the same manner.



- Numeric keys (0 to 9)
 - To select the desired items, press numeric keys that are corresponding to the head of the selection items on the setting window .
- [.] key
 - To move the cursor to the desired channel, press [ESC] key on the item setting window to have the non-display state. The screen can be scrolled up and down with [.] key instead of [↓] key.
- [DUPLICATE] key (Copied for every item)
 - To copy the desired item on the cursor to multiple lines, press [ESC] key to have the non-display state. Reverse displayed contents of the desired item can be copied to the next line with [DUPLICATE] key.

CH	Card Type	MEAS	Mode	Range	Hi Pass	Lo Pass	BAL	CAL	CAL Rng
1	CDV-40A	--	Strain	1kum/m	OFF	10kHz	ON	ON	100%
2	CDV-40A	--	Strain	1kum/m	OFF	10kHz	ON	ON	100%
3	CDV-40A	--	Strain	1kum/m	OFF	10kHz	ON	ON	100%
4	CDV-40A	--	Strain	1kum/m	OFF	10kHz	ON	ON	100%
5	CDV-40A	ON	Strain	1kum/m	OFF	10kHz	ON	ON	100%

- [CHARACTER] key (Copied for every line)
 - To copy all items (excluding names) on the cursor to multiple lines, press [ESC] key on the item setting window to have the non-display state. Contents of all items of reverse displayed channel can be copied to the next line for every line with [CHARACTER] key.

CH	Card Type	MEAS	Mode	Range	Hi Pass	Lo Pass	BAL	CAL	CAL Rng
1	CDV-40A	ON	Voltage	0.5V	0.2Hz	3kHz	**	OFF	100%
2	CDV-40A	ON	Voltage	0.5V	0.2Hz	3kHz	**	OFF	100%
3	CDV-40A	ON	Voltage	0.5V	0.2Hz	3kHz	**	OFF	100%
4	CDV-40A	ON	Voltage	0.2V	OFF	10kHz	**	ON	100%
5	CDV-40A	ON	Strain	1kum/m	OFF	10kHz	ON	ON	100%

4-1 SETTING CHANNEL CONDITIONS [Condition/Channel Cond]

This section describes setting of various conditions for built-in conditioner cards as well as setting of calibration coefficient, units, etc. of channels.

■ Operation Method

Select <Channel Cond> from <Condition> main menu to display channel condition setting items.

4-1-1 Setting Measuring Conditions [Condition/Channel Cond/MeasChannel]

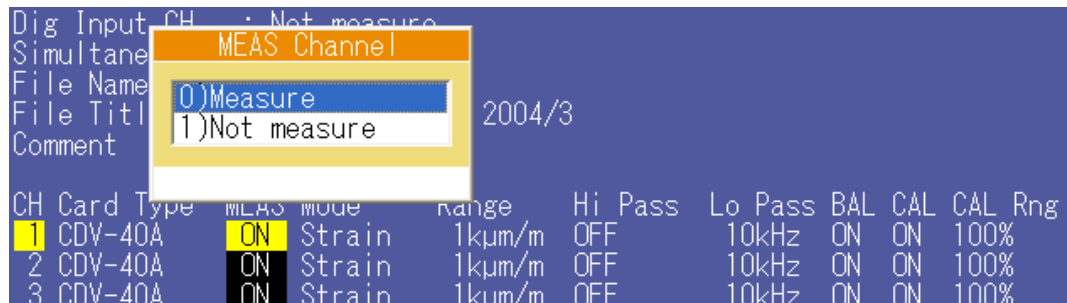
Set whether or not measuring channel is used for every channel.

■ Options

- “Measurement” Target channel is used.
- “Not measure” Target channel is not used.

■ Operation Method

- 1) Select <Channel Cond> from <Condition> main menu.
- 2) Select <Meas Channel> from the <Channel Cond> menu.
- 3) Cursor is displayed on the “Meas” column and “Meas Channel” setting window appears.
Here, select “Measurement” or “Not measure” and press [ENTER] key to determine the selection.
- 4) Then, the cursor moves to the next channel. Repeat the operation in item 3) and set the measuring channel of the next line.



MEMO

Note that channel that is set to “Measure” shall be monitor and recording target.

In addition, set “Not Measure” to channels that are not required to be recorded and the size of data file shall be decreased.

4-1-2 Setting Measuring Mode of Channels [Condition/Channel Cond/Mode]

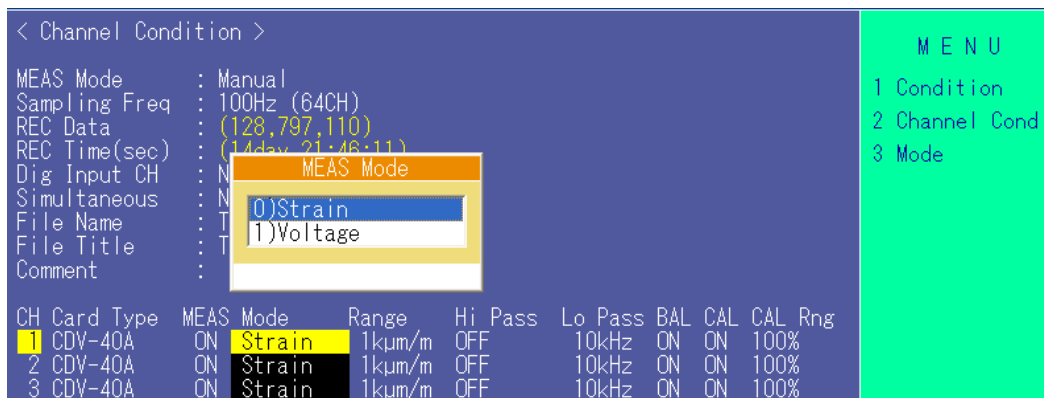
This section describes setting of measuring mode for every channel.

■ Options

- For CDV-40A Conditioner Card
Strain and Voltage

■ Operation Method

- 1) Select <Mode> from <Channel Cond> menu.
- 2) Cursor is displayed on the “Mode” column and a “Mode” setting window appears.
Since options of setting available measuring modes are automatically displayed according to the type of built-in conditioner, you can select the desired measuring mode from the above options and set by pressing [ENTER] key.
- 3) Then, the cursor moves to the next channel. Repeat the operation in item 2) and set mode for each channel.



4-1-3 Setting Range [Condition/Channel Cond/Range]

This section describes setting of ranges.

■ Options

- For CDV-40A Conditioner

- When measuring mode is set to “Strain”500 μ m/m, 1 k μ m/m, 2 k μ m/m, 5 k μ m/m, 10 k μ m/m, 20 k μ m/m, 50 k μ m/m, OFF
- When measuring mode is set to “Voltage”0.1V, 0.2V, 0.5V, 1.0V, 2.0V, 5.0V, 10.0V, OFF

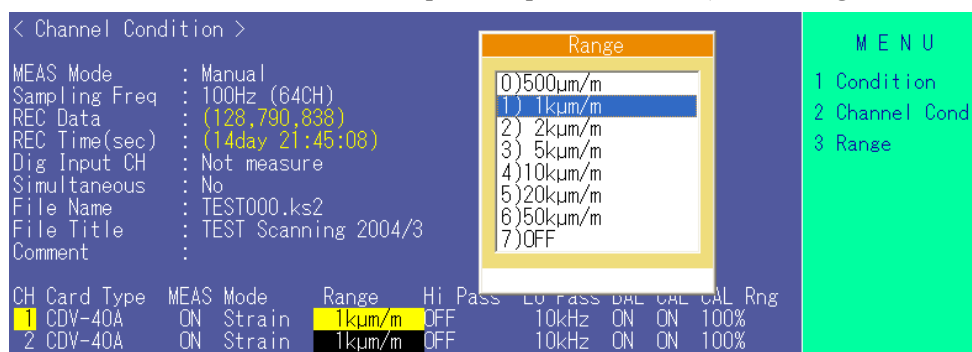
■ Operation Method

- 1) Select <Range> from <Channel Cond> menu.

- 2) Cursor is displayed on the “Range” column and “Range” setting window appears.

Since options of setting available measuring ranges are automatically displayed according to the type of built-in conditioner, you can select the desired measuring range from the above options and set by pressing [ENTER] key.

- 3) Then, the cursor moves to the next channel. Repeat the operation in item 2) and set range for each channel.



4-1-4 Setting High Pass Filter [Condition/Channel Cond/Hi Pass]

This section describes setting of conditioner high pass filter of channels.

■ Options

- For CDV-40A Conditioner
“OFF,” “0.2 Hz,” and “1.0 Hz”

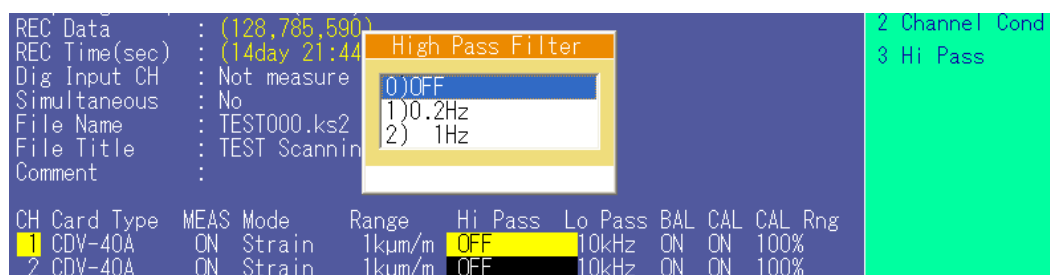
■ Operation Method

- 1) Select <Hi Pass Filter> from the <Channel Cond> menu.

- 2) Cursor is displayed on the “Hi Pass” column and “High Pass Filter” setting window appears.

When using the high pass filter (Input AC coupling), select “0.2” or “1.0 Hz” and press [ENTER] key. If no high pass filter is used (Input DC coupling), select “OFF.” (default value is “OFF”)

- 3) Then, the cursor moves to the next channel. Repeat the operation in item 2) and set the high pass filter of for each channel.



4-1-5 Setting Low Pass Filter [Condition/Channel Cond/Lo Pass]

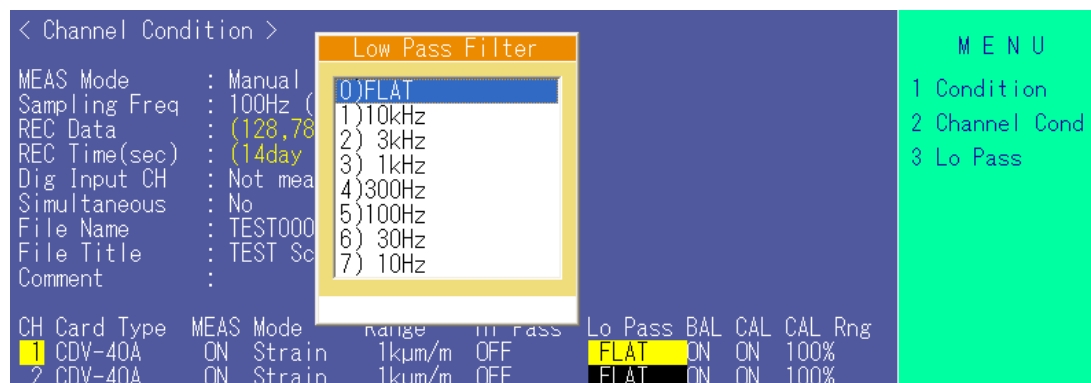
This section describes cutoff frequency of low pass filter of channels.

■ Options

- For CDV-40A Conditioner
10Hz, 30Hz, 100Hz, 300Hz, 1kHz, 3kHz, 10kHz, and FLAT

■ Operation Method

- 1) Select <Lopass Filter> from the <Channel Cond> menu.
- 2) Cursor is displayed on the “Lo Pass” column and “Low Pass Filter” setting window appears.
Here, set the low pass filter for the target channel. Select the appropriate frequency and press [ENTER] key to determine the setting.
- 3) Then, the cursor moves to the next channel. Repeat the operation in item 2) and set the low pass filter for each channel.



4-1-6 Setting Balance [Condition/Channel Cond/BAL ON/OFF]

This section is related to whether or not strain bridge initial unbalance of measuring channel is adjusted. Channel that is set to ON in <BAL ON/OFF> menu shall be balance target when <Balance> is selected in <Measurement> main menu.

■ Options

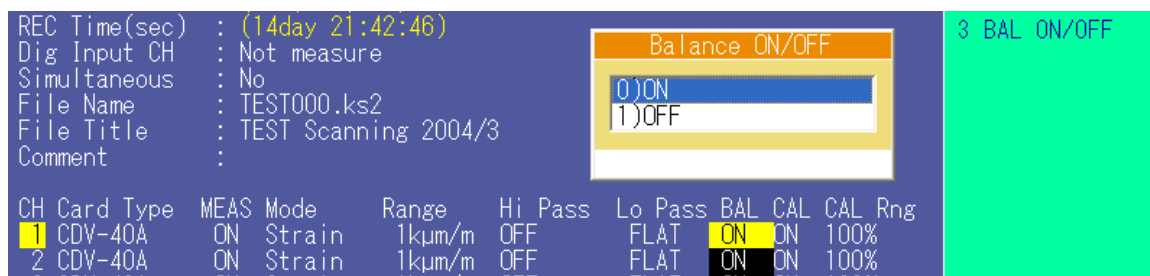
- “ON”..... Balance ON
- “OFF” Balance OFF

Note

When mode of the target channel is “Voltage,” this item is not applicable.

■ Operation Method

- 1) Select <BAL ON/OFF> > from the <Channel Cond> menu.
- 2) Cursor is displayed on the “BAL” column and a “BAL ON/OFF” setting window appears.
Here, set ON/ OFF of balance operation to the target channel. Select the appropriate item and press [ENTER] key to determine the setting.
- 3) Then, the cursor moves to the next channel. Repeat the operation in item 2) and set ON/OFF of balance operation for each channel.



4-1-7 Setting CAL [Condition/Channel Cond/CAL On/OFF

Setting of conditioner calibration value output target of channel is described.

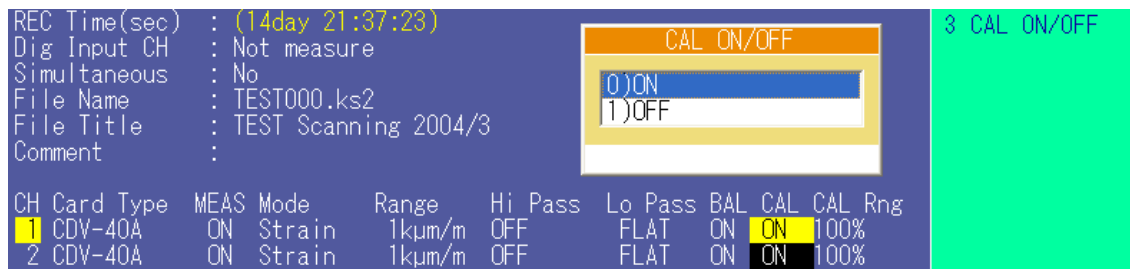
Channel that is set to “ON” shall be a calibration output target channel when <CAL ON/OFF> is selected from <Measurement> menu.

■ Options

- “ON” CAL ON
- “OFF” CAL OFF

■ Operation Method

- 1) Select <CAL ON/OFF> > from the <Channel Cond> menu.
- 2) Cursor is displayed on the “CAL” column and a “CAL ON/OFF” setting window appears.
Here, set ON/OFF of calibration to target channel. Select the appropriate item and press [ENTER] key to determine the setting.
- 3) Then, the cursor moves to the next channel. Repeat the operation in item 2) and set the calibration ON/OFF for each channel.



4-1-8 Setting CAL Range [Condition/Channel Cond/CAL Range]

This section describes setting of calibration range (calibration output value) of conditioner of channels.

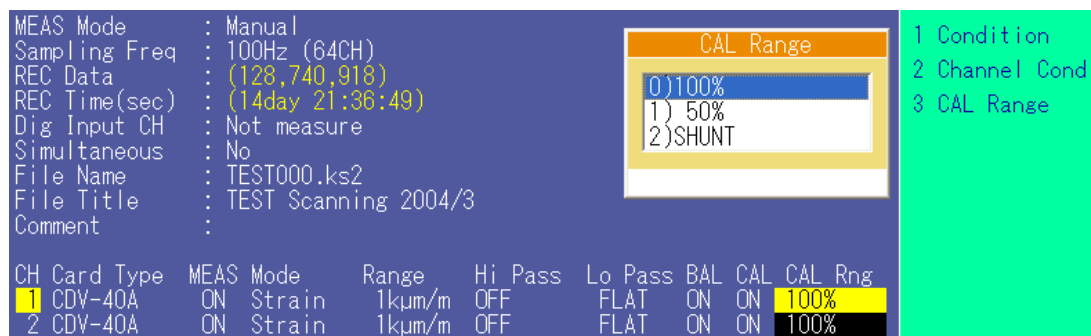
■ Options

● For CDV-40A Conditioner

- 50%..... Outputs calibration value equivalent to 50% of conditioner setting range.
- 100% Outputs calibration value equivalent to conditioner setting range.
- SHUNT Outputs calibration value equivalent to SHUNT resistance (Note) that is connected to measuring channel bridge.
SHUNT is set only for strain mode.

■ Operation Method

- 1) Select <CAL Range> > from the <Channel Cond> menu.
- 2) Cursor is displayed on the “CAL Range” column and “CAL Range” setting window appears.
Here, set calibration range to target channel. Select the appropriate item and press [ENTER] key to determine the setting.
- 3) Then, the cursor moves to the next channel. Repeat the operation in item 2) and set the calibration range for each channel.



Note

SHUNT

Input fixed resistance between [+BV] and [+IN] of strain gage bridge, add the bridge output value at that time to the current output value and output the obtained result.

Regardless of measuring range or calibration output range, SHUNT is determined by bridge resistance of strain sensors.

Relations between output value and bridge resistance are shown in the following table.

Bridge Resistance[Ω]	Output Value[μm/m]*
120	Approx. 80
240	Approx. 176
350	Approx. 257
700	Approx 515
1000	Approx.735

[Expressions]

$$\text{Output value} = \frac{\text{Bridge resistance}}{1360 \times 10^3} \times 10^6$$

* +CAL and -CAL are the same output. Accuracy is about ±5%.

4-1-9 SETTING CALIBRATION COEFFICIENT [Condition/Channel Cond/CAL Coef]

This section describes setting of conversion coefficient (calibration coefficient) to physical value (engineering value) corresponding to sensors that are connected to input of channels.

The calibration coefficient is also used as compensation coefficient for resistance value of lead wire in strain measurement or compensation coefficient for gage factors.

■ Physical Value Expression

Physical value = Calibration coefficient $\times$ Measured value + Offset (Unit is in engineering unit)

Note

For "Offset," see 4-1-10.

■ Calibration Coefficient for Every Sensor

[Strain Gage]

When strain gage is used, set calibration coefficient (C) as stated below for the following 2 types of compensations.

$$C = C_g \times C_l \text{ (Set unit in } \mu\text{m/m or } 10^{-6}\text{)}$$

● Compensation Coefficient 'C_g' of Gage Factor

Suppose gage factor of the strain gage is 'K_s,' compensation coefficient 'C_g' is obtained by the following expression.

$$C_g = 2.00/K_s$$

● Compensation Coefficient 'C_l' of Strain Gage Lead Wire

Suppose the entire resistance value (round trip resistance value of the lead wire) of strain gage lead wire in use is 'r_l,' compensation coefficient 'C_l' is obtained by the following expression.

$$C_l = (\text{Strain gage nominal resistance value} + r_l) / (\text{Strain gage nominal resistance value})$$

[Strain Gage Transducer]

For calibration coefficient 'C' for using the strain gage transducer, input calibration coefficient 'C_s' stated in the attached sheet in the transducer. (C_s is an engineering value per $\mu\text{m/m}$)

When compensating cable resistance value of the transducer together with that of the lead wire, calibration coefficient is obtained by multiplying the aforementioned calibration coefficient by the following lead wire compensation coefficient 'C_l.' Where, 'r_l' denotes the entire resistance value of the cable (round trip resistance value of the cable)

$$C_l = (\text{Transducer input resistance value} + r_l) / (\text{Transducer input resistance value})$$

$$C = C_s \times C_l \text{ (Unit is in engineering unit of the transducer)}$$

[Voltage Output Type Sensor]

For compensation coefficient 'C' of a voltage output type sensor, input engineering value per voltage.

$$C = \text{Engineering value}/1V \text{ (Set sensor engineering unit.)}$$

[Current Output Type Sensor]

Apply shunt resistance (Resistance value is 'Rs') to voltage card input and the obtained current is converted into voltage for measurement. At this time, set the following conversion coefficient to the calibration coefficient 'C' to be returned to the current value.

$$C = 1/R_s \text{ (Set unit in A or Ampere)}$$

$$C = 1000/R_s \text{ (Set unit in mA or milliampere)}$$

[Frequency Output Type Sensor]

Base unit of the measured value is frequency 'Hz.'. (Calibration coefficient = 1.0)

Calibration coefficient 'C' to obtain revolution 'rpm' shall be, for example, as follows.

$$C = 60/(\text{Number of pulses per revolution}) \text{ (Set unit in rpm)}$$

Procedures for calculating calibration coefficient in strain gage sensors are described in the following.

Ex.1) Strain Gage

Suppose the type of the strain gage in use is KFG-2-120-C1-11. Here, it is assumed that 5-m long L-6 lead wire is additionally extended to the strain gage.

Numeric values related to those stated on the package are considered by corresponding to coefficient in the previous item.

Type	KFG-2-120-11
.....	
Gage Resistance	$120.2 \pm 0.3 \Omega$
.....	
Gage Factor	$2.03 \pm 1.5\%$

Where, Ks denotes gage factor. Suppose it is set to 2.03.

$$K_s = 2.03$$

Strain resistance value. Suppose it is set to 120.2Ω .

$$\text{Strain resistance value} = 120.2$$

'r₁' denotes lead wire round trip resistance. Here, L-6 lead wire is used to extend the lead wire by 5 meters.

By referring to KYOWA's union catalog, since round trip resistance of the above lead L-6 wire is $0.44\Omega/\text{m}$, resistance 'r₁' of 5-meter lead wire is obtained as follows.

$$r_1 = 0.44 \times 5 = 2.2$$

Considering the above, gage factor compensation coefficient 'C_g' and lead wire compensation coefficient 'C₁' are obtained by the following expression.

$$C_g = 2.00 / 2.03 = 0.98522167 \cdots \doteq 0.98522$$

$$C_1 = (120.2 + 2.2) / 120.2 = 1.018302829 \cdots \doteq 1.01830$$

Therefore, calibration coefficient 'C' is obtained by the following expression.

$$C = 0.98522 \times 1.01830 = 1.003249526 \cdots \doteq 1.00325$$

Set the obtained $1.00325 \doteq 1.003$ as the calibration coefficient.

Note

Lead wire included resistance is expressed as gage resistance value for the current gage with lead wire to describe the lead wire compensated gage factor.

Ex.2) Strain Gage Transducer

1) Small Size Compression Load Cell

Explanation is made by taking for example a Small Size Compression Load Cell LCN-A-1KN (With rated value having 0 to 1 kN [102 kgf]). Following values are stated in the Calibration Sheet.

Rated Output	2000	μ V/V
Rated output	3999	$\times 10^{-6}$ *
.....		
Calibration coefficient	0.0005002 kN (0.05102#)	/1 μ V/V
Calibration constant	0.0002501 kN (0.02551#)	/1 $\times 10^{-6}$ *
In/out resistance	Input 350.1	Ω
	Output 349.8	Ω
Unit	* Strain	
Unit	# kgf	

For strain mode measurement, we use coefficient in the lower step (marked with *).

Suppose measurement is conducted in strain mode. Although both SI unit and gravitational unit systems are stated in the above notation, we use the SI unit system. If it is required to use the gravitational unit system, use by considering $C_g = 0.0002501$.

Next, suppose the length of the sensor cable is 10 meters with 4-conductor (0.5 mm²) shield cables.

Since round trip resistance value 'R' is $R = 0.7 \Omega/10m$, resistance value 'r₁' of the 10-meter long cable is obtained as follows.

$$r_1 = 0.7 \Omega$$

In addition, input resistance of the transducer is 350.1 Ω .

Considering the above, gage factor compensation coefficient 'C_g' and lead wire compensation coefficient 'C₁' are obtained by the following expression.

$$C_g = 0.0002501$$

$$C_1 = (350.1 + 0.7) / 350.1 = 1.0019994 \dots \doteq 1.0019994$$

Therefore, calibration coefficient 'C' is obtained by the following expression.

$$C = 0.0002501 \times 1.0019994 = 0.0002506 \dots \doteq 0.002506 \text{ (kN /}\mu\text{m/m)}$$

Set the obtained $0.0002506 = 2.506 \times 10^{-4}$ as the calibration coefficient.

Note

A strain gage transducer is generally calibrated with sensor cable. If no cable is extended, it is not required to conduct cable length compensation.

2) Small Size Pressure Transducer

Explanation is made by taking for example a Small Size Pressure Transducer PGM-500KH (With rated capacity having 0 to 50 MPa [509.9 kgf/cm²]). Following values are stated in the Calibration Sheet.

Rated Output	2224	μ V/V
Rated output	4447	$\times 10^{-6}$ *
.....		
Calibration coefficient	0.02248 MPa (0.2294#)	/1 μ V/V
Calibration constant	0.01124 MPa (0.1147#)	/1 $\times 10^{-6}$ *
In/out resistance	Input	352.3 Ω
	Output	349.1 Ω
Unit	* Strain	
Unit	# kgf/cm ²	

For strain mode measurement, we use coefficient in the lower step (marked with *).

Here measurement is conducted in strain mode.

$$C_g = 0.01124$$

Next, suppose the length of the sensor cable is 10 meters with 4-conductor (0.5 mm²) shield cables.

Since round trip resistance value 'R' is $R = 0.7 \Omega/10m$, resistance value 'r₁' of the 10-meter long cable is obtained as follows.

$$r_1 = 0.7 \Omega$$

In addition, input resistance of the transducer is 352.3 Ω .

Considering the above, gage factor compensation coefficient 'C_g' and lead wire compensation coefficient 'C_l' are obtained by the following expression.

$$C_g = 0.01124$$

$$C_l = (352.3 + 0.7) / 352.3 = 1.00198694 \dots \doteq 1.00199$$

Therefore, calibration coefficient 'C' is obtained by the following expression.

$$C = 0.01124 \times 1.00199 = 0.011262367 \dots \doteq 0.01126 \text{ (MPa / } \mu m/m \text{)}$$

Set the obtained $0.01126 = 1.126 \times 10^{-2}$ as the calibration coefficient.

Note

A strain gage transducer is generally calibrated with sensor cable. If no cable is extended, it is not required to conduct cable length compensation.

3) Differential Pressure Transducer

Explanation is made by taking for example a differential Pressure Transducer PD-2KA (With rated capacity having 0 to 200 kPa [2.039 kgf/cm²]). Following values are stated in the Calibration Sheet.

Rated output	1500	μ V/V
Rated output	2999	$\times 10^{-6}$ *
.....		
Calibration coefficient	0.1334 kPa (0.0001360#)	/1 μ V/V
Calibration constant	0.06669 kPa (0.0006799#)	/1 $\times 10^{-6}$ *
In/out resistance	Input 350.1	Ω
	Output 350.9	Ω
Unit	* Strain	
Unit	# kgf/cm ²	

For strain mode measurement, we use coefficient in the lower step (marked with *).

$$C_g = 0.06669$$

Next, suppose the length of the sensor cable is 10 meters with 4-conductor (0.5 mm²) shield cables.

Since round trip resistance value 'R' is R= 0.7 Ω /10m, resistance value 'r₁' of the 10-meter long cable is obtained as follows.

$$r_1 = 0.7 \Omega$$

In addition, input resistance of the transducer is 350.1 Ω .

Considering the above, gage factor compensation coefficient 'C_g' and lead wire compensation coefficient 'C₁' are obtained by the following expression.

$$C_g = 0.06669$$

$$C_1 = (350.1 + 0.7) / 350.1 = 1.0019942 \dots \doteq 1.00199$$

Therefore, calibration coefficient 'C' is obtained by the following expression.

$$C = 0.06669 \times 1.00199 = 0.0668627927 \dots \doteq 0.06686 \text{ (kPa /}\mu\text{m/m)}$$

Set the obtained 0.06686 = 6.686×10^{-2} as the calibration coefficient.

Note

A strain gage transducer is generally calibrated with sensor cable. If no cable is extended, it is not required to conduct cable length compensation.

4) Accelerometer

Explanation is made by taking for example an Accelerometer AS-1000A (With rated capacity having 1000 G).
Following values are stated in the Calibration Sheet.

Rated output	599	$\mu \text{ V/V}$
Rated output	1198	$\times 10^{-6*}$
.....		
Calibration coefficient	1.669	$\text{G/1 } \mu \text{ V/V}$
Calibration constant	0.8347	$\text{G/1} \times 10^{-6*}$
In/out resistance	Input 121.7	Ω
	Output 121.7	Ω
Unit	* Strain	

For strain mode measurement, we use coefficient in the lower step (marked with *).

$$C_g = 0.8347$$

Next, suppose the length of the sensor cable is 10 meters with 4-conductor (0.8 mm²) shield cables.

Since round trip resistance value 'R' is $R = 0.7 \Omega/10\text{m}$, resistance value 'r₁' of the 10-meter long cable is obtained as follows.

$$r_1 = 4.4 \Omega$$

In addition, input resistance of the transducer is 120Ω .

Considering the above, gage factor compensation coefficient 'C_g' and lead wire compensation coefficient 'C₁' are obtained by the following expression.

$$C_g = 0.8347$$

$$C_1 = (121.7 + 4.4) / 121.7 = 1.036454018 \dots \doteq 1.0365$$

Therefore, calibration coefficient 'C' is obtained by the following expression.

$$C = 0.8347 \times 1.0365 = 0.86516653 \dots \doteq 0.8652 (\text{G}/\mu\text{m/m})$$

Set the obtained $0.8652 = 8.65 \times 10^{-1}$ as the calibration coefficient.

Note

A strain gage transducer is generally calibrated with sensor cable. If no cable is extended, it is not required to conduct cable length compensation.

■ Input Range of Calibration Coefficient

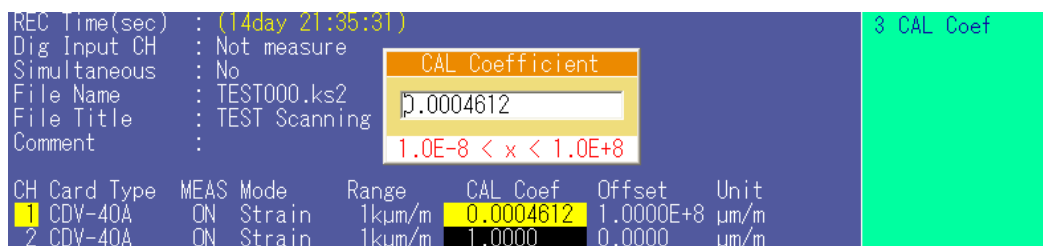
-1E8 to -1E-8, 1E-8 to 1E8

[Note] Default is set to 1.

Inputting 0 is not allowed.

■ Operation Method

- 1) Select <CAL Coef> from the <Channel Cond> menu.
- 2) The cursor is displayed on the “CAL Coef” column and a “CAL Coef” setting window appears.
- 3) Input calibration coefficient that is corresponding to the connected sensor.
- 4) Press [ENTER] key and input the calibration coefficient. Then, the determined calibration coefficient is displayed.



4-1-10 Setting Offset [Condition/Channel Cond/Offset]

Offset value is used when it is required to move the measured value in parallel by a certain amount to convert the obtained data into physical value data. For example, when a transducer having 4 to 20 mA is used, the offset is used for compensating the lower step value 4 mA.

■ Physical Value Conversion Expression

Physical value = CAL coefficient × Measured value + Offset (Unit is in engineering value)

■ Offset Setting Range

-1E8 to -1E-8, 0, 1E-8 to 1E8 (in physical value)

[Note] Default is set to 0.

■ Operation Method

- 1) Select <Offset> from the <Channel Cond> menu.
- 2) The cursor is displayed on the “Offset” column and an “Offset” setting window appears.
- 3) Input the shift amount to the offset value as shown in the following.

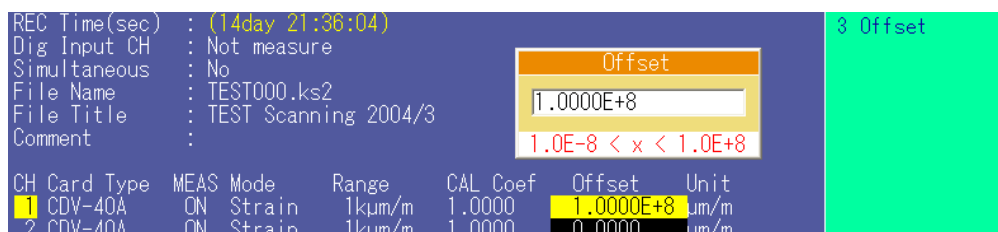
Note

Always set the offset in physical value (because CAL coefficient is added after multiplication).

After setting the offset ZERO value, it is reflected to this item.

For details of offset ZERO value, see “3-7.”

- 4) Press [ENTER] key to determine the offset value and the entered calibration coefficient is displayed on the screen.



4-1-11 Setting Unit [Condition/Channel Cond/Unit]

Physical value units that are corresponding to input sensors are described. According to conditioner types and measuring modes, μ m/m, V, etc. are set as default units.

■ List of Units

The following unit character strings are used in the EDX-2000B.

Table 4-1 List of Units

μ m/m	e	mV	V	MA	A	mm	cm
M	°C	° F	gf/cm2	kgf/mm2	kgf/cm2	kgf/m2	mmHg
kPa	MPa	g	kg	ton	gf	kgf	tonf
N	kgf·mm	kgf·cm	kgf·m	Nm	OHM	kOHM	MOHM
%	dB	ppm	cm/s	m/s	m/min	km/h	Hz
kHz	MHz	°	deg	rad	kN	kNm	kW
rpm	cm/s2	m/s2	G	daN	mile/h	*100kpa	deg/s
msec	sec	min	hour	USERDEF1	USERDEF2	USERDEF3	

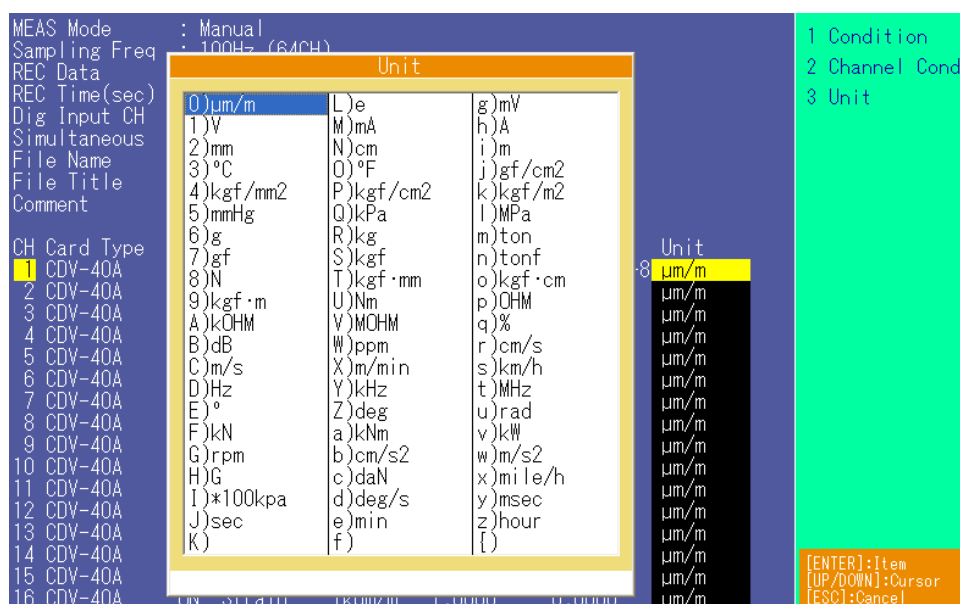
[Note] “USERDEF1” to “USERDEF3” are user defined character strings.

■ User Defined Units

For “USERDEF1” to “USERDEF3” in the Table 4-1 “List of Units,” arbitrary character strings can be defined and used.

■ Operation Method

- 1) Select <Unit> from the <Channel Cond> menu.
- 2) The cursor is displayed on the “Unit” column and “Unit” setting window appears.
- 3) Input the appropriate unit on the “Unit” setting window.
- 4) Press [ENTER] key to determine the unit and the selected unit is displayed on the cursor.



■ How to Input User Defined Unit Character String

To use units of the user defined character string, it is required to set “USERDEF1” to “USERDEF3” by selecting <Option Unit> from <Environment> main menu.

4-1-12 Setting Channel Name [Condition/Channel Cond/Channel Name]

Various comments such as sensor names, measured parts, etc. are entered for every input channel, when required, to be used for identifying data of channels.

■ Input Range

Any characters or symbols within 40 characters

■ Operation Method

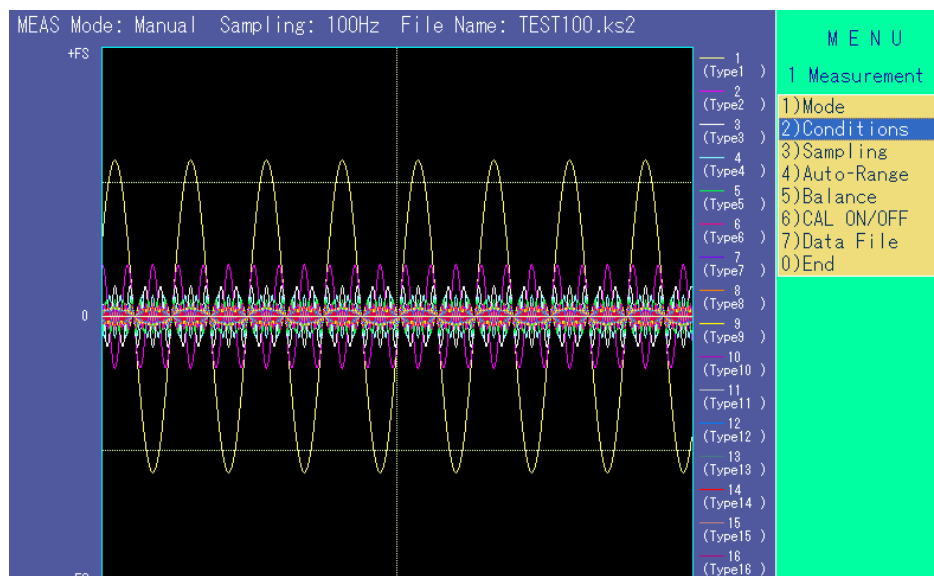
- 1) Select <Channel Name> from the <Channel Cond> menu.
- 2) The cursor is displayed on the “Channel Name” column and a “Channel Name” setting window appears.
- 3) Input the desired channel name on the “Channel Name” setting window.
- 4) Press [ENTER] key to determined the entered “Channel Name.”



- 5) The determined channel name is displayed as legend of channels on <Measurement> graph screen.
- Now, assume that the channel names are set as follows.



Then, legend of the channels are displayed on the <Measurement> graph screen.



4-1-13 Setting Digital Input Channel [Condition/Channel Cond/Digital Input]

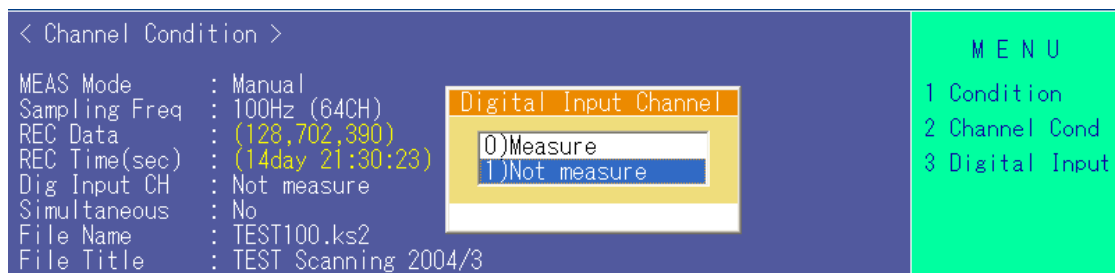
Setting of digital input channel is described.

■ Options

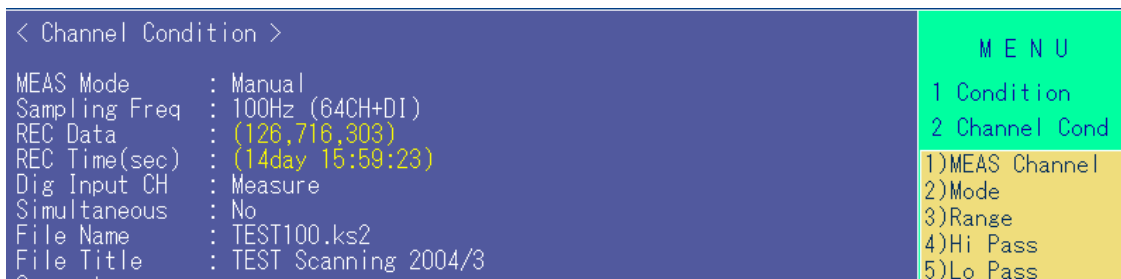
- “Measure” Digital input channel is measured.
- “Not measure” Digital input channel is not measured.

■ Operation Method

- 1) Select <Digital Input> from <Channel Cond> menu.
- 2) A “Digital Input Channel” setting window appears.
Select “Measure” or “Not measure” on the “Digital Channel” window.



- 3) Press [ENTER] key to display the determined contents on the “Digital Input” column on the screen.
As a notation, “Number of recording channels + DI”



4-2 SETTING MEASURING CONDITIONS [Condition/MEAS Cond]

Various items related to measuring conditions such as sampling frequency are described.

Select <MEAS Cond> from <Condition> main menu and various items on “Meas Cond” are displayed on the screen.

■ Measuring Condition Base Screen

The screenshot displays the "MEAS Condition" screen. On the left, a list of settings is shown with numbered callouts 1) through 5). On the right, a "MENU" box lists options: 1 Condition, 2 MEAS Cond, 1) MEAS Mode, 2) Sampling, 3) Comment, 4) Next Page, 5) Prev Page, and 0) End. Below the settings, a table lists 16 channels (CH 1 to 16) with columns for Card Type, MEAS Mode, Range, Hi Pass, Lo Pass, BAL, CAL, and CAL Rng.

Settings:

- 1) MEAS Mode : Manual
- 2) Sampling Freq : 100Hz (64CH+DI)
- 3) REC Data : (126,712,018)
- 4) REC Time(sec) : (14day 15:58:40)
- 5) Dig Input CH : Measure
- Simultaneous : No
- File Name : TEST100.ks2
- File Title : TEST Scanning 2004/3
- Comment :

CH	Card Type	MEAS Mode	Range	Hi Pass	Lo Pass	BAL	CAL	CAL Rng
1	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
2	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
3	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
4	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
5	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
6	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
7	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
8	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
9	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
10	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
11	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
12	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
13	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
14	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
15	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%
16	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%

MENU

- 1 Condition
- 2 MEAS Cond
- 1) MEAS Mode
- 2) Sampling
- 3) Comment
- 4) Next Page
- 5) Prev Page
- 0) End

[SPACE]:Change CH
[LEFT/RIGHT]:
Change Item

- 1) “MEAS Mode” Measuring method.
- 2) “Sampling” Sampling frequency at the measurement.
- 3) “Record Data” The number of recorded data at the measurement.
- 4) “Record Time” Data recording available time at the measurement.
- 5) “Comment” Comments to be added to the measured data file.

* In the above figure, contents of the number of recorded data and recording time may vary according to setting items. For details, see “4-2-6.”

4-2-1 Setting Measuring Mode [Condition/MEAS Cond/Meas Mode]

Measuring mode such as manual measuring mode, trigger measuring mode, etc. are set for recording data.

■ Options

Select the desired measuring mode from the following

“Manual,” “Manual (Set Rec Data),” “Interval,” “Analog Trig,” “Digital Trig,” “Ext Trig,” “Complex Trig” measuring modes.

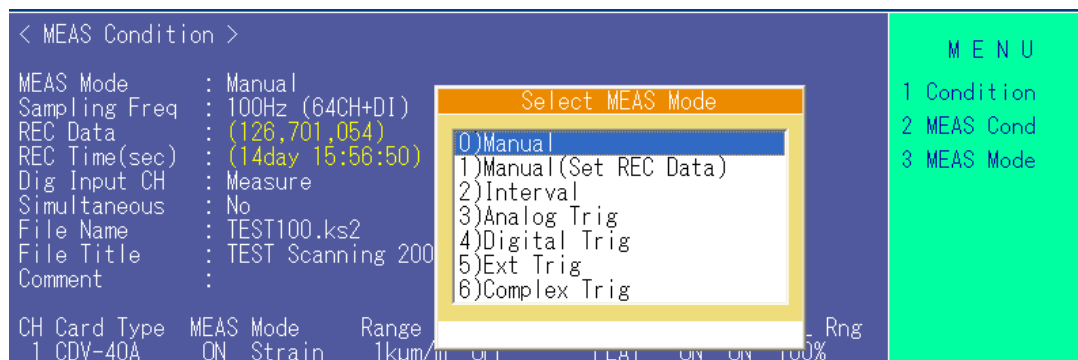
■ Table 4-2 Types of Measuring Modes

Types of Measuring Mode	Contents of settings	
Manual measuring mode	1) Manual	Manually press [REC/PAUSE] or [STOP] key to conduct measurement. Simultaneous processing measurement is available only when it is in manual measuring mode.
	2) Manual (Set Rec Data)	In addition to the above, recording time and the number of recorded data are set. Therefore, when recording conditions are satisfied, it automatically stops the measurement and becomes to be in monitor state.
Trigger measuring mode	1) Analog trig	Automatically measures with measured value of specified analog channel.
	2) Digital trig	Automatically measures with ON/OFF of specified bit of digital input.
	3) Ext trig	Automatically measures with external trigger signal.
	4) Complex trig	(Note) When end trigger is specified, setting of recording time or the number of recorded data is not available. Automatically measures with combined conditions of analog trigger, digital trigger, and external trigger conditions.
Interval measuring mode	Automatically measures with previously set time interval. (Note) Setting of recording time and the number of recorded data are available.	

■ Operation Method

- 1) Select <Meas Mode> from the <Channel Cond> menu.
- 2) A “Meas Mode” setting window appears. Select the desired measuring mode.
- 3) Press [Enter] key and determine the selected “Meas Mode” and the “Meas Mode” column on the measuring conditions screen is updated.

In addition, when measuring modes other than “Manual” is selected, required setting items are added to the menu.



4-2-2 Setting Sampling Frequency [Condition/MEAS Cond/Sampling]

Setting of sampling frequency is described. The sampling frequency is used in common for all channels.

■ Options

Table 4-3 Types of Sampling Frequency

Sampling Frequency	Options of Sampling Frequency
1,2,5 system clock	1, 2, 5, 10, 20, 50, 100, 200, 500, 1k, 2k,5k, 10k, 20k, 50kHz, 100kHz, 200kHz (*1)
2n system clock	2, 4, 8, 16, 32, 64, 128, 256, 512, 1.024k, 2.048k, 4.096k, 8.192k, 16.384k, 32.768k, 65.536kHz
External clock	None

Note

Sampling frequency of “2n system clock” is used when frequency resolution of the FFT analysis results are required to be a values with fractions omitted.

[Ex.]

Sampling Frequency	Resolution of FFT (2048) Analysis Results
4.096 kHz	1.0000 Hz
5.000 kHz	1.2207 Hz

(*1) Sampling frequency and maximum measuring channels (*2) have the following restrictions.

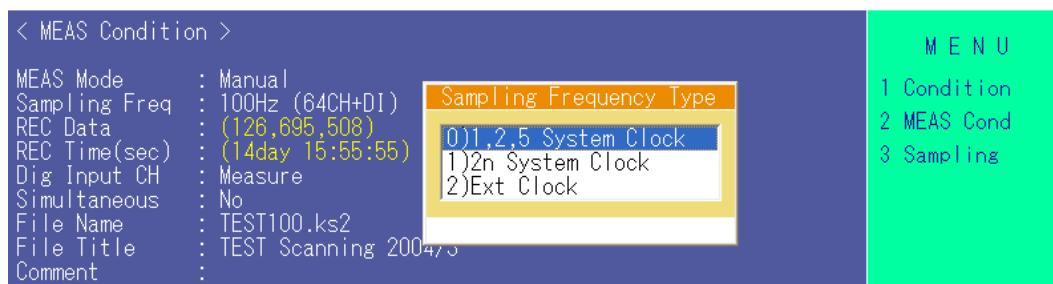
50 kHz or less.....Maximum 64 measuring channels
 100 kHz.....Maximum 32 measuring channels.
 200 kHz.....Maximum 16 measuring channels

(*2) Maximum number of channels when “ON” is selected in <Meas Channel> of <Channel Cond> menu.

In addition, for restrictions of the number of measured data according to sampling frequency, see “Note” in “4-2-3.”

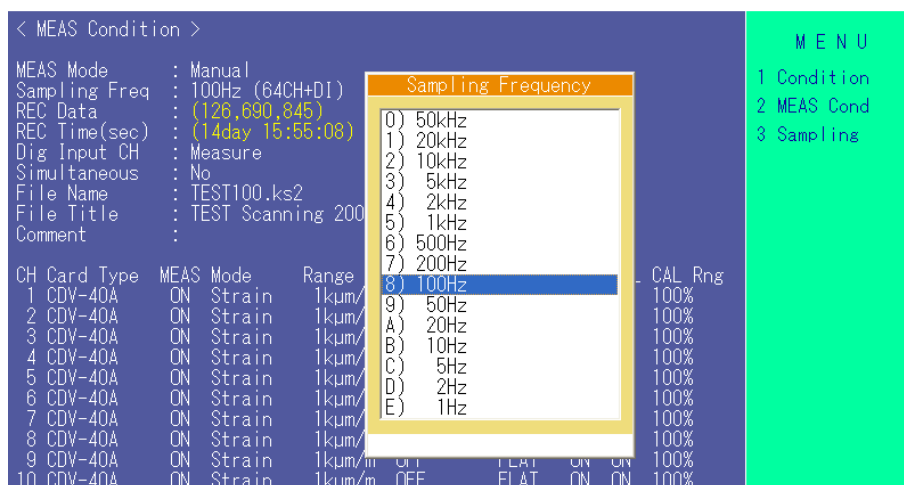
■ Operation Method

- 1) Select <Sampling> from <Meas Cond> menu.
- 2) The following “Sampling” setting window appears. After selecting the desired sampling frequency system, a detailed sampling frequency setting window appears. Select the desired sampling frequency.
- 3) Press [Enter] key to determine the selected sampling frequency and to update the “Sampling” column on the “Meas Cond” screen.



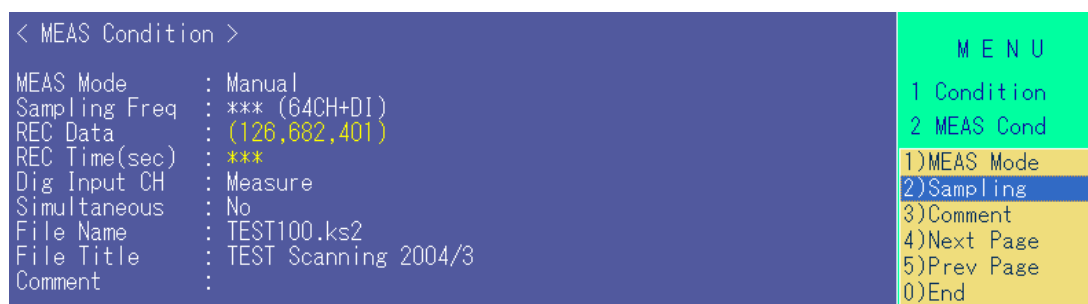
■ When “1, 2, 5 System Clock” or “2n System Clock” is Selected

- 1) Select “1, 2, 5 System Clock” or “2n System Clock.”
- 2) The following detailed “Sampling” window appears.
Select the desired sampling frequency.



■ When “External Clock” is Selected

- 1) Select “Ext Clock” to have the sampling mode of the selected external clock.



4-2-3 Setting the Number of Recorded Data [Condition/MEAS Cond/REC Data]

Setting of the number of recorded data per channel is described.

Set either one of the “REC Time” in the next section or “REC Data.” and the other is automatically updated. Settings of the “Record time” and “Record Data” are not available for manual measuring mode (1)) in the measuring mode type in “Table 4-2” in “Section 4-2-1” that enables simultaneous processing. The setting of the number of recorded data is available if measuring modes other than the above are selected.

■ Setting Range of the Number of Recorded Data

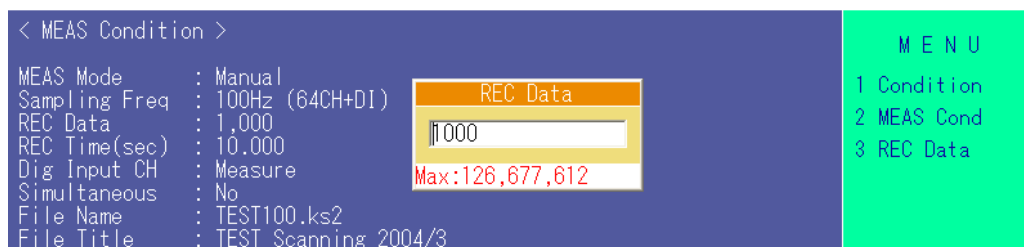
The number of record data is set from 2 to maximum value indicated on input range setting window.

Note

When sampling frequency is set to a value exceeding 10 kHz, the maximum number of data becomes 2G (giga). This data, 2 G data is responding to the total number of channels. For example, when the measuring channel is only 1, 2G data is measured by 1 channel. When there are 2 measuring channels, up to 1G data is measured by 1 channel.

■ Operation Method

- 1) Select <REC Data> from the <Meas Cond> menu.
- 2) A “Record Data” setting window appears as shown in the following. Select the desired number of record data.
- 3) Press [Enter] key to determine the selected REC data and to update the “REC Data” on the measuring conditions screen.



Note

If the “REC Data” portion is indicated with “***,” it means that the number of recorded data is invalid (setting not available). Check the measuring mode.

4-2-4 Setting Record Time [Condition/MEAS Cond/REC Time]

Setting of data recording time is described.

Set either one of the “REC Data” in the previous section or “REC Time” and the other is automatically updated.

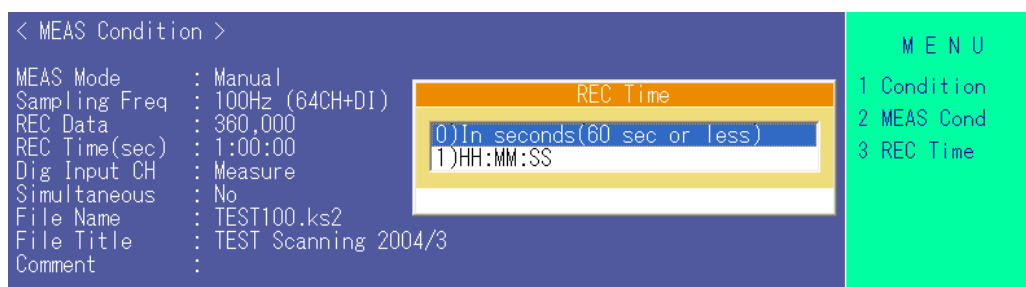
Setting of the “REC time” and “REC Data” are not available for manual measuring mode (1)) in the measuring mode type in “Table 4-2” in “Section 4-2-1” that enables simultaneous processing. The setting of recording time is available if measuring modes other than the above are selected.

■ Setting Range of Record Time

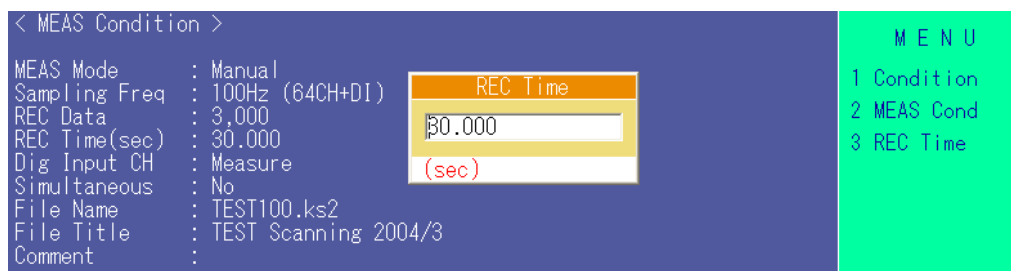
The “REC Time” is set in either units, second or hour/minute/second. The record time can be set in the range of 0.00002 (sec) to approximately 20,000 (hour). However, setting available recording time depends on the number of recording channels, sampling frequency, the number of recorded data as well as residual capacity of the built-in memory.

■ Operation Method

- 1) Select <REC Time> from the <Meas Cond> menu.
- 2) A Record Time” setting window appears as shown in the following. Select the desired input format and then, input the appropriate data recording time in the desired format.



■ Set Record Time in Second.



■ Set Record Time in HH:MM:SS format.



- 3) Press [ENTER] key to determine the “REC Time” and to update the “REC Time” column on the measuring conditions on the screen. Also, “REC Data” column is updated at the same time.

Note

If the “REC Data” portion is indicated with “***,” it means that the record time is invalid (setting not available). Check the measuring mode.

4-2-5 Setting Comments [Condition/Meas Cond/Comment]

Settings of comments to be added to test conditions, measured data file, recorded data file are described.

■ Input Range

Within 54 characters

■ Operation Method

- 1) Select <Comment> from the <Meas Cond> menu.
- 2) A “Comment” setting window appears as shown in the following.
Input appropriate comments to be added to the recorded file.
- 3) Press [ENTER] key and the entered comments are displayed on the “File Comment” on the measuring conditions screen.

The screenshot displays the 'MEAS Condition' menu with a 'File Comment' input window. The input window contains the text 'Test No.001' and a red text提示 'Within 54 chars'. The background menu shows various settings including MEAS Mode, Sampling, REC Data, REC Time, Dig In, Simultaneous, File Name, File Title, and Comment. A table at the bottom lists CH, Card Type, MEAS Mode, Range, Hi Pass, Lo Pass, BAL, CAL, and CAL Rng.

CH	Card Type	MEAS Mode	Range	Hi Pass	Lo Pass	BAL	CAL	CAL Rng	
1	CDV-40A	ON	Strain	1kum/m	OFF	FLAT	ON	ON	100%
2	CDV-40A	ON	Strain	1kum/m	OFF	FLAT	ON	ON	100%

4-2-6 Manual Mode Measurement

Details of manual mode measurement are described.

The manual mode measurement is classified into 2 types as described in the previous page (See “4-2-1.”).

In addition, simultaneous measurement is available only in manual measuring mode. (Cannot set the number of recorded data.)

- Manual Mode Measurement

Manually press [REC/PAUSE] or [STOP] key to conduct the manual mode measurement.

< MEAS Condition >		M E N U
MEAS Mode	: Manual	1 Condition
Sampling Freq	: 100Hz (64CH)	2 MEAS Cond
REC Data	: (128,633,654)	1)MEAS Mode
REC Time(sec)	: (14day 21:18:56)	2)Sampling
Dig Input CH	: Not measure	3)Comment
Simultaneous	: No	4)Next Page
File Name	: TEST100.ks2	5)Prev Page
File Title	: TEST Scanning 2004/3	0)End
Comment	: Test No.001	
CH Card Type	MEAS Channel Name	
1 CDV-40A	ON Type1	
2 CDV-40A	ON Type2	

During the manual mode measurement, on the columns “REC Data” and “REC Time,” the number of recorded data and recording time available for measurement and recording are indicated in yellow characters.

- Manual Mode Measurement (By setting the number of recorded data)

In addition to the above, this mode is capable of setting the number of recorded data and record time.

Although the measurement is started by manually pressing [REC/PAUSE] or [STOP] key, when the preset conditions are satisfied it automatically stops the measurement and becomes in monitor state.

< MEAS Condition >		M E N U
MEAS Mode	: Manual	1 Condition
Sampling Freq	: 100Hz (64CH)	2 MEAS Cond
REC Data	: 360,000	1)MEAS Mode
REC Time(sec)	: 1:00:00	2)Sampling
Dig Input CH	: Not measure	3)REC Data
Simultaneous	: No	4)REC Time
File Name	: TEST100.ks2	5)Comment
File Title	: TEST Scanning 2004/3	6)Next Page
Comment	: Test No.001	7)Prev Page
CH Card Type	MEAS Mode	0)End
1 CDV-40A	ON Strain	
2 CDV-40A	ON Strain	
	Range	
	1kum/m	
	Hi Pass	
	OFF	
	Lo Pass	
	FLAT	
	BAL	
	ON	
	CAL	
	ON	
	CAL Rng	
	100%	
	100%	

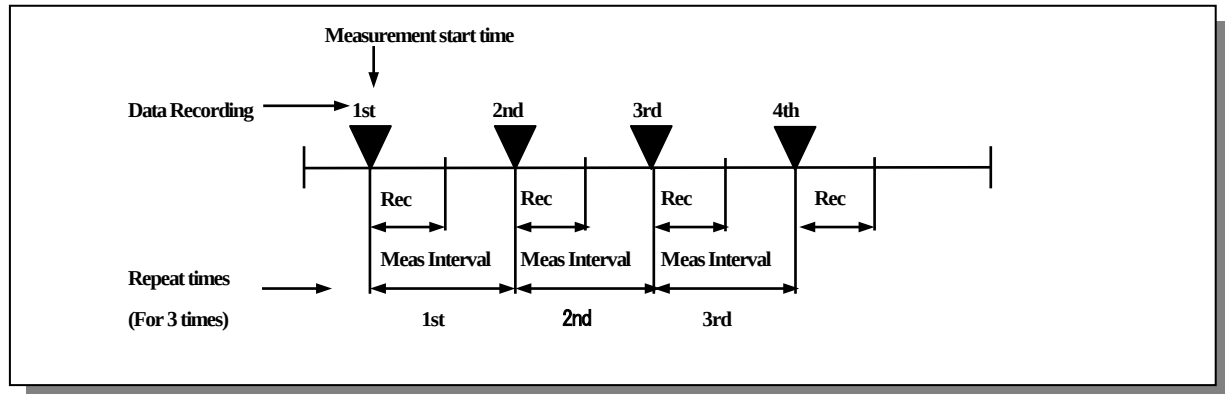
If the number of recorded data and the data recording time are already set, they are displayed on the respective columns.

For setting items of the manual mode measurement, see sections “4-2-1” to “4-2-5.”

4-2-7 Interval Mode Measurement

Settings of measurement start time and time interval for interval mode measurement are described.

- Concept of Interval Mode Measurement



Recording form of the measured data varies with data file format.

- Individual Format

When interval mode measurement is conducted by setting the repeat times to 2 or more, each of the individual interval mode measurements is recorded in different data file. At this time, file Nos. are automatically added one by one.

(Ex. "TEST-001" → "TEST-002" → "TEST-003" ..., etc.)

- Additional Format

When interval mode measurement is conducted by setting the repeat times to 2 or more, each of the individual interval mode measurements is recorded as block data in the same file. At this time, block Nos. of the recorded data are automatically added one by one.

(Ex. "TEST-001[1]" → "TEST-001[2]" → "TEST-001[3]" ..., etc.)

In addition, the measurement start time is also recorded resulting to have the actual recording times to Repeat Times + 1 (Times)

■ Setting Item

Items	Contents
Start Time	Set start time of the interval mode measurement (Year/Month/Day, Hour:Minute:Second).
MEAS Interval	Set measurement time interval (Hour:Minute:Second)
Repeat Times	Set repeat times of the interval mode measurement. *Actual data record times = Repeat times + 1

■ Operation Method

- 1) Select <Interval Cond> from the <MEAS Cond> menu.
- 2) An “Interval Cond” setting window appears as shown in the following.

< Interval Condition >										M E N U	
MEAS Mode	:	Interval	Start Date	:	2004/03/10					1 Condition	
Sampling Freq	:	100Hz (64CH)	Start Time	:	09:23:57					2 MEAS Cond	
REC Data	:	360,000	MEAS Interval	:	0:00:35					3 Interval Cond	
REC Time(sec)	:	1:00:00	Repeat Times	:	1					1)Start Time	
Dig Input CH	:	Not measure								2)MEAS Interval	
Simultaneous	:	No								3)Repeat Times	
File Name	:	TEST100.ks2								0)End	
File Title	:	TEST Scanning 2004/3									
Comment	:	Test No.001									
CH Card Type	MEAS Mode	Range	Hi Pass	Lo Pass	BAL	CAL	CAL Rng				
1 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				
2 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				

4-2-7-1 Setting Interval Mode Measurement Start Time [Condition/Meas Cond/Interval Cond/Start Time]

Setting of start time of the interval mode measurement is described.

■ Input Format

“****/ **/ ** ** : ** : **”

(Yr)(Mon)(Day)(Hr):(Min):(Sec)

[Ex.] Year 1996/Month 7/Day 7 Hour 18 : Minute 50 : Second 30 are expressed as “1996/07/07 18:50:30.”

In addition, by setting the following format, the interval mode measurement is started at the point when [REC/PAUSE] key is pressed.

“---/ --/ ---: --:--”

Note

Cannot set the time of the past.

■ Operation Method

- 1) Select <MEAS Cond> from the <Condition> main menu.
- 2) Select <Interval Cond> from the <MEAS Cond> menu
- 3) Select <Start Time> from the <Interval Cond> menu and the following “Start Time” setting window appears.
Input the desired start time.
- 4) Press [ENTER] key to determine the start time and the entered “Start Time” is displayed on the “Start Time” column.

< Interval Condition >										M E N U	
MEAS Mode	:	Interval	Start Date	:	2004/03/11					1 Condition	
Sampling Freq	:	100Hz (64CH)	Start Time	:	12:00:00					2 MEAS Cond	
REC Data	:	360,000	MEAS Interval	:	0:00:35					3 Interval Cond	
REC Time(sec)	:	1:00:00	Repeat Times	:	1					4 Start Time	
Dig Input CH	:	Not measure									
Simultaneous	:	No									
File Name	:	TEST100.ks2									
File Title	:	TEST Scanning 200									
Comment	:	Test No.001									
CH Card Type	MEAS Mode	Range	Hi Pass	Lo Pass	BAL	CAL	CAL Rng				
1 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				

4-2-7-2 Setting Interval of Interval Mode Measurement [Condition/MEAS Cond/Interval Cond/Meas Interval]

Setting of measuring interval of interval mode measurement is described.

■ Input Format

“ ** : ** : ** ”

(Hr):(Min):(Sec)

[Ex.] Hour 1 : Minute 50 : Sec 30 is expressed as “01 : 50 : 30.”

Note

In interval mode measurement, it is not allowed to set the interval measuring interval shorter than the data record time.

Set the time to “Data record Time + 5 sec.”

If it become to the time for starting the next measurement while data recording, the measurement is ignored.

■ Operation Method

- 1) Select <MEAS Cond> from the <Condition> main menu.
- 2) Select <Interval Cond> from the <MEAS Cond> menu
The following “MEAS Interval” setting window appears.
Input the desired measuring interval.
- 3) Press [ENTER] key to determine the entered measuring interval and the entered measuring interval is displayed on the “Meas Interval” column.

< Interval Condition >				M E N U
MEAS Mode	: Interval	Start Date	: 2004/03/11	
Sampling Freq	: 100Hz (64CH)	Start Time	: 12:00:00	
REC Data	: 360,000	MEAS Interval	: 2:00:00	
REC Time(sec)	: 1:00:00	Repeat Times	: 1	
Dig Input CH	: Not measure			
Simultaneous	: No			
File Name	: TEST100.ks2			
File Title	: TEST Scanning 200			
Comment	: Test No.001			

MEAS Interval

2 : 0 : 0

(HHH:MM:SS)

4-2-7-3 Setting Repeat Times in Interval Mode Measurement [Condition/Meas Cond/Interval Meas/Repeat Times]

Setting of repeat times in interval mode measurement is described.

■ Input Range

1 to 999 times

- Data recording conducted at measurement start is not included in the repeat times.

Note

Check that free space is sufficiently enough for recording “Record Time × (Repeat Times + 1).”

■ Operation Method

- 1) Select <MEAS Cond> from the <Condition> main menu.
- 2) Select <Interval Cond> from the <MEAS Cond> menu
- 3) Select <Repeat Times> from the <Interval Cond> menu.
- 4) The following “Repeat Times” setting window appears.
Input the desired repeat times.
- 5) Press [ENTER] key to determine the entered repeat times and the entered repeat times is displayed on the “Repeat Times” column.

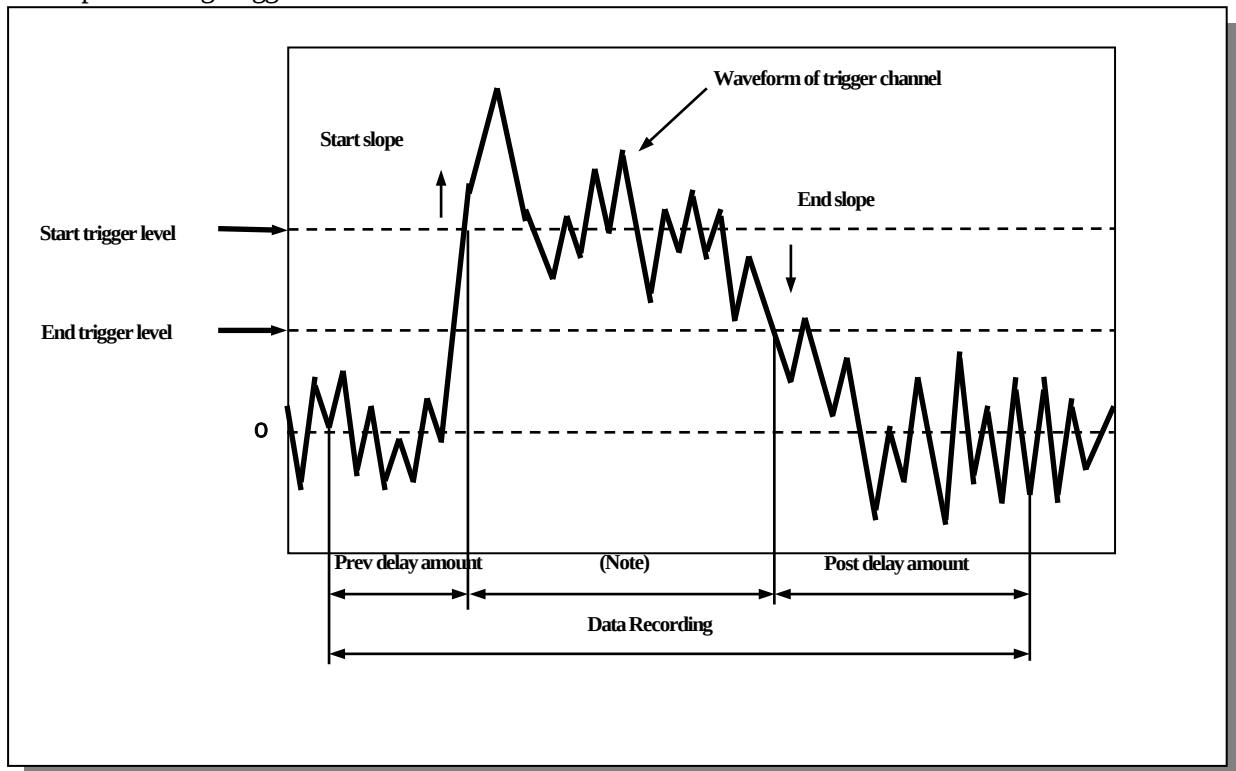
< Interval Condition >				M E N U
MEAS Mode	: Interval	Start Date	: 2004/03/11	1 Condition
Sampling Freq	: 100Hz (64CH)	Start Time	: 12:00:00	2 MEAS Cond
REC Data	: 360,000	MEAS Interval	: 2:00:00	3 Interval Cond
REC Time(sec)	: 1:00:00	Repeat Times	: 10	4 Repeat Times
Dig Input CH	: Not measure			
Simultaneous	: No			
File Name	: TEST100.ks2			
File Title	: TEST Scanning 200			
Comment	: Test No.001			

Repeat Times

4-2-8 Setting Analog Trigger Mode Measurement

Data is automatically measured based on measured values of previously specified analog input channel.

● Concept of Analog Trigger



Note

- The above figure shows that end trigger is used and both start and end triggers are in the same channel. If no end trigger is specified, setting of the number of recorded data (record time) are allowed.
- Suppose sampling frequency is more than 100 Hz. To prevent erroneous trigger due to accidental noise, the EDX-2000B is so designed that it is triggered for the first time when 4 measured values continuously satisfy trigger conditions.

■ Operation Method

- 1) Select <MEAS Cond> from the <Condition> main menu.
- 2) Select <Trigger Cond> from the <MEAS Cond> menu
- 3) The following analog trigger condition setting menu appears.
- 4) Select desired item to be set for on and after the following sections.

< Analog Trigger Condition >										M E N U	
MEAS Mode		: Analog Trig		[Start]		[End]				1 Condition	
Sampling Freq		: 100Hz (64CH)		Trig CH : 1		1				2 MEAS Cond	
REC Data		: (128,600,374)		Trig Level : 0.000		0.000				3 Trigger Cond	
REC Time(sec)		: (14day 21:13:23)		Trig Slope : Positive		Negative				1)Start Channel	
Dig Input CH		: Not measure		Delay(sec) : 0.000		0.000				2)Start Level	
Simultaneous		: No		RepeatTimes: 1						3)Start Slope	
File Name		: TEST100.ks2								4)PreTrig Delay	
File Title		: TEST Scanning 2004/3								5)End Trigger	
Comment		: Test No.001								6)End Channel	
CH	Card Type	MEAS Mode	Range	Hi Pass	Lo Pass	BAL	CAL	CAL Rng		7)End Level	
1	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%		8)End Slope	
2	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%		9)PosTrig Delay	
3	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%		A)Repeat Times	
4	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%		0)End	
5	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%			
6	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%			
7	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%			

4-2-8-1 Setting Trigger Channel [Condition/MEAS Cond/Trigger Cond/Start Channel, End Channel]

Settings of start and end channels of analog trigger mode measurement are described.

Note

If end trigger is set to “No,” you cannot set the <End Channel>.

■ Options

Measuring analog channel range.

■ Operation Method

- 1) Select <MEAS Cond> from the <Condition> main menu.
- 2) Select <Trigger Cond> from the <MEAS Cond> menu .
- 3) Select <MEAS Mode> from <MEAS Cond> menu.
- 4) A “Select Meas Mode” window appears.
Select “Analog Trig” and press [ENTER] key to determine the selection.
- 5) Select “Trigger Cond”
- 6) Select <Start Channel> or <End Channel> from the <Trigger Cond> menu
The following “Start Trigger Channel” or “End Trigger Channel” setting window appears.
Input the desired channel No. to be used as the trigger channel.
- 7) Press [ENTER] key to determine the entered channel No. and the entered channel No. is displayed on the “Start Channel” or “End Channel” column.

< Analog Trigger Condition >										MENU	
MEAS Mode	:	Analogue Trig								1 Condition	
Sampling Freq	:	100Hz (64CH)								2 MEAS Cond	
REC Data	:	(128,592,694)	Trig CH	:	1	[Start]				3 Trigger Cond	
REC Time(sec)	:	(14day 21:12:06)	Trig Level	:	0.000					4 Start Channel	
Dig Input CH	:	Not measure	Trig Slope	:	Positive	Negative					
Simultaneous	:	No	Delay(sec)	:	0.000	0.000					
File Name	:	TEST100.ks2	RepeatTimes	:	1						
File Title	:	TEST Scanning 200									
Comment	:	Test No.001									
Start Trigger Channel											
[10]											
CH Card Type	MEAS Mode	Range									
1 CDV-40A	ON Strain	1kum/m	ON	FLAT	ON	ON	100%				
2 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				

Note

If end trigger is used, you cannot set the number of recorded data or record time.

4-2-8-2 Setting Trigger Level [Condition/MEAS Cond/Trigger Cond/Start Level, End Level]

Settings of start and end levels of analog trigger mode measurement are described.

Note

If end trigger is set to “No,” you cannot set the <End Level>.

■ Input Range

Trigger level is set in physical values within range of a value ($\text{Setting range} \times \text{CAL Coefficient} + \text{Offset}$) relevant to setting range of start or end trigger channel.

■ Operation Method

- 1) Repeat operations from items 1) to 5) in the previous section “4-2-8-1.”
- 2) Select <Start Level> or <End Level> from the <Trigger Cond> menu.
- 3) The following “Start Trigger Level” or “End Trigger Level” setting window appears.
Input the desired trigger value in physical value..
- 4) Press [ENTER] key to determine the entered trigger level and the entered trigger level is displayed on the [Start] or [End] of the “Trig Level” column.

< Analog Trigger Condition >										MENU	
MEAS Mode	:	Analog Trig				Trig CH	:	1	[Start]	[End]	1 Condition
Sampling Freq	:	100Hz (64CH)				Trig Level	:	50.00	0.000		2 MEAS Cond
REC Data	:	(128,586,806)				Trig Slope	:	Positive	Negative		3 Trigger Cond
REC Time(sec)	:	(14day 21:11:08)				Delay(sec)	:	0.000	0.000		4 Start Level
Dig Input CH	:	Not measure				RepeatTimes	:	1			
Simultaneous	:	No									
File Name	:	TEST100.ks2									
File Title	:	TEST Scanning 200									
Comment	:	Test No.001									
Start Trigger Level											
50.000											
-1000.0 < x < 1000.0											
CH Card Type	MEAS Mode	Range									
1 CDV-40A	ON Strain	1kum/m	ON	FLAT	ON	ON	100%				
2 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				

4-2-8-3 Setting Trigger Slope [Condition/MEAS Cond/Trigger Cond/Start Slope, End Slope]

How to cross the trigger level when starting or ending the trigger mode measurement is described.

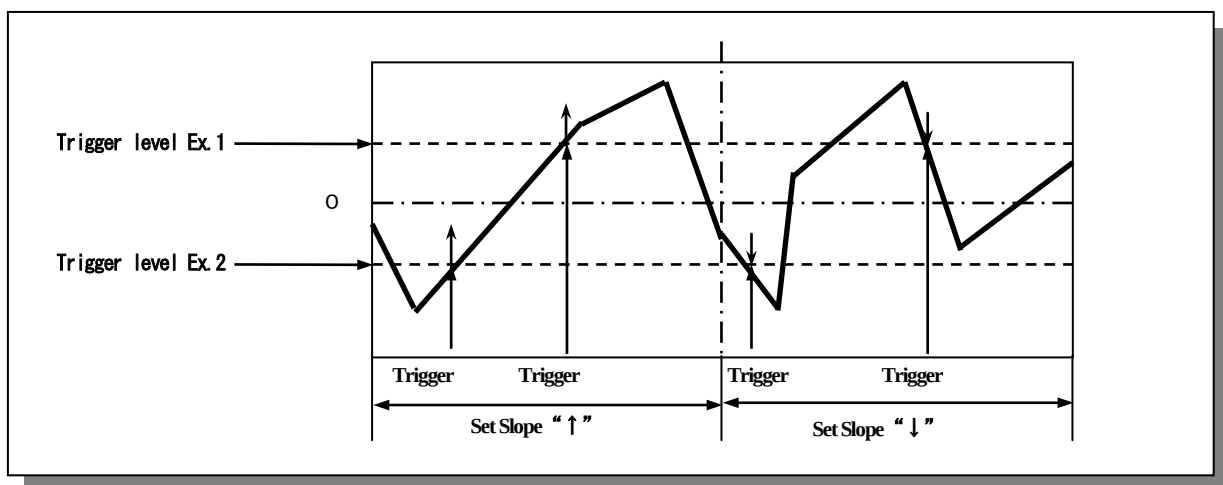
Note

If <End Trigger> is set to “No,” you cannot set the <End Level>.

- Concept of Trigger Slope

“Positive (↑)” Triggered when measured value of trigger channel rises up by crossing the preset trigger level from lower to upper portions.

“Negative (↓)” Triggered when measured value of trigger channel falls down by crossing the preset trigger level from upper to lower portions.

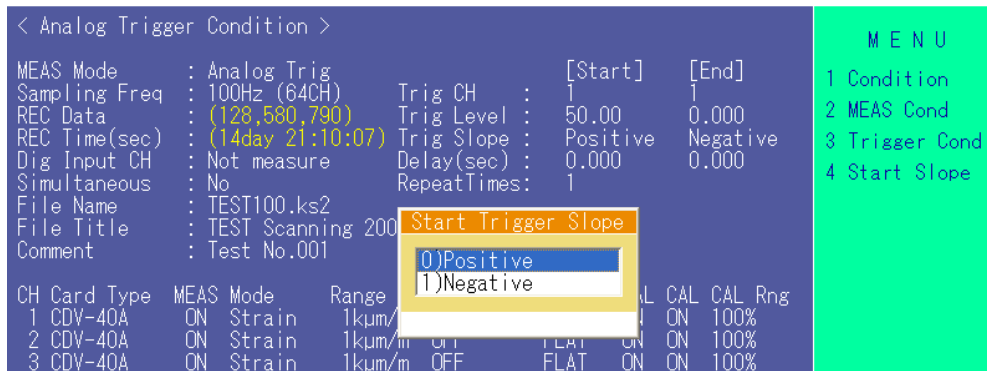


Note

Suppose sampling frequency is more than 100Hz. To prevent faulty trigger caused by accidental noise, etc. the EDX-2000B is so designed that when measured value of the trigger channel satisfies trigger conditions continuously for 4 times, it becomes triggered for the first time.

■ Operation Method

- 1) Repeat operations from items 1) to 5) in the previous section “4-2-8-1.”
- 2) Select <Start Slope> or <End Slope> from the<Trigger Cond> menu.
- 3) The following “Start Trigger Slope” or “End Trigger Slope” setting window appears.
Select the desired trigger slope.
- 4) Press [ENTER] key to determine the selected trigger slope and the determined trigger slope is displayed on [Start] or [End] of the “Trig Slope” column.



4-2-8-4 Setting Trigger Delay [Condition/MEAS Cond/Trigger Cond/PreTrig Delay]

Settings of delay before triggered (PreTrig Delay) and delay after triggered (PosTrig Delay) are described.

- Start trigger delay amount Number of recorded data before the start trigger.
- End trigger delay amount Number of recorded data after the end trigger.

Note

If <End Trigger> is set to “No” you cannot set the <PosTrig Delay>.

■ Input Range

Maximum value indicated on the input range setting window.

Note

When <End Trigger> is used (The number of recorded data and record times are valid), delay amount after triggered is not recorded. Data amount actually recorded shall be “Recorded data + Previous delay amount.”

■ Operation Method

- 1) Repeat operations from items 1) to 5) in the previous section “4-2-8-1.”
- 2) Select <PreTrig Delay> or <PosTrig Delay> from the <Trigger Cond> menu.
- 3) The following “PreTrig delay> or <PosTrig Delay> setting window appears.
Input the desired delay amount.
- 4) Press [ENTER] key to determine the entered delay amount and the entered delay amount is displayed on the “Delay” column.

< Analog Trigger Condition >										M E N U
MEAS Mode	:	Analog Trig	Trig CH	:	1	[Start]	:	1	[End]	1 Condition
Sampling Freq	:	100Hz (64CH)	Trig Level	:	50.00		:	0.000		2 MEAS Cond
REC Data	:	(128,574,518)	Trig Slope	:	Positive		:	Negative		3 Trigger Cond
REC Time(sec)	:	(14day 21:09:05)	Delay(sec)	:	100.0		:	0.000		4 PreTrig Delay
Dig Input CH	:	Not measure	RepeatTimes	:	1		:			
Simultaneous	:	No		:			:			
File Name	:	TEST100.ks2		:			:			
File Title	:	TEST Scanning 200		:			:			
Comment	:	Test No.001		:			:			
Prev Trigger Data(Delay)										
100.00										
Max = 163.84sec(16384)										
CH Card Type	MEAS Mode	Range								
1 CDV-40A	ON Strain	1kum/m	ON	FLAT	ON	ON	100%			
2 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%			

4-2-8-5 Setting Repeat Times [Condition/MEAS Cond/Trigger Cond/Repeat Times]

Setting of the number of times to repeat the trigger mode measurement with the same conditions is described.

Recording form of the measured data varies with data file format.

- Individual Format

When analog trigger mode measurement is conducted by setting the repeat times to more than 2 times, each of the analog trigger measurement data is recorded in different data files. At this time, file Nos. are automatically added one by one.

(Ex. "TEST-001" → "TEST-002" → "TEST-003" ..., etc.)

- Additional Format

When analog trigger measurement is conducted by setting the repeat times to more than 2 times, each of the analog trigger measurement data is recorded in the same file as block data. At this time, block Nos. of the recorded data are automatically added one by one.

(Ex. "TEST-001[1]" → "TEST-001[2]" → "TEST-001[3]" ..., etc.)

- Input range

1 to 999 times

- Note that data recording at the measurement start is not included in the repeat times.

Note

Take special care for continuously conducting the trigger mode measurement.

Assume that the trigger measurement is conducted as follows.

Trigger mode measurement 1 → Trigger mode measurement 2 → ... → Trigger mode measurement X

At this time, it takes approximately 5 seconds for preparing for the trigger mode measurement between the end of the measurement and the start of the next measurement.

- Operation Method

- 1) Repeat operations from items 1) to 5) in the previous section "4-2-8-1."
- 2) Select <Repeat Times> from the <Trigger Cond> menu.
- 3) The following "Repeat Times" setting window appears.
Input the desired repeat times.
- 4) Press [ENTER] key to determine the entered repeat times and the entered repeat times is displayed on the "Repeat Times" column.

< Analog Trigger Condition >										M E N U
MEAS Mode	:	Analog Trig								1 Condition
Sampling Freq	:	100Hz (64CH)	Trig CH	:	1	[Start]		[End]		2 MEAS Cond
REC Data	:	(128,568,630)	Trig Level	:	50.00			0.000		3 Trigger Cond
REC Time(sec)	:	(14day 21:08:06)	Trig Slope	:	Positive			Negative		4 Repeat Times
Dig Input CH	:	Not measure	Delay(sec)	:	100.0			0.000		
Simultaneous	:	No	RepeatTimes	:	50					
File Name	:	TEST100.ks2								
File Title	:	TEST Scanning 200								
Comment	:	Test No.001								
CH Card Type	MEAS Mode	Range								
1 CDV-40A	ON Strain	1kum/m	ON	FLAT	ON	ON	100%			
2 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%			

Repeat Times

50

4-2-8-6 Setting End Trigger [Condition/MEAS Cond/Trigger cond/End Trigger]

Setting of end trigger is described.

■ Options

- “No”..... End trigger is not used.
- “Yes” End trigger is used.

Note

If “No” is selected, menu items <End Channel>, <End Level>, <End Slope>, and <PosTrig Delay> are not displayed. At this, time columns relevant to the above menu items on the screen are displayed with “**”

■ Operation Method

- 1) Repeat operations from items 1) to 5) in the previous section “4-2-8-1.”
- 2) Select <End Trigger> from the <Trigger Cond> menu.
- 3) The following “End trigger” setting window appears.
Set whether or not “End Trigger” is used.
- 4) Press [ENTER] key to reflect the setting contents.
If “Yes” is selected, setting items related to end trigger are displayed on the screen.

< Analog Trigger Condition >										M E N U
MEAS Mode	:	Analog Trig	Trig CH	:	1	[Start]	[End]			1 Condition
Sampling Freq	:	100Hz (64CH)	Trig Level	:	50.00				**	2 MEAS Cond
REC Data	:	360,000	Trig Slope	:	Positive				**	3 Trigger Cond
REC Time(sec)	:	1:00:00	Delay(sec)	:	100.0				**	4 End Trigger
Dig Input CH	:	Not measure	RepeatTimes	:	50					
Simultaneous	:	No								
File Name	:	TEST100.ks2								
File Title	:	TEST Scanning 200								
Comment	:	Test No.001								
CH Card Type	MEAS Mode	Range								
1 CDV-40A	ON Strain	1kum/								
2 CDV-40A	ON Strain	1kum/m	ON	FLAT	ON	ON	100%			
3 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%			

End Trigger

0)No

1)Yes

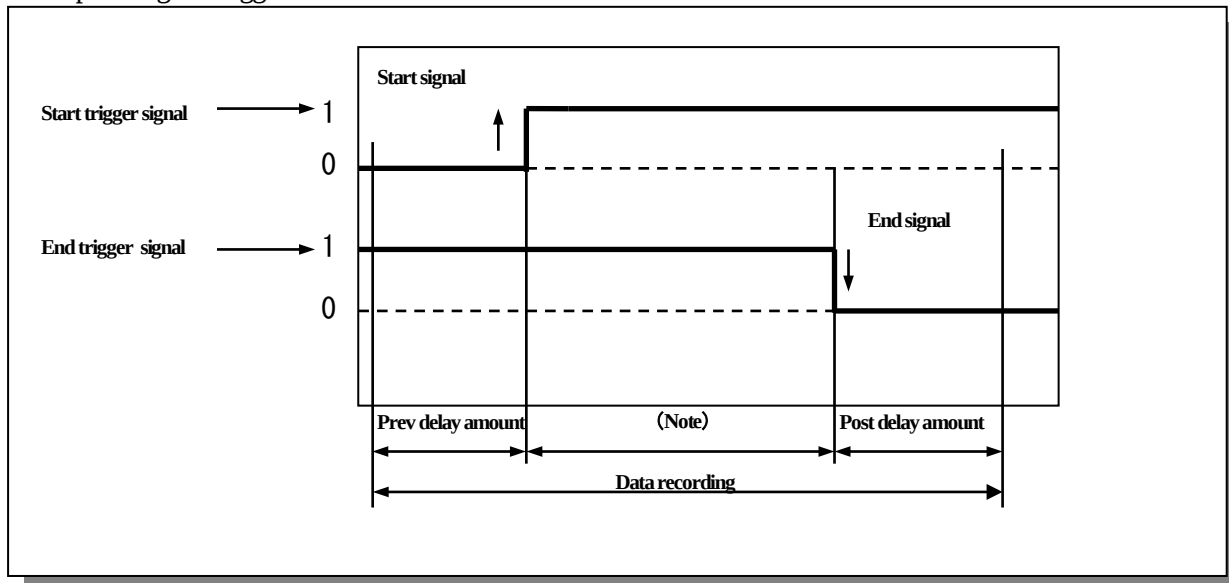
4-2-9 Setting Digital Trigger

Automatically conducts the measurement based on measured value of input digital channel.

Note

Setting of Digital Input is allowed only when “Measure” is selected by selecting <Channel Cond> from the <Conditions> main menu.

• Concept of Digital Trigger



Note

The above figure is an example when end trigger is used and both start and end trigger specified different bits. If end trigger is specified, you cannot set the number of recorded data (recording time).

■ Operation Method

- 1) Select <MEAS Cond> from the <Condition> main menu.
- 2) Select < MEAS Mode> from the <MEAS Mode> menu.
- 3) A “Select MEAS Mode” window appears.
Select “Digital Trig” and press [ENTER] key to determine the selection.
- 4) Select <Trigger Cond>.
- 5) The following digital trigger condition setting menu appears.

< Digital Trigger Condition >										M E N U	
MEAS Mode	:	Digital Trig						[Start]	[End]	1	Condition
Sampling Freq	:	100Hz (64CH+DI)	Trig Bit	:	1				**	2	MEAS Cond
REC Data	:	360,000	Trig Level	:	0				**	3	Trigger Cond
REC Time(sec)	:	1:00:00	Delay(sec)	:	100.0				**	1)Start Bit	
Dig Input CH	:	Measure	RepeatTimes:	:	50					2)Start Level	
Simultaneous	:	No								3)PreTrig Dela	
File Name	:	TEST100.ks2								4)End Trigger	
File Title	:	TEST Scanning 2004/3								5)Repeat Times	
Comment	:	Test No.001								0)End	
CH Card Type	MEAS Mode	Range	Hi Pass	Lo Pass	BAL	CAL	CAL Rng				
1 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				
2 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				
3 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				

4-2-9-1 Setting Trigger Bit [Condition/MEAS Cond/Trigger Cond/Start Bit, End Bit]

Setting of start and end trigger bits of digital trigger mode measurement are described.

Note

When <End Trigger> is set to “No,” you cannot set the <End Trigger Bit>.

- 1) Repeat operations from items 1) to 3) in the previous section “4-2-9.”
- 2) Select <Trigger Cond>.
- 3) Select <Start Bit> or <End Bit> from the “<Trigger Cond> menu.
The following “Start Trigger Bit” or “End Trigger Bit” setting window appears.
Input bit No. to be used as the trigger bit.
- 4) Press [ENTER] key to determine the entered bit No and the entered channel No. is displayed on [Start] or [End] of the “Trig Bit” column.

< Digital Trigger Condition >										M E N U	
MEAS Mode		: Digital Trig		Trig Bit		: [Start]		[End]		1 Condition	
Sampling Freq		: 100Hz (64CH+DI)		Trig Level		: 0		**		2 MEAS Cond	
REC Data		: 360,000		Delay(sec)		: 100.0		**		3 Trigger Cond	
REC Time(sec)		: 1:00:00		RepeatTimes		: 50				4 Start Bit	
Dig Input CH		: Measure									
Simultaneous		: No									
File Name		: TEST100.ks2									
File Title		: TEST Scanning 200									
Comment		: Test No.001									
										Start Trigger Bit	
										1-16	
CH	Card	Type	MEAS	Mode	Range			BAL	CAL	CAL	Rng
1	CDV-40A		ON	Strain	1kum/in	ON	FLAT	ON	ON		100%
2	CDV-40A		ON	Strain	1kum/m	OFF	FLAT	ON	ON		100%

4-2-9-2 Setting Trigger Level [Condition/MEAS Cond/Trigger Cond/Start Level, End Level]

Settings of start and end levels of digital trigger mode measurement are described.

Note

When <End Trigger> is set to “No,” you cannot set the <End Level>.

■ Setting Range

0 and 1 (OFF/ON)

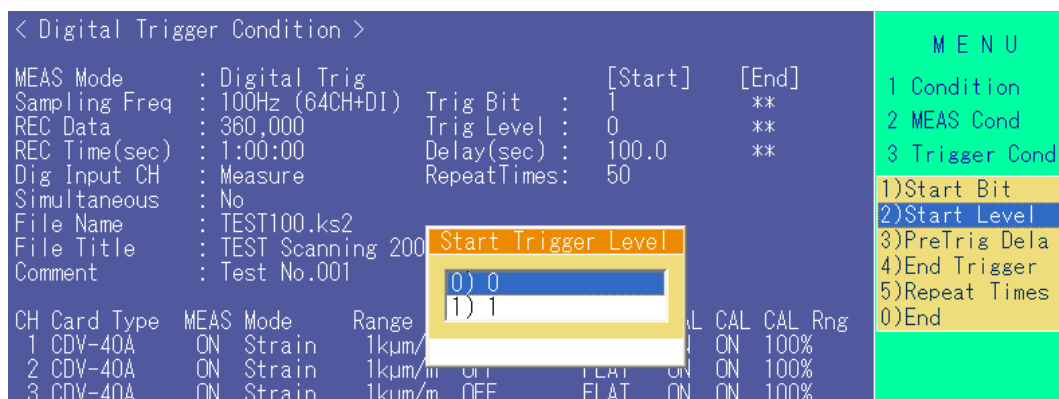
“1”Start trigger is activated when the relevant digital bit detected ‘1.’

“0”End trigger is activated when the relevant digital bit detected ‘0.’

Therefore, when it is in digital trigger mode measurement, different from other trigger measuring modes, no trigger slope is set. For example, assume that ‘1’ is set as the trigger level of the start bit trigger level and the bit is already in ‘1’ state before starting the measurement. Trigger is activated as soon as the trigger measurement is started. To avoid such state, always specify the bit that is in inverse level of the desired trigger level as the trigger bit in normal state.

■ Operation Method

- 1) Repeat operations from items 1) to 3) in the previous section “4-2-9-1.”
- 2) Select<Trigger Cond>.
- 3) Select <Start Level> or <End Level> from the <Trigger Cond> menu.
- 4) The following “Start Trigger Level” or “End Trigger Level” setting window appears.
Input the desired trigger level.
- 5) Press [ENTER] key to determine the entered channel No. and to displayed the entered channel No. on [Start] or [End] of the “Trig Level” column.



4-2-9-3 Setting Trigger Delay [Condition/MEAS Cond/Trigger Cond/PreTrig Delay, PosTrig Delay]

Settings of delay before triggered (PreTrig Delay) and delay after triggered (PosTrig Delay) are described.

Note

If <End Trigger> is set to “No,” you cannot set the <PosTrig Delay>.

■ Input Range

Maximum value indicated on the input range setting window.

Note

When <End Trigger> is not used (number of recorded data and recording times are valid), delay amount after triggered is not recorded. Data amount actually recorded shall be “Recorded data + Previous delay amount.”

■ Operation Method

- 1) Repeat operations from items 1) to 3) in the previous section “4-2-9-1.”
- 2) Select <Trigger Cond>.
- 3) Select <PreTrig Delay> or <PosTrig Delay> from the <Trigger Cond> menu.
- 4) The following “Prev Trigger Delay” or “Post Trigger Delay” setting window appears.
Input the desired delay.
- 5) Press [ENTER] key to determine the entered delay value and the entered delay value is displayed on [Start] or [End] of the “Delay” column.

< Digital Trigger Condition >										M E N U	
MEAS Mode	:	Digital Trig								1 Condition	
Sampling Freq	:	100Hz (64CH+DI)	Trig Bit	:	1					2 MEAS Cond	
REC Data	:	(126,561,285)	Trig Level	:	0					3 Trigger Cond	
REC Time(sec)	:	(14day 15:33:32)	Delay(sec)	:	100.0					4 PreTrig Dela	
Dig Input CH	:	Measure	RepeatTimes	:	50						
Simultaneous	:	No									
File Name	:	TEST100.ks2									
File Title	:	TEST Scanning 200									
Comment	:	Test No.001									
CH Card Type	:	MEAS Mode	Range	:							
1 CDV-40A	:	ON Strain	1kum/m	:	ON	FLAT	ON	ON	100%		
2 CDV-40A	:	ON Strain	1kum/m	:	OFF	FLAT	ON	ON	100%		

Prev Trigger Data(Delay)

100.00

Max = 161.31sec(16131)

4-2-9-4 Setting Repeat Times [Condition/MEAS Cond/Trigger Cond/Repeat Times]

Setting of the number of times to repeat the trigger mode measurement with the same conditions is described.
Recording form of the measured data varies with data file format.

- Individual Format

When digital trigger mode measurement is conducted by setting the repeat times to more than 2 times, each of the digital trigger mode measurement data is recorded in different data file. At this time, File Nos. are automatically added one by one.

(Ex. "TEST-001" → "TEST-002" → "TEST-003"... , etc.)

- Additional Format

When digital trigger measurement is conducted by setting the repeat times to more than 2 times, each of the digital trigger mode measurement is recorded in the same file as block data. At this time, file Nos. are automatically added one by one.

(Ex. "TEST-001[1]" → "TEST-001[2]" → "TEST-001[3]"..., etc.)

- Input range

1 to 999 times

- Note that data recording at the measurement start is not included in the repeat times.

Note

Take special care for continuously conducting the trigger mode measurement.

Assume that the trigger mode measurement is conducted as follows.

Trigger mode measurement 1 → Trigger mode measurement 2 → ... → Trigger mode measurement X

At this time, it takes approximately 5 seconds for preparing for the trigger mode measurement between the end of the measurement and the start of the next measurement.

- Operation Method

- 1) Repeat operations from items 1) to 3) in the previous section "4-2-9."
- 2) Select <Trigger Cond>.
- 3) Select <Repeat Times> from the <Trigger Cond> menu.

The following "Repeat Times" setting window appears.

Input the desired repeat times.

- 4) Press [ENTER] key to determine the entered repeat times and the entered repeat times is displayed on the "Repeat Times" column.

< Digital Trigger Condition >										M E N U	
MEAS Mode	:	Digital Trig				[Start]		[End]		1 Condition	
Sampling Freq	:	100Hz (64CH+DI)	Trig Bit	:	1			1		2 MEAS Cond	
REC Data	:	(126,555,488)	Trig Level	:	0			0		3 Trigger Cond	
REC Time(sec)	:	(14day 15:32:34)	Delay(sec)	:	100.0			0.000		4 Repeat Times	
Dig Input CH	:	Measure	RepeatTimes:	:	100						
Simultaneous	:	No									
File Name	:	TEST100.ks2									
File Title	:	TEST Scanning 200									
Comment	:	Test No.001									
CH Card Type	:	MEAS Mode	:	Range	:			BAL	CAL	CAL Rng	
1 CDV-40A	:	ON Strain	:	1kum/m	:	ON	FLAT	ON	ON	100%	
2 CDV-40A	:	ON Strain	:	1kum/m	:	OFF	FLAT	ON	ON	100%	

4-2-9-5 Setting End Trigger [Condition/MEAS Cond/Trigger Cond/End Trigger]

Setting of end trigger is described.

■ Options

- “No”..... End trigger is not used.
- “Yes” End trigger is used.

Note

If “No” is selected, menu items <End Trigger Bit> and <PosTrig Delay> are not displayed. At this time columns relevant to the above items on the screen are displayed with “**”.

■ Operation Method

- 1) Repeat operations from items 1) to3) in the previous section “4-2-9.”
- 2) Select <Trigger Cond>.
- 3) Select <End Trigger> from the <Trigger Cond> menu.
The following “End Trigger” setting window appears.
Select whether or not “End Trigger” is used.
- 4) Press [ENTER] key to reflect the setting contents.
If “Yes” is selected, setting items related to end trigger are displayed on the screen.

