HIOKI

INSTRUCTION MANUAL

8825

MEMORY HiCORDER

HIOKI E.E. CORPORATION

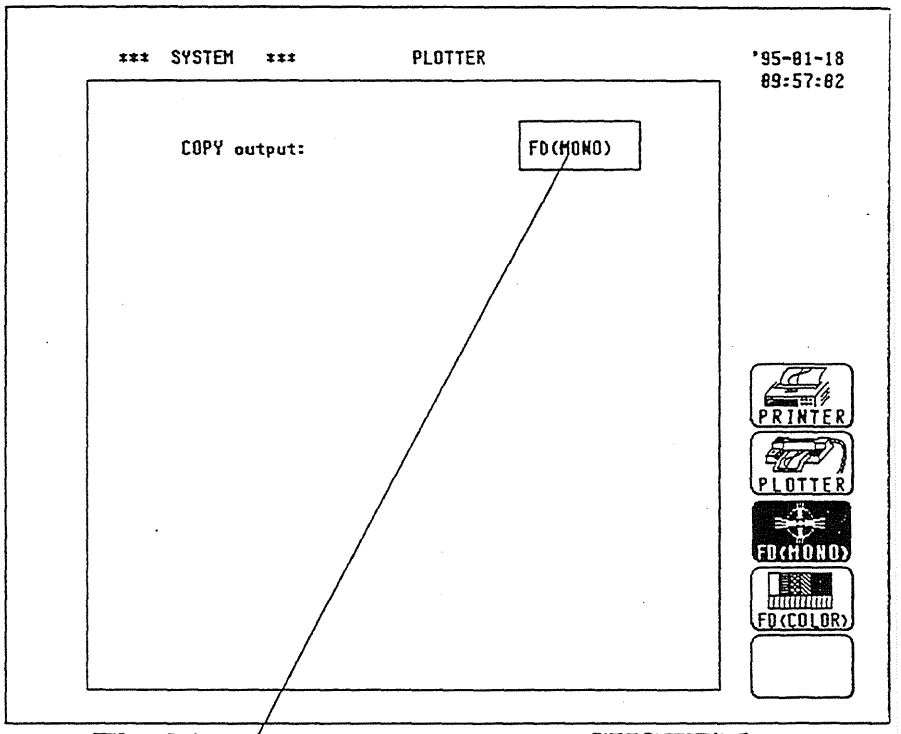
Extra-manual of the Saving the Screen Data Function

- Saving the screen data function with version V3.20 or later of the ROM.
- The each screen display data of the 8825 can be stored on the floppy disk in the bit map file (BMP) format.
- The bit map file is one of the standard graphic type of the WINDOWS*, therefore by uisng the graphic software,this file format can be used.
- This screen data can be used when making report by using the software such as a word processor, a tabular calculation, etc..
- By making a following setting and pressing the COPY key, the 640×480dots screen display data is stored.
- The screen data of the characters and waveforms (light,normal,and dark) colored can be stored.

*The WINDOWS is a registered trademark of Microsoft Corporation.

Method (Screen for making this setting : the SYSTEM screen)

1.Press the SYSTEM key, and the SYSTEM screen will appear.
2.Press the F5 (1of 2) key and select F4 (PLOTTER) key.
3.Using the cursor keys, move the flashing cursor to the "COPY output" item.
4.Select according to the function key indications.



Flashing cursor SYSTEM screen

Function key indication Meaning

:The direct hard copy of the screen display is printed in the internal unit.

:The waveform is drawn on the plotter.

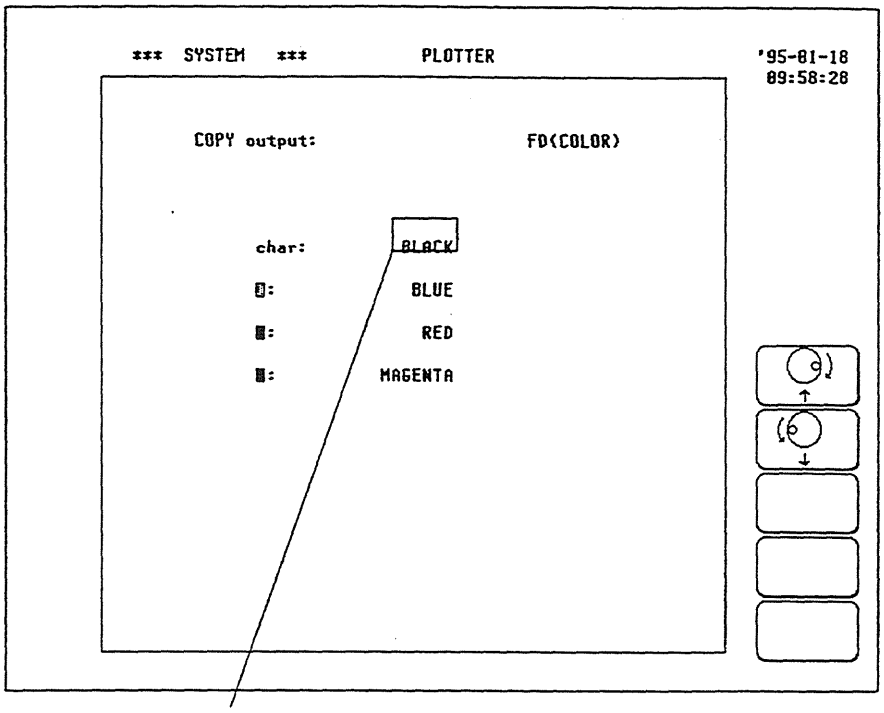
:Save the display screen data on the floppy disk.(monochrome)

:Save the display screen data on the floppy disk.(color)

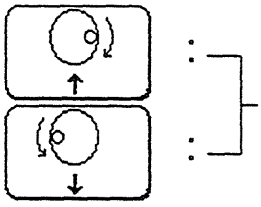
5.If FD(COLOR) is selected in the "COPY output" item, select each color for the character (including frame),waveform(light),waveform(normal), and waveform (dark).

Method (The screen for making this setting:the SYSTEM screen)

6.Move the cursor to each color item.
7.Select using the F1, F2 keys or knob control.



Function key indication Meaning Flashing cursor SYSTEM screen



: BLACK,BLUE,RED,MAGENTA,GREEN,CYAN,YELLOW,ORANGE

8.Press the COPY key, the display screen data is saved on the floppy disk.
(The file name is #AUTO001.BMP - #AUTO999.BMP)

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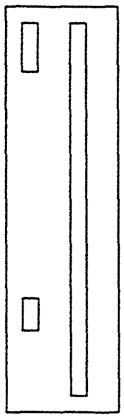
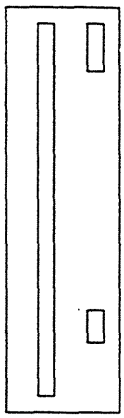
Command	Data	Meaning
:SYSTEM		
:COPY A$:COPY?	A$=PRINter、PLOTer、 FD_Mono,FD_Color	Setting of COPY output
:BMPColor A$,B$,C$,D$:BMPColor?	A$,B$,C$,D$= BLACK,BLUE,RED,MAGENTA、 GREEN,CYAN,YELLOW,ORANGE	Setting of Color

Extra-manual on the floppy disk drive compatible with 1.44M bytes format.

・The 8825 Memory Hi Corder which you have purchased since Mar.1995 is installed the floppy disk drive capable of 1.44M bytes format.(see the figures below)
(The floppy disk drive with version V3.20 or later of the ROM is compatible with 1.44M bytes format.)