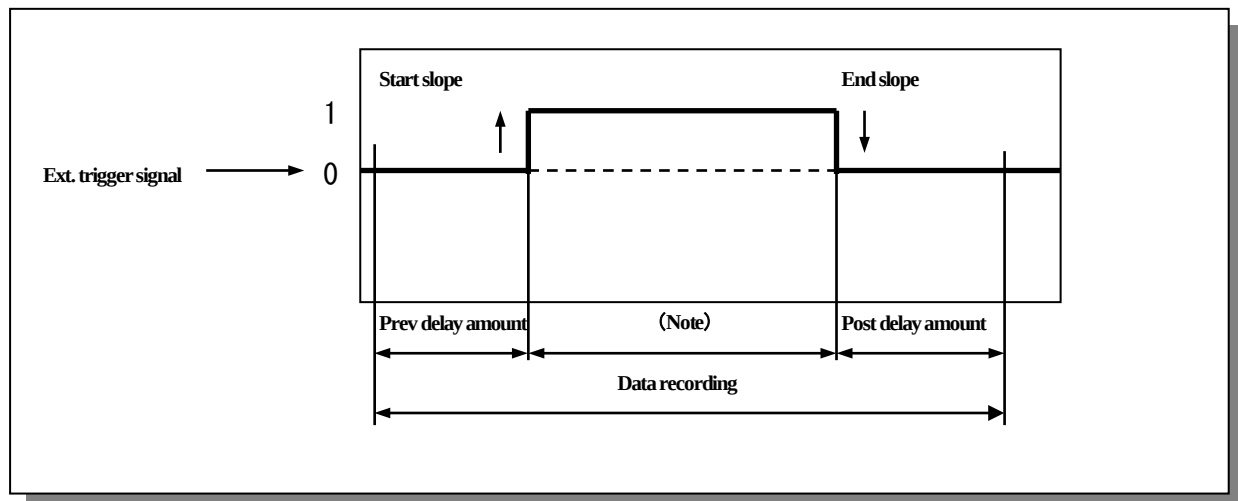
The screenshot shows the 'Digital Trigger Condition' menu. A sub-menu titled 'End Trigger' is overlaid, showing two options: '0)No' and '1)Yes', with '1)Yes' selected. The background menu lists various settings including MEAS Mode, Sampling Freq, REC Data, REC Time, Dig Input CH, Simultaneous, File Name, File Title, Comment, and a table of CH Card Type, MEAS Mode, Range, and CAL values.

CH	Card Type	MEAS Mode	Range	CAL	CAL	CAL	Rng
1	CDV-40A	ON	Strain	1kum/m	ON	ON	100%
2	CDV-40A	ON	Strain	1kum/m	ON	ON	100%
3	CDV-40A	ON	Strain	1kum/m	OFF	FLAT	ON

4-2-10 Setting External Trigger Mode Measurement

Describes details of trigger mode measurement activated by a signal from external trigger input connector. Refer to Hardware Instruction Manual for how to input external trigger signal.

- Concept of External Trigger Mode Measurement



Note

The above figure shows an example when the external trigger signal is used. If end trigger is not specified, the number of recorded data (recording time) is valid.

■ Operation Method

- 1) Select <Meas Cond> from the <Condition> main menu.
- 2) Select <Meas Mode> from the <Meas Cond> menu.
- 3) Select “Ext Trig” mode and press [ENTER] key to determine the selection.
- 4) Select <Trigger Cond>.
- 5) External trigger Conditions setting menu appears as shown in the following.

< Ext Trigger Condition >										M E N U	
MEAS Mode	:	Ext Trig						[Start]	[End]	1	Condition
Sampling Freq	:	100Hz (64CH+D1)	Trig Slope	:	Positive			Negative		2	MEAS Cond
REC Data	:	(126,549,439)	Delay(sec)	:	100.0			0.000		3	Trigger Cond
REC Time(sec)	:	(14day 15:31:34)	RepeatTimes	:	100					1)	Start Slope
Dig Input CH	:	Measure								2)	PreTrig Delay
Simultaneous	:	No								3)	End Trigger
File Name	:	TEST100.ks2								4)	End Slope
File Title	:	TEST Scanning 2004/3								5)	PosTrig Delay
Comment	:	Test No.001								6)	Repeat Times
CH Card Type	MEAS Mode	Range	Hi Pass	Lo Pass	BAL	CAL	CAL Rng			0)	End
1 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				
2 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				

4-2-10-1 Setting Trigger Slope [Condition/MEAS Cond/Trigger Cond/Start Slope, End Slope]

Note

If <End Trigger> is set to "No," you cannot set the <End Slope>.

• Concept of Trigger Slope

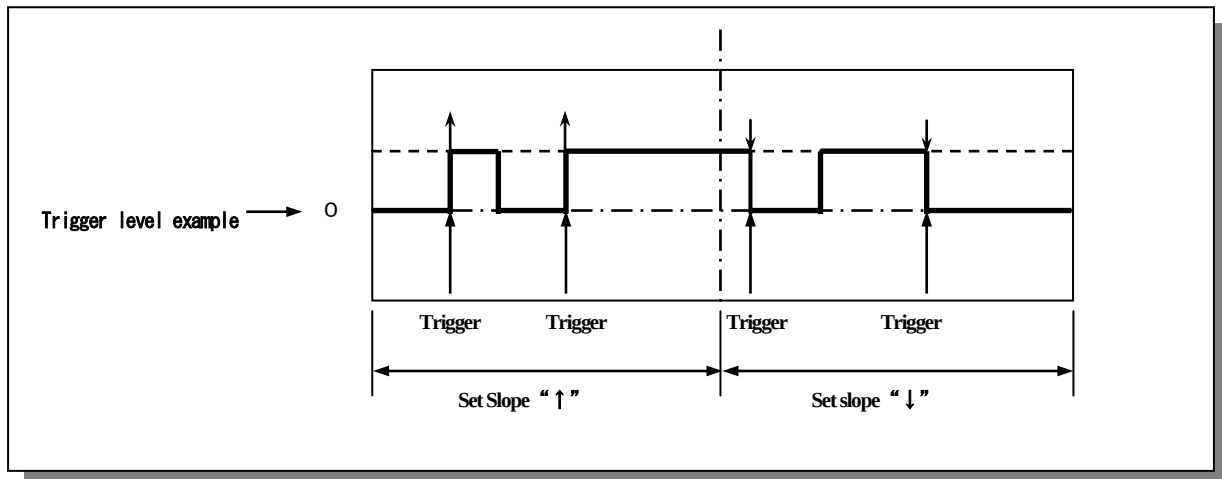
• Digital Trigger

"Positive (↑)" Triggered when external trigger signal rises up (0 → 1).

"Negative (↓)" Triggered when external trigger signal falls down (1 → 0).

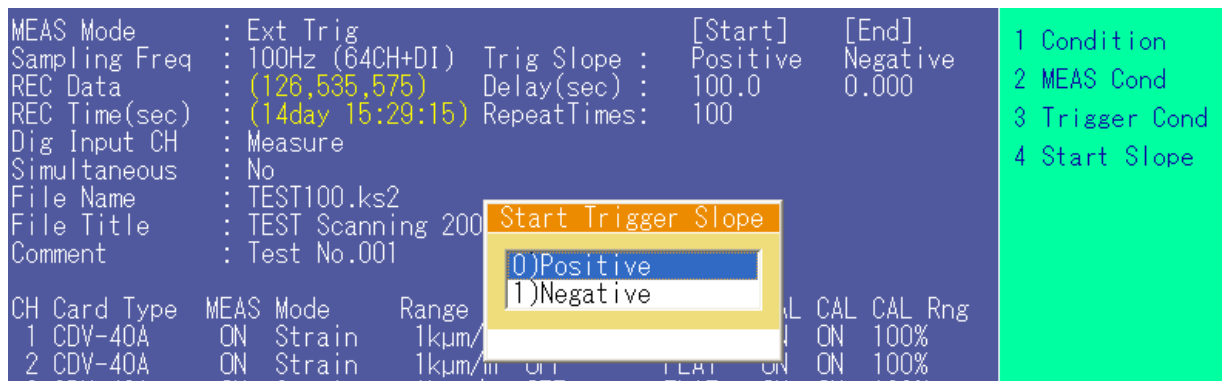
Since the external trigger signal is a single signal, it is used as start/end trigger signals.

See the input waveform of the external trigger signal and definition of the trigger slope in the following figure and set the appropriate trigger slope.



■ Operation Method

- 1) Repeat operations in items 1) to 3) in the previous section "4-9-10."
- 2) Select <Trigger Cond>.
- 3) Select <Start Slope> or <End Slope> from the <Trigger Cond> menu.
- 4) The following "Start Slope" or "End Slope" setting window appears.
Set desired trigger slope.
- 5) Press [ENTER] key to determine the selected trigger slope and the selected trigger slope is displayed on [Start] or [End] of "Trig Slope" column.



4-2-10-2 Setting Trigger Delay [Condition/MEAS Cond/Trigger Cond/PreTrig Delay/PosTrig Delay]

Note

If <End Trigger> is set to “No,” you cannot set the <PosTrig Delay>.

■ Input Range

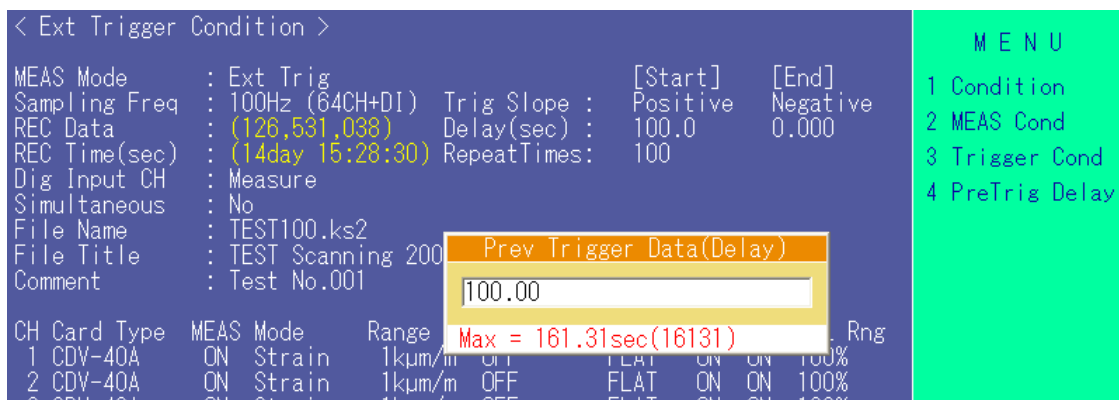
Maximum value indicated on the input range setting window.

Note

When <End Trigger> is not used (number of recorded data and record times are valid), delay amount after triggered is not recorded. Data amount actually recorded shall be “Recorded data + Previous delay amount.”

■ Operation Method

- 1) Repeat operations in items 1) to 3) in the previous section “4-9-10.”
- 2) Select <Trigger Cond>.
- 3) Select <PreTrig Delay> or <PosTrig Delay> from the <Trigger Cond> menu.
- 4) The following “Prev Trigger Delay” or “Post Trigger Delay” setting window appears.
Input the desired delay amount.
- 5) Press [ENTER] key to determine the entered delay amount and the entered delay amount is displayed on the [Start] or [End] of the “Delay” column.



4-2-10-3 Setting Repeat Times [Condition/MEAS Cond/Trigger Cond/Repeat Times]

Setting of the number of times to repeat the trigger mode measurement with the same conditions is described.

Recording form of the measured data varies with data file format.

- Individual Format

When external trigger mode measurement is conducted by setting the repeat times to more than 2 times, each of the external trigger measurement data is recorded in different data files. At this time, file Nos. are automatically added one by one.

(Ex. "TEST-001" → "TEST-002" → "TEST-003"... , etc.)

- Additional Format

When external trigger mode measurement is conducted by setting the repeat times to more than 2 times, each of the external trigger mode measurement data is recorded in the same file as block data. At this time, file Nos. are automatically added one by one.

(Ex. "TEST-001[1]" → "TEST-001[2]" → "TEST-001[3]"..., etc.)

- Input range

1 to 999 times

- Note that data recording at the measurement start is not included in the repeat times.

Note

Take special care for continuously conducting the trigger mode measurement.

Assume that the trigger mode measurement is conducted as follows.

Trigger mode measurement 1 → Trigger mode measurement 2 → ... → Trigger mode measurement X

At this time, it takes approximately 5 seconds for preparing for the trigger mode measurement between the end of the measurement and the start of the next measurement.

- Operation Method

1) Repeat operations in items 1) to 3) in the previous section "4-9-10."

2) Select <Trigger Cond>.

3) Select <Repeat Times> from the <Trigger Cond> menu.

The following "Repeat Times" setting window appears.

Input the desired repeat times.

4) Press [ENTER] key to determine the entered repeat times and the entered repeat times is displayed on the Repeat Times" column.

The screenshot shows the 'Ext Trigger Condition' menu with the following settings:

MEAS Mode	: Ext Trig	[Start]	[End]
Sampling Freq	: 100Hz (64CH+DI)	Trig Slope : Positive	Negative
REC Data	: (126,525,871)	Delay(sec) : 100.0	0.000
REC Time(sec)	: (14day 15:27:38)	RepeatTimes: 100	
Dig Input CH	: Measure		
Simultaneous	: No		
File Name	: TEST100.ks2		
File Title	: TEST Scanning 200		
Comment	: Test No.001		

A 'Repeat Times' input window is shown with the value '100' entered.

On the right, a 'MENU' list is visible:

- 1 Condition
- 2 MEAS Cond
- 3 Trigger Cond
- 4 Repeat Times

At the bottom, a table shows the status of various channels:

CH	Card Type	MEAS Mode	Range	BAL	CAL	CAL Rng
1	CDV-40A	ON Strain	1kum/m	ON	ON	100%
2	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON 100%

4-2-10-4 Setting End Trigger [Condition/MEAS Cond/Trigger Cond/End Trigger]

Setting of end trigger is described.

■ Input range

- “No”..... End trigger is not used.
- “Yes” End trigger is used.

Note

If “No” is selected, menu items <End Slope> and <PosTrig Delay> are not displayed. At this time, columns relevant to the above items on the screen are displayed with “**.”

■ Operation Method

- 1) Repeat operations in items 1) to 3) in the previous section “4-9-10.”
- 2) Select <Trigger Cond>.
- 3) Select <End Trigger> from the <Trigger Cond> menu.

The following “End Trigger” setting window appears.

Set whether or not “End Trigger” is used.

The screenshot shows the 'Ext Trigger Condition' menu on a dark blue background. The menu items are as follows:

MEAS Mode	: Ext Trig	[Start]	[End]
Sampling Freq	: 100Hz (64CH+DI)	Trig Slope : Positive	Negative
REC Data	: (126,520,830)	Delay(sec) : 100.0	0.000
REC Time(sec)	: (14day 15:26:48)	RepeatTimes: 100	
Dig Input CH	: Measure		
Simultaneous	: No		
File Name	: TEST100.ks2		
File Title	: TEST Scanning 200		
Comment	: Test No.001		

Below the menu items, there is a table with columns: CH, Card Type, MEAS Mode, Range, and CAL. The data rows are:

CH	Card Type	MEAS Mode	Range	CAL	CAL	CAL Rng
1	CDV-40A	ON	Strain	1kum/	ON	100%
2	CDV-40A	ON	Strain	1kum/m	ON	100%
3	CDV-40A	ON	Strain	1kum/m	OFF	FLAT

An 'End Trigger' sub-menu is overlaid on the screen, showing two options: '0)No' and '1)Yes'. The '1)Yes' option is highlighted. To the right of the main menu, there is a green vertical bar with the text 'MENU' and a list of menu items: '1 Condition', '2 MEAS Cond', '3 Trigger Cond', and '4 End Trigger'.

4-2-11 Setting Complex Trigger [Condition/MEAS Cond/Trigger Cnd/Complex Trig]

Describes details of complex trigger mode measurement that automatically conducts the measurement by combining the respective conditions of analog, digital, and external trigger mode measurements.

■ Operation Method

- 1) Select <Meas Cond> from the <Condition> main menu.
- 2) Select <Meas Mode> from the <Meas Cond> menu
- 3) A “Select Meas Mode” window appears.
Select “Complex Trig” mode and press [ENTER] key to determine the setting.
- 4) The following “Complex Trig” setting screen appears.
Set desired items on and after the following section. (From “4-2-11-1” to)

< MEAS Condition >										M E N U	
MEAS Mode	:	Complex Trig				[Start]		[End]		1 Condition	
Sampling Freq	:	100Hz (64CH+D1)	Trig CH	:	See trigger cond					2 MEAS Cond	
REC Data	:	(126,515,410)	Trig Level	:	See trigger cond					3 Trigger Cond	
REC Time(sec)	:	(14day 15:25:54)	Trig Slope	:	See trigger cond					1)Strt TrigCond	
Dig Input CH	:	Measure	Delay(sec)	:	100.0		0.000			2)PreTrig Delay	
Simultaneous	:	No	RepeatTimes	:	100					3)End Trigger	
File Name	:	TEST100.ks2								4)Repeat Times	
File Title	:	TEST Scanning 2004/3								0)End	
Comment	:	Test No.001									
CH Card Type	MEAS Mode	Range	Hi Pass	Lo Pass	BAL	CAL	CAL Rng				
1 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				
2 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				

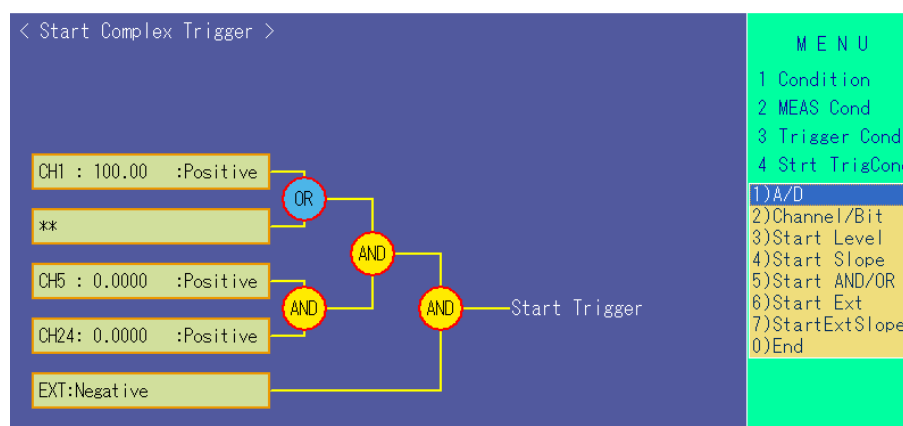
4-2-11-1 Setting Trigger Conditions [Condition/MEAS Cond/Complex Trig/Trigger Cond/Strt Trig Cond, End Cond]

Settings of various conditions related to start and end trigger conditions are described.
The screen structure slightly varies with installation method of conditioner cards.

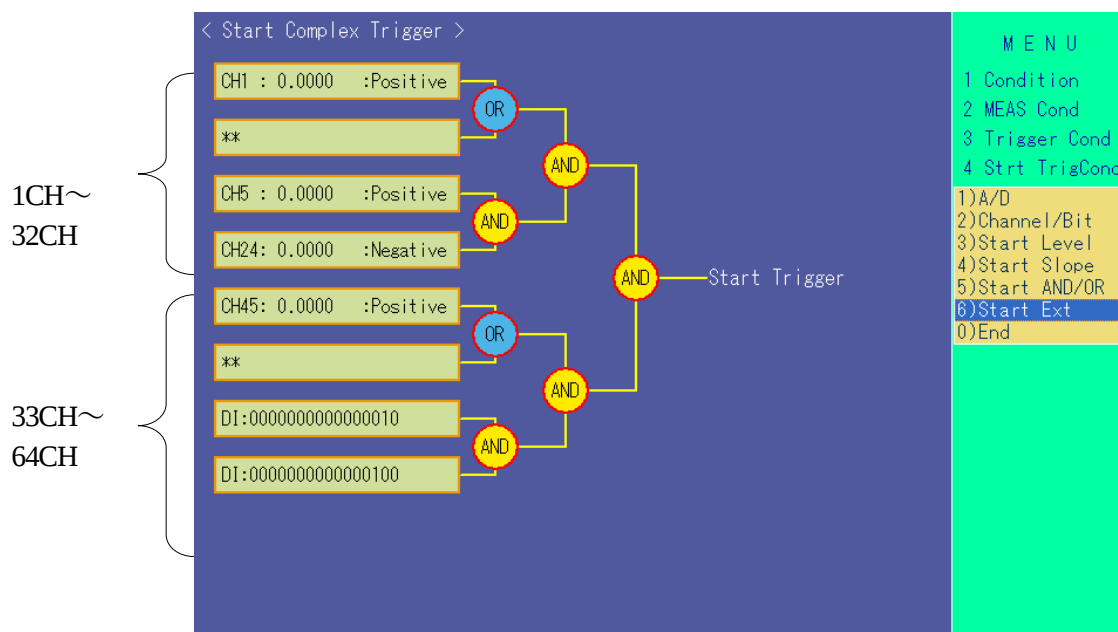
Note

If <End Trigger> is set to “No,” you cannot set <End Cond>.

■ Start Complex Trigger of EDX-2000B-32 (32-CH Type)



■ Start Complex Trigger Screen of EDX-2000B-64 (64-CH Type)



(1) Setting Trigger Channel Type [Condition/MEAS Cond/Complex Trig/A/D]

Setting of types of trigger channel is described.

Note

If <End Trigger> is set to "No," you cannot set <End Cond> in <A/D> menu.

■ Options

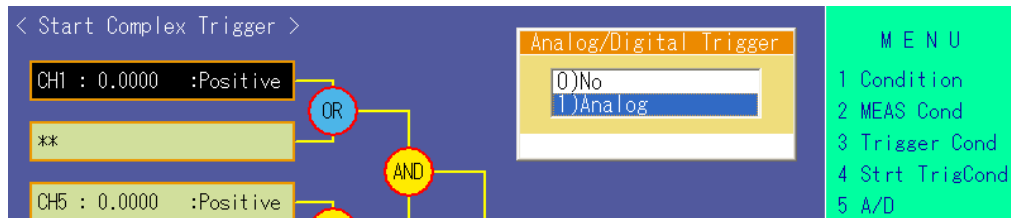
- EDX-2000B-64..... Maximum 8 channels
- EDX-2000B-32..... Maximum 4 channels

The following trigger method is selected in trigger source.

- No..... Unused.
- Analog..... Used as analog trigger
- Digital..... Used as digital trigger (Maximum 4 channels)

■ Operation Method

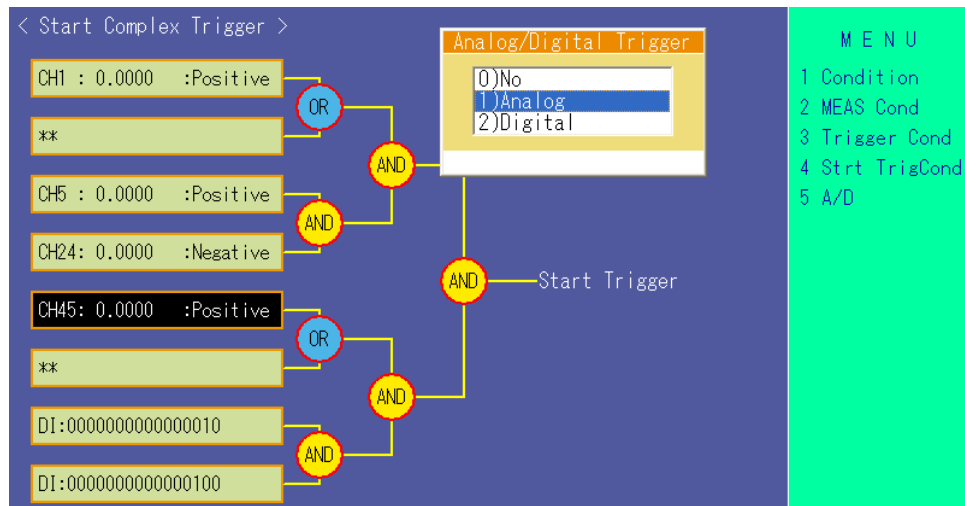
- 1) Repeat operations in items 1) to 4) in the previous section “4-2-11.”
- 2) Select <Trigger Cond>.
- 3) Select <Strt Trig Cond> from the <Trigger Cond> menu.
- 4) Select <A/D> from the <Strt Trig Cond> menu.
- 5) The following “Analog/Digital” setting window appears.
Set the desired trigger type to be used in trigger source.



In addition, for EDX-2000B-64, only “No” and “Analog” are selected for the first 4 items.

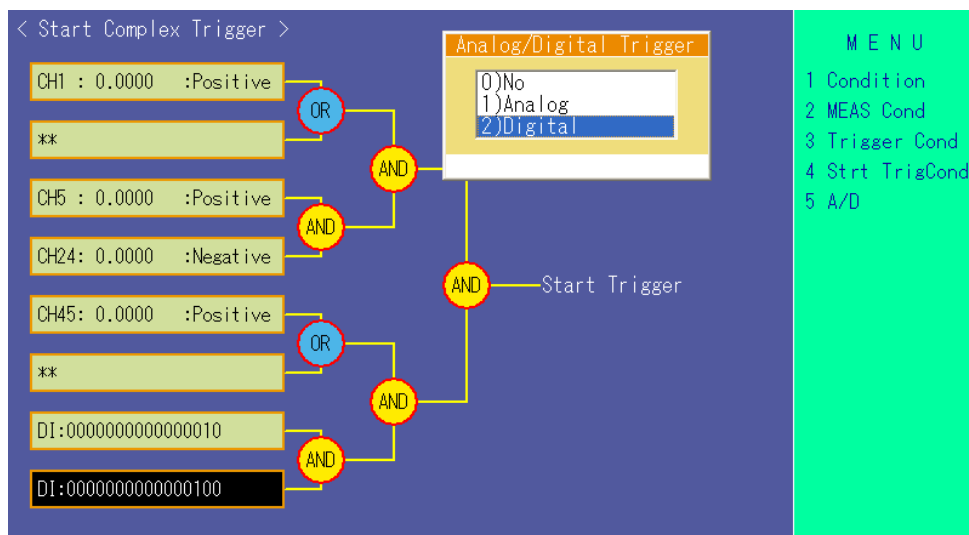
- 6) Press [ENTER] key to determine the trigger type and the selected trigger method is displayed.

● EDX-2000B-64 (I)



● EDX-2000B64 (II)

For EDX-2000B-64, “No,” “Analog, and “Digital” are selectable for on and after the 5th items.



(2) Setting Trigger Channel/Trigger Bit Channel [Condition/MEAS Cond/Complex Trig/Trigger Cond/Cond/Channel/Bit]

Setting of channel No. of analog trigger channel, or bit pattern of digital trigger channel to each trigger channel determined in the previous section are described.

Note

If <End Trigger> is set to “No,” you cannot set <Channel/Bit> in <End Cond> menu.

■ Input Range

• Analog trigger channel

Channels 1 to 32 For EDX-2000B-32 or EDX-2000B-64, down to the first 4 items

Channels 33 to 64 For EDX-2000B-64, on and after the 5th items

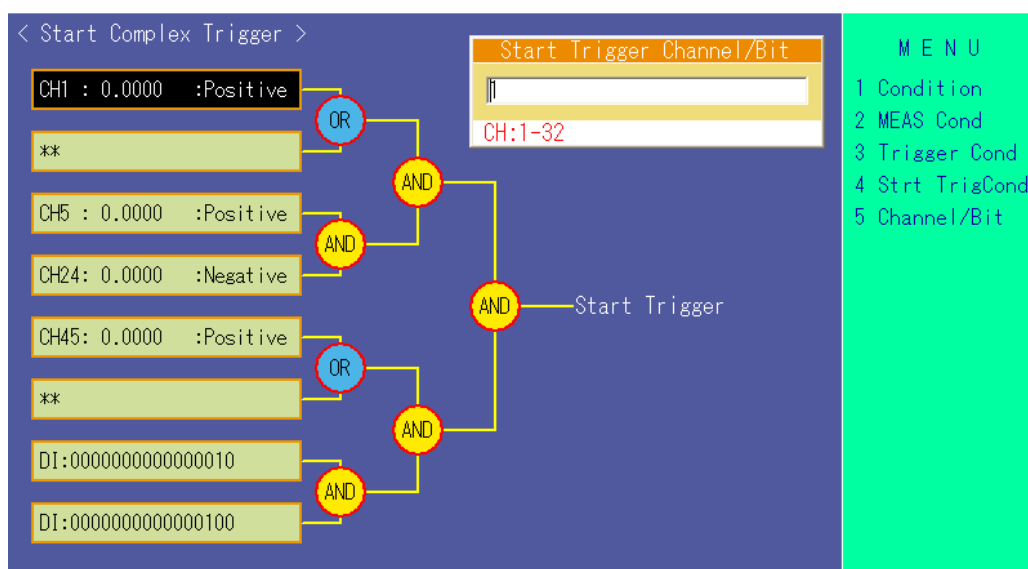
• Digital trigger channel

Set 16 bit patterns using 0 (OFF), 1(ON), and - (Other than bit determined target).

■ Operation Method

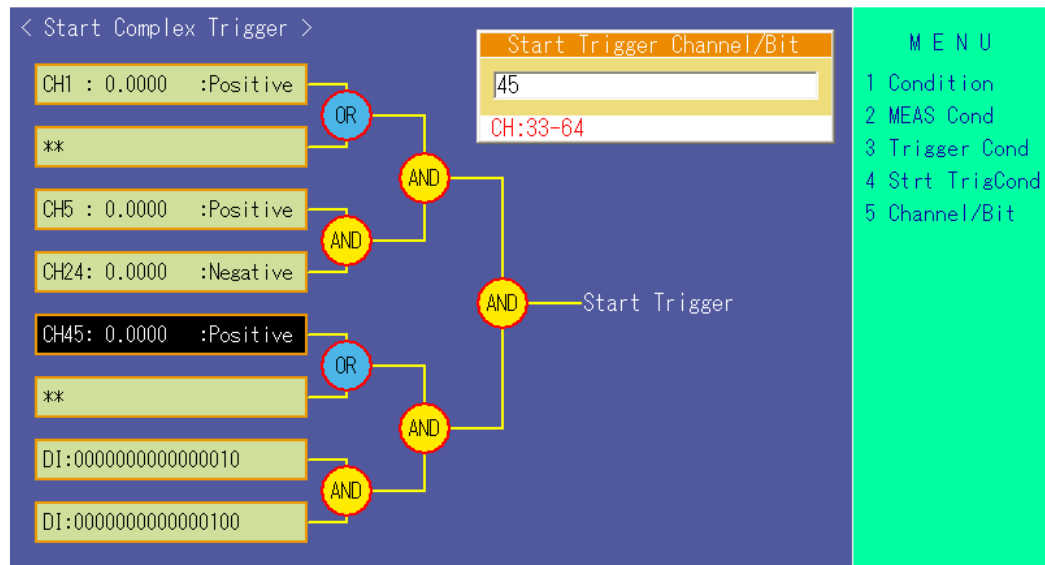
- 1) Repeat operations in items from 1) to 4) in the previous section “4-2-11.”
- 2) Select <Trigger Cond.>
- 3) Select <Strt Trig Cond> from the <Trigger Cond> menu.
- 4) Select <Channel/Bit> from the <Strt Trig Cond> menu.
- 5) A “Start Trigger Channel/Bit” setting window appears.

Input the desired analog trigger channel No. or digital trigger bit pattern.

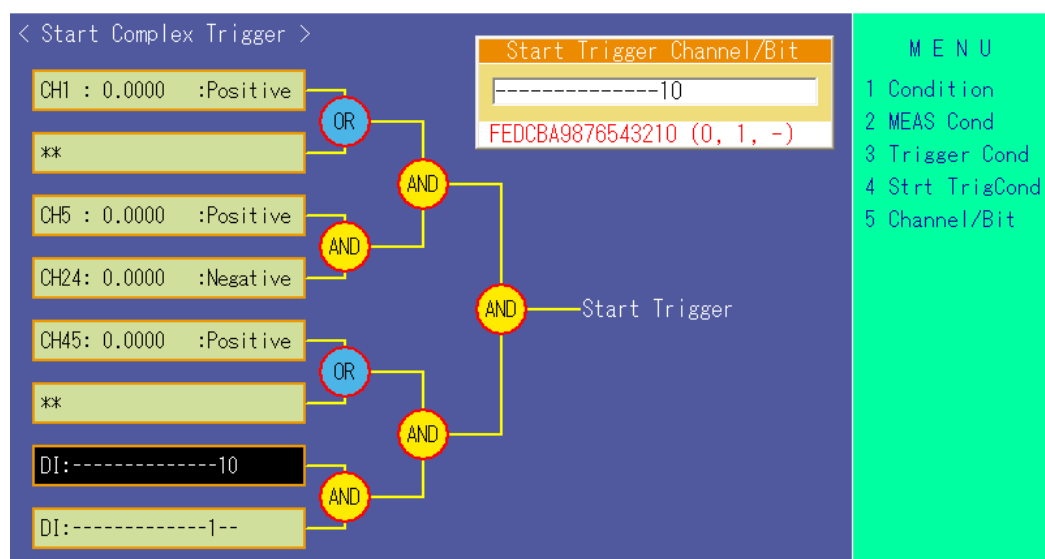


Press [ENTER] key to determine the entered items and to display the entered trigger channel No. or digital bit pattern.

- EDX-2000B-64 (I)
Ex.) Setting analog trigger channel
Specify 45 channels.



- EDX-2000B-64 (II)
Ex.) Setting digital trigger bit
Set 0th bit to OFF, 1st bit to ON and others to not eligible for the target.



(3) Setting Trigger Level [Condition/MEAS Cond/Complex Trig/Trigger Cond/Strt Trig Cond/Start Level, End Level]

Settings of start and end trigger levels of analog trigger channel are described.

Note

If <End Trigger> is set to “No,” you cannot set <End Level> in <End Cond>.

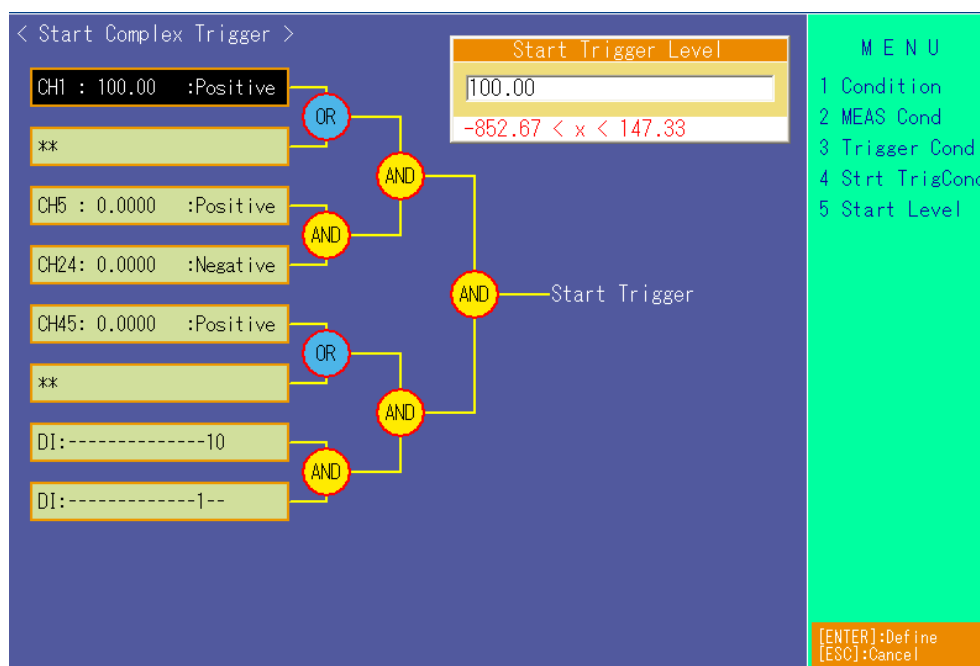
■ Input Range

Set physical value within range relevant to setting range (Setting range $\times$ CAL Coefficient + Offset) of start or end trigger channel.

■ Operation Method

- 1) Repeat operations in items from 1) to 4) in the previous section “4-2-11.”
- 2) Select <Trigger Cond.>
- 3) Select <Strt Trig Cond> from the <Trigger Cond> menu.
- 4) Select <Start Level> or <End Level> from the <Strt TrigCond> menu.
- 5) The following “Start Trigger Level” or “End Trigger Level” setting window appears.

Press [ENTER] key to determine the entered trigger level and to display the entered trigger level ed on the “Analog Trig CH” column.



(4) Setting Trigger Slope [Condition/MEAS Cond/Complex Trig/Trigger Cond/Strt TrigCond/Start Slope, End Slope]

Setting of how to cross the trigger level when starting or ending the trigger is described.

Note

If <End Trigger> is set to “No,” you cannot set <End Slope> in <End Cond> menu.

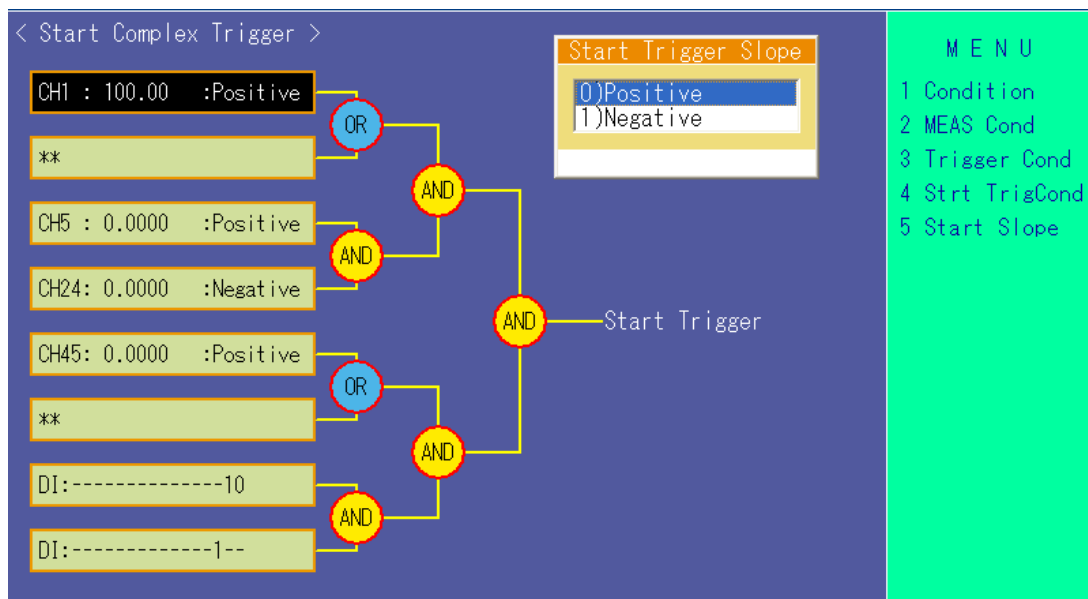
● Concept of Trigger Slope

“Positive (↑)” Triggered when measured value of trigger channel rises up by crossing the preset trigger level from lower to upper portions.

“Negative (↓)” Triggered when measured value of trigger channel falls down by crossing the preset trigger level from upper to lower portions.

■ Operation Method

- 1) Repeat operations in items from 1) to 4) in the previous section “4-2-11.”
- 2) Select <Trigger Cond.>
- 3) Select <Strt Trig Cond> from the <Trigger Cond> menu.
- 4) Select <Start Slope> or <End Slope> from the <Strt TrigCond> menu.
- 5) The following start or end trigger slope setting window appears.
Set the desired trigger slope.



- 6) Press [ENTER] key to determine the desired trigger slope and the trigger slope is displayed on the analog trigger channel column.

(5) Setting Trigger Start Condition (AND/OR) [Condition/MEAS Cond/Complex Trig/Trigger Cond/Strt TrigCond/Start AND/OR]

Set start and end trigger start conditions by combining with trigger conditions.

Note

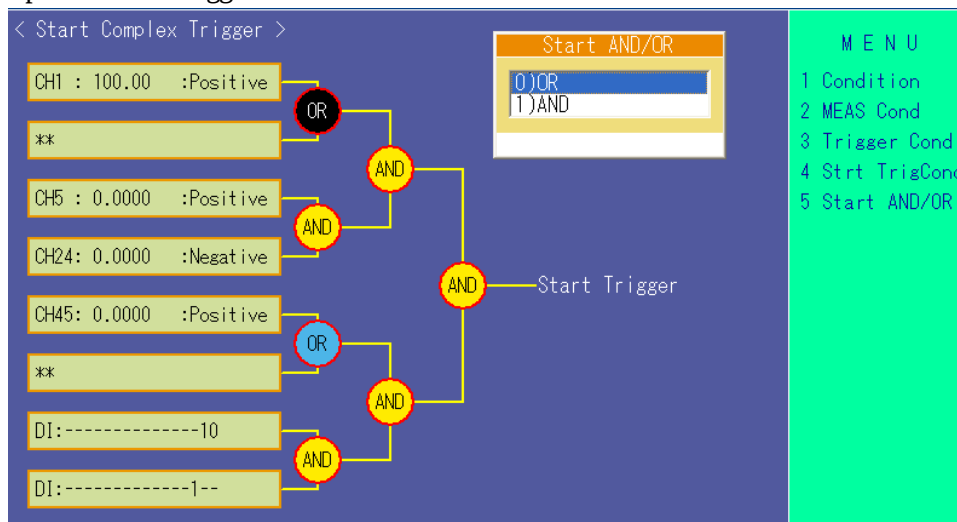
If <End Trigger> is set to “No,” you cannot set <End AND/OR> in <End Cond> menu.

- Options
 - AND AND is allowed only when both “Positive” and “Negative” slopes satisfied the required conditions.
 - OR.....OR is allowed when either of the “Positive” or “Negative” slope satisfied the required conditions..

■ Operation Method

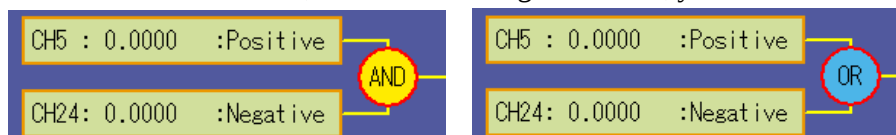
- Repeat operations in items from 1) to 4) in the previous section “4-2-11.”
- Select <Trigger Cond.>
- Select <Strt Trig Cond> from the <Trigger Cond> menu.
- Select <Start AND/OR> or <End AND/OR” from the <Strt TrigCond> menu.
- The following “Start AND/OR” or “End AND/OR” setting window appears.

Input the desired trigger condition.



Ref) Example of Setting AND and OR

When both of the conditions, “Positive” and “Negative” are set, you can set AND and OR.



When only one side of the conditions is set, always set OR.



(6) Setting External Trigger Mode Measurement [Condition/MEAS Cond/Complex Trig/Trigger Cond/Strt TrigCond/Start Ext, End Ext]

Set whether start or end external trigger is used.

Note

If <End Trigger> is set to “None,” you cannot set <End Trigger> in <End Cond.> menu.

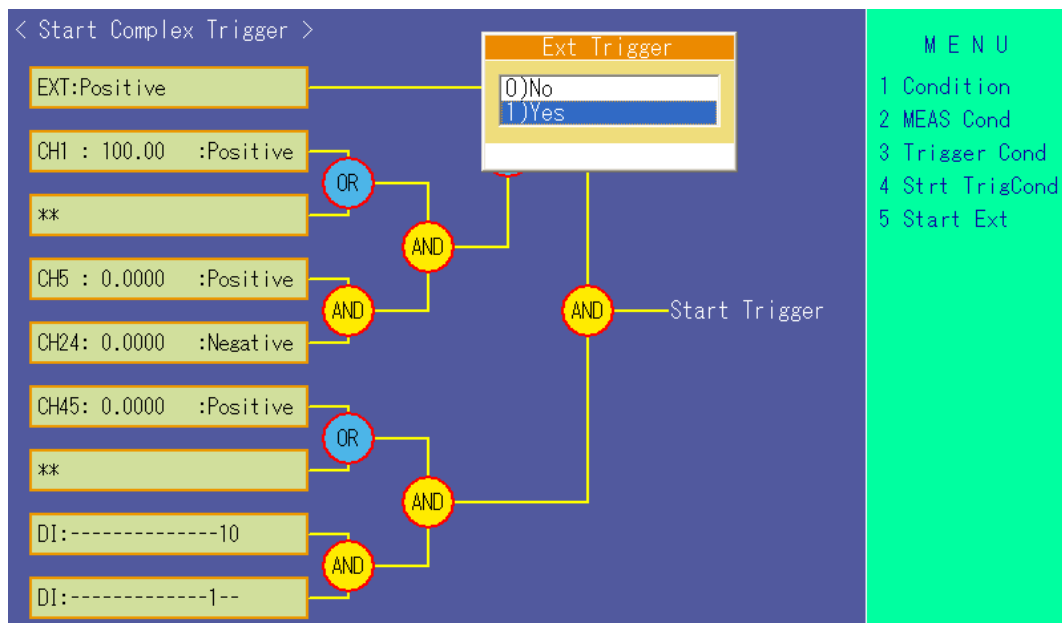
Options

- Yes Start/end external trigger is used.
- No Start/end external trigger is unused.

Operation Method

- 1) Repeat operations in items from 1) to 4) in the previous section “4-2-11.”
- 2) Select <Trigger Cond.>
- 3) Select <Strt Trig Cond> from the <Trigger Cond> menu.
- 4) Select <Strt TrigCond> from <Trigger Cond> menu.
- 5) Select <Start Ext> or <End Exit> from <Strt TrigCond> menu.
- 6) A “Ext Trigger” setting window appears.
- 7) Select “Yes” and <Start Extslope> or <End ExtSlope> menu is added to menu items.
- 8) A “Start Trigger Slope” selecting window appears.

Select on appropriate trigger to be displayed on the Start/End trigger channel column.



(7) Setting Trigger Slope [Condition/MEAS Cond/Complex Trig/Trigger Cond/Start Cond/Start Slope, End Slope]

Setting of start or end external trigger slope is described.

Note

If <End Trigger> is set to “No,” you cannot set <End ExtSlope> in <End Cond.> menu.

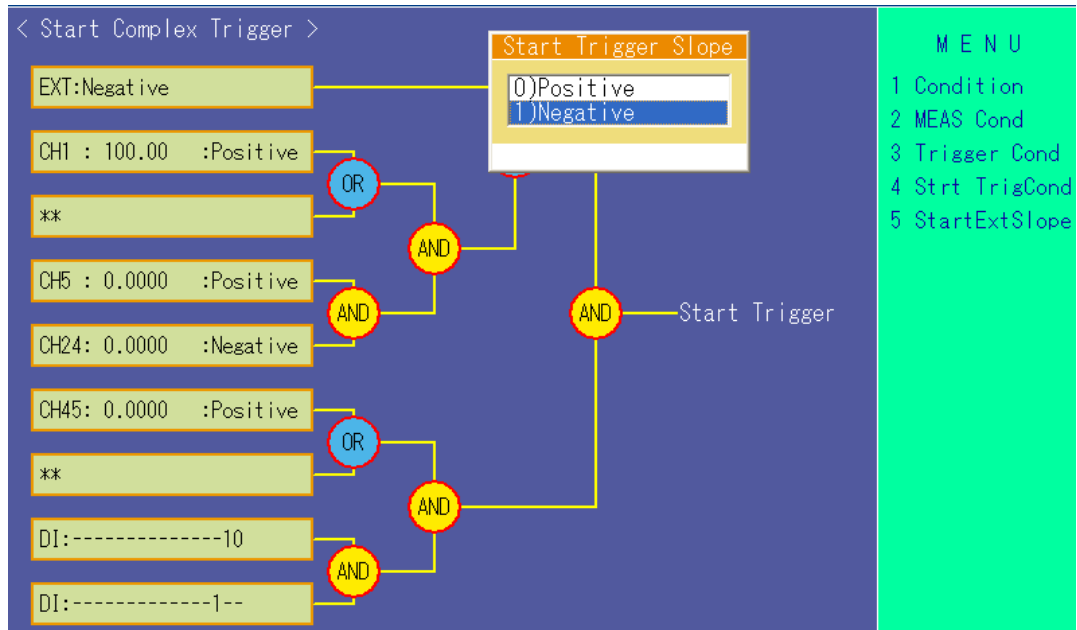
● Concept of Trigger Slope

“Positive (↑)” Triggered when measured value of trigger channel rises up by crossing the preset trigger level.

“Negative (↓)” Triggered when measured value of trigger channel falls down by crossing the preset trigger level.

■ Operation Method

- 1) Repeat operations in items from 1) to 4) in the previous section “4-2-11.”
- 2) Select <Trigger Cond.>
- 3) Select <Strt Trig Cond> from the <Trigger Cond> menu.
- 4) Select <Strt TrigCond> from <Trigger Cond> menu.
- 5) Select <Start Ext Slope> or End ExtSlope> from the <Start TrigCond> menu.
- 6) A “Start Trigger Slope” or “End Trigger Slope” setting window appears.
- 7) Press [Enter] key to determine the desired trigger slope.
- 8) The determined trigger slope appears on the start/end external trigger slope column.



4-2-11-2 Setting Trigger Delay [Condition/MEAS Cond/Complex Trig/Trigger Cond/PreTrig Delay, PosTrig Delay]

Settings of delay before triggered (PreTrig Delay) and delay after triggered (PosTrig Delay) are described.

Note

If <End Trigger> is set to “No,” you cannot set the <PosTrig Delay>.

■ Input Range

Maximum value indicated on the input range setting window.

Note

When <End Trigger> is not used (number of recorded data and record times are valid), delay amount after triggered is not recorded. Data amount actually recorded shall be “Recorded data + Previous delay amount.”

■ Operation Method

- 1) Repeat operations in items from 1) to 4) in the previous section “4-2-11.”
- 2) Select <Trigger Cond.>
- 3) Select <Strt Trig Cond> from the <Trigger Cond> menu.
- 4) Select <Strt TrigCond> from <Trigger Cond> menu.
- 5) Select <PreTrig Delay> or <PosTrig Delay> from the<Strt TrigCond> menu.
- 6) The following “PreTrig delay> or <PosTrig Delay> setting window appears.
Input the desired delay amount.
- 7) Press [ENTER] key to determine the entered delay amount and the entered delay amount is displayed on the [Start] or [End] of the “Delay” column.

< MEAS Condition >										M E N U
MEAS Mode	:	Complex Trig						[Start]	[End]	1 Condition
Sampling Freq	:	1kHz (64CH+DI)	Trig CH	:	See trigger cond					2 MEAS Cond
REC Data	:	1,800,000	Trig Level	:	See trigger cond					3 Trigger Cond
REC Time(sec)	:	0:30:00	Trig Slope	:	See trigger cond					4 PreTrig Delay
Dig Input CH	:	Measure	Delay(sec)	:	5.000	**				
Simultaneous	:	No	RepeatTimes	:	100					
File Name	:	TEST204.ks2								
File Title	:	TEST Scanning 200								
Comment	:	Test No.001								
			Prev Trigger Data(Delay)							
			5.0000							
			Max = 16.131sec(16131)							
CH	Card Type	MEAS Mode	Range							
1	CDV-40A	ON Strain	1kum/m	ON	FLAT	ON	ON	100%		
2	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%		
3	CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%		

4-2-11-3 Setting Repeat Times [Condition/MEAS Cond/Complex Trig/Trigger Cond/Repeat Times]

Setting of the number of times for repeating the trigger mode measurement with the same conditions is described.

Recording form of the measured data varies with data file format.

- Individual Format

When trigger mode measurement is conducted by setting the repeat times to more than 2 times, each of the trigger mode measurement data is recorded in different data file. At this time, file Nos. are automatically added one by one. (Ex. "TEST-001" → "TEST-002" → "TEST-003"... , etc.)

- Additional Format

When trigger mode measurement is conducted by setting the repeat times to more than 2 times, each of the trigger mode measurement data is recorded in the same file as block data. At this time, file Nos. are automatically added one by one..

(Ex. "TEST-001[1]" → "TEST-001[2]" → "TEST-001[3]"..., etc.)

- Input range

1 to 999 times

- Note that data recording at the measurement start is not included in the repeat times.

Note

Take special care for continuously conducting the trigger mode measurement.

Assume that the trigger mode measurement is conducted as follows.

Trigger mode measurement 1 → Trigger mode measurement 2 → ... → Trigger mode measurement X

At this time, it takes approximately 5 seconds for preparing for the trigger measurement between the end of the measurement and the start of the next measurement.

- Operation Method

- 1) Repeat operations in items 1) to 4) in the previous section "4-2-11."
- 2) Select <Trigger Cond>.
- 3) Select <Repeat Times> from the <Trigger Cond> menu.
- 4) The following "Repeat Times" setting window appears.
Input the desired repeat times.
- 5) Press [ENTER] key to determine the entered repeat times and the repeat times is displayed on the "Repeat Times" column.

< MEAS Condition >										MENU	
MEAS Mode	:	Complex Trig								1 Condition	
Sampling Freq	:	1kHz (64CH+DI)	Trig CH	:	See trigger cond					2 MEAS Cond	
REC Data	:	1,800,000	Trig Level	:	See trigger cond					3 Trigger Cond	
REC Time(sec)	:	0:30:00	Trig Slope	:	See trigger cond					4 Repeat Times	
Dig Input CH	:	Measure	Delay(sec)	:	5.000	**					
Simultaneous	:	No	RepeatTimes	:	15						
File Name	:	TEST204.ks2									
File Title	:	TEST Scanning 200									
Comment	:	Test No.001									
CH Card Type	MEAS Mode	Range									
1 CDV-40A	ON Strain	1kum/m	ON	FLAT	ON	ON	100%				
2 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				
3 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				
4 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				
5 CDV-40A	ON Strain	1kum/m	OFF	FLAT	ON	ON	100%				

4-2-11-4 -Setting End Trigger [Condition/MEAS Cond/Complex Trig/Trigger Cond/CompTrig Cond/End Trigger]

Setting of end trigger is described.

- Input range
 - “No”.....End trigger is not used.
 - “Yes”End trigger is used.

Note

If “No” is selected, menu items <End Cond> and <PosTrig Delay are not displayed. At this time columns relevant to the above items on the window are displayed with “**.”

- Operation Method
 - 1) Repeat operations in items 1) to 4) in the previous section “4-2-11.”
 - 2) Select <Trigger Cond>.
 - 3) Select <End Trigger> from the <Trigger Cond> menu.
 - 4) The following “End trigger” setting window appears.
Set whether or not “End Trigger” is used.

< MEAS Condition >										M E N U
MEAS Mode	:	Complex Trig								1 Condition
Sampling Freq	:	1kHz (64CH)	Trig CH	:	See trigger cond					2 MEAS Cond
REC Data	:	(117.445.830)	Trig Level	:	See trigger cond					3 Trigger Cond
REC Time(sec)	:	(1day 08:37:25)	Trig Slope	:	See trigger cond					4 End Trigger
Dig Input CH	:	Not measure	Delay(sec)	:	10.00	0.000				
Simultaneous	:	No	RepeatTimes	:	100					
File Name	:	TEST812.ks2								
File Title	:	TEST Scanning 200								
Comment	:	Test No.001								
CH	Card Type	MEAS Mode	Range							
1	CDV-40A	ON Strain	1kum/m							
2	CDV-40A	ON Strain	1kum/m							
3	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%		
4	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%		
5	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%		

End Trigger

0)No

1)Yes

- 5) Press [ENTER] key to reflect the setting contents.

If “Yes” is selected, setting items related to end trigger are displayed on the screen.

< MEAS Condition >										M E N U
MEAS Mode	:	Complex Trig								1 Condition
Sampling Freq	:	1kHz (64CH)	Trig CH	:	See trigger cond					2 MEAS Cond
REC Data	:	(117.438.790)	Trig Level	:	See trigger cond					3 Trigger Cond
REC Time(sec)	:	(1day 08:37:18)	Trig Slope	:	See trigger cond					1)Strt TrigCond
Dig Input CH	:	Not measure	Delay(sec)	:	10.00	0.000				2)PreTrig Delay
Simultaneous	:	No	RepeatTimes	:	100					3)End Trigger
File Name	:	TEST812.ks2								4)End Trig Cond
File Title	:	TEST Scanning 2004/3								5)PosTrig Delay
Comment	:	Test No.001								6)Repeat Times
										0)End
CH	Card Type	MEAS Mode	Range	Hi Pass	Lo Pass	BAL	CAL	CAL Rng		
1	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%		
2	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%		
3	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%		
4	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%		
5	CDV-40A	ON Strain	1kum/m	OFF	10kHz	ON	ON	100%		

4-3 SETTING SIMULTANEOUS PROCESSING MODE [Condition/Simlt Mode]

This section describes settings of simultaneous processing mode for simultaneously conducting histogram and FFT analysis monitoring together with the measurement.

Note

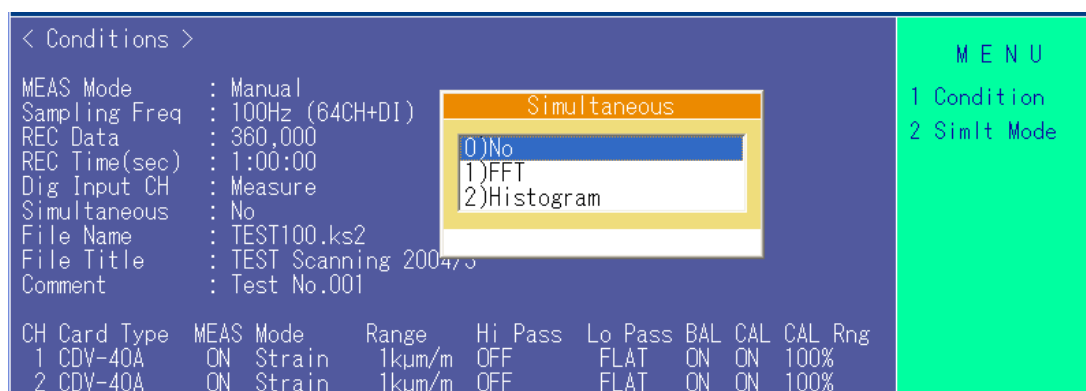
Simultaneous processing mode is set only when it is in manual measuring mode with sampling frequency 10 kHz or less.

■ Options

“No,” “FFT,” and “Histogram”

■ Operation Method

- 1) Select <Simlt Mode> from <Condition> main menu.
 - 2) The following “Simlt Mode” setting window appears.
 - 3) Select the desired item and press [ENTER] key to determine the selected item.
- Then, “Simultaneous” column on the measuring condition screen is updated.

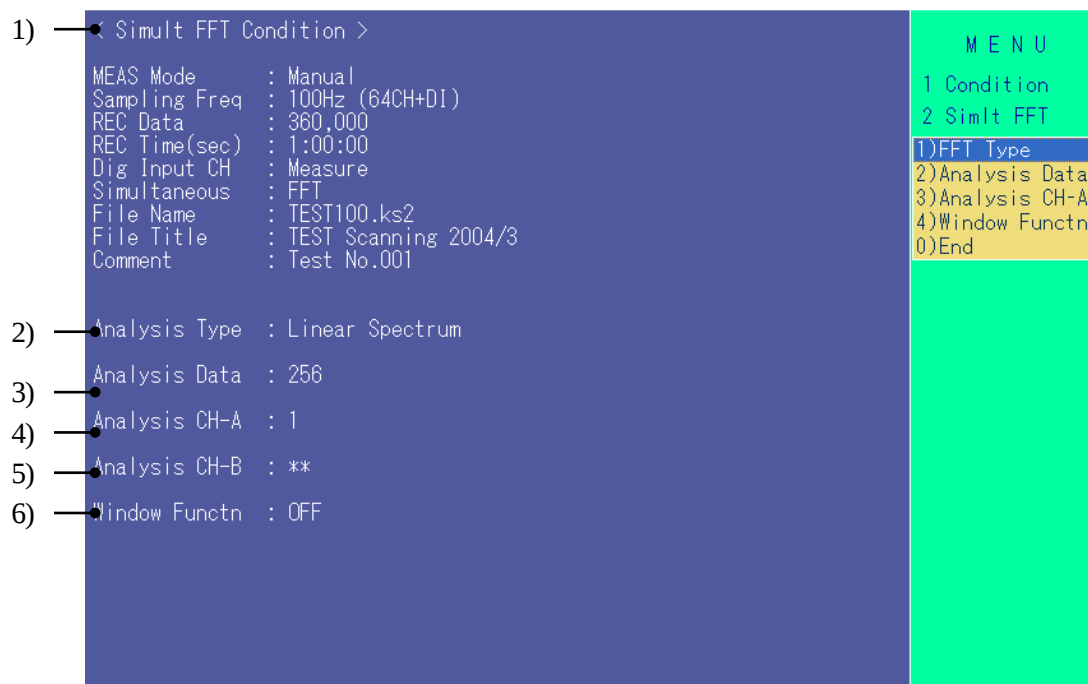


4-3-1 Setting Simultaneous FFT Analysis [Condition/Simlt FFT]

Setting of required conditions for conducting simultaneous FFT analysis together with the measurement is described. When “FFT” is selected in <Simlt Mode>, a menu <Simlt FFT> is displayed on the menu items.

■ Operation Method

- 1) Select <Simlt FFT> from <Condition> main menu.
- 2) The “Simultaneous” setting window appears. Select “FFT” from the “Simultaneous” setting window.
- 3) A menu <Simlt FFT> appears under the <Simlt Mode> menu. Here, select the <Simlt FFT>.
- 4) The following “Simlt FFT Condition” setting screen appears.
Select the required items to be set for on and after the succeeding items (from “4-3-1-1.”).



- 1) “Simultaneous” Required conditions for simultaneous processing mode.
- 2) “Analysis Type” Type of FFT analysis.
- 3) “Analysis Data” The number of FFT analysis data points.
- 4) “Analysis CH-A” Analysis channel A.
- 5) “Analysis CH-B” Analysis channel B.
The Analysis CH-B is displayed only when the type of FFT analysis is set to “Cross Spectrum” and “Cross Correlation.”
- 6) “Window Function” Window function.

Note

Upper limit of sampling frequency for simultaneous processing is 10 kHz.

4-3-1-1 Setting FFT Analysis Type [Condition/Simlt FFT/FFT Type]

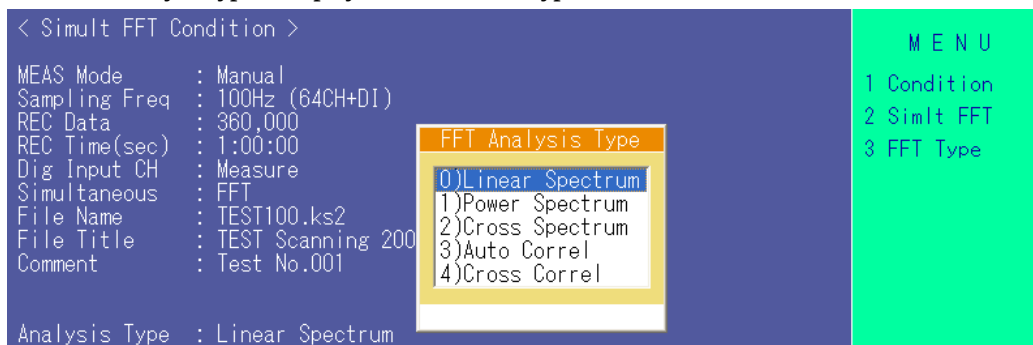
Set the type of FFT analysis.

■ Options

Linear spectrum, Power spectrum, Cross spectrum, Self correlation, and Cross correlation

■ Operation Method

- 1) Select <Simlt FFT> from <Condition> main menu.
- 2) Select <FFT Type> from the <Simlt FFT> menu.
- 3) The following “FFT Type” setting window appears.
Select the desired analysis type.
- 4) The selected analysis type is displayed on the “FFT Type” column.



4-3-1-2 Setting the Number of Analysis Data [Condition/Simlt FFT/Analysis Data]

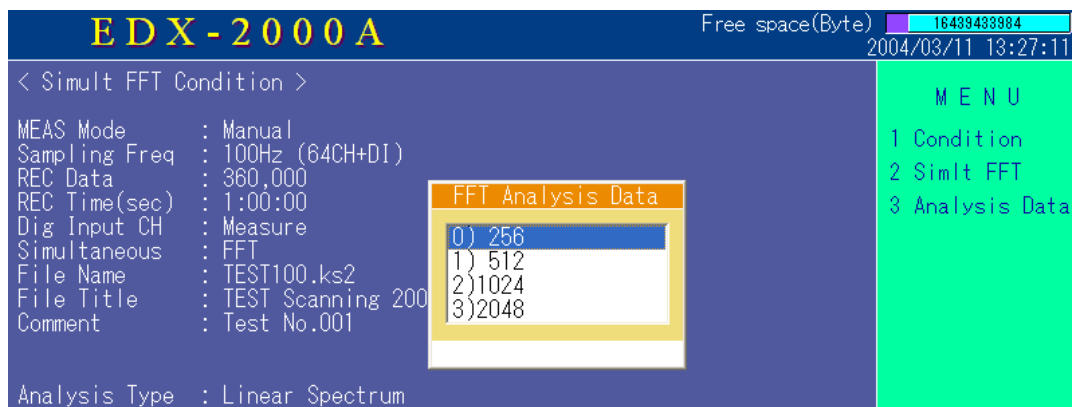
Set the number of FFT analysis data.

■ Options

256, 512, 1024, and 2048

■ Operation Method

- 1) Select <Simlt FFT> from <Condition> main menu.
- 2) Select <Analysis Data> from the <Simlt FFT> menu.
- 3) The following “Analysis Data” setting window appears.
Select the desired number of analysis data.
- 4) The selected number of analysis data is displayed on the “Analysis Data” column.



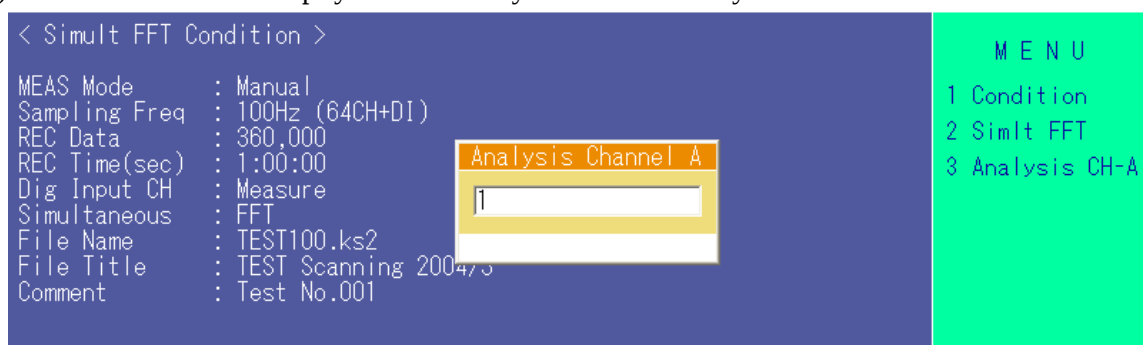
4-3-1-3 Setting Analysis Channel [Condition/Simlt FFT/Analysis CH-A, Analysis CH-B]

Set FFT analysis channel. When the type of FFT analysis is set to “Cross Spectrum” or “Cross Correlation,” since the analysis is conducted between 2 channels, it is also required to set the Analysis CH-B.

- Channel Setting Available Range
Channel range of the measurement

- Operation Method

- 1) Select <Simlt FFT> from <Condition> main menu.
- 2) Select <Analysis CH-A> or <Analysis CH-B> from the <Simlt FFT> menu.
- 3) The following “Analysis CH-A” or “Analysis CH-B” setting window appears.
Set the desired analysis channel number to be used for the analysis.
- 4) The determined item is displayed on the “Analysis CH-A” or “Analysis CH-B” column.



4-3-1-4 Setting Window Function [Condition/Simlt FFT/Window Functn]

Specify window function of FFT analysis.

- Options
OFF, Hanning, Hamming, Fejer, Blackman and Gaussian

- Operation Method

- 1) Select <Simlt FFT> from <Condition> main menu.
- 2) Select <Window Functn> from the <Simlt FFT> menu.
- 3) The following “Window Functn” setting window appears.
Select the desired window function.
- 4) The selected item is displayed on the “Window Functn” column.



4-3-2 Setting Simultaneous Histogram Processing [Condition/Simlt Hist]

Set required conditions for simultaneously conducting histogram processing together with the measurement.
Select “Histogram” in <Simlt Mode> and <Histogram> menu is displayed on the menu.

■ Operation Method

- 1) Select <Simlt Mode> from <Condition> main menu.
- 2) The “Simlt Mode” setting window appears. Here, select “Histogram.”
- 3) Then, <Simlt Hist> menu appears under the <Simlt Mode> menu.
Here, select the <Simlt Hist> menu.
- 4) The following “Simlt Histogram Condition” setting window appears.
Select required items for the succeeding sections (from “4-3-2-1” to).

< Simult Histogram Condition >								M E N U
MEAS Mode : Manual								1 Condition
Sampling Freq : 100Hz (64CH+DI)								2 Simlt Hist
REC Data : 360,000								1)Analysis CH
REC Time(sec) : 1:00:00								2)HistogramType
Dig Input CH : Measure								3)Slices
Simultaneous : Histogram								4)Hysteresis
File Name : TEST100.ks2								5)Offset
File Title : TEST Scanning 2004/3								6)Next Page
Comment : Test No.001								7)Prev Page
CH	Hist	Type	Slices	Width (Phys Val)	Unit	Hys (Slices)	Offset (Slices)	0)End
1 ON	P/V		32	64.0	μm/m	2	***	
2 ON	Max/Min		32	64.0	μm/m	2	0	
3 ON	Rain1D		32	64.0	μm/m	2	***	
4 ON	Rain2D		32	64.0	μm/m	2	***	
5 ON	Rain1D+Max/Min		32	64.0	μm/m	2	0	
6 ON	P/V		32	64.0	μm/m	2	***	
7 ON	Max/Min		32	64.0	μm/m	2	0	
8 ON	Rain1D		32	64.0	μm/m	2	***	
9 ON	Rain2D		32	64.0	μm/m	2	***	
10 ON	Rain1D+Max/Min		32	64.0	μm/m	2	0	
11 ON	P/V		32	64.0	μm/m	2	***	
12 ON	Max/Min		32	64.0	μm/m	2	0	
13 ON	Rain1D		32	64.0	μm/m	2	***	
14 ON	Rain2D		32	64.0	μm/m	2	***	
15 ON	Rain1D+Max/Min		32	64.0	μm/m	2	0	
16 ON	P/V		32	64.0	μm/m	2	***	
								[SPACE]:Change CH

- 1) “CH”..... Measuring channel No.
- 2) “Hist”..... Simultaneous histogram target channel
- 3) “Type” Type of histogram analysis
- 4) “Slices” Number of slices
- 4) “Slice Width” Slice width
- 6) “Unit” Units
- 7) “Hys”..... Hysteresis
- 8) “Offset”..... Offset

Note

Upper limit of sampling frequency for simultaneous processing is 10 kHz.

4-3-2-1 Setting Analysis Channel [Condition/Simlt Hist/Analysis CH]

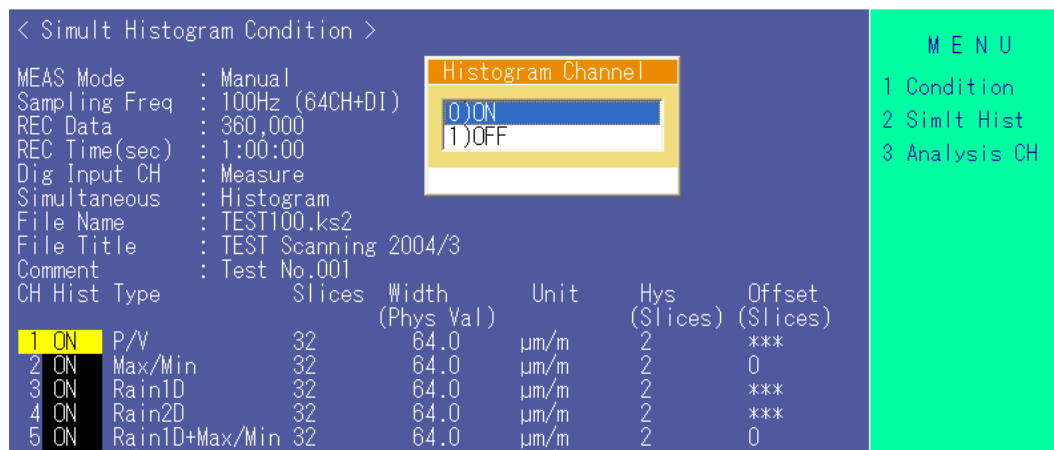
Set histogram analysis target channel.

■ Options

- “ON”..... Histogram ON
- “OFF”..... Histogram OFF

■ Operation Method

- 1) Select <Simlt Hist> from <Condition> main menu.
- 2) Select <Analysis CH> from the <Simlt Hist> menu.
- 3) The following histogram analysis channel setting window appears.
Here, set ON/OFF for histogram analysis channel.
- 4) The determined contents are displayed on “Histogram” columns of channels.



4-3-2-2 Setting Histogram Analysis Type [Condition/Simlt Hist/HistogramType]

Set the type of histogram analysis.

■ Options

- P/V..... Peak/Valley
- Max/Min..... Maximum/Minimum
- RAIN1D..... 1-D rainflow
- RAIN2D..... 2-D rainflow
- RAIN1D + Max/Min..... 1D rainflow + Max/Min

■ Operation Method

- 1) Select <Simlt Hist> from <Condition> main menu.
- 2) Select <HistogramType> from the <Simlt Hist> menu.
- 3) The following histogram analysis type setting window appears.
Here, set the desired histogram type.
- 4) The determined contents are displayed on “Type” column of channels.

< Simlt Histogram Condition >

MEAS Mode
Sampling Freq
REC Data
REC Time(sec)
Dig Input CH
Simultaneous
File Name
File Title
Comment
CH Hist Type

CH	Hist Type	Slices	Width (Phys Val)	Unit	Hys (Slices)	Offset (Slices)
1	ON P/V	32	64.0	μm/m	2	***
2	ON Max/Min	32	64.0	μm/m	2	0
3	ON Rain1D	32	64.0	μm/m	2	***
4	ON Rain2D	32	64.0	μm/m	2	***
5	ON Rain1D+Max/Min	32	64.0	μm/m	2	0

M E N U

1 Condition

2 Simlt Hist

3 HistogramType

Histogram Analysis Type

0)P/V	:Peak/Valley
1)Max/Min	:Maximum/Minimum
2)Rain1D	:1D Rainflow
3)Rain2D	:2D Rainflow
4)Rain1D+Max/Min	:1D Rainflow + Max/Min

4-3-2-3 Setting the Number of Slices [Condition/Simlt Hist/Slices]

Set the number of histogram slices.

■ Options

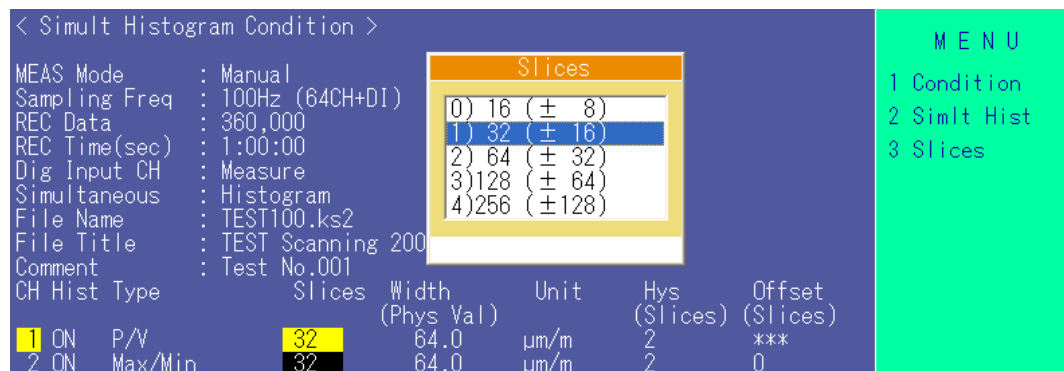
16(± 8), 32(± 16), 64(± 32), 128(± 64), and 256(± 128)

Note

Figures in parentheses represent the number of slices in P/V and Max/Min methods.

■ Operation Method

- 1) Select <Simlt Hist> from <Condition> main menu.
- 2) Select <Slices> from the <Simlt Hist> menu.
- 3) The following window appears for selecting the number of slices.
Here, set the desired number of slices.
- 4) The determined contents are displayed on “Slices” column of channels.



4-3-2-4 Setting Hysteresis [Condition/Simlt Hist/Hysteresis]

Set hysteresis.

Note

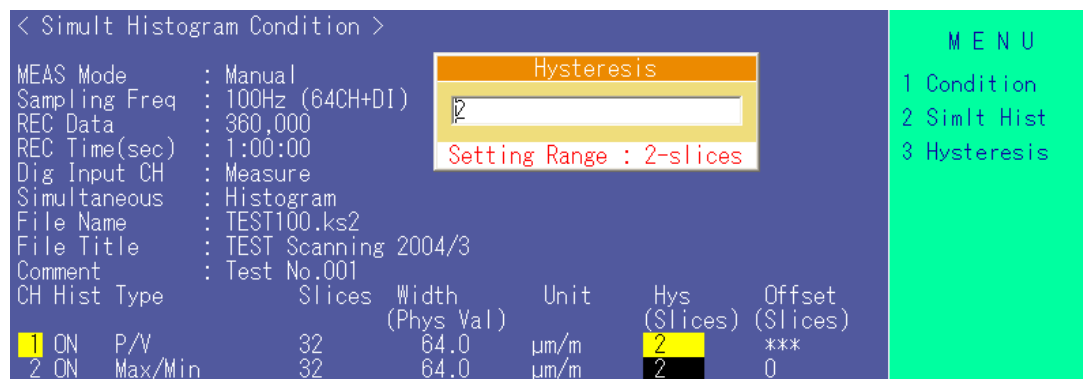
For details of the hysteresis, see histogram analysis in “8-4-5.”

■ Setting Range

2 to the number of specified slices.

■ Operation Method

- 1) Select <Simlt Hist> from <Condition> main menu.
- 2) Select <Hysteresis> from the <Simlt Hist> menu.
- 3) The following hysteresis setting window appears.
Here, set the appropriate hysteresis.
- 4) The determined contents are displayed on “Hys” column of channels.



4-3-2-5 Setting Offset [Condition/Simlt Hist/Offset]

Set offset.

Setting of the offset is allowed only when “Max/Min Method” is selected for histogram analysis.

Note

For details of offset, see histogram analysis in “8-4-5.”

- MAX/MIN Max/Min Method
- RAIN1D + MAX/MIN 1-dimension rainflow + Max/Min Method

■ Setting Range

2 to the number of $\pm$ slices/2

■ Operation Method

- 1) Select <Simlt Hist> from <Condition> main menu.
- 2) Select <Offset> from the <Simlt Hist> menu.
- 3) The following offset setting window appears.
Here, set the appropriate offset.
- 4) The determined offset is displayed on “Offset” column

< Simult Histogram Condition >

MEAS Mode : Manual
Sampling Freq : 100Hz (64CH+D1)
REC Data : 360,000
REC Time(sec) : 1:00:00
Dig Input CH : Measure
Simultaneous : Histogram
File Name : TEST100.ks2
File Title : TEST Scanning 2004/3
Comment : Test No.001

CH Hist Type Slices Width Unit Hys Offset
(Phys Val) (Slices) (Slices)

1 ON	P/V	32	64.0	μm/m	2	***
2 ON	Max/Min	32	64.0	μm/m	2	0
3 ON	Rain1D	32	64.0	μm/m	2	***

Offset

0

Setting Range : 2-±slices/2

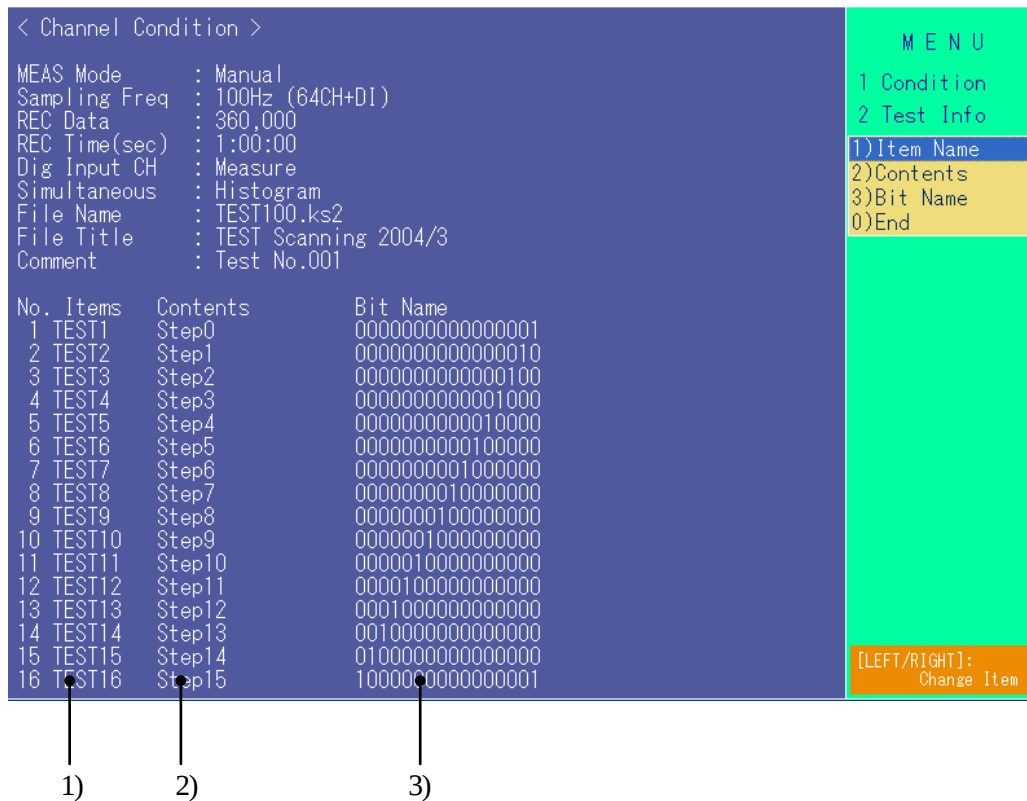
M E N U

1 Condition
2 Simlt Hist
3 Offset

4-4 SETTING TEST INFORMATION [Condition/Test Info]

This section describes procedures for entering “Test Info” for saving test information into recording data, if required. Select <Test Info> from the <Condition> main menu and “Test Info” related items are displayed.

■ Test Information Base Screen



- 1) “Item Name” Test items
- 2) “Contents” Contents of the test
- 3) “Bit Name” Digital input data with bit information

4-4-1 Setting Item Name [Condition/Test Info/Item Name]

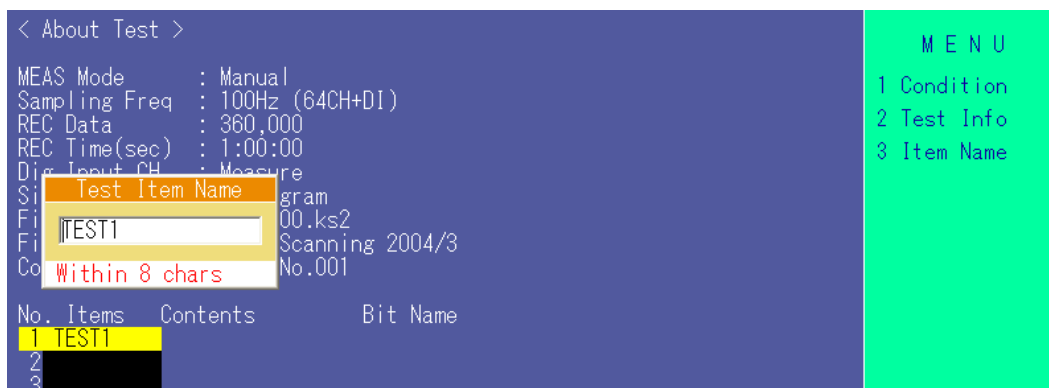
Set test item names.

- Input Range

Within 8 characters

- Operation Method

- 1) Select <Test Info> from <Condition> main menu.
- 2) Select <Item Name> from the <Test Info> menu.
- 3) The following “Test Item Name” setting window appears.
Here, input the appropriate comment.
- 4) Press [ENTER] key to display the entered comment on the “Item” column on the measuring conditions screen
At this time, the cursor is moved to the next line.
- 5) If necessary, repeat operations in items 3) to 4) and set other “Item Name”s.



4-4-2 Setting Contents [Condition/Test Info/Contents]

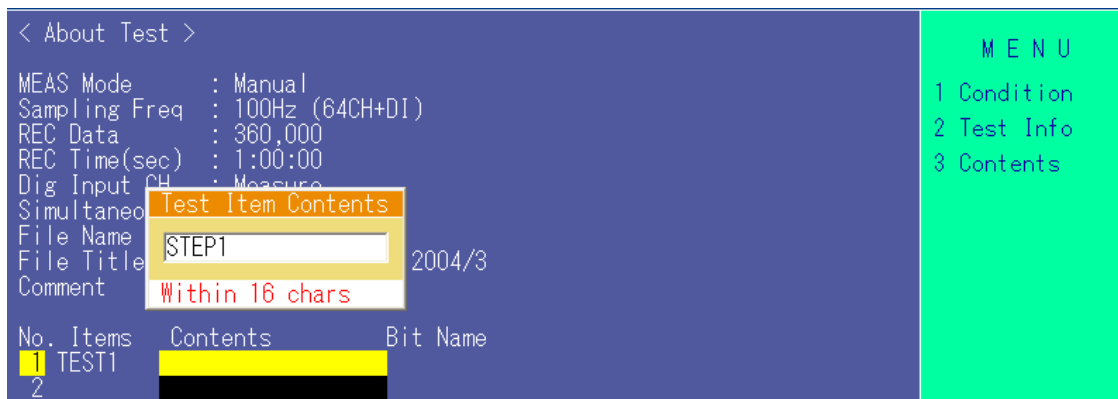
Set contents of test information items.

■ Input Range

Within 16 characters

■ Operation Method

- 1) Select <Test Info> from <Condition> main menu.
- 2) Select <Contents> from the <Test Info> Menu.
- 3) The following “Test Item Contents” setting window appears.
Here, input the appropriate comment.
- 4) Press [ENTER] key to display the entered comment on the “Contents” column on the measuring conditions screen.
At this time, the cursor is moved to the next line.
- 5) If necessary, repeat operations in items 3) to 4) and set other “Content”s.



4-4-3 Setting Bit Name [Condition/Test Info/Bit Name]

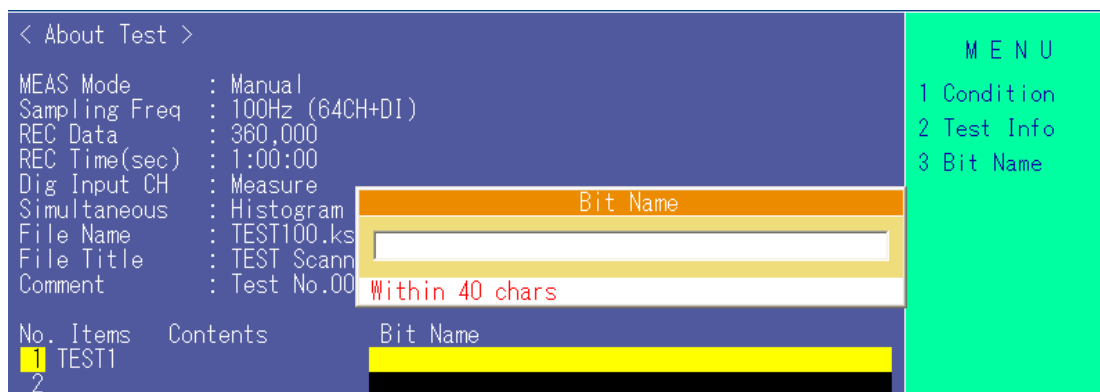
Describes bit information of digital input data.

■ Input Range

Within 40 characters

■ Operation Method

- 1) Select <Test Info> from <Condition> main menu.
- 2) Select <Bit Name> from the <Test Info> Menu.
- 3) The following “Bit Name” setting window appears.
Here, input the appropriate comment.
- 4) When using alphabet s, etc. that are not on the panel key, display the character input window and select the desired character.
After entering the required characters, clear the character input window.
- 5) Press [ENTER] key to display the entered comment on the “Bit Name” column on the measuring conditions screen.
At this time, the cursor is moved to the next line.
- 6) If necessary, repeat operations in items 3) to 5) and set other “Bit Name”s.



4-5 SETTING ACTUAL LOAD CALIBRATION [Condition/Actl Load CAL]

■ Actual Load Calibration

Actual load calibration is a method for calculating data by adding the external actual load and the relevant physical value. Continuously conduct operations in the following order.

Balance → Zero Measurement → Actual Load Measurement

■ Balance

Balance means to remove strain bridge unbalance in strain measurement. It is conducted in no-load state to have the output of the internal conditioner to Zero.

By conducting the balance operation, the indicated value becomes approximately Zero ('0').

Note

Do not forget to connect actually used sensors and conduct balance in no-load state.

■ Actual Load Calibration Base Screen

< Actual Load CAL >										M E N U	
MEAS Mode		: Manual								1 Condition	
Sampling Freq		: 100Hz (64CH+DI)								2 Actl Load CAL	
REC Data		: (126,372,743)								1) Calibrate	
REC Time(sec)		: (14day 15:02:07)								2) CAL Condition	
Dig Input CH		: Measure								3) Initialize	
Simultaneous		: No								4) Next Page	
File Name		: TEST100.ks2								5) Prev Page	
File Title		: TEST Scanning 2004/3								0) End	
Comment		: Test No.001									
CH	BAL Tgt	BAL Rsl	CAL Tgt	Rated	Rated Value	ZERO Value	Range Unit	CAL Coef			
1	ON	**	ON	1.0000	***	***	μm/m	***			
2	ON	**	ON	1.0000	***	***	μm/m	***			
3	ON	**	ON	1.0000	***	***	μm/m	***			
4	ON	**	ON	1.0000	***	***	μm/m	***			

- 1) "BAL Tgt" Select channels that conduct conditioner balance. It is used in common with "BAL Target" in "Channel Cond."
Balance function is available only for conditioners with range set to strai mode.
- 2) "BAL Rsl" Balance results (OK or NG).
Criterion of balance results is based on "BAL Standard" on the <Environment> setting screen.
- 3) "CAL Tgt" Select channel that conducts actual load calibration.
- 4) "Rated " When conducting actual load calibration, set rated value for the input data.
- 5) "Rated Value" Rated measured value when conducting the actual load calibration.
- 6) "Zero Value" Zero measured value when conducting the actual load calibration.
- 7) "CAL Coef" Compensation coefficient obtained from the results of the actual load alibration is substituted to calibration coefficient. The actual measured data converted into physical value with the obtained coefficient.

Note

Conduct actual load calibration and the already determined calibration coefficient is updated. In addition, if calibration coefficient is entered in <Channel Cond> menu, results of external calibration become invalid.

4-5-1 Calibration [Condition/Actl Load CAL/Calibrate]

Successively conduct the following items.

- 1) Balance (Only BAL target channel)
- 2) Zero measurement (Only calibration target channel)
- 3) Actual load calibration (Only calibration target channel)

If there is no target channel, calibration is omitted.

■ Measuring Conditions

Both external calibration and Zero measurement have the same measuring conditions.

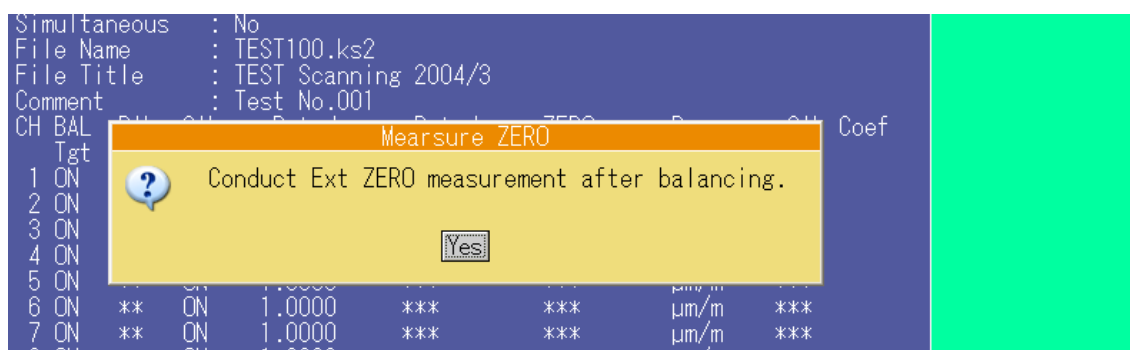
Sampling frequency 100 Hz

Number of samplings 100 data (Measuring time is 1 second)

■ Operation Method

- 1) Select <Actl Load CAL> from <Condition> main menu.
- 2) Actual load calibration messages are displayed in due order. Respond to the messages with the following key operations.
Yes [ENTER] key
Cancel [ESC] key

■ Balance



■ During Zero Measurement

File Name	: TEST100.ks2									
File Title	: TEST Scanning 2004/3									
Comment	: Test No.001									
CH	BAL	BAL	CAL	Rated	Measuring ZERO value			Range	CAL Coef	
	Tgt	Rsl	Tgt		Wait a while.			Unit		
1	ON	**	ON	1.0000	3sec			μm/m	***	
2	ON	**	ON	1.0000				μm/m	***	
3	ON	**	ON	1.0000				μm/m	***	
4	ON	**	ON	1.0000				μm/m	***	
5	ON	**	ON	1.0000				μm/m	***	
6	ON	**	ON	1.0000	***	***		μm/m	***	
7	ON	**	ON	1.0000	***	***		μm/m	***	
8	ON	**	ON	1.0000	***	***		μm/m	***	
9	ON	**	ON	1.0000	***	***		μm/m	***	
10	ON	**	ON	1.0000	***	***		μm/m	***	

■ Conducting Actual Load Calibration

File Name	: TEST100.ks2									
File Title	: TEST Scanning 2004/3									
Comment	: Test No.001									
CH	BAL	BAL	CAL	Rated	Calibrate Actual Load			Range	CAL Coef	
	Tgt	Rsl	Tgt		Conduct rated value measurement.			Unit		
1	ON	**	ON	1.0000	Input the d value and hold for 1 sec or more.			μm/m	***	
2	ON	**	ON	1.0000				μm/m	***	
3	ON	**	ON	1.0000				μm/m	***	
4	ON	**	ON	1.0000				μm/m	***	
5	ON	**	ON	1.0000				μm/m	***	
6	ON	**	ON	1.0000	***	***		μm/m	***	
7	ON	**	ON	1.0000	***	***		μm/m	***	

■ Measured Results

EDX-2000A

Free space(Byte)16425900800

2004/03/11 14:41:32

< Actual Load CAL >

MEAS Mode : Manual

Sampling Freq : 100Hz (64CH+D1)

REC Data : (126,353,083)

REC Time(sec) : (14day 14:58:50)

Dig Input CH : Measure

Simultaneous : No

File Name : TEST100.ks2

File Title : TEST Scanning 2004/3

Comment : Test No.001

CH BAL BAL CAL Rated Rated ZERO Range CAL Coef

Tgt Rsl Tgt Value Value Unit

1 ON NG ON 1.0000 125.97 9.0000 μm/m 0.0085493

2 ON NG ON 1.0000 376.63 940.81 μm/m -0.0017725

3 ON OK ON 1.0000 854.69 282.50 μm/m 0.0017477

4 ON OK ON 1.0000 35.938 279.44 μm/m -0.0041068

5 ON NG ON 1.0000 529.41 602.00 μm/m -0.013775

6 ON OK ON 1.0000 678.88 707.75 μm/m -0.034632

7 ON OK ON 1.0000 436.44 857.69 μm/m -0.0023739

8 ON OK ON 1.0000 107.19 743.91 μm/m -0.0015706

9 ON OK ON 1.0000 972.09 496.56 μm/m 0.0021029

10 ON OK ON 1.0000 943.47 210.28 μm/m 0.0013639

11 ON NG ON 1.0000 562.72 761.56 μm/m -0.0050291

12 ON NG ON 1.0000 354.28 479.69 μm/m -0.0079741

13 ON NG ON 1.0000 483.03 468.94 μm/m 0.070953

14 ON NG ON 1.0000 383.97 971.91 μm/m -0.0017009

15 ON NG ON 1.0000 867.28 762.28 μm/m 0.0095238

16 ON NG ON 1.0000 324.47 110.88 μm/m 0.0046818

M E N U

1 Condition

2 Actl Load CAL

1) Calibrate

2) CAL Condition

3) Change Result

4) Initialize

5) Next Page

6) Prev Page

0) End

[SPACE]: Change CH

■ Balance Results

Results of balance are expressed as “OK” or “NG.”

Criterion of the results is based on the “Balance Standard” on the <Environment> setting screen.

When the balance standard is changed, conduct the balance once again. Results of Zero measurement and rated value measurement are indicated on “Input Meas” and “Zero Meas” columns, respectively. In addition, the measured results are reflected on the calibration coefficient.

4-5-2 Setting Calibration Conditions [Condition/Actl Load CAL/CAL Condition/BAL ON/OFF]

Specify channels that conduct balance and actual load calibration as well as set the rated calibration value.

4-5-2-1 Setting Balance [Condition/Act; Ext CAL Cond/CAL Condition/BAL ON/OFF]

Specify channel that conducts balance.

Note that you cannot specify conditioners with no balance function nor channels that are not measuring targets.

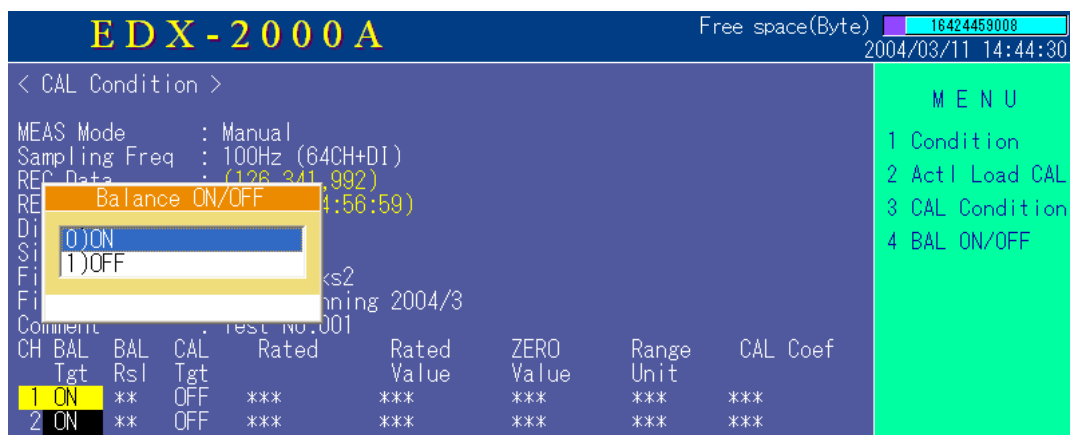
Conditioners with balance function can be set only when it is used for strain range.

■ Options

- “ON”.....Balance ON channel
- “OFF”Balance OFF channel

■ Operation Method

- 1) Select <Actl Load CAL> from <Condition> main menu.
- 2) Select <CAL Condition> from the <Actl Load Cond> menu.
- 3) Select <BAL ON/OFF> from the <Cal Condition> menu.
- 4) The following “Balance ON/OFF” setting window appears.
Here, select the balance target channel.
- 5) The selected content is displayed on the “BAL Target” columns of channels.



4-5-2-2 Setting Calibration Target [Condition/Actl Load CAL/CAL Condition/CAL Target]

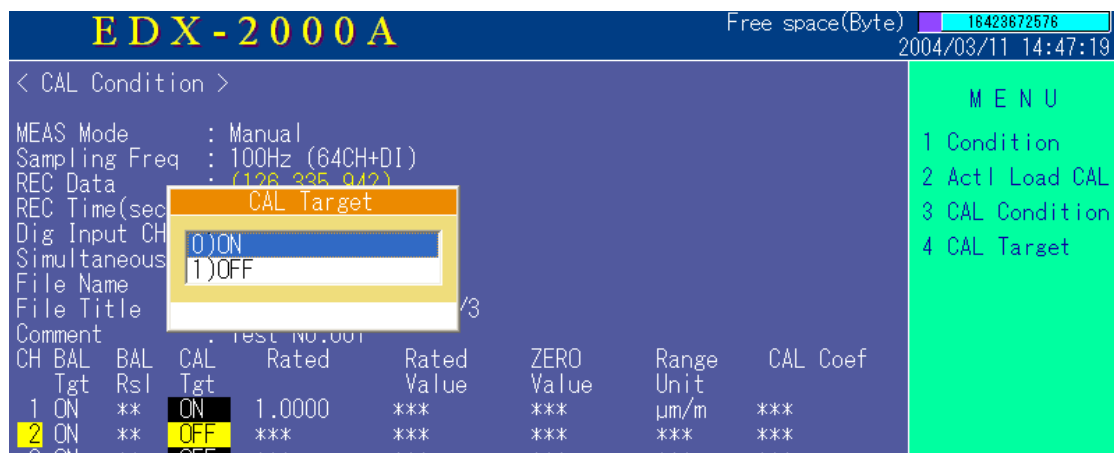
Specify channels that conduct the actual load calibration. Note that you cannot specify channels that are not measuring targets.

■ Options

- “ON”..... Calibration ON channel
- “OFF”..... Calibration OFF channel

■ Operation Method

- 1) Select <Actl Load CAL> from <Condition> main menu.
- 2) Select <CAL Condition> from the <Actl Load CAL> menu
- 3) Select <CAL Target> from the <Cal Condition> menu.
- 4) The following “CAL Target” setting window appears.
Here, select “ON/OFF” for the desired calibration target channel.
- 5) The selected content is displayed on the “CAL Target” columns of channels.



4-5-2-3 Setting Rated Value [Condition/Actl Load CAL/CAL Condition/Rated Value]

Set physical value relevant to the external actual load.