○Floppy disk drive corresponding to 1.44M bytes.
(button and LED on the left)



×Floppy disk drive not corresponding to 1.44M bytes.
(butten and LED on the right)

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Incorrect 3.5 inch 2HD or 2DD floppy disks can be used. 2HD disks are formatted in NEC PC-9801 format, and 2DD disks in IBM-PC/AT ME-DOS format. The recording capacity on PC-9801 format 2HD disks is 1.2M bytes, and on IBM-PC/AT format 2DD disks is 720K bytes.

Correct 3.5 inch 2HD or 2DD floppy disks can be used. The memory capacity is 720K bytes in IBM-PC/AT format, 1.2M bytes in PC-9801 format, and 1.44M bytes in IBM-PC/AT or PC-9801(3 mode) format.

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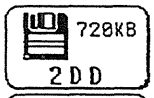
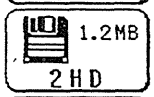
Press the function key F4(FORMAT) and the function keys indicate types of memory capacity shown below. By using the function keys, select the disk to format.

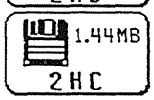
Function key indication　　Meaning



:format a 2DD disk.(720K bytes)



:format a 2HD disk.(1.2M bytes)



:format a 2HC disk.(1.44M bytes)

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Command	Data	Meaning
:FDISK		
:FORMAT A$	A$=2DD,2HD,2HC	floppy disk format

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① Incorrect

Memory recorder function ・・・
Recorder function ・・・・・・・
X-Y recorder function ・・・・・
} 3 blocks　　Note) 1 block = 1024 bytes

Correct

720K bytes or 1.2M bytes:

Memory recorder function ・・・
Recorder function ・・・・・・・
X-Y recorder function ・・・・・
} 3 blocks　　Note) 1 block = 1024 bytes

1.44M bytes:

Memory recorder function ・・・
Recorder function ・・・・・・・
X-Y recorder function ・・・・・
} 6 blocks　　Note) 1 block = 512 bytes

② Incorrect

$$\frac{\text{(Recording length (divisions)} \times 100) \times 2 \times \text{number of channnels}}{1024} + 2 \text{ blocks (rounded upwards)}$$

Correct

720K bytes or 1.2M bytes:

$$\frac{\text{(Recording length (divisions)} \times 100) \times 2 \times \text{number of channnels}}{1024} + 2 \text{ blocks (rounded upwards)}$$

Note) 1 block = 1024 bytes (720K bytes or 1.2M bytes)

1.44M bytes:

$$\frac{\text{(Recording length (divisions)} \times 100) \times 2 \times \text{number of channnels}}{512} + 4 \text{ blocks (rounded upwards)}$$

Note) 1 block = 512 bytes (1.44M bytes)

③ Incorrect

Memory capacity required for a waveform dicision area ・・・32 blocks

Correct

720K bytes or 1.2M bytes:

Memory capacity required for a waveform dicision area ・・・32 blocks

Note) 1 block = 1024 bytes (720K bytes or 1.2M bytes)

1.44M bytes:

Memory capacity required for a waveform dicision area ・・・64 blocks

Note) 1 block = 512 bytes (1.44M bytes)

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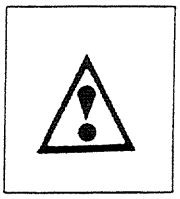
Introduction

Thank you for buying this Hioki 8825 Memory HiCorder. To get the maximum performance from this unit, and ensure trouble-free operation, read this manual first.

Safety Notes



- This manual includes important directions for safe operation and maintenance of the 8825 unit. Note carefully the following safety points before using the unit.

Safety symbols

	Identifies important sections which must be read by the user before carrying out the relevant operation on the unit.
	Protective ground connection
	Fuse

The following three levels of heading are also used in this manual to prioritize warnings.

Danger	This indicates points where an error could pose serious danger to the operator.
Warning	This indicates points where an error could damage the unit or pose a hazard to the operator.
Notes	This indicates important points on operation.