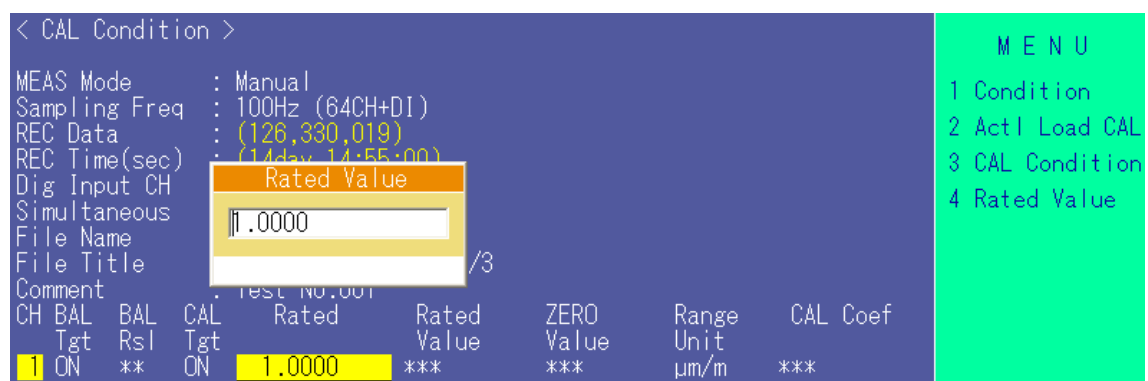
■ Setting Range

Whole numbers of larger than '0' in 7 characters

(Within range from 0.00001 to 9999999)

■ Operation Method

- 1) Select <Actl Load CAL> from <Condition> main menu.
- 2) Select <CAL Condition> from the <Actl Load CAL> menu
- 3) Select <Rated Value> from the <Cal Condition> menu.
- 4) The following "Rated Value" setting window appears.
Here, input the appropriate rated value.
- 5) The entered rated value is displayed on the "Rated Value" columns of channels.



4-5-3 Changing Calibration Results [Condition/Actl Load CAL/Change Result]

Change the results of the actual load calibration.

4-5-3-1 Changing Rated Measured Value [Condition/Actl Load CAL/Change Result/Rated Value]

Details for changing rated measured value obtained from the actual load calibration are described.

■ Operation Method

- 1) Select <Actl Load CAL> from <Condition> main menu.
- 2) Select <Change Result> from the <Actl Load CAL> menu
- 3) Select <Meas Rated> from the <Change Result> menu.
- 4) The following “Change Rated Value” setting window appears.

Here, change the rated measured value.

CH	BAL	BAL	CAL	Rated	Rated	ZERO	Range	CAL
Tgt	Rsl	Tgt		Value	Value	Value	Unit	Coef
1	ON	NG	ON	1.0000	125.97	9.0000	μm/m	0.0085493

- 5) Press [ENTER] key to determine the changed value and to update the “Rated Meas” column of the target channel.

4-5-3-2 Changing Zero Measured Value [Condition/Actl Load CAL/Change Result/Zero Value]

Change Zero measured value obtained from the Zero measurement.

■ Operation Method

- 1) Select <Actl Load CAL> from <Condition> main menu.
- 2) Select <Change Result> from the <Actl Load CAL> menu
- 3) Select <Zero Meas> from the <Change Result> menu.
- 4) The following “Change Zero Value” setting window appears.

Here, change the Zero measured value.

CH	BAL	BAL	CAL	Rated	ZERO	Range	CAL	
Tgt	Rsl	Tgt		Value	Value	Unit	Coef	
1	ON	NG	ON	1.0000	125.97	9.0000	μm/m	0.0085493

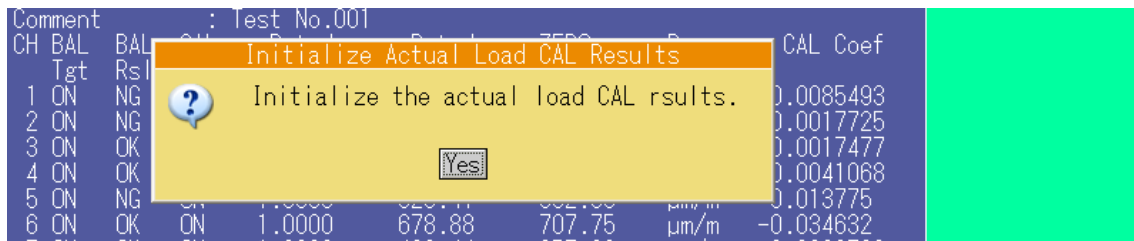
- 5) Press [ENTER] key to determine the changed value and to update the “Zero Meas” column of the target channels.

4-5-4 Initializing Results of Actual Load Calibration [Condition/Actl Load CAL/Initialize]

Initializing the results of the actual load calibration is described.

■ Operation Method

- 1) Select <Actl Load CAL> from <Condition> main menu.
- 2) Select <Initialize> from the <Actl Load CAL> menu
- 3) The following window appears to confirm whether or not the results of actual load calibration is initialized.
Respond to messages and proceed according to instructions on the screen.
Yes [ENTER] key
Cancel [ESC] key



- 4) Press [ENTER] key and the result of the actual load calibration is updated.

4-6 SETTING MEASURING CONDITION FILE [Condition/MEASCond File]

This section describes details for saving preset measuring conditions, setting measuring conditions all together in bulk by loading the previously saved measuring condition file.

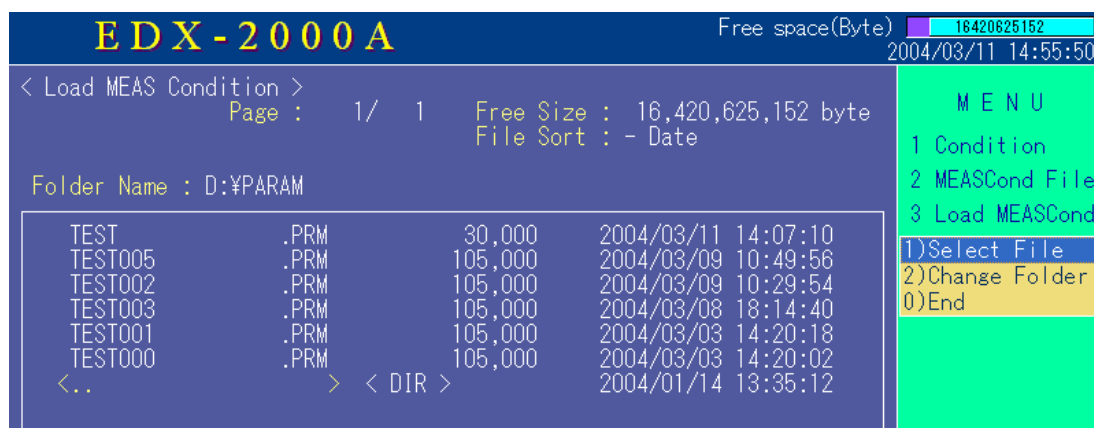
Select <MEASCond File> from the <Condition> main menu to display items related to “MEASCond File.”

4-6-1 Loading Measuring Conditions [Condition/MEASCond File/Load MeasCond]

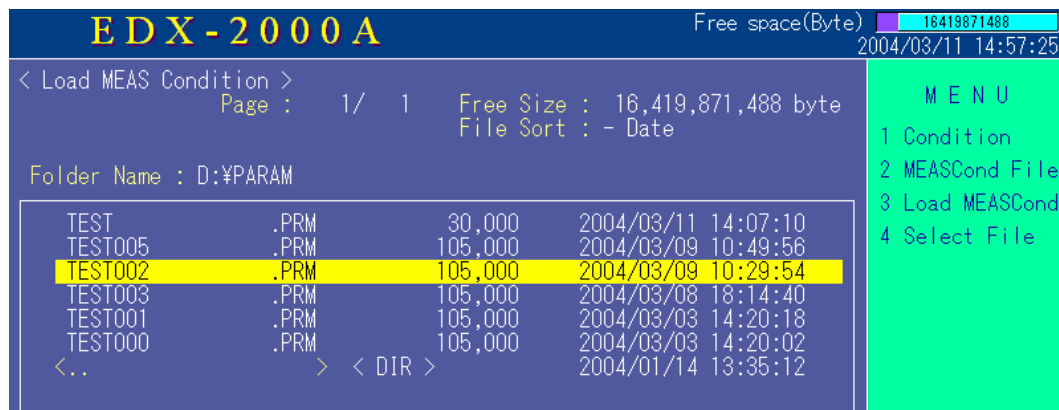
Load the already existing measuring condition file.

■ Operation Method

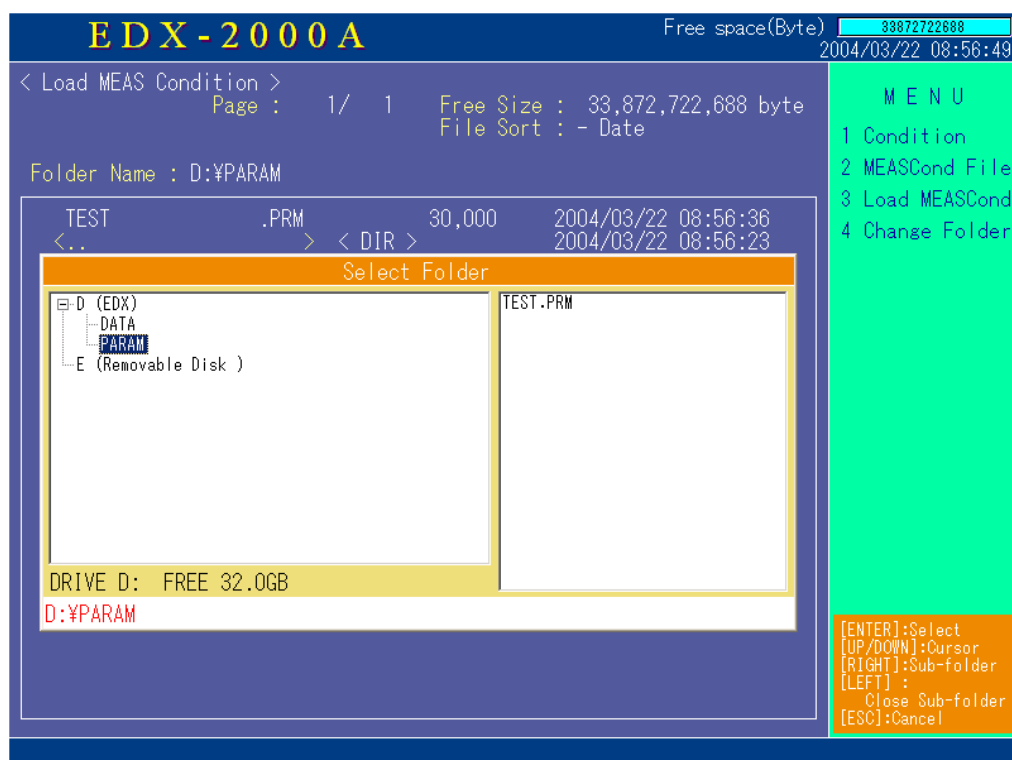
- 1) Select <MEASCond File> from <Condition> main menu.
- 2) Select <Load MEASCond> from the <MEASCond File> menu
- 3) The following <Load MEASCond> screen appears.



- 4) When target measuring condition file already exists on the screen, select <Select File> from the <Load MEASCond> menu and move the cursor on the screen to the target file. Press [ENTER] key to load the measuring condition file.



- 5) When the target measuring condition file exists in other folders, select <Change Folder> from the <Load MEASCond> menu and move the cursor to the folder having target measuring condition file. Then, conduct operation in item 4) and load the measuring condition file.

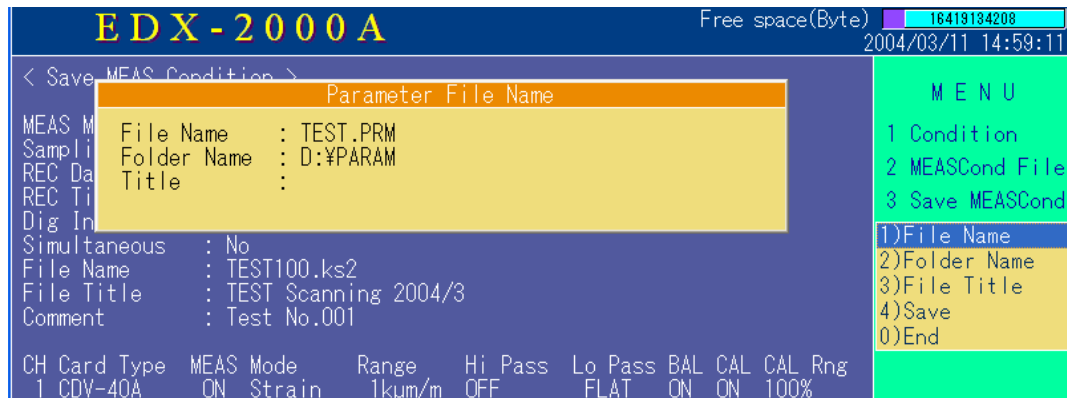


4-6-2 Saving Measuring Conditions [Condition/MEASCond File/Save MEASCond]

Procedures for saving measuring conditions previously saved up to now is described.

■ Operation Method

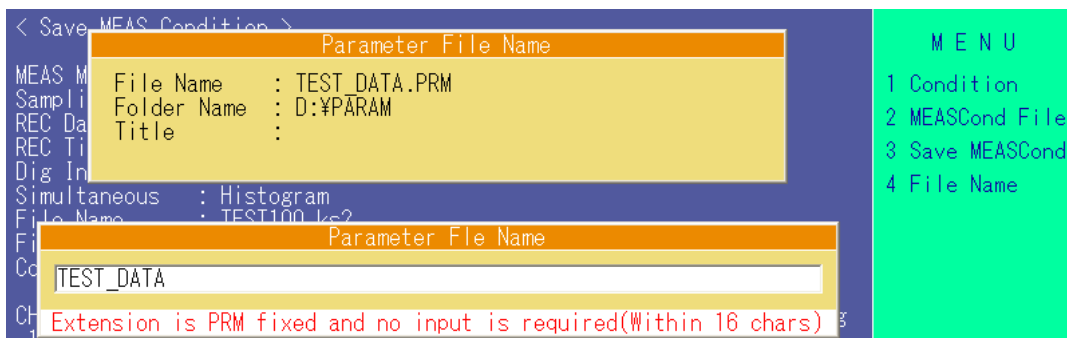
- 1) Select <MEASCond File> from <Condition> main menu.
- 2) Select <Save MEASCond> from the <MEASCond File> menu
- 3) The following “Parameter File Name” window appears.



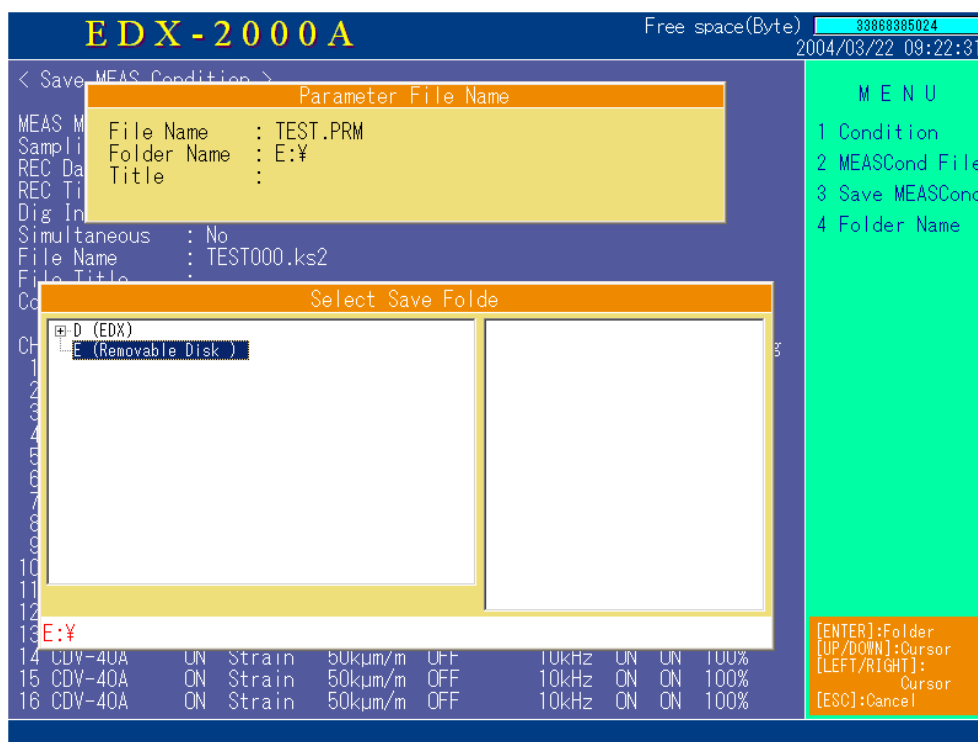
- 4) Select <File Name> from the <Save MEASCond> menu. And a “Parameter File Name” setting window appears.

Here, input the desired file name.

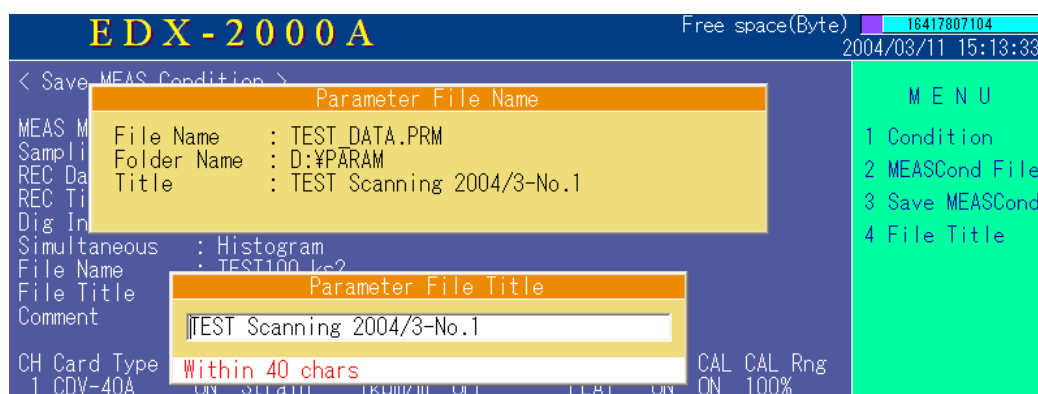
Press [ENTER] key to determine the entered file name.



- 5) Select <Folder Name> from the <Save MEASCond> menu. And a folder name setting window appears.
If you do not want to save the current measuring condition file into another folder, input an appropriate folder name.
Press [ENTER] key to determine the folder name.



- 6) Select <File Title> from the <Save MEASCond> menu. And a “Parameter File Title” setting window appears.
Here, input an appropriate file title.
Press [ENTER] key to determine the file title.



- 7) After completing the above operations, select <Save> from the <Save MEASCond> menu to save the actual measuring condition file.

4-7 SETING DATA FILE [Condition/Data File]

This section describes settings of recorded data file name, file No., and file comment.

■ Operation Method

- 1) Select <Data File> from <Condition> main menu.
- 2) The following “Data File Name” setting window appears.

EDX-2000A Free space(Byte) 16417069824 2004/03/11 15:15:05

< Data File >

MEAS M

Sampli

REC Da

REC Ti

Dig In

Simult

File N

File T

Comment : Test No.001

CH Card Type MEAS Mode Range Hi Pass Lo Pass BAL CAL CAL Rng

1 CDV-40A ON Strain 1kum/m OFF FLAT ON ON 100%

2 CDV-40A ON Strain 1kum/m OFF FLAT ON ON 100%

3 CDV-40A ON Strain 1kum/m OFF FLAT ON ON 100%

4 CDV-40A ON Strain 1kum/m OFF FLAT ON ON 100%

5 CDV-40A ON Strain 1kum/m OFF FLAT ON ON 100%

DATA FILE NAME

File Name : TEST

File No. : 100

Title : TEST Scanning 2004/3

SaveFileName : TEST100.ks2

M E N U

1 Condition

2 Data File

1)File Name

2)File No.

3)File Title

0)End

- 3) Select <File Name> from the <Data File> menu. The following “Data File Name” setting window appears. Here, input the desired file name within 40 characters. Press [ENTER] key to determine the entered file name.

EDX-2000A Free space(Byte) 16416348928 2004/03/11 15:16:10

< Data File >

MEAS M

Sampli

REC Da

REC Ti

Dig In

Simult

File N

File T

Comment : Test No.001

CH Card Type MEAS Mo Data File Name

1 CDV-40A ON St TEST

2 CDV-40A ON St

3 CDV-40A ON St

4 CDV-40A ON Strain 1kum/m OFF FLAT ON ON 100%

5 CDV-40A ON Strain 1kum/m OFF FLAT ON ON 100%

DATA FILE NAME

File Name : TEST

File No. : 100

Title : TEST Scanning 2004/3

SaveFileName : TEST100.ks2

M E N U

1 Condition

2 Data File

3 File Name

- 4) Select <File No.> from the <Data File> menu. A “File No.” setting window appears. Here, input the desired file Nos. within range from 0 to 999. Press [ENTER] key to determine the entered file No.

< Data File >

MEAS M

Sampli

REC Da

REC Ti

Dig In

Simult

File N

File T

Comment : Test No.001

CH Card Type MEAS Mo Data File No.

1 CDV-40A ON St 100

2 CDV-40A ON St

3 CDV-40A ON St

4 CDV-40A ON Strain 1kum/m OFF FLAT ON ON 100%

DATA FILE NAME

File Name : TEST

File No. : 100

Title : TEST Scanning 2004/3

SaveFileName : TEST100.ks2

M E N U

1 Condition

2 Data File

3 File No.

- 5) Select <File Title> from the <Data File> menu. A “Data File Title” setting window appears.
Here, input a file title having information of data file to be recorded within 40 characters.
Press [ENTER] key to determine the entered file title.

< Data File >

Data File Name

File Name : TEST

File No. : 100

Title : TEST Scanning 2004/3

SaveFileName : TEST100.ks2

Comment : Test No.001

CH	Card Type	MEAS	Mo	Data File Title	Rng
1	CDV-40A	ON	St	TEST Scanning 2004/3	%
2	CDV-40A	ON	St		%
3	CDV-40A	ON	St		%
4	CDV-40A	ON	St		%

M E N U

1 Condition

2 Data File

3 File Title

4-8 COMPENSATING INTERNAL SENSITIVITY [Condition/Comp IntSense]

- Compensating Internal Sensitivity

When using a strain gage or strain gage transducer with 4-gage method, decline in sensitivity due to the specified input cable is compensated.

Note

Do not forget to connect sensors actually in use before compensating the internal sensitivity.

- Compensate Internal Sensitivity Screen

EDX-2000A

Free space(Byte)

28,871,428,864

2004/06/21 12:46:23

< Int Sens Adj >

MEAS Mode : Manual

Sampling Freq : 100Hz (64CH)

REC Data : (225.556,246)

REC Time(sec) : (26day 02:32:42)

Dig Input CH : Not measure

Simultaneous : No

File Name : TEST000.ks2

File Title :

Comment :

CH	Card	Type	CH	Name	Comp	Comp	CH	Card	Type	CH	Name	Comp	Comp
					Tgt	Rsl						Tgt	Rsl
1	CDV-40A		ON	**	17	CDV-40A	OFF	**				OFF	**
2	CDV-40A		ON	**	18	CDV-40A	OFF	**				OFF	**
3	CDV-40A		ON	**	19	CDV-40A	OFF	**				OFF	**
4	CDV-40A		ON	**	20	CDV-40A	OFF	**				OFF	**
5	CDV-40A		ON	**	21	CDV-40A	OFF	**				OFF	**
6	CDV-40A		OFF	**	22	CDV-40A	OFF	**				OFF	**
7	CDV-40A		OFF	**	23	CDV-40A	OFF	**				OFF	**
8	CDV-40A		OFF	**	24	CDV-40A	OFF	**				OFF	**
9	CDV-40A		OFF	**	25	CDV-40A	OFF	**				OFF	**
10	CDV-40A		OFF	**	26	CDV-40A	OFF	**				OFF	**
11	CDV-40A		OFF	**	27	CDV-40A	OFF	**				OFF	**
12	CDV-40A		OFF	**	28	CDV-40A	OFF	**				OFF	**
13	CDV-40A		OFF	**	29	CDV-40A	OFF	**				OFF	**
14	CDV-40A		OFF	**	30	CDV-40A	OFF	**				OFF	**
15	CDV-40A		OFF	**	31	CDV-40A	OFF	**				OFF	**
16	CDV-40A		OFF	**	32	CDV-40A	OFF	**				OFF	**

M E N U

1 Condition

2 Comp IntSense

1)Comp Target

2)Compensate

3)Initialize

4)Next Page

5)Prev Page

0)End

[SPACE]:Change CH

- 1) “Card Type” Types of conditioner cards
- 2) “CH Name” Displays the preset channel name.
- 3) “Comp Tgt” Select a target channel for internal sensitivity compensation
- 4) “Comp Rsl” Displays results of internal sensitivity compensation.

4-8-1 SETTING COMPENSATION TARGET [Condition/Comp IntSense/ Comp Target]

This section describes settings of target channel for conducting internal sensitivity compensation.

Measuring target channel in strain mode are set as a target channel for conducting internal sensitivity compensation.

■ Options

- “ON”..... Internal sensitivity compensation ON
- “OFF” Internal sensitivity compensation OFF

■ Operation Method

- 4) Select <Comp IntSense> from the <Condition> menu.
- 5) Select <Comp Target> menu from the <Comp IntSense> menu.
- 6) Then, the following “Comp Target” setting window appears. Select and set the desired compensation target channel.
- 7) The selected contents are displayed on “Comp Tgt” column of channels.

EDX-2000A Free space(Byte) 28,871,428,864 2004/06/21 12:46:35

< Int Sens Adj >

MEAS Mode : Manual
Sampling Freq : 100Hz (64CH)
REC Data : (225,556,246)
REC Time(sec) : (26day 02:32:42)
Dig Input CH : Not measure
Simultaneous : No
File Name : TEST000.ks2
File Title :
Comment :

Comp Target

0) ON
1) OFF

CH	Card Type	CH Name	Comp Tgt	Comp Rsl	CH	Card Type	CH Name	Comp Tgt	Comp Rsl
1	CDV-40A		ON	**	17	CDV-40A		OFF	**
2	CDV-40A		ON	**	18	CDV-40A		OFF	**
3	CDV-40A		ON	**	19	CDV-40A		OFF	**
4	CDV-40A		ON	**	20	CDV-40A		OFF	**
5	CDV-40A		ON	**	21	CDV-40A		OFF	**
6	CDV-40A		OFF	**	22	CDV-40A		OFF	**
7	CDV-40A		OFF	**	23	CDV-40A		OFF	**
8	CDV-40A		OFF	**	24	CDV-40A		OFF	**
9	CDV-40A		OFF	**	25	CDV-40A		OFF	**
10	CDV-40A		OFF	**	26	CDV-40A		OFF	**
11	CDV-40A		OFF	**	27	CDV-40A		OFF	**
12	CDV-40A		OFF	**	28	CDV-40A		OFF	**
13	CDV-40A		OFF	**	29	CDV-40A		OFF	**
14	CDV-40A		OFF	**	30	CDV-40A		OFF	**
15	CDV-40A		OFF	**	31	CDV-40A		OFF	**
16	CDV-40A		OFF	**	32	CDV-40A		OFF	**

M E N U

1 Condition
2 Comp IntSense
3 Comp Target

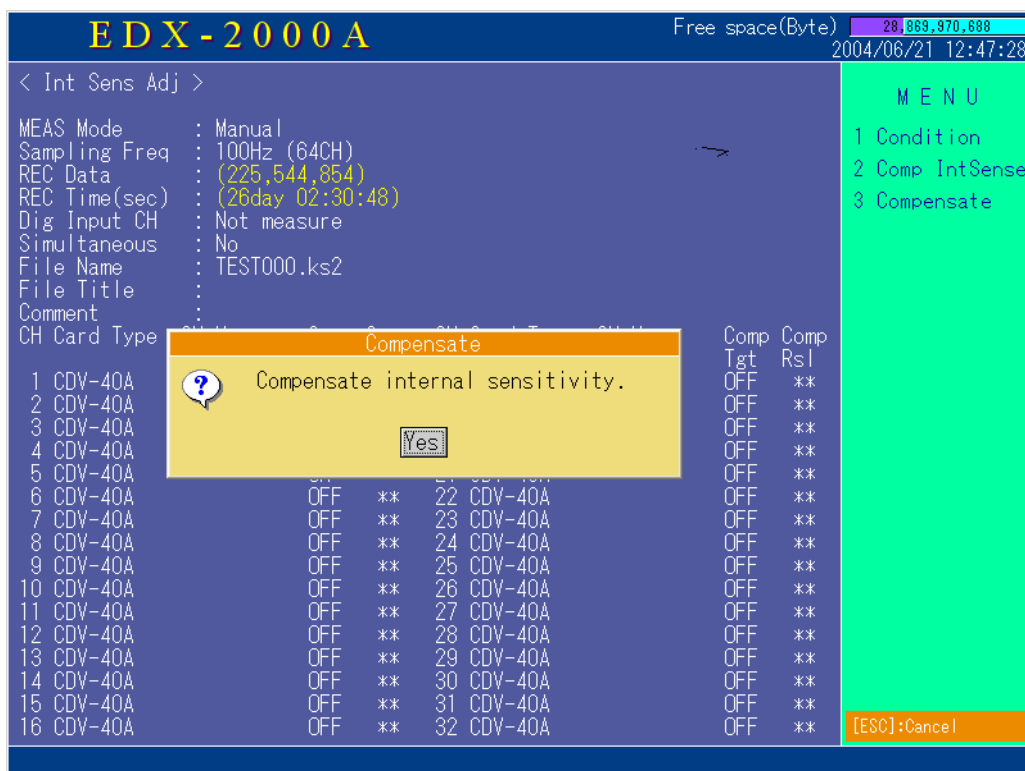
[ENTER]:Item
[UP/DOWN]:Cursor
[ESC]:Cancel

4-8-2 EXECUTE COMPENSATE [Condition/Comp IntSense/Compensate]

Conduct internal sensitivity compensation of channels that are set to “ON” in “Comp Target” window.
This menu is displayed when there exist channels with compensation target set to “ON.”

■ Operation Method

- 1) Select <Compensate> from the <Comp IntSense> menu.
- 2) The following “Compensate” window appears to confirm whether internal sensitivity is compensated.
Proceed with the following key operations.
To compensate [ENTER] key
To stop [ESC] key



- 3) After compensating the internal sensitivity, the following compensation results are displayed on the screen.
- Channel of which internal sensitivity is normally compensated is indicated with “OK” on the “Comp Rsl” column.
- For channels resulted with “NG,” check sensor wirings and conduct internal sensitivity compensation once again

EDX-2000A

Free space(Byte)28,868,516,808

2004/06/21 12:48:09

< Int Sens Adj >

MEAS Mode : Manual

Sampling Freq : 100Hz (64CH)

REC Data : (225,533,494)

REC Time(sec) : (26day 02:28:54)

Dig Input CH : Not measure

Simultaneous : No

File Name : TEST000.ks2

File Title :

Comment :

CH	Card Type	CH Name	Comp Tgt	Comp Rsl	CH	Card Type	CH Name	Comp Tgt	Comp Rsl
1	CDV-40A		ON	OK	17	CDV-40A		OFF	**
2	CDV-40A		ON	NG	18	CDV-40A		OFF	**
3	CDV-40A		ON	OK	19	CDV-40A		OFF	**
4	CDV-40A		ON	NG	20	CDV-40A		OFF	**
5	CDV-40A		ON	OK	21	CDV-40A		OFF	**
6	CDV-40A		OFF	**	22	CDV-40A		OFF	**
7	CDV-40A		OFF	**	23	CDV-40A		OFF	**
8	CDV-40A		OFF	**	24	CDV-40A		OFF	**
9	CDV-40A		OFF	**	25	CDV-40A		OFF	**
10	CDV-40A		OFF	**	26	CDV-40A		OFF	**
11	CDV-40A		OFF	**	27	CDV-40A		OFF	**
12	CDV-40A		OFF	**	28	CDV-40A		OFF	**
13	CDV-40A		OFF	**	29	CDV-40A		OFF	**
14	CDV-40A		OFF	**	30	CDV-40A		OFF	**
15	CDV-40A		OFF	**	31	CDV-40A		OFF	**
16	CDV-40A		OFF	**	32	CDV-40A		OFF	**

MENU

1 Condition

2 Comp IntSense

1)Comp Target

2)Compensate

3)Initialize

4)Next Page

5)Prev Page

0)End

[SPACE]:Change CH

4-8-3 INITIALIZE [Condition/Comp IntSense/Initialize]

Results of internal sensitivity compensation of channels that are set to “ON” in “Comp Target” window are initialized. This menu is displayed when there exist channels with compensation target set to “ON.”

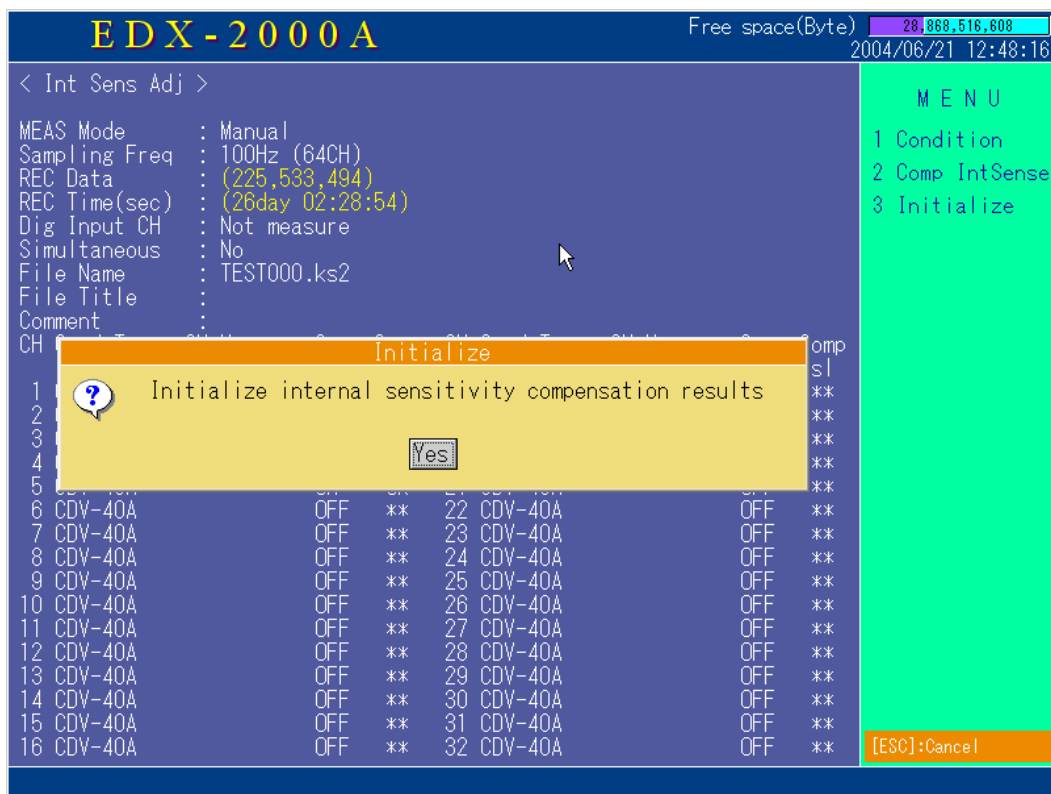
■ Operation Method

- 1) Select <Initialize> from the <Comp IntSense> menu.
- 2) The following “Initialize” window appears to confirm whether the results of internal sensitivity compensation are initialized.

Proceed with the following key operations.

To initialize [ENTER] key

To stop [ESC] key



- 3) After initialized, the “Comp Rsl” column shall be indicated with “**.”

4-9 TEDS [Condition/TEDS]

EDX-2000B Memory Recorder/Analyzer (hereinafter referred to as the EDX) is capable of loading various information items on TEDS (Transducer Electronic Data Sheet) sensors as well as automatically setting appropriate range, calibration coefficient, units, etc.

Since the EDX is not able to load all the information items on TEDS sensors, conditioner cards and template IDs of the TEDS sensors that can load TEDS information items are used in the EDX as described in the following table.

Conditioner Card Type	Template ID	Sensor Type
CDV-40B/-F	30	Voltage output type sensor
	33	Strain Gage Sensor
DPM-42A/-F	33	Strain Gage Sensor
CTA-40A	36	K or T type Thermocouple (Separately sold adaptor is required)
CCA-40A/-F	0	Piezoelectric accelerometer
	24	Piezoelectric accelerometer
	25	Piezoelectric accelerometer

Select <Condition> from the main menu. Then, select <TEDS> from the <Condition>.

On the <TEDS> screen, various items such as measuring mode, measuring range, unit, low pass filter, etc. are automatically set.

1) →

EDX-2000A Free space(Byte) 12,804,041,472 2005/06/22 17:31:25

< TEDS >

Auto Set
Meas Range(Range) : ON
Unit : ON
Low pass : ON
Coeff : ON
Channel Name : User Data

CH	Set	Result	Mode	MeasRange	Unit	LoPass	Coeff
1	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
2	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
3	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
4	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
5	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
6	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
7	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
8	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
9	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
10	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
11	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
12	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
13	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
14	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
15	ON	**	Strain	1000.0	µm/m	10kHz	1.0000
16	ON	**	Strain	1000.0	µm/m	10kHz	1.0000

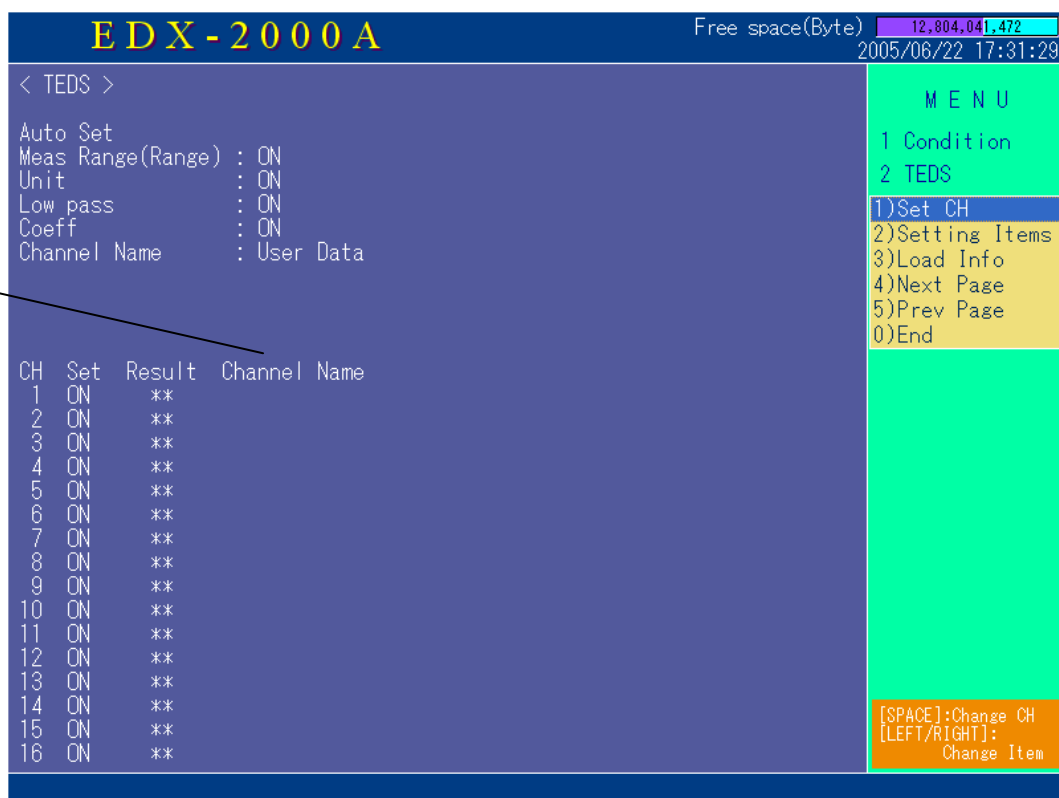
2) 3) 4) 5) 6) 7) 8) 9)

MENU
1 Condition
2 TEDS
1)Set CH
2)Setting Items
3)Load Info
4)Next Page
5)Prev Page
0)End

[SPACE]:Change CH
[LEFT/RIGHT]: Change Item

- 1) Auto SetAfter loading the TEDS information, this “Auto Set” item shows whether or not (ON/OFF) the items are set to the channel conditions.
- 2) CH.....Input CH Nos. (1 to 64)
- 3) SetAfter loading the TEDS information, set ON this “Set” column to allow setting to CH conditions.
- 4) ResultResults of loading the TEDS information.
 **: No TEDS information is loaded.
 OK: TEDS information is properly loaded.
 NG: TEDS corresponding sensor is not connected or conditioner card not corresponding TEDS sensor is connected.
- 5) Mode.....Mode preset in <CH Condition> or the mode calculated after loading the TEDS information.
- 6) MeasRange.....Measuring range preset in <CH Condition> or a value obtained by multiplying the measuring range calculated after loading the TEDS information by calibration coefficient. The value indicated at this time shall be the maximum value of the measurement.
- 7) UnitUnit preset in <CH Condition> or unit after loading the TEDS information.
- 8) Lopass.....Low pass filter preset in <CH Condition> or low pass filter calculated after loading the TEDS information.
- 9) CoeffCAL coefficient preset in <CH Condition> or CAL coefficient calculated after loading the TEDS information.
- 10) Channel Name.....Channel name preset in <CH Condition> or the channel name after loading the TEDS information.
 If the channel name is not shown, press the ☐ or ☐ key while <TEDS> menu is displayed. Then, the following screen appears to show the channel name.

10)



4-9-1 SET CH [Condition/TEDS/Set CH]

This section describes a method for setting a channel that allows settings of measuring mode, measuring range, unit, low pass filter, calibration coefficient, etc. after loading the TEDS information.

MEMO

- Loading TEDS information is targeted for all the installed CHs irrespective of ON/OFF of “Set” CH column.
 - After loading the TEDS information, items with CH conditions automatically set are only items set to ON in “Set” column and the items set to ON in <Setting Items> menu.
- If either of the items are set to OFF, channel conditions are not changed.

■ Options

- ON: Item that is allowed to change in <Setting Items> menu is set to CH conditions.
- OFF: The current CH conditions are not changed.

■ Operation Method

- 1) Select <Set CH> from the <TEDS> menu.
- 2) The cursor is shown on the “Set” column and a “Set Channel” setting window appears.
Here, select ON or OFF and press the **ENTER** key to determine the setting.
- 3) The cursor moves to the next “CH.” Repeat the operation in item 2) to set the next CH.

The screenshot displays the EDX-2000A interface. At the top, the title "EDX-2000A" is shown in yellow on a blue background. To the right, the "Free space(Byte)" is indicated as 12,803,828,480, and the date/time is 2005/06/22 17:33:27. The main menu is titled "< TEDS >" and lists several options: Auto Set, Meas Range(Range) : ON, Unit : ON, Low pass : ON, Coeff : ON, and Channel Name : User Data. A "Set Channel" dialog box is overlaid on the screen, showing two options: "0) ON" and "1) OFF". The "0) ON" option is currently selected. To the right of the main menu is a "MENU" section with three items: "1 Condition", "2 TEDS", and "3 Set CH". At the bottom right, a legend indicates that [ENTER] is for Item, [UP/DOWN] is for Cursor, and [ESC] is for Cancel.

CH	Set	Result	Mode	MeasRange	Unit	LoPass	Coeff
1	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
2	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
3	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
4	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
5	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
6	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
7	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
8	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
9	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
10	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
11	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
12	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
13	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
14	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
15	ON	**	Strain	1000.0	μm/m	10kHz	1.0000
16	ON	**	Strain	1000.0	μm/m	10kHz	1.0000

4-9-2 SETTING ITEM [Condition/TEDS/Setting Items]

After loading TEDS information, select required items to be set in CH conditions.

Setting items can be changed before and after loading the TEDS information. In addition, irrespective of ON or OFF of the <Setting Items>, after loading the TEDS information, the loaded results are displayed.

< TEDS Setting Items >								M E N U	
Auto Set								1	Condition
Meas Range(Range) : ON								2	TEDS
Unit : ON								3	Setting Items
Low pass : ON								1)Meas Range	
Coeff : ON								2)Unit	
Channel Name : User Data								3)Low Pass	
								4)Coeff	
								5)Channel Name	
								0)End	
CH	Set	Result	Mode	MeasRange	Unit	LoPass	Coeff		
1	ON	**	Strain	1000.0	μm/m	10kHz	1.0000		
2	ON	**	Strain	1000.0	μm/m	10kHz	1.0000		
3	ON	**	Strain	1000.0	μm/m	10kHz	1.0000		

4-9-2-1 Setting Measuring Range [Condition/TEDS/Setting Items/Meas Range]

Select this menu <Meas Range> to set ON/OFF of changing the measuring mode or range set by loading the TEDS information.

MEMO

- Measuring mode and range are automatically obtained by calculating sensor type and rated capacity.
- Since measuring range is displayed with a maximum value that can be obtained by calculating measuring mode and range as well as calibration coefficient, refer to the obtained results for determining the measuring range.
- For sensors with rated capacity not mentioned in the TEDS information, measuring range shall be of the maximum range.
Ex.) For CCA-40A connected piezoelectric accelerometers, since rated capacity is not stated in the TEDS information, measuring range shall be set to the maximum
- This setting is a collective settings for all the channels and not for individual channel. You cannot set ON/OFF for every channel.

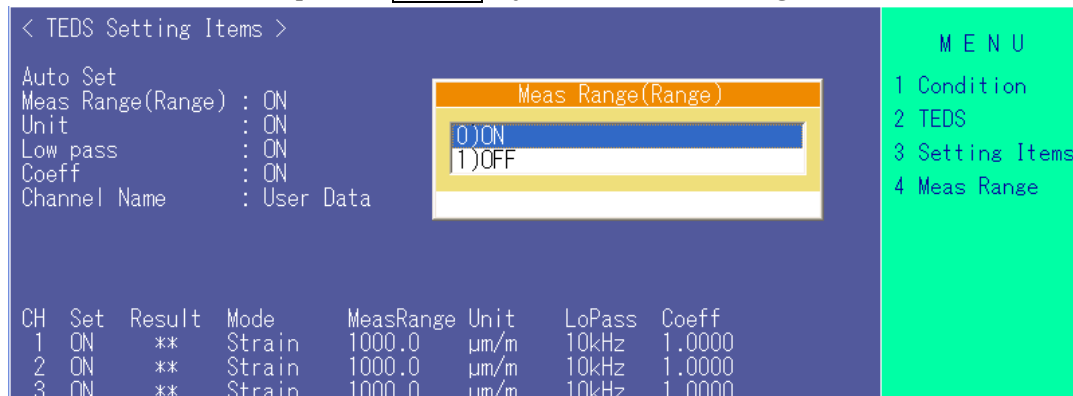
■ Options

- ON: Allows to change the measuring mode and range.
- OFF: Disables to change the measuring mode and range.

■ Operation Method

- 1) Select <Meas Range> from the <Setting Items> menu.
- 2) A “Meas Range” setting window appears.

Here, select ON or OFF and press the **ENTER** key to determined the setting.



4-9-2-2 Setting Unit [Condition/TEDS/Setting Items/Unit]

Select this menu <Unit> to set ON/OFF of changing the unit that is set by loading the TEDS information.

MEMO

- If units other than units that can be set on the EDX are mentioned in the TEDS information, the unit shall be 'mm.'
- If the unit 'Pa' is mentioned in the TEDS information, it shall be converted into units 'kPa' or 'Mpa' according to the rated capacity.
- For CCA-40A, unit m/s².
- This setting is a collective settings for all the channels and not for individual channel. You cannot set ON/OFF for every channel.

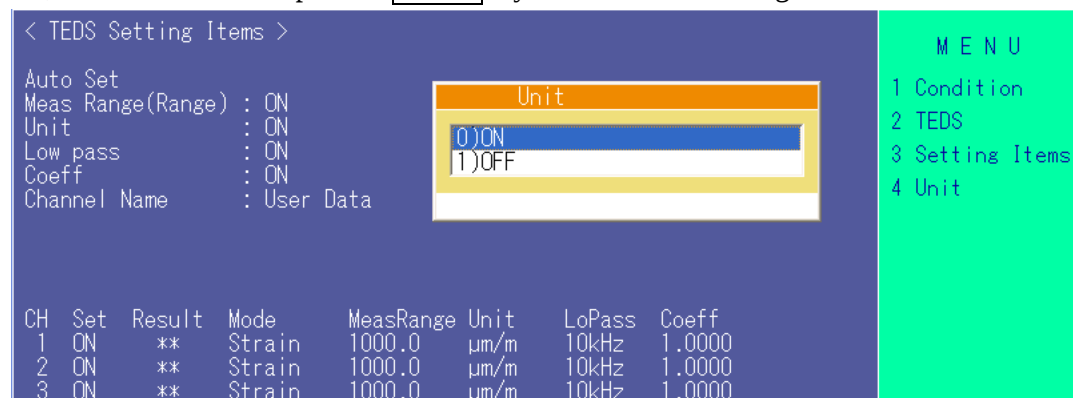
■ Options

- ON: Allows to change the unit.
- OFF: Disables to change the unit.

■ Operation Method

- 1) Select <Unit> from the <Setting Items> menu.
- 2) A “Unit” setting window appears.

Here, select ON or OFF and press the **ENTER** key to determined the setting.



4-9-2-3 Setting Low Pass Filter [Condition/TEDS/Setting Items/Low Pass]

Select this menu <Low Pass> to set ON/OFF of changing low pass filter that is set by loading the TEDS information.

MEMO

- Low pass filter is automatically set only when the TEDS sensor is connected to the CDV-40A and DPM-42A. However, if conditioner cards with anti-aliasing filter (CDV-40A-F, DPM-42A-F, and CCA-40A-F) are used and sampling frequency is more than 100 Hz, “AUTO” is set on the “LoPass” column. For sensors connected to other conditioner cards, no low pass filter is set.
- This setting is a collective settings for all the channels and not for individual channel. You cannot set ON/OFF for every channel.

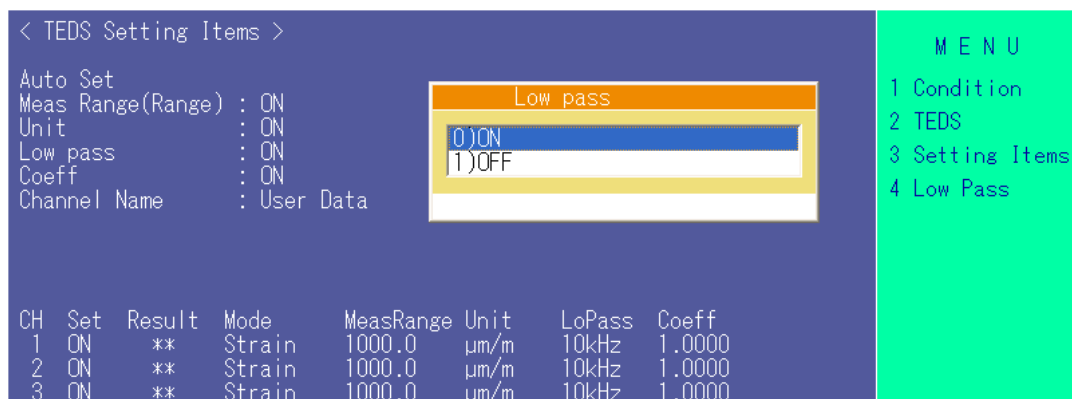
■ Options

- ON: Allows to change the low pass filter.
- OFF: Disables to change the low pass filter.

■ Operation Method

- 1) Select <Low Pass> from the <Setting Items> menu.
- 2) A “Low pass” setting window appears.

Here, select ON or OFF and press the **ENTER** key to determined the setting.



4-9-2-4 Setting Calibration Coefficient [Condition/TEDS/Setting Items/Coeff]

Select this menu <Coeff> to set ON/OFF of changing calibration coefficient that is set by loading the TEDS information.

NOTE

- After loading the TEDS information, only calibration coefficient is automatically set. Offset value set on the CH condition is not changed.
After loading the TEDS information, if measuring mode or range is changed, always confirm the offset value.
- This setting is a collective settings for all the channels and not for individual channel. You cannot set ON/OFF for every channel.

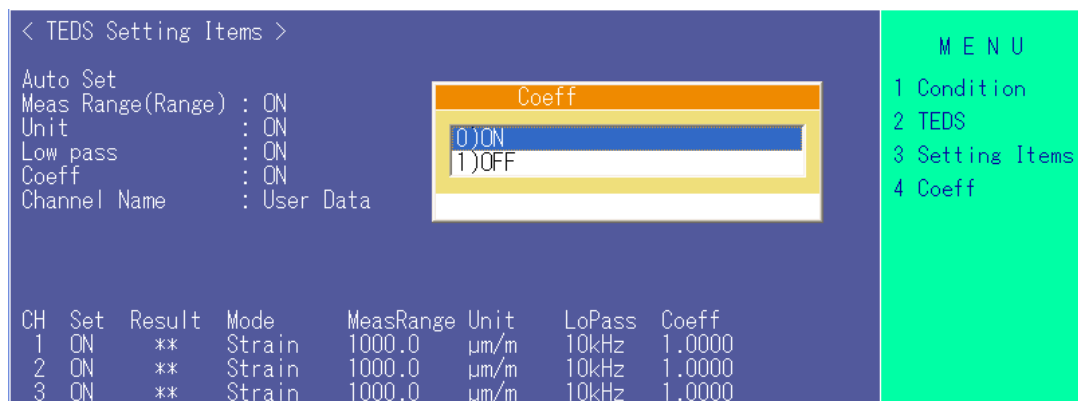
■ Options

- ON: Allows to change the calibration coefficient.
- OFF: Disables to change the calibration coefficient.

■ Operation Method

- 1) Select <Coeff> from the <Setting Items> menu.
- 2) A “Coeff” setting window appears.

Here, select ON or OFF and press the **ENTER** key to determined the setting.



4-9-2-5 Setting Channel Name [Condition/TEDS/Setting Items/Channel Name]

Select this menu <Channel Name> to set the channel name. If the TEDS information is properly loaded, contents of the current channel name is changed to the required contents of the following options.

NOTE

- This setting is a collective settings for all the channels and not for individual channel. You cannot set ON/OFF for every channel.

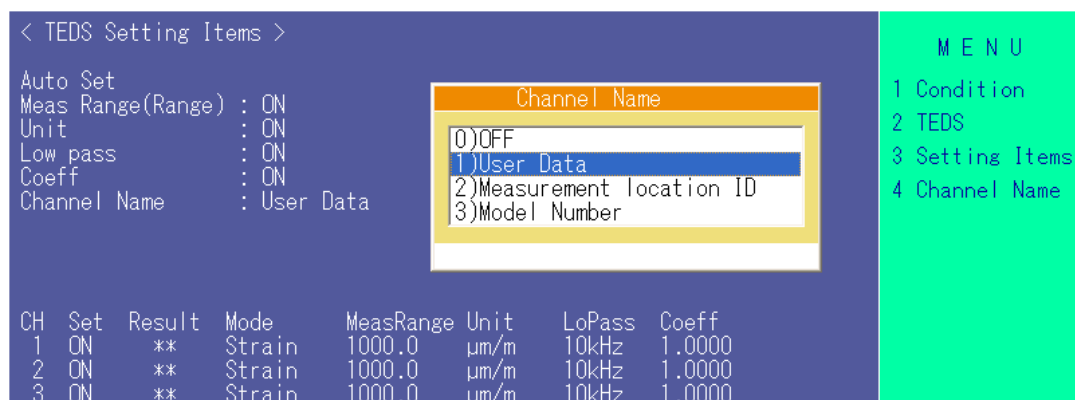
■ Options

- OFF: Currently set contents are not changed. (remained as it is),
- User Data: For KYOWA made TEDS sensors, Model name, etc. are set.
Nothing is set for products of firms other than KYOWA.
- Measurement location ID: Measurement location ID of TEDS information is set.
- Model Number: Model Number of the TEDS information is set.

■ Operation Method

- 1) Select <Channel Name> from the <Setting Items> menu.
- 2) A “Channel Name” setting window appears.

Here, select item to be set for the channel name and press the **ENTER** key to determined the setting.



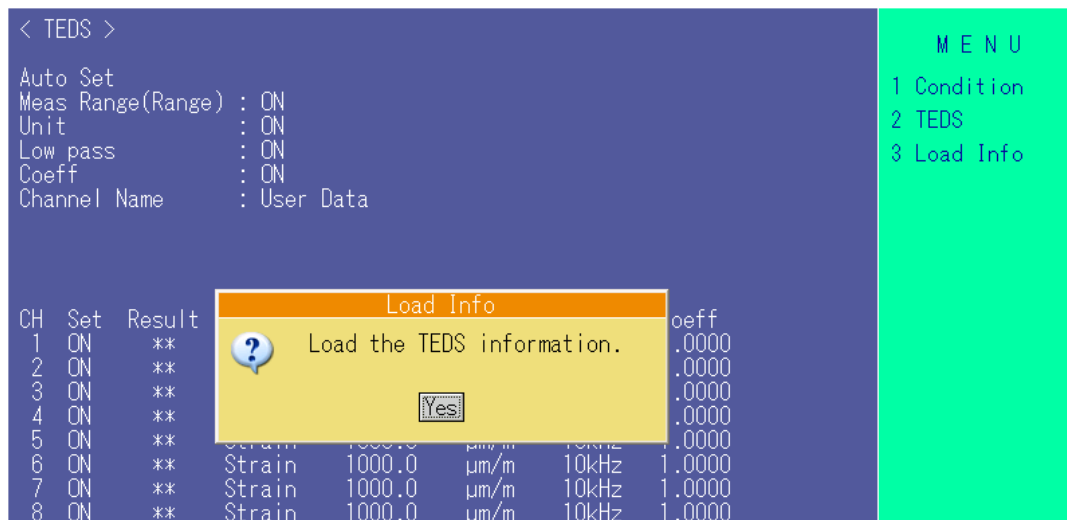
4-9-3 LOADING TEDS INFORMATION [Condition/TEDS/Load Info]

Select this menu <Load Info> to load the TEDS information.

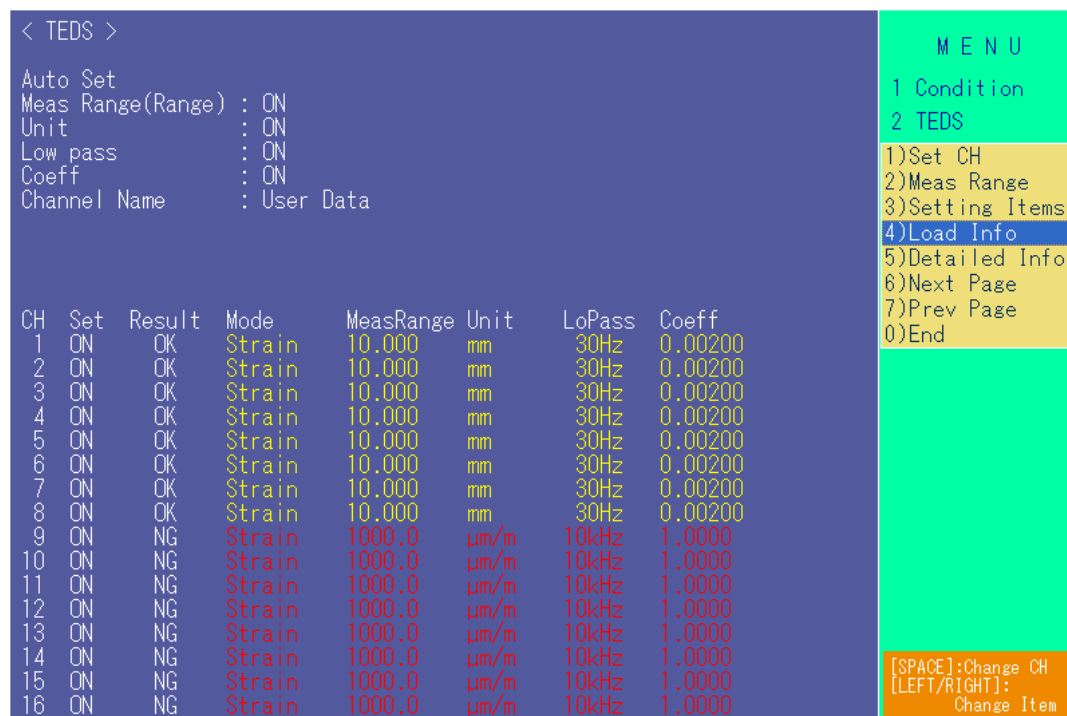
Irrespective of items set in <Set CH> and <Setting Items> menus, loading the TEDS information is targeted for information of all the installed channels.

■ Operation Method

- 1) Select <Load Info> from the <TEDS> menu.
- 2) A “Load Info” setting window appears.



- 3) To load the TEDS information, click 'Yes' or press the **ENTER** key.
- 4) When loading the TEDS information is completed, the following screen appears showing 'OK' or 'NG' on the 'Result' column.



■ Setting Screen Color

Display color on the screen shall be colored according to <Set CH>, Result, and <Setting Items> as shown in the following.

Items set for the channel conditions shall be colored in yellow.

Color	Set CH	Loaded Result	Setting Items	Remarks
Yellow	ON	OK	ON	To be set to CH conditions
White	ON	OK	OFF	
White	OFF	ON	ON	
Red	ON/OFF	NG	ON/OFF	

4-9-4 SETTING MEASURING RANGE [Condition/TEDS/Meas Range]

After loading the TEDS information, you can change the automatically set measuring range.

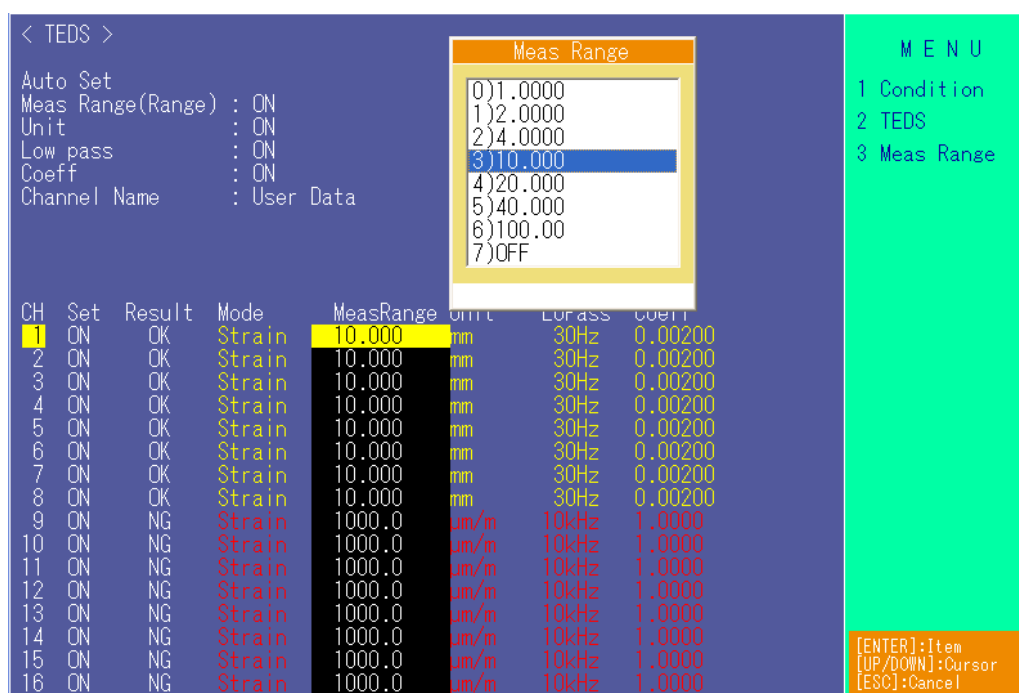
MEMO

- Changing the measuring range is allowed only for channels with the following conditions.
Channels not satisfying even one of the required conditions are not displayed with the menu <Meas Range>.
- 1) Results of loading the TEDS information is **OK**.
- 2) “Set” CH column is **ON**.
- 3) <Setting Range> selected from <Setting Items> menu is **ON**.
- 4) Measuring range is colored in **Yellow**.

■ Operation Method

- 1) Select <Meas Range> from the <TEDS> menu.
- 2) A “Meas Range” setting window appears.

Here, select the desired measuring range and press the **ENTER** key to determined the setting.

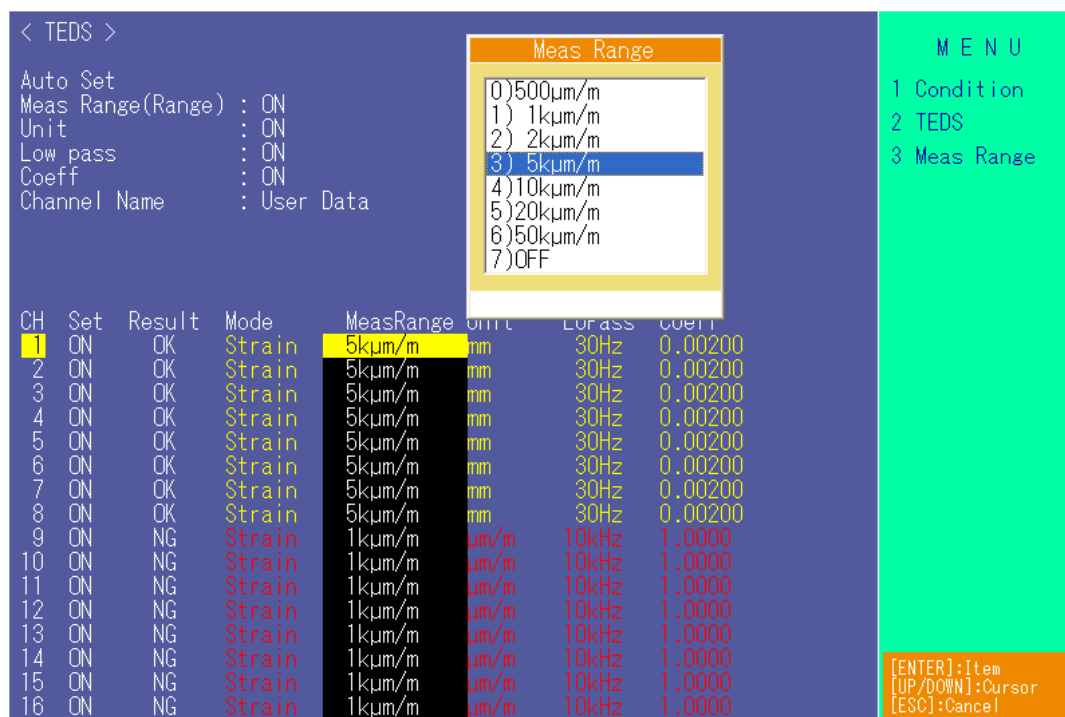


■ Setting Measuring Range

Measuring range is set to a maximum value that can be measured obtained by the following expression by calculating range value and calibration coefficient of the conditioner card.

$$\text{Measuring range} = \text{Meas Range} \times \text{Calibration coefficient}$$

As same as setting the general channel conditions, when setting the range, press the **TAB** key while displaying menus and select the menu <Meas Range>. Then, the desired range can be selected as same as channel conditions as shown in the following.



MEMO

- After reading the TEDS information, you can change only the item "Meas Range."
You cannot change various other items such as mode, unit, low pass filter, calibration coefficient, channel name, etc. on this screen. To change the above, change by selecting <CH Condition> menu.

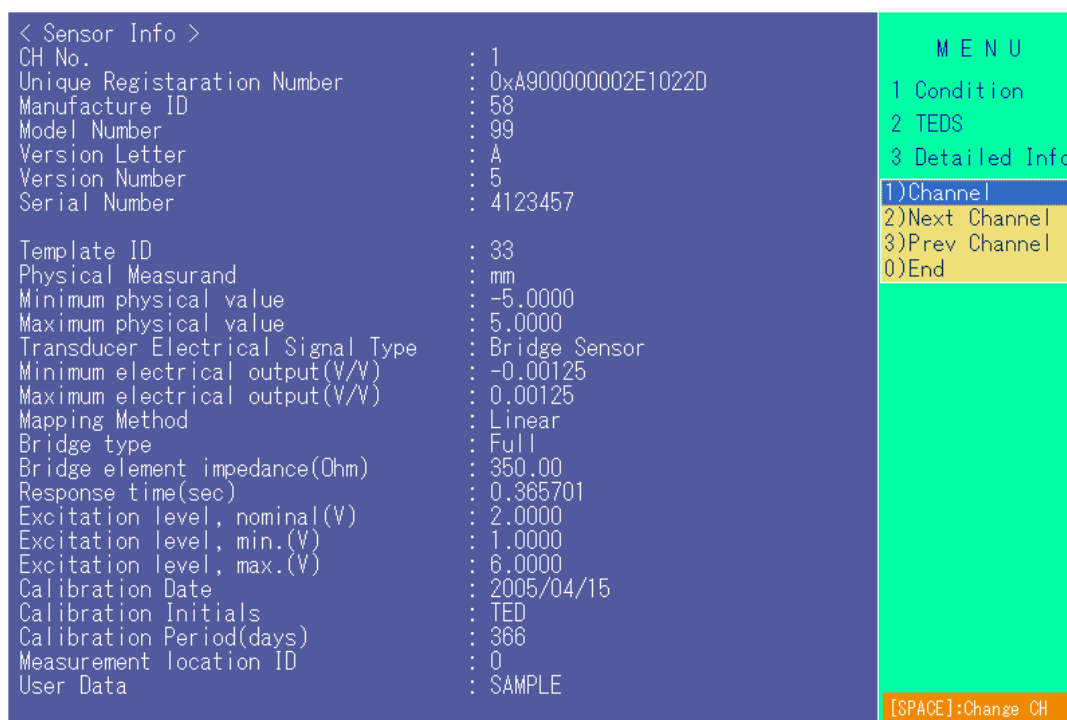
4-9-5 DISPLAYING TEDS SENSOR DETAILED INFORMATION [Condition/TEDS/Detailed Info]

MEMO

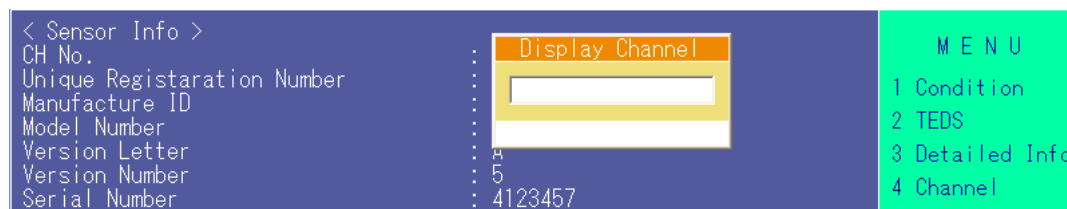
- The menu <Detailed Info> is displayed only when the TEDS information is properly loaded.
- After loading the TEDS information, even if the result is NG, the <Detailed Info> may appear in some cases. At this time, EDX corresponding TEDS sensors are connected but sensor corresponding conditioner cards may not be connected. Therefore, for channels with loaded results NG and capable of detailed display, confirm the connected state of the sensors.
- For details of items displayed by selecting the menu <Detailed Info>, contact TEDS sensor manufacturing company

■ Operation Method

- 1) Select <Detailed Info> from the <TEDS> menu.



- 2) To change the display channel, press the **[SPACE]** key or select the <Channel> and input the desired CH No.



4-9-6 SETTING CHANNEL CONDITIONS [Condition/TEDS/Exit]

After loading the TEDS information, set items of column “Set” to ON, “Result” to OK, and <Setting Items> to ON (Items colored in yellow) to CH conditions.

■ Operation Method

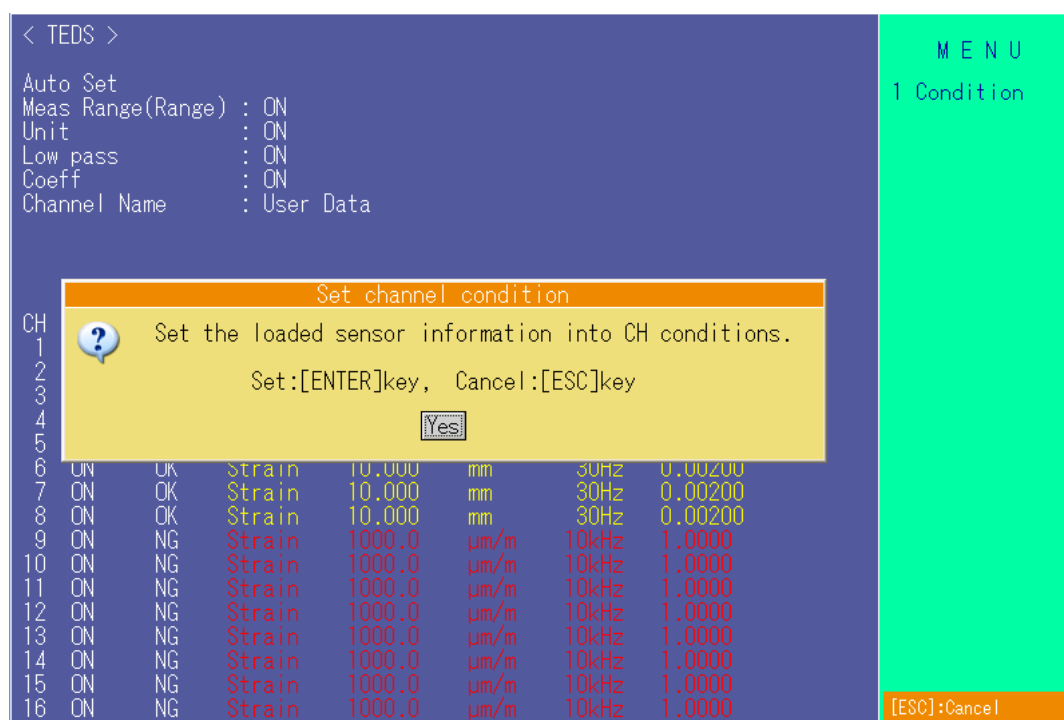
- 1) Setting items to channel conditions is conducted when closing the TEDS screen.

Select <End>.

Then, a message appears to confirm the setting of items to CH conditions. Select and press the following key.

key: Set to channel conditions.

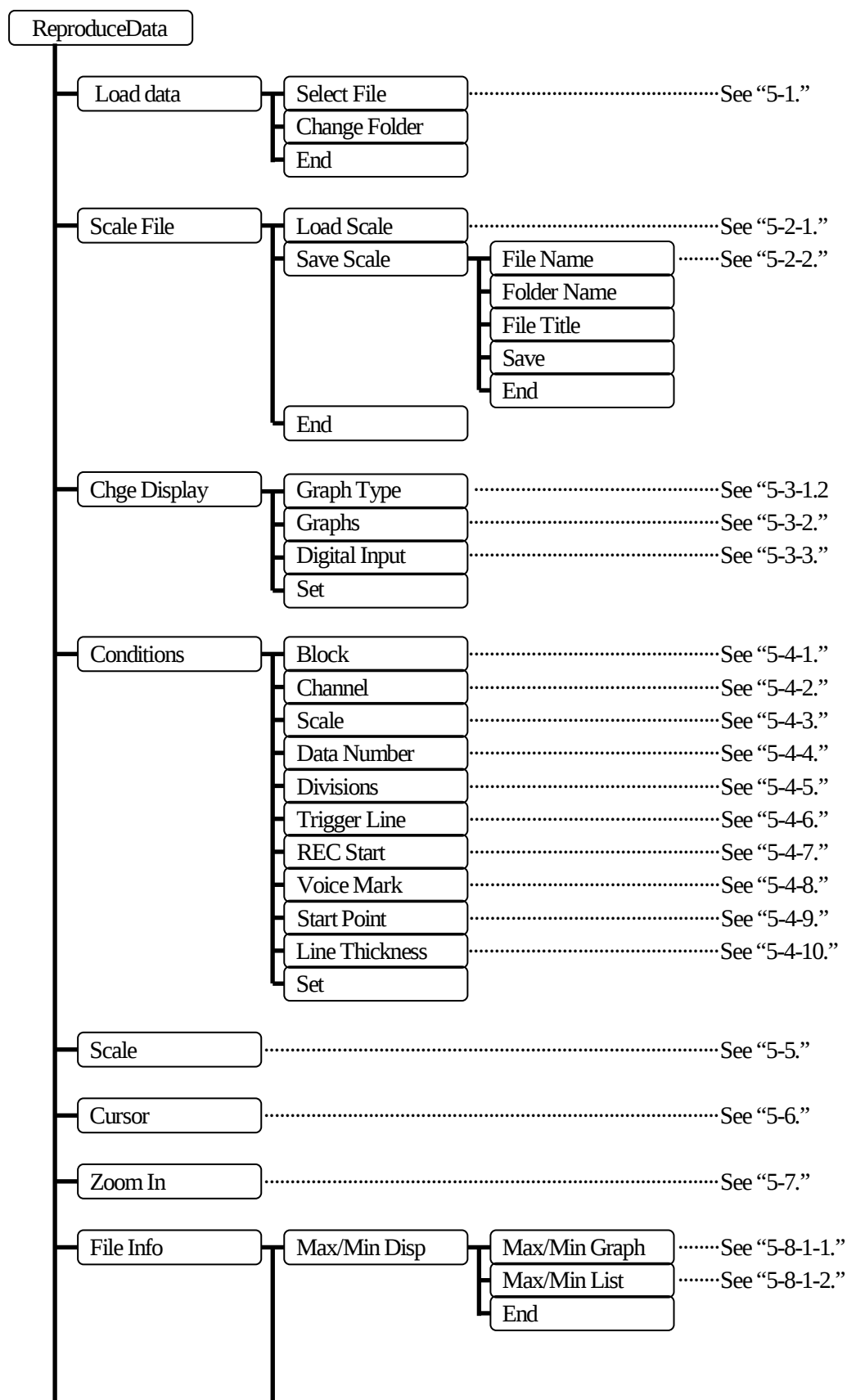
key: Not set to channel conditions.

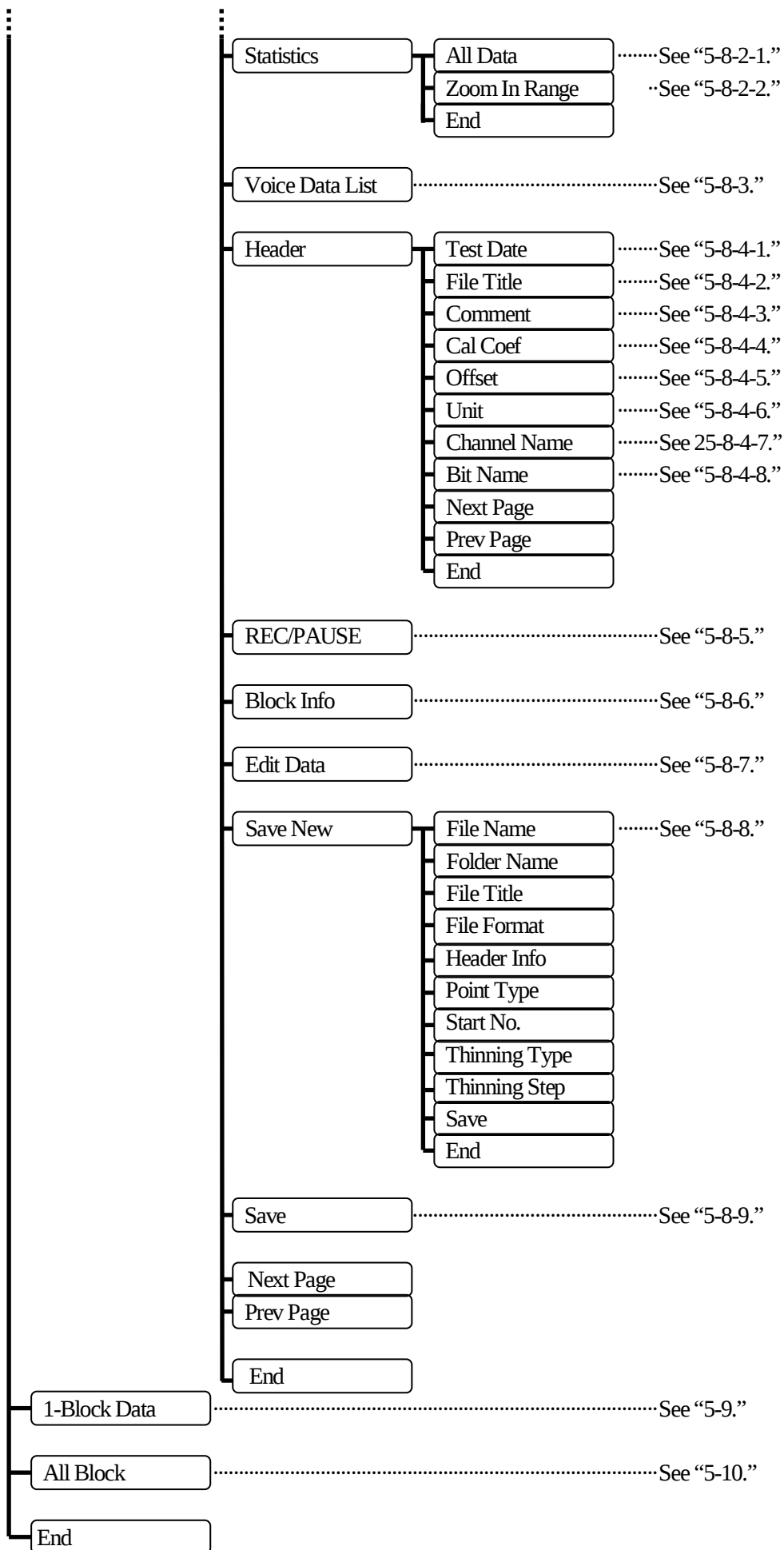


- 2) In any items are changed by loading the TEDS information, confirm on the “CH Condition” screen.

5. REPRODUCING DATA [ReproduceData]

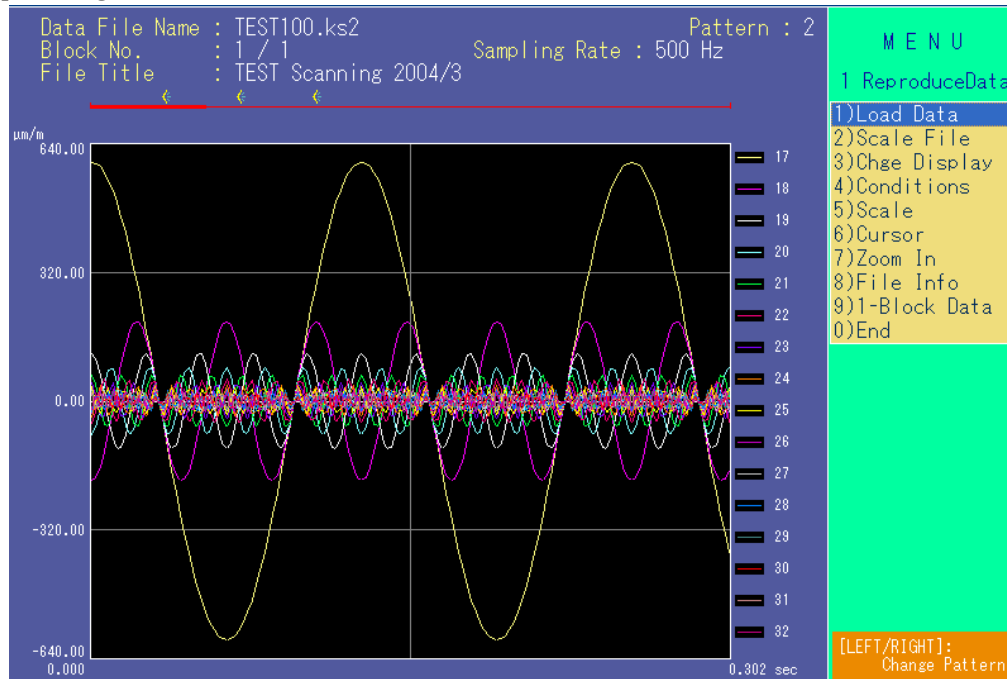
This Chapter describes how to reproduce the already recorded file.





When reproducing data, data is graphically or numerically displayed, cutted out, subjected to basic statistic operation, zoomed in and edited to confirm the recorded data.

■ Data Reproducing Screen



■ Block No.

File type of recorded data file is classified into 2 types, individual and additional format files. Suppose it is set to additional format file. Every time [REC/PAUSE] key is pressed, 1 block data is additionally filed into 1 file.

For example, when a file recorded with 4-block data is reproducing data, the indication of the block No. shall be expressed as 1/4 as shown in the above screen. Since data production is expressed in blocks, if it is required to reproduce other block data, change the block No. by selecting <Conditions> from <ReproduceData> main menu. Select <Block> from the Conditions> menu. And then, change the block No.

■ Patterns

When reproducing data, graph display can be combined with 4 patterns of graph display channel.

Pressing [←] or [→] key switchovers the graph patterns. To change the channel, select <Conditions> from the <ReproduceData> main menu.

■ Voice Mark

When selecting a data file with voice input, select <Voice Mark> from <Conditions> menu and set the “Voice Mark” to “ON.” Then, the voice mark appears on the upper graph. Playing back the voice data is available by selecting <Cursor> and <File Info> in <Conditions> menu.

■ Description of Menu Items

<Load Data>	Target file for reproducing data.
<Scale File>	Loads and saves the scale file (display conditions).
<Chge Display>	Graph types and the number of display graphs.
<Conditions>	Graph display conditions.
<Scale>	Graph scale.
<Cursor>	Displays numeric value of cursor position data and plays back the voice data.
<Zoom In>	Set and display zoom-in range of display graph.
<File Info>	Edits data, conducts statistic operations, plays back data, cuts out data, converts data, etc.
<1-Block Data>	Graphically displays 1 block reproduced data in channels.
<All Block>	Graphically displays all blocks of reproduced data in channels.
<End>	Ends reproducing data.

■ Operation Procedures

- 1) Select <Load Data> from <ReproduceData> main menu.
- 2) Select the required file and select <Chge Display> and <Conditions> to set various items such as graph types, the number of graphs, the number of channels, scale, the number of data, etc.
- 3) Determined display conditions are saved by selecting <Scale File> from the <ReproduceData> main menu.

■ Applications ([Q]uestion and [A]nswer)

[Q] To display different block data

[A] Select <Block> from <Conditions> in <ReproduceData> main menu to change the display block No.

[Q] To change the combination of graph patterns.

[A] Change the graph pattern No. to the desired No. with [←] or [→] key and change graph display conditions by selecting <Conditions> menu from <ReproduceData> main menu.

[Q] To confirm the whole contents of data

[A] Select <All Block> from <ReproduceData> main menu to display graphs for every channel.

[Q] To confirm numeric value on the graph

[A] Select <Cursor> menu from <ReproduceData> main menu. Move the cursor with [←] or [→] key and press [ENTER] key. Then, numeric value on the cursor is displayed on the screen.

[Q] To play back voice data

[A1] Select <File Info> from <ReproduceData> main menu. Then, select <Voice Data> from the <File Info> menu to play back the voice data.

[A2] Select <Conditions> from <ReproduceData> main menu. Then, select <Voice Mark> from the <Conditions> menu. Set the voice mark to "ON."

Select <Cursor> from the <ReproduceData> main menu. While moving the cursor, press [VOICE MEMO] key approximately 1 second on the voice mark to play back the data.

- [Q] To confirm maximum and minimum values of recorded data
- [A] Select <File Info> from <ReproduceData> main menu.
Select <Statistics> from the <File Info> menu.
Select <All Data> from <Statistics> menu and conduct statistic calculation.
- [Q] To confirm maximum and minimum values of the limited range
- [A] Select <Zoom In> from <ReproduceData> to specify the range.
Select <File Info> from the <ReproduceData> main menu.
Select <Statistics> from the <File Info> menu.
Select <Zoom In Range> from <Statistics> menu and conduct statistic calculation.
- [Q] To confirm data recording conditions
- [A] Select <File Info> from <ReproduceData> main menu.
- [Q] To edit recording conditions (Test date, comment, CAL coefficient, offset, unit, channel name, and bit name)
- [A] Select <File Info> from <ReproduceData> main menu.
Select <Edit Header> from the <File Info> menu.
Select required recording conditions on the <Edit Header> menu screen.
- [Q] To confirm the listed recorded data
- [A] Select <File Info> from the <ReproduceData> main menu.
Select <Edit Data> from the <File Info> menu to edit the recorded data.
- [Q] To edit the recorded data
- [A] Select <File Info> from the <ReproduceData> main menu.
Select <Edit Data> from the <File Info> menu to edit the recorded data.
- [Q] To cut out the recorded data in the required range and save into a different file
- [A] Select <Zoom In> from <ReproduceData> main menu to specify the required range.
Then, select <File Info> from the <ReproduceData> main menu.
Select <Save New> from the <File Info> menu.
- [Q] To save the data file in CSV format file
- [A] Select <File Info> from the <ReproduceData> main menu.
Select <Save New> from the <File Info> menu.
Select <File Format> from the <Save New> menu.
Then, select CSV format on the “File Format” window and after setting required conditions for converting data into CSV format file, select <Save> menu.

5-1 LOADING RECORDED DATA FILE [ReproduceData/Load Data]

Select already recorded data file and reproduce the data. The selected data file is displayed on the graph.

The graph has 2 types, time axis graph and X-Y graph. The graph types can be changed by selecting <Chge Display> from <ReproduceData> main menu. For selecting other graph display conditions, select <Conditions> from the <ReproduceData> main menu.

■ Operation Method

- 1) Select <Load Data> from <ReproduceData> main menu.
- 2) Select <Select File> from the <Load Data> menu
- 3) Press [ENTER] key on the desired data file.

Note

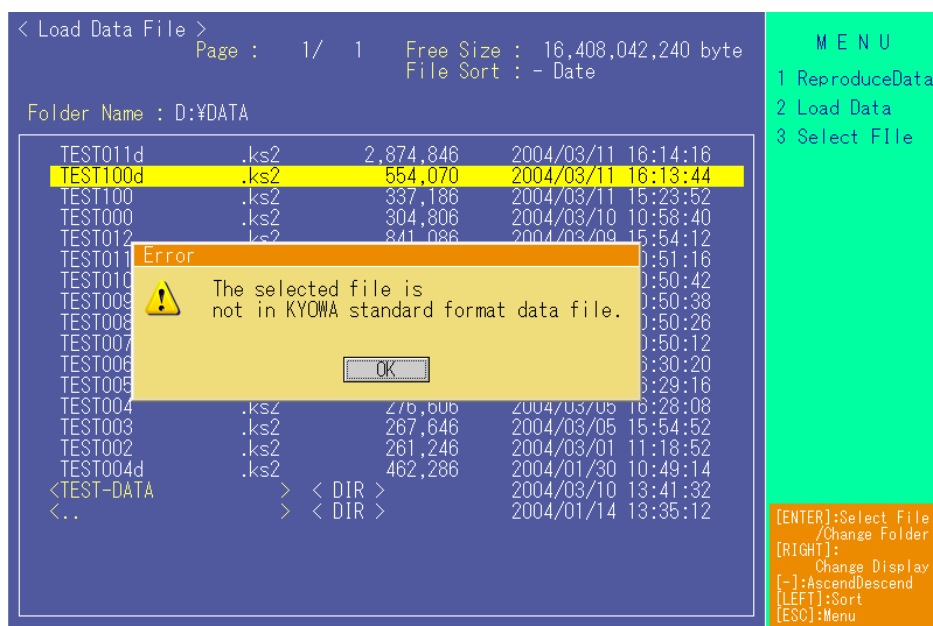
Press the [CHARACTER] key on the file cursor to display data file information (the number of blocks, measuring mode, the number of measuring channels, sampling rate, file title, comment, block information, test information, etc.).

■ To Change Folder

- 1) Select <Load Data> from <ReproduceData> main menu.
- 2) Select <Change Folder> from the <Load Data> menu
- 3) A folder selecting window appears. Move the cursor to a desired folder with [↑], [↓], [←], or [→] key and press [ENTER] key.

■ When Loading Incorrect Data File

When loading data files other than the KYOWA standard data file or when loading data files edited on purpose by measuring instruments other than the EDX-2000B, the following message may appear on the error window.



5-2 SCALE FILE [ReproduceData/Scale]

Graph display condition file that has previously reproduced data is called a scale file. By loading the scale file, the previously set state can be reproduced immediately.

5-2-1 Loading Scale File [ReproduceData/Scale File/Load Scale]

■ Operation Method

- 1) Select <Scale File> from <ReproduceData> main menu.
- 2) Select <Load Scale> from the <Scale File> menu
- 3) Select <Select File> from the <Load Scale> menu.
- 4) Press [ENTER] key on the desired condition file.

■ To Change Folder

- 1) Select <Load Data> from <ReproduceData> main menu.
- 2) Select <Change Folder> from the <Load Data> menu.
- 3) A “Change Folder” selecting window appears. Move the cursor to the desired folder with [↑], [↓], [←], or [→] key and press [ENTER] key

Note

- Select the <Load Scale> menu, if required.
- When no <Load Scale> menu is selected, data is reproduced with previous graph display conditions.

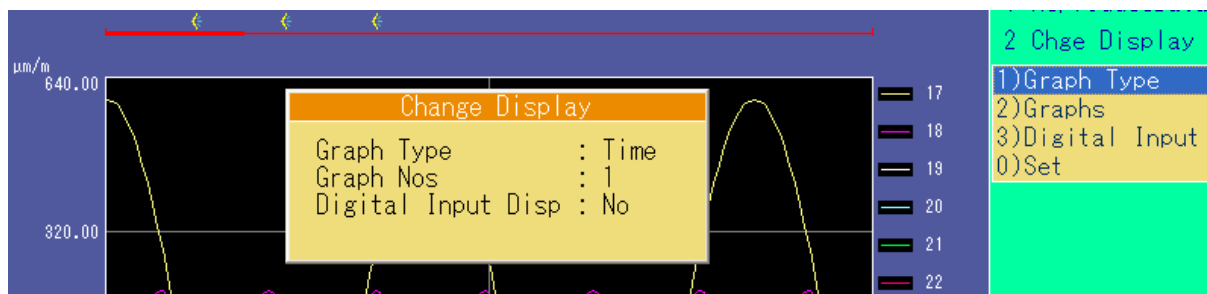
5-2-2 Saving Scale File [ReproduceData/Scale File/Save Scale]

■ Operation Method

- 1) Select <Scale File> from <ReproduceData> main menu.
- 2) Select <Save Scale> from the <Scale File> menu
- 3) Select <File Name>, <Folder Name>, and <File Title> from the <Save Scale> menu.
- 4) Select <Save> from the <Save Scale> menu to save the current graph display conditions.

5-3 CHANGING DISPLAY [ReproduceData/Chge Display]

Set graph types, the number of graphs and whether or not digital input is displayed.



■ Contents of Menu Items

- “Graph Type” Select “Time Series” or “X-Y.”
- “Graphs Nos.” Select the number of display graphs.

5-3-1 Changing Graph Type [ReproduceData]Chge Display/Graph Type]

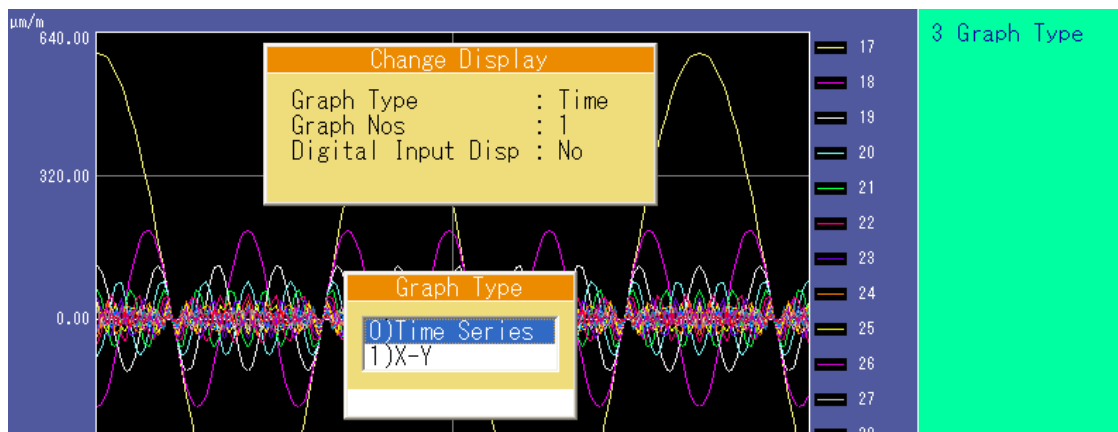
Change type of displayed graph.

■ Options

“Time Series” or “X-Y”

■ Operation Method

- 1) Select <Chge Display> from <ReproduceData> main menu.
- 2) Select <Graph Type> from the <Chge Display> menu.
A graph type setting window appears. Select “Time Series” or “X-Y.”



- 3) After selecting the desired graph type, it returns to the change display screen.
- 4) Select <Set> from <Chge Display> menu to change the screen to the determined graph.

5-3-2 Changing the Number of Display Graphs [Reproduce Data/Chge Display/Graphs]

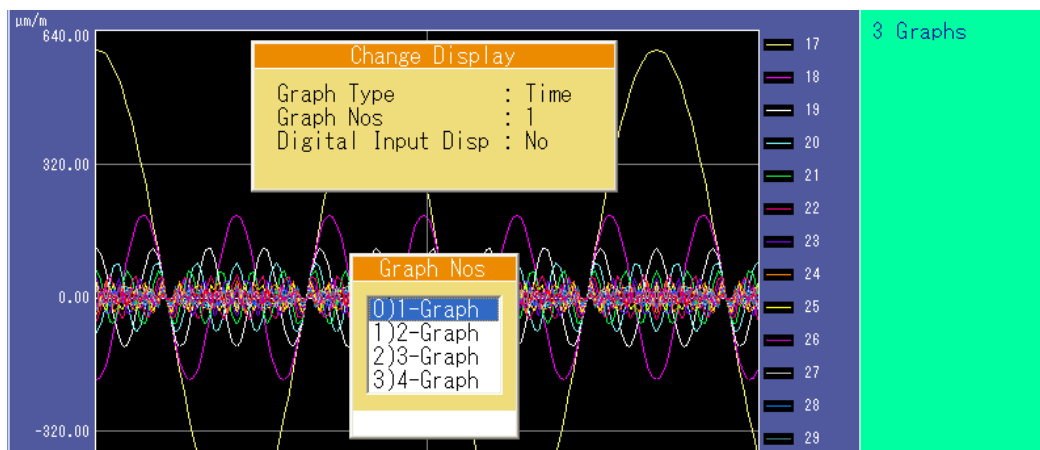
The number of graph screens is changed. The number of selected graphs varies with the graph type. In addition, when more than 2 graphs are set on the time series graph, display range of on and after the 2nd graphs shall be zoomed in portion of the 1st graph (highest rank)

■ Options

Time Series Graph 1 to 4 graph
X-Y Graph 1 and 2 graph

■ Operation Method

- 1) Select <Chge Display> from <ReproduceData> main menu.
- 2) Select <Graphs> from <Chge Display> menu.
- 3) A “Graph Nos.” setting window appears. Select “1-Graph,” “2-Graph,” “ 3-Graph,” or “4-Graph.”
- 4) After setting the desired number of graphs, it returns to change display screen.
- 5) Select <Set> from the <Chge Display> menu to change the screen to the determined graph.



5-3-3 Displaying Digital Input [ReproduceData/Chge Display/Digital Input]

Set whether or not digital input channel is graphically displayed.

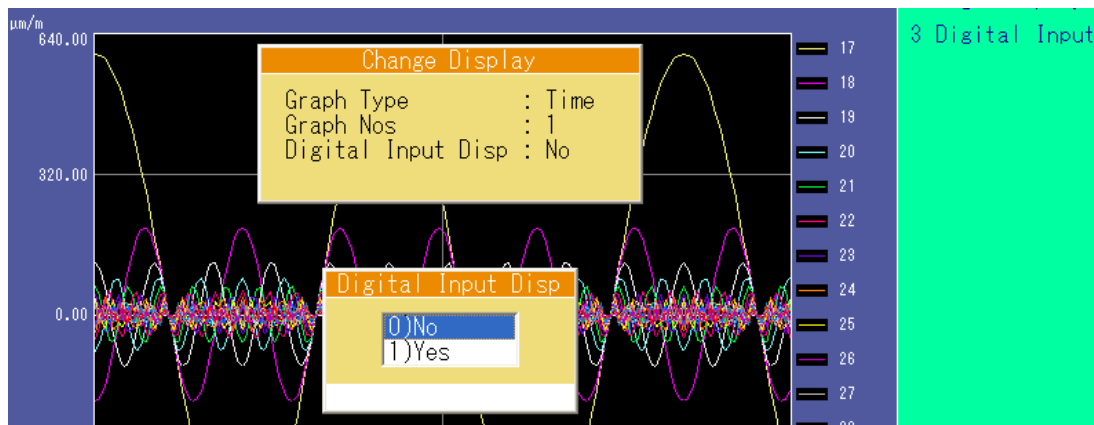
The above setting is available only when data file with digital input channel is selected.

■ Options

“No,” and “Yes”

■ Operation Method

- 1) Select <Chge Display> from <ReproduceData> main menu.
- 2) Select <Digital Input> from <Chge Display> menu.