Danger

- To avoid the danger of electric shock or damage to the unit, never apply more than 250 V (either AC or DC) between a pair of input units or between an input unit and the frame.
  In particular, if a power line capable of carrying a large current is connected, and applies an excess voltage, there is a danger of a short circuit accident.
- In order to avoid accidents from electric shock, before removing or replacing an input unit or changing a fuse, disconnect the input cables and the power cable.
  To prevent fire hazards, use a fuse of the rating specified on the rear panel.
- If any metal parts of the input cables are exposed there is a danger of electric shock. Use only the 9574 input cables supplied.
- Normally keep all eight input units installed permanently. If a unit is not fitted, it must be replaced by a blanking panel. If the unit is operated with an input unit not in place it poses a shock hazard.

- In order to avoid accidents from electric shock, before replacing an input unit, check that the input cables are disconnected, turn off the power, and remove the power cable.

Warning

- The logic inputs are not floating. Although eight sets of logic probes can be connected, they all have a common ground with the main unit.

Danger and warning

- To prevent damage to the 8825 unit, never exceed the limits in the table on the right for the various input connections.
- The unit should always be operated in the range of 5℃ to 40℃ and 35% to 80% relative humidity. Avoid operation in direct sunlight, in dusty conditions or in the presence of corrosive gases.

Input connection	Maximum capacity
8907 inputs 8909 inputs	350 V DC+AC peak
8908 inputs	100 V AC/DC
$\overline{\text{EXT TRIG}}$, $\overline{\text{START}}/\overline{\text{STOP}}$	-5 V to +10 V
$\overline{\text{TRIG OUT}}$, $\overline{\text{GO}}/\overline{\text{NG}}$	-20 V to +30 V, 500 mA max, 200 mW max

Notes on Use

To ensure safe operation, and in order to exploit to the full the functionality of the unit, please follow the directions in this section carefully.

Shipping check

When the unit is delivered, check that it has not been damaged in transit. In particular check panel switches and connectors.

In the event of any damage, or failure to operate according to specification, contact your nearest service representative without delay.

Before powering on

Check that the power supply is correct for the rating of the unit. Also check that the correct fuse is fitted.

Protective grounding

The protective ground terminal must be connected to ground. Alternatively, if a properly grounded three-pin outlet is available, then using the three-core power cord provides automatic grounding.

Using the printer

Using the printer for low-speed printing (the recorder function) in a high-temperature or high-humidity environment should be avoided at all costs. This can seriously reduce the printer life.

Recording paper

This unit uses a thermal printer. The recording paper supplied has characteristics finely tuned for use with the printer. Using recording paper of a different specification may not only result in impaired printing quality, but even prevent the printer from operating. Always use the Hioki specified product.

Storage

If the unit will not be used for a substantial period, to protect the printer head and prevent deformation of the rubber rollers, move the head up/down lever to the head up position.

Shipment

If reshipping the unit, preferably use the original packing. If this is not available, use the following procedure.

(1) Wrap the unit in plastic sheeting.

(2) Ensure that the front panel is protected by packing material, so that the display screen is not liable to direct blows.

(3) Pack the unit in a cardboard box, of at least 7 mm thickness, providing at least 100 mm of cushioning round the unit.

(4) After covering the unit with packing, pack the accessories, and add more cushioning, then seal with adhesive tape. If necessary use banding or other fastening on the whole package.

Notes • Before shipping the unit, always remove any floppy disk.

• Before shipping the unit, or when storing the unit for a long time, move the head up/down lever to the head up position. If the unit is left in the state in which the head is applying pressure to the platen roller, the roller may be deformed, and the printing may become uneven.

If the recording paper is mistakenly inserted back to front, waveform recording is impossible. Be very careful about this point.