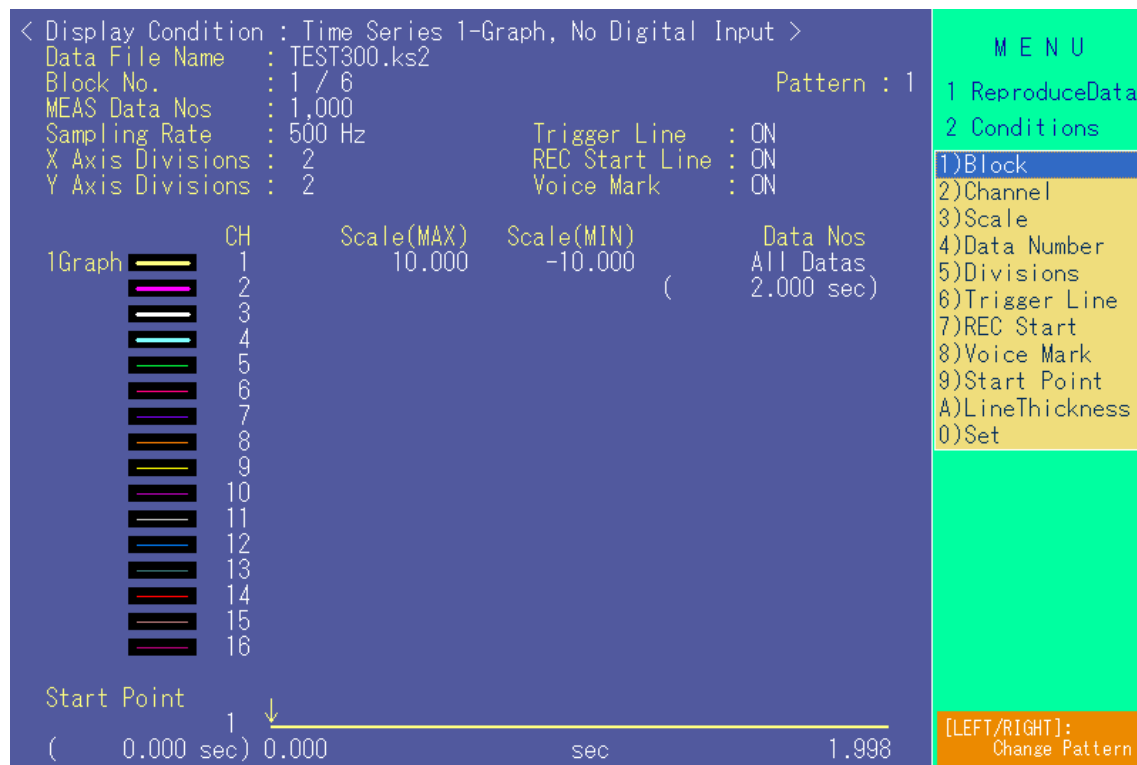


- 3) The following “Digital Input” window appears. Select “No” or “Yes.”
- 4) After the selection, it returns to change display screen.
- 5) Select <Set> from the <Chge Display> menu to change the screen to the determined graph.

5-4 SETTING DISPLAY CONDITIONS [ReproduceData/Conditions]

This section describes settings of various graph conditions (the number of blocks, channel, scale, the number of data, graph divisions, trigger point line, REC point, voice mark display, etc.).

Setting items vary with contents of graph types and the number of graphs determined by selecting <Chge Display> in <ReproduceData> main menu.



■ Description of Menu Items

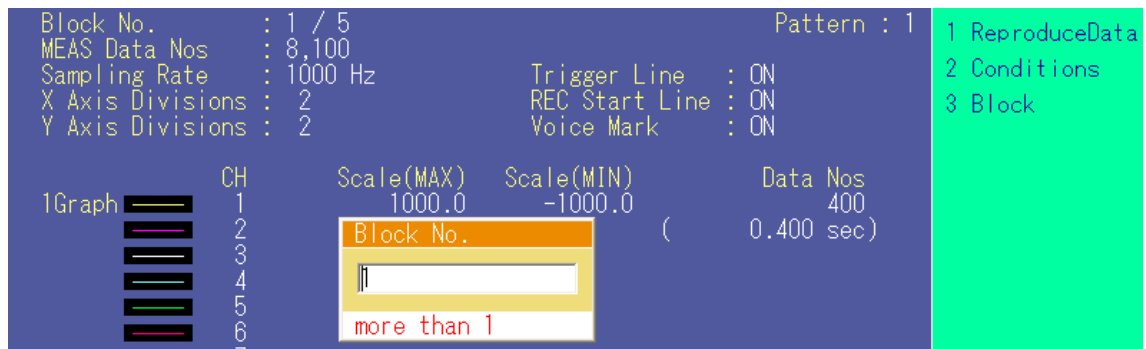
- <Block> Block No.
- <Channel> Graph displayed channel
- <Scale> Graph scale
- <Data Number> The number of graph display data
- <Divisions> The number of X axis or Y axis graph divisions
- <Trigger Line> Trigger point
- <REC Start> REC line.
- <Voice Mark> Voice mark.
- <Start Point> Data display start point.
- <Line Thickness> Graph line thickness.
- <Set> Set graph display conditions and ends the display condition menu.

5-4-1 Setting Blocks [ReproduceData/Conditions/Block]

Set desired block No.

■ Operation Method

- 1) Select <Conditions> from <ReproduceData> main menu.
- 2) Select <Blocks> from <Conditions> menu.



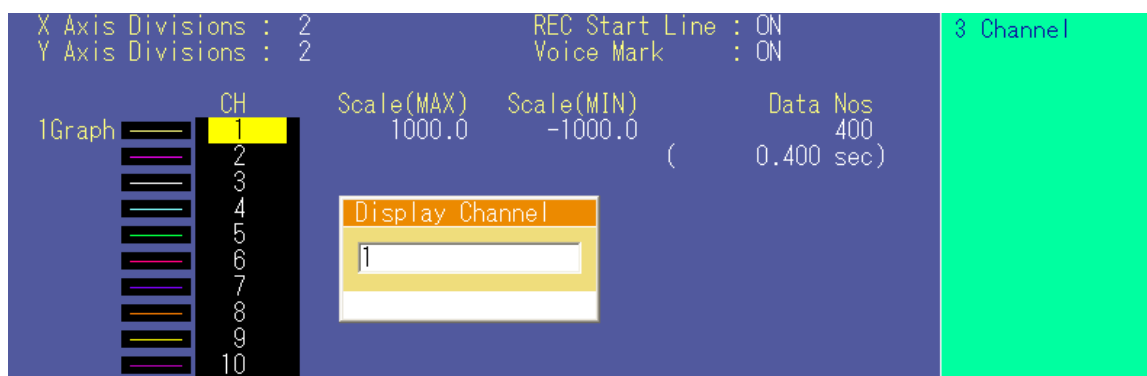
- 3) A “Block No.” setting window appears. Input the desired block No. and press [ENTER] key to determined the entered block No.

5-4-2 Setting Channel [ReproduceData/Conditions/Channel]

Setting of graph display target channel is displayed.

■ Operation Method

- 1) Select <Conditions> from <ReproduceData> main menu.
- 2) Select <Channels> from <Conditions> menu.
- 3) Move the cursor on the target graph line with [↑] or [↓] key.
Input the desired channel No. and press [ENTER] key to determine the entered channel No.



- 4) Press [ESC] key to set the following with a dialog box for inputting data in closed state.
 - Press [DUPLICATE] key with the cursor channel and the cursor channel with 1 channel No. added is set to the next channel.
 - Move the cursor to the desired channel and press [DEL] key to delete the channel.
- 5) Press [ESC] key once again to return to the menu screen.

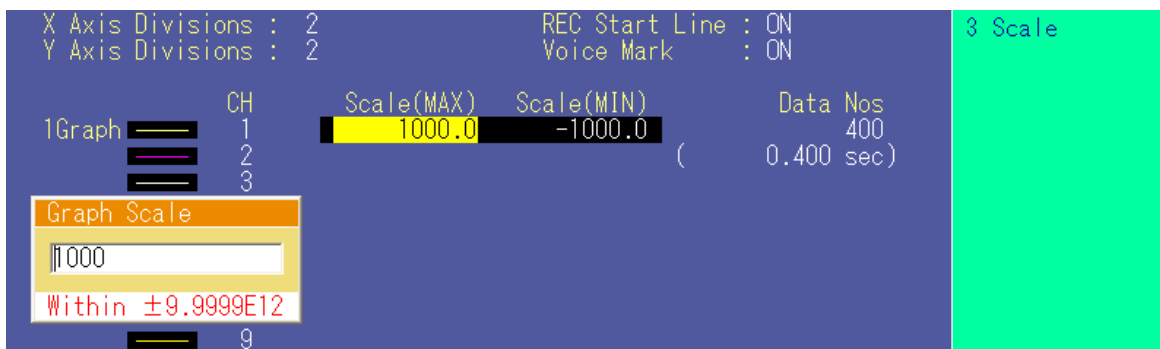
5-4-3 Setting Graph Scale [ReproduceDataConditions/Scale]

Setting of graph Y axis scale is described.

The graph scale is set in the same manner by selecting <Scale> from <ReproduceData> main menu.

■ Operation Method

- 1) Select <Conditions> from <ReproduceData> main menu.
- 2) Select <Scale> from <Conditions> menu.
- 3) The entire target scale setting items on the screen are reverse displayed and the cursor is displayed.
- 4) Move the cursor to the desired item with [↑] or [↓] key, input the desired scale value, and then, press [ENTER] key to determine the setting.



- 5) Press [ESC] key to set the following with a dialog box for inputting data in closed state.
 - Move the cursor with [↑] or [↓] key.
 - Scale value is changed by 1, 2, and 5 steps with [←] or [→] key.
- 6) Press [ESC] key once again to return to the menu screen.

5-4-4 Setting the Number of Display Data [ReproduceData/Conditions/Data Number]

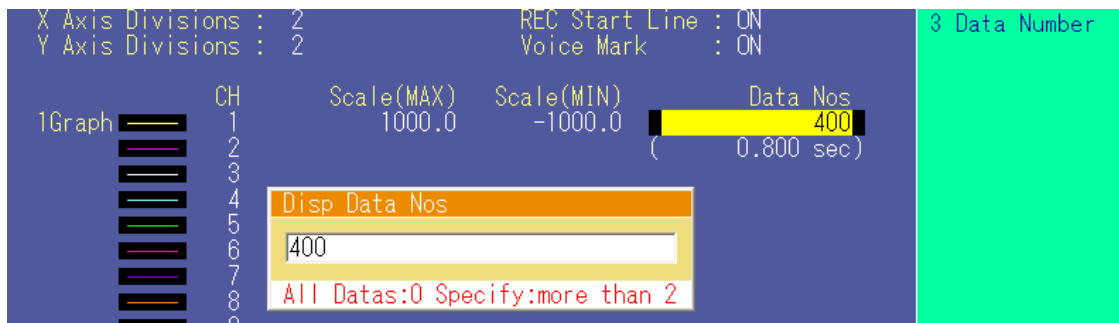
Setting of the number of display data on the reproduced graph is described.

The number of data on multiple graphs (more than 2 graphs) is in 2 groups, upper rank graph (1st graph) and graphs on and after the 2nd graphs.

In addition, set the number of data of the 1st graph to a preset number of on and after the 2nd graph.

■ Operation Method

- 1) Select <Conditions> from <ReproduceData> main menu.
- 2) Select <Data Number> from <Conditions> menu.
- 3) The entire scale setting items of data number of the target on the screen are reverse displayed and the cursor is displayed.
- 4) Move the cursor to the desired item with [↑] or [↓] key and press [ENTER] key to display a data No. setting window. Input the desired number of data, and then, press [ENTER] key to determine the setting.
If the number of data is set to '0,' "All Data" is displayed.



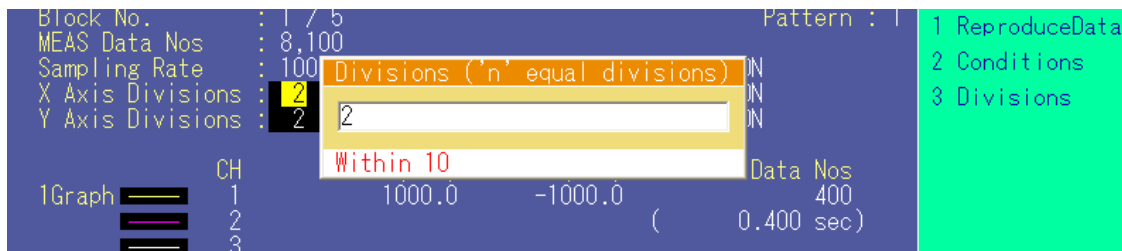
- 5) Press [ESC] key to set the following with a dialog box for inputting data in closed state.
 - Move the cursor is moved with [↑] or [↓] key.
 - The number of data on the cursor is halved with [4] key.
 - The number of data on the cursor can be doubled with [6] key.
 - The number of data is changed by 1, 2, and 5 steps with [←] or [→] key.
- 6) Press [ESC] key once again to return to the menu screen.

5-4-5 Setting the Number of Divisions [ReproduceData/Conditions/Divisions]

Setting of the number of graph divisions is described.

■ Operation Method

- 1) Select <Conditions> from <ReproduceData> main menu.
- 2) Select <Divisions> from <Conditions> menu.
- 3) The entire division setting items of data number of the target on the screen are reverse displayed and the cursor is displayed.
- 4) Move the cursor to the desired item with [↑] or [↓] key, input the desired number of divisions, and then, press [ENTER] key to determine the setting.



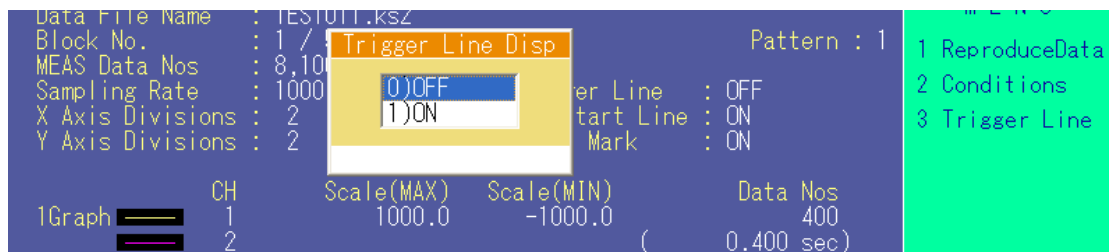
- 5) Press [ESC] to end the setting.
- 6) Press [ESC] key once again to return to the menu screen.

5-4-6 Setting Trigger Point Line [ReproduceData/Conditions/Trigger Line]

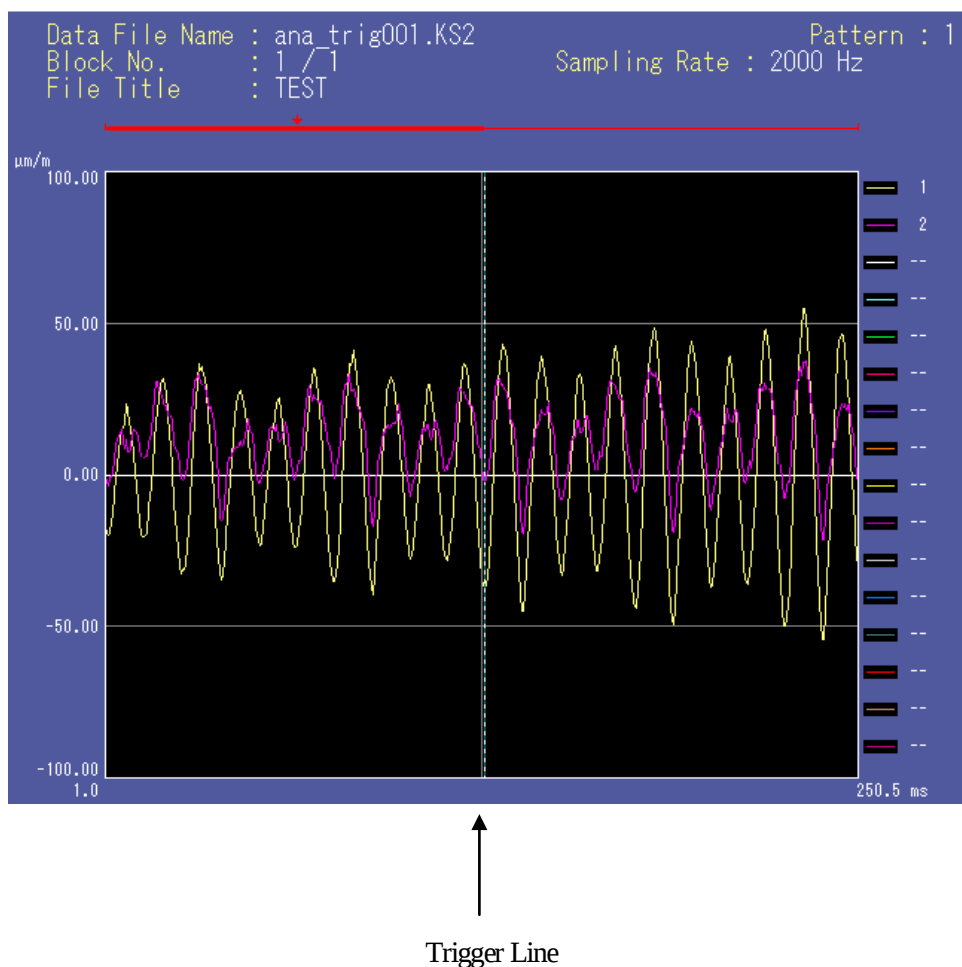
Set whether or not trigger point line is displayed on trigger start or end position.
This function is available for reproducing data file of trigger mode measurement.

■ Operation Method

- 1) Select <Conditions> from <ReproduceData> main menu.
- 2) Select <Trigger Line> from <Conditions> menu.
- 3) Move the cursor with to “ON” or “OFF” [↑] or [↓] key and press [ENTER] key on the setting item to determine the setting.



When <Trigger Line> is “ON”

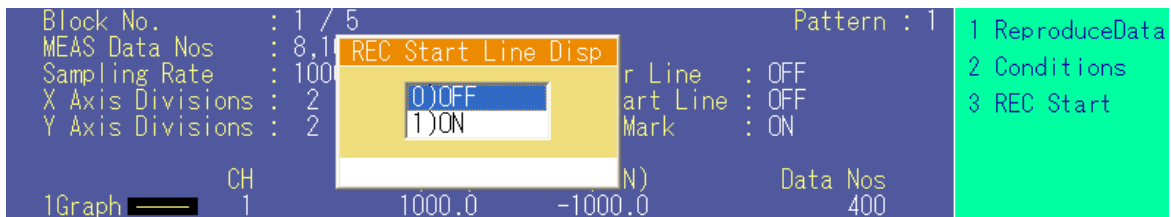


5-4-7 Setting REC Start Display [ReproduceData/Conditions/REC Start]

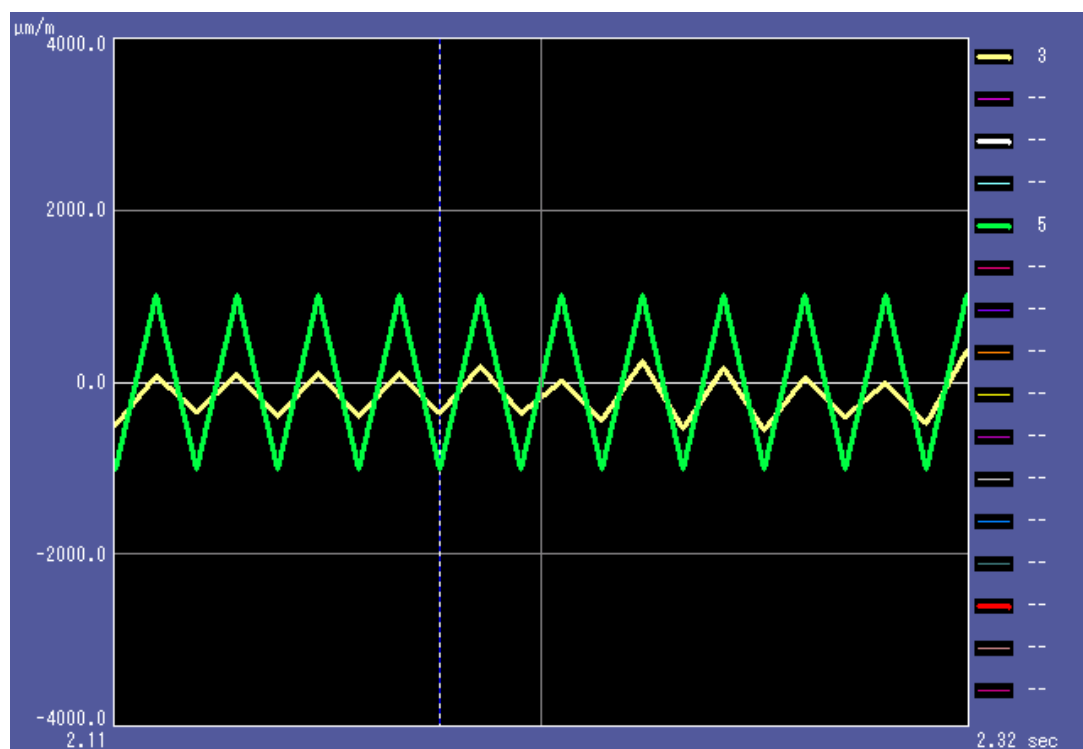
Set whether or not REC point start position in the data file that conducted REC/PAUSE operation while recording data is displayed.

■ Operation Method

- 1) Select <Conditions> from <ReproduceData> main menu.
- 2) Select <REC Start> from <Conditions> menu.
- 3) A “REC Start Line Disp” selecting window appears.
- 4) Move the cursor with [↑] or [↓] key and press [ENTER] key to determine the setting.



When <REC Start> is “ON”



Rec Start Line

5-4-8 Setting Voice Mark [ReproduceData/Conditions/Voice Mark]

Set whether or not voice mark is displayed on the graph.
The voice data is played back when “Voice Mark” is ON.

Note

Voice mark is displayed only when recorded data file with voice is played back.

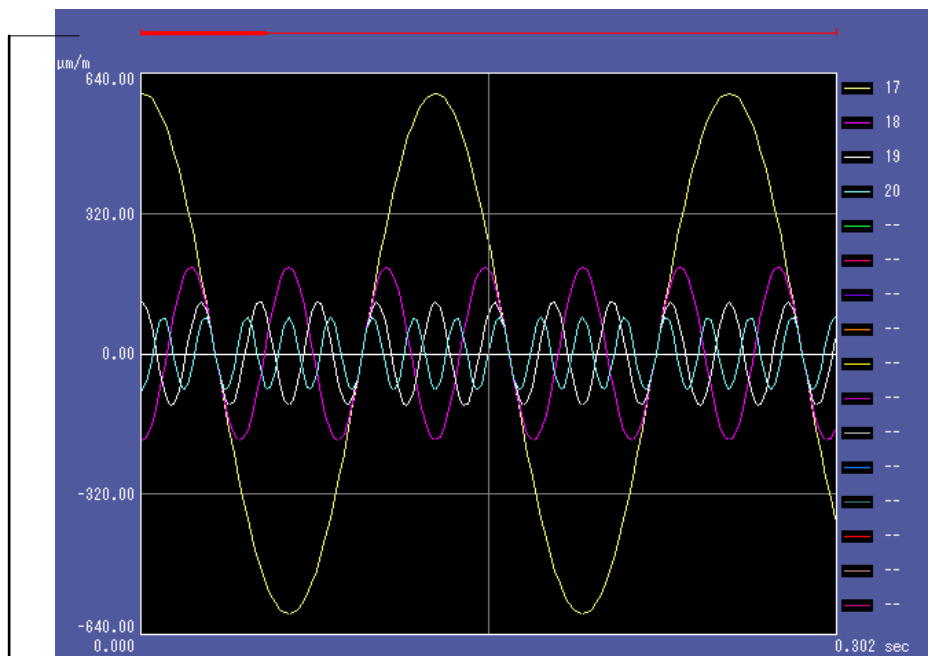
■ Operation Method

- 1) Select <Conditions> from <ReproduceData> main menu.
- 2) Select <Voice Mark> from <Conditions> menu.



- 3) Move the cursor with [↑] or [↓] key and press [ENTER] key on the setting item to determine the setting.

When <Voice Mark> is “OFF”



When <Voice Mark> is “ON”



5-4-9 Setting Start Point[ReproduceData/Conditions/Start Point]

Set start point of graph data display.

■ Operation Method

- 1) Select <Conditions> from <ReproduceData> main menu.
- 2) Select <Start Point> from <Conditions> menu.
- 3) Move the start point of the graph display with [←] or [→] key and press [ENTER] key to determine the setting.



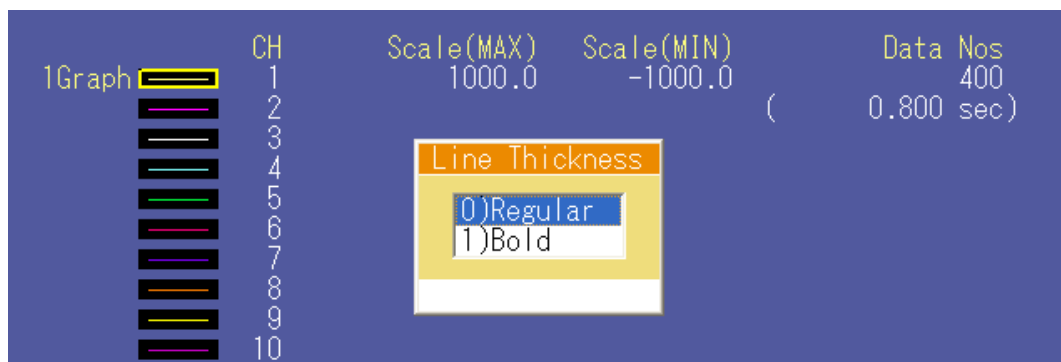
- Move every 10 data at medium speed with [SHIFT] + [←] or [→] keys.
- Move every 100 data at high speed with [4] or [6] keys.

5-4-10 Changing Graph Line Thickness [ReproduceData/Conditions/LineThickness]

Changes line thickness of the graph.

■ Operation Method

- 1) Select <Conditions> from <ReproduceData> main menu.
- 2) Select <Line Width> from <Conditions> menu.
- 3) A “LineThickness” selecting window appears.
- 4) Move the cursor to “Regular” or “Bold” with [↑] or [↓] key and press [ENTER] key on the desired item to determine the setting.
- 5) Press [ESC] key to close the setting window.



- Press [DUPLICATE] key to copy the contents on the cursor to the next item.

- 6) Press [ESC] to return to the menu screen.

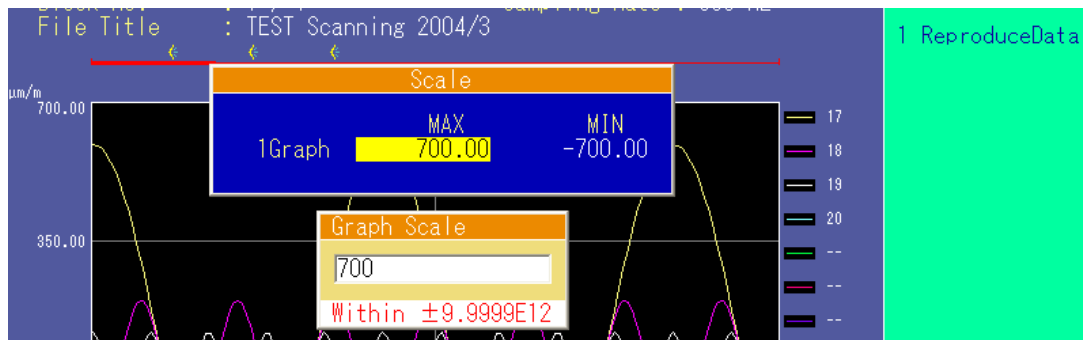
5-5 SETTING GRAPH SCALE [ReproduceData/Scale]

This section details setting of graph Y axis scale.

The graph scale is set in the same manner by selecting <Scale> from <Conditions> in ReproduceData> main menu.

■ Operation Method

- 1) Select <Scale> from <ReproduceData> main menu.
- 2) Move the cursor with [↑] or [↓] key and press [ENTER] key on the setting item to determine the setting.



- 3) Input the desired scale value and press [ENTER] key to determine the setting.
- 4) Press [ESC] key to set the following with a dialog box for inputting data in closed state.
 - The scale value can be changed by 1, 2, and 5 steps with [←] or [→] key.
- 5) Press [ESC] key to return to the menu screen.

5-6 DISPLAYING GRAPH CURSOR [ReproduceData/Cursor]

Data on the cursor point is numerically displayed by operating the cursor on the graph.

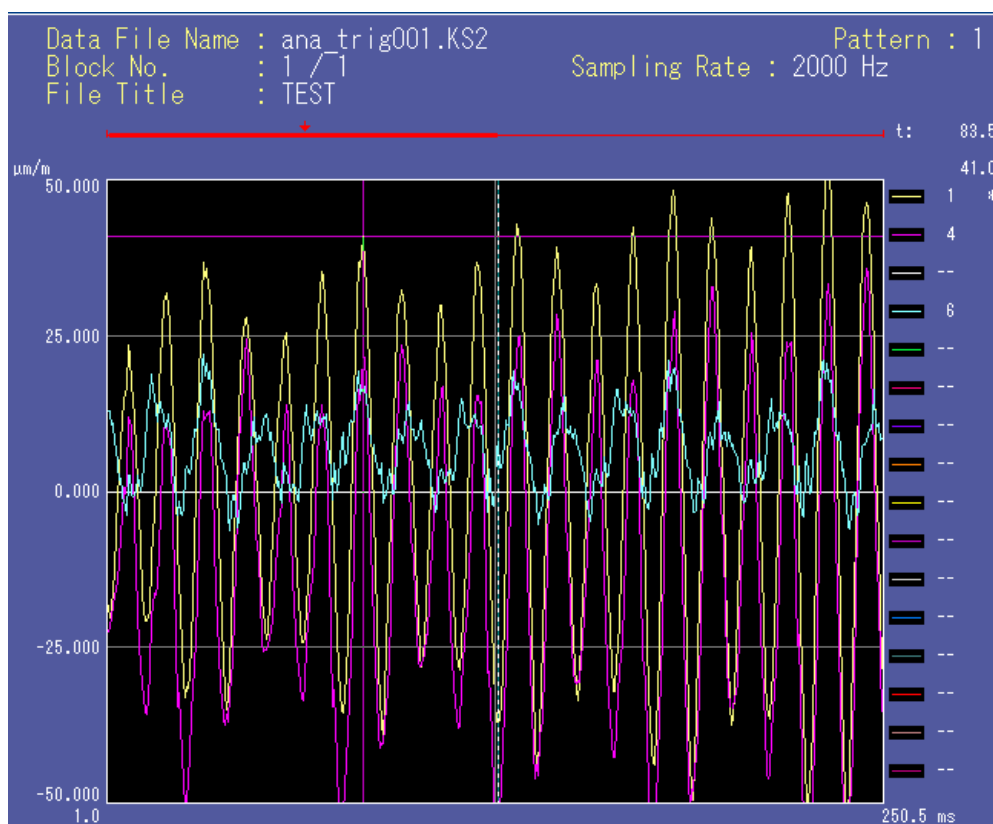
In addition, when multiple graphs are displayed, a graph at the top is displayed with enclosed ranges of other graphs.

That is to say, zoomed in graphs of the above enclosed ranges are displayed on and after the 2nd graphs.

In addition, if there exists voice input data, playing back the data is available.

■ Operation Method

- 1) Select <Cursor> from <ReproduceData> main menu.
- 2) A cursor appears on the graph screen. Move the cursor with [←] or [→] key and press [ENTER] key.
For time series graph, physical value data of the cursor point is displayed on the upper graph, and the time is indicated on the lower graph. For X-Y graph, X axis physical value data is displayed on the lower graph, and Y axis physical value data is indicated on the graph right side.



- The cursor scrolls when it is moved to the screen end.
- Recorded data value is re-displayed with [DEL] key.
- Cursor target channel is changed with [SPACE] key.

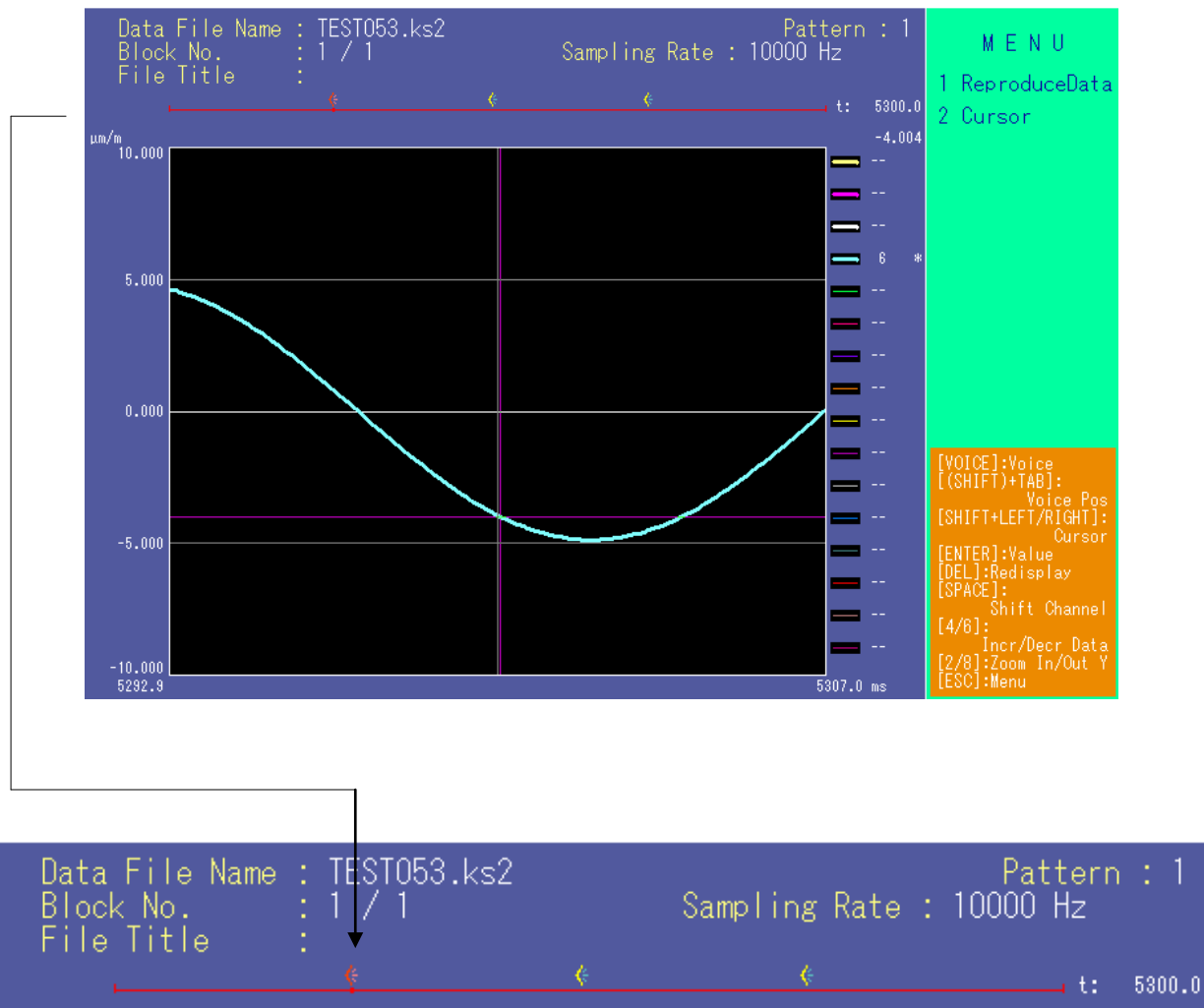
The cursor target channel is marked with asterisk (*) on the graph right side.

- The number of display data is increased/decreased with [4] or [6] key.
- Y axis scale value is increased/decreased with [2] or [8] key.

MEMO

When 2 physical values are displayed on 1 cursor position, it means that multiple data is superimposed on the cursor position. If the display area is zoomed in and overlapping data is reduced, the data is displayed in 1 graph. In addition, 2 values indicate the maximum position and minimum value of the overlapping point.

Playing Back Voice Data



- Pressing [TAB] key moves the cursor to the right side of a voice mark point. When the voice mark turns red, press [VOICE MEMO] key approximately 1 second and it start playing back the voice data. In addition, the cursor moves to the left side of the voice mark point with [SHIFT] + [TAB] keys.

3) Press [ESC] key to return to the menu screen.

5-7 ZOOMING IN [ReproduceData/Zoom In]

This section describes zoomed in display of the currently displayed graph. When multiple graphs are displayed, specify the graph zoom-in range on the 1st graph.

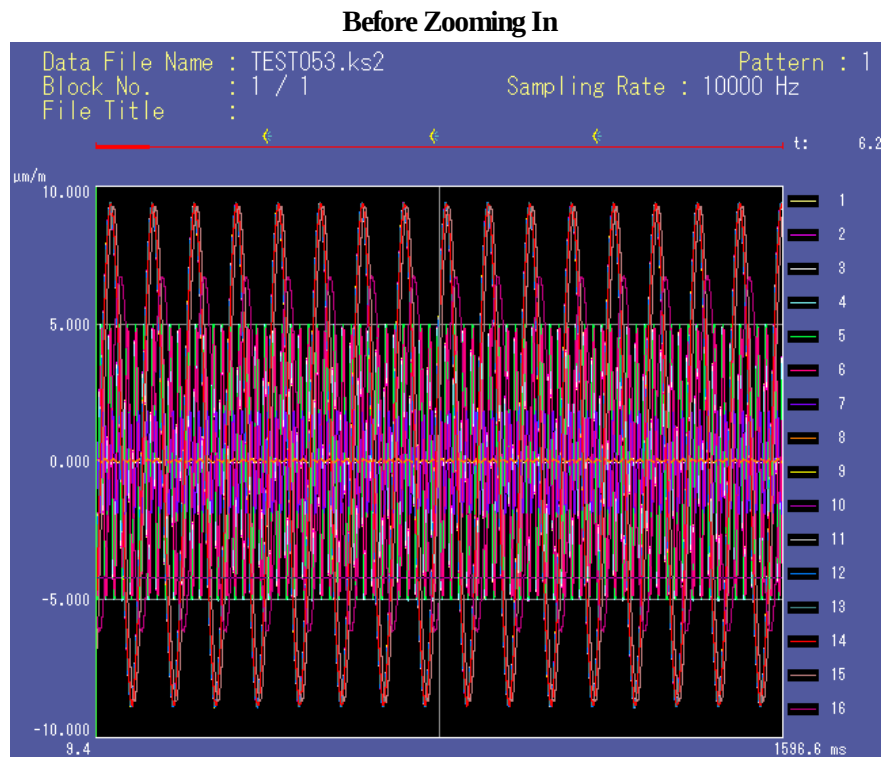
In addition, zoom in range determined in this section is used in <Zoom In Range> obtained by selecting <Statistics> from <File Info> menu.

■ Operation Method

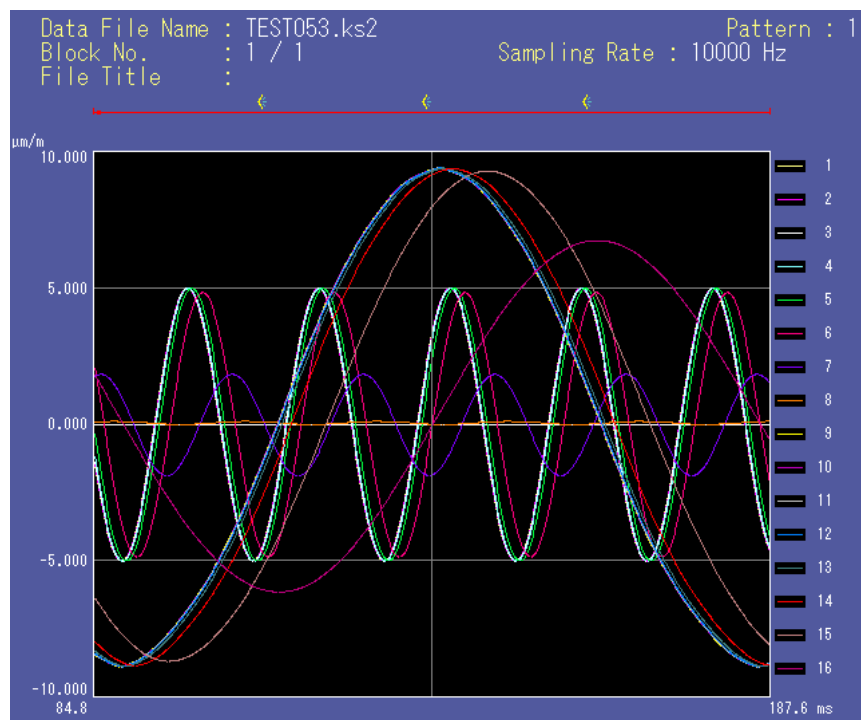
- 1) Select <Zoom In> from <ReproduceData> main menu.
- 2) A cursor appears on the graph screen. Move the cursor to the desired start point of the menu zoom in range with [←] or [→] key and press [ENTER] key to determine the start point.
- 3) Move the cursor to the desired end point of the menu zoom in range with [←] or [→] key and press [ENTER] key to determine the end point. Then, the determined range between the start and end points is zoomed in.

Moreover, the rang size can be changed as follows.

- Time axis of the graph is zoomed by one half with [4] key (Zoom in time axis).
- Time axis of the graph is zoomed to double the size with [6] key (Zoom out time axis).



After Zoomed In



5-8 FILE INFORMATION [ReproduceData/File Info]

This section describes various information files, for example, displaying maximum and minimum values of reproduced data, conducting statistic operation, playing back voice data, editing header and data, displaying data recording and block information, and saving new data.

< File Information >						M E N U	
Data File Name : TEST817.ks2						1 ReproduceData	
Block No. : 1 / 4						2 File Info	
MEAS Mode : Manual						1)Max/Min Disp	
MEAS Data Nos : 18,300						2)Statistics	
Sampling Rate : 1000 Hz						3)Voice Data	
MEAS Time : 18.300 sec						4)Edit Header	
Test Date : 2004/05/10 16:01:24						5)REC/PAUSE	
File Title : TEST Scanning 2004/3						6)Block Info	
Comment : Test No.001						7)Edit Data	
CH	Range	Filter	Coefficient	Offset	Unit	8)Save New	
1	1 μ m/m	10kHz	1.0000	0.0000	μ m/m	9)Save	
2	1 μ m/m	10kHz	1.0000	0.0000	μ m/m	A)Next Page	
3	1 μ m/m	10kHz	1.0000	0.0000	μ m/m	B)Prev Page	
4	1 μ m/m	10kHz	1.0000	0.0000	μ m/m	0)End	
5	1 μ m/m	10kHz	1.0000	0.0000	μ m/m		
6	1 μ m/m	10kHz	1.0000	0.0000	μ m/m		
7	1 μ m/m	10kHz	1.0000	0.0000	μ m/m		
8	1 μ m/m	10kHz	1.0000	0.0000	μ m/m		
9	1 μ m/m	10kHz	1.0000	0.0000	μ m/m		
10	1 μ m/m	10kHz	1.0000	0.0000	μ m/m		
11	1 μ m/m	10kHz	1.0000	0.0000	μ m/m		
12	1 μ m/m	10kHz	1.0000	0.0000	μ m/m		
13	1 μ m/m	10kHz	1.0000	0.0000	μ m/m		
14	1 μ m/m	10kHz	1.0000	0.0000	μ m/m		
15	1 μ m/m	10kHz	1.0000	0.0000	μ m/m		
16	1 μ m/m	10kHz	1.0000	0.0000	μ m/m		

■ Description of Menu Items

- <Max/Min Disp> Maximum and minimum value of data file.
- <Statistics> Conduct statistic operation of data files.
- <Voice Data > Confirm and play back the list of voice data.
- <Edit Header> Edit header information of data file.
- <REC/PAUSE> Data recording date, record time, and the number of recorded data of data file.
- <Block Info>..... Data recording date and a list of the number of recorded data for every block.
- <Edit Data> Edit data.
- <Save New>..... Save new data file and convert data into CSV format file data.
- <Save>..... Overwrite and save the edited data file.
- <Next Page>..... Change to channel conditions of the next the screen.
- <Prev Page> Change to channel conditions of the previous screen.
- <End> End displaying and editing the file information.

5-8-1 Displaying Maximum and Minimum Values [ReproduceData/File Info/Max/Min Disp]

Displays various data of the recorded data, that is, a graph showing 200 data back and forth of the maximum value, 5 upper rank data of the maximum value, a graph showing 200 data back and forth of the minimum value and 5 lower rank data of the minimum value.

■ Max Data

The maximum data is, by centering on maximum peak value, displayed with 200 data in the front and 199 data in the back totaling 400 data. If the number of data around the maximum value does not satisfy the specified number (for example, when the head data is the maximum value or the number of maximum value detecting target data is less than 400), short of data is filled with '0.' In addition, 5 upper rank data from the maximum peak value is displayed. Both data is extracted and saved when recording data.

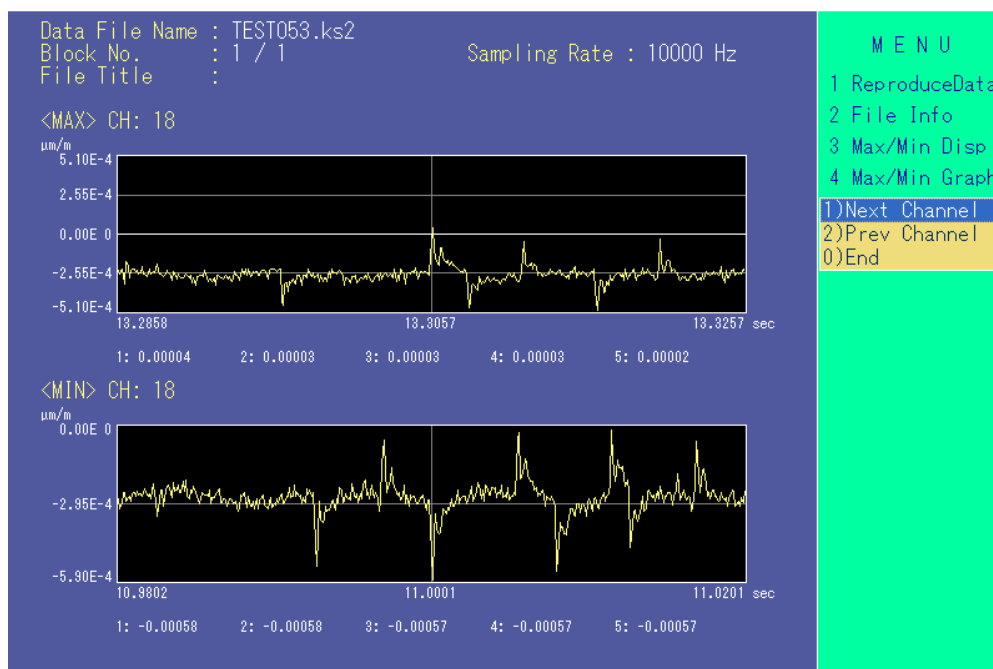
■ Min Data

Minimum data is, by centering on minimum valley value, displayed with 200 data in the front and 199 data in the back totaling 400 data. If the number of data around the minimum value does not satisfy the specified number (for example, the head data is the minimum value or the number of data of the minimum value detecting target data is less than 400), short of data is filled with '0.' In addition, 5 lower rank data from the minimum valley value is displayed. Both data is extracted and saved when recording data.

5-8-1-1 Graphically Displaying Maximum and Minimum Values [ReproduceData/File Info/Max/Min Disp/Max/Min Graph]

■ Operation Method

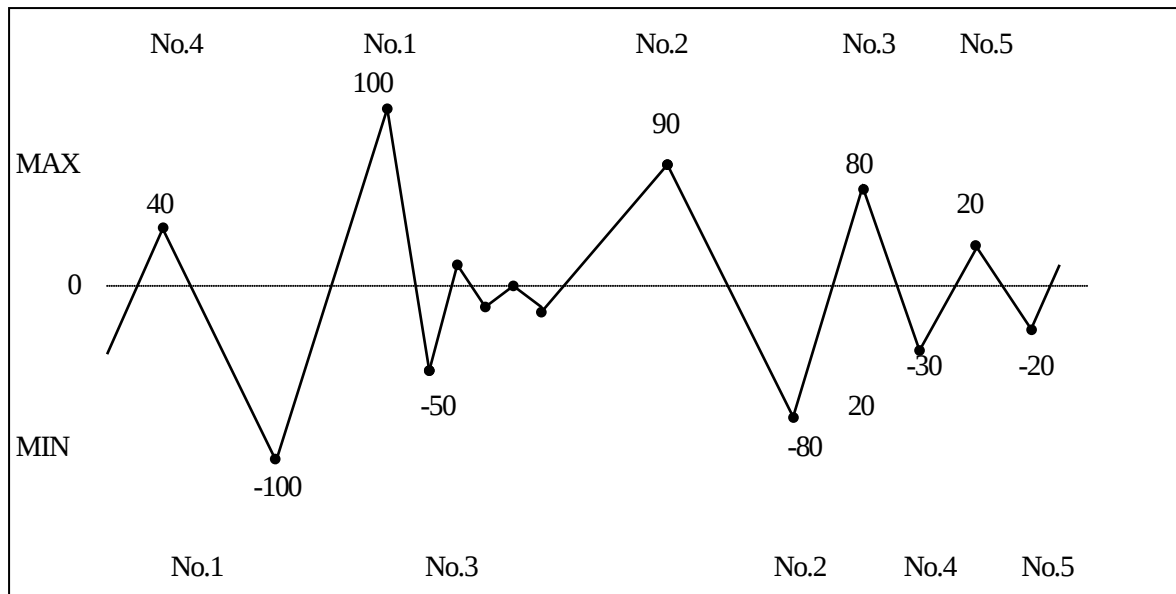
- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Max/Min Disp> from the <File Info> menu.
- 3) Select <Max/Min Graph> from the <Max/Min Disp> menu.



- 4) Maximum and minimum data of the head channel of the recorded data with 200 data in the front and 199 data in the back totaling 400 data are displayed. In addition, the respective maximum data and 5 minimum data are numerically displayed on the lower graph, respectively. (For the respective 5 maximum and minimum values, see the next section "5-8-1-2.")

5-8-1-2 List of Maximum and Minimum Values [ReproduceData/File Info/Max/Min Disp/Max/Min List]

Displays upper 5 rank data of the PEAK value valley, and lower 5 data of the VALLEY value.



■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
 - 2) Select <Max/Min Disp> from the <File Info> menu.
 - 3) Select <Max/MinList> from the <Max/Min Disp> menu.
- To change the display channel, select <Next Page> or <Prev Page>.

< MAX/MIN >		Data File Name : TEST053.ks2					MEAS Data Nos : 214,000		M E N U	
		Block No. : 1 / 1							1 ReproduceData	
		File Title :							2 File Info	
									3 Max/Min Disp	
									4 Max/Min List	
									1)Next Page	
									2)Prev Page	
									0)End	
CH		No.1	No.2	No.3	No.4	No.5				
1	MAX	5.007	5.006	5.006	5.006	5.006				
		8.549	5.330	10.390	11.889	10.970				
	MIN	-5.047	-5.047	-5.047	-5.046	-5.046				
2	MAX	5.004	5.004	5.004	5.004	5.004				
		13.929	16.409	1.459	5.650	6.470				
	MIN	-5.041	-5.041	-5.041	-5.041	-5.041				
3	MAX	5.002	5.002	5.002	5.002	5.001				
		15.149	15.929	18.349	20.489	0.099				
	MIN	-5.043	-5.043	-5.043	-5.043	-5.043				
4	MAX	5.001	5.001	5.001	5.001	5.000				
		17.130	13.930	17.790	17.970	8.290				
	MIN	-5.045	-5.045	-5.045	-5.045	-5.045				
		11.900	3.289	13.020	17.320	17.540				
		[Upper : Physical value Lower : Time (sec)]								
		1st	2nd	3rd	4th	5th				

Ex) No. 1

- 5.007..... 1st PEAK value data of the extreme value data (Physical value)
- 8.549..... Time when the PEAK value occurred for the first time.
- 5.047 1st VALLEY value data of the extreme value data (Physical value)
- 6.560..... Time when the VALLEY value occurred for the first time.

5-8-2 Statistic Operation [ReproduceData/File Info/Statistics]

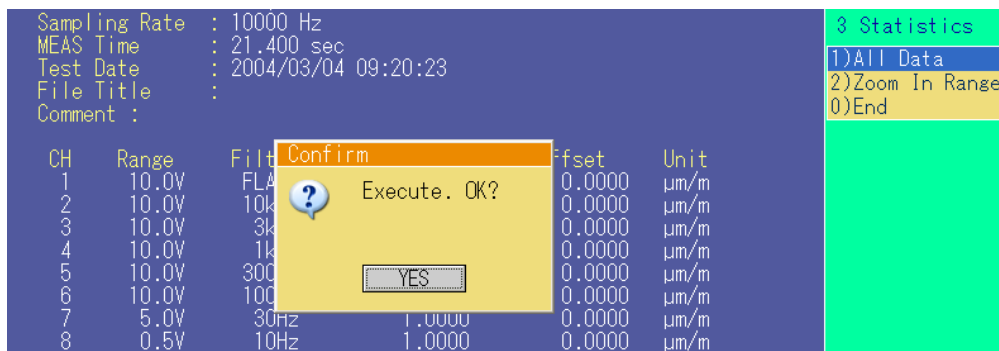
Procedures for conducting statistic operation (maximum\minimum value, average, and standard deviation) of the recorded data files and displaying calculated results are described. The statistic operation range can be selected from all data range and zoom in range.

5-8-2-1 Statistic Operation for All Data Range [ReproduceData/File Info/Statistics/All Data]

Conducts statistic operation by targeting on all the reproduced data.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Statistics> from the <File Info> menu.
- 3) Select <All Data> from the <Statistics> menu.
- 4) A message window appears to confirm whether statistic operation is conducted.
Select "Yes."



- 5) Select <Scroll> from <Statistics> menu with [↑] or [↓] key to scroll the screen.
 - The statistic operation screen is changed with [←] or [→] key

CH	Max	Min	Average	Standard	Unit
< Statistic Operation >					
Data File Name : TEST053.ks2					
Block No. : 1 / 1 MEAS Data Nos : 214,000					
Statistics Range : from 1 to 214,000					
File Title :					
CH	Max	Min	Average	Standard	Unit
1	5.0066	-5.0472	-0.033187	3.5522	μm/m
2	5.0044	-5.0412	-0.031008	3.5534	μm/m
3	5.0016	-5.0431	-0.033243	3.5529	μm/m
4	5.0009	-5.0453	-0.034897	3.5531	μm/m
5	4.9991	-5.0381	-0.032035	3.5500	μm/m
6	4.8491	-4.8972	-0.033031	3.4453	μm/m
7	1.8380	-1.9023	-0.032349	1.3192	μm/m
8	0.10042	-0.012094	0.044244	0.040274	μm/m
9	9.4534	-8.9563	0.29574	6.4561	μm/m
10	9.4506	-8.9541	0.29506	6.4557	μm/m

CH	Max	(Time s)	Min	(Time s)	Unit
< Statistic Operation >					
Data File Name : TEST053.ks2					
Block No. : 1 / 1 MEAS Data Nos : 214,000					
Statistics Range : from 1 to 214,000					
File Title :					
CH	Max	(Time s)	Min	(Time s)	Unit
1	5.0066	8.5495	-5.0472	6.5597	μm/m
2	5.0044	13.9294	-5.0412	10.9596	μm/m
3	5.0016	15.1495	-5.0431	8.1796	μm/m
4	5.0009	17.1296	-5.0453	11.8997	μm/m
5	4.9991	1.2396	-5.0381	8.7003	μm/m
6	4.8491	12.9518	-4.8972	0.7912	μm/m
7	1.8380	9.8563	-1.9023	5.0356	μm/m
8	0.10042	8.9583	-0.012094	2.7976	μm/m
9	9.4534	0.5256	-8.9563	1.4482	μm/m
10	9.4506	4.3128	-8.9541	2.7106	μm/m

- 6) Press [ESC] key to return to the menu screen and select <Save> from the <Statistics> menu.
 - 7) Specify the file name, folder name, and file title and select the <Save> from the <Statistics> menu.
- Then, the results of the statistic operation are saved in CSV format file.

5-8-2-2 Statistic Operation for Zoom In Range [ReproduceData/File Info/Statistics/Zoom In Range]

Procedures for conducting statistic operation by targeting on zoom in range of the recorded data are described.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Statistics> from the <File Info> menu.
- 3) Select <Zoom In Range> from the <Statistics> menu.
Set the desired zoom in range for statistic operation.
- 4) A message window appears to confirm whether statistic operation is conducted.
Select "Yes."
- 5) Select <Scroll> from <Statistics> menu and move the cursor with [↑] or [↓] key to change the page.
• The statistic operation screen is changed with [←] or [→] key

CH	Max	Min	Average	Standard deviation	Unit
CH	Max	(TimeS)	↑↓ Min	(Time S)	Unt

- 6) Press [ESC] key to return to the menu screen and select <Save> from the <Statistics> menu.
- 8) Specify the file name, folder name, and file title and select the <Save> from the <Statistics> menu to save the results of the statistic operation.

5-8-3 Playing Back Voice Data [ReproduceData/File Info/Voice Data]

Procedures for playing back the voice data are described.

The <Voice Data> menu is displayed only when voice input data is played back.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Voice Data> from the <File Info> menu.

< Voice Data List >				M E N U	
Data File Name : TEST053.ks2		Data Nos : 3		1 ReproduceData	
Block No. : 1 / 1				2 File Info	
File Title :				3 Voice Data	
No.	Time (sec)	No.	Time (sec)		
1	5.300	2	10.500		
3	15.600				

- 3) Move the cursor to the desired data and press [VOICE MEMO] key to play back the voice data.
- 4) Press [ESC] key to return to the menu screen.

5-8-4 Editing Header [ReproduceData/File Info/Edit Header]

Describes details of editing various items such as test date of reproduced data, file title, comment, calibration coefficient, offset, unit, channel name, and bit name.

< Edit Header >							M E N U	
Data File Name : TEST053.ks2							1	ReproduceData
Block No. : 1 / 1							2	File Info
MEAS Mode : Manual							3	Edit Header
MEAS Data Nos : 214,000							1)	Test Date
Sampling Rate : 10000 Hz							2)	File Title
MEAS Time : 21.400 sec							3)	Comment
Test Date : 2004/03/04 09:20:23							4)	CAL Coef
File Title :							5)	Offset
Comment :							6)	Unit
CH	Range	Filter	Coefficient	Offset	Unit		7)	Channel Name
1	10.0V	FLAT	1.0000	0.0000	μm/m		8)	Bit Name
2	10.0V	10kHz	1.0000	0.0000	μm/m		9)	Next Page
3	10.0V	3kHz	1.0000	0.0000	μm/m		A)	Prev Page
4	10.0V	1kHz	1.0000	0.0000	μm/m		0)	End
5	10.0V	300Hz	1.0000	0.0000	μm/m			
6	10.0V	100Hz	1.0000	0.0000	μm/m			
7	5.0V	20Hz	1.0000	0.0000	μm/m			

■ Description of Menu Items

- <Test Date>..... Edit test date of the data file.
- <File Title>..... Edit title of the data file.
- <Comment>..... Edit comment on the data file.
- <CAL Coef>..... Change calibration coefficient of channels.
- <Offset>..... Change offset value of channels.
- <Unit>..... Edit unit of channels.
- <Channel Name>..... Edit channel names.
- <Bit Name>..... Edit bit name of the digital channel.
- <Next Page>..... Change conditions of the next screen.
- <Prev Page>..... Change conditions of the previous screen.
- <End>..... End the header editing.

MEMO

Test date of various measurements are as follows.

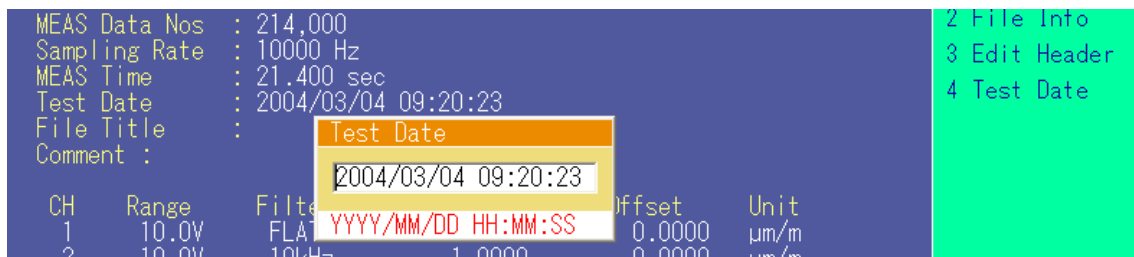
- Manual mode measurement..... Time when data is recorded for the first time
- Trigger mode measurement..... Time when the first trigger occurred
- Interval mode measurement..... Time of the first interval mode measurement.

5-8-4-1 Editing Test Date [ReproduceData/File Info/Edit Header/Test Date]

Edits recording date and time of the recorded date.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Edit Header> from the <File Info> menu.
- 3) Select <Test Date> from the <Edit Header> menu.
- 4) The following “Test Date” setting window appears. Edit the test date.



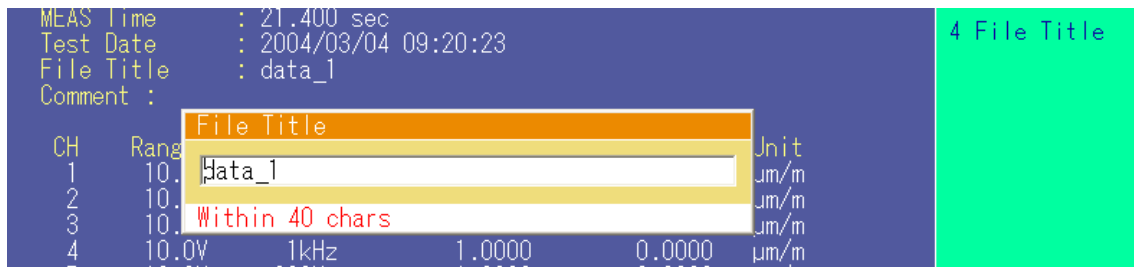
- 5) Press [ENTER] key to determine the edited date.

5-8-4-2 Editing File Title [ReproduceData/File Info/Edit Header/File Title]

Edits the file title of the reproduced data.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Edit Header> from the <File Info> menu.
- 3) Select <File Title> from the <Edit Header> menu.
- 4) The following “File Title” setting window appears. Edit the file title.



- Input the file title within maximum 40 characters.

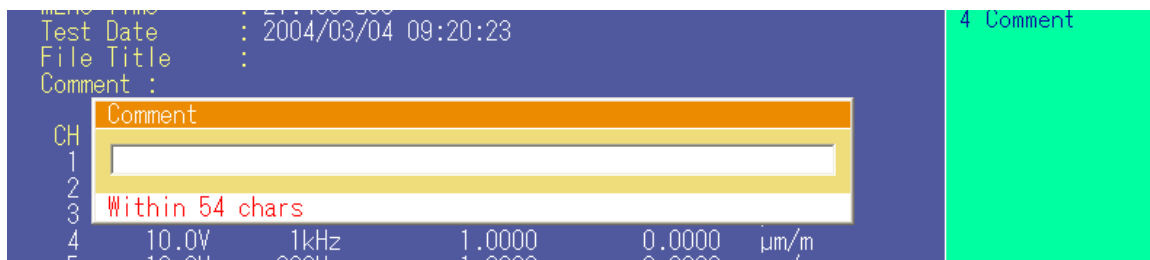
- 5) Press [ENTER] key to determine the edited file title.

5-8-4-3 Editing Comment [Reproduce Data/File Info/Edit Header/Comment]

Edits comment of the reproduced data.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Edit Header> from the <File Info> menu.
- 3) Select <Comment> from the <Edit Header> menu.
- 4) The following “Comment” setting window appears. Edit the comment.



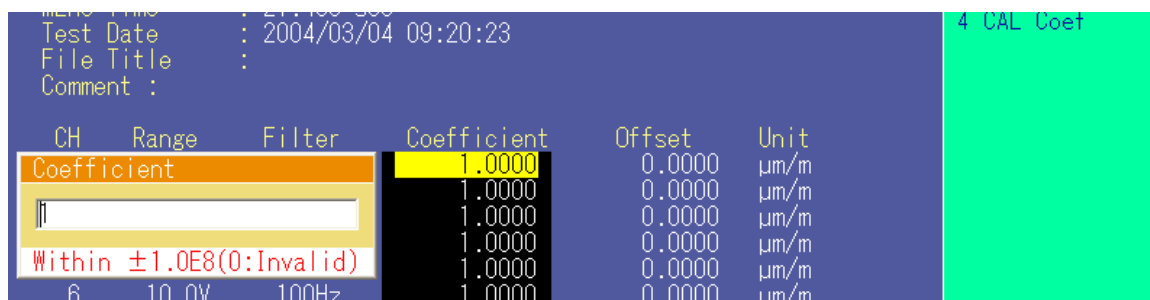
- Input the comment with maximum 54 characters.

5-8-4-4 Editing Calibration Coefficient [ReproduceData/File Info/Edit Header/CAL Coef]

Edits calibration coefficient of channels of the reproduced data.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Edit Header> from the <File Info> menu.
- 3) Select <CAL Coef> from the <Edit Header> menu.
- 4) The following “CAL Coef” setting window appears. Edit the calibration coefficient.



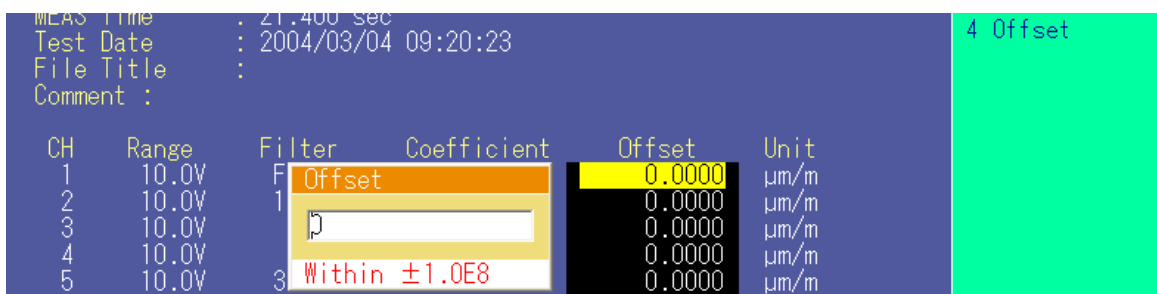
- Input range of the calibration coefficient if from -1.0E8 to 1.0E8.
- 5) Press [ENTER] key to determine the edited calibration coefficient and the cursor moves to the next channel.
 - 6) Press [ESC] key to close the window.
 - Press [DUPLICATE] key and the calibration coefficient on the cursor is copied to the next channel.
 - 7) Press [ESC] key to return to the menu screen.

5-8-4-5 Editing Offset [RreproduceData/File Info:Edit Header/Offset]

Edits offset of the reproduced data.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Edit Header> from the <File Info> menu.
- 3) Select <Offset> from the <Edit Header> menu.
- 4) The following “Offset” setting window appears. Edit the calibration coefficient.



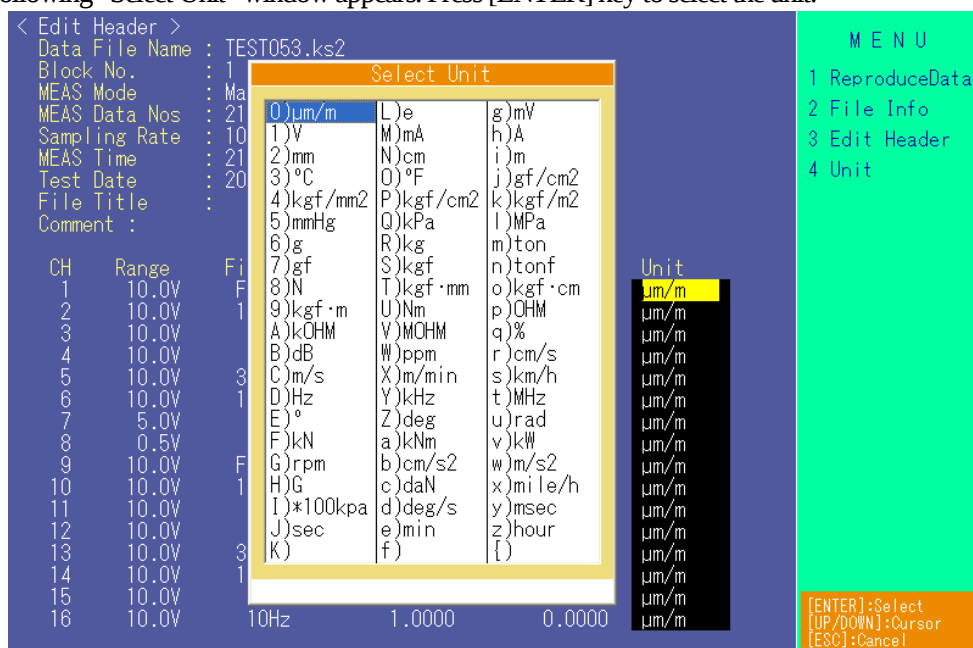
- Input the offset within range from -1.0E8 to 1.0E8.
- 5) Press [ENTER] key to determine the edited offset and the cursor moves to the next channel.
- 6) Press [ESC] key to close the window.
 - Press [DUPLICATE] key and the offset on the cursor is copied to the next channel.
- 7) Press [ESC] key to return to the menu screen.

5-8-4-6 Editing Unit [RreproduceData/File Info>Edit Header/Unit]

Edits offset of the reproduced data.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Edit Header> from the <File Info> menu.
- 3) Select <Unit> from the <Edit Header> menu.
- 4) The following “Select Unit” window appears. Press [ENTER] key to select the unit.



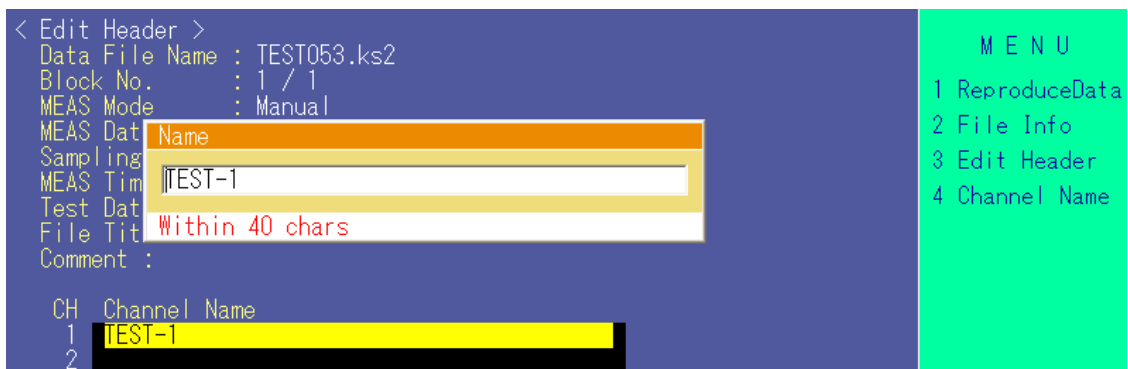
- 5) Press [ESC] key to close the unit setting window.
 - Press [DUPLICATE] key and the unit on the cursor is copied to the unit of the next channel.
- 6) Press [ESC] key once again to return to the menu screen.

5-8-4-7 Editing Channel Name [ReproduceData/File Info/Edit Header/Channel Name]

Edits channel name of the reproduced data.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Edit Header> from the <File Info> menu.
- 3) Select <Channel Name> from the <Edit Header> menu.
- 4) The following channel name setting window appears. Edit the channel name.



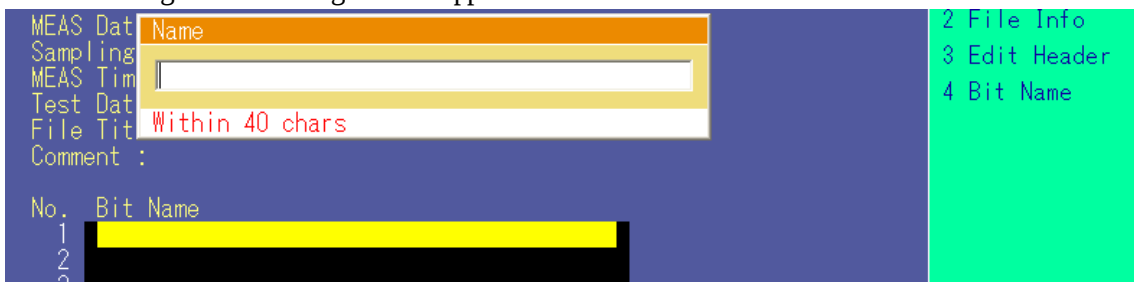
- Input the channel name with maximum 40 characters.
- 5) Press [ENTER] key to determine the edited channel name and the cursor moves to the next channel.
 - 6) Press [ESC] key to close the channel name setting window.
 - Press [DUPLICATE] key and the channel name on the cursor is copied to the next channel.
 - 7) Press [ESC] key once again to return to the menu screen.

5-8-4-8 Editing Bit Name [ReproduceData/File Info/Edit Header/Bit Name]

Edits bit name of the reproduced data.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Edit Header> from the <File Info> menu.
- 3) Select <Bit Name> from the <Edit Header> menu.
- 4) The following bit name setting window appears. Edit the bit name.



- Input the bit name within 40 characters.

- 5) Press [ENTER] key to determine the edited bit name and the cursor moves to the next channel.
- 6) Press [ESC] key to close the channel name setting window.
 - Press [DUPLICATE] key and the bit name on the cursor is copied to the next channel.
- 7) Press [ESC] key once again to return to the menu screen.

5-8-5 REC/PAUSE Information [ReproduceData/File Info/REC/PAUSE]

Displays date and time for start recording the reproduced data and the number of recorded data.

This menu, [REC/PAUSE] is displayed when selecting data file that is recorded by conducting REC/PAUSE operation for multiple times.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <REC/PAUSE> from the <File Info> menu.

< REC/PAUSE Information > Data File Name : TEST053.ks2 Block No. : 1 / 1 File Title : REC/PAUSE Times : 2					M E N U 1 ReproduceData 2 File Info 3 REC/PAUSE
No.	Start Time	MEAS Time(sec)	Data Nos		
1	2004/03/04 09:20:23	5.200	52,000		
2	2004/03/04 09:20:50	16.200	162,000		

- 3) Press [ESC] key to return to the menu screen.

5-8-6 Displaying Block Information [Reproducedata/File Info/Block Info]

When displaying multiple block data, data record start date and the number of recorded data are listed up for every block. This function is available for data file recorded with additional format.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Block Info> from the <File Info> menu.

< Block Information > Data File Name : TEST011.ks2 Blocks : 5 File Title :					M E N U 1 ReproduceData 2 File Info 3 Block Info
No.	Start Time	Data Nos			
1	2004/03/09 10:50:51	8,100			
2	2004/03/09 10:50:54	3,600			
3	2004/03/09 10:50:56	12,200			
4	2004/03/09 10:51:01	9,800			
5	2004/03/09 10:51:05	13,900			

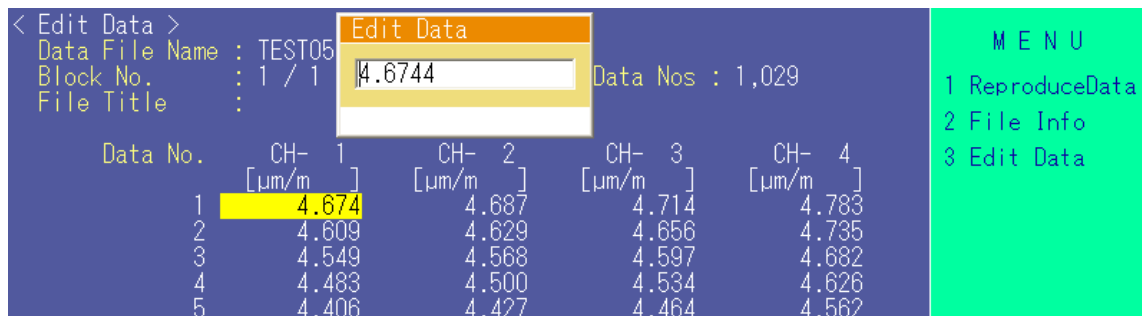
- 3) Press [ESC] key to return to the menu screen.

5-8-7 Editing Data [ReproduceData/File Info/Edit Data]

Edits the reproduced data.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Edit Data> from the <File Info> menu.
- 3) Move the cursor with [↑], [↓], [←], or [→] key and press [ENTER] key on the desired data to edit the data.



- 4) Press [ESC] key to close the “Edit Data” setting window.
- 5) Press [ESC] key once again to return to the menu screen.

5-8-8 Saving New Data [ReproduceData/File Info/Save New]

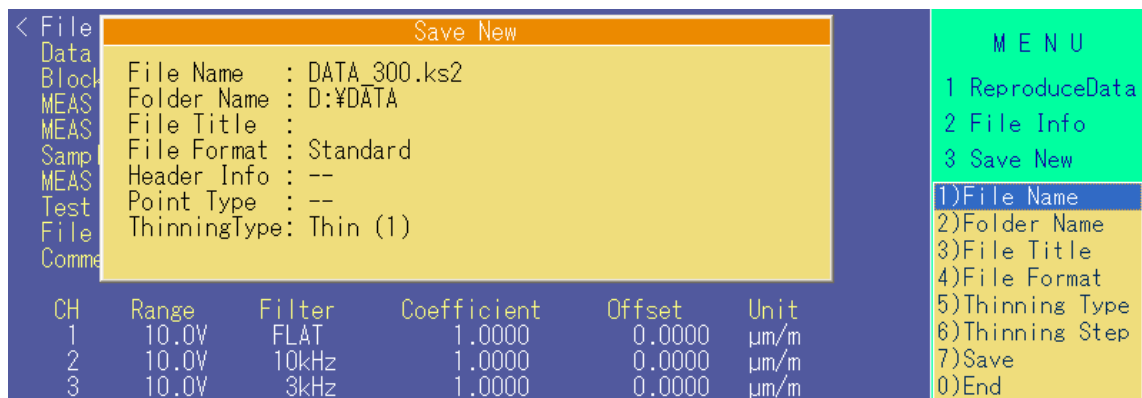
Saves the recorded data as the new data file.

In addition, setting conditions determined for the CSV format converted data is reflected on <Convert File> menu selected on the <File Manage> main menu.

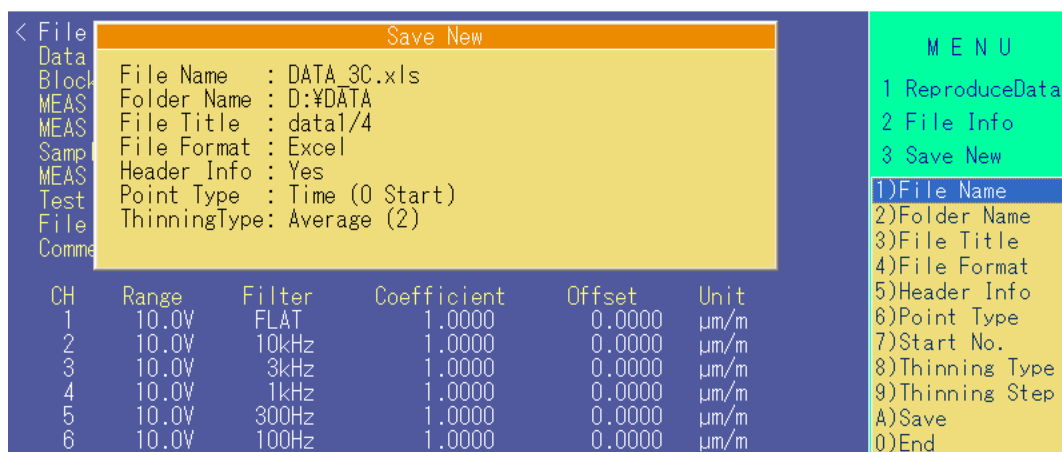
Note

Target range for saving new data is a currently displayed block range.

- When the file format is in “Standard Format File”



- When the file format is in “Excel Format File”



■ Description of Menu Items

- <File Name> File name for saving new data.
 <Folder Name> Data file for saving new data,
 <File Title> File title (within maximum 40 characters).
 <File Format> File format for saving data.

File Format	Description
Standard Format	Saves data in KYOWA standard data format (KS2).
CSV Format	Saves data in CSV format file. Although the EDX-2000B cannot read the CSV format file, it can be read by Excel and Text Editor and commercially available software, etc. Extension is 'CSV.'
Excel Format	Saves data in Excel format file. Extension is 'xls.'

- <Header Info> Set whether or not header information is saved. (See “12-1-2-2”)
 (This menu <Header Info> appears when the file is in CSV format file.)
 <Point Type> Sequentially numbered on data head. (See “12-1-2-2.”)
 This menu <Point Type> appears when the file is in CSV format file.)

Point type	Description
Time	Sequentially numbered from 0 to data record time.
Data No.	Sequentially numbered with 0 or from 1 to the number or recorded data.

- <Start No.> When the point type is data No., set whether it is started from 0 or 1.
 (See “12-2-1-1.”)
 <Thinning Step> Specifies data thinning step.
 If it is set to '0,' no thinning.
 <Thinning Type> Select the desired type from “Thin” and “Average.”
 (See “12-2-1-1.”)

Thinning Type	Description
Simple Thinning	Saves data for every specified thinning step (Ex..) For data A, B, C, D, E, and F A B C D E F Thinning step 1 × × × B, D, F data is thinned out. Thinning step 2 × × × × B, C, E, F data is thinned out.
Average Thinning	Saves data by averaging data obtained from the specified number of preset thinning steps. (Ex.) For data A, B, C, D, and E Thinning step 2 (A+B)/2, (C+D)/2, (E+F)/2 Thinning step 3 (A+B+C)/3, (D+E+F)/3

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Save New> from the <File Info> menu.
- 3) A “Save New” setting window appears. Select and edit the desired file name, file format, etc. Press [ENTER] key, to determine the edited item. Then, <Save> menu is added to the menu items. Select the <Save> key.

MEMO

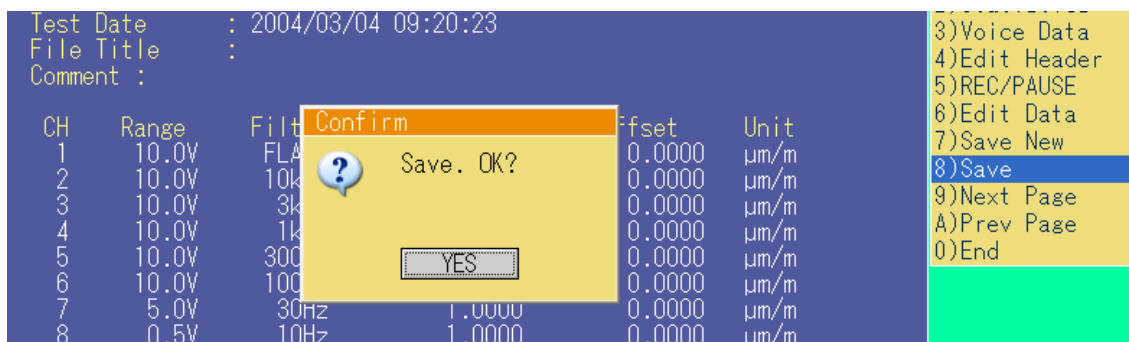
When other than ‘0’ is set for thinning step, sampling rate of the header information is changed according to the thinning step.

5-8-9 Saving Data File [ReproduceData/File Info/Save]

When header contents are edited by selecting <Edit Header> menu or data is edited by selecting <Edit Data> menu, the reproduced data is saved in the file.

■ Operation Method

- 1) Select <File Info> from <ReproduceData> main menu.
- 2) Select <Save> from the <File Info> menu.
- 3) A widow appears to confirm whether data is overwritten and saved. If it is OK, press [ENTER] key.



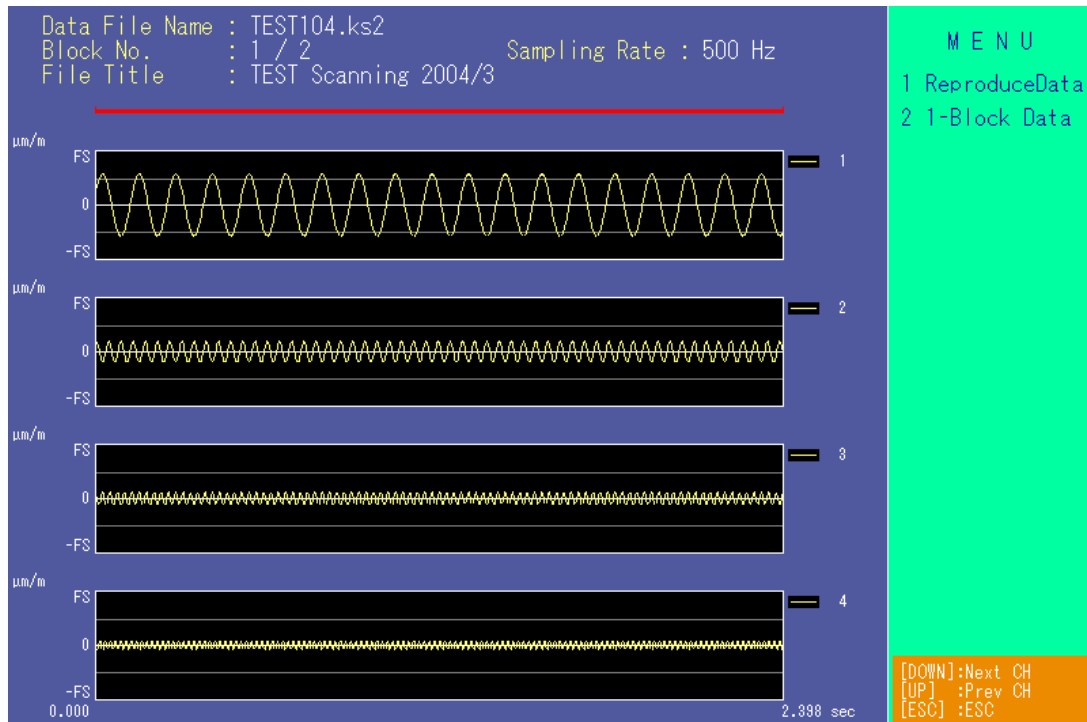
5-9 DISPLAYING 1 BLOCK DATA [ReproduceData/1-Block Data]

Graphically displays 1-block of the reproduced data for every channel.

To change the display block, select <Conditions> from the <ReproduceData> main menu.

■ Operation Method

- 1) Select <1 Block Data> from <ReproduceData> main menu



- Displays the next channel with [$\downarrow$] key.
- Displays the previous channel with [$\uparrow$] key.
- Returns to the menu screen with [ESC] key.
- To change the display block select <Block> from <Conditions> menu on <ReproduceData> main menu.

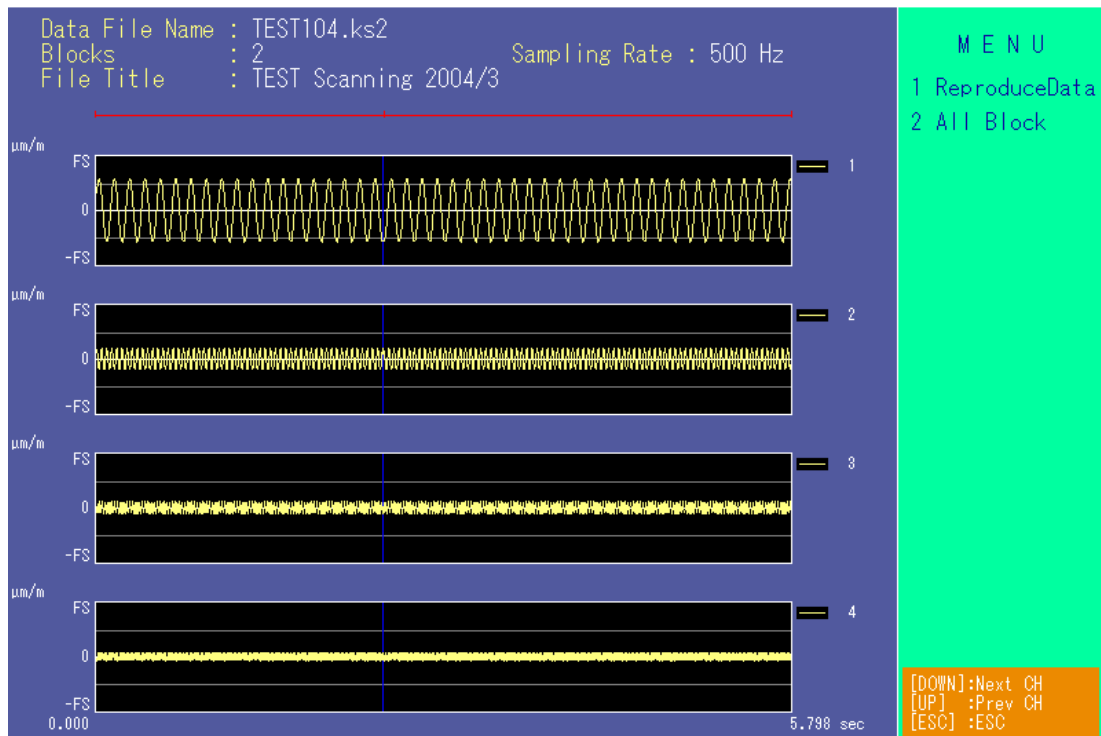
5-10 DISPLAYING ALL BLOCK DATA[ReproduceData/All Block]

Graphically displays all block reproduced data in series for every channel.

This menu <All Block> appears when selecting a file recorded with multiple block data.

■ Operation Method

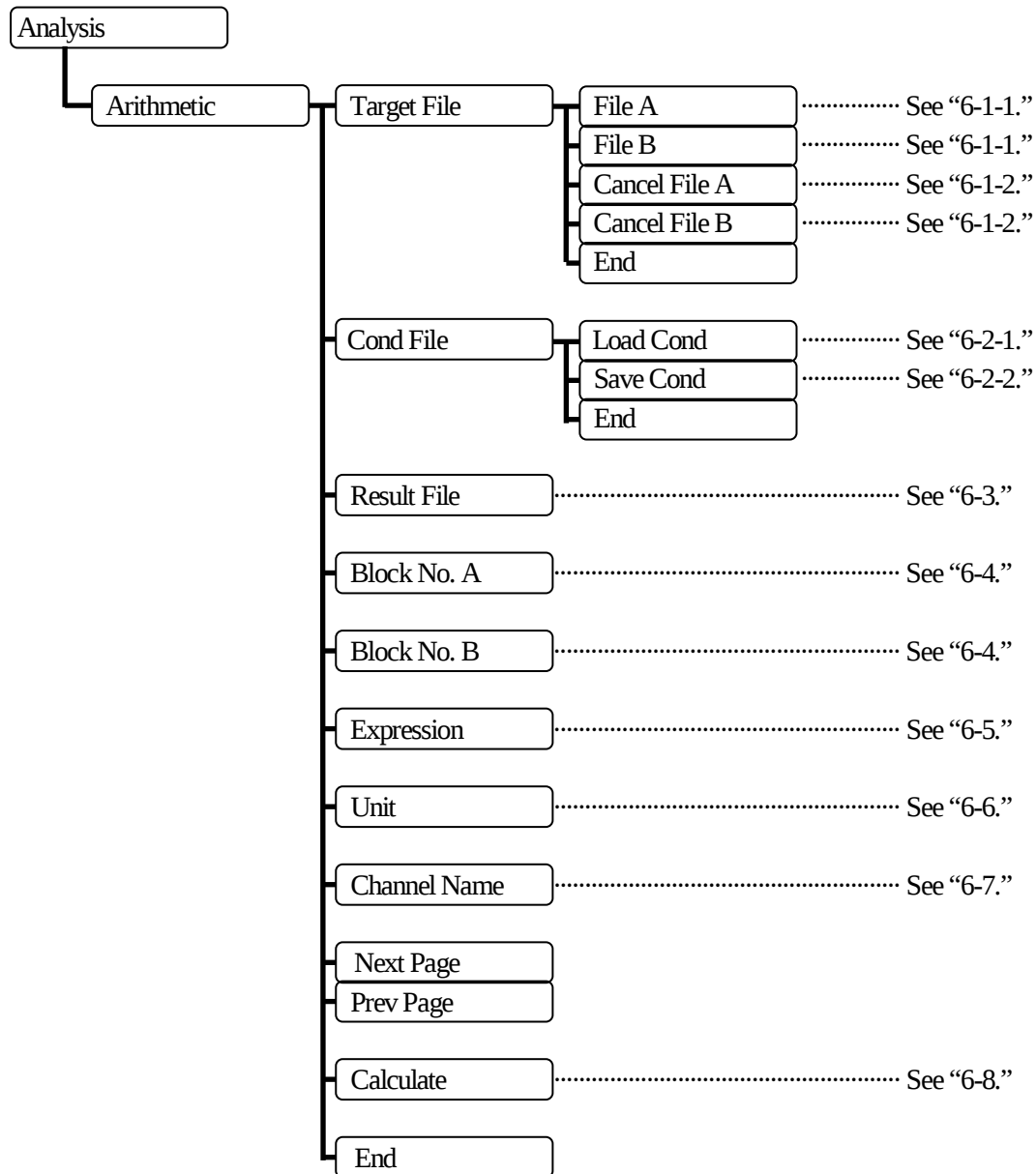
- 1) Select <All Block>. from <ReproduceData> main menu
- 2) All data is graphically displayed.



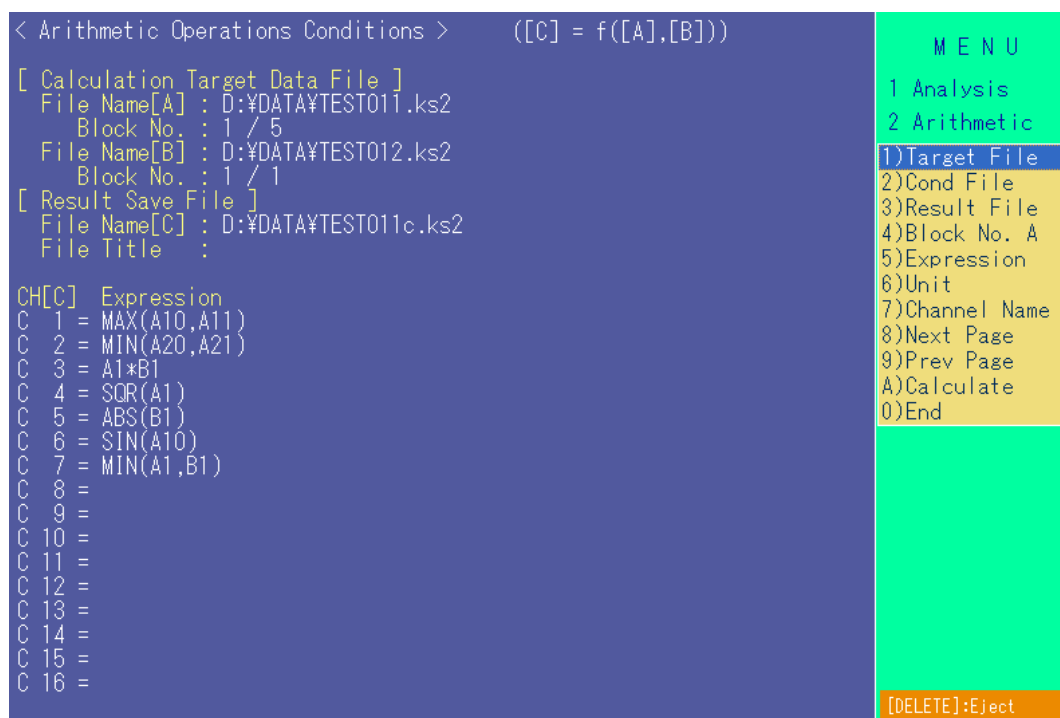
- Displays the next channel with [↓] key.
- Displays the previous channel with [↑] key.
- Returns to the menu screen with [ESC] key.

6. ARITHMETIC OPERATIONS

This Chapter describes arithmetic operations (+, -, ×, /) and functional calculation conducted between channels of maximum 2 data files. Arithmetic expression can be entered up to 192 channels. Since expression, unit and channel name of the previous settings are successively used, when the EDX-2000B is started up the next time, edit the expression, etc. if required.



■ Arithmetic Operations Screen



■ Description of Menu Items

- <Target File> Select calculation target file.
- <Cond File> Load the arithmetic operations condition file and save the arithmetic operations conditions.
- <Result File> Set details of calculation result file.
- <Block No. A, Block No. B> Set block data calculation target No.
- <Expression> Set expression for maximum 192 channels.
- <Unit> Set unit of calculation result data for every channel.
- <Channel Name> Set comments for every channel.
- <Next Page> Change expression to the next channel.
- <Prev Page> Change expression to the previous channel.
- <Calculate> Conduct arithmetic operations with preset conditions.
- <End> End the arithmetic operations.

■ Operation Procedures

- 1) Select <Arithmetic> from <Analysis> main menu.
- 2) Select <Target File> from the <Arithmetic> menu.
- 3) Set calculation result file name and folder for saving the file.
- 4) Set arithmetic operations conditions. (Load arithmetic operations condition file if required.)
- 5) Save the arithmetic operations conditions into a file.
- 6) Conducts the arithmetic operations.

■ Restrictions

- 1) All characters that are used for expressions are alphabets from Aa to Zz, whole numbers from 0 to 9, parenthesis (), operators (+, -, *, /), square root and power (^),.
- 2) Calculation can be conducted in maximum 2 data files (target files A and B).
- 3) When conducting the arithmetic operations in 2 files, select the files having the same sampling frequency.
If the number of data per channel differs between the 2 files, calculate by considering the file having the lesser number of data.
- 4) Only analog channel can be a calculation target channel. (Calculation of digital channel is not allowed.)
- 5) Input expression with maximum 60 characters.
- 6) Functions that can be entered in the expression are described in the following table.

Trigonometric Function	SIN、COS、TAN、ASIN、ACOS、ATAN (Degree is in radian unit)
Logarithm Function	LN (Natural Logarithm), LOG (Common Logarithm)
Exponential Function	EXP (Exponential)
Rosette Function	HMX (Maximum principal strain), HMN (Minimum principal strain), HSM (Maximum sheering strain), SMX (Maximum principal stress), SMN (Minimum principal stress), SSM(Maximum principal sheering stress), DEG (Direction of principal strain)
Other Functions	ABS (Absolute Value), SQR(Square Root), MAX (Maximum value), MIN (Minimum value)

- 7) If “divided by 0” occurred during calculation, substitute 1×10^{38} to calculated result and continue the calculation.
- 8) If the result of calculation exceeds 1×10^{38} , stop the calculation. (The result file is not saved.)

6-1 SELECTING CALCULATION TARGET FILE [Arithmetic/Target File]

This section describes procedures for selecting calculation target file and canceling the selected calculation target file.

■ Operation Method

- 1) Select <Target File> from <Arithmetic> menu.

6-1-1 Setting Calculation target File [Arithmetic/Target File/File A, File B]

Set a calculation target file. When calculation is conducted in 2 data files, set both <File A> and <File B>.

■ Operation Method

- 1) Select <Target File> from <Arithmetic> menu.
- 2) Select <File A> or <File B> from the <Target File> menu.
- 3) Move the cursor to the target file “File A” or “File B” with [↑] or [↓] key and press [ENTER] key to determine the target file.

Note

Press the [CHARACTER] key on the file cursor to display various items, for example, data file information (the number of blocks, measuring mode, the number of measuring channels, sampling rate, file title, comment, block information, test information, etc).

■ To Change the Folder

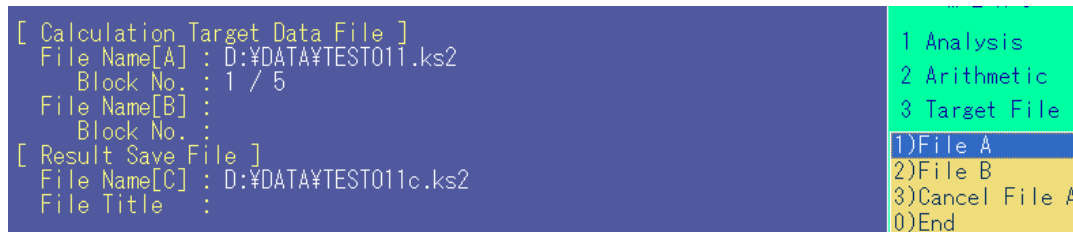
- 1) Select <Change Folder> from <File A> or <File B> menu.
- 2) A “Select Folder” window appears. Move the cursor to the desired folder with [↑], [↓], [←], or [→] key and press [ENTER] key to determine the selection.

6-1-2 Canceling the Setting of Calculation Target File [Arithmetic/Target File/Cancel File A, Cancel File B]

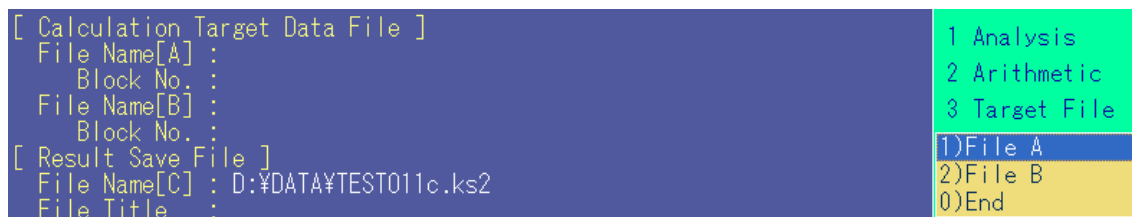
Cancels the preset calculation target file.

■ Operation Method

- 1) Select <Target File> from <Arithmetic> menu.
- 2) Select <Cancel File A> or <Cancel File B> from the <Target File> menu.



- 3) Move the cursor to the desired file with [↑] or [↓] key and press [ENTER] key to determine the cancel.
Then, the target <Cancel File A> or <Cancel File B> is cancelled.
 - After <Cancel File A> Menu is Selected



6-2 LOADING AND SAVING ARITHMETIC OPERATIONS CONDITION FILE [Arithmetic/Cond file]

This section described basics of loading the arithmetic operations condition file previously saved to set all the arithmetic operations conditions together at one time.

6-2-1 Loading Arithmetic Operations Condition File [Arithmetic/Cond File/Load Cond]

Load the previously saved arithmetic operations condition file.

- Operation Method
 - 1) Select <Cond File> from <Arithmetic> menu.
 - 2) Select <Load Cond> from the <Cond File> menu.
 - 3) Move the cursor to the desired selection on the <Load Cond> menu with [↑] or [↓] key and press [ENTER] key.
- To Change the Folder
 - 1) Select <Change Folder> menu.
 - 2) A “Select Folder” selecting window appears. Move the cursor to the desired folder with [↑], [↓], [←], or [→] key and press [ENTER] key to determine the changed folder.

6-2-2 Saving Arithmetic Operations Condition File [Arithmetic/Cond File/Save Cond]

Procedures for saving the preset arithmetic operations conditions are described.

The previously saved arithmetic operations condition files are loaded to set them all together at a time.

- Operation Method
 - 1) Select <Cond File> from <Arithmetic> menu.
 - 2) Select <Save Cond> from the <Cond File> menu.
 - 3) Specify a file name, folder name, and file title and select <Save> menu.
 - 4) A message appears to confirm whether the file is saved. Press [ENTER] key to save the specified items.
 - 5) Select <End> menu and it returns to the menu screen.

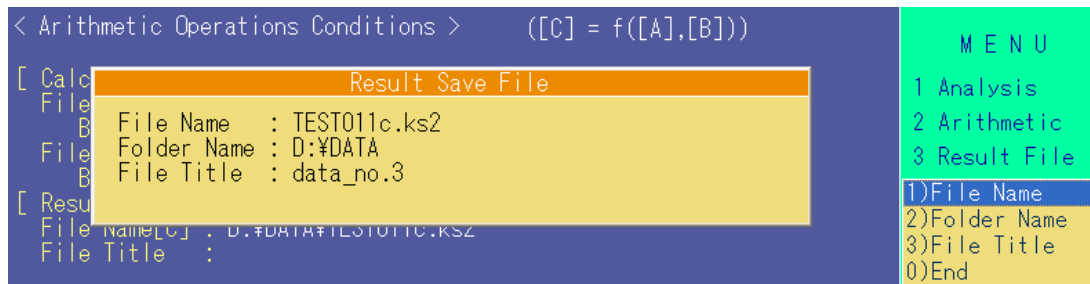
6-3 SPECIFYING CALCULATED RESULT FILE [Arithmetic/Result File]

Procedures for setting file name, folder name, and file title of calculation result file are described. Extension of the analysis result file is 'ks2.'

The calculation result file is considered as same as the recorded data, which can be subjected to data reproduction or analysis.

■ Operation Method

- 1) Select <Result File> from <Arithmetic> menu.
- 2) Specify <File Name>, <Folder Name> or <File Title> menu and Select <End> menu to set the selection.



6-4 SETTING BLOCK NO. [Arithmetic/Block No. A, Block No. B]

If any block data file(s) exist in the selected calculation target file, set block Nos. for the calculation target.

As a default value, block '1' is set as a calculation target.

Note

When setting Block No. A to '0,' all blocks are targeted for calculation.

Block No. B is set to '1' and since 1 block is targeted for calculation, calculating all blocks is not allowed.

Calculation of different block Nos. in multiple files is described in the following.

(File A is a 3-block data file and file B is a 2-block data file)

■ Calculating File A 3-block data file and File B 2-block data file

Calculate File A 3-block and File B 2-block data and the calculated results shall be 1-block data.

FileA	Block1	Block2	Block3
			Target Block

FileB	Block1	Block2
		Target Block

Result FileC	Block1
	A3 and B2

■ Calculating File A all-block data files and File B 2-block data file

Calculate File A 1-block and File B 2-block data, File A 1-block and File B 2-block data, File A 2-block and File B 2-block data and the calculated results shall be 3-block data.

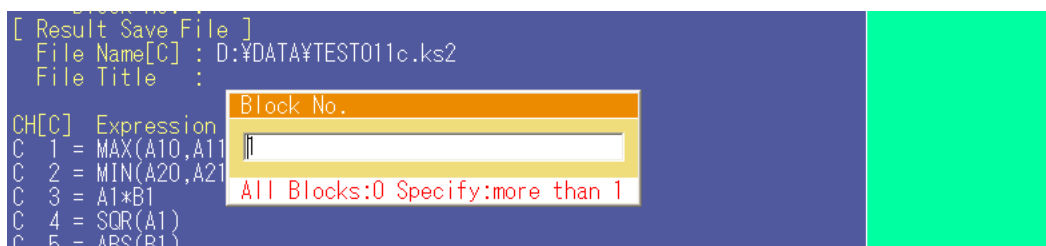
FileA	Block1	Block2	Block3
	Target Block		

FileB	Block1	Block2
		Target Block

ResultFileC	Block1	Block2	Block3
	A1 and B2	A2 and B2	A3 and B2

■ Operation Method

- 1) Select <Block No.A> or <B lock No.B> from <Arithmetic> menu.
- 2) Input the desired calculation target block No. and press [ENTER] key



6-5 SETTING EXPRESSION [Arithmetic/Expression]

This section described setting of expression for every channel.

Expressions are set in calculation channels (From C1 to C192) and the calculation results are saved as data of calculation channels with the same format of the recording data file. Built-in function is used for the expressions. (See “6-9.”)

$C_n = f(A_k, B_m)$ where, A denotes calculation target file (A)

B denotes calculation target file (B)

C denotes calculation result file (C)

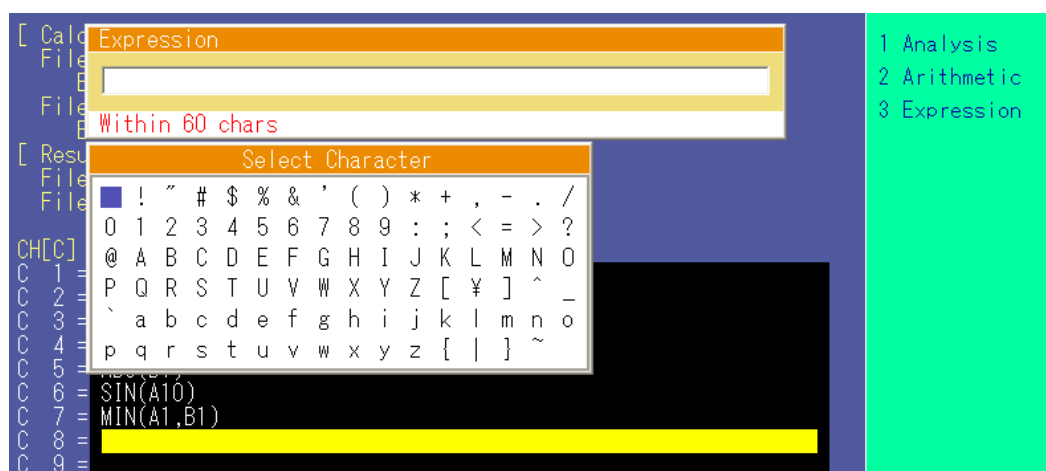
k, m, n denote channel Nos.

■ Calculating Conditions

- 1) Only analog channel shall be calculation target channel.
- 2) Input expressions within 30 figures.
- 3) If calculation result exceeds 1×10^{38} , stop the calculation.
- 4) If “divided by 0” occurred during the calculation, substitute 1×10^{38} to the calculation results and continue the calculation.

■ Operation Method

- 1) Select <Expression> from <Arithmetic> menu.
- 2) An “Expression” column appears in reverse display. Move the cursor to the desired expression with [$\uparrow$] or [$\downarrow$] key and then, press [ENTER] key.
- 3) An “Expression” setting window appears. Press [CHARACTER] key and input the desired expression.



Specify calculation target channel with ‘A**’ and ‘B**.’ (A and B denote calculation target file, and ** denotes channel No.)

[Ex.]

- $(A1+A2)/2$
- $(10*(A10/B10)-(B3/(A5-B5))$
- $SQR(A10)$
- $SIN(A11)$
- $LOG(B10)$
- $HMX(A10, A11, A12)$
- $HSM(B10, B11, 12)$
- $SMN(A10, A11, A12, 2.1, 0.3)$
- $DEG(B10, B11, B12)$

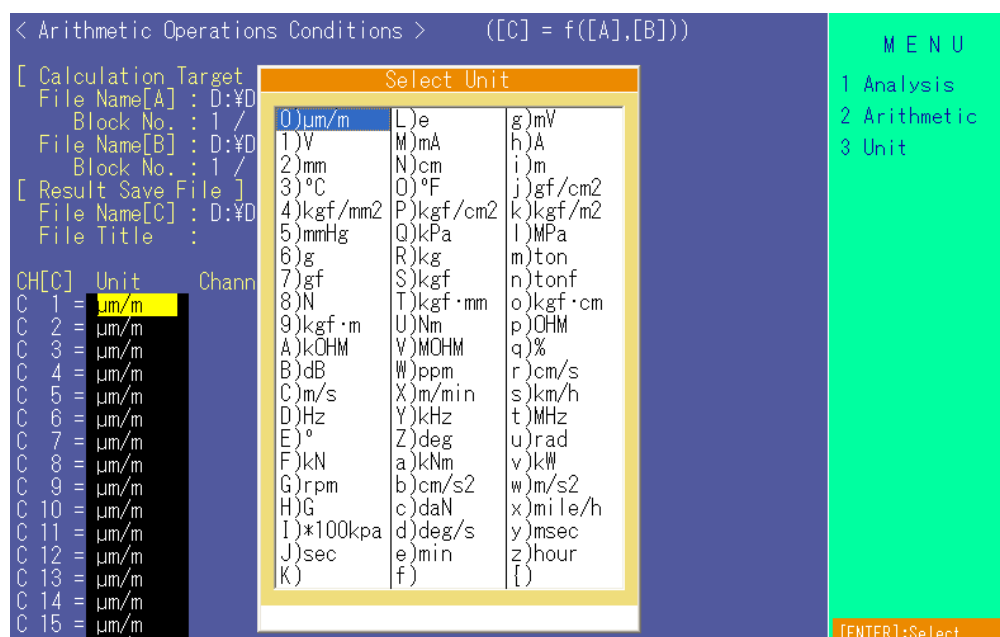
- 4) Press [ENTER] key to determine the expression.
- 5) Press [ESC] key to return to the menu screen.

6-6 SETTING UNIT [Arithmetic/Unit]

This section describes setting of unit of calculation result file [C] for every channel.

■ Operation Method

- 1) Select <Unit> from <Arithmetic> menu.
- 2) A “Select Unit” window appears. Select the desired unit.



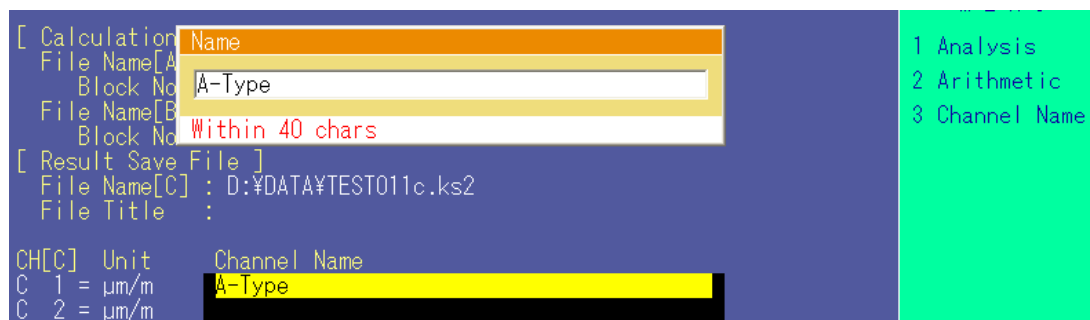
- 3) Press [ESC] key to close the “Unit” setting window.
Press [DUPLICATE] key on the cursor to copy the unit on the cursor position to the next channel.
- 4) Press [ESC] key once again to return to the menu screen.

6-7 SETTING CHANNEL NAME [Arithmetic/Channel Name]

This section describes setting of channel name of calculation result file [C] for every channel.

■ Operation Method

- 1) Select <Channel Name> from <Arithmetic> menu.
- 2) Move the cursor to the desired channel with [↑] or [↓] key, input the channel name and then, press [ENTER] key to determine the input channel name.



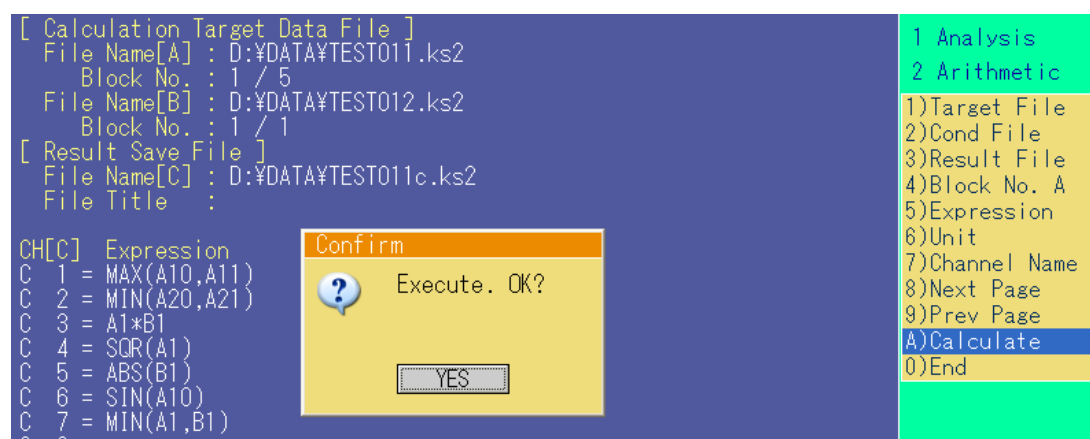
- 3) Press the [ESC] to return to the menu screen.

6-8 EXECUTING CALCULATION [Arithmetic/Calculate]

This section describes execution of arithmetic operations.
Calculation results are saved into the result file.

■ Operation Method

- 1) Select <Calculate> from <Arithmetic> menu.
- 2) A message appears to confirm whether calculation is conducted. If it is OK, press [ENTER] key.



6-9 EXAMPLE OF USE OF VARIOUS FUNCTIONS [Arithmetic/Expression]

This section describes various functions that can be used for expressions.

'nnn' represents calculation target channel No. and set with A*B*. (A and B are calculation target files.) In addition, setting of numeric values is also available (excluding rosette function).

6-9-1 Square Root Function SQR (nnn) [SQR]

Square root function is a function to obtain square root from measured data of the specified calculation target channel.

- Ex. SQR (A10)
 - Obtain square root of channel 10 of calculation target file A.
 - When the calculation target channel data is 8.78, calculation result shall be 2.9631.

6-9-2 Absolute Value Function ABS (nnn) [ABS]

Absolute value function is a function to obtain absolute value of measured data of the specified calculation target channel.

- Ex. ABS (A10)
 - Obtain ABS of channel 10 of calculation target file A.
 - When the calculation target channel data is 8.78, calculation result shall be 8.78.

6-9-3 Comparison Function (Maximum) MAX (nnn) [MAX]

Comparison function is a function to obtain the larger value of measured data between the specified 2 calculation target channels.

- Ex. MAX (A10, A11)
 - Consider the larger value between channels 10 and 11 of calculation target file A as calculated result.
 - When data of the calculation target channel resulted to be 8.78 and 5.06, the calculation result shall be 8.78..

6-9-4 Comparison Function (Minimum) MIN (nnn, nnn) [MIN]

Comparison function is a function to obtain the smaller value of the measured data between the specified 2 calculation target channels.

- Ex. MIN (A10, A11)
 - Consider the smaller value between channels 10 and 11 of calculation target file A as calculated result.
 - When data of the calculation target channel resulted to be 8.78 and 5.06, the calculation result shall be 5.06.

6-9-5 SIN Function SIN (nnn) [SIN]

SIN function is a function to obtain SIN from with measured data of the specified calculation target channel. Angle is in radian unit.

- Ex. SIN (A10)
 - Obtain SIN of channel 10 of calculation target file A.
 - When data of the calculation target channel is 8.78, the calculation result shall be 0.60102.

6-9-6 COS Function COS (nnn) [COS]

COS function is a function to obtain COS from measured data of the specified calculation target channel.
Angle is in radian unit.

■ Ex. COS (A10)

- Obtain COS of channel 10 of calculation target file A.
- When data of the calculation target channel is 8.78, the calculation result shall be -0.79923.

6-9-7 TAN Function TAN (nnn) [TAN]

TAN function is a function to obtain TAN from measured data of the specified calculation target channel.
Angle is in radian unit.

■ Ex. TAN (A10)

- Obtain TAN of channel 10 of calculation target file A.
- When data of the calculation target channel is 8.78, the calculation result shall be -0.75200.

6-9-8 ASIN Function ASIN (nnn) [ASIN]

ASIN function is a function to obtain SIN^{-1} from measured data of the specified calculation target channel.
Angle is in radian unit.

If the number of arguments is less than -1, set SIN^{-1} to -1. and if the same is more than +1, set SIN^{-1} to +1.

■ Ex. ASIN (A10)

- Obtain SIN^{-1} of channel 10 of calculation target file A.
- When data of the calculation target channel is 0.5, the calculation result shall be -0.52350.

6-9-9 ACOS Function ACOS (nnn) [ACOS]

ACS function is a function to obtain COS^{-1} from measured data of the specified calculation target channel.
Angle is in radian unit.

If the number of arguments is less than -1, set SIN^{-1} to -1. and if the same is more than +1, set SIN^{-1} to +1.

■ Ex. ACOS (A10)

- Obtain COS^{-1} of channel 10 of calculation target file A.
- When data of the calculation target channel is 0.5, the calculation result shall be 1.04720.

6-9-10 ATAN Function ATAN (nnn) [ATAN]

ATAN function is a function to obtain TAN^{-1} with measured data of the specified calculation target channel. Angle is in radian unit.

■ Ex. ATAN (A10)

- Obtain TAN^{-1} of channel 10 of calculation target file A.
- When data of the calculation target channel is 0.5, the calculation result shall be 0.46365.

6-9-11 LOG (Common Logarithm) Function LOG (nnn) [LOG]

LOG function is a function to obtain LOG from measured data of the specified calculation target channel.

■ Ex. LOG (A10)

- Obtain LOG of channel 10 of calculation target file A.
- When data of the calculation target channel is 8.78, the calculation result shall be 0.94349.

6-9-12 LN (Logarithm Natural) Function LN (nnn) [LN]

LN function is a function to obtain LN with measured data of the specified calculation target channel.

■ Ex. LN (A10)

- Obtain LN of channel 10 of calculation target file A.
- When data of the calculation target channel is 8.78, the calculation result shall be 2.1725.

6-9-13 EXP (Exponent) Function EXP (nnn) [EXP]

EXP function is a function to obtain $\text{EXP}(e^x)$ with measured data of the specified calculation target channel.

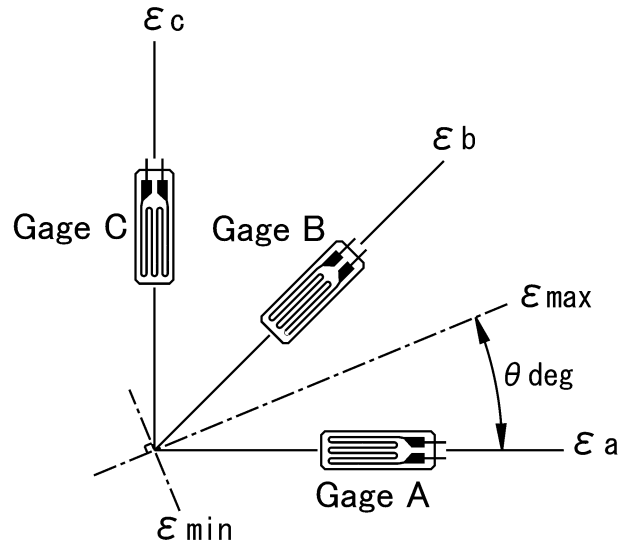
■ Ex. EXP (A10)

- Obtain EXP of channel 10 of calculation target file A.
- When data of the calculation target channel is 8.78, the calculation result shall be 6502.9.

6-9-14 Rosette Function [Rosette Function]

Rosette function is an analytical function using 3-axis rosette gage.

Three strain gages denoted by A, B, and C are located as shown in the following figure.



Rosette Gage

where, arguments $\epsilon_a, \epsilon_b, \epsilon_c$ denote CH Nos., E denotes Young's modulus (unit : $\times 10^6$), and ν denotes Poisson's ratio.

6-9-14-1 HMX (Maximum Principal Strain) Function HMX ($\epsilon_a, \epsilon_b, \epsilon_c$)[HMX]

HMX function is a function to obtain the Maximum Principal Strain from the specified 3-channel measured data.

■ Ex. HMX (A10, A11, A12)

- Obtain the Maximum Principal Strain from channels 10, 11, and 12 of calculation target file A.
- Calculation results shall be 924.86 $\mu\text{m/m}$, when data of the calculation target channel A10 is 671 $\mu\text{m/m}$, the same of A11 is 740 $\mu\text{m/m}$, and the same of A12 is 914 $\mu\text{m/m}$.

■ Expression

$$\epsilon_{\max} = \frac{1}{2} \left[\epsilon_a + \epsilon_c + \sqrt{2 \{ (\epsilon_a - \epsilon_b)^2 + (\epsilon_b - \epsilon_c)^2 \}} \right]$$

6-9-14-2 HMN (Minimum Principal Strain) Function HMN(εa, εb, εc) [HMN]

HMN function is a function to obtain the Minimum Principal Strain from the specified 3-channel measured data.

■ Example HMN (A10, A11, A12)

- Obtain the Minimum Principal Strain from channels 10, 11, and 12 of calculation target file A.
- Calculation results shall be 666.14 μm/m, when data of the calculation target channel A10 is 671 μm/m, the same of A11 is 740 μm/m, and the same of A12 is 914 μm/m.

■ Expression

$$\varepsilon_{\min} = \frac{1}{2} \left[\varepsilon_a + \varepsilon_c - \sqrt{2 \left\{ (\varepsilon_a - \varepsilon_b)^2 + (\varepsilon_b - \varepsilon_c)^2 \right\}} \right]$$

6-9-14-3 HSM (Maximum Sheering Strain) Function HSM(εa, εb, εc) [HSM]

HSM function is a function to obtain the Maximum Sheering Strain from the specified 3-channel measured data.

■ Ex. HSM (A10, A11, A12)

- Obtain the Minimum Principal Sheering Strain of channels 10, 11, and 12 of calculation target file A.
- Calculation results shall be 264.71 μm/m, when data of the calculation target channel A10 is 671 μm/m, the same of A11 is 740 μm/m, and the same of A12 is 914 μm/m.

■ Expression

$$\gamma_{\max} = \sqrt{2 \left\{ (\varepsilon_a - \varepsilon_b)^2 + (\varepsilon_b - \varepsilon_c)^2 \right\}}$$

6-9-14-4 SMX (Maximum Principal Stress) Function SMX ($\epsilon_a, \epsilon_b, \epsilon_c, E, \nu$) [SMX]

SMX function is a function to obtain the Maximum Principal Stress from the specified 3-channel measured data.

■ Ex. SMX (A10, A11, A12, 2.1, 0.3)

- Obtain the Maximum Principal Stress of channels 10, 11, and 12 of calculation target file A.
- Calculation results shall be 2591.3 kfg/cm² when data of the calculation target channel A10 is 671 $\mu\text{m/m}$, the same of A11 is 740 $\mu\text{m/m}$, the same of A12 is 914 $\mu\text{m/m}$, Young's modulus is 2.1 and Poisson's ratio is 0.3.

■ Expression.

$$\sigma_{\max} = \frac{E}{2(1-\nu^2)} \left[(1+\nu)(\epsilon_a + \epsilon_c) + (1-\nu) \times \sqrt{2\{(\epsilon_a - \epsilon_b)^2 + (\epsilon_b - \epsilon_c)^2\}} \right]$$

6-9-14-5 SMN (Minimum Principal Stress) Function SMN ($\epsilon_a, \epsilon_b, \epsilon_c, E, \nu$) [SMN]

SMN function is a function to obtain the Minimum Principal Stress from the specified 3-channel measured data.

■ Ex. SMn (A10, A11, A12, 2.1, 0.3)

- Obtain the Minimum Principal Stress from channels 10, 11, and 12 of calculation target file A.
- Calculation results shall be 2163.7 kfg/cm² when data of the calculation target channel A10 is 671 $\mu\text{m/m}$, the same of A11 is 740 $\mu\text{m/m}$, the same of A12 is 914 $\mu\text{m/m}$, Young's modulus is 2.1 and Poisson's ratio is 0.3.

■ Expression.

$$\sigma_{\min} = \frac{E}{2(1-\nu^2)} \left[(1+\nu)(\epsilon_a + \epsilon_c) - (1-\nu) \times \sqrt{2\{(\epsilon_a - \epsilon_b)^2 + (\epsilon_b - \epsilon_c)^2\}} \right]$$

6-9-14-6 SSM (Maximum Sheering Stress) Function SSM ($\epsilon_a, \epsilon_b, \epsilon_c, E, \nu$) [SSM]

SSM function is a function to obtain the Maximum Sheering Stress from the specified 3-channel measured data.

■ Ex.

- Obtain the Minimum Sheering Stress from channels 10, 11, and 12 of calculation target file A.
- Calculation results shall be 213.81 kfg/cm² when data of the calculation target channel A10 is 671 $\mu\text{m/m}$, the same of A11 is 740 $\mu\text{m/m}$, the same of A12 is 914 $\mu\text{m/m}$, Young's modulus is 2.1 and Poisson's ratio is 0.3.

■ Expression.

$$\tau_{\max} = \frac{E}{2(1+\nu)} \times \sqrt{2\{(\epsilon_a - \epsilon_b)^2 + (\epsilon_b - \epsilon_c)^2\}}$$

6-9-14-7 DEG (Principal Strain Direction) Function DEG ($\epsilon_a, \epsilon_b, \epsilon_c$) [DEG]

DEG function is a function to obtain Direction of the Principal Strain from the specified 3-channel measured data.

Set direction of angle of gage A to 0° (degree). When strain amount of gages A and C is $\epsilon_a < \epsilon_c$, the angle shall be gage A and minimum principal strain.

■ Ex. DEG)A10, A11, A12)

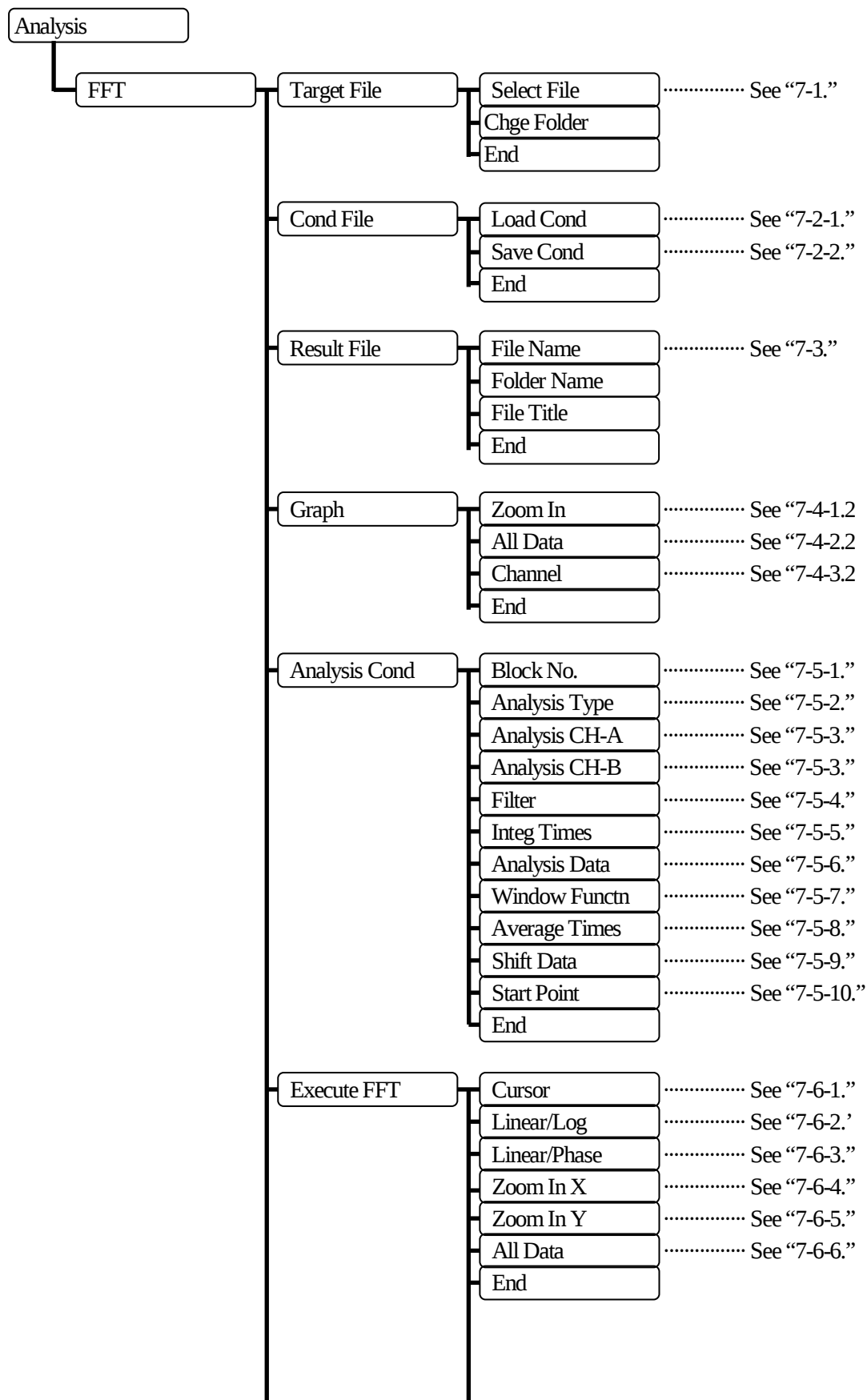
- Obtain Direction of the Principal Strain from channels 10, 11, and 12 of calculation target file A.
- Calculation results shall be 11.685° when data of the calculation target channel A10 is 671 $\mu\text{m/m}$, the same of A11 is 740 $\mu\text{m/m}$, and the same of A12 is 914 $\mu\text{m/m}$.

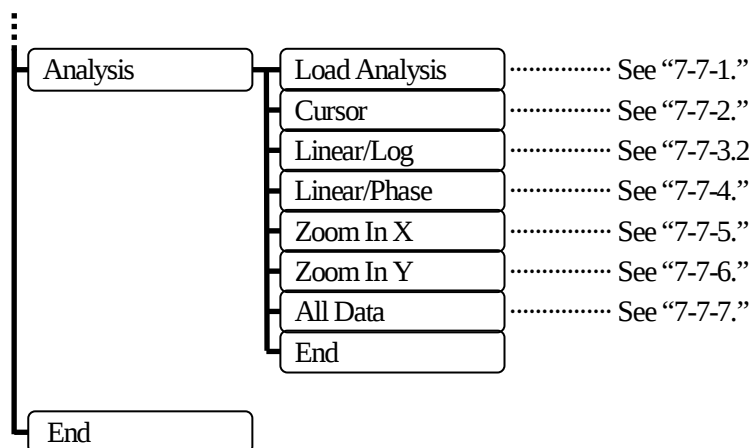
■ Expression.

$$\theta = \frac{1}{2} \tan^{-1} \left[\frac{2\epsilon_b - \epsilon_a - \epsilon_c}{\epsilon_a - \epsilon_c} \right]$$

7. FFT [Analysis/FFT]

This Chapter describes procedures for conducting FFT analysis of the recorded data file.





FFT Analysis Screen

< FFT Analysis Conditions >		M E N U
[Analysis Target Data File]		1 Analysis
Data File Name : D:\¥DATA¥TEST104.ks2		2 FFT
Block No. : 1 / 2		1)Target File
MEAS Data Nos : 1,200		2)Cond File
Sampling Rate : 500 Hz		3)Result File
Test Date : 2004/03/12 11:37:01		4)Graph
File Title : TEST Scanning 2004/3		5)Analysis Cond
[Result Save File]		6)Execute FFT
Data File Name : D:\¥DATA¥TEST104.csv		7)Analysis
File Title : TEST Scanning 2004/3		0)End
[FFT Analysis Conditions]		
Analysis Type : Power Spectrum		
Channel-A : 1		
Channel-B :		
Filter(Hz) : FLAT		
Integral Times : 0		
Analysis Data Nos : 1024		
Window Function : Humming		
Average Times : 1		
Shift Data Nos : 1		
Analysis Start Point : 1		

■ Description of Menu Items

- <Target File> Select analysis target file.
- <Cond File> Load the FFT condition file and save analysis conditions.
- <Result File>..... Set details of FFT result file.
- <Graph>..... Graphically display the target file.
- <Analysis Cond> Set FFT analysis conditions.
- <Excute FFT>..... Conduct FFT analysis.
- <Analysis> Specify results file of FFT analysis and conducts FFT analysis once again.

■ Operation Procedures

- 1) Select analysis target file.
- 2) Set an analysis result file name or a folder to save the file.
- 3) Set analysis conditions (Loads the analysis condition file, if required.)
- 4) Saves analysis conditions into a file.
- 5) Conducts the FFT analysis.

7-1 SELECTING TARGET FILE [FFT/Target File]

Select target file for conducting analysis .

■ Operation Method

- 1) Select <Target File> from <FFT> menu.
- 2) Select <Select File> from the <Target File> menu.
- 3) Move the cursor to the desired file with [↑], [↓], [←], [→]key and press [ENTER] key to determine the file.

MEMO

Pressing the [CHARACTER] key with the cursor on the file displays various information of data file (the number of blocks, measuring mode, the number of measuring channels, sampling rate, file title, comment block information, test information, etc.)

■ To Change the Folder

- 1) Select <Target File> from <FFT> menu.
- 2) Select <Change Folder> from the <Target File> menu.
- 3) A folder selecting window appears. Move the cursor to the desired folder with [↑] or [↓] key and press [ENTER] key to determine the folder.

7-2 LOADING AND SAVING ANALYSIS CONDITION FILE [FFT/Cond File]

Analysis condition file is saved into a file. By loading the said analysis condition file the next time, the previously set conditions can be set all together at a time. Extension of the histogram analysis condition file is 'e2f.'

7-2-1 Loading Analysis Condition File [FFT/Cond File/Load Cond]

Loads the previously saved analysis condition file.

■ Operation Method

- 1) Select <Cond File> from <FFT> menu.
- 2) Select <Load Cond> from the <Cond File> menu.
- 3) Select <Select File> from the <Load Cond> menu.
Move the cursor to the desired file with [↑] or [↓] key and press [ENTER] key to determine the file.

■ To Change the Folder

- 1) Select <Target File> from <FFT> menu.
- 2) Select <Change Folder> from the <Target File> menu.
- 3) A Folder selecting window appears. Move the cursor to the desired folder with [↑], [↓], [←], [→] key and press [ENTER] key to determine the folder.

7-2-2 Saving Analysis Condition File [FFT/Cond File/Save Cond]

Saves the preset analysis conditions into a file. By loading the previously saved condition file at a later date, the analysis conditions can be set all together at a time.

■ Operation Method

- 1) Select <Cond File> from <FFT> menu.
- 2) Select <Save Cond> from the <Cond File> menu.
- 3) Specify a file name, folder name, and file title and select the <Save> menu.
- 4) A message appears to confirm whether to save the above items. Press [ENTER] key to save the items.
If the items are not saved, press [ESC] key to stop saving data.
- 5) A message “... is created” appears. Press [ENTER] key to return to the menu screen.
- 6) Select <End> menu to close the setting window.

7-3 SPECIFYING ANALYSIS RESULT FILE [FFT/Result File]

Specifies various items (file name, folder name, and file title) required for saving the analysis result file. Extension of the analysis result file is ‘CSV.’

■ Operation Method

- 1) Select <Result File> from <FFT> menu.



- 2) Specify a file name, folder name, and file title and select <End> from the <Result File> menu.

7-4 DISPLAYING GRAPH [FFT/Graph]

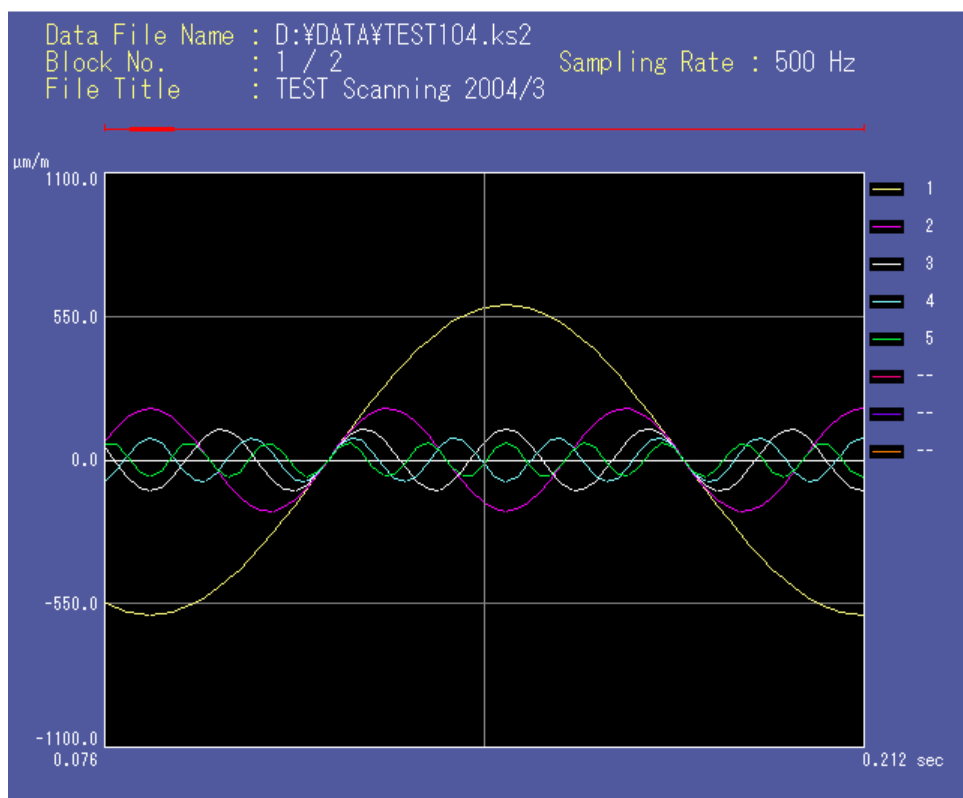
This section describes basics of displaying time axis graph of measured data file, if required. In addition, analysis start point is specified on the above graph.

7-4-1 Zoom-In Display of Graph [FFT/Graph/Zoom-In]

Zooms and displays arbitrary range of the current graph X axis.

■ Operation Method

- 1) Select <Target File> from <FFT> menu.
- 2) Select <Select File> from the <Target File> menu.
- 3) Move the cursor to the desired file and press [ENTER] key.
- 4) Select <Graph>.
- 5) Select <Zoom In> from the <Graph> menu.
- 6) Move the cursor with [←] or [→] key to the desired display start point and press [ENTER] key.
- 7) Move the cursor with [←] or [→] key to the desired display end point and press [ENTER] key.

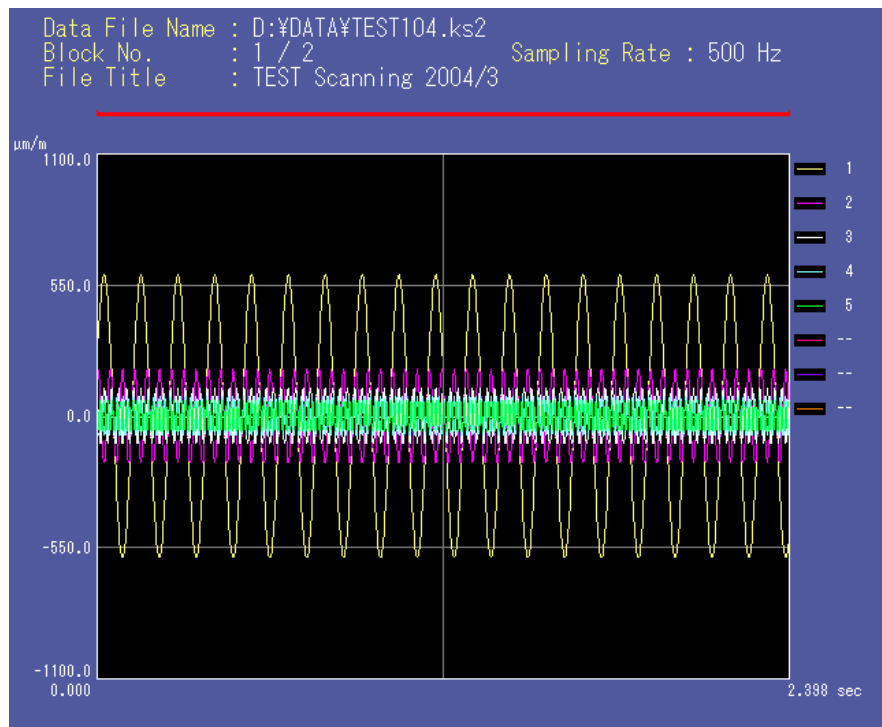


7-4-2 Displaying All Data [FFT/Graph/All Data]

Displays all data of the analysis target file.

■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-4.”
- 2) Select <All Data> from the <Graph> menu.

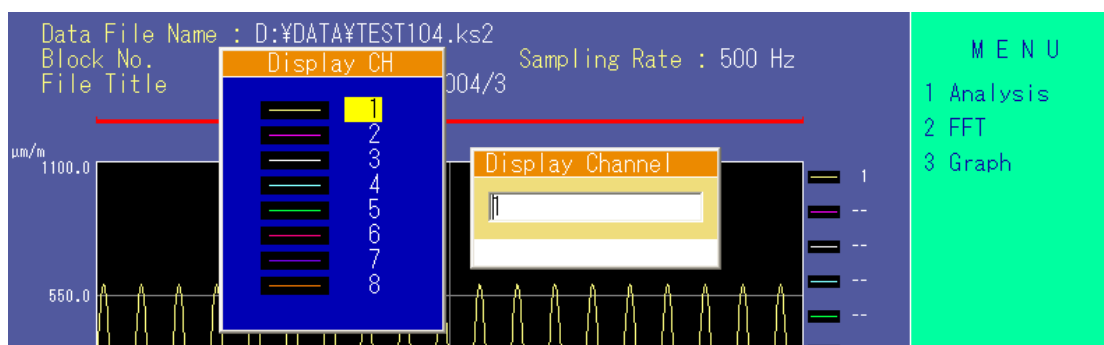


7-4-3 Displaying Channel [FFT/Graph/Channel]

Set channel for displaying graphs.

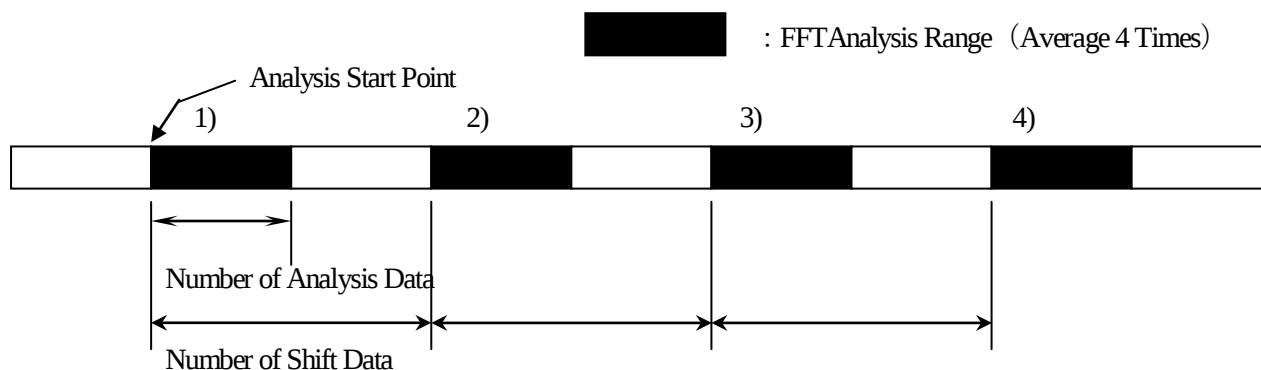
■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-4.”
- 2) Select <Channel> from the <Graph> menu.
- 3) Move the cursor to the desired channel with [$\uparrow$] or [$\downarrow$] key and press [ENTER] key.
- 4) A channel input window appears. Input a channel for displaying the graph.



7-5 ANALYSIS CONDITIONS [FFT/Analysis Cond]

This section describes details of setting conditions for conducting FFT analysis.



7-5-1 Setting Block No. [FFT/Analysis Cond/Block No.]

If multiple block data items exist in the selected analysis target file, set block Nos. for FFT analysis target files. Set the default value to '0' and all blocks shall be FFT analysis target.

■ Operation Method

- 1) Select <Target File> from the <FFT> menu.
- 2) Select <Select File> from the <Target File> menu.
- 3) Move the cursor to the desired file and press [ENTER] key.
- 4) Select <Analysis Cond>.
- 5) Select <Block No.> from the <Analysis Cond> menu.
- 6) A "Block No." entering window appears. Input analysis target block No. and press [ENTER] key to determine the entered block No.

Sampling Rate : 500 Hz	4 Block No.
Test Date : 2004/03/12 11:37:01	
File Title : TEST Scanning 2004/3	
[Result Save File	
Data File Name : []	
File Title : []	
All Blocks:0 Specify:more than 1	

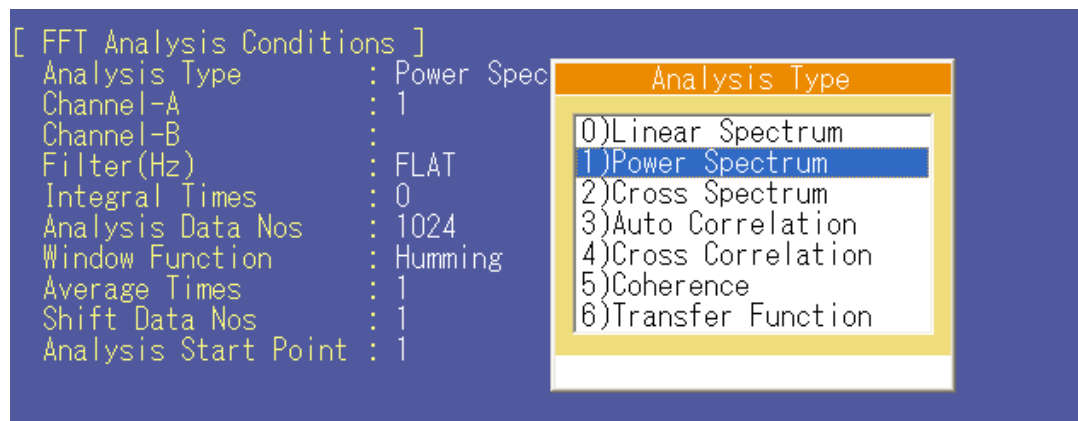
7-5-2 Setting Analysis Type [FFT/Analysis Cond/Analysis Type]

■ Options

Linear spectrum, Power spectrum, Cross spectrum, Self correlation, Cross correlation, Coherence, and Transfer function

■ Operation Method

- 1) Repeat operations from items 1) to 3) in the previous section “7-5.”
- 2) Select <Analysis Type>.
- 3) An “Analysis Type” selecting window appears. Move the cursor with [↑] or [↓] key to the desired analysis type and press [ENTER] key to determine the selection.



■ Precautions When Using Coherence Function

Set conditions for conducting multiple FFT analyses. Set average times and the number of shift data.

[Example] When analysis start point is 1, the number of analysis data is 256, average times is 4, and the number of shift data is 128.

1st time Conduct FFT analysis from analysis start point 1 to 256 points.

2nd time Shift the data to 128 points and conducts FFT analysis from 129 to 256 points.

3rd time Shift the data to 128 points as same as the 2 time, and conducts FFT analysis from 257 to 256 points

4th time Shift the data to 128 points as same as the 2 time and conducts FFT analysis for 256 points. And then, take the average of data obtained from 4 FFT analyses.

Note

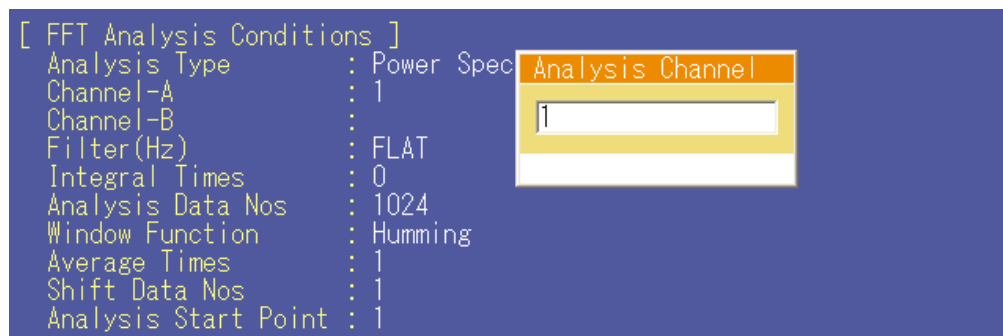
If the average times is set to '1' time, all the coherence values becomes '1, and error message appears.

7-5-3 Setting Analysis Channel [FFT/Analysis Cond/Analysis CH-A, Analysis CH-B]

Set FFT analysis target channel.

■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-5-1.”
- 2) Select <Analysis CH-A> or <Analysis CH-B> from the <Analysis Cond> menu.
- 3) An <Analysis CH-A> or <Analysis CH-B> selecting window appears. Input the desired analysis target channel and press [ENTER] key to determine the selection.



7-5-4 Setting Filter [FFT/Analysis Cond/Filter]

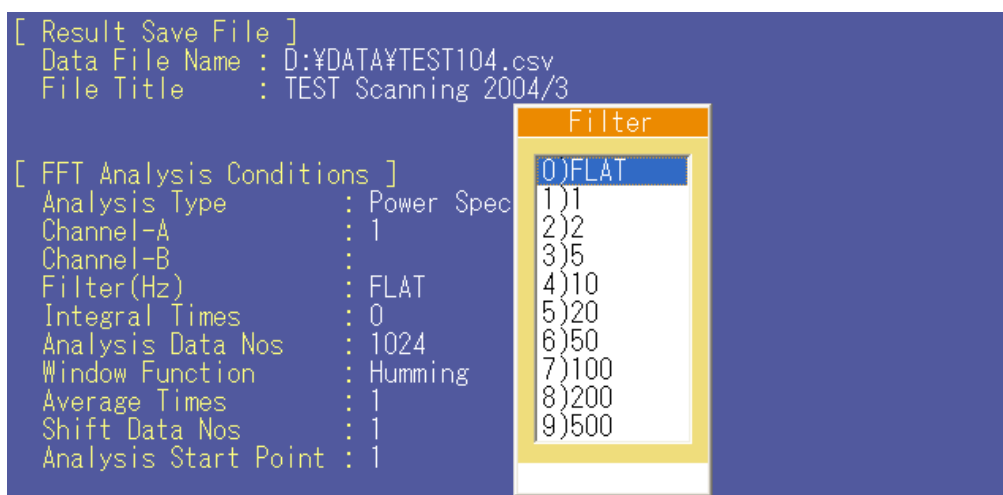
Before conducting the FFT analysis, original data can undergo filter processing. Set filter value for filtering processing.

■ Options

1, 2, 5, 10, 20, 50, 100, 200, 500, and FLAT

■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-5-1.”
- 2) Select <Filter> from the <Analysis Cond> menu.
- 3) A “Filter” selecting window appears. Move the cursor to the desired filter with [↑] or [↓] key and press [ENTER] key to determine the selection.



7-5-5 Setting Integration Times [FFT/Analysis Cond/Integ Times]

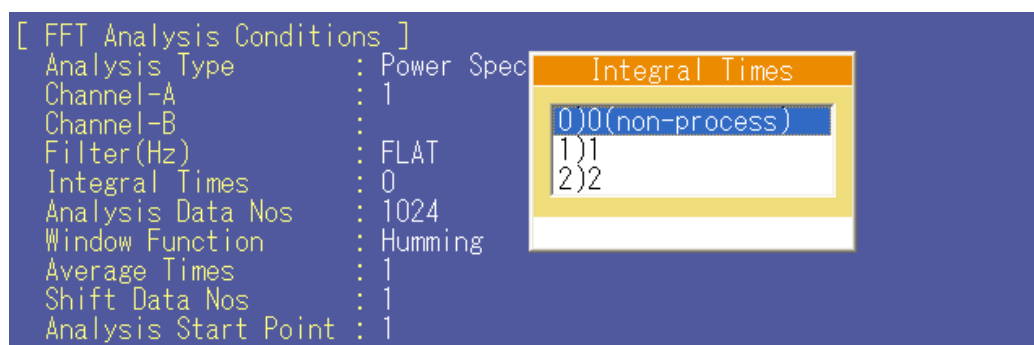
Before conducting the FFT analysis, original data can be subjected to integral processing. Set the number of integral times for integration processing.

- Options

0 (No integration), 1, 2 (times)

- Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-5-1.”
- 2) Select <Integ Times> from the <Analysis Cond> menu.
- 3) An “Integ Times” selecting window appears. Move the cursor to the desired integral times with [↑] or [↓] key and press [ENTER] key to determine the selection.



7-5-6 Setting the Number of Analysis Data [FFT/Analysis Cond/Analysis Data]

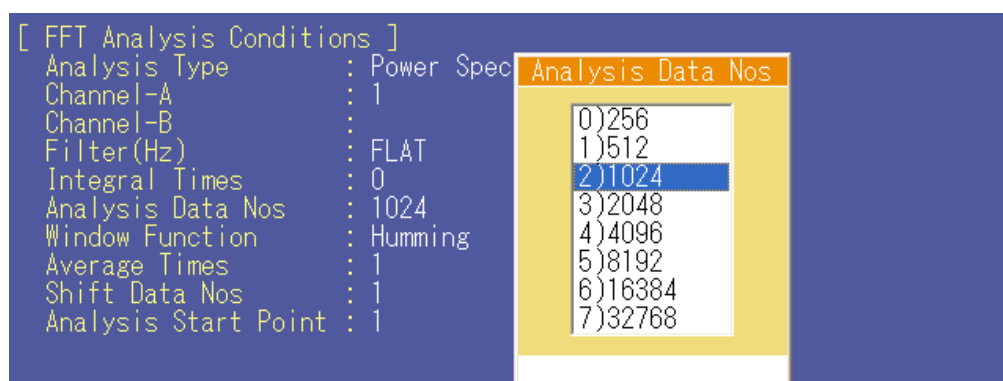
Set the number of FFT analysis data.

- Options

256, 512, 1024, 2048, 4096, 8192, 16384, and 32768

- Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-5-1.”
- 2) Select <Analysis Data> from the <Analysis Cond> menu.
- 3) An “Analysis Data” selecting window appears. Move the cursor to the desired number of analysis data with [↑] or [↓] key and press [ENTER] key to determine the selection.



7-5-7 Setting Window Function [FFT/Analysis Cond/Window Functn]

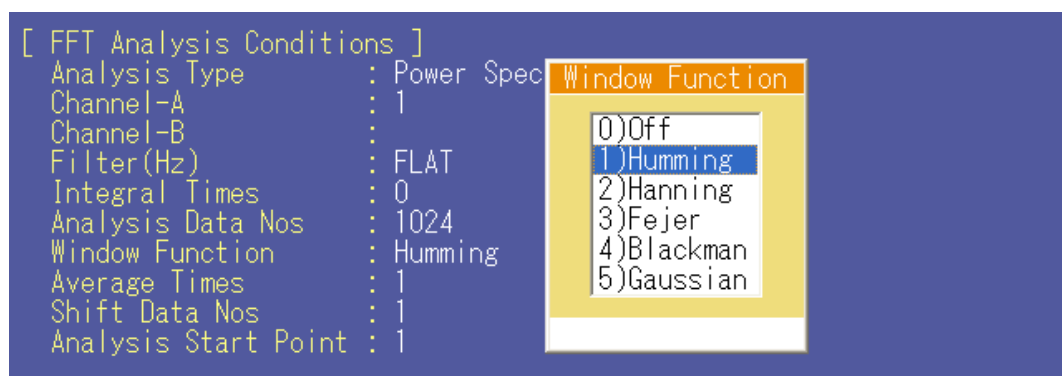
Set window function of the FFT analysis.

■ Options

OFF (None), Hamming, Hanning, Fejer, Blackman, and Gaussian

■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-5-1.”
- 2) Select <Window Functn> from the <Analysis Cond> menu.
- 3) A “Window Functn” selecting window appears. Move the cursor to the desired window function with [↑] or [↓] key and press [ENTER] key to determine the selection.



7-5-8 Setting Average Times [FFT/Analysis Cond/Average Times]

Set the average times of the FFT analysis.

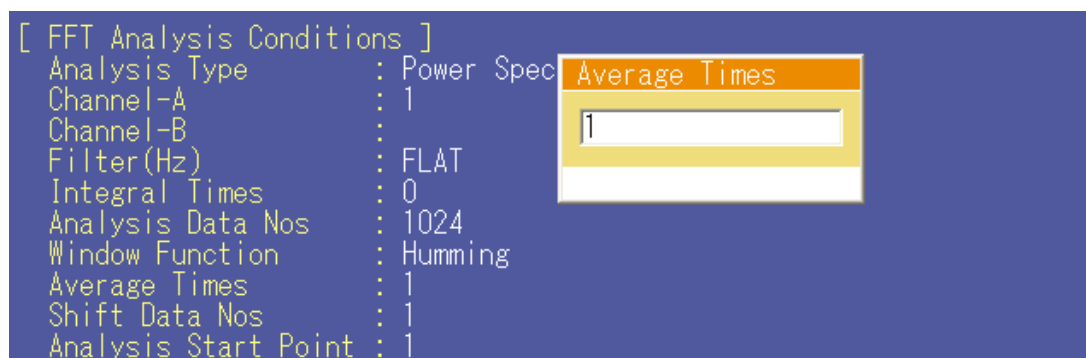
■ Setting Range

1 to 9999999999 (Maximum 10 digits)

If '0' is specified, data up to the last data files are averaged.

■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-5-1.”
- 2) Select <Average Times> from the <Analysis Cond> menu.
- 3) An “Average Times” window appears. Input the desired average times and press [ENTER] key to determine the average times.



7-5-9 Setting the Number of Shift Data [FFT/Analysis Cond/Shift Data]

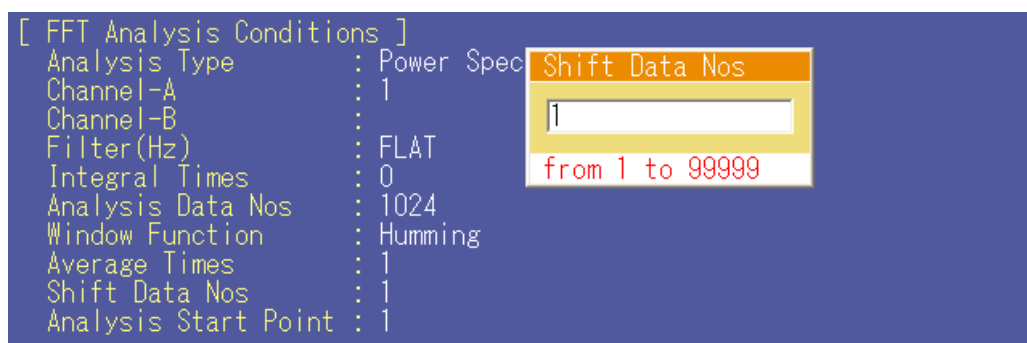
When the average times of the FFT analysis is set to more than 2, set the number of shift data of analysis start point.

■ Setting Range

1 to 99999

■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-5-1.”
- 2) Select <Shift Data> from the <Analysis Cond> menu.
- 3) A “Shift Data Nos” window appears. Input the desired number of shift data and press [ENTER] key to determine the shift data.

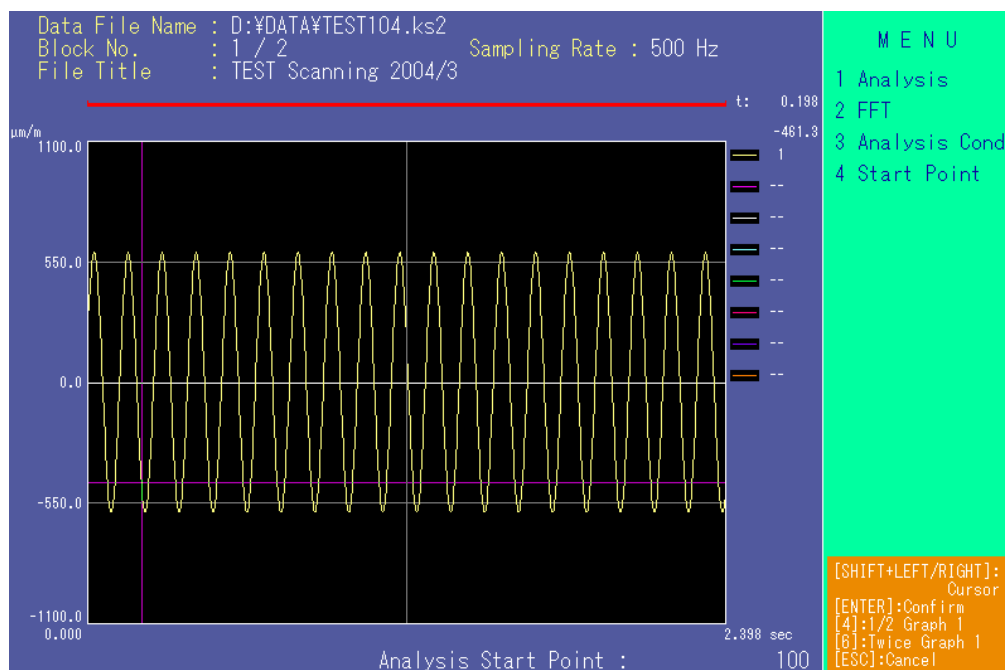


7-5-10 Setting Analysis Start Data Point [FFT/Analysis Cond/Start Point]

Set FFT analysis start data point. Initial state shall be set at the 1st data of the measuring data file.

■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-5-1.”
- 2) Select <Start Point> from the <Analysis Cond> menu.
- 3) A graph appears. Move the cursor to the desired start point with [←] or [→] key and press [ENTER] key to determine the start point.

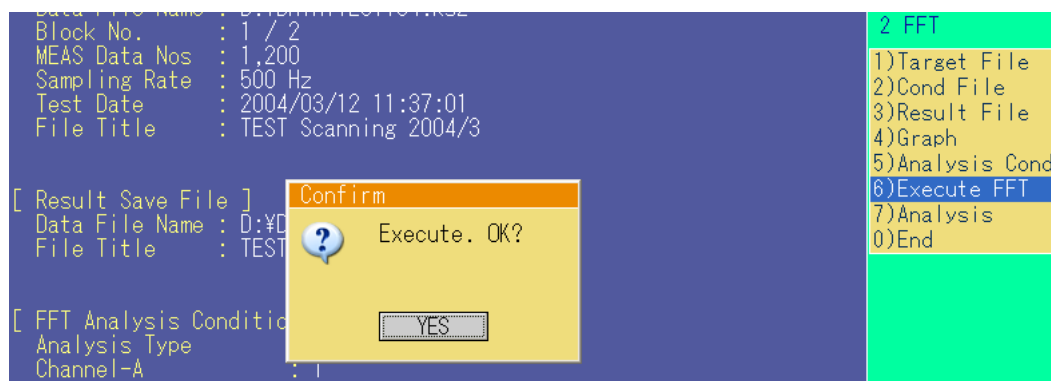


7-6 EXECUTING FFT ANALYSIS [FFT/Execute FFT]

This section describes details of FFT analysis executed with preset FFT analysis conditions and saved in the FFT analysis result file.

■ Operation Method

- 1) Select <Target File> from the <FFT> menu.
- 2) Select <Select File> from the Target File>.
- 3) Move the cursor to the desired File and press [ENTER] key.
- 4) Select <Execute FFT>.
- 5) A message window appears to confirm whether FFT is conducted. If it is OK, press [ENTER] key.
If it is required to cancel, press [ESC] key.



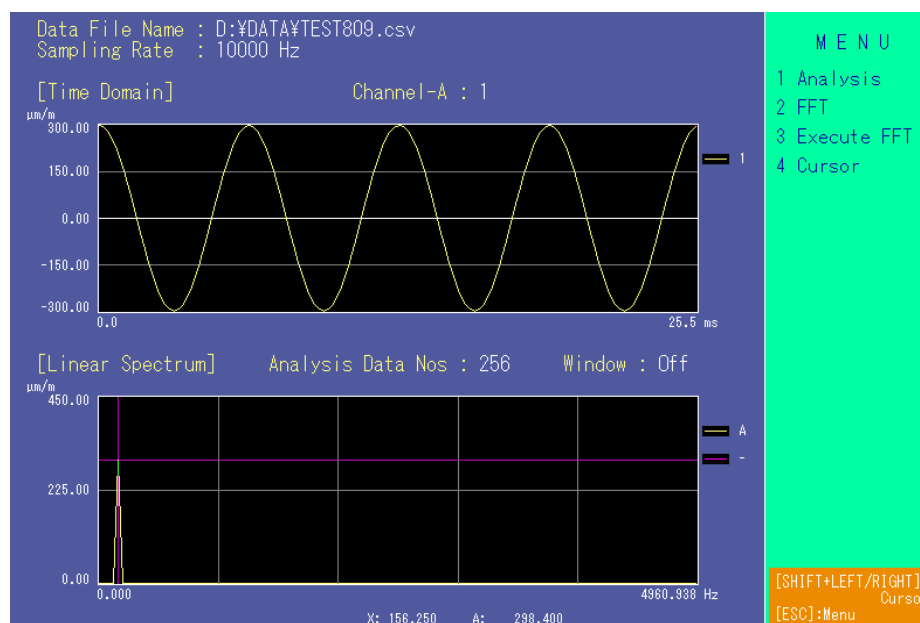
- 6) A message “...” is created” appears. Press [ENTER] key to return to the menu screen.

7-6-1 Displaying Cursor [FFT/Execute FFT/Cursor]

Value of FFT analysis result graph is loaded by moving the cursor.

■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-6.”
- 2) Select <Cursor> from the <Execute FFT> menu.
- 3) Move the cursor with [←] or [→] key and the value on the cursor position is displayed.



4) To end the cursor display, Press [ENTER] or [ESC] key.

[ENTER] key..... Ends the cursor display while displaying a cross-shaped cursor on the graph and cursor value on the lower graph.

[ESC] key..... Ends the cursor display by erasing a cross-shaped cursor on the cursor and cursor value on the lower graph.

7-6-2 Changing Linear/Log Display [FFT/Execute FFT/Linear/Log]

Y axis of the FFT analysis result graph is changed to linear or log display. The log is in relative display with 0 dB set as a peak value.

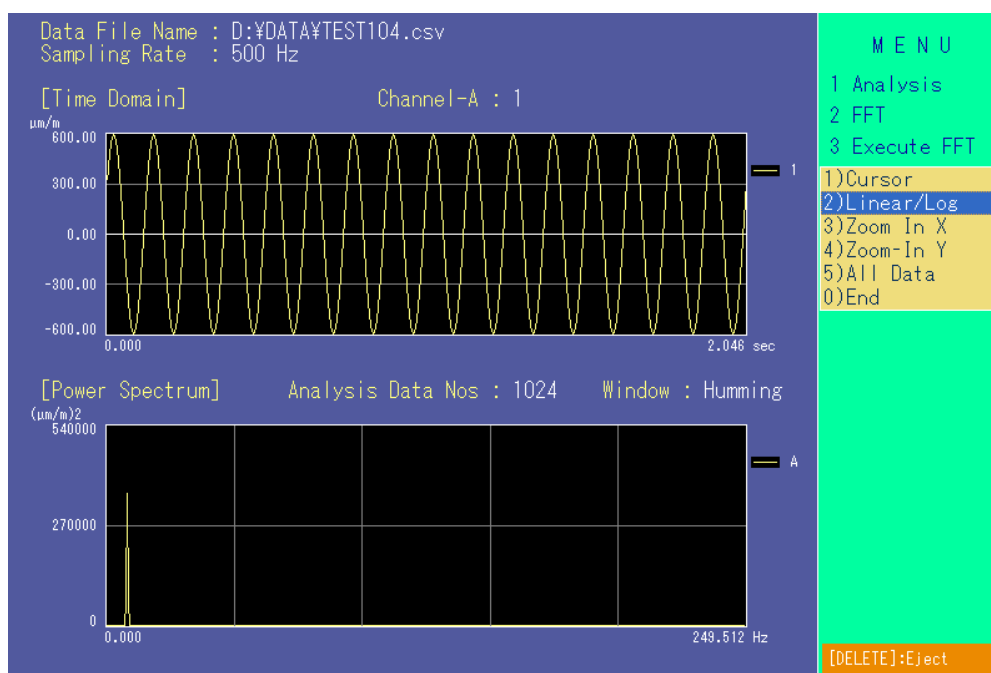
■ Operation Method

1) Repeat operations from items 1) to 4) in the previous section “7-6.”

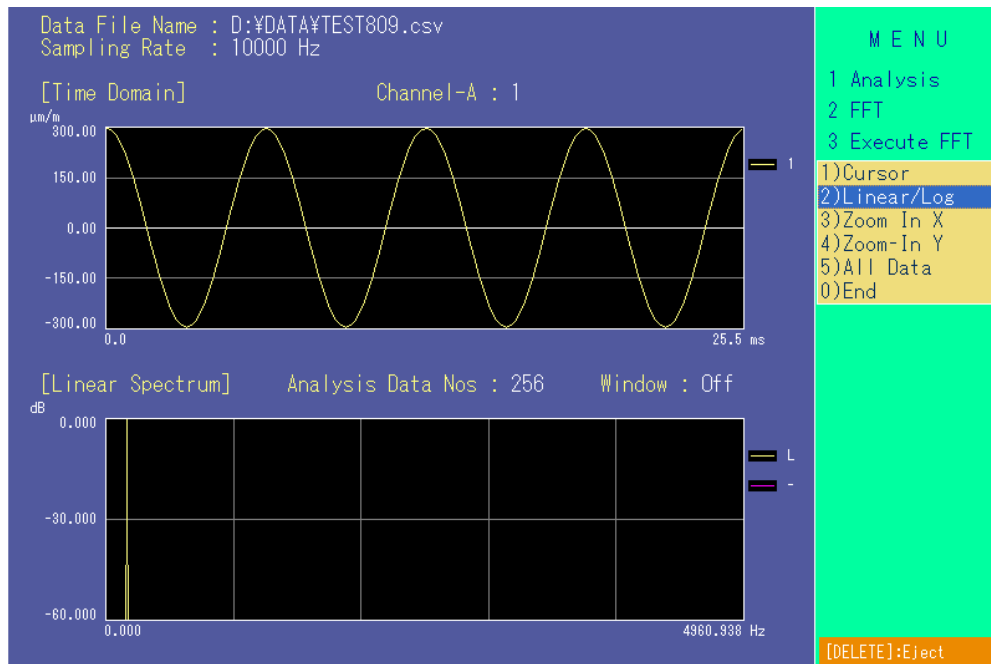
2) Select <Linear/Log> from the <Execute FFT> menu.

Y axis display of the FFT analysis result graph alternately changes from Linear to Log.

■ [Linear]



■ [LOG]



7-6-3 Changing Linear/Phase Display [FFT/Execute FFT/Linear/Phase]

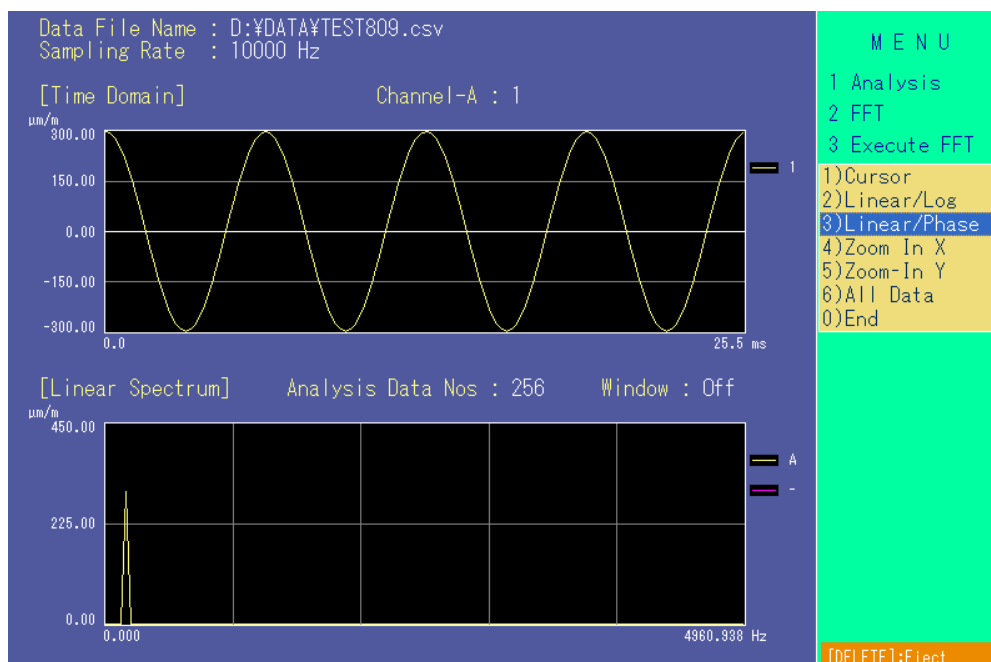
Graphical display of the FFT analysis results is changed to “Amplitude,” “Phase,” or “Amplitude + Phase Phased.” In the analysis result graph, A denotes “Amplitude,” P denotes “Phase,” and A and P denote “Amplitude + Phase Superimposed.”

■ Operation Method

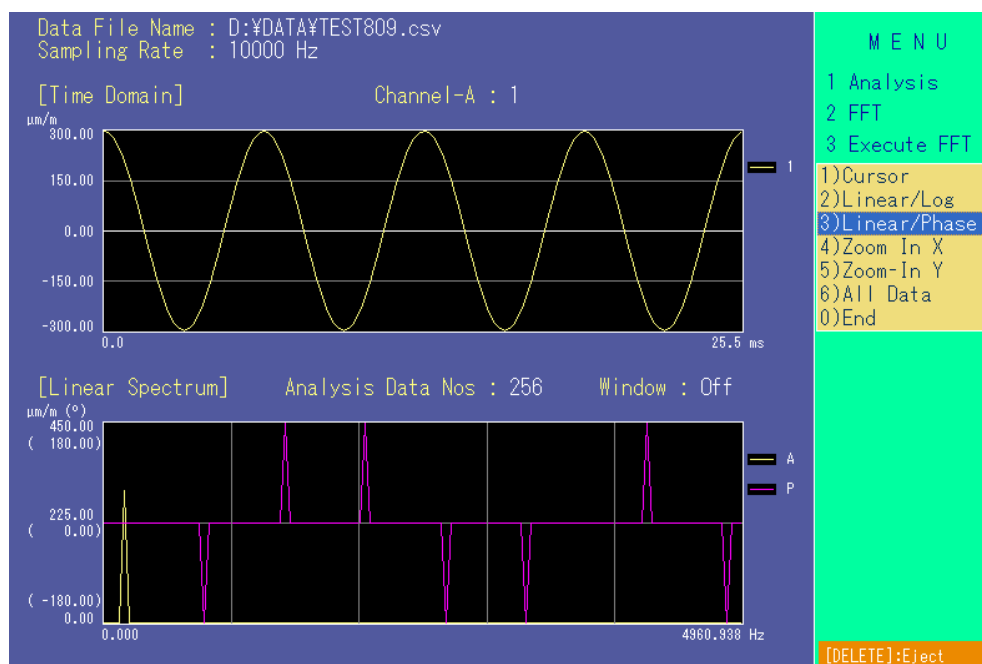
- 1) Repeat operations from items 1) to 4) in the previous section “7-6.”
- 2) Select <Linear/Phase> from the <Execute FFT> menu.

Display of the FFT analysis result graph changes alternately.

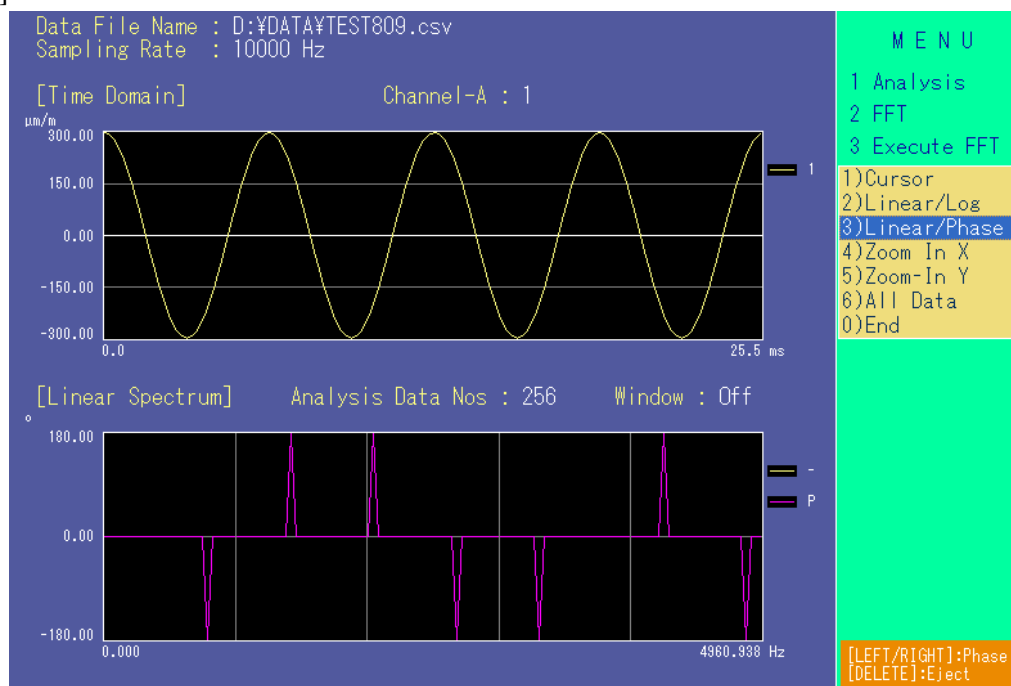
■ [Amplitude]



■ [Amplitude + Phase Superimposed]



■ [Phase]



When only [Phase] is displayed for the FFT analysis result, the graph display can be changed by pressing [←] or [→] key as described in the following table.

Default screen is in -180 to $+180^{\circ}$

Cursor Key [←]	Phase Display	Cursor Key [→]
▼	-180 to $+180^{\circ}$	▲
▼	-90 to $+270^{\circ}$	▲
▼	0 to $+360^{\circ}$	▲
▼	-270 to $+90^{\circ}$	▲

7-6-4 Zooming X Axis [FFT/Execute FFT/Zoom In X]

Zooms in arbitrary range of X axis (frequency, time) of the FFT analysis result graph.

■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-6.”
- 2) Select <Zoom In X> from the <Execute FFT> menu.
- 3) Move the cursor to the zoom in start point with [←] or [→] key and press [ENTER] key to determine the start point.
Move the cursor to the zoom in end point with [←] or [→] key and press [ENTER] key to determine the end point.
As soon as the setting of the zoom in end point is completed, the selected range is graphically displayed.

7-6-5 Zooming Y Axis [FFT/Execute FFT/Zoom In Y]

Zooms in arbitrary range of Y axis (frequency, time) of the FFT analysis result graph.

■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-6.”
- 2) Select <Zoom In Y> from the <Execute FFT> menu.
- 3) Move the cursor to the zoom in start point with [↑] or [↓] key and press [ENTER] key to determine the start point.
Move the cursor to the zoom in end point with [↑] or [↓] key and press [ENTER] key to determine the end point.
As soon as the setting of the zoom in end point is completed, the selected range is graphically displayed.

7-6-6 Displaying All Data [FFT/Execute FFT/All Data]

Graphically displays all data of the FFT analysis results.

■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-6.”
- 2) Select <All Data> from the <Execute FFT> menu.

7-7 ANALYSIS [FFT/Analysis]

This section describes details of loading the previous analysis result file as well as saving the analysis results.

7-7-1 Loading Analysis Result File [FFT/Analysis/Load Analysis]

Loads the FFT analysis result file.

■ Operation Method

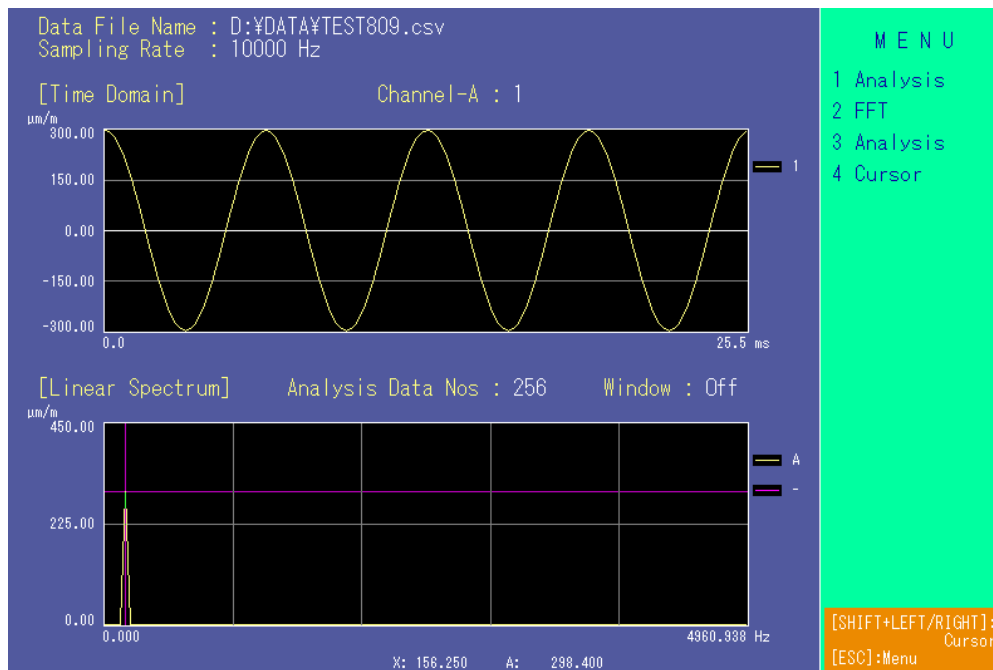
- 1) Select <Analysis> from <FFT> menu.
- 2) Select <Load Analysis> from the <Analysis> menu.
- 3) Select <Select File> from the <Load analysis> menu
- 4) Move the cursor to the desired file with [↑] or [↓] key and press [ENTER] key to determine the selection.

7-7-2 Displaying Cursor [FFT/Analysis/Cursor]

Value of the FFT analysis result graph is loaded by moving the cursor.

■ Operation Method

- 1) Select <Analysis> from <FFT> menu.
- 2) Select <Cursor> from the <Analysis> menu.
- 3) Move the cursor to the desired point with [←] or [→] key and the value of the cursor position is displayed on the lower graph.



- 4) To end the cursor display, Press [ENTER] or [ESC] key.

[ENTER] key..... Ends the cursor display while displaying a cross-shaped cursor on the graph and cursor value on the lower graph.

[ESC] key..... Ends the cursor display by erasing a cross-shaped cursor on the graph and cursor value on the lower graph.

7-7-3 Changing Linear/Log Display [FFT/Analysis/Linear/Log]

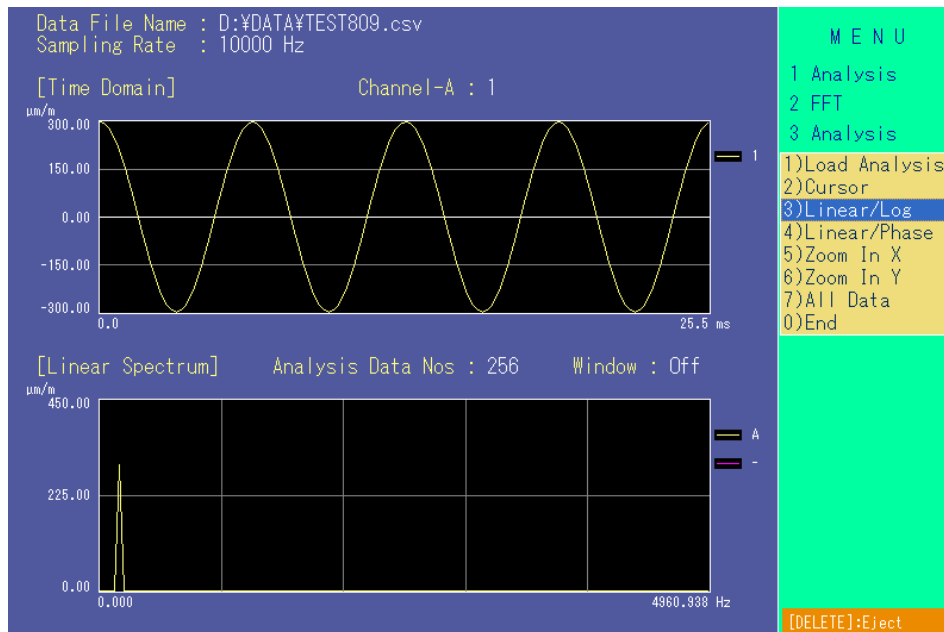
Y axis of the FFT analysis result graph is changed to linear or log display.

■ Operation Method

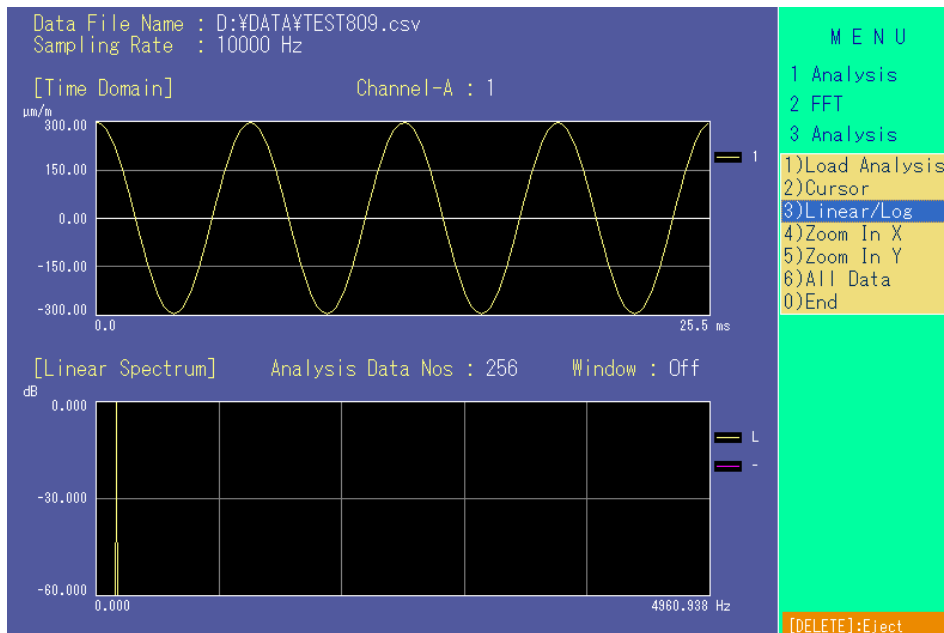
- 1) Select <Analysis> from <FFT> menu.
- 2) Select <Linear/Log> from the <Analysis> menu.

Y axis display of the FFT analysis result graph alternately changes from Linear to Log.

■ [Linear]



■ [Log]



Note

The log is in relative display with 0 dB set as a peak value.

7-7-4 Changing Linear/Phase Display [FFT/Analysis/Linear/Phase]

Graphical display of the FFT analysis results is changed to “Amplitude,” “Phase,” or “Amplitude + Phase Superimposed.”

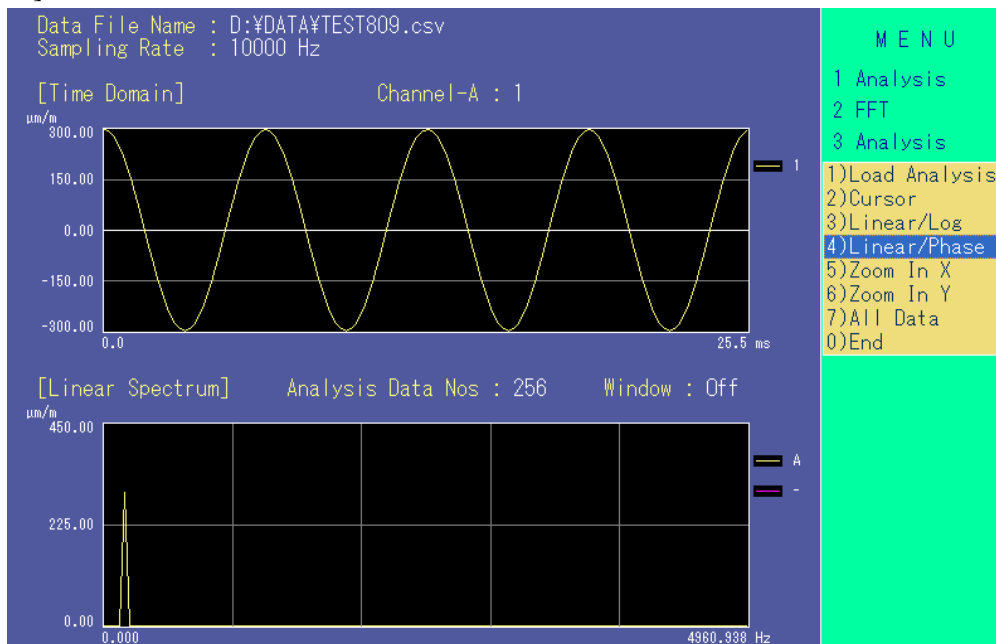
In the analysis result graph, A denotes “Amplitude,” P denotes “Phase,” and A and P denote “Amplitude + Phase Superimposed.”

■ Operation Method

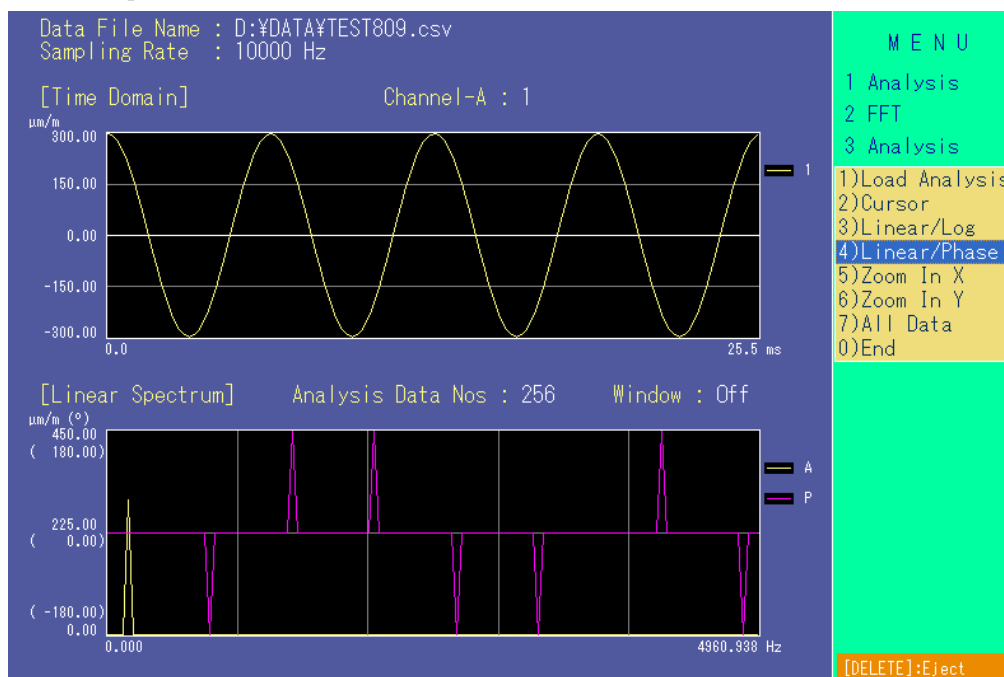
- 1) Select <Analysis> from <FFT> menu.
- 2) Select <Linear/Phase> from the <Analysis> menu.

Display of the FFT analysis result graph changes one after other.

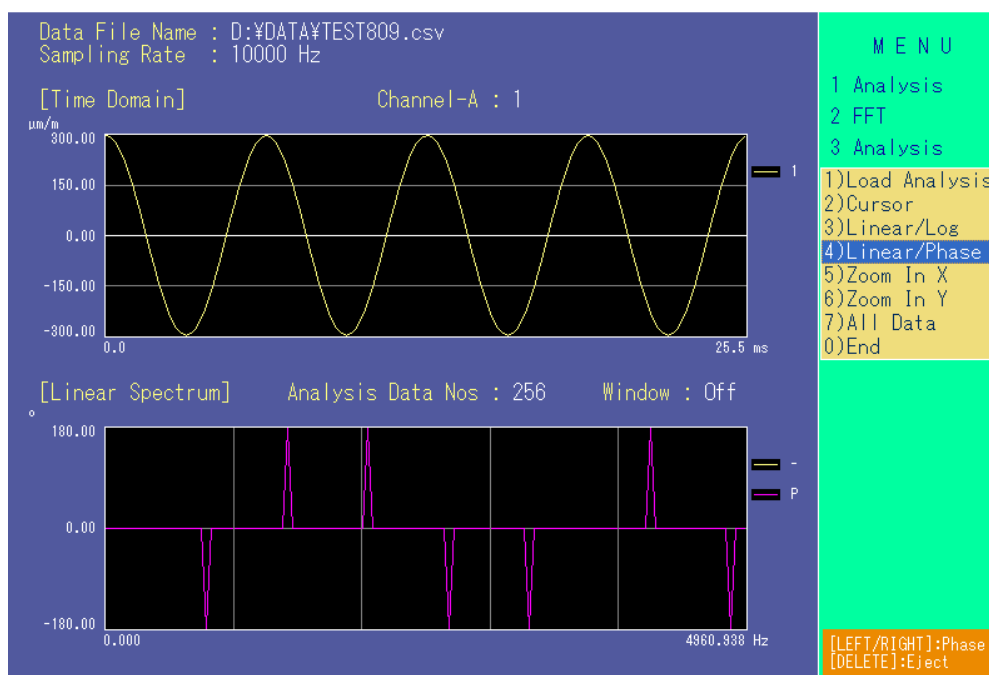
■ [Amplitude]



■ [Amplitude + Phase]



■ [Phase]



When only [Phase] is displayed for the FFT analysis result, the graph display can be changed by pressing [←] or [→] key as described in the following table.

Default screen is in -180 to $+180^{\circ}$

Cursor Key [←]	Phase Display	Cursor Key [→]
▼	-180 to $+180^{\circ}$	▲
▼	-90 to $+270^{\circ}$	▲
▼	0 to $+360^{\circ}$	▲
▼	-270 to $+90^{\circ}$	▲

7-7-5 Zooming X Axis [FFT/Analysis/Zoom In X]

Zooms in arbitrary range of X axis (frequency, time) of the FFT analysis result graph.

■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-6.”
- 2) Select <Zoom In X> from the <Analysis> menu.
- 3) Move the cursor to the zoom in start point with [←] or [→] key and press [ENTER] key to determine the start point.
Move the cursor to the zoom in end point with [←] or [→] key and press [ENTER] key to determine the end point.
As soon as the setting of the zoom in end point is completed, the selected range is graphically displayed.

7-7-6 Zooming Y Axis [FFT/Analysis/Zoom In Y]

Zooms in arbitrary range of Y axis (frequency, time) of the FFT analysis result graph.

■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-6.”
- 2) Select <Zoom In Y> from the <Analysis> menu.
- 3) Move the cursor to the zoom in start point with [←] or [→] key and press [ENTER] key to determine the start point.
Move the cursor to the zoom in end point with [←] or [→] key and press [ENTER] key to determine the end point.
As soon as the setting of the zoom in end point is completed, the selected range is graphically displayed.

7-7-7 Displaying All Data [FFT/Analysis/All Data]

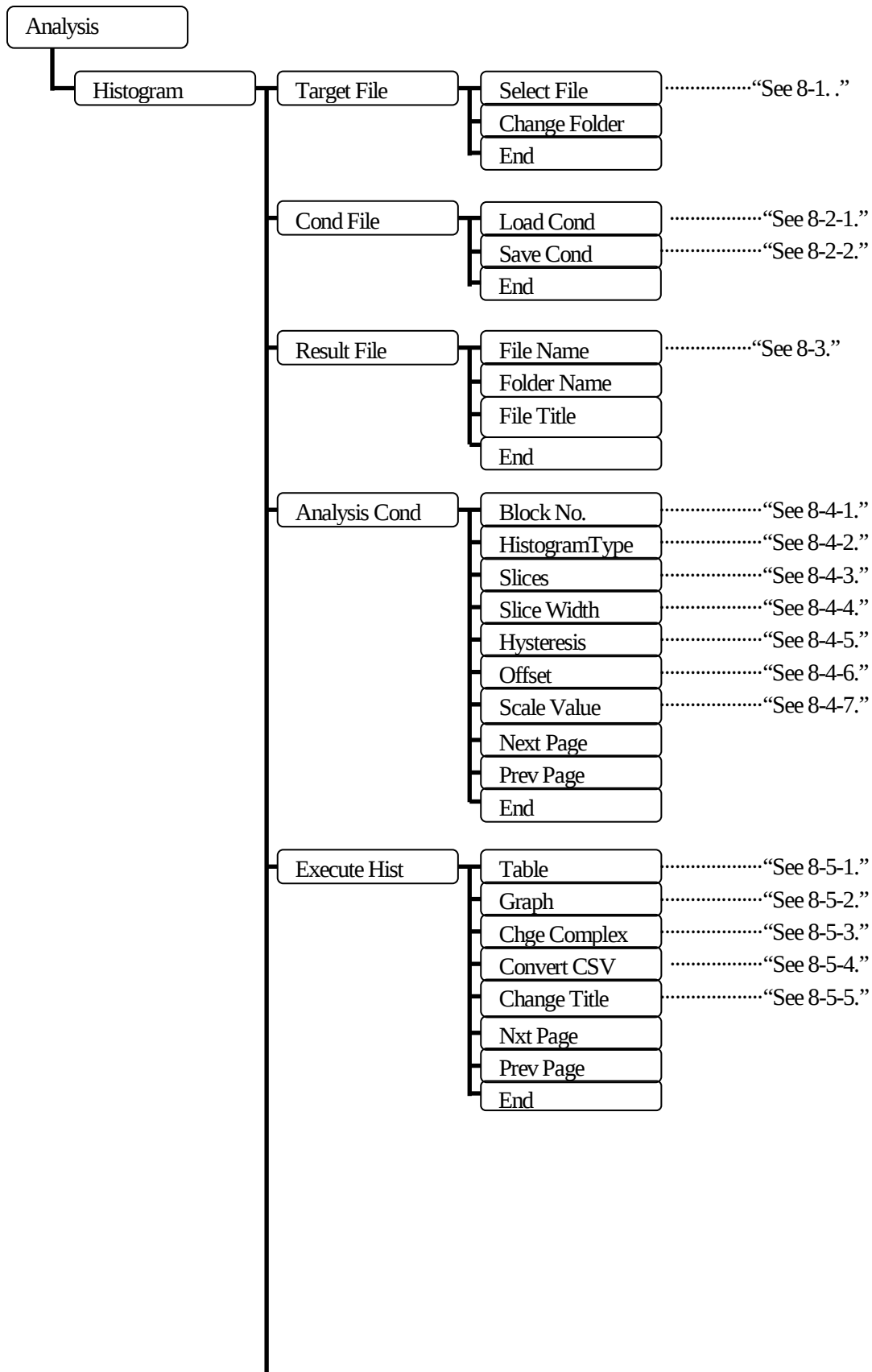
Graphically displays all data of the FFT analysis results.

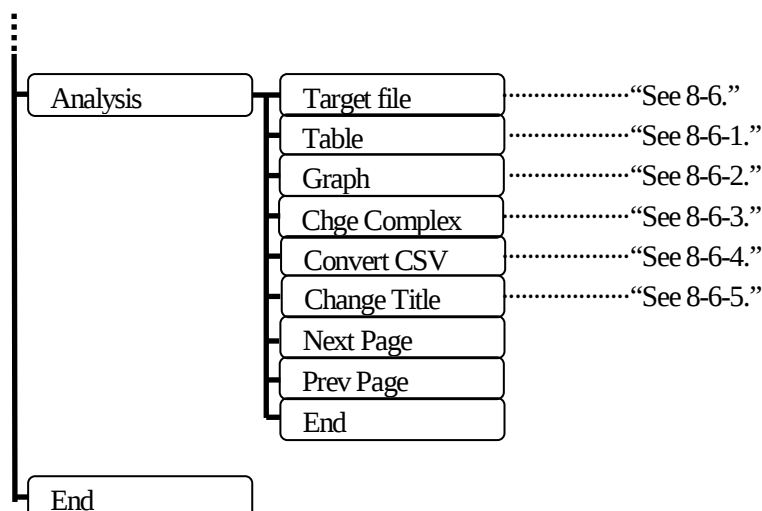
■ Operation Method

- 1) Repeat operations from items 1) to 4) in the previous section “7-6.”
- 2) Select <All Data> from the <FFT> menu.

8. HISTOGRAM ANALYSIS [Analysis/Histogram]

This chapter describes histogram of data file. The analysis result is saved in a file and you can check the result with a list and a chart.