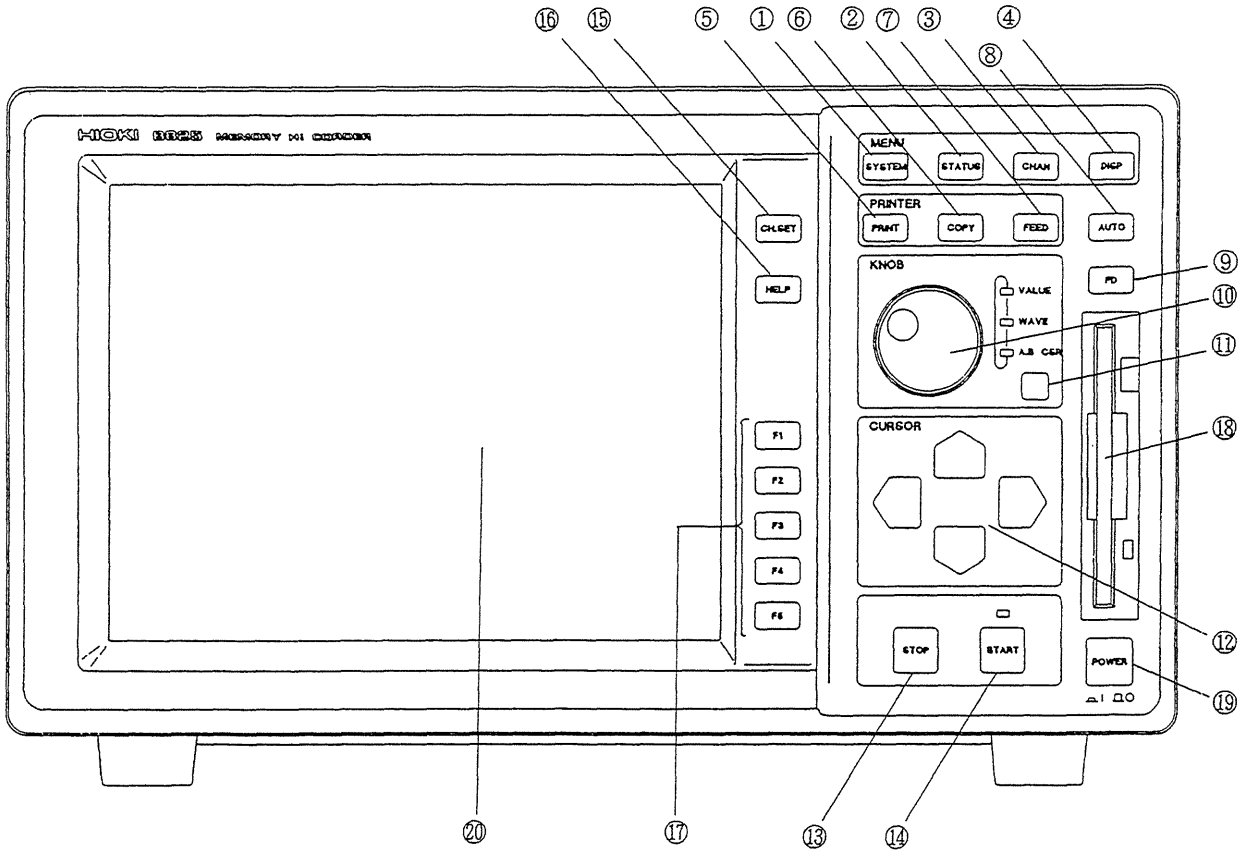
Miscellaneous

In the event of problems with operation, first refer to Section 17-3 "Troubleshooting."

Organization

This instruction manual has two parts. The first part describes the recorder functions, and the second, its affiliated functions. For instructions on how to use the FFT analyzer functions and GP-IB interface, please refer to a separate manual, the 8825 FFT Analyzer • GP-IB Interface Instruction Manual.

Identification of Controls and Indicators



① SYSTEM key
Displays the "system" screen on the screen display.

② STATUS key
Displays the "status" screen (the screen for setting the conditions of measurement) on the screen display.