■ Histogram Analysis Screen

< Histogram Analysis Conditions >								M E N U	
[Analysis Target Data File]								1 Analysis	
Data File Name : D:\¥DATA¥TEST011.ks2								2 Histogram	
Block No. : 1 / 5								1)Target File	
MEAS Data Nos : 8,100								2)Cond File	
Sampling Rate : 1000 Hz								3)Result File	
Test Date : 2004/03/09 10:50:51								4)Analysis Cond	
[Result Save File Name]								5)Execute Hist	
Data File Name : D:\¥DATA¥TEST011.his								6)Analysis	
File Title :								7)Next Page	
								8)Prev Page	
								0)End	
CH	Type	Slices	Width	Unit	Hysteresis	Offset	Scale		
1	P/V	100	1.000	µm/m	0	**	50.000		
2	P/V	100	1.000	µm/m	0	**	50.000		
3	MAX/MIN	100	1.000	µm/m	0	0.000	50.000		
4	MAX/MIN	100	1.000	µm/m	0	0.000	50.000		
5	RAIN[1D]	100	1.000	µm/m	0	**	100.000		
6	RAIN[1D]	100	1.000	µm/m	0	**	100.000		
7	RAIN[2D]	50	1.000	µm/m	0	**	50.000		
8	RAIN[2D]	50	1.000	µm/m	0	**	50.000		
9	AMPLITUDE	100	1.000	µm/m	0	**	100.000		
10	AMPLITUDE	100	1.000	µm/m	0	**	100.000		
11	TIME[1D]	100	1.000	µm/m	0	**	50.000		
12	RAIN+M/M	50	1.000	µm/m	0	0.000	50.000		
13	RAIN+M/M	100	1.000	µm/m	0	0.000	100.000		
14	RAIN+P/V	100	1.000	µm/m	0	**	100.000		
15	RAIN+P/V	100	1.000	µm/m	0	**	100.000		
16	P/V	100	1.000	µm/m	0	**	50.000	[DELETE]:Eject	

■ Description of Menu Items

- <Target File>Select target file for analysis.
 <Cond File>Load a histogram condition file and save analysis conditions.
 <Result File>Set a histogram result file.
 <Analysis Cond>Set conditions for histogram analysis.
 <Execute Hist>Conduct histogram analysis processing with the specified conditions.
 <Analysis>Display result file after histogram analysis processing and create a graph and a table.
 <Next Page>Change display to conditions of the next channel.
 <Prev Page>Change display to conditions of previous channel.

■ Operation Procedures

- 1) Select a analysis target file.
- 2) Set a file name and folder name for saving the analysis results.
- 3) Set analysis conditions. (Load a condition file when needed.)
- 4) Save analysis conditions in a file.
- 5) Conduct histogram analysis processing.

	One-dimension type	One-dimension complex type	Two-dimension type
Target file	Recorded data files, calculation result files (arithmetics, differential & integral calculus and filter)		
Type	▪ Peak/valley ▪ Max/Min ▪ 1D Rainflow method (1D) ▪ Amplitude method ▪ Time at level (1-D)	▪ 1-dimension rainflow method (1D) + Max/Min ▪ 1-dimension rainflow method (1D) + Peak/valley	▪ 2-dimension rainflow method (2D)
Slices	Even number between 10 (± 5) and 256 (± 128)		Even number between 10 and 50
Slice Width	The width of one slice is set by physical value.		
Hysteresis	The amplitude width for masking is set by the number of slices.		
Offset	Set only Max/Min can be set.		

8-1 SELECTING TARGET FILE [Histogram/Target file]

Select a target file for analysis.

■ Operation Method

- 1) Select <Histogram> from <Analysis> main menu.
- 2) Select <Target File> from the <Histogram> menu.
- 3) Select <Select File> from the <Target File> menu.
- 4) Move the cursor the desired file with [↑] or [↓] key and press [ENTER] key to determine the file.

MEMO

If you press the [CHARACTER] key on the file cursor, you can display the information of data file (the number of blocks, measuring mode, number of measuring channels, sampling rate, file title, comment, block information, test information and etc.).

■ To change the folder

- 1) Select <Change Folder> from the <Target file>.
- 2) A folder selecting window appears. Move the cursor to a desired folder with [↑], [↓], [←], or [→] key and press [ENTER] key to determine the folder.

8-2 LOADING AND SAVING ANALYSIS CONDITION FILE [Histogram /Cond File]

Analysis condition file is saved into a file. By loading the said analysis condition file the next time, the previously set conditions can be set all together at a time. Extension of the histogram analysis condition file is 'e2h.'

8-2-1 Loading an Analysis Condition File [Histogram/Cond File/Load Cond]

Loads the previously saved analysis condition file.

■ Operation Method

- 1) Select <Load Cond> from <Cond File> menu.
- 2) Select <Select File> menu, move the cursor to the desired file with [↑] or [↓] key, and press [ENTER] key to determine the file.

■ To change the folder

- 1) Select <Change Folder> from the <Target File> menu.
- 2) A folder selecting window appears. Move the cursor to a desired folder with [↑], [↓], [←], or [→] key and press [ENTER] key to determine the folder.

8-2-2 Saving Analysis Condition File [Histogram/Cond File/Save Cond]

Save the preset analysis conditions in a file. By loading the previously saved condition file at a later date, the analysis conditions can be set all together at a time.

■ Operation Method

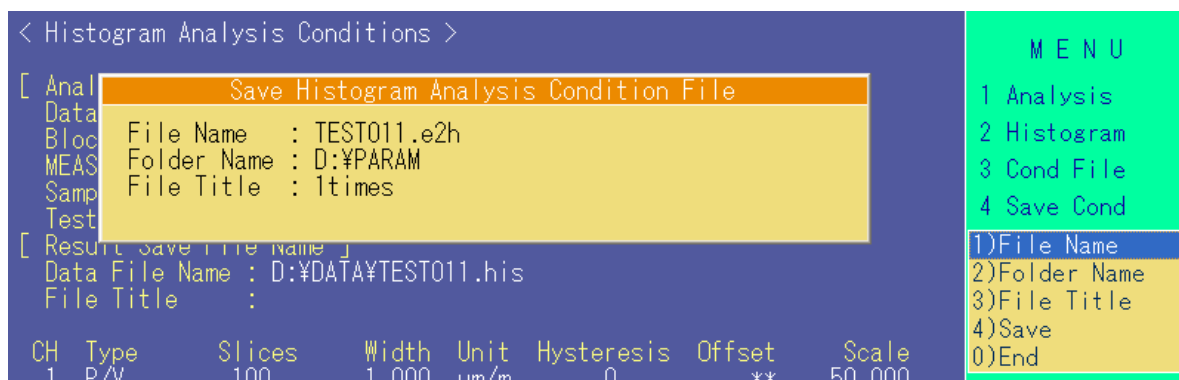
- 1) Select <Save Cond> from <Cond File> menu.
- 2) Specify a file name, a folder name and a file title, and then select <Save> menu.
- 3) A message appears to confirm whether to save the above items. Press [ENTER] key to save the items.
If the items are not saved, press [ESC] key to stop saving data.
- 4) A message "... is created." appears. Press [ENTER] key to return to the menu.
- 5) Select <End> menu to close the setting window.

8-3 SPECIFYING AN ANALYSIS RESULT FILE [Histogram/Result file]

This section describes how to specify required items (file name, folder name and file title) for saving the analysis results in a file. The extension of the analysis result file is 'his.' Load this file by <Analysis> menu and you can see the result by a graph or a table.

■ Operation Method

- 1) Select <Select File> from <Target File> menu.
- 2) Move the cursor to the desired file with [↑] or [↓] key and press [ENTER] key.
- 3) Select <Result File> menu.
- 4) Specify a file name, a folder name and a file title, and then select <End> menu.



8-4 SETTING ANALYSIS CONDITIONS [Histogram/Analysis Cond]

Set conditions for histogram analysis. If you save the preset conditions in a file by <Save Cond> menu, you can use it at a later day by loading it and set analysis conditions all together at a time.

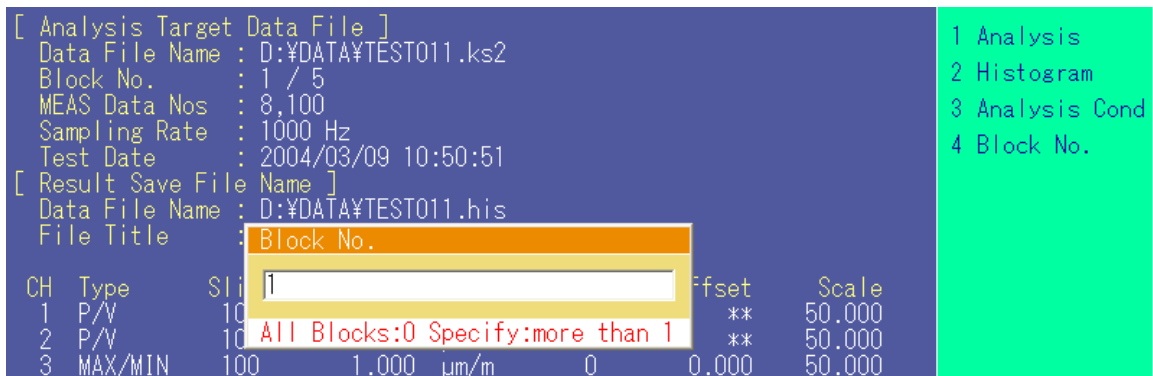
The following sections describe how to set histogram analysis conditions.

8-4-1 Setting Block Number [Histogram/Analysis Cond/Block No.]

If a selected target file contains block data, you must specify a block for analysis. By default, the first block will be selected for analysis. If you set the number to '0,' all the blocks will be processed.

■ Operation Method

- 1) Select the desired file by selecting <Select File> from <Target File> menu.
- 2) Select <Analysis Cond>.
- 3) Select <Block No.> from <Analysis Cond> menu.
- 4) A "Block No." input window appears. Specify a block number and press [ENTER] key.



8-4-2 Setting the Type of Histogram Processing [Histogram/Analysis Cond/HistogramType]

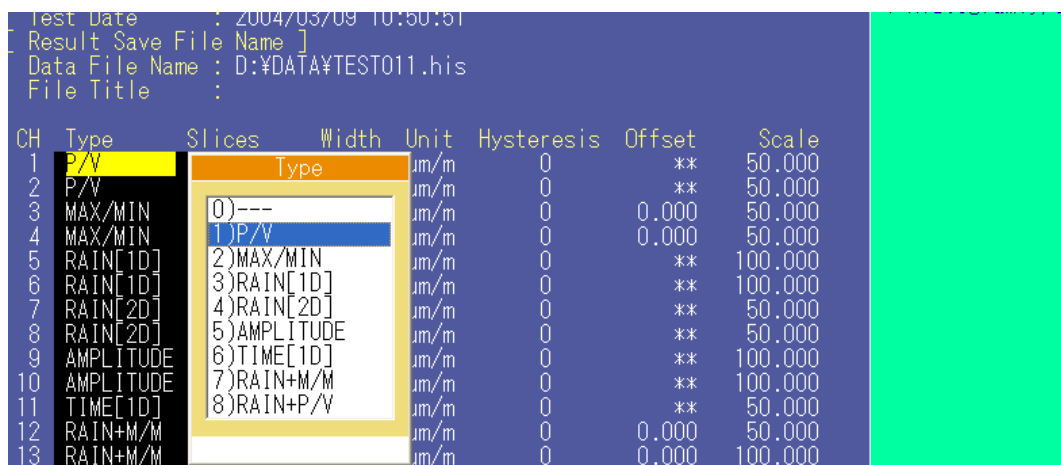
Set the type of histogram processing for each channel.

■ Optionals

---	No processing
P/V	Peak/valley (1-D type)
MAX/MIN	Max/Min (1-D type)
RAIN[1D]	1-dimension rainflow method (1-D type)
RAIN[2D]	2-dimension rainflow method (2-D type)
AMPLITUDE	Amplitude width method (1-D type)
TIME[1D]	Time at level (1-D type)
RAIN+M/M	1-dimension rainflow method (1-D) + Peak/Valley (1-D complex type)
RAIN+P/V	1-dimension rainflow method (1-D) + Max/Min (1-D complex type)

■ Operation Method

- 1) Select the desired file by selecting <Select File> from <Target File> menu.
- 2) Select <Analysis Cond>
- 3) Select <HistogramType> from <Analysis Cond> menu.
- 4) A histogram type selecting window appears. Move the cursor to the target protocol with [] or [↑/↓] key, and press [ENTER] key to determine the desired histogram type.



- 5) Press [ESC] key to close the selection window. Then you can duplicate the type as described below. Press [DUPLICATE] key to copy the type on the cursor to the next channel.
- 6) Press [ESC] key once again to return to the menu.

8-4-3 Setting Slice Number [Histogram/Analysis Cond/Slices]

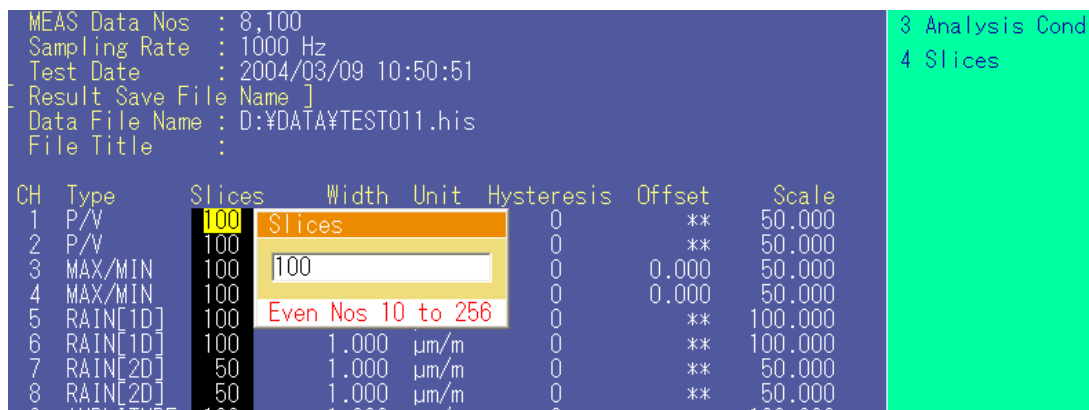
Set the number of slices for each channel.

■ Set Range

	One-dimension type	One-dimension complex type	Two-dimension type
Type	▪ Peak/Valley ▪ MAX/MIN ▪ Rainflow method (1D) ▪ Amplitude method ▪ Time at level (1-D)	▪ 1-dimension rainflow method (1D) + Max/min ▪ Rainflow method (1D) + Peak/valley	▪ 2-dimension rainflow method (2D)
Slices	Even number between 10 (± 5) and 256 (± 128)		Even number between 10 and 50

■ Operation Method

- 1) Select <Slices> from <Analysis Cond> menu.
- 2) An input window appears. Specify a slice number and press [ENTER] key.
- 3) Press [ESC] key to close the selection window. Then you can duplicate the slice number as described below.
Press [DUPLICATE] key to copy the slice number on the cursor to the next channel.



- 4) Press [ESC] once key again to return to the menu.

Set the slice width for each channel.

Numeric value from 1E-8 to 1E8.

- 1) Select <Slice Width> from <Analysis Cond> menu.
- 2) A “Slice Width” setting window appears. Input a slice width and press [ENTER] key.

```

Sampling Rate : 10000 Hz
Test Date    : 2004/03/04 09:20:23
[ Result Save File Name ]
Data File Name : D:\¥DATA¥TEST053.his
File Title    :

CH  Type      Slices  Width  Unit  Hysteresis  Offset  Scale
1  P/V        100     10.000  Slice Width  **      500.000
2  P/V        100     10.000  **          **      500.000
3  MAX/MIN    100     50.000  10          0.000  2500.00
4  MAX/MIN    100     50.000  **          0.000  2500.00
5  RAIN[1D]   100     100.000  1.0E-8 to 1.0E8  **      1.00E 4
6  RAIN[1D]   100     100.000  µm/m        0        **      1.00E 4

```

- 3) Press [ESC] key to close the input window. Then you can duplicate a slice width as described below. Press [DUPLICATE] key to copy the slice width on the cursor to the next channel.
- 4) Press [ESC] key once again to return to the menu.

8-4-5 Setting Hysteresis [Histogram/Analysis Cond/Hysteresis]

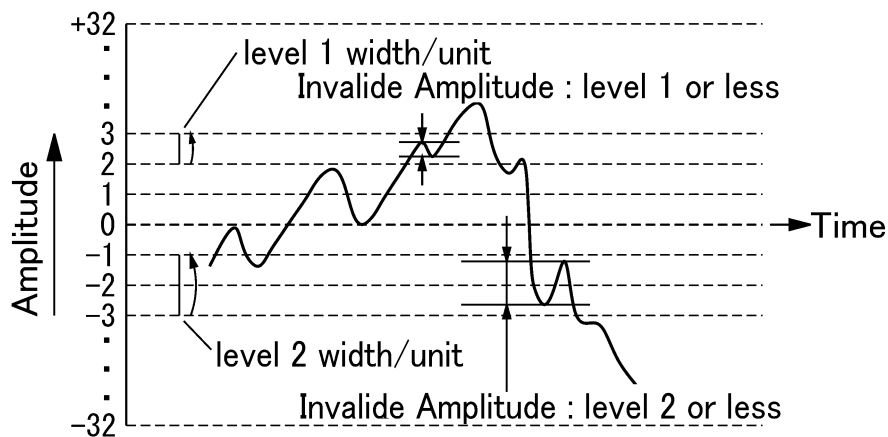
Set the hysteresis for each channel.

Hysteresis is to set the invalid amplitude width by the unit of a slice level width. It is used effectively in the following cases: when input signals contain noises or unnecessary signals, and you want to make their count invalid; or when you want to ignore the amplitude factors below a specific level intentionally.

■ To conduct histogram analysis for other than max/min value

In case of hysteresis = 1: Peak or a valley that does not exceed 1 level-width/unit is invalid.

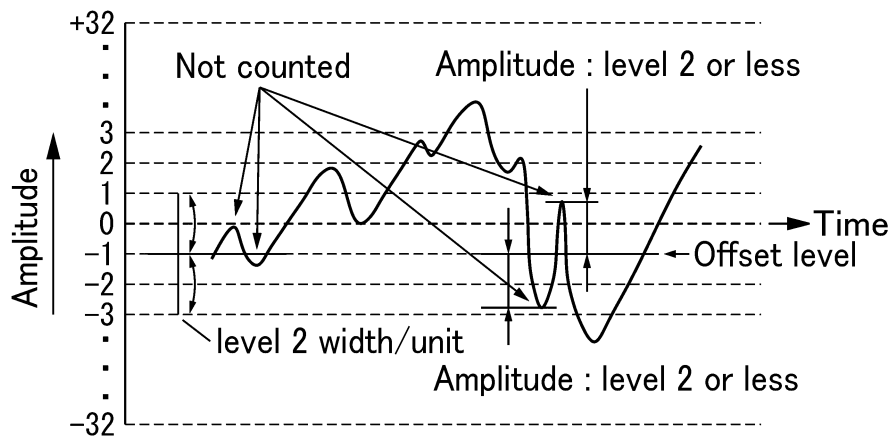
In case of hysteresis = 2: Peak or a valley that does not exceed 2 level-widths/unit is invalid.



Definition of hysteresis except Max/min

■ To conduct histogram analysis of Max/min

In case of hysteresis = 2: Peak or a valley that does not exceed 2 level-widths/unit is invalid.



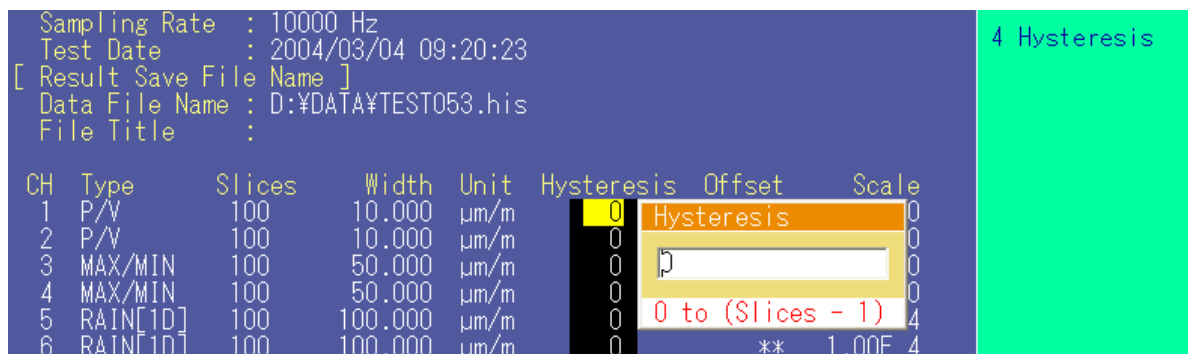
Definition of Hysteresis of Max/Min Method

■ Setting Range

Any numeric value from 0 up to (the number of slices – 1).

■ Operation Method

- 1) Select <Hysteresis> from <Analysis Cond> menu.
- 2) A “Hysteresis” setting window appears. Input hysteresis and press [ENTER] key.

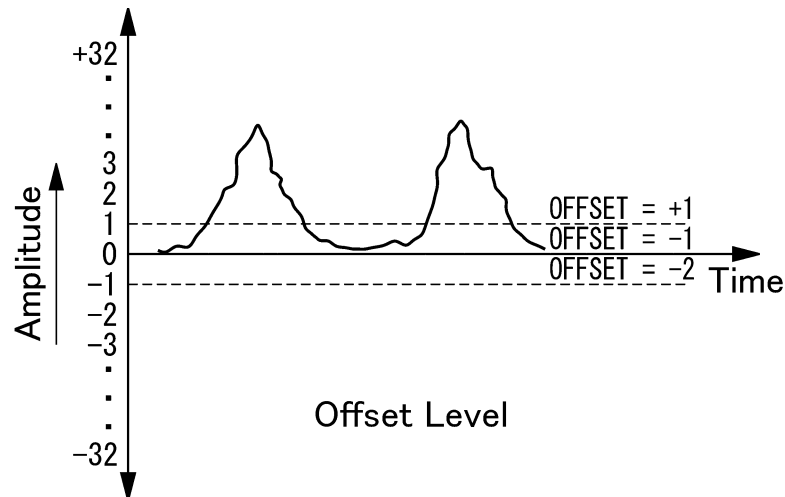


- 3) Press [ESC] key to close the input window. Then you can duplicate a hysteresis as described below.
Press [DUPLICATE] key to copy the hysteresis on the cursor to the next channel.
- 4) Press [ESC] key once again to return to the menu.

8-4-6 Setting Offset [Histogram/Analysis Cond/Offset]

If the type of histogram processing is the Max/Min method, you can set offset for every channel.

Offset means that you can move the apparent reference point freely instead of setting the reference for input signals to be Zero (in an analog form). Offset is an effective parameter for histogram processing when the algorithm of Max/Min method is used for signals that produce only one-way output factors, such as pressure or displacement signals.



■ Setting Range

Numeric value from $-1\text{E}+8$ to $1\text{E}+8$.

■ Operation Method

- 1) Select <Offset> from <Analysis Cond> menu.
- 2) An "Offset" setting window appears. Input an offset value and press [ENTER] key.

Sampling Rate : 10000 Hz
Test Date : 2004/03/04 09:20:23
[Result Save File Name]
Data File Name : D:\DATA\TEST053.his
File Title :

CH	Type	Slices	Width	Unit	Hysteresis	Offset	Scale
1	P/V	100	Offset		0	**	500.000
2	P/V	100			0	**	500.000
3	MAX/MIN	100	0		0	1.000	2500.00
4	MAX/MIN	100			0	0.000	2500.00
5	RAIN[1D]	100	-1.0E8 to 1.0E8		0	**	1.00E 4
6	RAIN[1D]	100	100.000	μm/m	0	**	1.00E 4

4 Offset

- 3) Press [ESC] key to close the input window. Then you can duplicate an offset value as described below.
Press [DUPLICATE] key to copy the offset value on the cursor to the next channel.
- 4) Press [ESC] key once again to return to the menu.

8-4-7 Setting Scale Value [Histogram/Analysis Cond/Scale]

A scale value is set for each channel. Once a scale value is set, the slice width is calculated by the specified number of slices. Though a scale value is determined by the slice width and the number slices for this device, the slice width can be determined by the preset slice numbers if you enter a scale value.

■ Set Range

Numeric value from 1E+-8 to 1E+8.

■ Operation Method

- 1) Select <Scale> from <Analysis Cond> menu.
- 2) A “Scale” setting window appears. Specify a scale value and press [ENTER] key.

```

Sampling Rate : 1000 Hz
Test Date    : 2004/03/04 09:20:23
[ Result Save File Name ]
Data File Name : D:\DATA\¥TEST053.his
File Title    :

CH  Type      Slices      Width Unit Hysteresis Offset      Scale
1  P/V        100         10.00 Scale ** 500.000
2  P/V        100         10.00 ** 500.000
3  MAX/MIN    100         50.00 500 100 2500.00
4  MAX/MIN    100         50.00 100 2500.00
5  RAIN[1D]   100         100.00 1.0E-8 < Width < 1.0E8 ** 1.00E 4
6  RAIN[1D]   100         100.000 µm/m 0 ** 1.00E 4

```

The slice width is displayed after it is automatically calculated by the scale value and the number of slices.
(Slice Width = Scale Value/Slices)

- 3) Press [ESC] key to close the input window. Then you can duplicate a scale value as described below.
Press [DUPLICATE] key to copy the scale value on the cursor to the next channel.
- 4) Press [ESC] key once again to return to the menu.

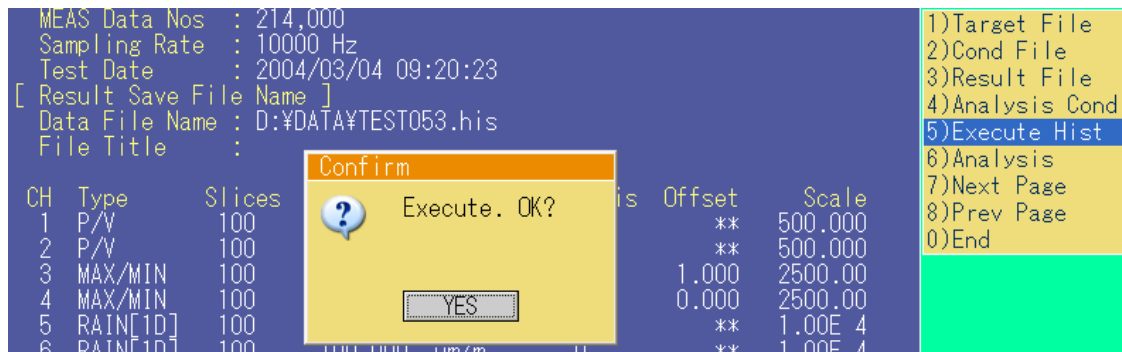
8-5 CONDUCTING HISTOGRAM PROCESSING [Histogram/Execute Hist]

Conduct histogram processing under the preset histogram conditions and save the result in a histogram processing result file. After processing is completed, a total counted slice number for every channel is displayed in “Total Count” column on the screen. The extension of a histogram processing result file is ‘his.’

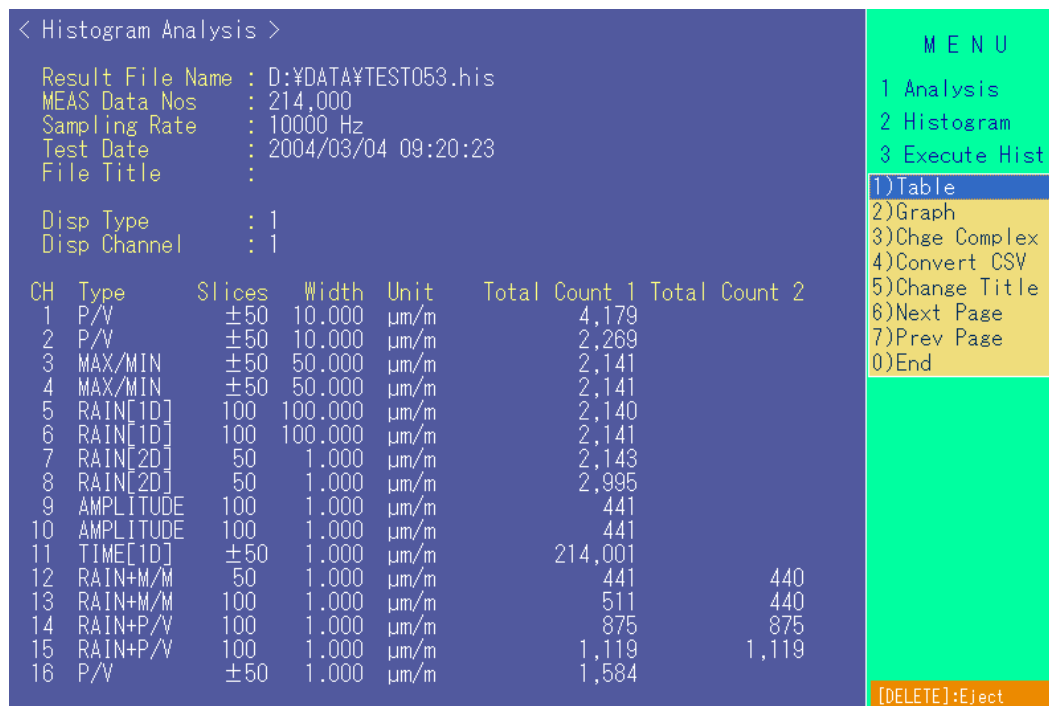
■ Operation Method

- 1) Select <Execute Hist> from <Histogram> menu.
- 2) A message appears to confirm whether to conduct histogram or not. Press [ENTER] key to conduct it.

If you want to cancel it, press [ESC] key.



- 3) A message “... is created” appears. Press [ENTER] key to return to the menu.
- 4) After histogram processing is completed, the following analysis menu appears. You can continue to make a graph and a table.



■ Description of Menu Items

- <Table>.....Display a table for every channel.
- <Graph>Display a graph every channel.
- <Chge Complex>Switch between the types of 1-D complex analysis type.
- <Convert CSV>.....Convert histogram result file into a text form.
- <Change Title>.....Change the file title.
- <Next Page>Move to the next page.
- <Prev Page>.....Move to previous page.
- <End>End the display of the analysis result.

8-5-1 Confirming Histogram Processing Result (Table) [Histogram/Execute Hist/Table]

Display a list of histogram processing result for every channel.

■ Operation Method

- 1) After selecting the desired file on <Target File> menu, select <Execute Hist> menu.
- 2) Select <Table> from the <Histogram> menu to display a list of histogram processing result.

Result File Name : D:\¥DATA¥TEST200.his File Title : TEST Scanning 2004/3 Test Date : 2004/03/22 13:07:54 MEAS Time : 4.900 sec CH : 11 Name : Type11 Type : TIME[1D] Slices : ±50 Unit : µm/m							
Range	Count	Range	Count	Range	Count	Range	Count
-50.000	0	-28.000	0	-6.000	153	17.000	0
-49.000	0	-27.000	0	-5.000	153	18.000	0
-48.000	0	-26.000	0	-4.000	0	19.000	0
-47.000	0	-25.000	0	-3.000	153	20.000	0
-46.000	0	-24.000	0	-2.000	153	21.000	0
-45.000	0	-23.000	0	-1.000	0	22.000	0
-44.000	0	-22.000	0	1.000	153	23.000	0
-43.000	0	-21.000	0	2.000	153	24.000	0
-42.000	0	-20.000	0	3.000	153	25.000	0
-41.000	0	-19.000	0	4.000	0	26.000	0
-40.000	0	-18.000	0	5.000	153	27.000	0
-39.000	0	-17.000	0	6.000	153	28.000	0
-38.000	0	-16.000	0	7.000	154	29.000	0
-37.000	0	-15.000	232	8.000	154	30.000	0
-36.000	0	-14.000	459	9.000	0	31.000	0
-35.000	0	-13.000	153	10.000	153	32.000	0
-34.000	0	-12.000	153	11.000	306	33.000	0
-33.000	0	-11.000	306	12.000	153	34.000	0
-32.000	0	-10.000	153	13.000	153	35.000	0
-31.000	0	-9.000	0	14.000	459	36.000	0
-30.000	0	-8.000	153	15.000	230	37.000	0
-29.000	0	-7.000	153	16.000	0	38.000	0

M E N U

- 1 Analysis
- 2 Histogram
- 3 Execute Hist
- 4 Table

- 1)Next Channel
- 2)Prev Channel
- 3)Next Slice
- 4)Prev Slice
- 5)Edit
- 0)End

■ Description of Menu Items

- <Next Channel> The table of the next channel.
- <Prev Channel> The table of the previous channel.
- <Next Slice> Make the table of next slices, when all slices cannot be displayed on one page.
(It is displayed when the number of slices is 70 (±35) or more.)
- <Prev Slice> The table of the previous slice.
(It is displayed when the number of slices is 70 (±35) or more.)
- <Next MEAN> The table of the next mean stress level.
(It is displayed only when the histogram type is 2-dimension rainflow method.)
- <Prev MEAN> The table of the previous mean stress level.
(It is displayed only when the histogram type is 2-dimension rainflow method.)
- <Edit> Edit histogram data (Count).

8-5-1-1 Editing Histogram Data (Count) [Histogram/Execute Hist/Table/Edit]

Edit (change) currently analyzing histogram data (Count).

■ Setting Range

0 to 4294967295

■ Operation Method

- 1) Select <Edit> from <Table> menu.
- 2) Move the cursor to a desired histogram data with [↑] or [↓]key, and press [ENTER] key.
- 3) An input window appears. Enter an integer within 10 digits and press [ENTER] key.

Result File Name : D:\¥DATA¥TEST200.his						M E N U 1 Analysis 2 Histogram 3 Execute Hist 4 Table 5 Edit	
File Title : TEST							
Test Date : 2004							
MEAS Time : 4.900 sec							
CH : 15 Name : Type							
Type : RAIN[1D] Slice : $\mu\text{m}/\text{m}$							
Edit Count Value							
1							
0 to 4294967295							
Range	Count	Range	Count	Range	Count	Range	Count
1.000	1	23.000	0	45.000	0	67.000	0
2.000	0	24.000	0	46.000	0	68.000	0
3.000	0	25.000	0	47.000	0	69.000	0

- 4) Press [ESC] key to end the editing.
- 5) Press [ESC] key once again to return to the menu.

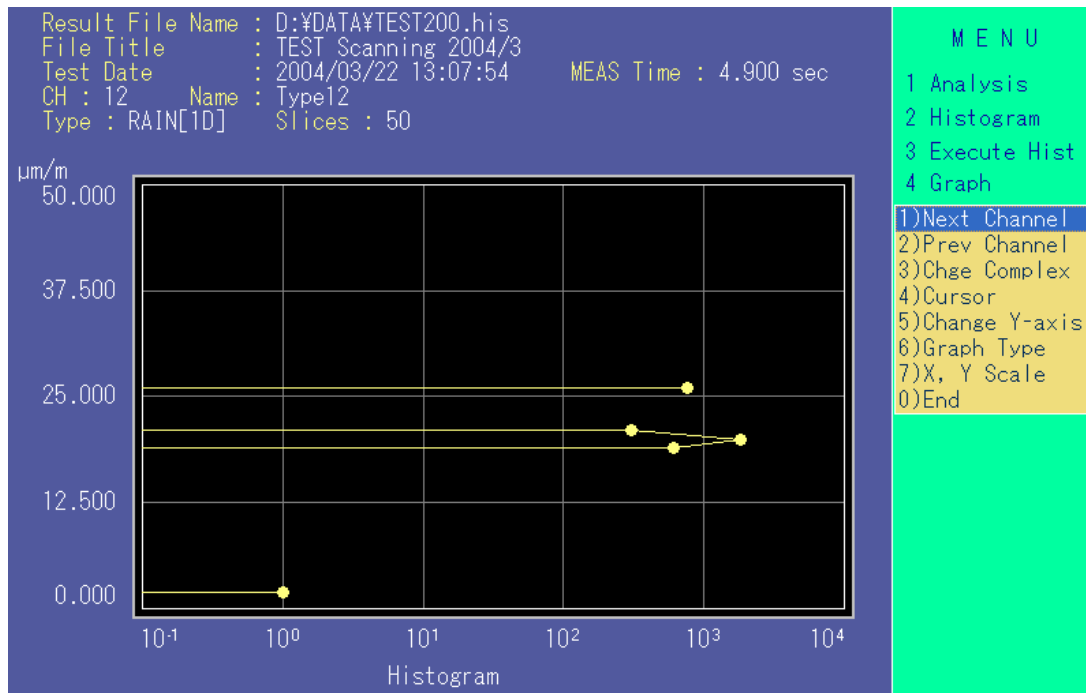
8-5-2 Display of Histogram Processing Result (Graph) [Histogram/Execute Hist/Graph]

Display a graph of histogram processing results for each channel.

■ Operation Method

Select <Graph> from the <Execute Hist> menu to display a graph of histogram processing results.

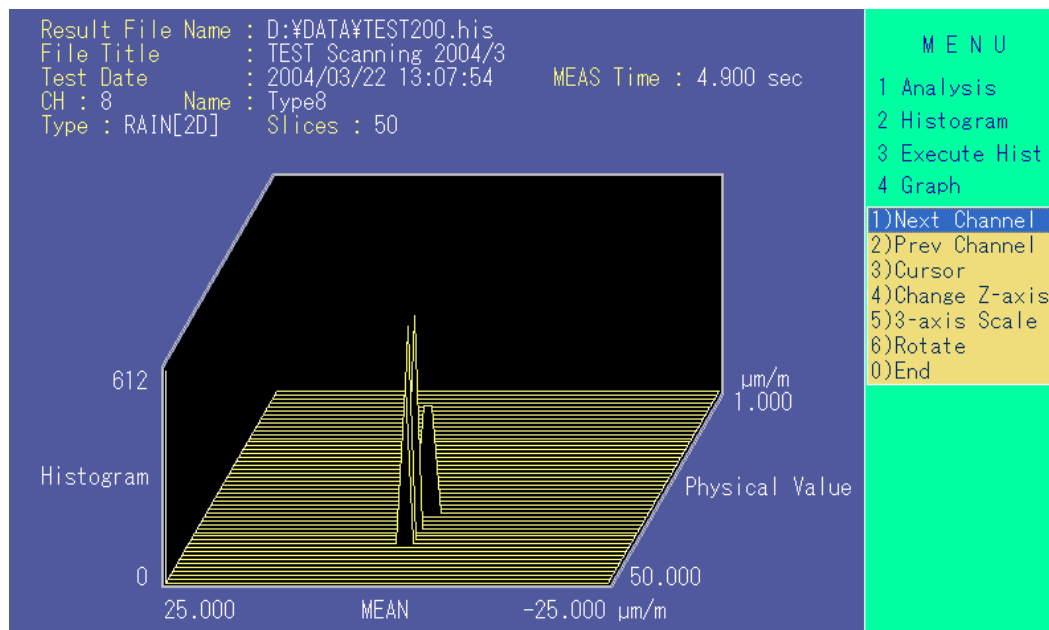
■ Menu structure of the histogram type being other than 2-dimension rainflow method



■ Description of Menu Items

- <Next Channel> Make the graph of the next channel.
- <Prev Channel> Make the graph of the previous channel.
- <Chge Complex> Switch between histogram result, if the type is 1-dimension complex type.
- <Cursor> Load the data for the graph.
- <Change Y-axis> Change the Y-axis.
- <Graph Type> Change the graph type for display.
- <X,Y scale> Change the scale of Xaxis and Yaxis.
- <End> End the display of graph.

■ Menu structure of the histogram type is 2-dimension rainflow method



■ Description of Menu Items

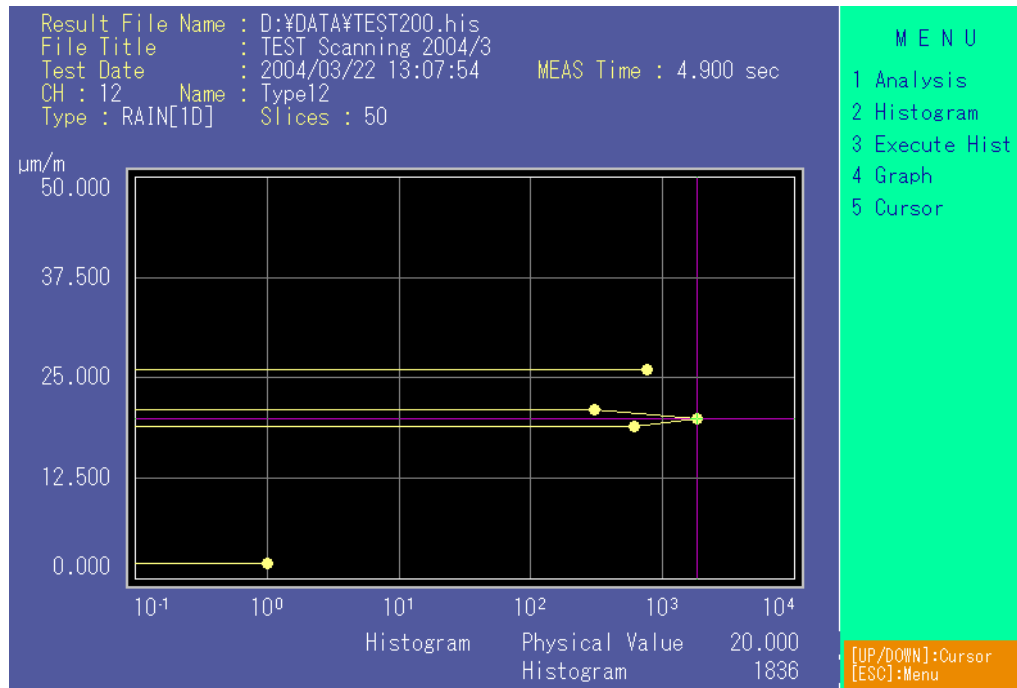
- <Next Channel> Make the graph of the next channel.
- <Prev Channel> Make the graph of the previous channel.
- <Cursor> Load the data for the graph.
- <Change Z-axis> Change the Z-axis.
- <3-axis Scale> Change the scale of X-axis, Y-axis and Z-axis.
- <Rotate> Rotate a graph on the X-Y plane (stress and mean stress).
- <End> End the display of graph.

8-5-2-1 Cursor [Histogram/Execute Hist/Graph/Cursor]

Read a value of the displayed graph.

■ Operation Method

- 1) Select <Cursor> from the <Graph> menu.
- 2) Move the cursor with [↑] or [↓] key and the physical quantity value and the times of the histogram on the cursor position are displayed in the right bottom of the graph.



- 3) Press [ESC] key again to return to the menu.

8-5-2-2 Changing Y-axis [Histogram/Execute Hist/Graph/Change Y-axis]

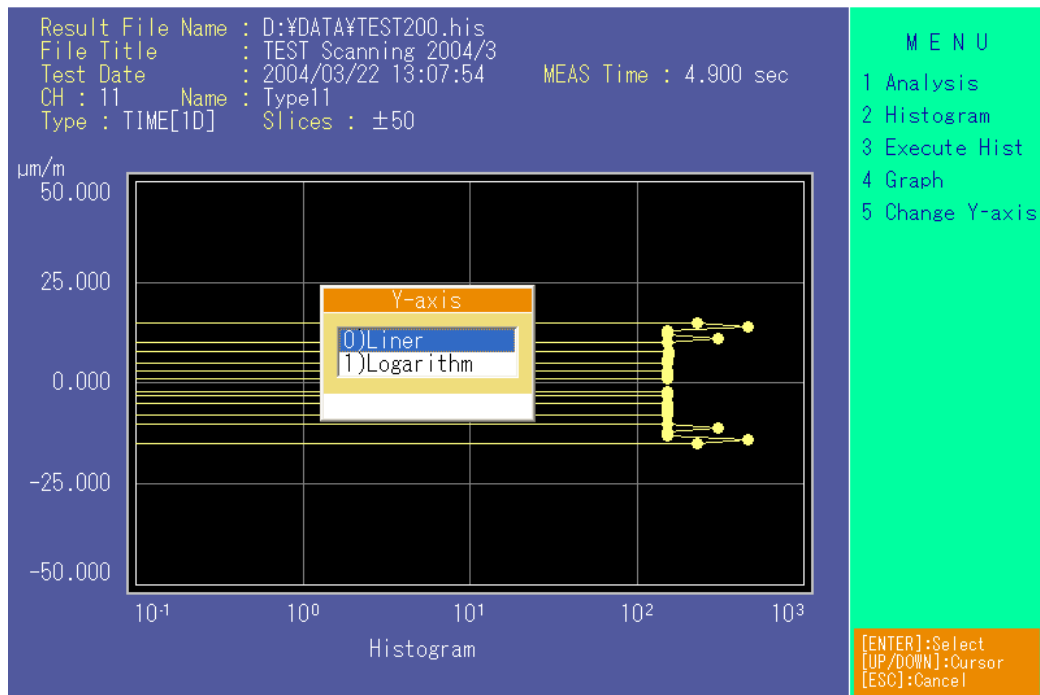
If the histogram type is 1-dimension rainflow method or amplitude method, the Y-axis of the graph is switched between linear display and logarithm display.

■ Options

Linear and Log

■ Operation Method

- 1) Select <Change Y-axis> from <Graph> menu.
- 2) A selection window appears. Move the cursor with [↑] or [↓] key, and press [ENTER] key.



8-5-2-3 Changing Z-axis [Histogram/Execute Hist/Graph/Change Z-axis]

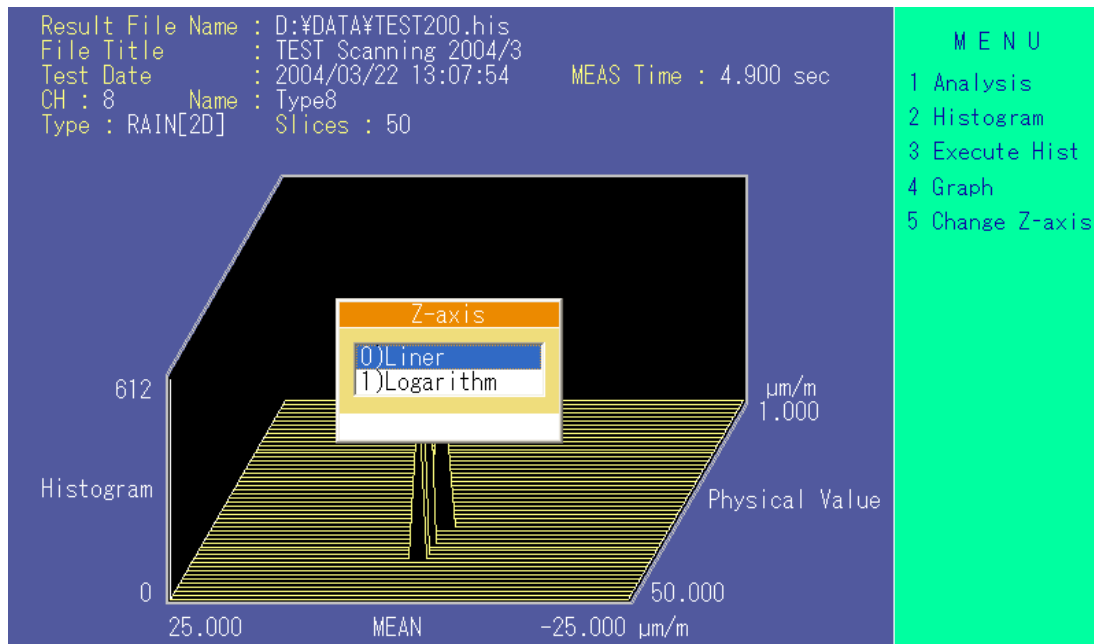
If the histogram type is 2-dimension rainflow method, the Z-axis of the graph (axis of the number of times) is switched between linear display and logarithm display.

■ Options

Linear and Log

■ Operation Method

- 1) Select <Change Z-axis> from <Graph> menu.
- 2) A selection window appears. Move the cursor with [↑] or [↓] key and press [ENTER] key.



8-5-2-4 Changing Graph Type [Histogram/Execute Hist/Graph/ Graph Type]

Change the graph type.

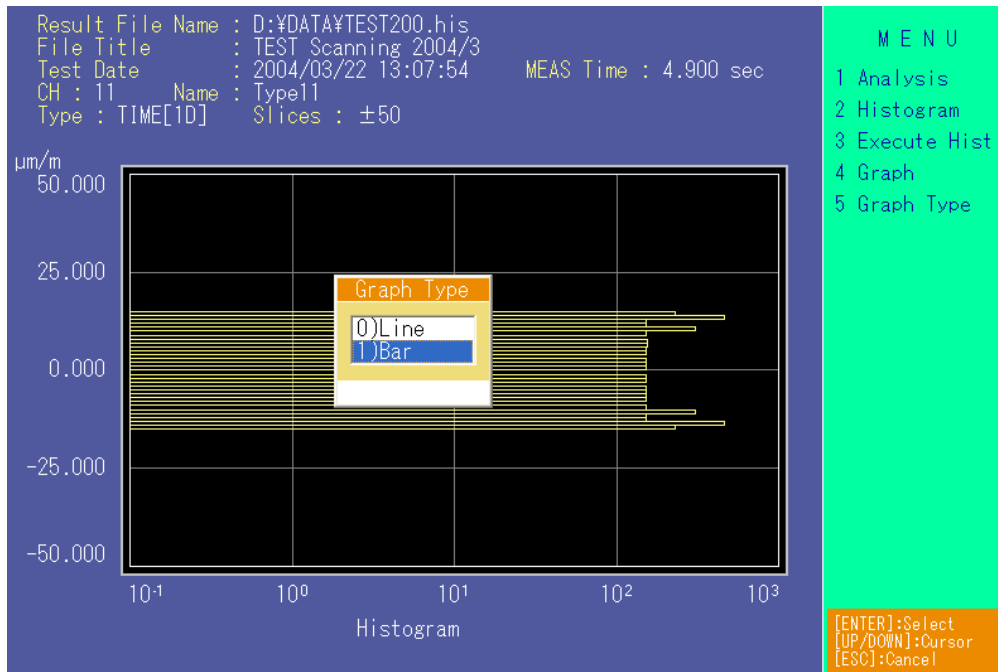
However, if the type is 2-dimension rainflow method, you cannot change the type.

■ Optionals

Line and Bar

■ Operation Method

- 1) Select <Graph Type> from <Graph> menu.
- 2) A “Graph Type” selection window appears. Move the cursor with [$\uparrow$] or [$\downarrow$] key and press [ENTER] key.



8-5-2-5 Changing Scale of X, Y-axis [Histogram/Execute Hist/Graph/X, Y Scale]

Change the scale of the X and Y-axis of the displayed graph.

However, if the type is 2-dimension rainflow method, you cannot change the scale.

8-5-2-5-1 Changing Scale Mode [Histogram/Execute Hist/Graph/X, Y Scale/Scale Mode]

Change the scale mode of the displayed graph.

■ Options

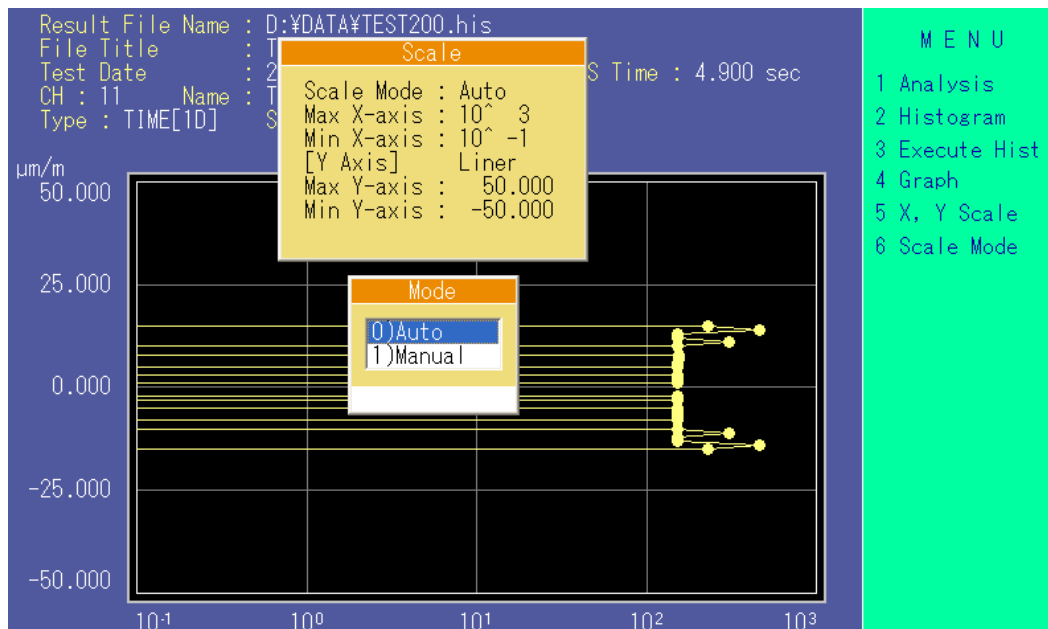
Auto and Manual

Auto.....The Scale is automatically set from the histogram count value.

ManualThe Scale can be set manually. (Setting scale on and after sections 8-5-2-5-2 are available.)

■ Operation Method

- 1) Select <X,Y Scale> from the <Graph> menu.
- 2) Select <Scale Mode> from the <X, Y Scale> menu.
- 3) A “Scale” selection window appears. Move the cursor with [↑] or [↓] key and press [ENTER] keys.



8-5-2-5-2 Setting X-axis Maximum Value [Histogram/Execute Hist/Graph/X, Y Scale/Max X-axis]

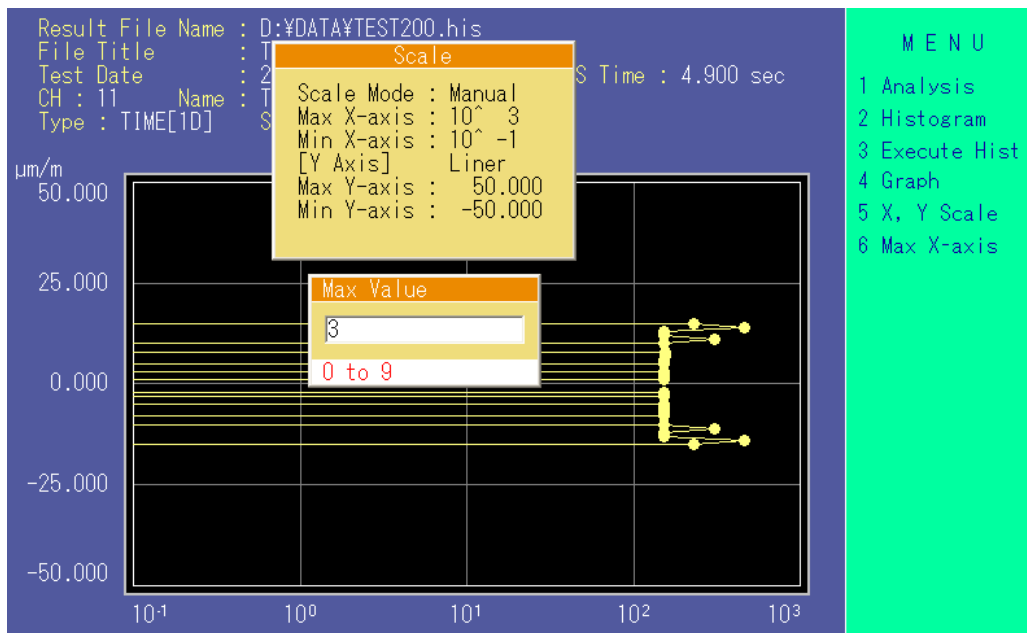
Set the maximum value on the X-axis of the displayed graph.

■ Setting Range

From 0 to 9 (10^0 to 10^9)

■ Operation Method

- 1) Select <Max X-axis> from <Scale Mode> menu.
- 2) Input the maximum value of the X-axis in the setting window and press [ENTER] key.



8-5-2-5-3 Setting X-axis Minimum Value [Histogram/Execute Hist/Graph/X, Y Scale/Min X-axis]

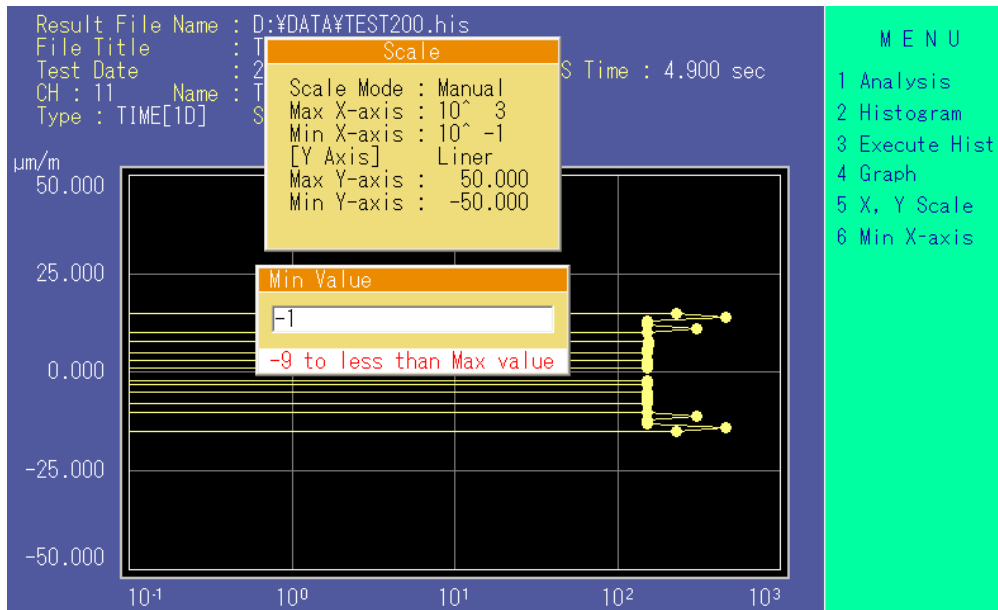
Set the minimum value on the X-axis of the displayed graph.

■ Setting Range

From -9 to the maximum value of the X-axis (10^{-9} to the maximum value of the X-axis)

■ Operation Method

- 1) Select <Min X-axis> from <Scale Mode> menu.
- 2) Input the minimum value of the X-axis in the setting window and press [ENTER] key.



8-5-2-5-4 Setting Y-axis Maximum Value [Histogram/Execute Hist/Graph/X, Y Scale/Max Y-axis]

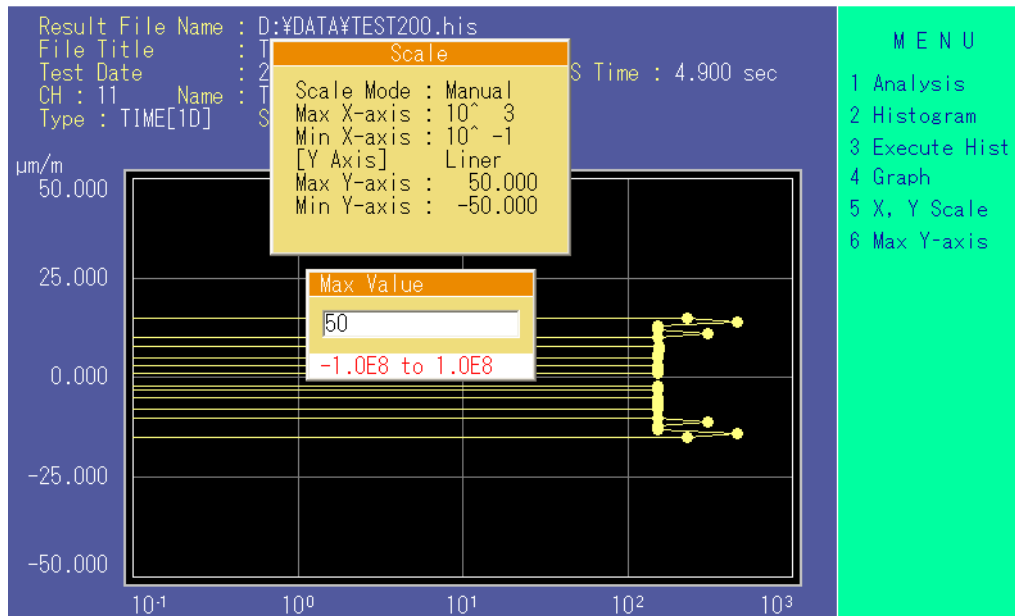
Set the maximum value on the Y-axis of the displayed graph.

■ Setting Range

Linear display -1E8 to 1E8
Logarithm display 0 to 9 (10^0 to 10^9)

■ Operation Method

- 1) Select <Max Y-axis> from <Scale Mode> menu.
- 2) Input the maximum value of the Y-axis in the setting window and press [ENTER] key.



8-5-2-5-5 Setting Y-axis Minimum Value [Histogram/Execute Hist/Graph/X, Y Scale/Min Y-axis]

Set the minimum value on the Y-axis of the displayed graph.

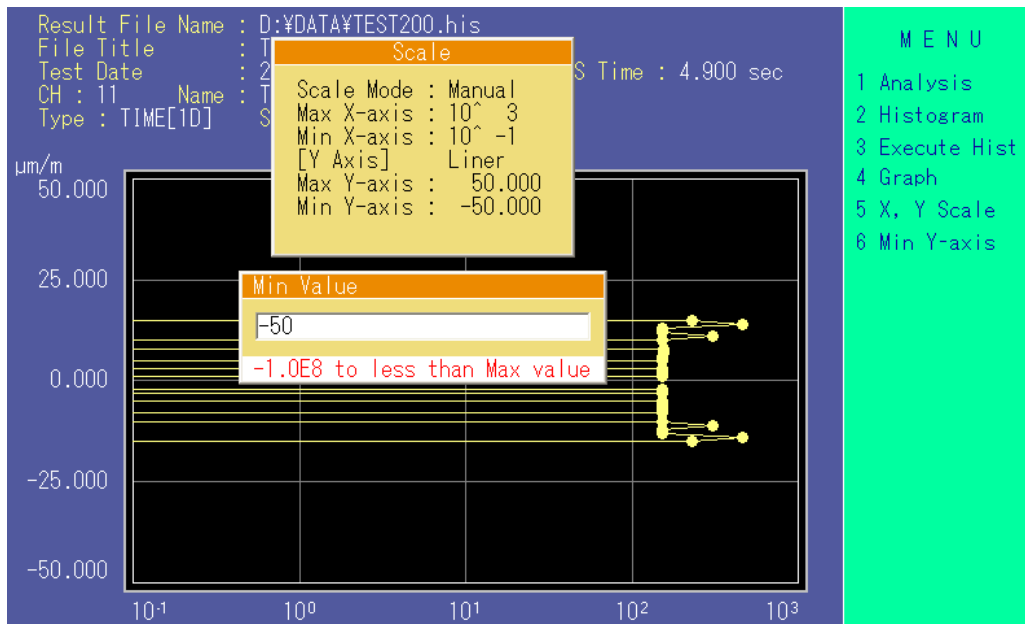
■ Setting Range

Linear display-1E8 to the maximum value on the Y-axis

Logarithm display-9 to the maximum value on the Y-axis (10^{-9} to the maximum value on the Y-axis)

■ Operation Method

- 1) Select <Min Y-axis> from <Scale Mode> menu.
- 2) Input the minimum value of the Y-axis in the setting window and press [ENTER] key.



8-5-2-6 Changing 3-axis Scale [Histogram/Execute Hist/Graph/3-axis Scale]

Change the scale of the X, Y and Z axes of the displayed graph, if the histogram type is 2-dimension rainflow method.

■ Operation Method

- 1) Select <3-axis Scale> menu.
- 2) A “3-axis Scale” setting window appears. Select <Set> menu after specifying the item, and make a graph according to the setting.

8-5-2-6-1 Changing Scale Mode [Histogram/Execute Hist/Graph/3-axis Scale/Scale Mode]

Change the scale mode of the displayed graph.

■ Options

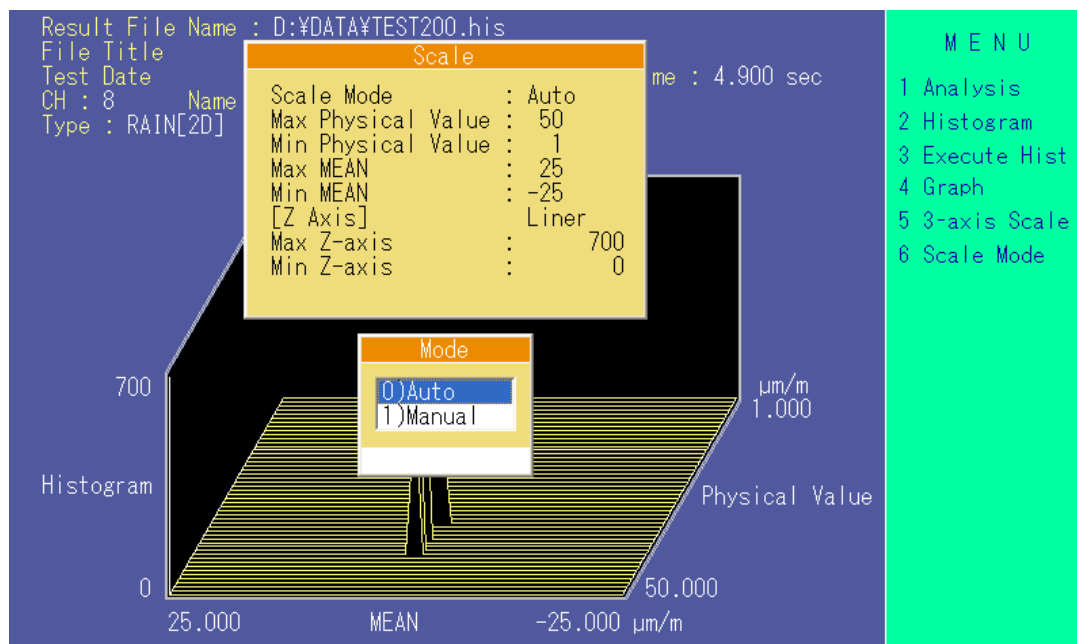
Auto and Manual

Auto.....The scale is automatically displayed from the histogram count value.

ManualThe scale can be set manually. (Setting scale on and after sections 8-5-2-6-2 are available.)

■ Operation Method

- 1) Select <Scale Mode> from <3-axis Scale> menu.
- 2) A mode selection window appears. Move the cursor with [↑] or [↓] key and press [ENTER] key.



8-5-2-6-2 Setting Physical Quantity Axis Maximum Value [Histogram/Execute Hist/Graph/3-axis Scale/Max Phys Val]

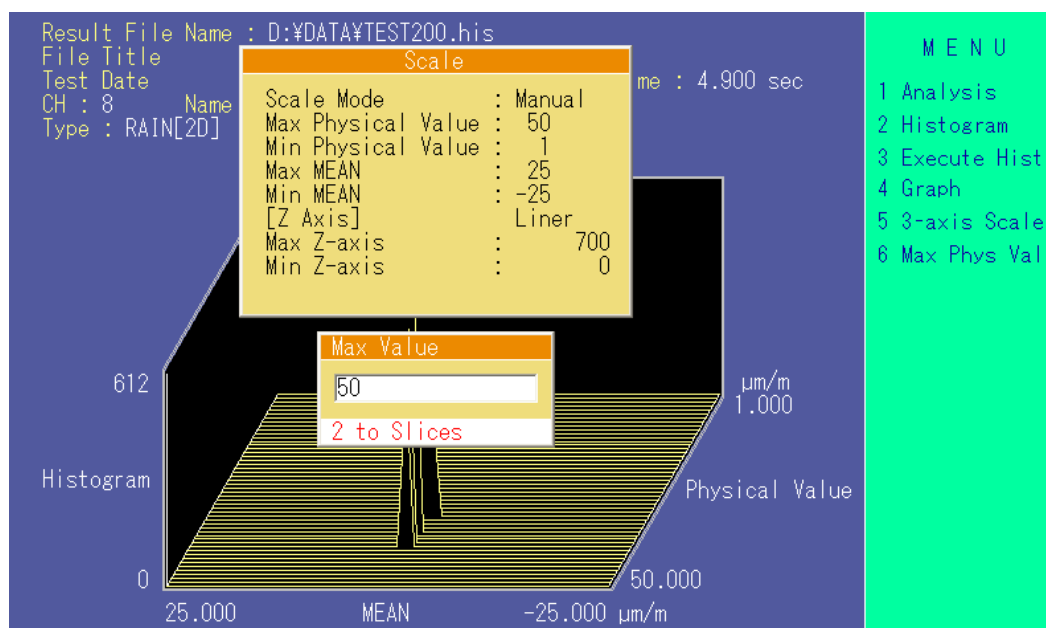
Set the maximum value on the physical quantity axis of the displayed graph.

■ Set Range

2 to 50 (up to the preset slice number)

■ Operation Method

- 1) Select <Max Phys Value> from <3-axis Scale> menu.
- 2) Input the maximum value of the physical axis in the “Max Value” setting window and press [ENTER] key.



8-5-2-6-3 Setting Physical Quantity Axis Minimum Value [Histogram/Execute Hist/Graph/3-axis Scale/Min Phys Val]

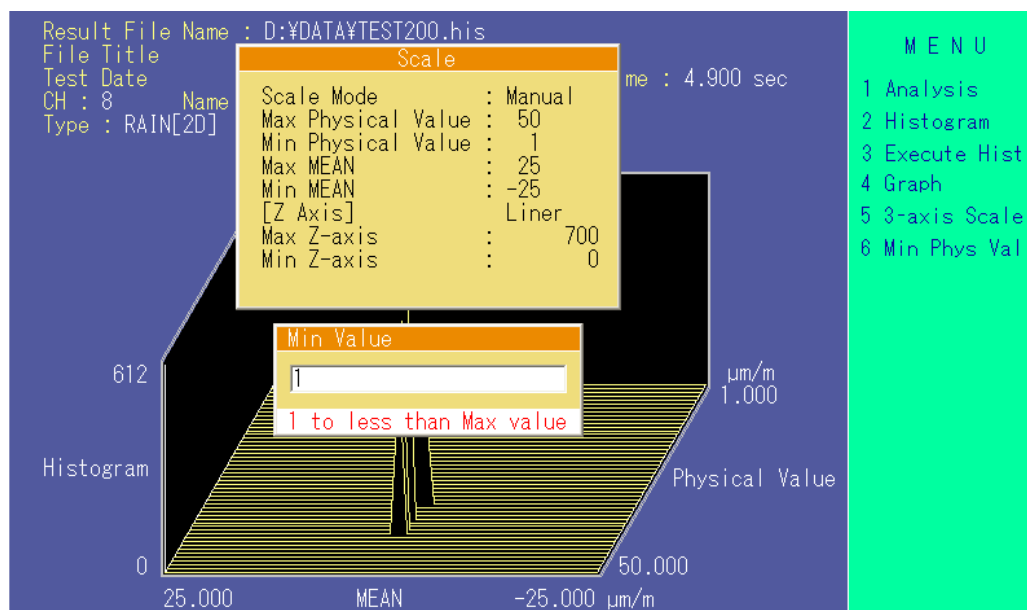
Set the minimum value on the physical quantity axis of the displayed graph.

■ Set Range

1 to the maximum physical quantity

■ Operation Method

- 1) Select <Min Phys Value> from <3-axis Scale> menu.
- 2) Input the minimum value of the physical axis in the “Min Value” setting window and press [ENTER] key.



8-5-2-6-4 Setting MEAN Axis Maximum Value [Histogram/Execute Hist/Graph/3-axis Scale/Max Mean]

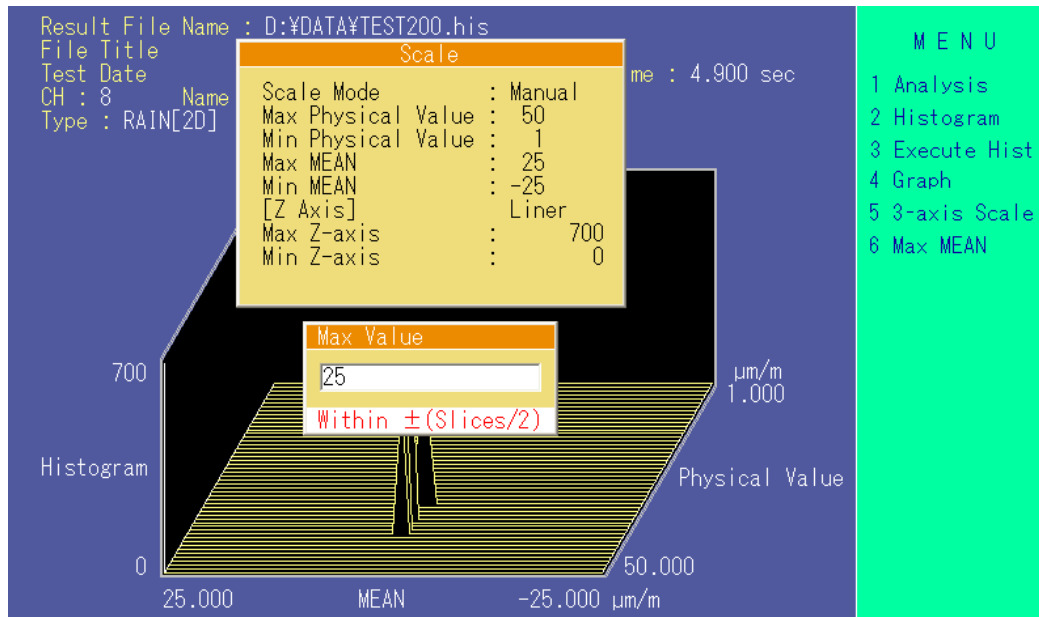
Set the maximum value on the MEAN stress of the displayed graph.

■ Set Range

Within $\pm$ (the number of slices/2)

■ Operation Method

- 1) Select <Max MEAN> from <3-axis Scale> menu.
- 2) Input the maximum value of the MEAN axis in the “Max Value” setting window and press [ENTER] key.



8-5-2-6-5 Setting MEAN Axis Minimum Value [Histogram/Execute Hist/Graph/3-axis Scale/Min Mean]

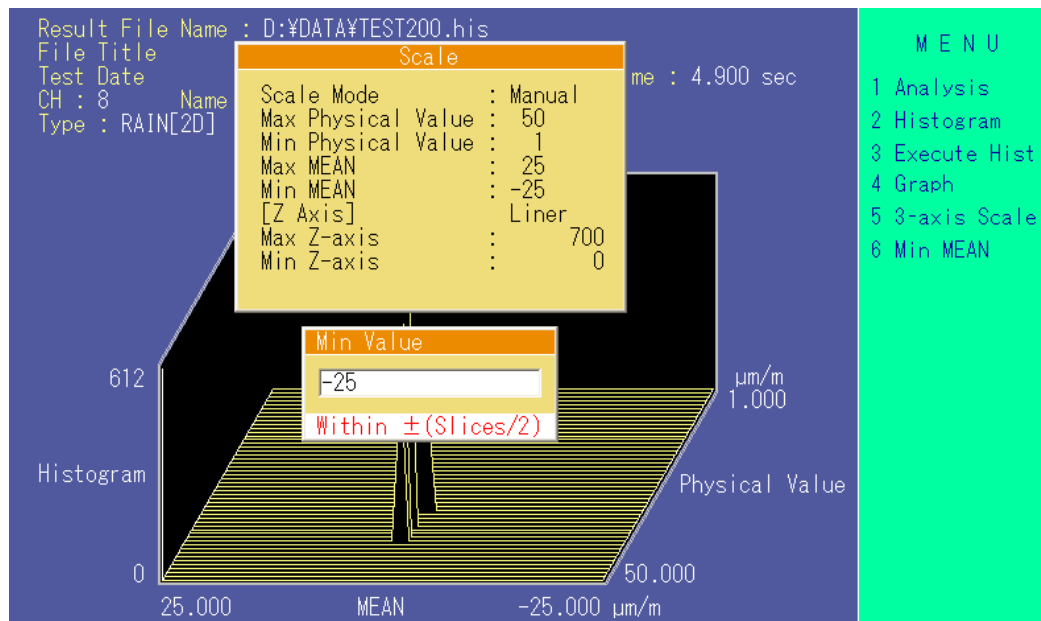
Set the minimum value on the MEAN axis of the displayed graph.

■ Set Range

Within $\pm$ (the number of slices/2)

■ Operation Method

- 1) Select <Min MEAN> from <3-axis Scale> menu.
- 2) Input the minimum value of the MEAN axis in the “Min Value” setting window and press [ENTER] key.



8-5-2-6-6 Setting Z-Axis Maximum Value [Histogram/Execute Hist/Graph/3-axis Scale/Max Z-axis]

Set the maximum value on the Z-axis (histogram count axis) of the displayed graph.

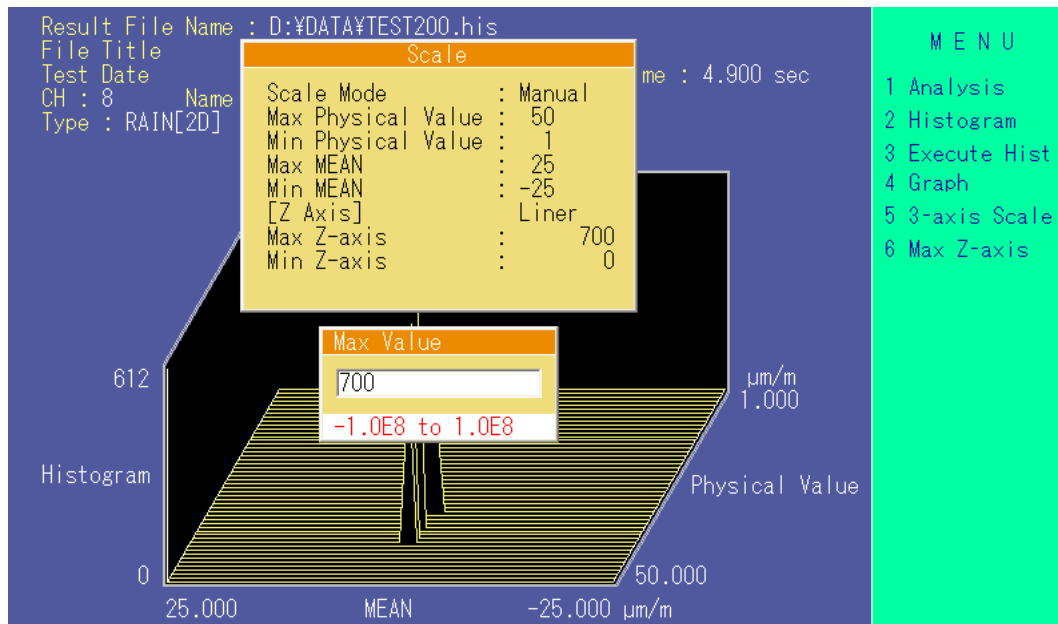
■ Set Range

Liner display -1E8 to 1E8

Logarithm display 0 to 9 (10^0 to 10^9)

■ Operation Method

- 1) Select <Max Z-axis> from <3-axis Scale> menu.
- 2) Input the maximum value of the Z-axis in the “Max Value” setting window and press [ENTER] key.



8-5-2-6-7 Setting Z-Axis Minimum Value [Histogram/Execute Hist/Graph/3-axis Scale/Min Z-axis]

Set the minimum value on the Z-axis (histogram count axis) of the displayed graph.

■ Set Range

Liner display..... 0 to the maximum value on the Z-axis

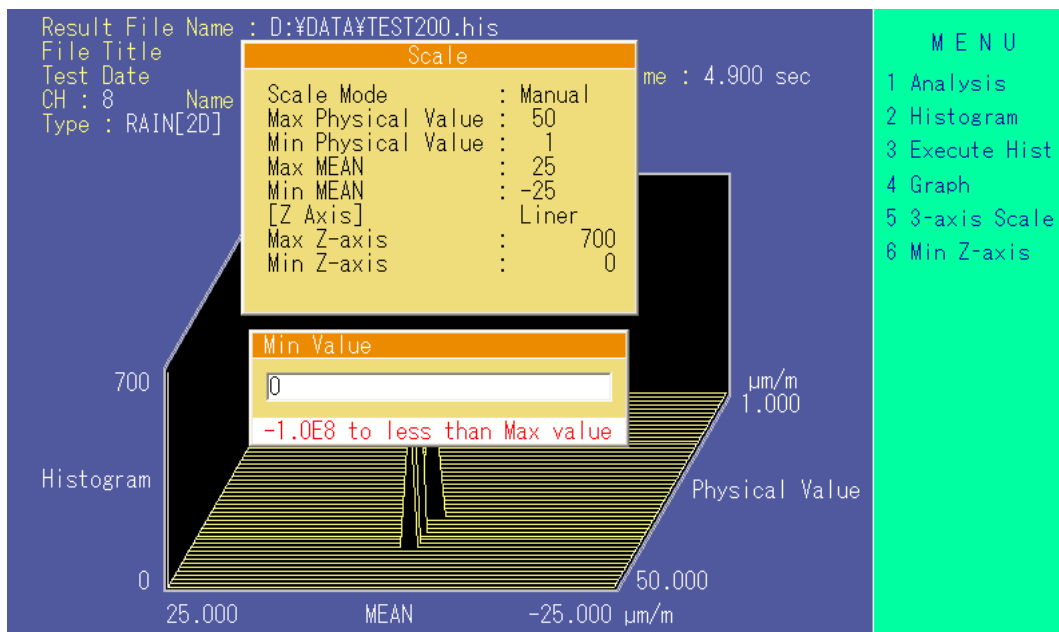
Logarithm display -9 to less than the maximum value on the Z-axis

Note

Because the Z-axis data are the count value, they are always positive. That is '0' is expressed by 10^{-1} to 10^{-9} on the logarithmic graph.

■ Operation Method

- 1) Select <Min Z-axis> from <3-axis Scale> menu.
- 2) Input the minimum value of the Z-axis in the "Min Value" setting window and press [ENTER] key.



8-5-2-7 Rotating Graph [Histogram/Execute Hist/Graph/Rotate]

Rotate a displayed graph with a step of 90 degrees on the X-Y plane (stress-mean stress).

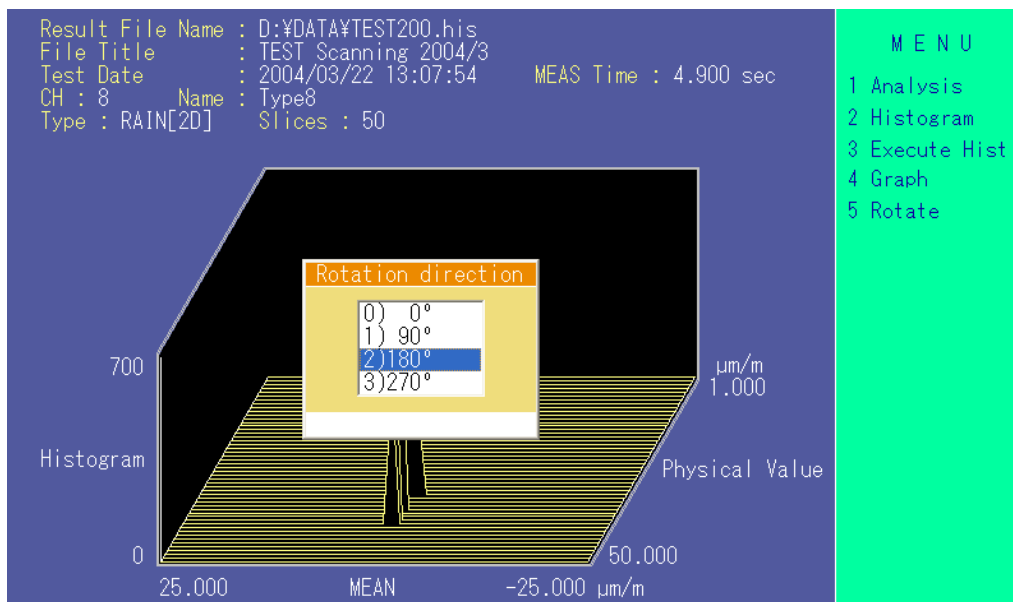
You can use rotate a graph only when the type is 2-dimension rainflow method.

■ Optionals

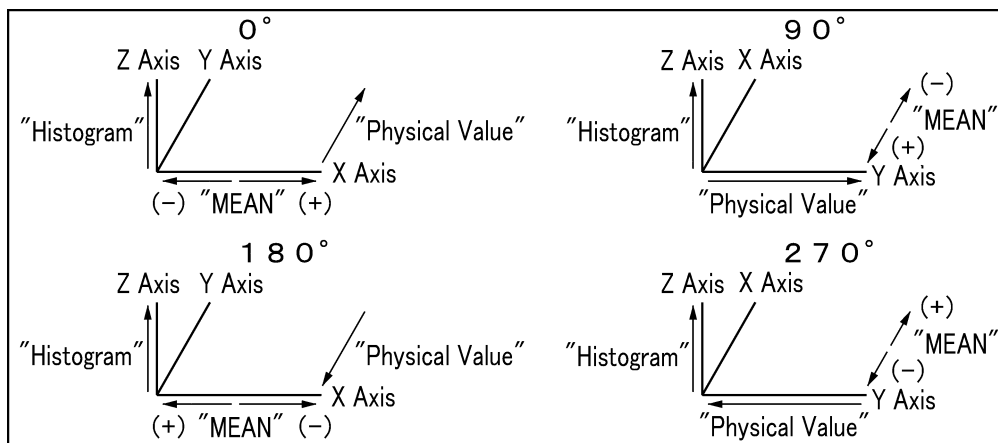
0°, 90°, 180°, 270°

■ Operation Method

- 1) Select <Rotate> from <3-axis Scale> menu.
- 2) A "Rotation direction" selection window appears. Move the cursor with [↑] or [↓] keys, and press [ENTER] key on an appropriate item.



■ Description of Rotation



8-5-3 Changing the Histogram Type of 1-Dimension Complex Types [Histogram /Execute Hist/Chge Complex]

For complex histogram type, whether histogram results is displayed on either “1D rainflow” or “Max/Min” (“Peak/Valley”) can be set in advance for graphically or numerically displaying data.

Whether the histogram results is displayed on either of the above can be changed on graph or table.

■ Operation Method

Select <Chge Complex> from <Execute Hist> menu. Select either 1-dimension rainflow method or Max/Min(Peak/Valley) by selecting “1” or “2” with the [ENTER] key.

The selected “1” or “2” is displayed on “Disp Type” column.

· Display Type is “1”

File Title : TEST Scanning 2004/3							1)Table
Disp Type : 1							2)Graph
Disp Channel : 12							3)Chge Complex
							4)Convert CSV
							5)Change Title
							6)Next Page
							7)Prev Page
							0)End
CH	Type	Slices	Width	Unit	Total Count 1	Total Count 2	
1	P/V	±50	10.000	μm/m	153		
2	P/V	±50	10.000	μm/m	459		
3	MAX/MIN	±50	50.000	μm/m	0		

· Display Type is “2”

File Title : TEST Scanning 2004/3							1)Table
Disp Type : 2							2)Graph
Disp Channel : 12							3)Chge Complex
							4)Convert CSV
							5)Change Title
							6)Next Page
							7)Prev Page
							0)End
CH	Type	Slices	Width	Unit	Total Count 1	Total Count 2	
1	P/V	±50	10.000	μm/m	153		
2	P/V	±50	10.000	μm/m	459		
3	MAX/MIN	±50	50.000	μm/m	0		

For example, if the histogram processing is 1-dimension rainflow method + Max/Min, “1” is for 1-dimension rainflow method and “2” is for Max/Min.

8-5-4 Converting Histogram Processing Result into CSV file [Histogram/Execute Hist/Convert CSV]

Convert histogram processing result into the CSV format and save it. The extension of the file is 'CSV.'

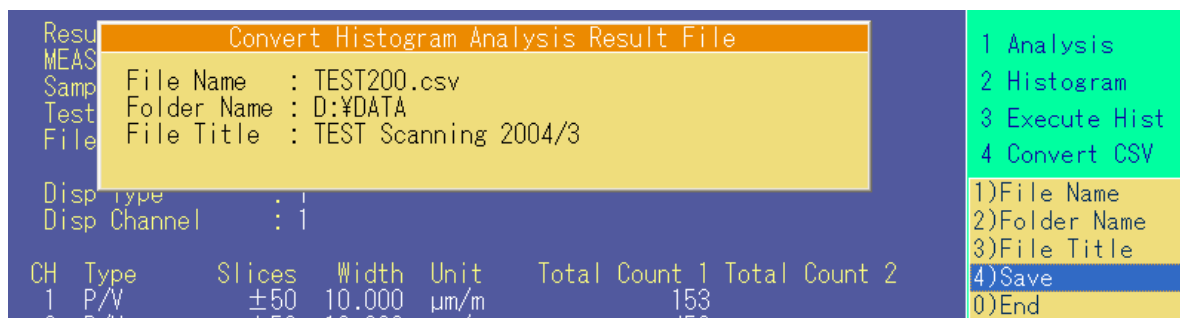
A CSV file of histogram analysis result is created for every channel.

■ Example: if a file name is TEST001 and it has the data of five channels

Five files of TEST001_005.CSV are created from TEST001_001.CSV.

■ Operation Method

- 1) Select <Convert CSV> from <Execute Hist> menu.
- 2) Specify a file name, a folder name and a file title, and then select <Save> menu.
- 3) A message appears to confirm whether the file is saved. Press [ENTER] key to save it.
If you want to cancel it, press [ESC] key.



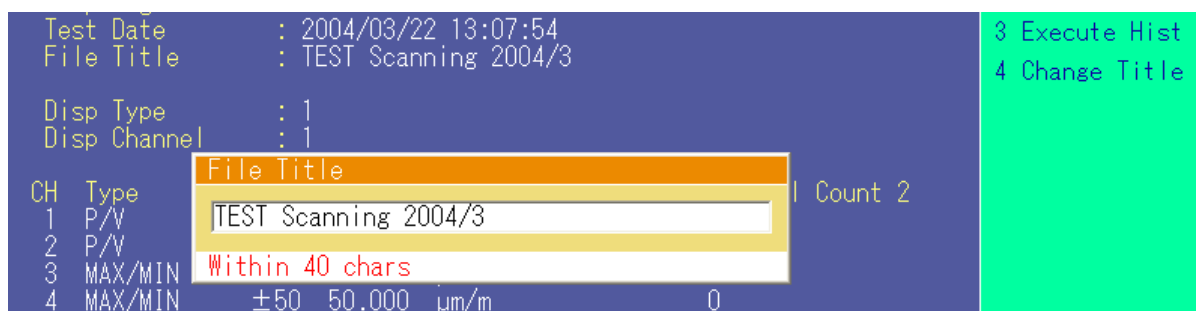
- 4) A message "Created" appears. Press [ENTER] key to return to the menu.
- 5) Select <End> menu.

8-5-5 Changing File Title [Histogram/Execute Hist/Change Title]

Change the title of a file for histogram result.

■ Operation Method

- 1) Select <Change Title> from <Execute Hist> menu.
- 2) A "File Title" input window appears. Input the title and press [ENTER] key.



8-6 DISPLAYING HISTOGRAM PROCESSING RESULT [Histogram /Analysis]

Load the histogram processing result (extension is 'his') to analyze the histogram processing results on a table and graph for every channel.

■ Operation Method

- 1) Select <Analysis> from <Histogram> menu.
- 2) Select <Target File> menu.
- 3) Select <Select File> from the <Target File> menu.

Move the cursor with [] [] key and press [ENTER] key.

8-6-1 Display of Histogram Processing Result (Table) [Histogram/Analysis/Table]

Display a list of histogram processing result for every channel.

■ Operation Method

Select <Table> from <Analysis> menu to display a list of histogram processing result.

Result File Name : D:\¥DATA¥TEST200.his File Title : TEST Scanning 2004/3 Test Date : 2004/03/22 13:07:54 MEAS Time : 4.900 sec CH : 11 Name : Type11 Type : TIME[10] Slices : ±50 Unit : µm/m							
Range	Count	Range	Count	Range	Count	Range	Count
-50.000	0	-29.000	0	-6.000	153	17.000	0
-49.000	0	-27.000	0	-5.000	153	18.000	0
-48.000	0	-26.000	0	-4.000	0	19.000	0
-47.000	0	-25.000	0	-3.000	153	20.000	0
-46.000	0	-24.000	0	-2.000	153	21.000	0
-45.000	0	-23.000	0	-1.000	0	22.000	0
-44.000	0	-22.000	0	1.000	153	23.000	0
-43.000	0	-21.000	0	2.000	153	24.000	0
-42.000	0	-20.000	0	3.000	153	25.000	0
-41.000	0	-19.000	0	4.000	0	26.000	0
-40.000	0	-18.000	0	5.000	153	27.000	0
-39.000	0	-17.000	0	6.000	153	28.000	0
-38.000	0	-16.000	0	7.000	154	29.000	0
-37.000	0	-15.000	232	8.000	154	30.000	0
-36.000	0	-14.000	459	9.000	0	31.000	0
-35.000	0	-13.000	153	10.000	153	32.000	0
-34.000	0	-12.000	153	11.000	306	33.000	0
-33.000	0	-11.000	306	12.000	153	34.000	0
-32.000	0	-10.000	153	13.000	153	35.000	0
-31.000	0	-9.000	0	14.000	459	36.000	0
-30.000	0	-8.000	153	15.000	230	37.000	0
-29.000	0	-7.000	153	16.000	0	38.000	0

M E N U

- 1 Analysis
- 2 Histogram
- 3 Analysis
- 4 Table

- 1)Next Channel
- 2)Prev Channel
- 3)Next Slice
- 4)Prev Slice
- 5)Edit
- 0)End

■ Description of Menu Items

- <Next Channel> Make the table of the next channel.
- <Prev Channel> Make the table of the previous channel.
- <Next Slice> Make the table of next slices, when all slices cannot be displayed on one page.
(It is displayed when the number of slices is 70 (±35) or more.)
- <Prev Slice> Make the table of the previous slice.
(It is displayed when the number of slices is 70 (±35) or more.)
- <Next MEAN> Make the table of the next mean stress level.
(It is displayed only when the histogram type is 2-dimension rainflow.)
- <Prev MEAN> Make the table of the previous mean stress level.
(It is displayed only when the histogram type is 2-dimension rainflow.)
- <Edit> Edit histogram data (Count).

8-6-1-1 Editing Histogram Data (Count) [Histogram/Analysis/Table/Edit]

Edit (change) the currently analyzed histogram data (Count).

■ Set Range

0 to 4294967295

■ Operation Method

- 1) Select <Edit> from <Table> menu.
- 2) Move the cursor to a desired histogram data with [↑] or [↓] key and press [ENTER] key.
- 3) An input window appears. Enter an integer within 10 digits and press [ENTER] key.

Result File Name : D:\¥DATA¥TEST200.his
File Title : TEST
Test Date : 2004
CH : 10 Name : Type
Type : AMPLITUDE Slice : $\mu\text{m}/\text{m}$

MEAS Time : 4.900 sec

Edit Count Value

1

0 to 4294967295

Range	Count	Range	Count	Range	Count	Range	Count
1.000	1	23.000	0	45.000	0	67.000	0
2.000	0	24.000	0	46.000	0	68.000	0
3.000	0	25.000	918	47.000	0	69.000	0
4.000	0	26.000	306	48.000	0	70.000	0

M E N U
1 Analysis
2 Histogram
3 Analysis
4 Table
5 Edit

- 4) End editing to press [ESC] key.
- 5) Press [ESC] key once again to return to the menu.

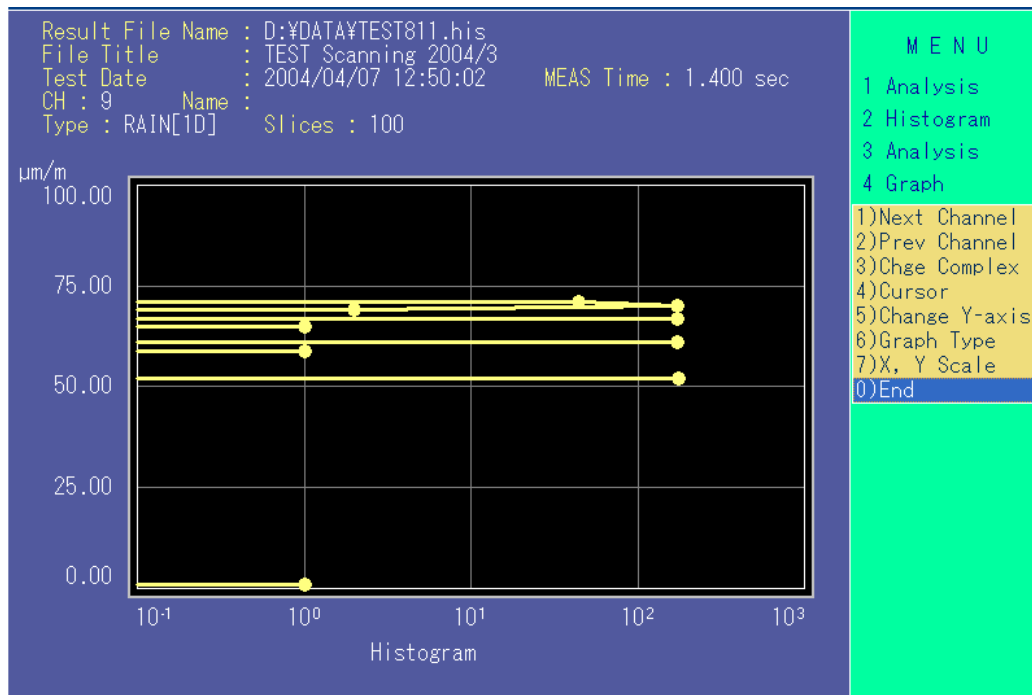
8-6-2 Displaying Histogram Processing Result (Graph) [Histogram/Analysis/Graph]

Display a graph of histogram processing results for every channel.

■ Operation Method

Select <Graph> from <Analysis> menu to display a graph of histogram processing results.

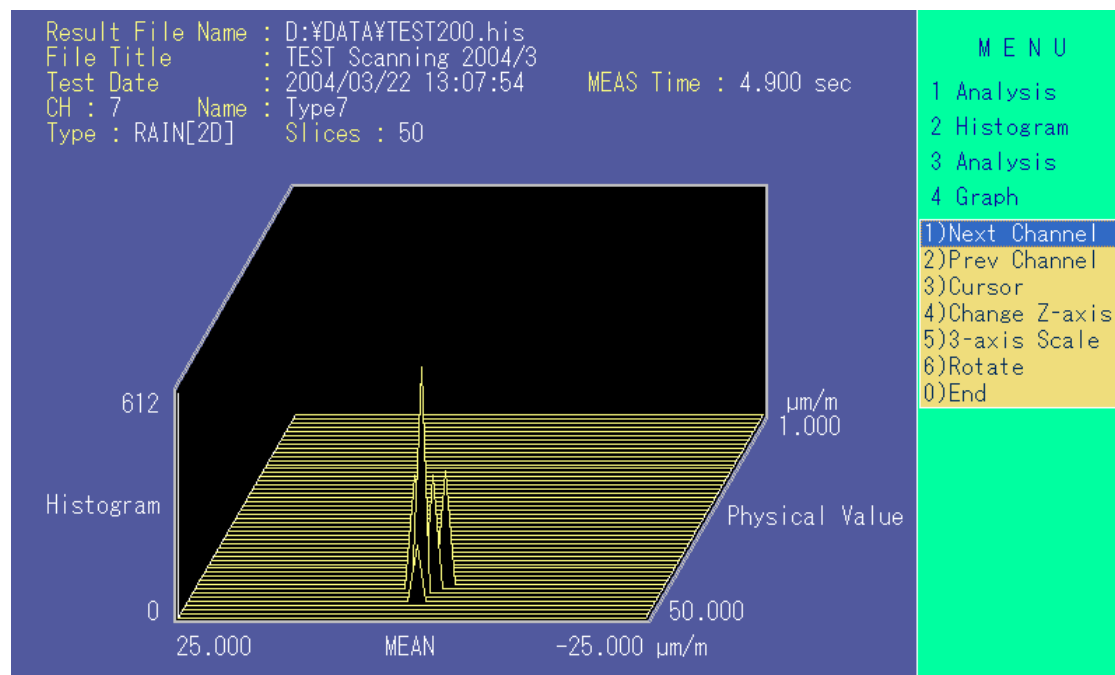
■ Menu of the histogram type being other than 2-dimension rainflow method.



■ Description of Menu Items

- <Next Channel> Make the graph of the next channel.
- <Prev Channel> Make the graph of the previous channel.
- <Chge Complex> Switch between histogram results, if the type is 1-D complex type.
- <Cursor> Load the data for the graph.
- <Change Y-axis> Change Y-axis.
- <Graph Type> Change the graph type.
- <X,Y scale> Change the scale of X-axis and Y-axis.
- <End> End the display of graph.

■ Menu items of the histogram type being 2-dimension rainflow method



■ Description of Menu Items

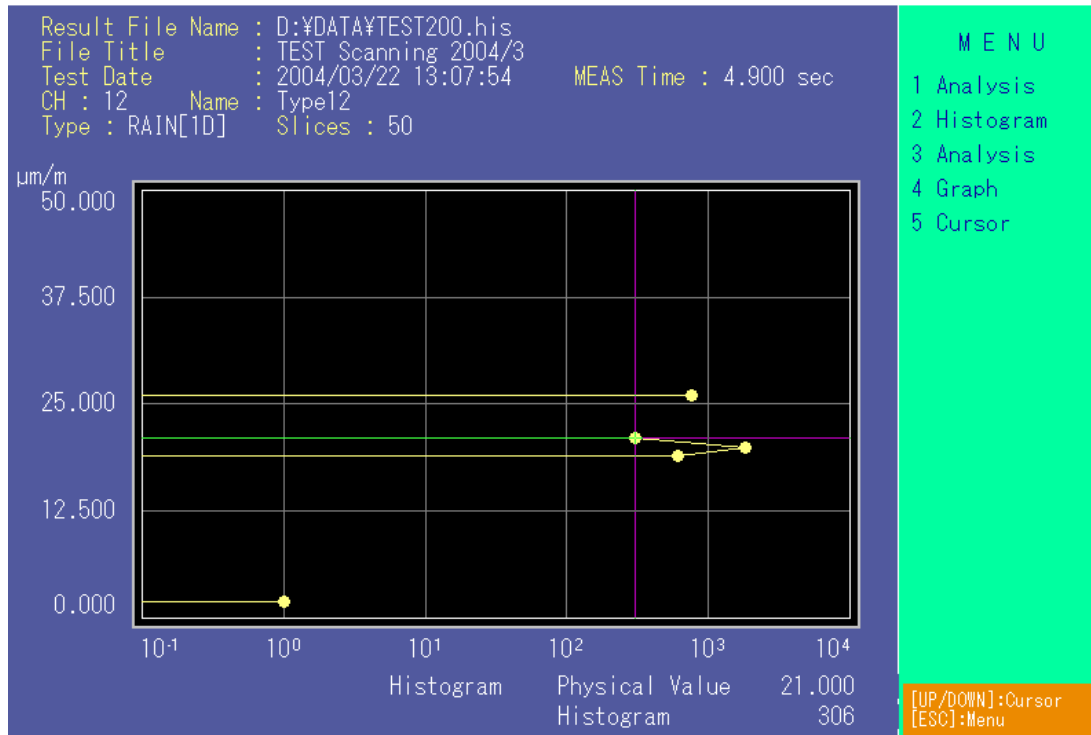
- <Next Channel> Make the graph of the next channel.
- <Prev Channel> Make the graph of the previous channel.
- <Cursor> Load the data for the graph.
- <Change Z-axis> Change Z-axis.
- <3-axis Scale> Change the scale of X-axis, Y-axis and Z-axis.
- <Rotate> Rotate a graph on the X-Y plane (stress and mean stress).
- <End> End the display of graph.

8-6-2-1 Cursor [Histogram/Analysis/Graph/Cursor]

Read a value of the displayed graph.

■ Operation Method

- 1) Select <Cursor> from <Graph> menu.
- 2) Move the cursor with [$\leftarrow$] [$\rightarrow$] key and the physical quantity value and the number of histogram times at the cursor position is displayed in the right bottom of the graph.



- 3) Press [ESC] key again to return to the menu.

8-6-2-2 Changing Y-axis [Histogram/Analysis/Graph/Change Y-axis]

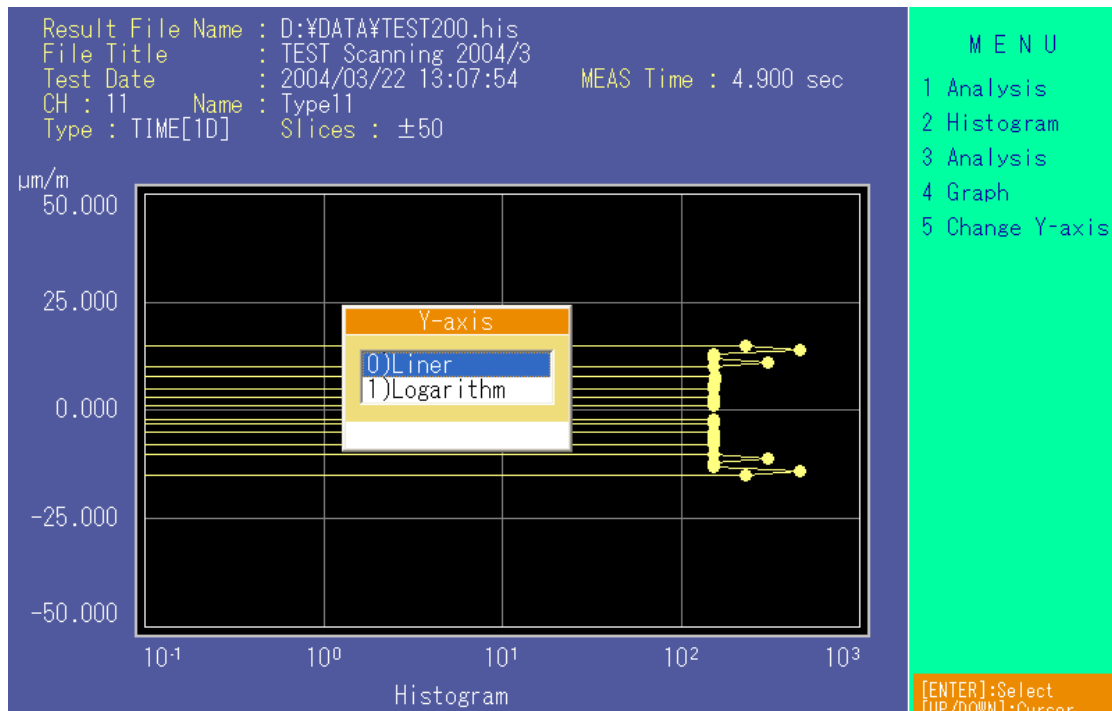
If the histogram type is 1-dimension rainflow method or amplitude method, the Y-axis of the graph is switched between linear display and log display.

■ Optionals

Linear and Log

■ Operation Method

- 1) Select <Change Y-axis> from <Graph> menu.
- 2) A “Y-axis” selection window appears. Move the cursor with [↑] or [↓] key and press [ENTER] key.



8-6-2-3 Changing Z-axis [Histogram/Analysis/Graph/Change Z-axis]

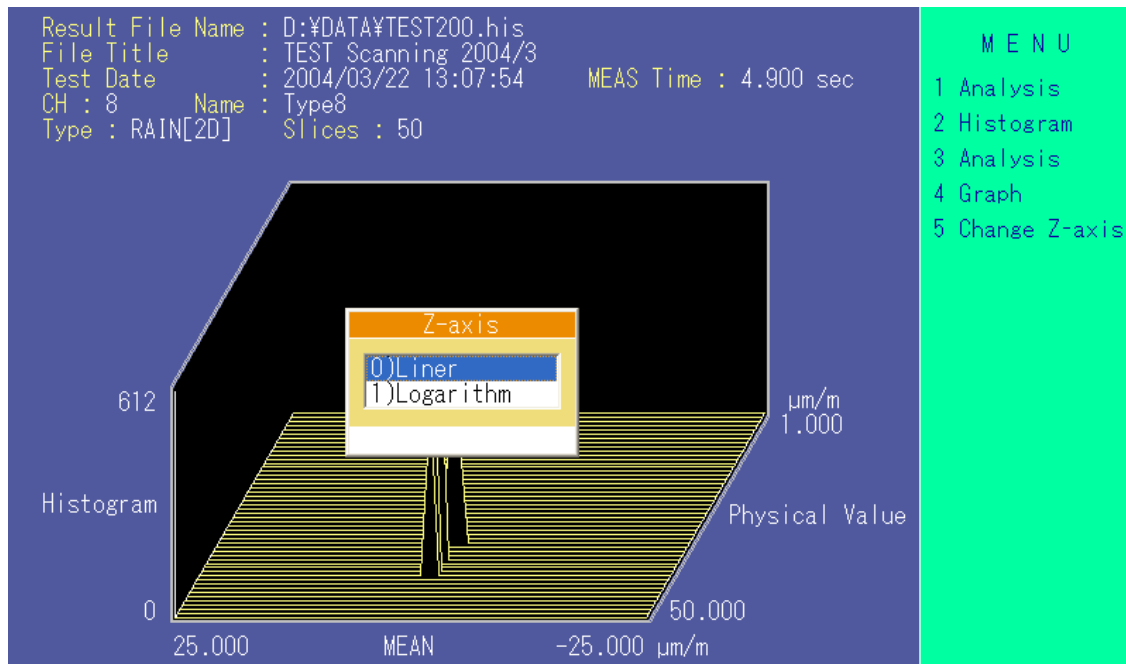
If the histogram type is 2-dimension rainflow method, the Z-axis of the graph (axis of the number of times) is switched between linear display and log display.

■ Optionals

Linear and Log

■ Operation Method

- 1) Select <Change Z-axis> from <Graph> menu.
- 2) A “Z-axis” selection window appears. Move the cursor with [↑] or [↓] key and press[ENTER]Key.



8-6-2-4 Changing Graph Type [Histogram/Analysis/Graph/Graph Type]

Change the current graph type.

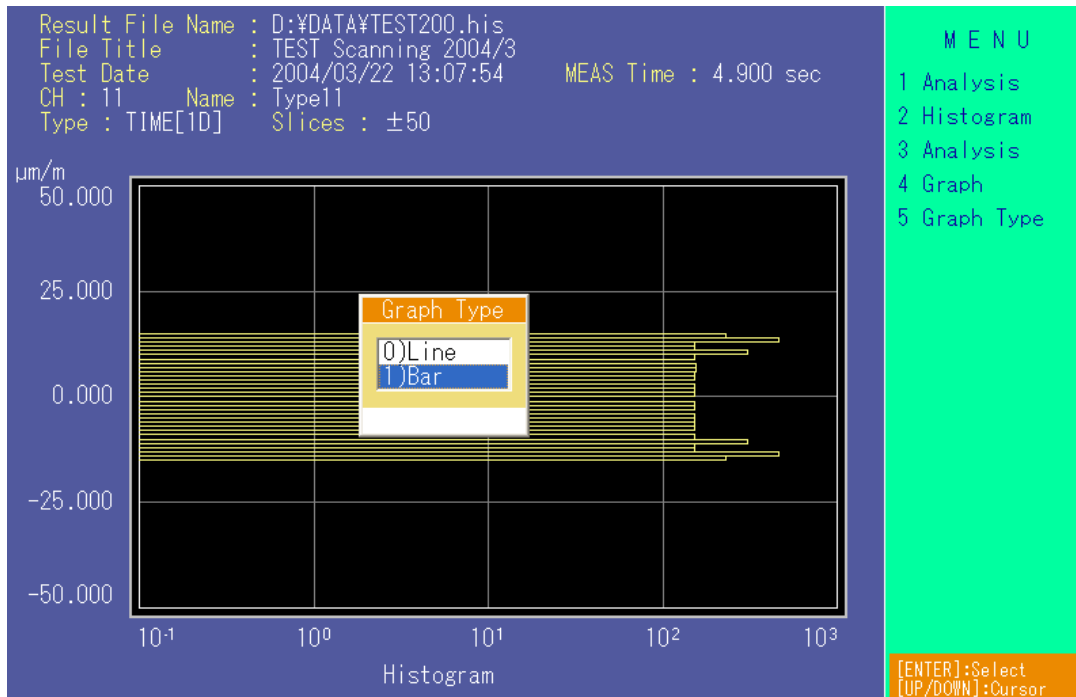
However, if the histogram type is 2-dimension rainflow method, you cannot change the graph type.

■ Optionals

Line and Bar

■ Operation Method

- 1) Select <Graph Type> from <Graph> menu.
- 2) A “Graph Type” selection window appears. Move the cursor with [$\uparrow$] or [$\downarrow$] key and press [ENTER] key.



8-6-2-5 Changing Scale of X, Y-axis [Histogram/Analysis/Graph/X, Y Scale]

Change the scale of the X-and Y-axis of the displayed graph.

However, if the type is 2-dimension rainflow method, you cannot change the scale.

8-6-2-5-1 Changing Scale Mode [Histogram/Analysis/Graph/X, Y Scale/Scale Mode]

Change the scale mode of the current graph.

■ Optionals

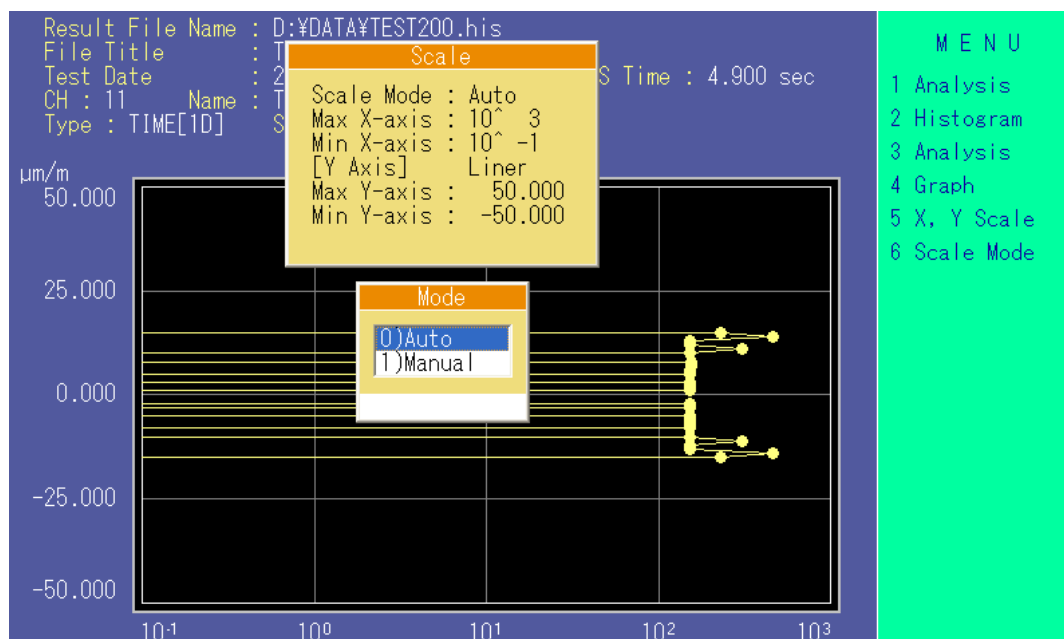
Auto and Manual

Auto..... The scale for display is automatically displayed from the histogram count value.

Manual The scale can be set manually. (Setting scales on and after sections 8-6-2-5-2 are available.)

■ Operation Method

- 1) Select <Scale Mode> from <X, Y Scale> menu.
- 2) A “Scale” selection window appears. Move the cursor with [] or [↓] key and press [ENTER] keys.



8-6-2-5-2 Setting X-axis Maximum Value [Histogram/Analysis/Graph/X, Y Scale/Max X-axis]

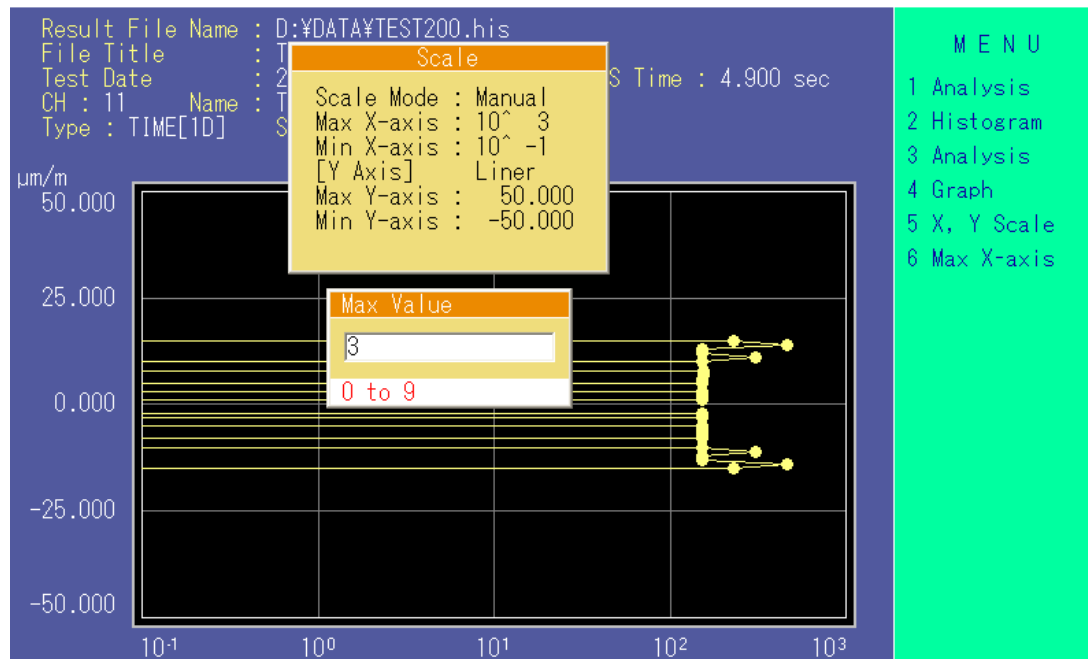
Set the maximum value on the X-axis of the displayed graph.

■ Set Range

From 0 to 9 (10^0 to 10^9)

■ Operation Method

- 1) Select <Max X-axis> from <X, Y Scale> menu.
- 2) Input the maximum value of the X-axis in the “Max Value” setting window and press [ENTER] key.



8-6-2-5-3 Setting X-axis Minimum Value [Histogram/Analysis/Graph/X, Y Scale/Min X-axis]

Set the minimum value on the X-axis of the displayed graph.

■ Set Range

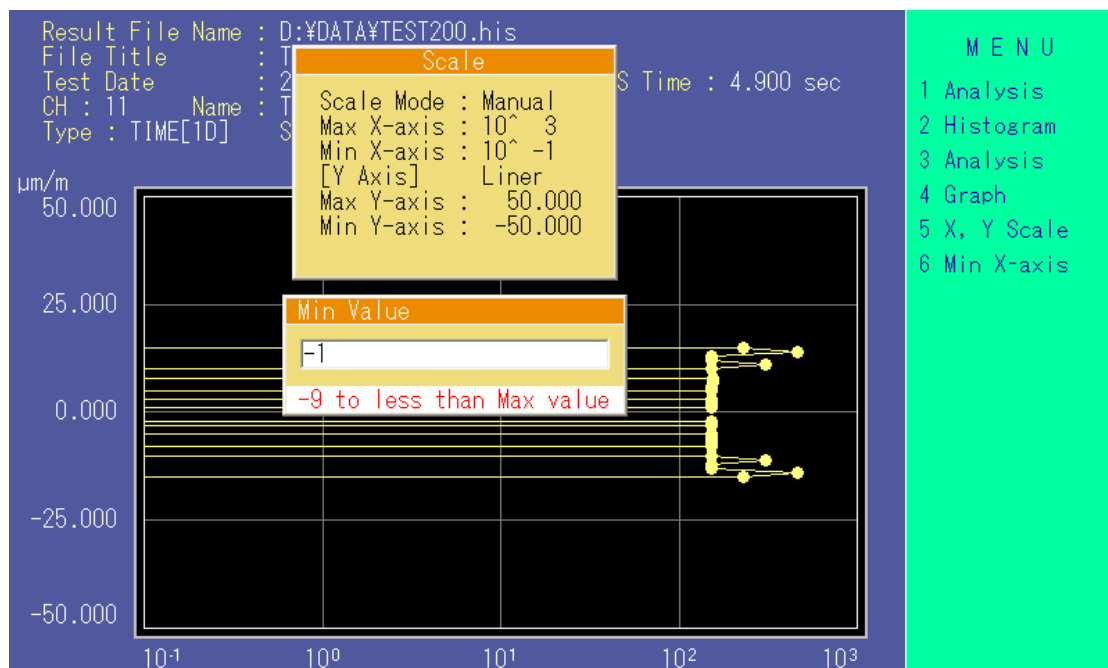
From -9 to the maximum value of the X-axis (10^{-9} to the maximum value of the X-axis)

Note

Because the X-axis data is the count value, the actual data is more than '0.' That is '0' is expressed by 10^{-1} to 10^{-9} on the logarithmic chart.

■ Operation Method

- 1) Select <Min X-axis> from <X, Y Scale> menu.
- 2) Input the minimum value of the X-axis in the "Min Value" setting window and press [ENTER] key.



8-6-2-5-4 Setting Y-axis Maximum Value [Histogram/Analysis/Graph/X, Y Scale/Max Y-axis]

Set the maximum value on the Y-axis of the displayed graph.

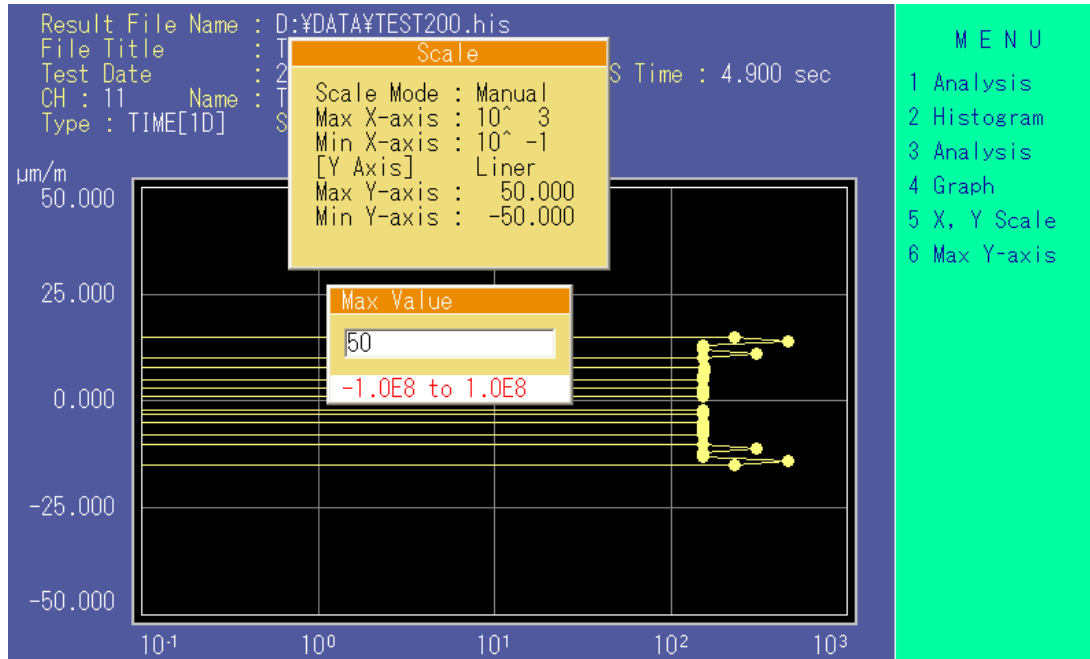
■ Set Range

Linear display -1E8 to 1E8

Logarithm display 0 to 9 (10^0 to 10^9)

■ Operation Method

- 1) Select <Max Y-axis> from <X, Y Scale> menu.
- 2) Input the maximum value of the Y-axis in the “Max Value” setting window and press [ENTER] key.



8-6-2-5-5 Setting Y-axis Minimum Value [Histogram/Analysis/Graph/X, Y Scale/Min Y-axis]

Set the minimum value on the Y-axis of the displayed graph.

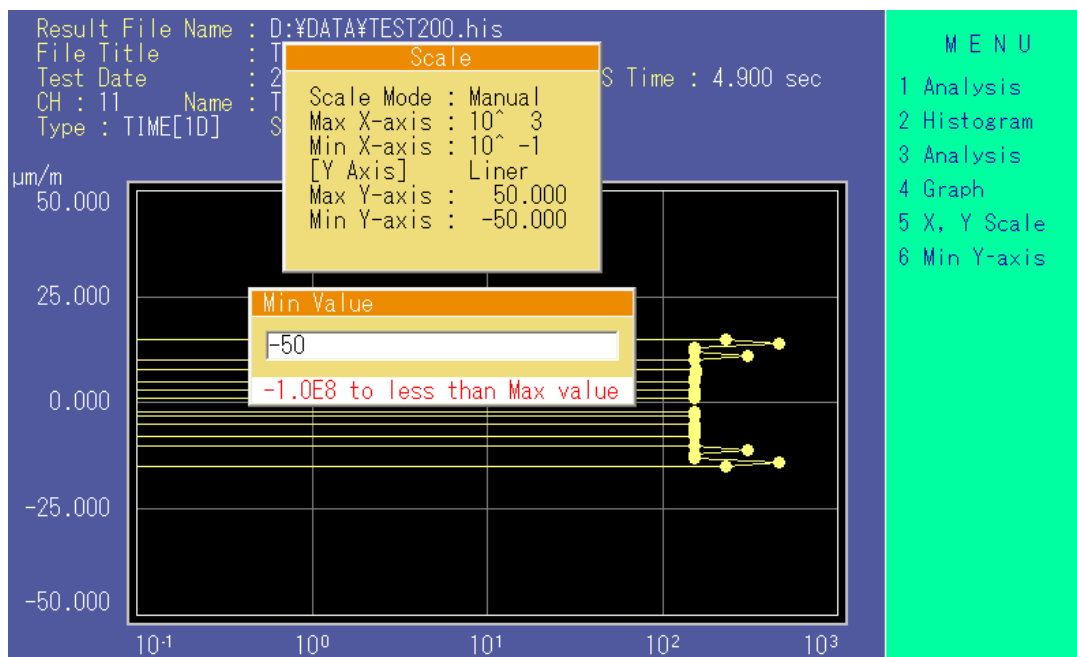
■ Set Range

Linear display -1E8 to the maximum value on the Y-axis

Logarithm display -9 to the maximum value on the Y-axis
(10^{-9} to the maximum value on the Y-axis)

■ Operation Method

- 1) Select <Min Y-axis> from <X, Y Scale> menu.
- 2) Input the minimum value of the Y-axis in the “MinValue” setting window and press [ENTER] key.



8-6-2-6 Changing 3-axis Scale [Histogram/Analysis/Graph/3-axis Scale]

Change the scale of the X, Y and Z axes of the displayed graph, if the histogram type is 2-dimension rainflow method.

■ Operation Method

- 1) Select <3-axis Scale> from <Graph> menu.
- 2) When a setting window appears. Select <Set> menu after specifying the item, and make a graph according to the set is displayed.

8-6-2-6-1 Changing Scale Mode [Histogram/Analysis/Graph/3-axis Scale/Scale Mode]

Change the scale mode of the displayed graph.

■ Optionals

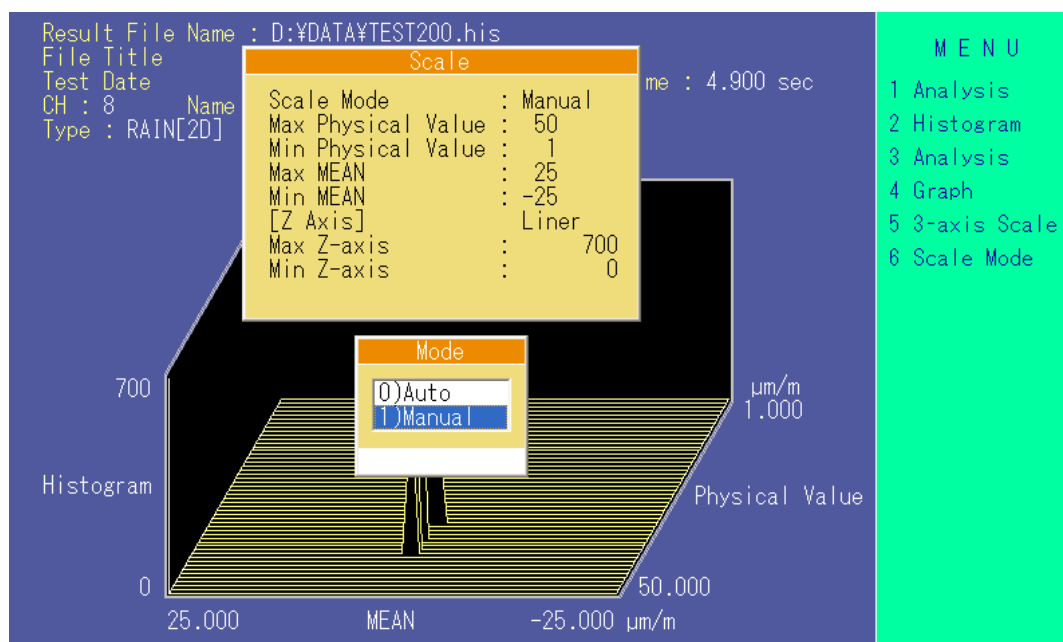
Automatic and Manual

Auto..... The scale automatically displayed from the histogram count value.

Manual The scale can be set manually. (Setting scales on and after sections 8-6-2-6-2 are available.)

■ Operation Method

- 1) Select <Scale Mode> from <3-axis Scale> menu.
- 2) When scale a selection window appears. Move the cursor with [↑] or [↓] key and press [ENTER] key.



8-6-2-6-2 Setting Physical Quantity Axis Maximum Value [Histogram/Analysis/Graph/3-axis Scale/Max Phys Val]

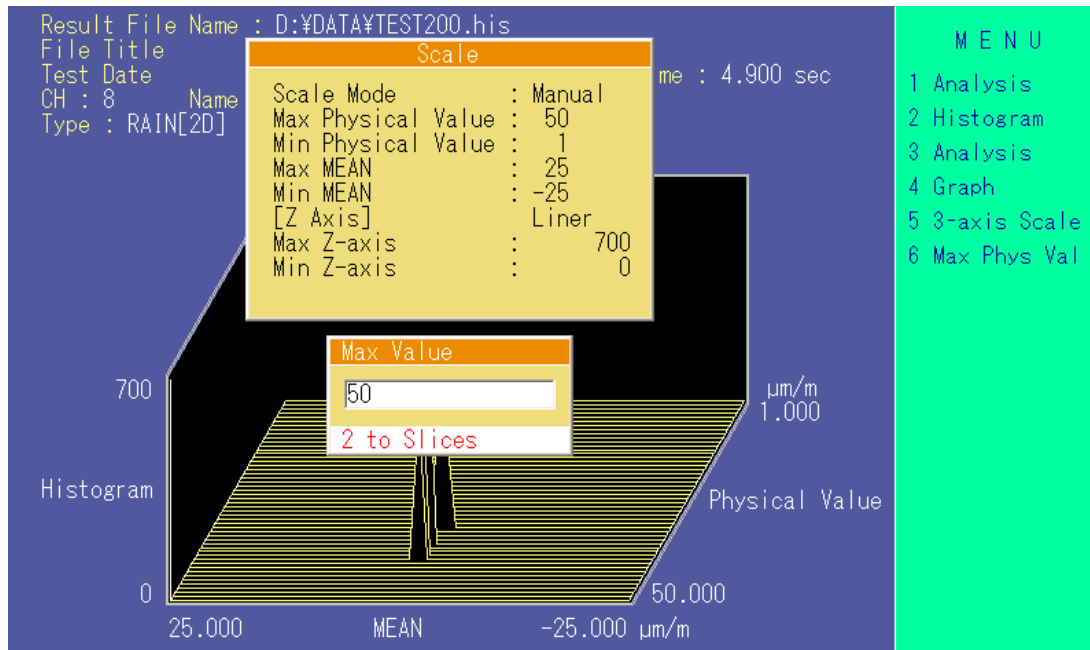
Set the maximum value on the physical quantity axis of the displayed graph.

■ Set Range

2 to 50 (up to the preset slice number)

■ Operation Method

- 1) Select <Max Phys Val> from <3-axis Scale> menu.
- 2) Input the maximum value of the physical axis in the “Max Value” setting window and press [ENTER] key.



Set the minimum value on the physical quantity axis of the displayed graph.

1 to the maximum physical quantity

- 1) Select <Min Phys Value> from <3-axis Scale> menu.
- 2) Input the minimum value of the physical axis in the “Min Value” setting window and press [ENTER] key.



8-6-2-6-4 Setting MEAN Axis Maximum Value [Histogram/Analysis/Graph/3-axis Scale/Max Mean]

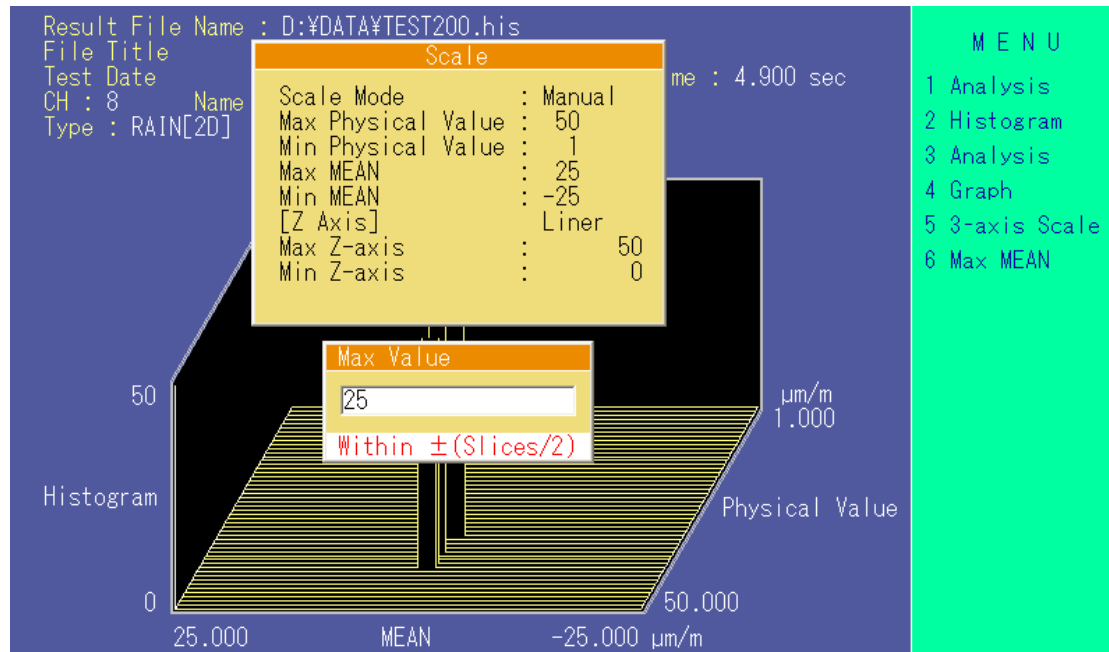
Set the maximum value on the MEAN axis of the displayed graph.

■ Set Range

Within $\pm$ (the number of slices/2)

■ Operation Method

- 1) Select <Max MEAN> from <3-axis Scale> menu.
- 2) Input the maximum value of the MEAN axis in the “Max Value” setting window and press [ENTER] key.



8-6-2-6-5 Setting MEAN Axis Minimum Value [Histogram/Analysis/Graph/3-axis Scale/Min Mean]

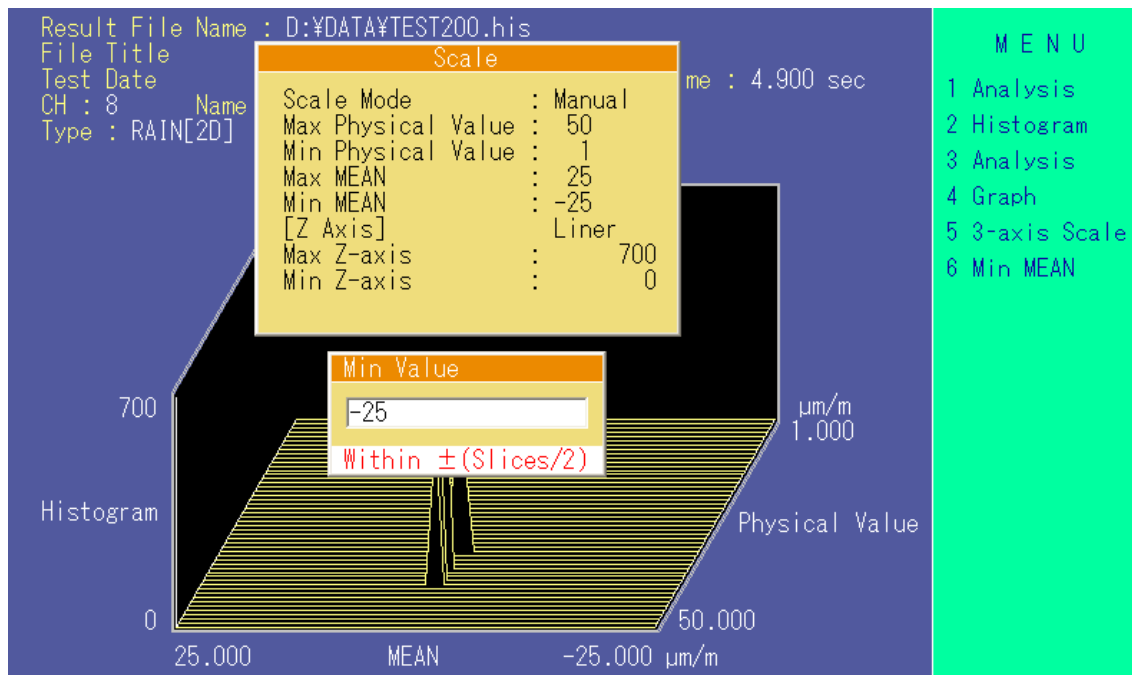
Set the minimum value on the MEAN axis of the displayed graph.

■ Set Range

Within $\pm$ (the number of slices/2)

■ Operation Method

- 1) Select <Min MEAN> from <3-axis Scale> menu.
- 2) Input the minimum value of the MEAN axis in the “Min Value” setting window and press [ENTER] key.



8-6-2-6-6 Setting Z-Axis Maximum Value [Histogram/Analysis/Graph/3-axis Scale/Max Z-axis]

Set the maximum value on the Z-axis (histogram count axis) of the displayed graph.

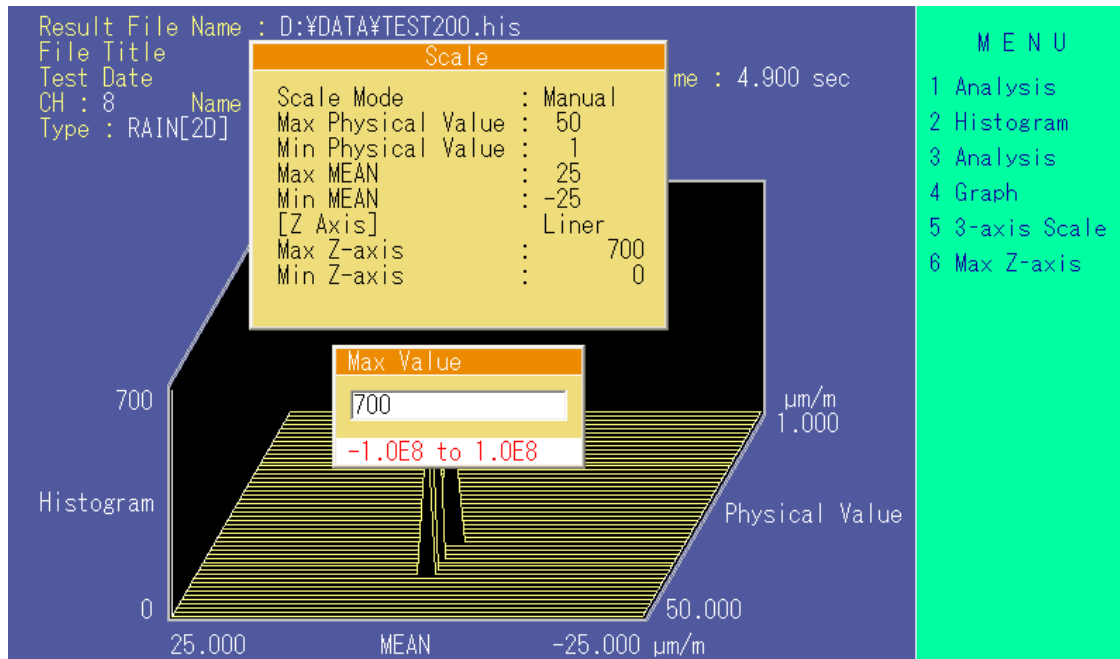
■ Set Range

Linear display -1E8 to 1E8

Logarithm display 0 to 9 (10^0 to 10^9).

■ Operation Method

- 1) Select <Max Z-axis> from <3-axis Scale> menu.
- 2) Input the maximum value of the Z-axis in the “Max Value” setting window and press [ENTER] key.



8-6-2-6-7 Setting Z-Axis Minimum Value [Histogram/Analysis/Graph/3-axis Scale/Min Z-axis]

Set the minimum value on the Z-axis (histogram count axis) of the displayed graph.

■ Set Range

Liner display..... 0 to the maximum value on the Z-axis

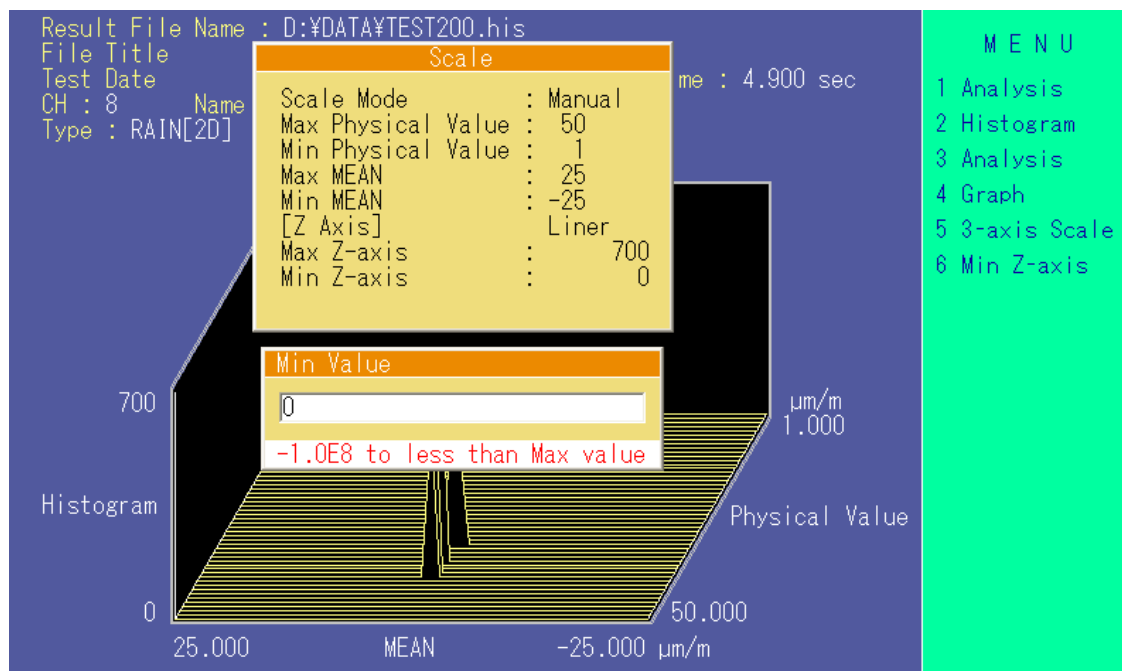
Logarithm display -9 to less than the maximum value on the Z-axis

Note

Because the Z-axis data is the count value, the actual data is more than '0.' That is '0' is expressed by 10^{-1} to 10^{-9} on the logarithmic chart.

■ Operation Method

- 1) Select <Min Z-axis> from <3-axis Scale> menu.
- 2) Input the minimum value of the Z-axis in the "Min Value" setting window and press [ENTER] key.



8-6-2-7 Rotating Graph [Histogram/Analysis/Graph/Rotate]

Rotate a displayed graph with a step of 90 degrees on the X-Y plane (stress-mean stress).

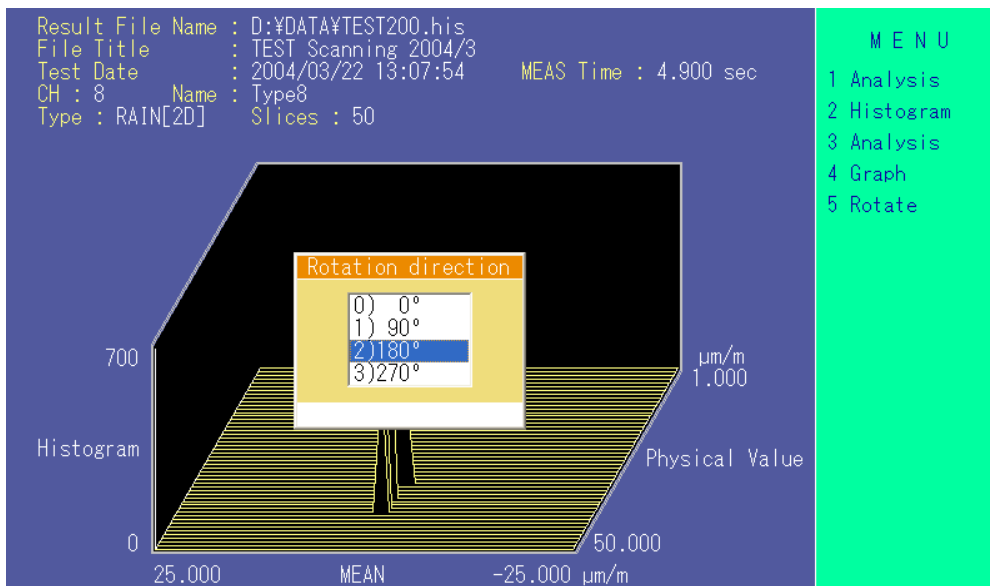
You can rotate a graph only when the type is 2-dimension rainflow method.

■ Options

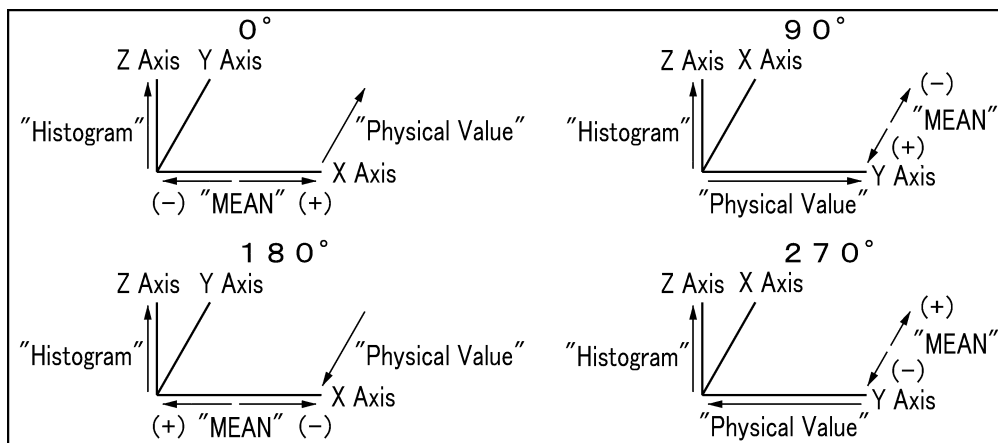
0°, 90°, 180°, 270°

■ Operation Method

- 1) Select <Rotate> from <Graph> menu.
- 2) A "Rotation direction" selection window appears. Move the cursor with [↑] or [↓] key and press [ENTER] key on an appropriate item.



■ Description of Rotation



8-6-3 Changing the Histogram Type for 1-Dimension Complex [Histogram/Analysis/Chge Complex]

For complex histogram type, whether histogram results is displayed on either “1D rainflow” or “Max/Min” (“Peak/Valley”) can be set in advance for graphically or numerically displaying data.

Whether the histogram results is displayed on either of the above can be changed on graph or table.

■ Operation Method

Select <Chge Complex> from <Analysis> menu. Select either 1-dimension rainflow method or Max/Min(Peak/Valley) by selecting “1” or “2” with the [ENTER] key.

The selected “1” or “2” is displayed on “Disp Type” column.

- Display Type is “1”

File Title : TEST Scanning 2004/3							1)Target File
Disp Type : 1							2)Table
Disp Channel : 1							3)Graph
CH	Type	Slices	Width	Unit	Total Count 1	Total Count 2	4)Chge Complex
1	P/V	±50	10.000	μm/m	153		5)Convert CSV
2	P/V	±50	10.000	μm/m	459		6)Change Title
3	MAX/MIN	±50	50.000	μm/m	0		7)Next Page
4	MAX/MIN	±50	50.000	μm/m	0		8)Prev Page
5	RAIN[1D]	100	100.000	μm/m	1,377		0)End

- Display Type is “2”

File Title : TEST Scanning 2004/3							1)Target File
Disp Type : 2							2)Table
Disp Channel : 1							3)Graph
CH	Type	Slices	Width	Unit	Total Count 1	Total Count 2	4)Chge Complex
1	P/V	±50	10.000	μm/m	153		5)Convert CSV
2	P/V	±50	10.000	μm/m	459		6)Change Title
3	MAX/MIN	±50	50.000	μm/m	0		7)Next Page
4	MAX/MIN	±50	50.000	μm/m	0		8)Prev Page
5	RAIN[1D]	100	100.000	μm/m	1,377		0)End

For example, if the histogram processing is 1-Dimension rainflow method + Max/Min, “1” is for Max and “2” is for Min.

8-6-4 Converting Histogram Processing Result into CSV File [Histogram/Analysis/Convert CSV]

Convert histogram processing result into the CSV format and save it. The extension of the file is 'CSV'.

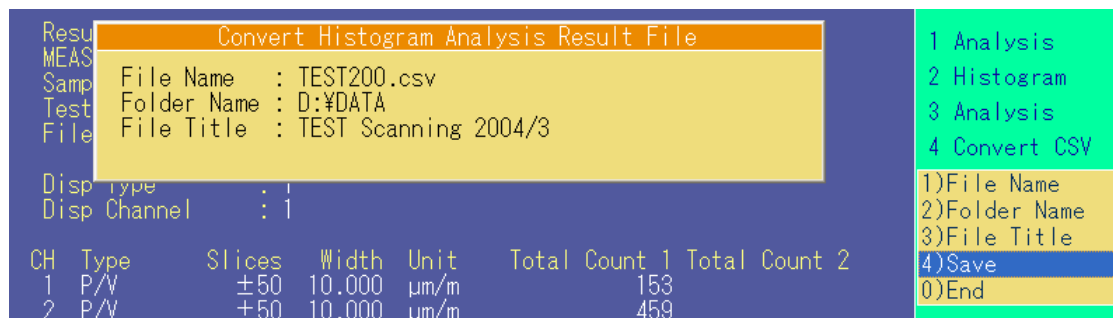
A CSV file of histogram analysis result is created for each channel.

■ Example When a file name is TEST001 and it has the data of 5 channels

Five files of TEST001_005.CSV are created from TEST001_001.CSV.

■ Operation Method

- 1) Select <Convert CSV> from <Analysis> menu.
- 2) Specify a file name, a folder name and a file title, and then select <Save> menu.
- 3) A message appears to confirm whether the file is saved. Press [ENTER] key to save it.
If you want to cancel it, press [ESC] key.



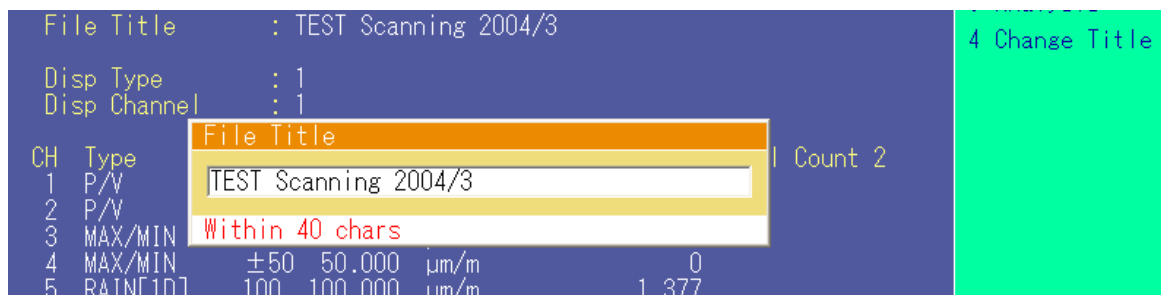
- 4) A message "Creat a file" appears. Press [ENTER] key to return to the menu.
- 5) Select <END> menu.

8-6-5 Changing File Title [Histogram/Analysis/Change Title]

Change the title of a file for histogram result.

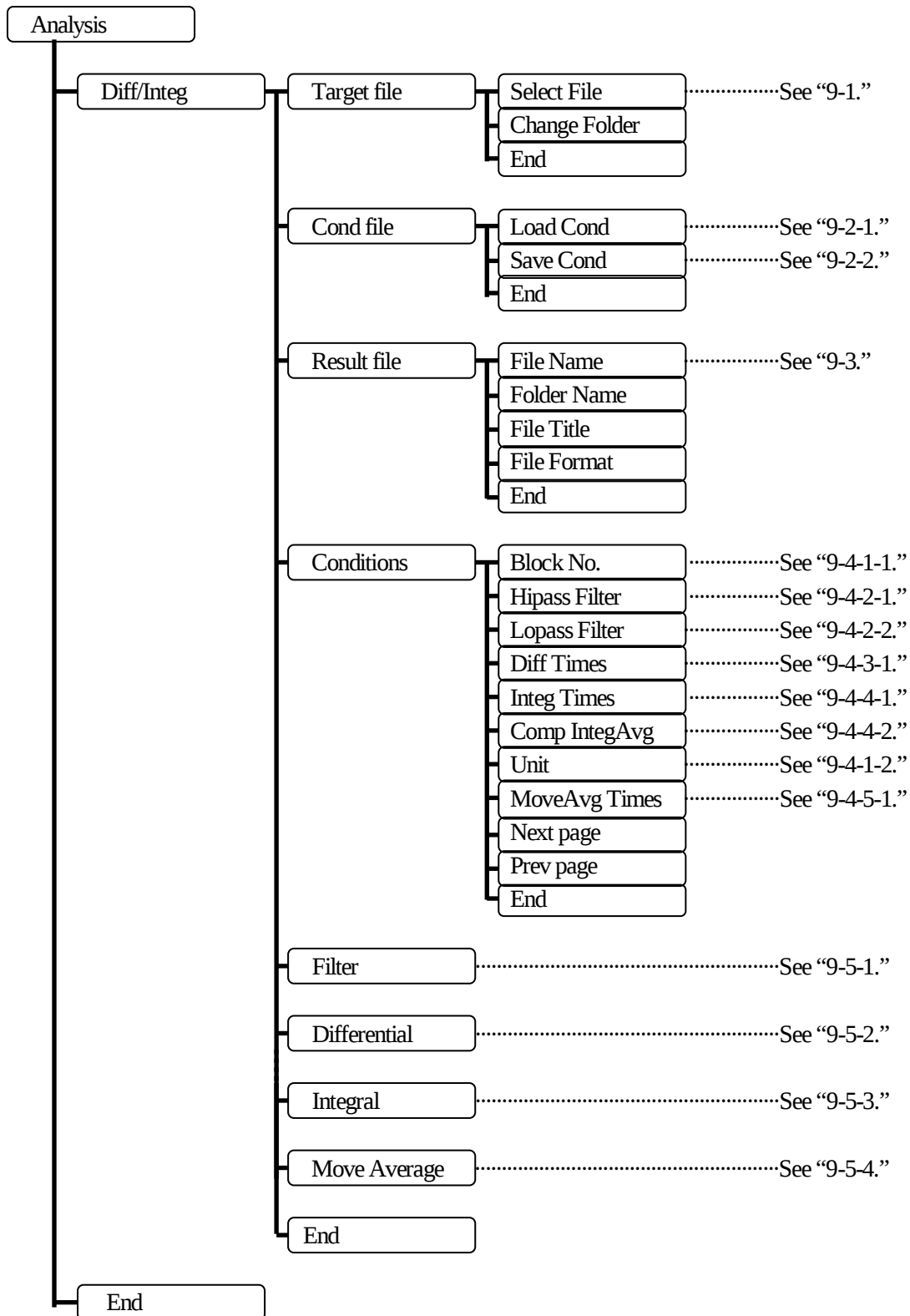
■ Operation Method

- 1) Select <Change Title> from <Analysis> menu.
- 2) A "File Title" setting window appears. Input the title and press [ENTER] key.



9. DIFFERENTIATION AND INTEGRATION [Analysis/Diff/Integ]

This chapter describes filtering of a data file and differentiation & integration. The result of filtering and differentiation & integration is saved in a standard data file (KS2) and it can be checked by data reproduction.



■ Differentiation and Integration Screen

< Differential/Integral Conditions >							M E N U	
[Analysis Target Data File]							1 Analysis	
Data File Name : D:\DATA\TEST100.ks2							2 Diff/Integ	
Block No. : 1 / 1							1)Target File	
MEAS Data Nos : 850							2)Cond File	
Sampling Rate : 500 Hz							3)Result File	
Test Date : 2004/03/11 15:23:49							4)Conditions	
[Result Save File Name]							5)Filter	
Data File Name : D:\DATA\TEST100d.ks2							6)Differential	
File Title : TEST Scanning 2004/3							7)Integral	
File Type : Standard							8)Move Average	
							9)Next Page	
							A)Prev Page	
							0)End	
CH	High Pass	Low Pass	Diff Times	Integ Times	Unit			
1	FLAT	10	1	2	μm/m			
2	0.1	20	1	2	μm/m			
3	0.2	50	1	2	μm/m			
4	0.5	100	1	2	μm/m			
5	1.0	200	1	2	μm/m			
6	2.0	500	1	2	μm/m			
7	5.0	1000	1	2	μm/m			
8	10.0	FLAT	1	2	μm/m			
9	0.1	10	1	2	μm/m			
10	0.1	20	1	2	μm/m			
11	0.2	50	1	2	μm/m			
12	0.5	100	1	2	μm/m			
13	1.0	200	1	2	μm/m			
14	2.0	500	1	2	μm/m			
15	5.0	1000	1	2	μm/m			
16	10.0	FLAT	1	2	μm/m			
Moving Average Times : 1 Compensate Average Before Integ : No								

■ Description of Menu Items

- <Target File> Select target file for processing.
- <Cond File> Load and save a processing condition file.
- <Result File> Set a processing result file.
- <Conditions> Set conditions for analysis processing.
- <Filter> Conduct filtering.
- <Differential> Conduct differential processing according to the differential analysis conditions.
- <Integral> Conduct integral processing according to the integral analysis conditions.
- <Move Average> Conduct moving average according to the analysis conditions.
- <Next Page> Move to the next page.
- <Prev Page> Move to previous page.
- <End> End differential and integral analysis.

■ Operation Procedure

- 1) Select a target file for processing.
- 2) Set a file name for processing result and specify a folder for saving the file.
- 3) Specify analysis conditions. (Load a condition file when needed.)
- 4) Save analysis conditions in a file.
- 5) Conduct analysis processing. (Filter, differential, integral and moving average)

9-1 SELECTING TARGET FILE [Diff/Integ/Target File]

Select a target file for analysis.

■ Operation Method

- 1) Select <Target File> from <Target File> menu.
- 2) Select <Select File> menu. Move the cursor to the desired file with [↑] or [↓] key and press [ENTER] key to determine the file.

Note

If you press the [CHARACTER] key on the file cursor, you can display the information of data file (the number of blocks, measuring mode, number of measuring channels, sampling rate, file title, comment, block information, test information and etc.).

■ To change the folder

- 1) Select <Change Folder> from <Target File> menu.
- 2) A folder selecting window appears. Move the cursor to a desired folder with [↑], [↓], [←], or [→] key and press [ENTER] key to determine the folder.

9-2 LOADING AND SAVING ANALYSIS CONDITION FILE [Diff/Integ/Cond File]

Analysis condition file is saved into a file. By loading the said analysis condition file the next time, the previously set conditions can be set all together at a time. Extension of the histogram analysis condition file is 'e2i.'

■ Operation Method

Select <Cond File> menu.

9-2-1 Loading Analysis Condition File [Diff/Integ/Cond File/ Load Cond]

Loads the previously saved analysis condition file.

■ Operation Method

- 1) Select <Cond File> from <Diff/Integ> menu.
- 2) Select <Load Cond> from <Cond File> menu.
- 3) Select <Select File> from <Load Cond> menu. Move the cursor to the desired file with [↑] or [↓] key and press [ENTER] key to determine the file.

■ To change the folder

- 1) Select <Change Folder> from <Load Cond> menu.
- 2) A folder selecting window appears. Move the cursor to a desired folder with [↑], [↓], [←], or [→] key and press [ENTER] key to determine the folder.

9-2-2 Saving Analysis Condition File [Diff/Integ/Cond File/Save Cond]

Save the preset analysis conditions in a file. By loading the previously saved condition file at a later date, the analysis conditions can be set all together at a time.

■ Operation Method

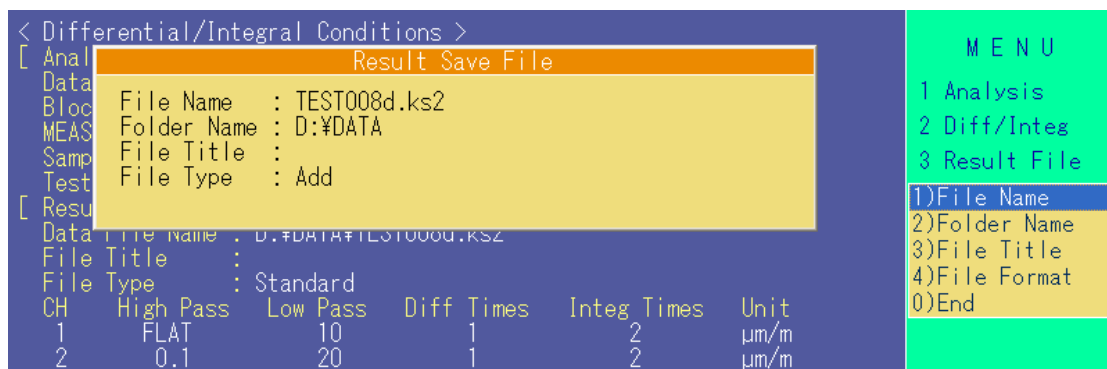
- 1) Select <Save Cond> from <Cond File> menu.
- 2) Specify a file name, a folder name and a file title, and then select <Save> menu.
- 3) A message appears to confirm whether to save the above items. Press [ENTER] key to save the items.
If the items are not saved, press [ESC] key to stop saving data.
- 4) A message “Created” appears. Press [ENTER] key to return to the menu.
- 5) Select <End> menu to close the setting window.

9-3 SPECIFYING ANALYSIS RESULT FILE [Diff/Integ/Result file]

This section describes how to specify required items (file name, folder name, file title and file format) for saving analysis results in a file. The extension of an analysis result file is ‘ks2’.

■ Operation Method

- 1) Select <Result File> from <Diff/Integ> menu.
- 2) Specify a file name, a folder name, a file title and a file format, and then select <END> menu.



■ File Format:

- Standard Format Analysis result is saved in the specified file according to the analysis conditions.
- Addition Format In addition to analysis result, data of the target file are saved in the specified file according to the analysis conditions.

If the file format is addition format, the analysis results are added to the last channel of target channels. However, the digital input channel is moved to the channel behind the analysis result data.

The channel names are automatically set as described below.

■ In case of Filtering

Set values of high pass filterFLAT, 0.1, 0.2, 0.5, 1, 2, 5, 10

Set values of low pass filterFLAT, 10, 20, 50, 100, 200, 500, 1000

- If FLAT is set to both high pass filter and low pass filter, no addition is made.

"Hooo Looo"

(1) (2)

1) Set value of high pass filter (Hz)

2) Set value of low pass filter (Hz)

■ In case of differential processing

Set values of differential times0, 1, 2

"Do"

(1)

1) Number of differential Times

■ In case of integral processing

Set values of integral times0, 1, 2

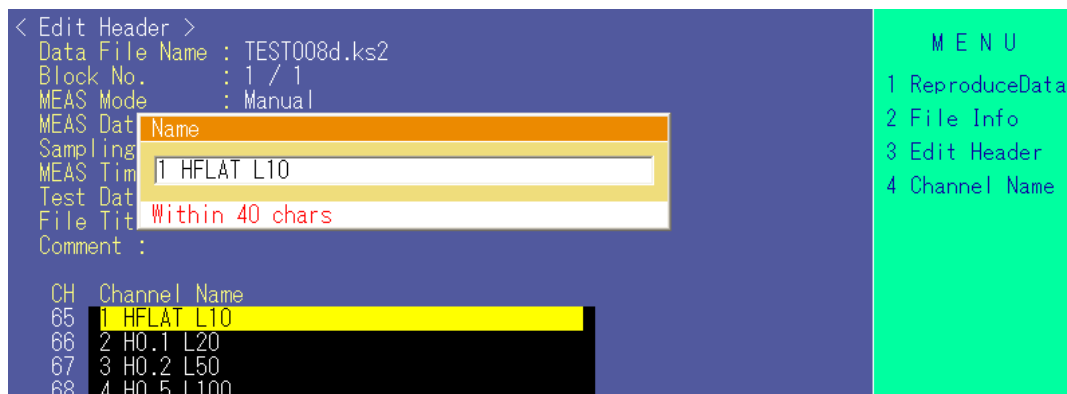
"Io"

(1)

1) Number of Integral Times

These settings can be checked by selecting menu items in due order from <ReproduceData> <File Info> <Edit Header> and <Channel Name>.

■ Reproduce Data Screen



9-4 SETTING ANALYSIS CONDITIONS [Diff/Integ/Conditions]

Set conditions for histogram analysis. If you save the preset conditions in a file by <Save Cond> menu, you can use it at a later date by loading the file to set analysis conditions all together at a time.

■ Operation Method

- 1) Select the desired file by selecting <Select File> from <Target File> menu.
- 2) Select <Conditions> from <Diff/Integ> menu.

9-4-1 Setting Common Items [Diff/Integ/Conditions]

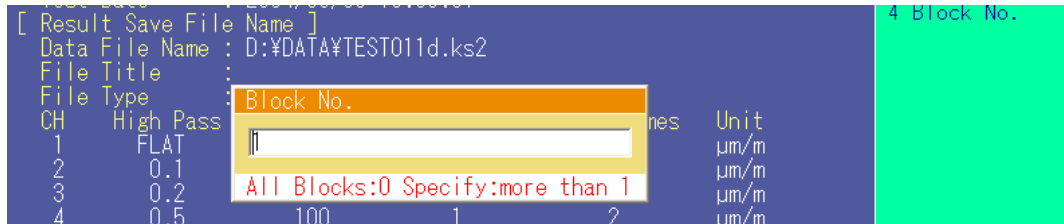
This section describes how to set common items (i.e. block number and unit) for conducting analysis processing.

9-4-1-1 Setting Block Number [Diff/Integ/Conditions/Block No.]

If a selected target file contains multiple block data, it is required to specify a block for analysis. By default, the first block is selected for analysis. If you set the number to '0,' all the blocks will be processed.

■ Operation Method

- 1) Select <Block No.> from <Conditions> menu.
- 2) A "Block No." setting window appears. Specify a block number and press [ENTER] key.

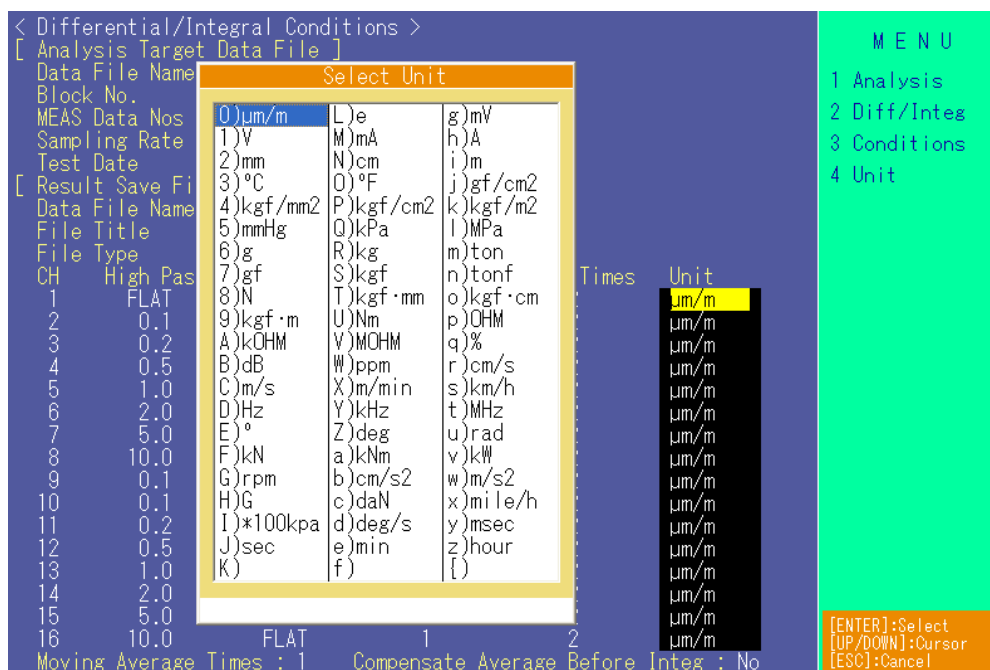


9-4-1-2 Selecting Unit [Diff/Integ/Conditions/Unit]

Specify unit for each channel.

■ Operation Method

- 1) Select <Unit> from <Conditions> menu.
- 2) A unit selection window appears. Move the cursor with [↑], [↓], [←] or [→] key and press [ENTER] key to determine unit.



- 3) Press [ESC] key to close the selection window. Then you can duplicate a channel as described below.
Press [DUPLICATE] key to copy the settings on the cursor to the next channel.
- 4) Press [ESC] key once again to return to the menu.

9-4-2 Setting Filtering [Diff/Integ/Conditions]

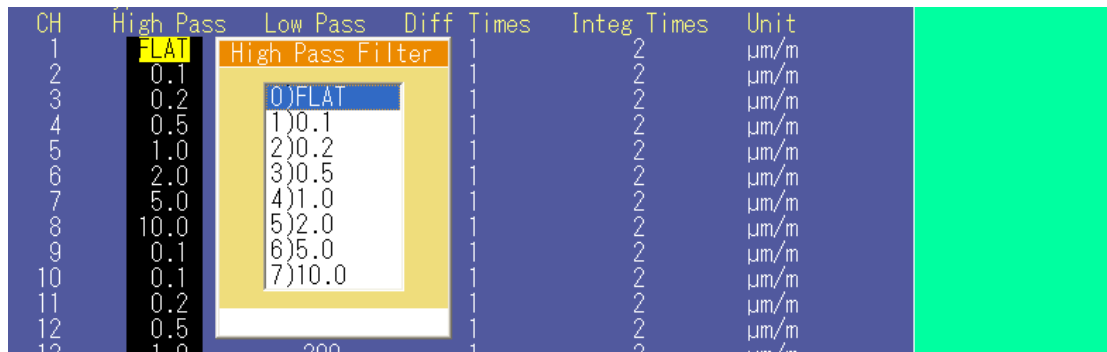
This section describes how to specify the settings required for filtering.

9-4-2-1 Setting High Pass Filter [Diff/Integ/Conditions/Hipass Filter]

Specify high pass filter for each channel.

■ Operation Method

- 1) Select <Hipass Filter> from <Conditions> menu.
- 2) A “High Pass Filter” setting window appears. Move the cursor to desired item with [↑] or [↓]key and press [ENTER] key.



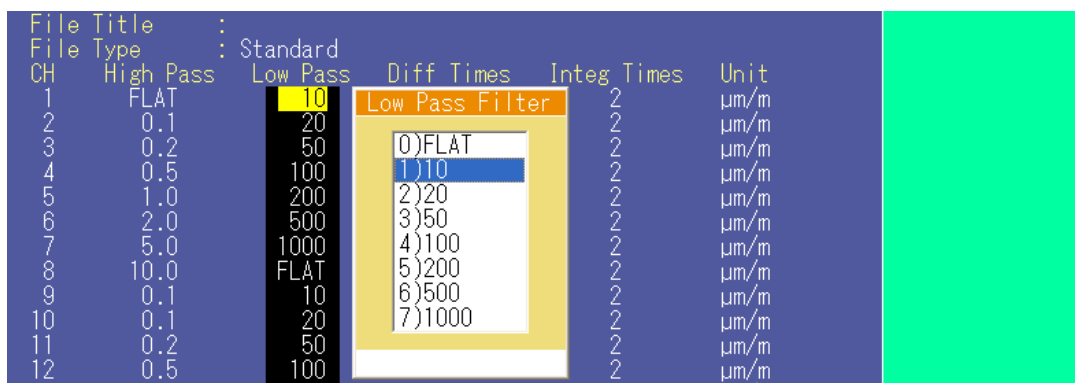
- 3) Press [ESC] key to close the setting window. Then you can duplicate the settings as described below. Press [DUPLICATE] key to copy the settings on the cursor to the next channel.
- 4) When you press [ESC] key again, the menu will appear.

9-4-2-2 Setting Low Pass Filter [Diff/Integ/Conditions/Lopass Filter]

Specify low pass for each channel.

■ Operation Method

- 1) Select <Lopass Filter> from <Conditions> menu.
- 2) A “Low Pass Filter” setting window appears. Move the cursor to desired item with [↑] or [↓]key and press [ENTER] key.



- 3) Press [ESC] key to close the setting window. Then you can duplicate the settings as described below Press [DUPLICATE] key to copy the settings on the cursor to the next channel.
- 4) When you press [ESC] key again, the menu will appear.

9-4-3 Setting Differential Processing [Diff/Integ/Conditions]

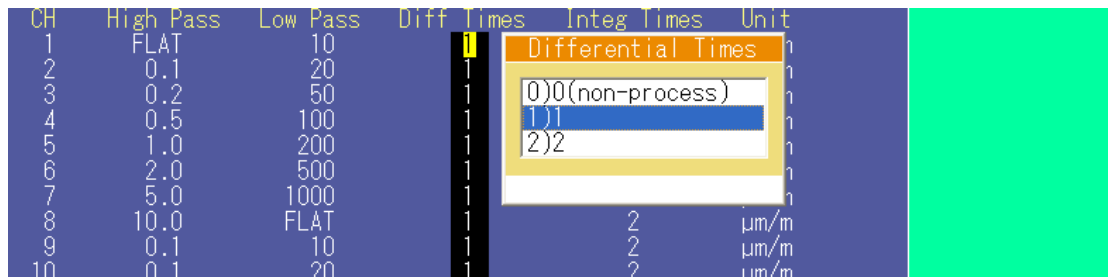
This section describes how to specify the settings required for differential processing.

9-4-3-1 Setting Differential Times [Diff/Integ/Conditions/Diff Times]

Specify number of times of differential analysis for each channel. Setting it to '0' allows no differential processing.

■ Operation Method

- 1) Select <Diff Times> from <Conditions> menu.
- 2) A "Differential Times" selection window appears. Move the cursor to the desired item with [↑] or [↓] key and press [ENTER] key.



- 3) Press [ESC] key to close the setting window. Then you can duplicate the settings as described below.
Press [DUPLICATE] key to copy the settings on the cursor to the next channel.
- 4) Press [ESC] key once again to return to the menu.

9-4-4 Setting Integral Processing [Diff/Integ/Conditions]

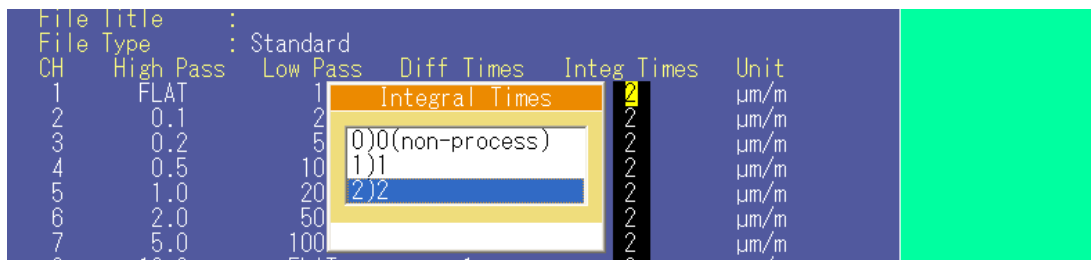
This section describes how to specify the settings required for integral processing.

9-4-4-1 Setting Integral Times [Diff/Integ/Conditions/Integ Times]

Specify the times of integral analysis for each channel. Setting it to '0' allows no integral processing.

■ Operation Method

- 1) Select <Integ Times> from <Conditions> menu.
- 2) An "Integral Times" selection window appears. Move the cursor to the desired item with [↑] or [↓] key and press [ENTER] key.



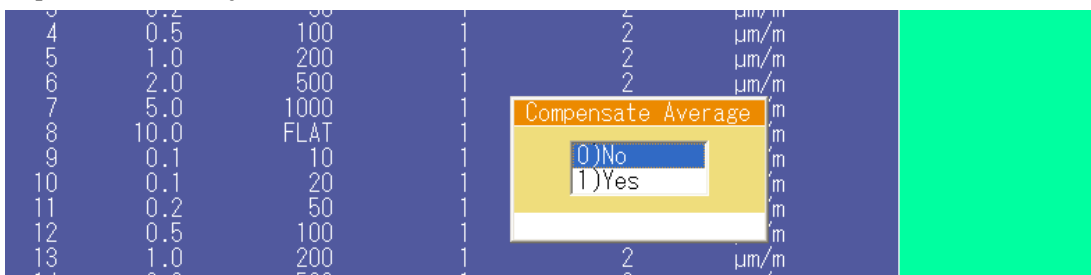
- 3) Press [ESC] key to close the setting window. Then you can duplicate the settings as described below.
Press [DUPLICATE] key to copy the settings on the cursor to the next channel.
- 4) Press [ESC] key once again to return to the menu.

9-4-4-2 Selecting Compensated Integration Average [Diff/Integ/Conditions/Comp IntegAvg]

Select whether average compensation is enable or disable before integral processing. Select "Yes" to obtain the average of all the data before integral processing. Subtracted the obtained average from each piece of data to be subjected to integral processing.

■ Operation Method

- 1) Select <Comp IntegAvg> from <Conditions> menu.
- 2) A "Compensate Average" selection window appears. Move the cursor to the desired item with [↑] or [↓] key and press [ENTER] key.



9-4-5 Setting Moving Average Processing [Diff/Integ/Conditions]

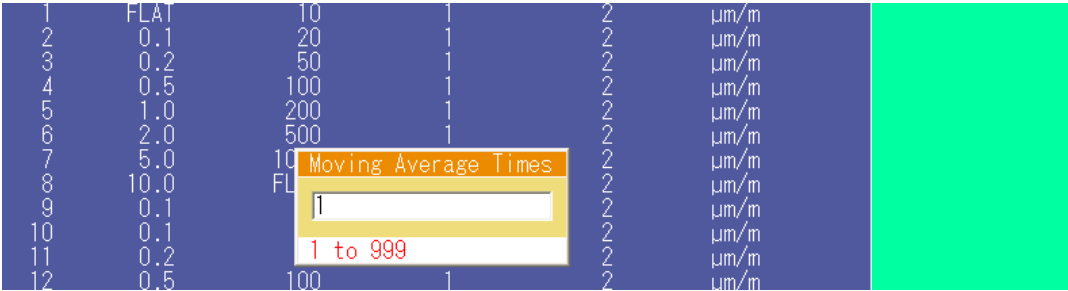
This section describes how to specify the settings required for moving average processing.

9-4-5-1 Setting Move Average Times [Diff/Integ/Conditions/MoveAvg Times]

Specify the times of moving average processing.

■ Operation Method

- 1) Select <MoveAvg Times> from <Conditions> menu.
- 2) A “Moving Average Times” setting window appears. Input any numeric value from 1 to 999 and press [ENTER] key.



9-5 CONDUCTING ANALYSIS [Diff/Integ]

This section describes how to conduct filtering, differential processing, integral processing and moving average calculation.

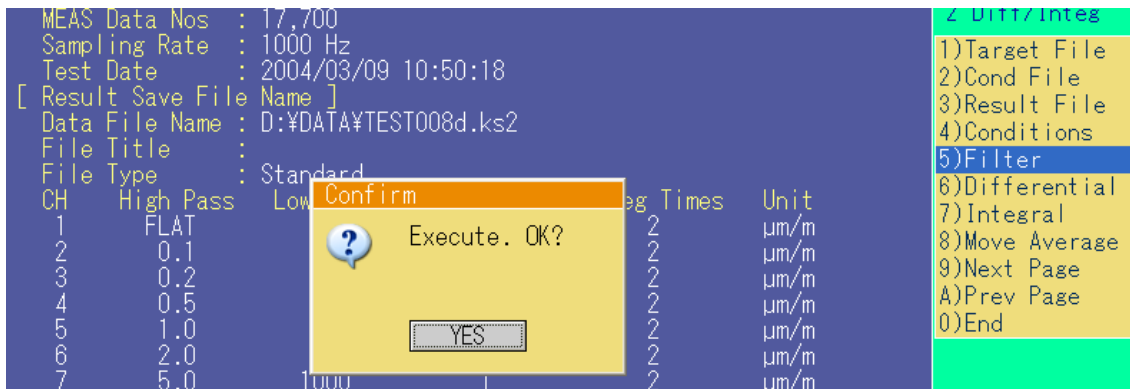
9-5-1 Filtering [Diff/Integ/Filter]

Conduct filtering according to the specified conditions. The filtering results are saved in a file specified by selecting <Result File> menu, and you can check the results by selecting <ReproduceData> menu.

The filter has the characteristics of 4th order, Butterworth IIR. The cutoff frequency is approximately -6dB. The attenuation characteristics is approximately -24dB/oct. It is a digital filter without phase delay.

■ Operation Method

- 1) Select <Filter> from <Diff/Integ> menu after selecting the desired file by selecting <Select File> from <Target> menu.
- 2) A message appears to confirm whether filtering is conducted or not. If it is OK, press [ENTER].
If you want to cancel it, press [ESC] key.



- 3) A message "Created" appears. Press [ENTER] key to return to the menu screen.

9-5-2 Conducting Differentiation [Diff/Integ/Differential]

Conduct differential processing by using forward difference according to the analysis conditions.

The differential processing results are saved in a file specified by selecting <Result File> menu. Check the result by selecting <ReproduceData> menu.

Note

If filtering is enable, filtering is conducted to the original data before differential processing. In case of double differentiation, filtering is conducted only before the first differential analysis.

■ Note

If the differential times are not specified, no differential analysis is allowed.

■ Operation Method

- 1) Select <Differential> from <Diff/Integ> menu.
- 2) A message appears to confirm whether conduct differential processing is conducted or not. If it is OK, press [ENTER].
If you want to cancel it, press [ESC] key.
- 3) A message "Created" appears. Press [ENTER] key to return to the menu screen.

9-5-3 Conducting Integration [Diff/Integ/Integral]

Conduct integral processing by the trapezium rule according to the analysis conditions.

The integral processing result is saved in a file specified by <Result File> menu.

Note

If filtering is enable, filtering is conducted to the original data before integral processing. In case of double integration, filtering is conducted only before the first integral processing.

■ Note

If the integral times are not specified, no integral analysis is allowed.

■ Operation Method

- 1) Select <Integral> from <Diff/Integ> menu.
- 2) A message appears to confirm whether integral processing is conducted or not. If it is OK, press [ENTER].
If you want to cancel it, press [ESC] key.
- 3) A message "Created" appears. Press [ENTER] key to return to the menu screen.

9-5-4 Conducting Moving Average [Diff/Integ/Move Average]

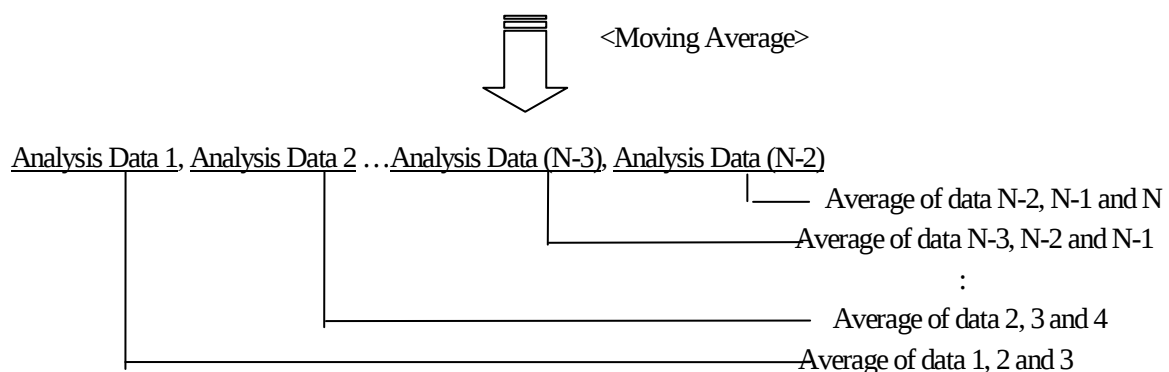
Conduct moving average for every channel of the target file according to the analysis conditions.

The results of moving average are always saved in the file by the standard format. You can check the result by selecting <ReproduceData> menu.

■ Moving-Average Method

(When the number of data/CH is N and the number of moving average is 3)

Data 1, Data 2, Data 3, Data 4... Data N-3, Data N-2, Data N-1, Data N



The data/CH of the result file is as follows:

$$(\text{Data/CH of the target file}) - (\text{Number of moving average}) + 1$$

■ Operation Method

- 1) Select <Move Average> from <Diff/Integ> menu.
- 2) A message appears to confirm whether moving average is conducted or not. If it is OK, press [ENTER].
If you want to cancel it, press [ESC] key.
- 3) A message "Created" appears. Press [ENTER] key to return to the menu screen.

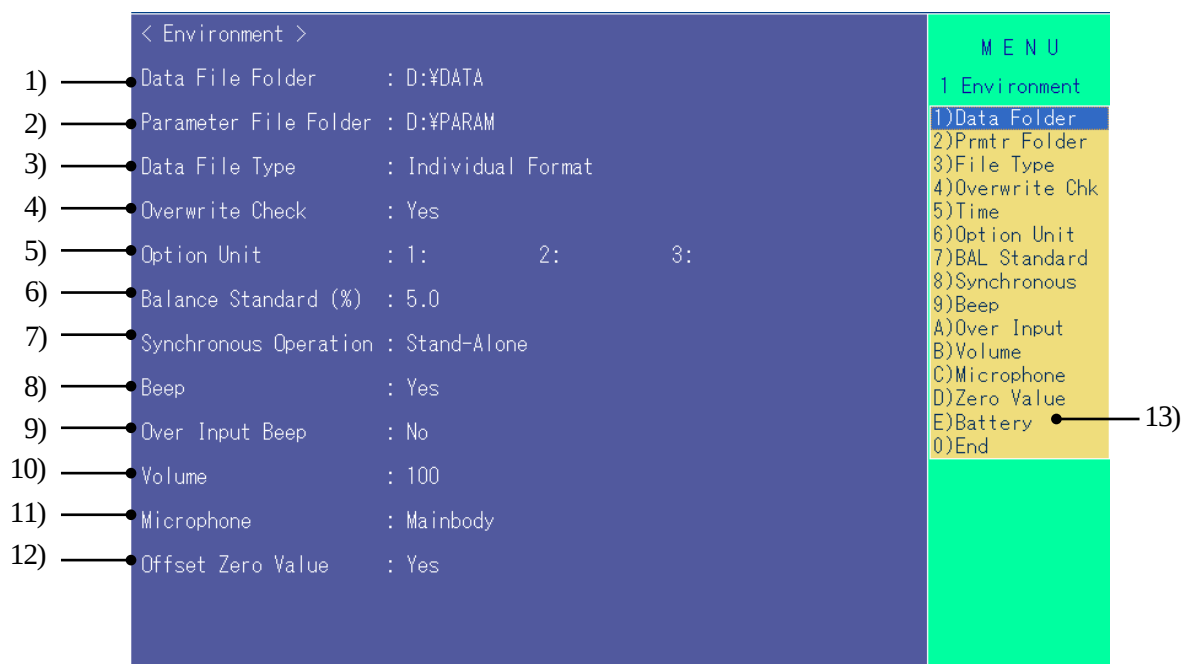
10. ENVIRONMENT [Environment]

This chapter describes how to set the operating environment conditions of EDX-2000B.

The save destinations of recorded data files and measuring (Meas) condition files, and external devices are set up.

Environment	
Data Folder	See "10-1."
Prmtr Folder	See "10-2."
File Type	See "10-3."
Overwrite Chk	See "10-4."
Time	See "10-5."
Option Unit	See "10-6."
BAL Standard	See "10-7."
Synchronous	See "10-8."
Beep	See "10-9."
Over Input	See "10-10."
Volume	See "10-11."
Microphone	See "10-12."
Zero Value	See "10-13."
Battery	See "10-14."
End	

■ Environment Screen



- 1) <Data Folder>.....Display a folder for saving default.
- 2) <Prmtr Folder>.....Display a folder for saving default.
- 3) <File Type>.....Display a save format of recorded data files.
- 4) <Overwrite Chk>.....Indicate whether the overwrite checking function, which is used when a file of the same name exists, is enabled/disabled.
- 5) <Option Unit>.....Displays user specified units.
- 6) <BAL Standard>.....Display a balance standard value (quantity determination value) while the bridge balance is performed..
- 7) <Synchronous>.....To be set when a measurement is conducted with multiple EDX's.
- 8) <Beep>.....Indicates if beep sound is generated.
- 9) <Over input>.....Indicate if a warning beep sound is generated when an over input occurs.
- 10) <Volume>.....Indicate a speaker volume level while sound data is reproduced.
- 11) <Microphone>.....Display the input path from the microphone that records sound data.
- 12) <Zero Value>.....Indicate if the offset Zero value function is used.
- 13) <Battery>.....Check the charge status of the internal battery.

Note

In the EDX-2000A, “¥” is used as delimiter for the folder instead of “\.”

10-1 SETTING DATA FOLDER [Environment/Data Folder]

This section describes how to set a data folder for saving data files.

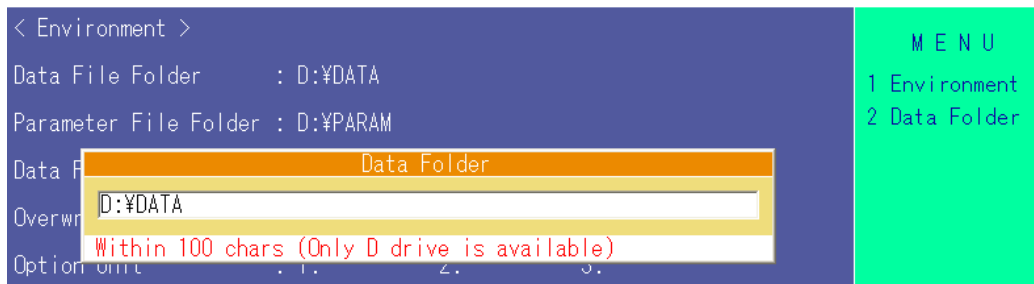
Although the save destination folder can be renamed to any name, the "D" drive must be used.

■ Input range

Within 100 characters.

■ Operation Method

- 1) Select <Data Folder> from <Environment> main menu.
- 2) A "Data Folder" setting window appears as shown in the figure below.
To change the data folder, enter a proper folder name.
- 3) The result of the setting is displayed in the "Data Folder" column.



10-2 SETTING PARAMETER FOLDER [Environment/Prmtr Folder]

This section describes how to make an initial setting of the parameter folder for saving parameter files.

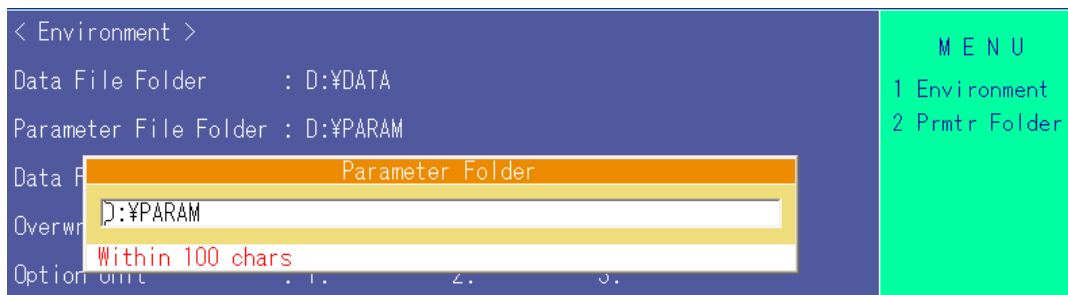
Set a destination folder normally used although it can be changed from time to time.

■ Input range

Within 100 alphanumeric characters.

■ Operation Method

- 1) Select <Prmtr Folder> from <Environment> main menu.
- 2) A "Parameter Folder" setting window appears as shown in the figure below.
To change the parameter folder, enter a proper folder name.
- 3) The result of the setting is displayed in the "Prmtr Folder" column.



10-3 SETTING DATA FILE TYPE [Environment/File Type]

This section describes how to set a data file type, a format for saving of measured data.

■ Options

- **“Additional format”** Measured data is added to one file. That is, multiple measured data is recorded in a single file.
- **“Individual format”** A file is created for every measurement.

MEMO

If the data file format is "Individual", the recorded data from [REC/PAUSE] to [STOP] is saved in one file. If the data format is "Additional", such data becomes a block in the same file. The file No. increases by one for the "Individual format" file, while the block No. increases by one for the "Additional format" file.

• For Individual type

Measurement data is recorded into a separate file when [STOP] key is pressed during measurement. The file number is increased by one automatically.
("TEST-001.ks2"→"TEST-002.ks2"→"TEST-003.ks2"...)

• For Additional type

The measured data recorded so far becomes a data block when [STOP] key is pressed. The data is recorded as one block data in the same file, and the block number of the recorded data increases by one automatically.
("TEST-001[1].ks2"→"TEST-001[2].ks2"→"TEST-001[3].ks2"...)

Block data

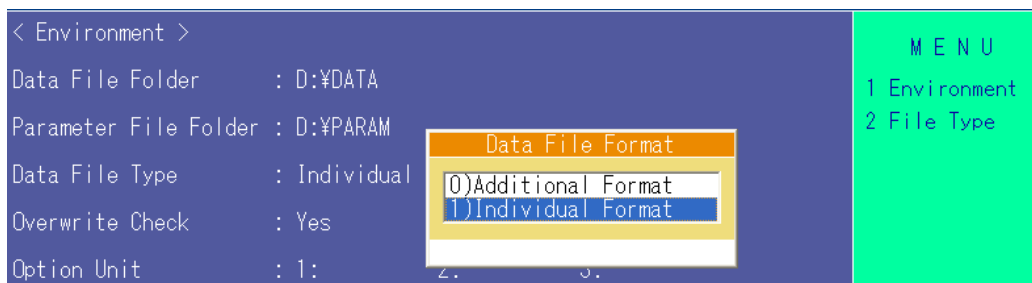
The measured data to be added to the same file when the data type of "Additional" is specified.

Note

If the sampling frequency is set to a value exceeding 10kHz from the <Measurement> or other screen, the data file format forcibly becomes “Individual” format. And then, if the frequency is set to 10kHz or less, the desired data file type that you have set becomes effective.

■ Operation Method

- 1) Select <File Type> from <Environment> main menu.
- 2) A “Data File Format” setting window appears as shown below.
Select a proper file type.
- 3) The result of the setting is displayed in the "File Type" column.



10-4 SETTING OVERWRITE CHECK [Environment/Overwrite Chk]

This section describes how to set overwrite checking function.

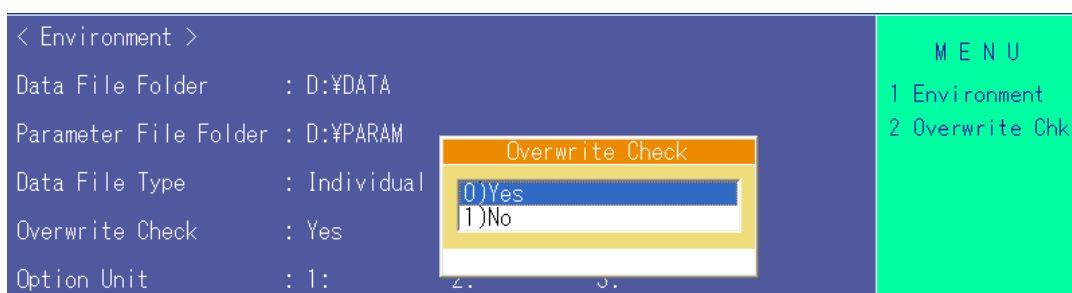
This function is enabled when the file type is “Individual”. In the case of “Additional format” file, the data is added as a new block, so that the file is not overwritten.

■ Options

- “Yes” If a file of the same name exists during the measurement, confirm whether or not the measured data file is overwritten.
- “No” Overwrites the measured data file without confirmation.

■ Operation Method

- 1) Select <Overwrite Chk> from <Environment> main menu.
- 2) An “Overwrite Check” setting window appears as shown below. Select a proper method.
- 3) The result of the setting is displayed in the "Overwrite Chk" column.

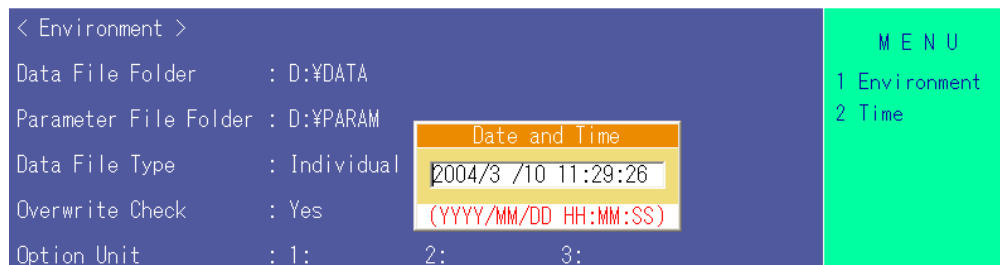


10-5 SETTING TIME [Environment/Time]

This section describes how to set Time.

■ Operation Method

- 1) Select <Time> from <Environment> main menu.
- 2) A “Date and Time” setting window appears as shown below.
Set the correct time.



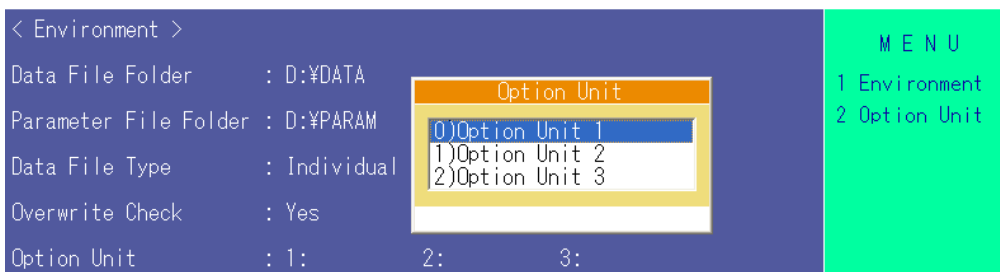
10-6 SETTING ARBITRARY UNIT [Environment/Option Unit]

Set arbitrary units that users can create freely.

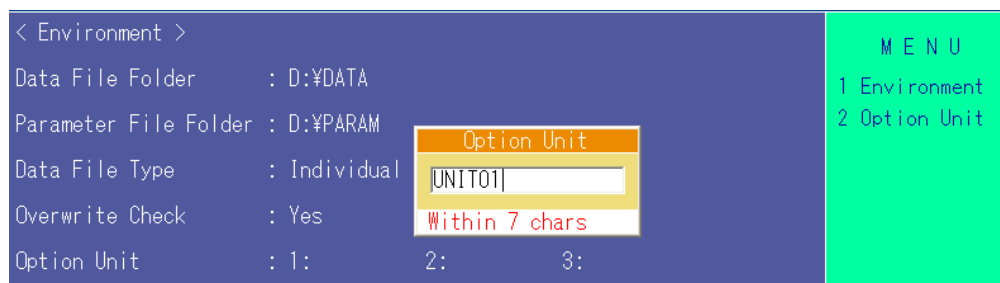
Up to 3 arbitrary units can be set.

■ Operation Method

- 1) Select <Option Unit> from <Environment> main menu.
- 2) An “Option Unit” setting window appears as shown below.



- 3) Move the cursor to the desired item and press [ENTER] key. An input window appears.
Create desired units.



- 4) The result of the setting is displayed in the "Option Unit" column.

10-7 SETTING BALANCE STANDARD VALUE [Environment/BAL Standard]

The following describes how to set the balance standard value, criteria of quantity determination during balancing. The result of balancing is "OK" if the remain of balance is within the balance standard value ($\pm$) for the measurement range; otherwise, "NG".

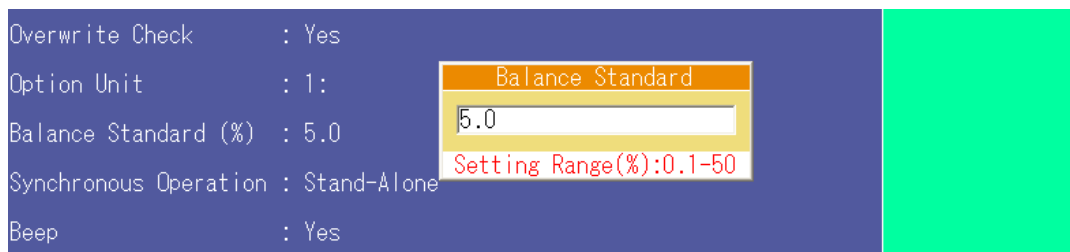
Since the noise superimposition amount varies depending on the sensor cable length and the measurement environment, the balancing result may become "NG" even when the measurement system (from the sensor to EDX) is normal if this value is set to as small as "0.5" or lower. Since this item is for the use of our maintenance service, do not change our factory default "5.0" normally.

■ Input range

0.1 to 50 (%.....Ratio to full scale)

■ Operation Method

- 1) Select <BAL Standard> from <Environment> main menu.
- 2) A "Balance Standard" setting window appears as shown in the figure below.
Set a proper value.
- 3) The result of the setting is displayed in the "BAL Standard" column.



10-8 SETTING SYNCHRONOUS OPERATION [Environment/Synchronous]

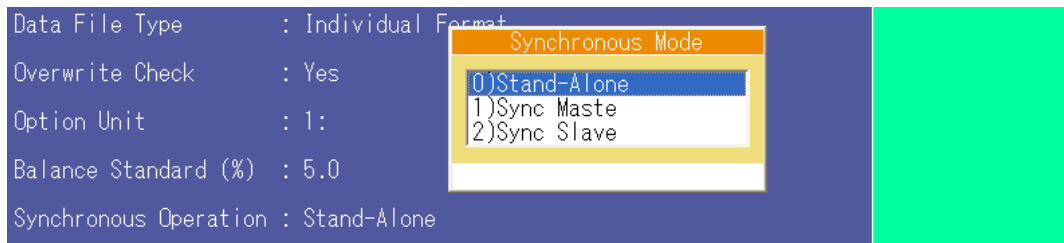
This section describes how to set the mode using multiple EDXs.

■ Options

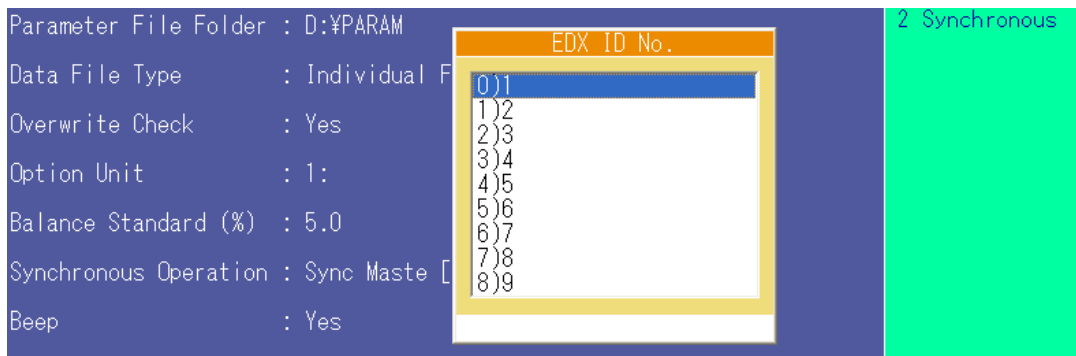
- “Stand – Alone” Only 1 EDX operates.
- “Sync Master” Master (1st unit)
- “Sync Slave” Slave (Multiple units: 1 to 9)

■ Operation Method

- 1) Select <Synchronous> from <Environment> main menu.
- 2) A “Synchronous Mode” setting window appears as shown in the Figure below.
Select a proper synchronous operation mode.



- 3) If "Synchronous slave" is selected, the ID No. of the EDX in use must be set.
The EDX ID No. setting window appears. Select a unique ID No.



- 4) The result of the setting is displayed in the "Synchronous" column.

10-9 SETTING BEEP SOUND [Environment/Beep]

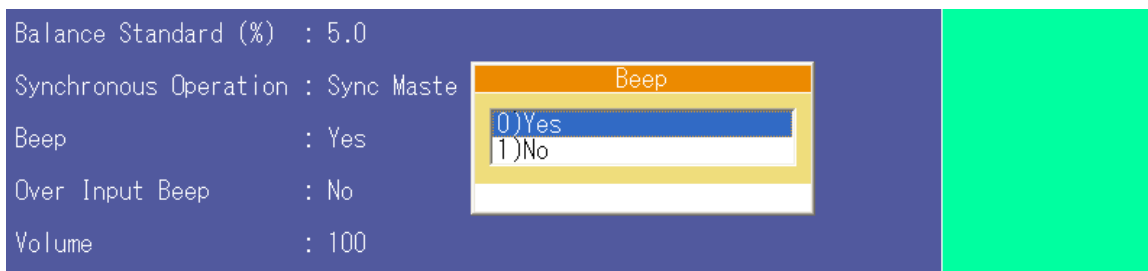
This section describes how to set the beep sound when an error occurs.

■ Options

- “Yes”.....Beep sound is generated when an error occurs.
- “No”Beep sound is not generated.

■ Operation Method

- 1) Select <Beep> from <Environment> main menu.
- 2) A “Beep sound” setting window appears as shown in the figure below.
Make a proper setting.
- 3) The result of the setting is displayed in the “Beep Sound” column.



10-10 SETTING OVER INPUT BEEP SOUND[Environment/Over Input]

This section describes the operation the beep sound when the input data exceeds the input rage. While recording data.

■ Options

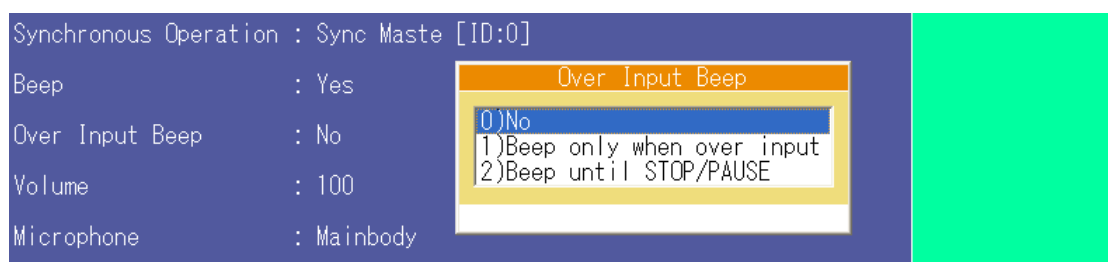
- “No”Beep sound is not generated.
- “Beep only when over input”Beep sound is generated when an over input occurs.
- “Beep until STOP/PAUSE”Beep sound is generated until [STOP] or [REC/PAUSE] is pressed.

Note

The previous beep sound setting (“10-9”) and the setting in this section are independent with each other. Therefore, even if the beep sound is set to “No” in the previous item (“10-9”), the beep sound is generated at an over input when the beep sound is set to generate in this item.

■ Operation Method

- 1) Select <Over Input> from <Environment> main menu.
- 2) An over input beep setting window appears as shown in the figure below.
Select a proper setting.
- 3) The result of the setting is displayed in the “Over Input Beep” column.



10-11 SETTING VOLUME [Environment/Volume]

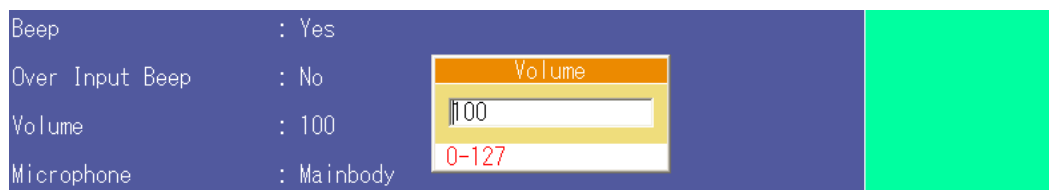
This section describes how to set the voice-recording volume (speaker volume).

■ Setting range

127 Max. 0 No sound

■ Setting Method

- 1) Select <Volume> from <Environment> main menu.
- 2) A "Volume" setting window appears as shown in the figure below.
Set a proper volume value.
- 3) The result of the setting is displayed in the "Volume" column.



10-12 SETTING MICROPHONE [Environment/Microphone]

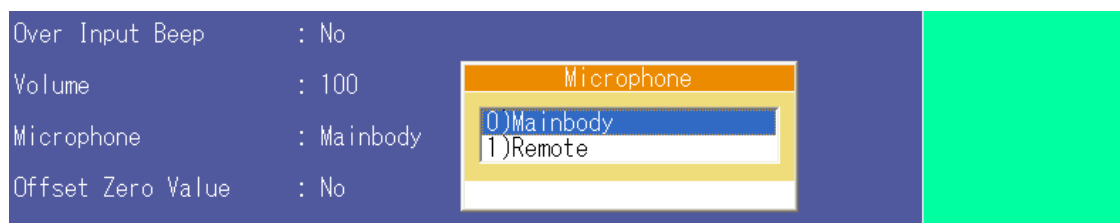
This section describes how to select a voice-recording microphone (MIC).

■ Options

- "Main body" A microphone is used that is connected to the microphone terminal on the main body.
- "Remote" A remote control microphone is used.

■ Operation Method

- 1) Select <Microphone> from <Environment> main menu.
- 2) "Microphone" setting window appears as shown in the figure below.
Select a microphone to be used.
- 3) The result of the setting is displayed in the "Microphone" column.



10-13 SETTING WHETHER OFFSET ZERO VALUE SETTING FUNCTION [Environment/Zero Value]

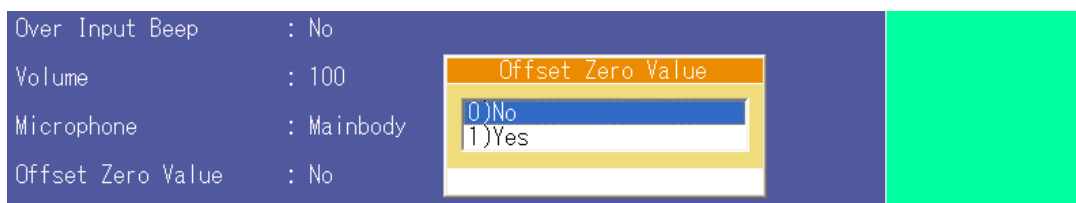
This section describes how to set the use of offset Zero value setting function is use. If this function is set to “Yes”, a menu for the offset Zero value setting is added to the <Measurement> menu. For the offset Zero value setting, see “3-7.”

■ Options

- No Offset Zero value function is not used.
- Yes Offset Zero value function is used.

■ Operation Method

- 1) Select <Zero Value> from <Environment> main menu.
- 2) An “Offset Zero Value” setting window appears as shown in the figure below.
Set whether the offset Zero Value function is used or not.



- 3) The result of the selection is displayed in the “Offset Zero Value” column.

10-14 REFRESHING BUILT-IN BATTERY [Environment/Battery]

EDX-2000B has a built-in battery to avoid any trouble during operation and at momentary power failure.

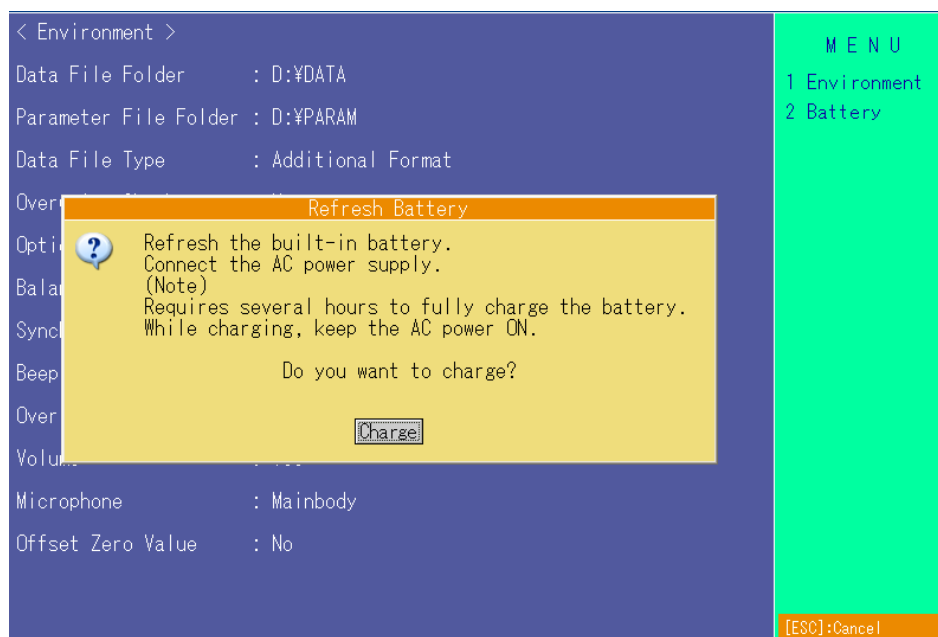
While the EDX-2000B is operated with the AC power, the internal battery is always charging. However, if a momentary voltage fluctuation occurs or a voltage drop occurs while operating the unit with the DC power, the built-in battery immediately starts to maintain the operation.

It is necessary to keep the built-in battery in good condition by discharging fully and charging fully.

This section explains how to refresh the built-in battery.

■ Operation Method

- 1) Select <Battery> from <Environment> main menu.
- 2) A “Refresh Battery” window appears as shown in the figure below.



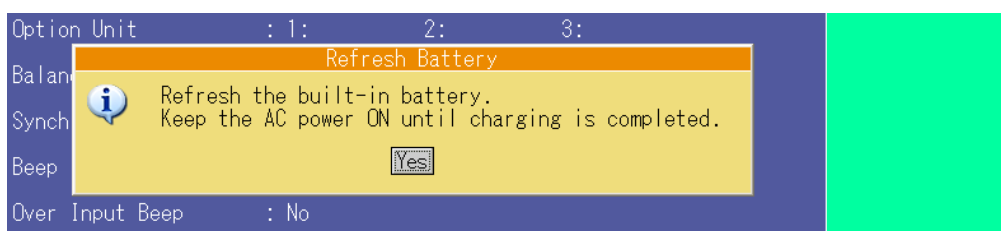
Use the following key operations:

[ENTER]..... Start refreshing the built-in battery.

[ESC] Cancel

Press [ENTER] key to proceed the operation.

3) The following message appears while charging battery.



The [POWER] lamp on the operation panel indicates how the built-in battery is being refreshed.



- **Discharging** Flickers in orange.
- **Charging**..... Lights up in orange.
- **Normal termination** Lights up in green.
- **Battery failure** Lights up in red.

You can roughly check whether the battery is normal as follows:

- The battery is normal if fully discharged battery is fully charged in approx. 2 hours.
- The battery is determined as failed if fully discharged battery is fully charged within 1 hour.

Note

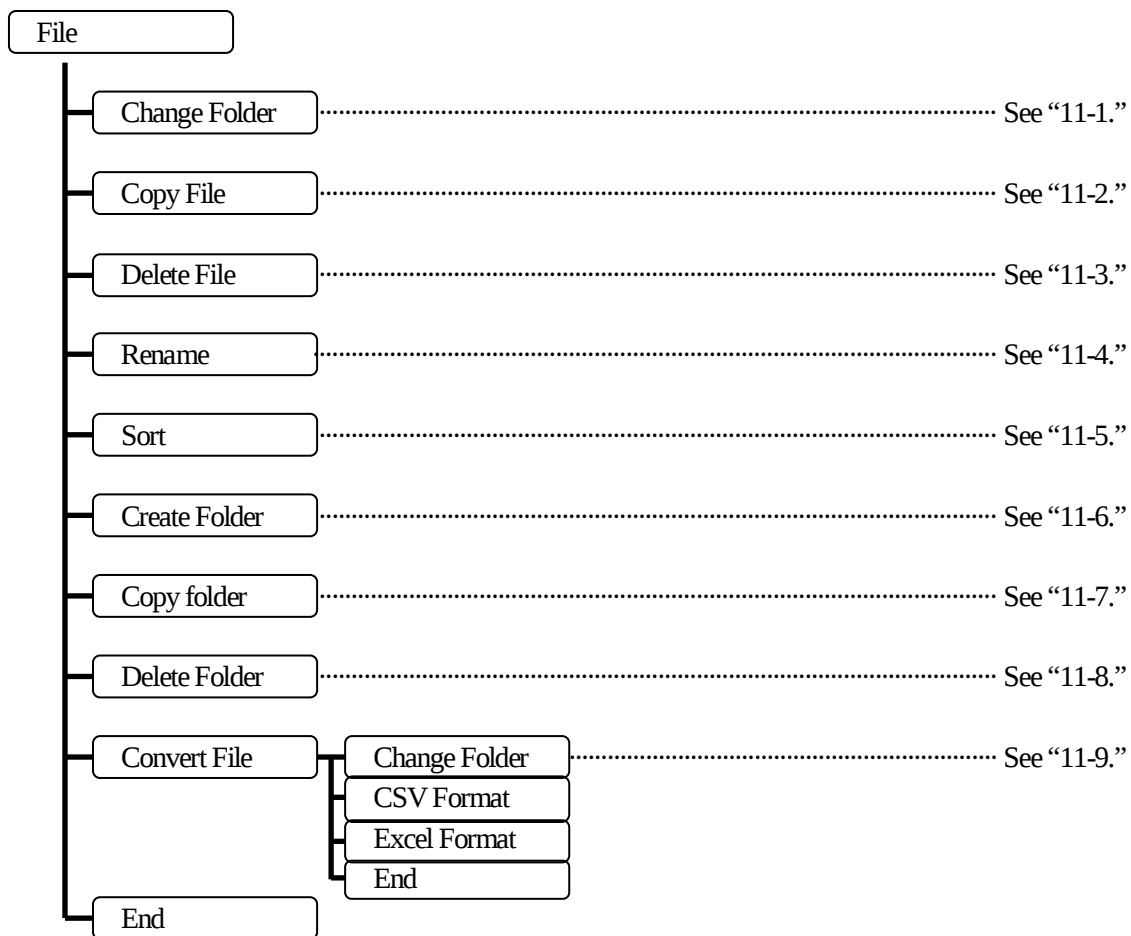
Check the above items once in every month. The expiry date of the built-in battery is 1 year.
Always replace the battery periodically. Or, the built-in battery becomes deteriorated and may not be able to back up the system when the AC or DC power failure occurs.
Although the EDX can be operated while it is discharged or charged, keep the power switch turned ON until it has been charged.

MEMO

To refresh the built-in battery, firstly discharge it fully and then, fully charge to keep it in sound condition.

11. FILE MANAGEMENT [File]

File operations including copying, deleting, and renaming are available for various files (e.g. data files and condition files).



■ File Type

[Cond File]

- MeasCond File (*****.PRM)
- Reproduction Cond file (*****.e2s)
- Arithmetic Operations Condition (*****.e2a)
- FFT Analysis Cond file (*****.e2f)
- Histogram analysis Cond file (*****.e2h)
- Diff/Integ Cond file (*****.e2i)

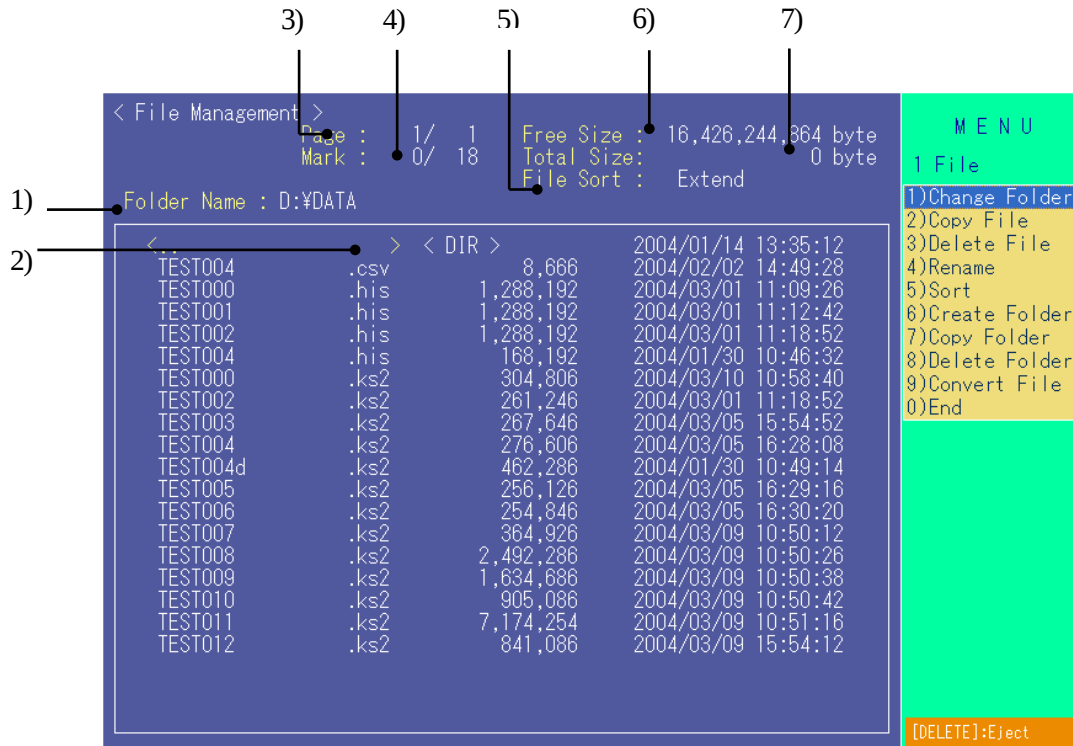
[Data File]

- Recorded data file, analysis result files (*****KS2)
- Histogram processing results data file (*****.his)
- Excel format data file (*****.xls)

[Text File]

- Statistical processing result data file, FFT analysis result data file, CSV data file
(*****.CSV)

■ File Management Base Screen



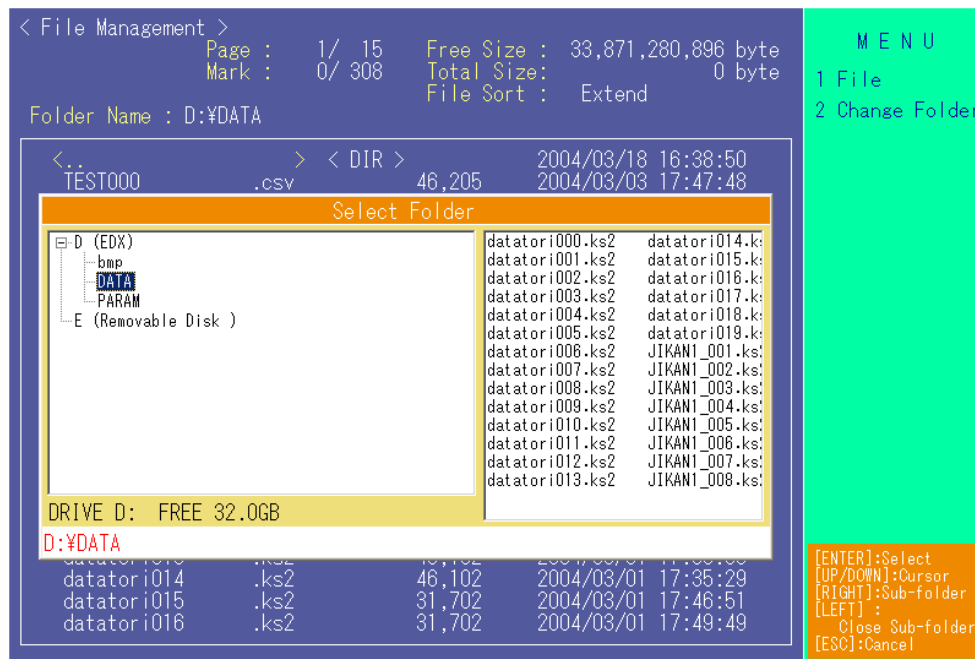
- 1) <Folder name> The name of a folder with the file list.
- 2) <File list> A list of the files in the folder. The above example shows only CSV files.
- 3) <Page> If the number of files is exceeding to be shown on one screen, display page/total pages is displayed.
- 4) <Mark> The number of selected files are displayed. (Selected files/total files)
- 5) <File sort> Display a sort order.
- 6) <Free space> Free space of the drive displayed.
- 7) <Total size> Total size of selected files.

11-1 CHANGING FOLDER [File/Change Folder]

This section describes how to change the displayed folder.

■ Operation Method

- 1) Select <Change Folder> from <File> main menu.
- 2) The folder selection window appears as shown in the figure below.
Select a proper folder using [↑] or [↓] key.
- 3) A list of files in the selected folder is shown at the side of the folder window.
- 4) Set a proper folder by repeating the steps from (2) to (3).



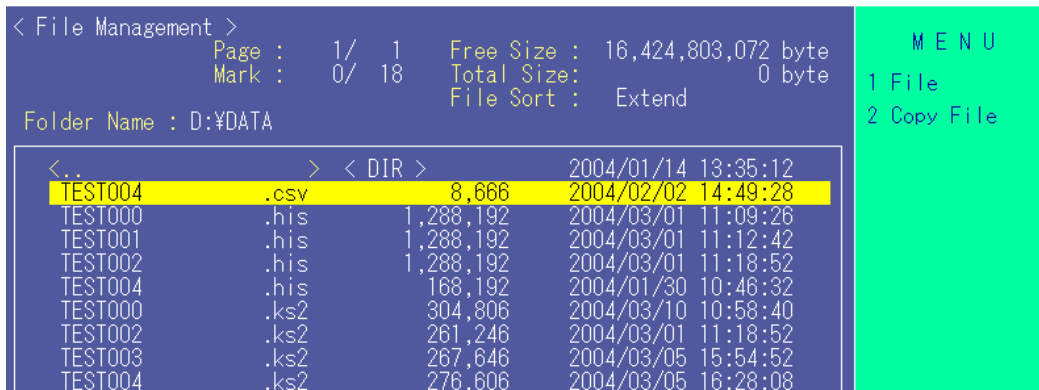
11-2 COPYING FILE [File/Copy File]

This section describes how to copy files.

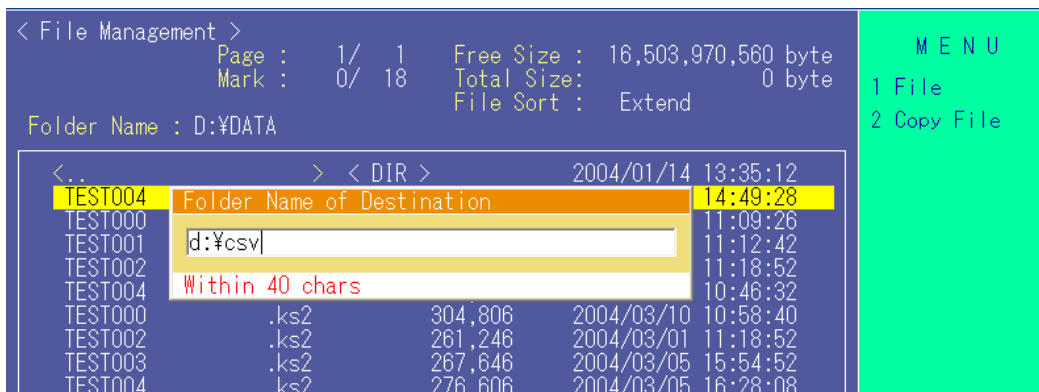
After selecting a file to copy, set a copy destination folder.

■ Operation Method

- 1) Select <Copy File> from <File> main menu.
- 2) A cursor appears in the file list as shown in the figure below. Select a file to copy.
To select multiple files, use [SPACE] key. A “*” mark is added to the head of the file name.
To deselect a selected file, press [SPACE] key once again.



- 3) If you press [ENTER] key for selection, a “Folder Name of Destination” window appears to set a copy destination folder name.
If [SHIFT] + [ENTER] keys are pressed, a folder selection window appears.
After selecting a proper folder using [↑] or [↓] key, press [ENTER] key. The selected folder name is set as a copy destination folder name.
Setting an appropriate folder name and press [ENTER] key. Then, a copy operation starts.



11-3 DELETING FILE [File/Delete File]

This section describes how to delete files.

Note

Once a file is deleted, it cannot be restored.

■ Operation Method

- 1) Select <Delete File> from <File> main menu.
- 2) A cursor appears in the file list as shown in the figure below. Select the desired file to delete.
To select multiple files, use [SPACE] key. A “*” mark is added to the head of the file name.
To deselect a selected file, press [SPACE] key once again.

< File Management >				MENU	
Page :	1/ 1	Free Size :	16,503,167,744 byte	1 File	
Mark :	3/ 18	Total Size:	2,585,050 byte	2 Delete File	
Folder Name : D:¥DATA		File Sort :	Extend		
<..	>	< DIR >	2004/01/14 13:35:12		
* TEST004	.csv	8,666	2004/02/02 14:49:28		
* TEST000	.his	1,288,192	2004/03/01 11:09:26		
* TEST001	.his	1,288,192	2004/03/01 11:12:42		
TEST002	.his	1,288,192	2004/03/01 11:18:52		
TEST004	.his	168,192	2004/01/30 10:46:32		
TEST000	.ks2	304,806	2004/03/10 10:58:40		
TEST002	.ks2	261,246	2004/03/01 11:18:52		
TEST003	.ks2	267,646	2004/03/05 15:54:52		
TEST004	.ks2	276,606	2004/03/05 16:28:08		

- 3) If you press [ENTER] key for selection, a window appears to confirm the operation.
Press [ENTER] key to start deleting specified file(s). Press [ESC] key to stop the operation.

11-4 RENAMING [File/Rename]

This section describes how to rename a file or folder.

■ Input range

Within 16 characters (within 3 characters for an extension)

■ Operation Method

- 1) Select <Rename> from <File> main menu.
- 2) A cursor appears in the file list as shown in the figure below. Move the cursor to a file desired or folder and press [ENTER] key.
- 3) A “New Name” setting window appears.
Input the desired file name.

< File Management >				MENU	
Page :	1/ 1	Free Size :	16,502,348,544 byte	1 File	
Mark :	0/ 18	Total Size:	0 byte	2 Rename	
Folder Name : D:¥DATA		File Sort :	Extend		
<..	>	< DIR >	2004/01/14 13:35:12		
TEST004	.csv	8,666	2004/02/02 14:49:28		
TEST000	.his	1,288,192	2004/03/01 11:09:26		
TEST001	.his	1,288,192	2004/03/01 11:12:42		
TEST002	.his	1,288,192	2004/03/01 11:18:52		
TEST004	.his	168,192	2004/01/30 10:46:32		
TEST000			2003/10 10:58:40		
TEST002			2003/01 11:18:52		
TEST003			2003/05 15:54:52		
TEST004			2003/05 16:28:08		
TEST004d			2001/30 10:49:14		
TEST005	.ks2	256,126	2004/03/05 16:29:16		

New Name

TEST004 .csv

Within 16 (Extension within 3)

11-5 SORTING [File/Sort]

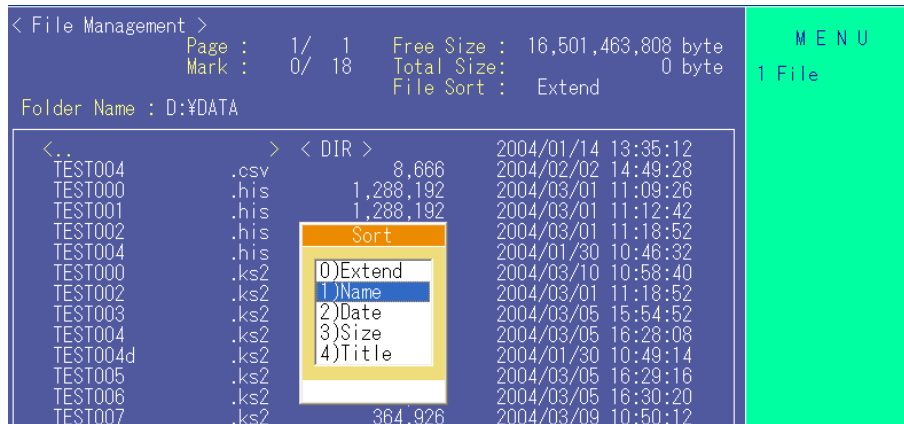
This section describes how to sort files and display them on the list.

■ Options

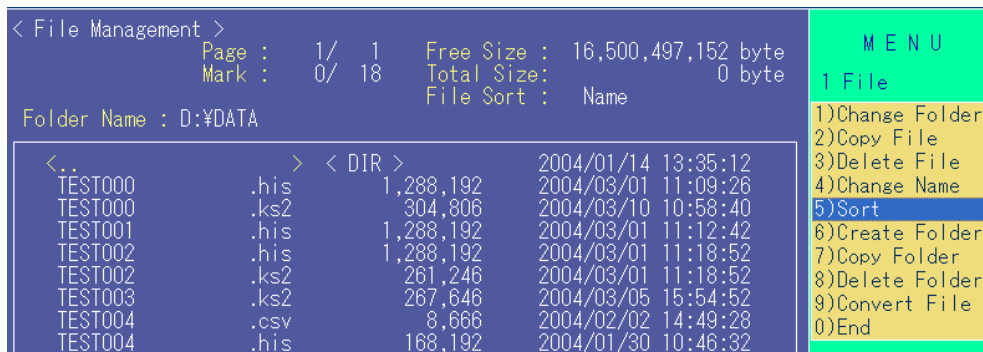
Extension, name, date, size, and title

■ Operation Method

- 1) Select <Sort> from <File> main menu.
- 2) A "Sort" selection window appears as shown in the figure below. Select an appropriate item.
In this example, "Name" is selected for sorting files.



- 3) The following list shows the result of a sort performed on "Name".



11-6 CREATING FOLDER [File/Create Folder]

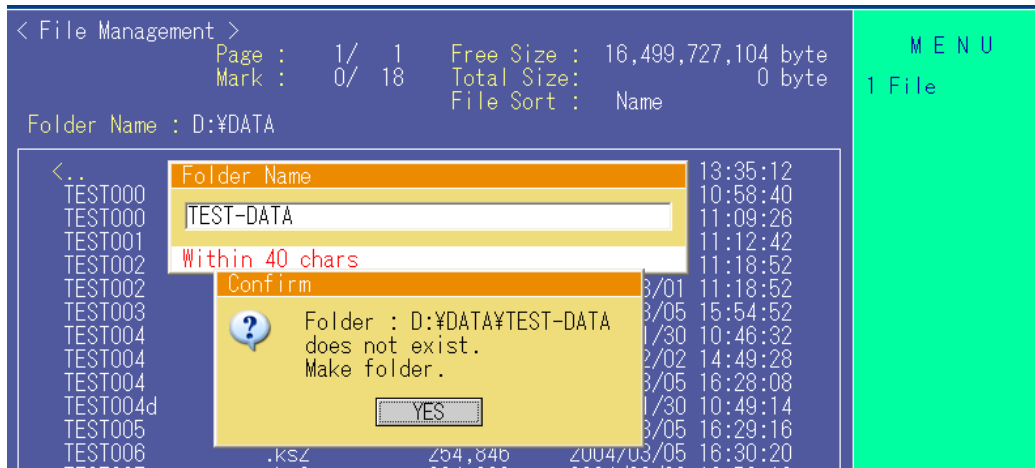
This section describes how to create a new folder under a displayed folder.

■ Input range

Within 40 characters

■ Operation Method

- 1) Select <Create Folder> from <File> main menu.
- 2) A “Folder Name” setting window appears as shown in the figure below.
Input a desired folder name and press [ENTER] key.



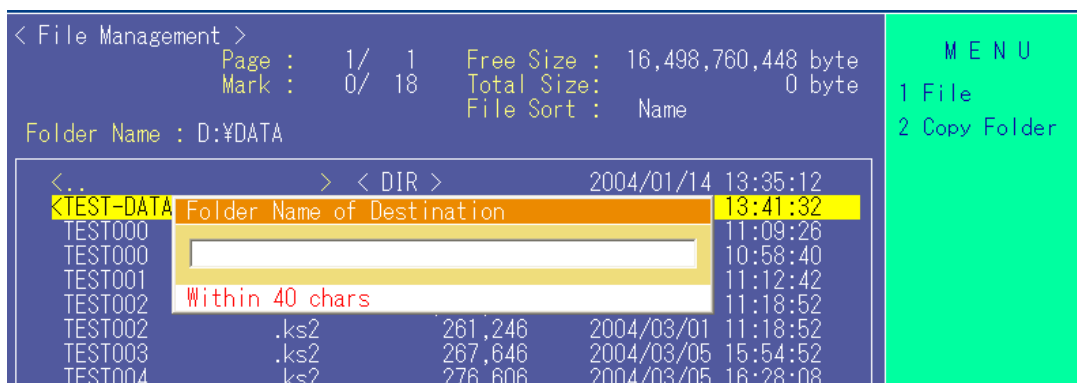
11-7 COPYING FOLDER [File/Copy Folder]

This section describes how to copy folder unit (folder and including files).

Select a desired folder, and set a copy destination folder.

■ Operation Method

- 1) Select <Copy Folder> from <File> main menu.
- 2) A cursor appears on the folder list. Select a desired folder.
- 3) Press [SHIFT] + [ENTER] keys on the selected folder. A “Folder Name of Destination” window appears..



- 4) After entering a copy destination folder, press [ENTER] key to start copying the specified folder.

11-8 DELETING FOLDER [File/Delete Folder]

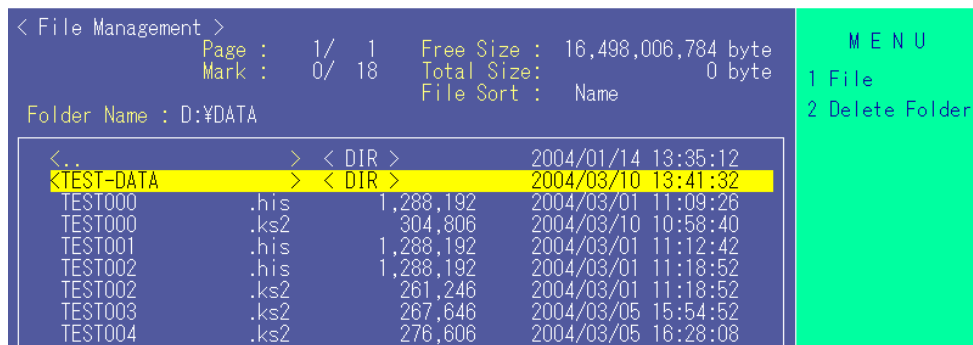
This section describes how to delete a folder.

Note

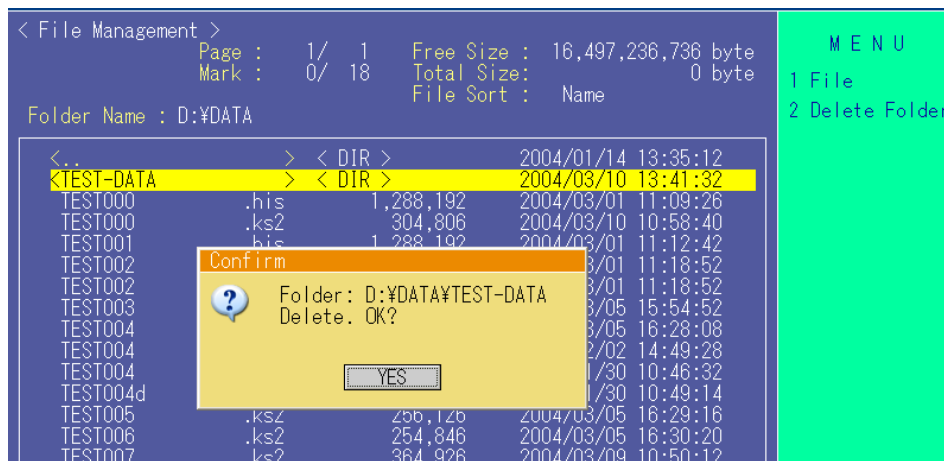
If a folder is deleted, all of the files included in the folder are also deleted.
Once you delete a folder, you cannot restore it.

■ Operation Method

- 1) Select <Delete Folder> from <File> main menu.
- 2) The folder deletion window appears as shown in the figure below.
Select the desired folder to delete using [↑] or [↓] key.



- 3) If [SHIFT] + [ENTER] keys are pressed, a window appears to confirm the operation.
Press [ENTER] key to start the deletion operation. If you want to cancel it, press [ESC] key.



11-9 CONVERTING FILE [File/Convert File]

This section describes how to convert the measured data file into the CSV format file.

Note

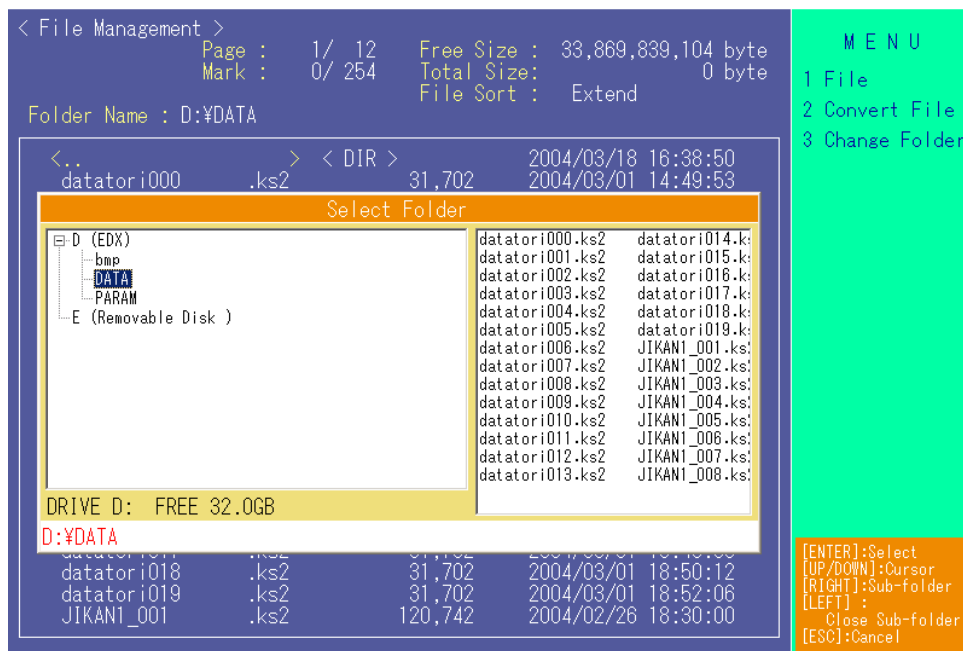
Setting contents of file conversion is conforming to those determined by selecting menu items in due order <ReproduceData> → <File Info> → <Save New>. (See “5-8-8.”)

11-9-1 Changing Folder [File/Convert File/Change Folder]

This subsection describes how to change a folder.

■ Operation Method

- 1) Select <Change Folder> from <Convert File> menu.
- 2) A “Select Folder” window appears as shown in the figure below.
Select a proper folder using [↑] or [↓] key.
- 3) A list of files in the selected folder is shown at the side of the folder window.
- 4) Set a proper folder by repeating the steps from (2) to (3).



MEMO

This is a similar operation as <File>→<Change Folder>.

11-9-2 Converting into CSV Format File [File/Convert File/CSV Format]

In this subsection, the measured data file is actually converted into a text file of the CSV format.

Note

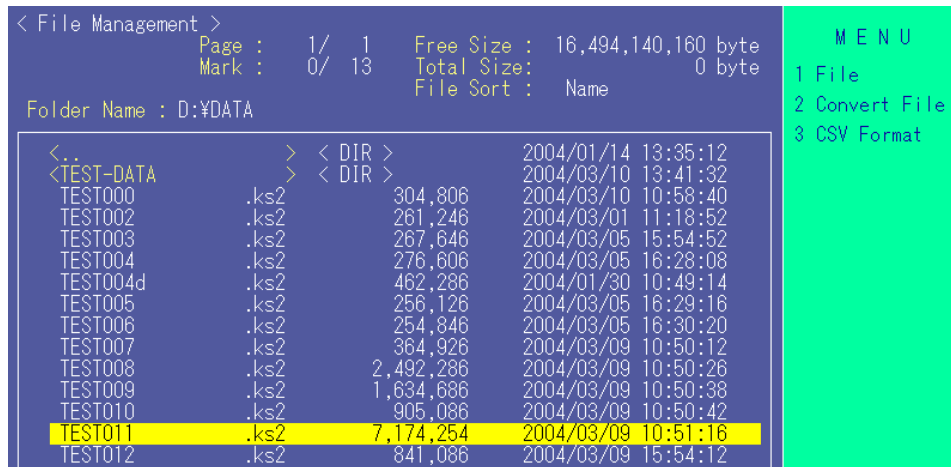
For a measured data file of additional type, a CSV file is created for every block.

For example, assume that the file name is "TEST-SMP.ks2" and the number of black data is 4. In this case, total 4 CSV files: TEST-SMP_1.CSV, TEST-SMP_2.CSV, TEST-SMP_3.CSV, and TEST-SMP_4.CSV; are created.

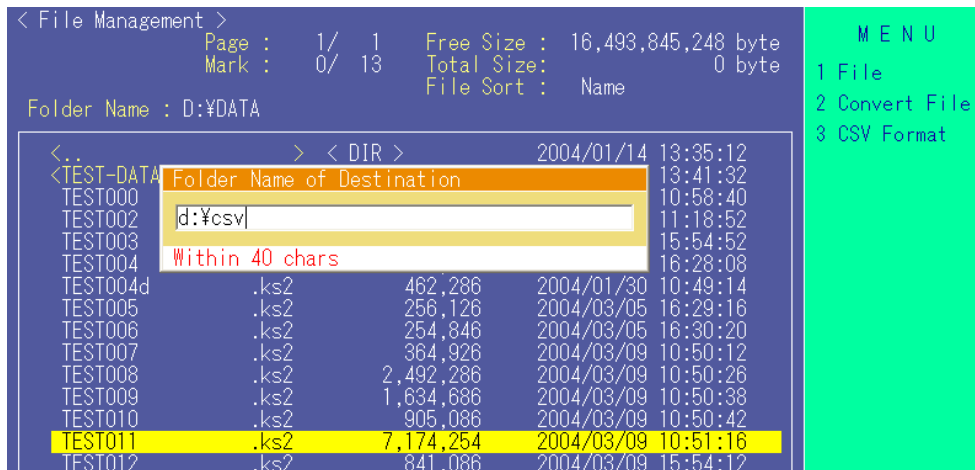
■ Operation Method

- 1) Select <CSV Format> from <Convert File> menu.
- 2) Select the desired measured data file of conversion target with the cursor and press [ENTER] key.

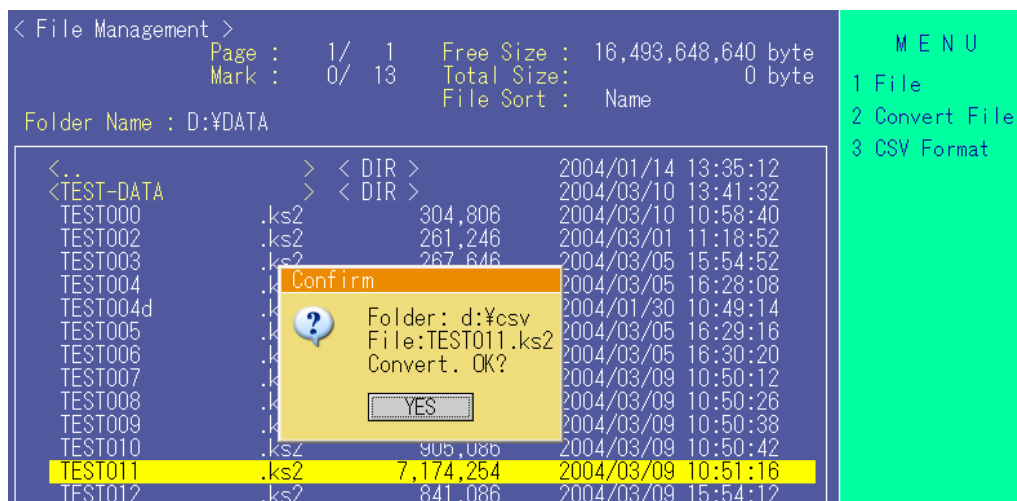
To select multiple files, add a "*" mark to desired files using [SPACE] key and then, press [ENTER] key.



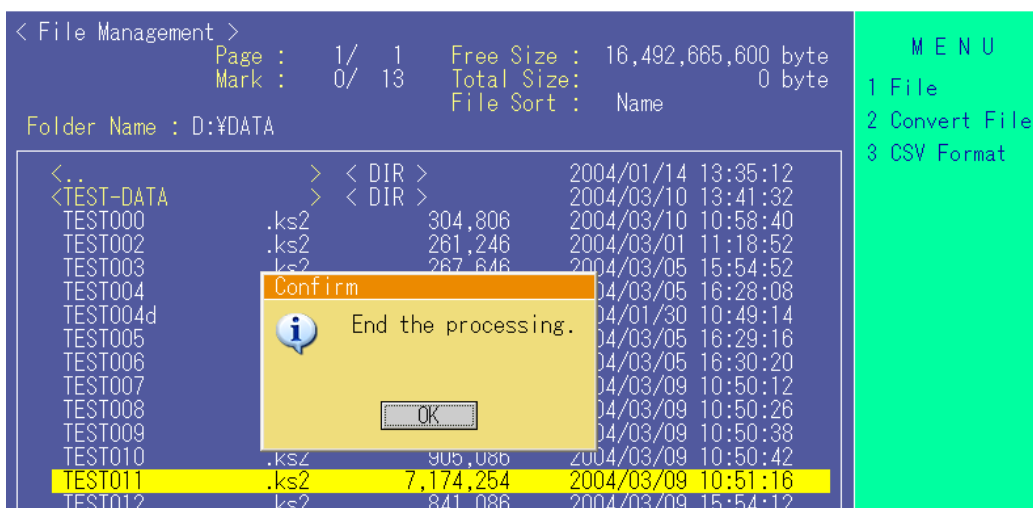
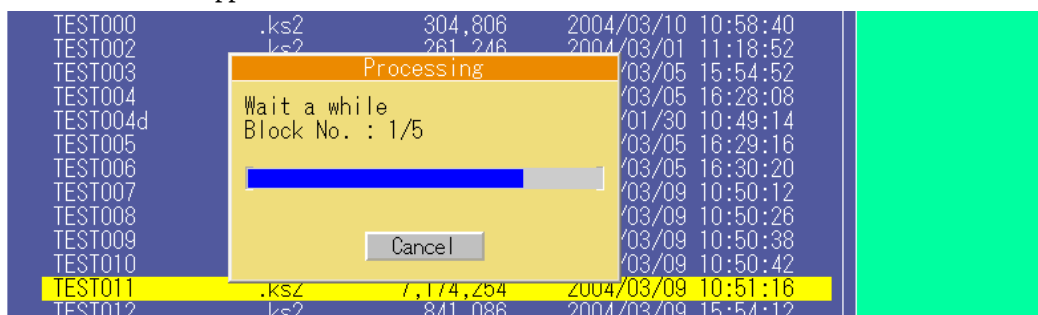
- 3) As shown in the figure below, a "Folder Name of Destination" window appears for saving the files after conversion. Enter a proper file name.



- 4) After entering a folder name, press [ENTER] key. A file conversion confirmation window appears.
To continue the processing, press [ENTER] key. To cancel, press [ESC] key.



- 5) If [ENTER] key is pressed, a window appears indicating the progress of the processing. And then, a termination confirmation window appears.



11-9-3 Converting to EXCEL Format File [File/Convert File/Excel Format]

In this subsection, the measured data file is actually converted into an Excel format file.

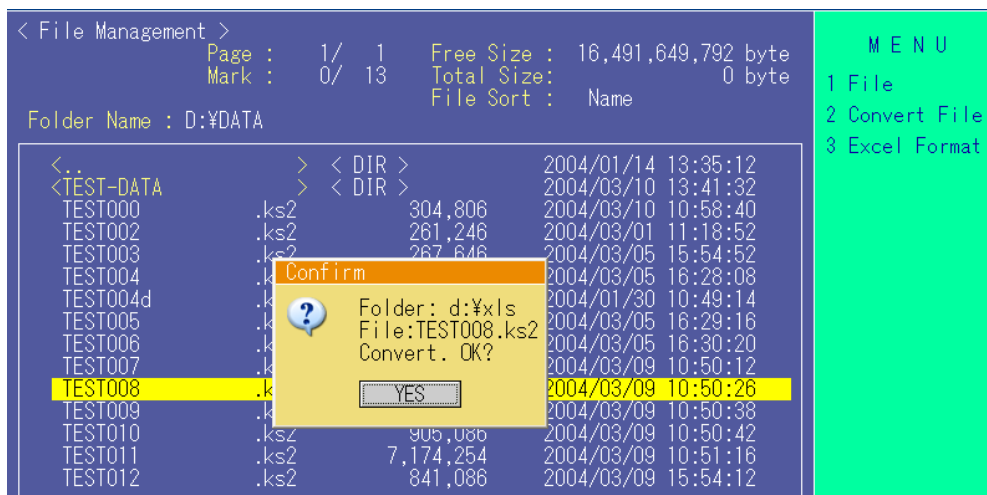
Note

For measured data of additional format file, an Xls file is created for everyh block.

For example, assume that the file name is “TEST-SMP.ks2” and the number of black data is 4. In this case, total 4 Xls files: TEST-SMP_1.Xls, TEST-SMP_2.Xls, TEST-SMP_3.Xls, and TEST-SMP_4.Xls; are created.

■ Operation Method

- 1) Select <Exel Format> from <Convert File> menu.
- 2) Select a desired data file with cursor, and press [ENTER] key.
To select multiple files, add a “*” mark to desired files using [SPACE] key, and then press [ENTER] key.
- 3) A “Folder Name of Destination” window appears to save the files after conversion. Enter a proper file name.
- 4) After entering a folder name, press [ENTER] key. A file conversion confirmation window appears as shown in the figure below.
To continue the processing, press [ENTER] key. To cancel, press [ESC] key.



- 5) If [ENTER] key is pressed, a window appears indicating the progress of the processing. And then, a termination confirmation window appears.

12. DETAILED INFORMATION

This section describes data file format and analysis processing of the data recorded by this measuring device. Data file outputted from the EDX-2000B are roughly classified into KYOWA original binary file (Kyowa standard format:KS2Format) and text file (CSV format).The respective formats are described in this section.

12-1 ASCII File Format (CSV FORMAT)

Measured data and analysis results are saved in an ASCII format file.

Since a character string is enclosed in double quotation marks (“”), and commas are used for delimiter for items, the file can be read by commercially available spreadsheet software.

12-1-1 Recorded Data File

The following is a format of a file converted from an recorded data file into an ASCII format file. The extension is ‘CSV,’

■ Format (Example 1)

“ID No”, “EDX-2000A”	1)
“Title”, “SAMPLE DATA”	2)
“ Test Date”, “2003/12/01”, “09:24:37”	3)
“MEAS CH”,16	4)
“Digital Input”, “OFF”	5)
“Sampling Rate (Hz)”,100	6)
“Data Nos/ch”,400	7)
“Meas Time (Sec)”,4	8)
“CH Name”, “NAME1”, “NAME2”, “NAME3”, ...	9)
“CH No”, “CH01”, “CH02”, “CH03”, ...	10)
“Range”,10000,10000,1000, ...	11)
“Calibrator”,1.0000,6.4320,1.0000, ...	12)
“Offset”,0.0000,0.0000,0.0000, ...	13)
“Unit”, “μm/m”, “μm/m”, “μm/m”, ...	14)
0, -1048, 6524, 35.4, ...	15)
1, -2232, 6454, -389.2, ...	
2, -1191, 6549, -56.9, ...	
3, -2130, 6442, -312.6, ...	
4, -1043, 6535, 68.2, ...	
5, -2187, 6444, -347.2, ...	
6, -1128, 6502, -68.9, ...	
7, -2240, 6464, -386.2, ...	
8, -1056, 6526, -6.8, ...	
9, -2127, 6448, -325.8, ...	
10, -1025, 6516, 67.0, ...	
: : : :	
399, -1798, 6518, -284.8, ...	

■ Description of Items

- | | |
|-------------------------|---|
| 1) "ID No" | ID number of data file. |
| 2) "Title" | Title of data file. |
| 3) "Test Date" | Test date and time recorded. |
| 4) "MEAS CH" | The number of data recorded. |
| 5) "Digital Input" | ON/OFF of digital input. |
| 6) "Sampling Rate (Hz)" | Sampling rate recorded. |
| | For external clock, the value is set to 0. |
| 7) "Data Nos/CH" | The number of data (/1CH). |
| 8) "MEAS time (Sec)" | Measurement time. |
| | For external clock, the item name is "Meas Times", and the value is as same as 7). |
| 9) "CH Name" | Comment for every channel. |
| 10) "CH No." | Channel number. |
| 11) "Range" | Range value for every channel. |
| 12) "Calibrator" | Calibration coefficient for every channel. |
| 13) "Offset" | Offset value for every channel. |
| 14) "Unit" | Unit for every channel. |
| 15) Meas Data | Data obtained by measurement. Measured data for one measurement is converted to physical value, delimited by a comma for every channel, and then, stored in 1 line. |

12-1-2 Conditions of ASCII Conversion

An ASCII file created by selecting <Save New> from <ReproduceData> main menu can be converted by setting various conditions. The set conditions are also reflected on CSV conversion of file management.

■ When header info is set to “Yes”

```

“ID No”, “EDX-2000A”
“Title”, “SAMPLE DATA”
“Test Date”, “2003/12/01”, “09:24:37”
“MEAS CH”, 16
“Digital Input”, “OFF”
“Sampling Rate (Hz)”, 100
“Data Nos/CH”, 400
“MEAS time (Sec)”, 4
“CH Name”, “NAME1”, “NAME2”, “NAME3”, ...
“CH No.”, “CH01”, “CH02”, “CH03”, ...
“Range”, 10000, 10000, 1000, ...
“Calibrator”, 1.0000, 6.4320, 1.0000, ...
“Offset”, 0.0000, 0.0000, 0.0000, ...
“Unit”, “μm/m”, “μm/m”, “μm/m”, ...
0, -1048, 6524, 35.4, ...
1, -2232, 6454, -389.2, ...
2, -1191, 6549, -56.9, ...
3, -2130, 6442, -312.6, ...
4, -1043, 6535, 68.2, ...
5, -2187, 6444, -347.2, ...
6, -1128, 6502, -68.9, ...
7, -2240, 6464, -386.2, ...
8, -1056, 6526, -6.8, ...
9, -2127, 6448, -325.8, ...
10, -1025, 6516, 67.0, ...
:      :      :      :
399, -1798, 6518, -284.8, ...

```

■ When header info is set to “No”

```

“Unit”, “μm/m”, “μm/m”, “μm/m”, ...
0, -1048, 6524, 35.4, ...
1, -2232, 6454, -389.2, ...
2, -1191, 6549, -56.9, ...
3, -2130, 6442, -312.6, ...
4, -1043, 6535, 68.2, ...
5, -2187, 6444, -347.2, ...
6, -1128, 6502, -68.9, ...
7, -2240, 6464, -386.2, ...
8, -1056, 6526, -6.8, ...
9, -2127, 6448, -325.8, ...
10, -1025, 6516, 67.0, ...
:      :      :      :
399, -1798, 6518, -284.8, ...

```

■ When point type is set to “Time”

“Unit”, “μm/m”, “μm/m”, “μm/m”, ...
 0.00, -1048, 6524, 35.4, ...
 0.01, -2232, 6454, -389.2, ...
 0.02, -1191, 6549, -56.9, ...
 0.03, -2130, 6442, -312.6, ...
 0.04, -1043, 6535, 68.2, ...
 0.05, -2187, 6444, -347.2, ...
 0.06, -1128, 6502, -68.9, ...
 0.07, -2240, 6464, -386.2, ...
 0.08, -1056, 6526, -6.8, ...
 0.09, -2127, 6448, -325.8, ...
 0.10, -1025, 6516, 67.0, ...
 : : : :
 3.99, -1798, 6518, -284.8, ...

■ When point type is set to “Data No.”

“Unit”, “μm/m”, “μm/m”, “μm/m”, ...
 0, -1048, 6524, 35.4, ...
 1, -2232, 6454, -389.2, ...
 2, -1191, 6549, -56.9, ...
 3, -2130, 6442, -312.6, ...
 4, -1043, 6535, 68.2, ...
 5, -2187, 6444, -347.2, ...
 6, -1128, 6502, -68.9, ...
 7, -2240, 6464, -386.2, ...
 8, -1056, 6526, -6.8, ...
 9, -2127, 6448, -325.8, ...
 10, -1025, 6516, 67.0, ...
 : : : :
 399, -1798, 6518, -284.8, ...

■ When start No. is set to “0”

“Unit”, “μm/m”, “μm/m”, “μm/m”, ...
 0, -1048, 6524, 35.4, ...
 1, -2232, 6454, -389.2, ...
 2, -1191, 6549, -56.9, ...
 3, -2130, 6442, -312.6, ...
 4, -1043, 6535, 68.2, ...
 5, -2187, 6444, -347.2, ...
 6, -1128, 6502, -68.9, ...
 7, -2240, 6464, -386.2, ...
 8, -1056, 6526, -6.8, ...
 9, -2127, 6448, -325.8, ...
 10, -1025, 6516, 67.0, ...
 : : : :
 399, -1798, 6518, -284.8, ...

■ When start No. is set to “1”

“Unit”, “μm/m”, “μm/m”, “μm/m”, ...
 1, -1048, 6524, 35.4, ...
 2, -2232, 6454, -389.2, ...
 3, -1191, 6549, -56.9, ...
 4, -2130, 6442, -312.6, ...
 5, -1043, 6535, 68.2, ...
 6, -2187, 6444, -347.2, ...
 7, -1128, 6502, -68.9, ...
 8, -2240, 6464, -386.2, ...
 9, -1056, 6526, -6.8, ...
 10, -2127, 6448, -325.8, ...
 11, -1025, 6516, 67.0, ...
 : : : :
 400, -1798, 6518, -284.8, ...

■ When thinning step is set to “0”

No data is thinned out.

“ID No.”, “EDX-2000A”
 “Title”, “SAMPLE DATA”
 “Test Date”, “2003/12/01”, “09:24:37”
 “MEAS CH”, 16
 “Digital Input”, “OFF”
 “Sampling Rate(Hz)”, 20
 “Data Nos/CH”, 80
 “MEAS Time (Sec)”, 4
 “CH Name”, “NAME1”, “NAME2”, “NAME3”, ...
 “CH No.”, “CH01”, “CH02”, “CH03”, ...
 “Range”, 10000, 10000, 1000, ...
 “Calibrator”, 1.0000, 6.4320, 1.0000, ...
 “Offset”, 0.0000, 0.0000, 0.0000, ...
 “Unit”, “ $\mu\text{m/m}$ ”, “ $\mu\text{m/m}$ ”, “ $\mu\text{m/m}$ ”, ...
 0, -1048, 6524, 35.4, ...
 1, -2232, 6454, -389.2, ...
 2, -1191, 6549, -56.9, ...
 3, -2130, 6442, -312.6, ...
 4, -1043, 6535, 68.2, ...
 5, -2187, 6444, -347.2, ...
 6, -1128, 6502, -68.9, ...
 7, -2240, 6464, -386.2, ...
 8, -1056, 6526, -6.8, ...
 9, -2127, 6448, -325.8, ...
 10, -1025, 6516, 67.0, ...
 : : : :
 399, -1798, 6518, -284.8, ...

■ When thinning step is set to “4” and “Simple”

Data is thinned out every 4 data.

“ID No.”, “EDX-2000A”
 “Title”, “SAMPLE DATA”
 “Test Date”, “2003/12/01”, “09:24:37”
 “MEAS CH”, 16
 “Digital Input”, “OFF”
 “Sampling Rate (Hz)”, 20
 “Data Nos/CH”, 80
 “MEAS Time (Sec)”, 4
 “CH Name”, “NAME1”, “NAME2”, “NAME3”, ...
 “CH No.”, “CH01”, “CH02”, “CH03”, ...
 “Range”, 10000, 10000, 1000, ...
 “Calibrator”, 1.0000, 6.4320, 1.0000, ...
 “Offset”, 0.0000, 0.0000, 0.0000, ...
 “Unit”, “ $\mu\text{m/m}$ ”, “ $\mu\text{m/m}$ ”, “ $\mu\text{m/m}$ ”, ...
 0, -1048, 6524, 35.4, ...
 1, -2187, 6444, -347.2, ...
 2, -1025, 6516, 67.0, ...
 : : : :
 79, -2098, 6496, -562.4, ...

■ When thinning step is set to “4” and “Average”

Take the average for every 4 data and thin out.

“ID No.”, “EDX-2000A”
 “Title”, “SAMPLE DATA”
 “Test Date”, “2003/12/01”, “09:24:37”
 “MEAS CH”, 16
 “Digital Input”, “OFF”
 “Sampling Rate(Hz)”, 25
 “Data Nos/CH”, 80
 “MEAS time (Sec)”, 4
 “CH Name”, “NAME1”, “NAME2”, “NAME3”, ...
 “CH No.”, “CH01”, “CH02”, “CH03”, ...
 “Range”, 10000, 10000, 1000, ...
 “Calibrator”, 1.0000, 6.4320, 1.0000, ...
 “Offset”, 0.0000, 0.0000, 0.0000, ...
 “Unit”, “ $\mu\text{m/m}$ ”, “ $\mu\text{m/m}$ ”, “ $\mu\text{m/m}$ ”, ...
 0, -1650, 6492, -180.8, ...
 1, -1649, 6486, -183.5, ...
 2, -1614, 6489, -158.2, ...
 : : : :
 79, -1538, 6477, -151.9, ...

12-1-3 FFT Analysis Result Format

Data in a file is saved with ASCII code.

■ When FFT analysis type is linear spectrum(Example)

1) "FFT_FILE"
2) "ID No.", "EDX-2000A"
3) "Title", "data_1"
4) "Test Date", "2003/12/08", "10:27:16"
5) "Sampling Rate (Hz)", 500
6) "FFT Type", "Linear spectrum"
7) "Window Function", "OFF"
8) "Data/CH", 256
9) "FFT Point Nos", 256
10) "FFT Data Nos", 128
11) "Data Interval (Hz)", 1.9531
12) "Average Times", 1
13) "Shift Data Nos", 0
14) "Unit", " $\mu\text{m/m}$ ", " $\mu\text{m/m}$ ", " $^\circ$ ", "dB"
15) "Data No.", "CH-A1 data", "Amplitude", "Phase", "Logarithmic amplitude"
1, 422.00, 1.0000e-15, 0.0000, -355.52
2, 378.63, 1.0000e-15, 0.0000, -355.52
3, 331.56, 1.0000e-15, 0.0000, -355.52
4, 281.34, 1.0000e-15, 0.0000, -355.52
5, 228.38, 596.81, 45.000, 0.0000
:
:
:
125, 551.38, 0.0079695, 135.00, -97.488
126, 526.34, 1.0000e-15, 0.0000, -355.52
127, 496.22, 1.0000e-15, 0.0000, -355.52
128, 461.34, 1.0000e-15, 0.0000, -355.52
129, 422.00
130, 378.63
131, 331.56
132, 281.34
133, 228.38
134, 173.25
135, 116.41
:
:
:
255, 496.22
256, 461.34

16)

17)

When FFT analysis type is cross spectrum, cross correlation, coherence, or transfer function, the line of “Data No.”, “CH-A1 data”, “Amplitude”, “Phase”, “Logarithmic amplitude” is changed to “CH – A1 data”, “CH – B2 data”, “Phase”, “Logarithmic amplitude”.

■ Description of Items

- 1) “FFT_FILE” Title
- 2) “ID No.” ID number of data file.
- 3) “Title” Title of FFT analysis result file.
- 4) “Test Date” Test date and time when measuring.
- 5) “Sampling Rate (Hz)” Sampling frequency measured.
- 6) “FFT Type” Type of FFT analysis.
- 7) “Window Function” Window function of FFT analysis.
When window function is not used, it is set to “OFF”.
- 8) “Data/CH” The number of data (/1CH).
- 9) “FFT Point Nos” The number of measured data subjected to FFT analysis.
- 10) “FFT Data Nos” The number of FFT analysis data.
- 11) “Data Interval (Hz)” Interval of FFT analysis data.
Sampling frequency (linear, power, cross) or sampling cycle (correlation).
- 12) “Average Times” Average number of times of FFT analysis.
- 13) “Shift Data Nos” The number of shift data of the start point of FFT processing
subsequent to averaging.
- 14) “Unit” Unit for each channel and each analysis data.
- 15) Analysis CH FFT analysis target channel No.
For example, in the case of CH-A2, FFT analysis is executed by targeting Channel 2.
- 16) Meas Data Data obtained by measurement. Measured data for one measurement is delimited by a comma for every channel, and saved by converting into physical value.
- 17) FFT data Data subjected to FFT analysis. Analysis results data corresponding to FFT analysis type delimited by a comma and saved.

Type of FFT analysis	Analysis result data
Linear spectrum Cross spectrum Transfer function	Linear amplitude, phase, logarithmic amplitude
Power spectrum	Linear amplitude, logarithmic amplitude
Auto correlation, cross correlation	Correlation
Coherence	Coherence value

12-1-4 Histogram Analysis Result File

A histogram analysis result file is created for each channel.

■ When analysis type is other than 2-dimension rainflow Method (example 1)

"Histogram Data"	1)
"Title", "SAMPLE DATA"	2)
"Test Date", "2003/11/09", "18:30:12"	3)
"Data Nos/CH", 1000	4)
"Sampling Rate (Hz)", 100	5)
"Channel", 8	6)
"Type", "RAIN[1D]"	7)
"Slices", 100	8)
"Slice Width", 9.0000	9)
"Unit", "cm"	10)
"Hysteresis", 0	11)
"Offset", 0.0000	12)
"Scale Value", 900.00	13)
"Total Count", 20	14)
"Slice Level", "Slice Range", "Count"	15)
1, 9.0000, 0	16)
2, 18.000, 2	
: : :	
99, 891.00, 0	
100, 900.00, 12	
"Type", "P/V"	
"Total Count", 20	
"Slice level", "Slice range", "Count"	
-50, -450.00, 10	
-49, -441.00, 0	
: : :	
50, 450.00, 10	

: To be inserted for complex type.

■ Description of Items

- 1) "Histogram Data" Title.
- 2) "Title" Title of histogram analysis result file.
- 3) "Test date" Test date and time when measuring, recorded in original data file before analysis.
- 4) "Data Nos/CH" The number of data (/CH) in original data file.
- 5) "Sampling Rate" Sampling measured, recorded in original data file.
- 6) "Channel" Channel number.
- 7) "Type" Type of histogram analysis.
- 8) "Slices" The number of slices.
- 9) "Slice Width" Slice width.
- 10) "Unit" Unit of original data.
- 11) "Hysteresis" Invalid amplitude width.
- 12) "Offset" Offset value. Used in MAX/MIN Method.
- 13) "Scale Value" Scale value obtained from the number of slices and slice width.
- 14) "Total Count" Value obtained by adding all slice counts.
- 15) "Items of analysis result" Items of a list of histogram analysis results shown in the succeeding lines that follows.

16) "Analysis result data" Data per slice.

■ When analysis type is 2-dimension rainflow Method(RAIN[2D]) (example 2)

"Histogram Data"	1)
"Title", "SAMPLE DATA"	2)
"Test Date", "2003/11/09", "18:30:12"	3)
"Data Nos/CH", 1000	4)
"Sampling Rate (Hz)", 100	5)
"Channel", 4	6)
"Type", "RAIN[2D]"	7)
"Slices", 10	8)
"Slice Width", 5.0000	9)
"Unit", "V"	10)
"Hysteresis", 0	11)
"Offset", 0.0000	12)
"Scale Value", 50.00	13)
"Total Count", 20	14)
"Slice Level", "Slice Range", "Count"	15)
1, 5.0000, 0, 0, 0, 0, 0, 0, 0, 0, 0	16)
2, 10.000, 0, 0, 0, 0, 0, 0, 0, 0, 0	
: : :	
9, 45.000, 0, 0, 0, 0, 0, 0, 0, 0, 0	
10, 50.000, 0, 0, 0, 0, 0, 20, 0, 0, 0	

■ Description of Items

- 1) "Histogram Data" Title
- 2) "Title" Title of histogram analysis result file.
- 3) "Test Date" Test date and time when measuring, the analysis original data file.
- 4) "Data Nos/CH" The number of data (/CH) in analysis original data file.
- 5) "Sampling Cycle" Sampling cycle of measurement of the analysis source data file.
- 6) "Channel" Channel No.
- 7) "Type" Type of histogram analysis.
- 8) "Slices" The number of slices.
- 9) "Slice Width" Slice width.
- 10) "Unit" Unit of original data.
- 11) "Hysteresis" Invalid amplitude width.
- 12) "Offset" Offset value. Unused in 2D Rainflow Method.
- 13) "Scale Value" Scale value obtained from the number of slices and slice width.
- 14) "Total Count" Value obtained by adding all slice counts.
- 15) "Items of Analysis Result" Items of a list of histogram analysis results shown in the succeeding lines.
- 16) "Analysis Result data" Data per slice.
 Count values for every Mean are shown from the 3rd row.
 In the above example , Mean(-5) · Mean(-4) ··· Mean(-1) · Mean(1) ···
 Mean(5),
 in sequence.

12-2 FFT ANALYSIS

The EDX-2000B is designed to obtain various spectrums by FFT (Fast Fourier Transform). In order to express the FFT results in real amplitude (coefficient of Fourier series), real number and imaginary number of FFT analysis results, that is a complex form of Fourier series are doubled, respectively, to be used as FFT results. ($X_a = R_a + jI_a$ Where, R_a denotes twice the value of the real number and I_a , twice the value of the same of the imaginary number).

Since the EDX-2000B functions to obtain the average of target time series data and compensate the time series data (subtraction) before signal waveform is subjected to FFT analysis, it is not applicable for DC component.

12-2-1 Various Spectrums

This section describes details of various spectrums in the EDX-2000B.

■ Linear Spectrum

The EDX-2000B is capable of obtaining amplitude and phase spectrums of target signal waveforms.

The amplitude spectrum is defined by real amplitude of Fourier series to be set as amplitude (0 to peak value) of frequency components. It is expressed in the unit of signal waveform (Ex. : V, μ e, etc.)

Logarithmic display of the phase spectrum is a relative display with maximum amplitude of frequency components set to 0 dB.

Subscript a in the following equation denotes “Analysis CH-A.”

$$\text{Amplitude } |X_a| : \sqrt{R_a^2 + I_a^2}$$

$$\text{Logarithm(dB)} : 20 \log \frac{|X_a|}{|X_a|_{\max}}, \quad |X_a|_{\max} : \text{Maximum amplitude}$$

$$\text{Phase } \theta_a : \tan^{-1} \frac{I_a}{R_a}$$

Suppose amplitude spectrum $|X_a|$ is compared with the amplitude spectrum $|C_a|$ that is based on complex form of Fourier series C_a . Then, the amplitude spectrum becomes twice the value as shown in the following equation.

$$|C_a| = \sqrt{C_a \cdot C_a^*} = \sqrt{\left(\frac{a_a - jb_a}{2}\right) \cdot \left(\frac{a_a + jb_a}{2}\right)} = \frac{1}{2} |X_a|$$

where, C_a : Complex form of Fourier series and a_a, b_a : Coefficients of Fourier series

In addition, relations between amplitude of amplitude spectrum and root mean square (rms), and between entire amplitude (p-p value) are described in the following.



■ Power Spectrum

Power spectrum is a square value of the linear spectrum amplitude. The power spectrum is expressed in the unit of square value of signal waveform (Ex. : V^2 , etc.).

Logarithmic display of the power spectrum is a relative display with maximum amplitude of frequency components set to 0 dB.

Subscript a in the following equation denotes “Analysis CH-A.”

$$\text{Amplitude } |X_a|^2 : R_a^2 + I_a^2$$

$$\text{Logarithm(dB)} : 10 \log \frac{|X_a|^2}{|X_a|_{\max}^2}$$

Suppose $|X_a|^2$ is compared with power spectrum $|C_a|^2$ that is based on the complex form of Fourier series C_a . Then, the power spectrum shall be 4 times as large the value as shown in the following equation.

$$|C_a|^2 = C_a \cdot C_a^* = \left(\frac{a_a - jb_a}{2} \right) \cdot \left(\frac{a_a + jb_a}{2} \right) = \frac{1}{4} (a_a^2 + b_a^2) = \frac{1}{4} |X_a|^2$$

where, C_a : Complex form of Fourier series, a_a and b_a : Coefficients of Fourier series

■ Cross Spectrum

The amplitude becomes a product of frequency components of 2 signals and the phase expresses the relative phase difference between both signals. Subscripts a and b in the following equations denote “Analysis CH-A” and “Analysis CH-B”, respectively.

Logarithmic display of the amplitude spectrum becomes a relative display with maximum amplitude of frequency components set to 0 dB. The phase spectrum is expressed in -180 to 180 (Degree).

$$\text{Amplitude } X_{ab} : X_b \cdot X_a^* = \sqrt{R_{ab}^2 + I_{ab}^2}, X_a^* : X_a \text{ Complex conjugate number}$$

$$\text{Logarithm(dB)} : 20 \log \frac{X_{ab}}{X_{ab \max}}, X_{ab \max} : \text{Maximum amplitude}$$

$$\text{Phase } \theta_{ab} : \tan^{-1} \frac{I_{ab}}{R_{ab}}$$

$$(\text{Note}) X_{ab} = X_b \cdot X_a^* = R_{ab} + jI_{ab}$$

■ Auto Correlation Function

When the target signal waveform is displaced on the time axis, similarity with the source waveform is displayed and the value shall be between $+1$ to -1 that is normalized by a value of time lag ‘0.’

The auto-correlation function is obtained by calculating Fourier inverse transformation (F^{-1}) of power spectrum $|X_a|^2$. Subscript a in the following equation denotes “Analysis CH-A.”

$$\frac{F^{-1}|X_a|^2}{F^{-1}|X_a(0)|^2}$$

■ Cross Correlation Function

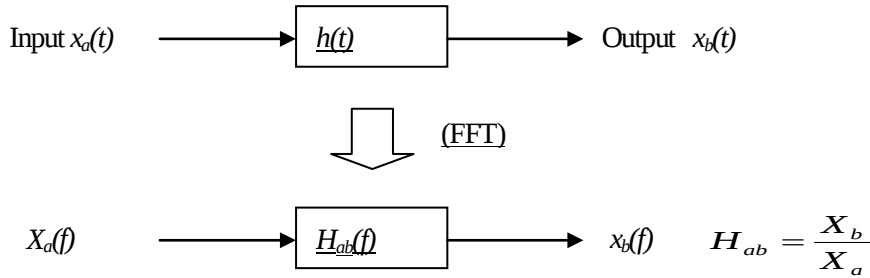
When either one of 2 signal waveforms is displaced on the time axis, similarity with the other signal waveform is displayed and the value shall be between +1 to -1 that is normalized by a value of time lag '0.'

The cross correlation function is obtained by calculating Fourier inverse transformation (F^{-1}) of cross spectrum $|H_{ab}|$. Subscripts $_a$ and $_b$ denote "Analysis CH-A" and "Analysis CH-B," respectively.

$$\frac{F^{-1}|H_{ab}|}{F^{-1}|H_{ab}(0)|}$$

■ Transfer Function

Obtain input/output transfer characteristics of the following system.



where, $h(t)$ denotes Impulse response, and $H_{ab}(f)$ denotes Transfer function

Logarithmic display of the amplitude spectrum becomes a relative display with maximum amplitude of frequency component set to 0 dB. The phase spectrum is expressed in -180 to 180 (Degree).

Subscripts $_a$ and $_b$ denote "Analysis CH-A" and "Analysis CH-B," respectively

$$\text{Amplitude } H_{ab} : \frac{X_b}{X_a} = \frac{X_b \cdot X_a^*}{X_a \cdot X_a^*} = \frac{\sqrt{R_{ab}^2 + I_{ab}^2}}{R_a^2 + I_a^2}$$

$$\text{Logarithm(dB)} : 20 \log \frac{H_{ab}}{H_{ab \max}}, H_{ab \max} : \text{Maximum amplitude}$$

$$\text{Phase } \theta_{ab} : \tan^{-1} \frac{I_{ab}}{R_{ab}}$$

$$\text{(Note)} X_{ab} = X_b \cdot X_a^* = R_{ab} + jI_{ab}$$

12-2-2 Supplementary Description

■ Time Series Data and FFT Analysis Result

When analysis target time series data is sampling rate $\Delta t \times N$ Number of data = Cycle (Analysis interval), the k-order frequency f_k and base frequency f_1 are expressed as follows.

$$f_k = \frac{k}{T} = \frac{k}{N\Delta t}$$

$$f_1 = \frac{1}{T} = \frac{1}{N\Delta t}$$

Maximum order frequency is considered as $k=N/2$ and **maximum analysis frequency** is obtained by the following equation.

$$f_{N/2} = \frac{1}{2\Delta t}$$

Analysis frequency of the finite Fourier series is decomposed to components in the matter of double integers ($k=1, 2, 3, \dots, N/2$) from f_1 to $f_{N/2}$. ($k=0$ is DC component)

The abovementioned basic frequency f_1 shall be a frequency resolution (Δf) of Fourier series.

In addition, it is the maximum analysis frequency that can be analyzed by $f_{N/2}$ and is called **Nyquist frequency**.

The FFT analysis in the EDX-2000B obtains $k=0, 1, 2, 3, \dots, N/2-1$ ($N/2$) of data and the actual maximum analysis frequency is $f_{N/2-1}$.

For example, when sampling frequency 10 kHz (Sampling rate $\Delta t = 10^{-4}$ sec) and the number of analysis data $N = 4096$ are subjected to FFT analysis, the cycle T (analysis interval) becomes 0.4096 sec. Therefore, base frequency f_1 (= frequency resolution Δf) becomes 2.44 Hz and the maximum analysis frequency, $f_{N/2-1} = 4.99756$ kHz.

■ FFT Averaging Processing

Regarding FFT averaging processing of the EDX-2000B amplitude, phase, etc. of the FFT results are obtained for every FFT analysis, and the amplitude and phase spectrum data obtained by repeating the FFT for specified times are averaged to be considered as the final results.

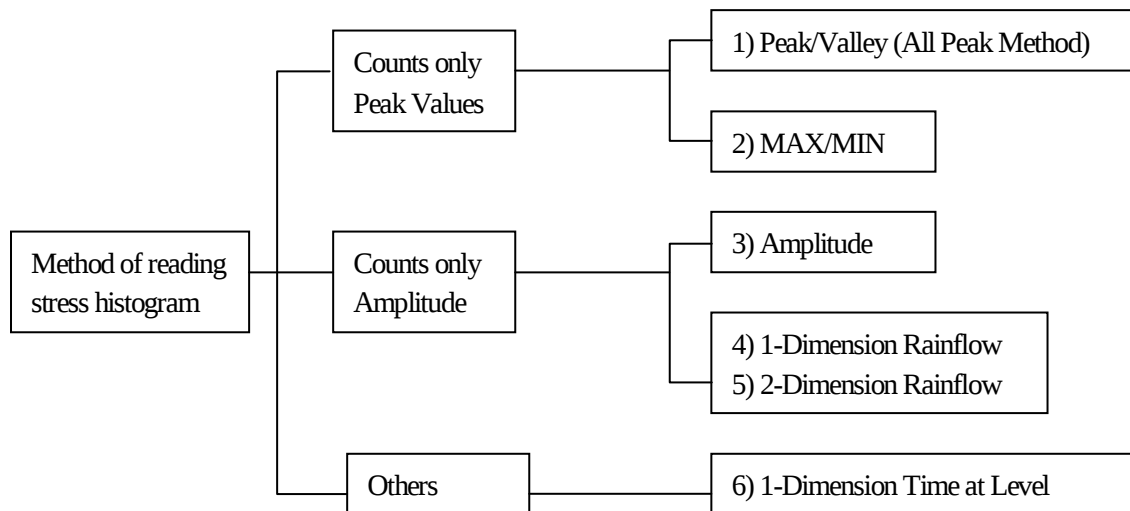
It should be noted that the FFT averaging processing is entirely different from other methods that separately average real number and imaginary number portions of the FFT results and converts the obtained averaged data into amplitude or phase spectrum to be considered as the final results.

12-3 DESCRIPTION OF HISTOGRAM ANALYSIS PROCESSING

There are various analysis algorithms to translate such physical variable into a histogram of sine waves, as strain, stress and vibration waveforms detected on a structure subjected to a random working load.

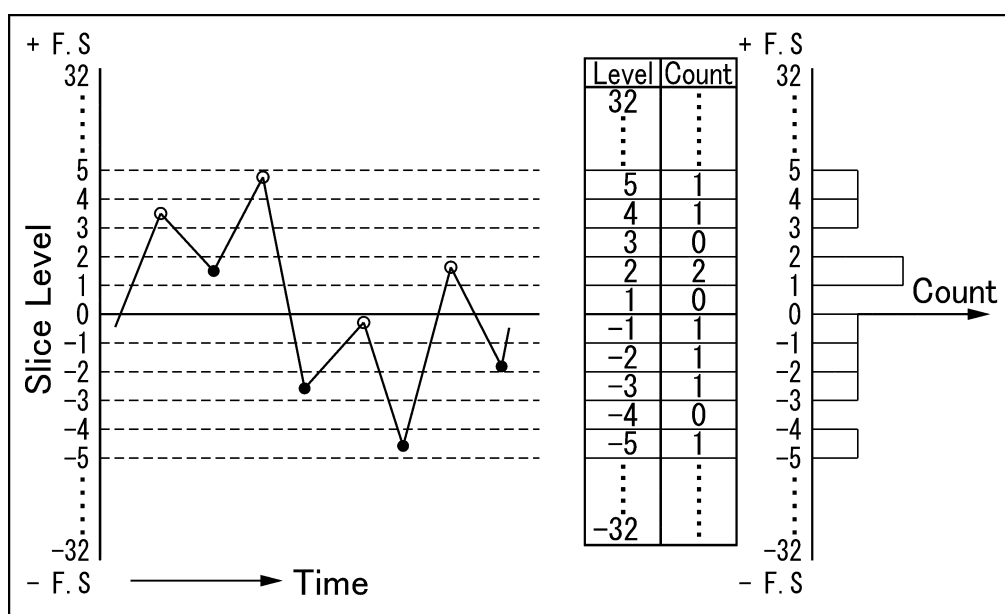
Histogram data obtained by this waveform analysis can be used as information for evaluating service life of structural members affected by fatigue and damage in progress.

This Chapter briefly describes how these algorithm programs.



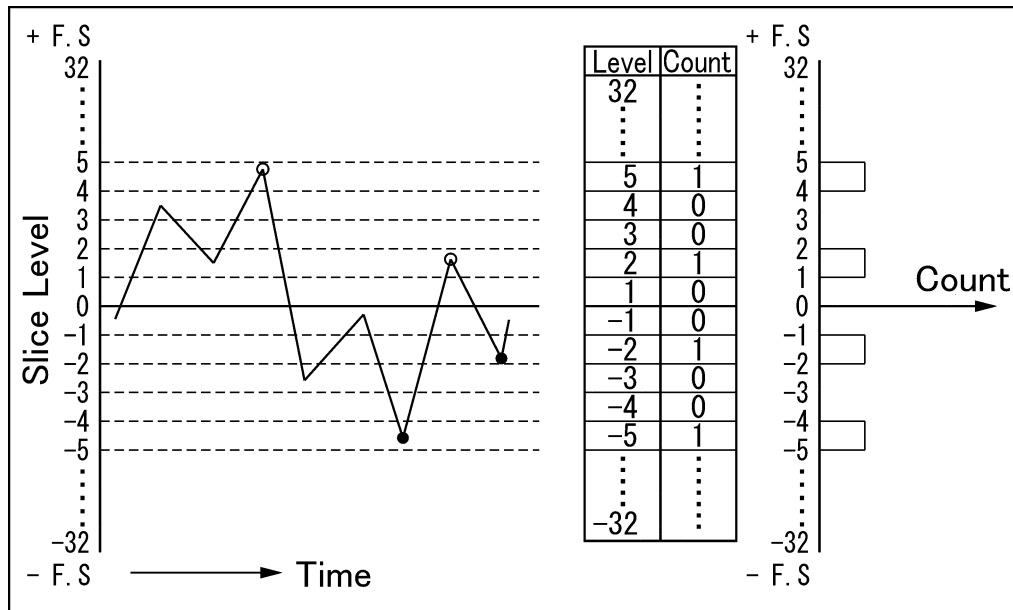
■ Peak/Valley Algorithm

Peak/Valley method is a method that counts the value of every peak (Peak Value, marked "○") where a slope shifts from ascent to descent and the value of every valley (Valley Value, marked "●") where a slope shifts from descent to ascent.



■ MAX/MIN Algorithm

Max/Min algorithm is a method, by considering the center level ('0' in the following figure) as the reference level, that counts the maximum value (Positive side marked with "○") of every ascent which crosses the reference level and counts the minimum value (Negative side marked "●") of every decent which crosses the reference level .

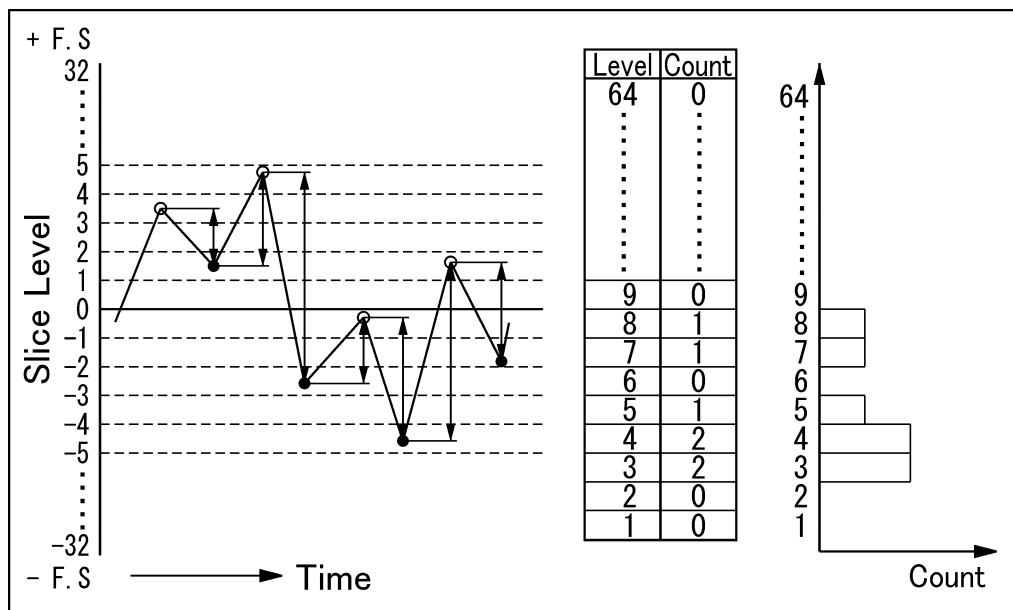


■ AMPLITUDE

This is a method that counts strain amplitude from peak to valley values as well as from valley to peak values regardless of the levels, positive or negative, as shown in the following figure.

The advantage of this algorithm is that it allows direct reading of amplitudes.

However, if harmonics are superimposed on amplitudes, a large amplitude may be occasionally overlooked.



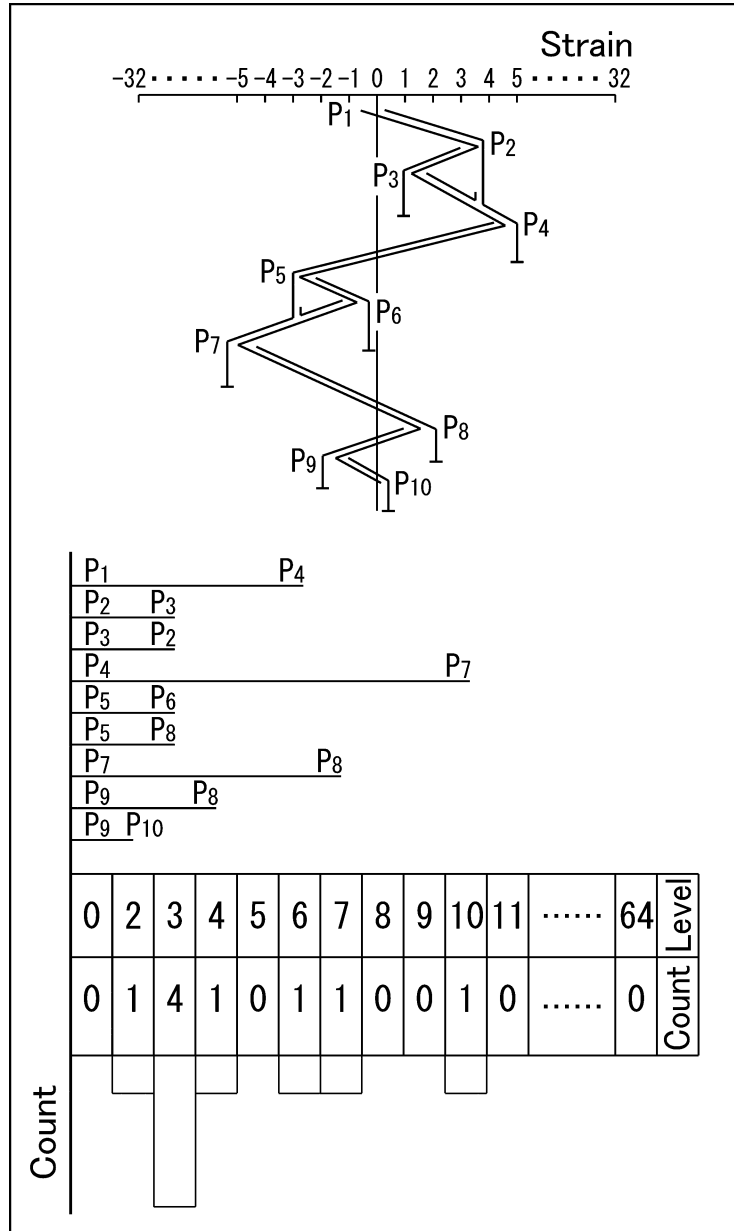
■ 1-Dimension rainflow Algorithm

The Rainflow algorithm is designed to count histogram of strain amplitudes focusing on the hysteresis loop (closed loop) of stress-strain curve.

When carefully observing the stress-strain curve, you will find that hysteresis has a portion that never closes.

The Rainflow algorithm counts such a portion by regarding it as what gives a 1/2 cycle of fatigue damage.

Therefore, when 1/2 cycle of the same value is counted twice, a cycle of one closed loop is counted.



As shown at right, give the vertical axis to the time. Then consider the time-serial changes of strain waveform as a multilayered roof structure involving $P_1 \rightarrow P_2 \rightarrow P_9 \rightarrow P_{10}$. Suppose that rain flows from the top of the roof and passes through peaks and values.

By considering that raindrops fall and stop in conformity with the requirements listed below, the length of rainflow on the horizontal axis are measured and the corresponding strain amplitude are sliced to obtain respective fatigue-initiating components.

The right figure is an exploded view of strain amplitude

that counts the above contents.

Note) See (Note) on the next page for relations

between

count value and cycles of the rainflow algorithm

the right figure.

■ Three Requirements for Raindrops to Fall and Stop

Requirement 1: Raindrops flowing in numerical order from the top of the roof to the lower roofs until a requirement for stop is satisfied.

Requirement 2: Raindrops falling from the edge stop when either of the following two requirements is satisfied.

a) Rightward Flow

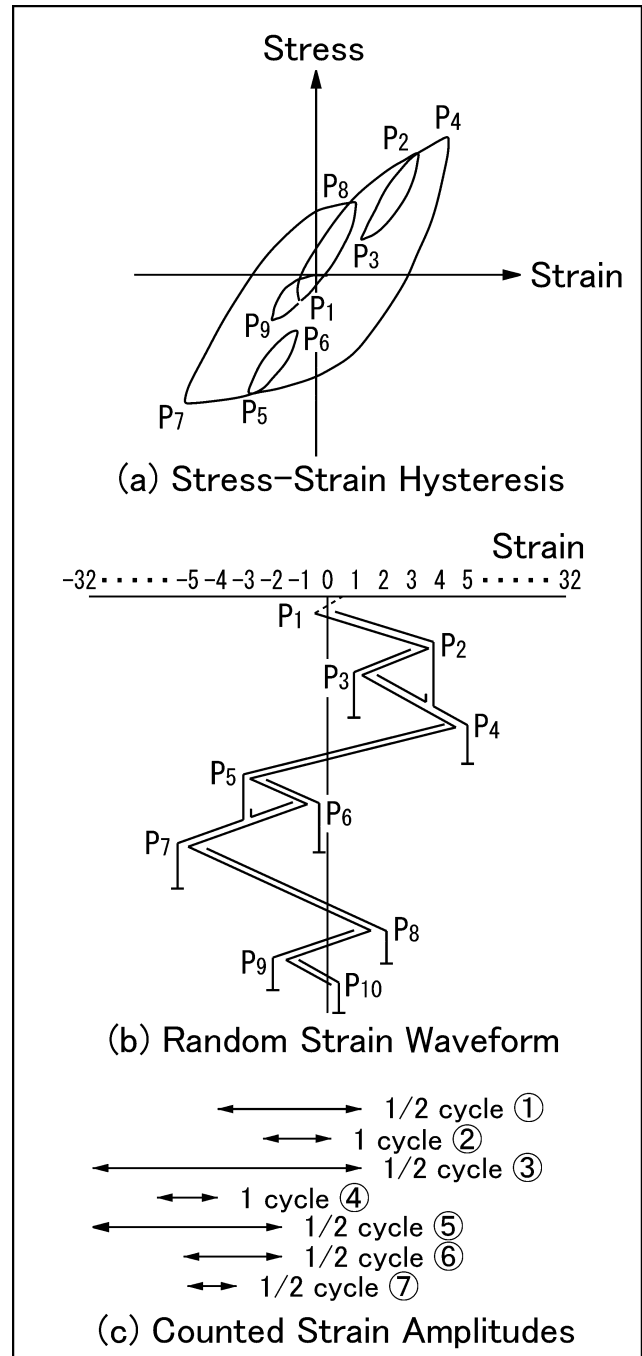
There comes an edge of roof, which is placed at left from the starting point of the rightward flow. (The rightward flow from P_1 drops from the edge of P_4 but stops dropping on the way since there is the edge of P_5 which is placed left from starting point P_1)

b) Leftward Flow

There comes an edge of roof, which is placed right from the starting point of the leftward flow.

Requirement 3: The rainflow stops if another raindrops flow on a portion of the same roof.

(rainflow on roof P_2 - P_3 , which was started from P_2 , stops all the pints where is falls from P_3 .)



Note

Count value of rainflow algorithm (1-dimension./2-dimension rainflow algorithms) in the EDX-2000A is obtained by setting 1/2 cycle as count '1.' Therefore, when converting the obtained count value to "cycle" to be used for predicting service life, set each count value to 1/2.

$$(\text{Number of cycles}) = (\text{Histogram count value}) \times (1/2)$$

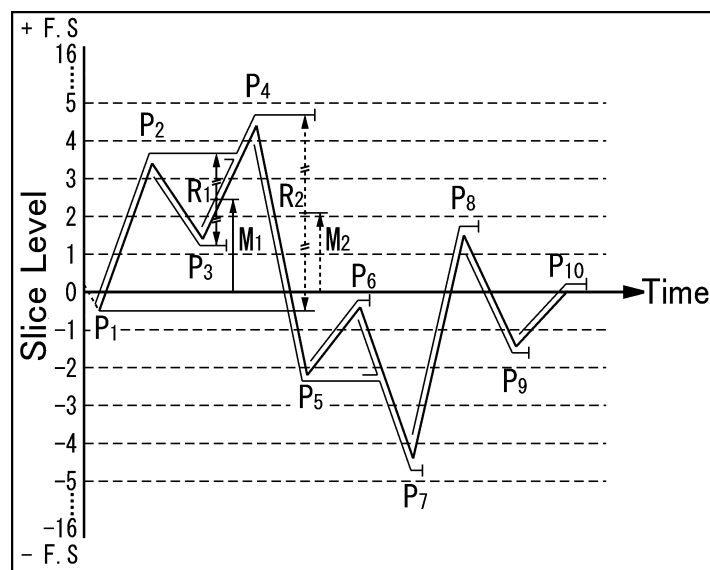
■ 2-Dimension rainflow Algorithm

The 2-dimension rainflow algorithm is a method that calculates amplitudes and mean value to be subjected to histogram processing.

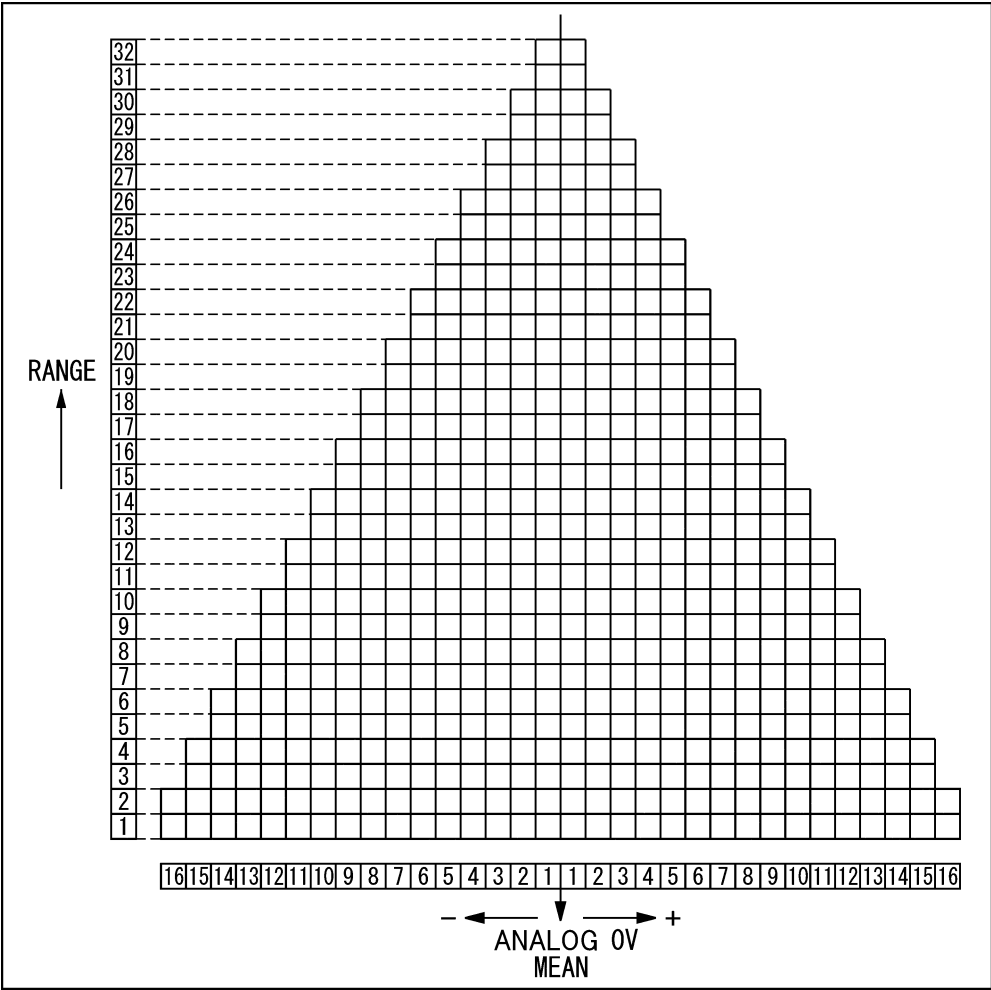
R_n denotes Amplitude

| Peak-Valley |

M_n:denotes Mean value with "0" as reference.



That is, while the 1-dimension rainflow algorithm counts histogram of amplitude $R_1, R_2, \dots, R_n$, the 2-dimension rainflow algorithm counts amplitude and MEAN values simultaneously as well as average stress of the waveform to be subjected to histogram processing.



■ Time At Level (1-dimension)

The time-at-level algorithm is a method that samples signal waveform at a certain intervals and counts time frequency when sampling data comes between slice levels N-1 and N.