③ CHAN (channel) key
Displays the "channel" screen (the screen for setting the input channels) on the screen display.

④ DISP (display) key
Displays the "display" screen on the screen display.

⑤ PRINT key
Prints out a waveform stored in memory.

⑥ COPY key
Prints a copy of the current screen display.

⑦ FEED key
While this key is being held down, the recording paper is fed forward.

⑧ AUTO (auto-range) key
In the memory recorder function mode, automatically sets the time axis range and the voltage axis range so as to make them easy to observe, and performs measurement.

⑨ FD (floppy disk) key

Changes the screen display over to the "floppy disk control" screen. By using the "floppy disk control" screen, the floppy disk unit can be operated. This should be done after inserting a floppy disk.

⑩ Knob

By using this control, numerical values can be altered, waveforms can be scrolled, and the A and B cursors can be moved. The LEDs to the right of this knob indicate its current function.

⑪ Knob select key

This key changes over the function of the rotatable knob. Each press of this key cycles the illuminated one of the LEDs which show the function of the rotatable knob through VALUE, WAVE, and A.B CSR in order.

⑫ Cursor keys

These four keys move the flashing portion on the screen display (the flashing cursor) up, down, left, and right.

⑬ STOP key

Stops operation of the 8825. (Releases the START key.)

⑭ START key

Starts measurement and analysis. During measurement and analysis an LED above this key is illuminated.

⑮ CH. SET (channel set) key

Displays information about the input channels on the screen display. The conditions of measurement relating to each channel can be set.

⑯ HELP key

Initiates the position display mode, when the screen display is displaying the " display" screen.

⑰ F1 to F5 (function) keys

Select the corresponding items which appear opposite them in the lower right portion of the screen display.

⑱ Floppy disk insertion slot

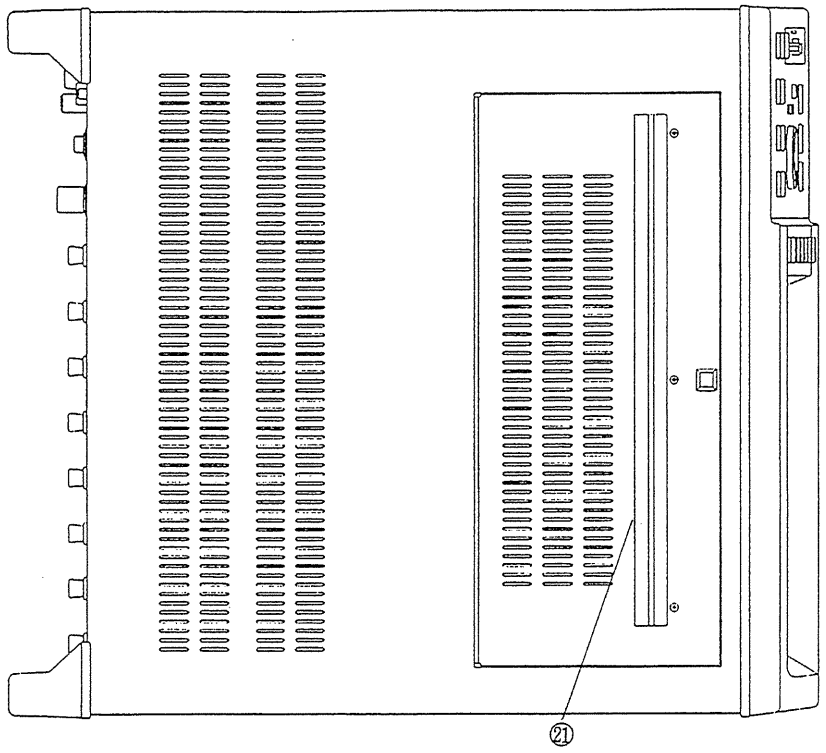
For insertion of a 3.5 inch floppy disk.

⑲ Power switch

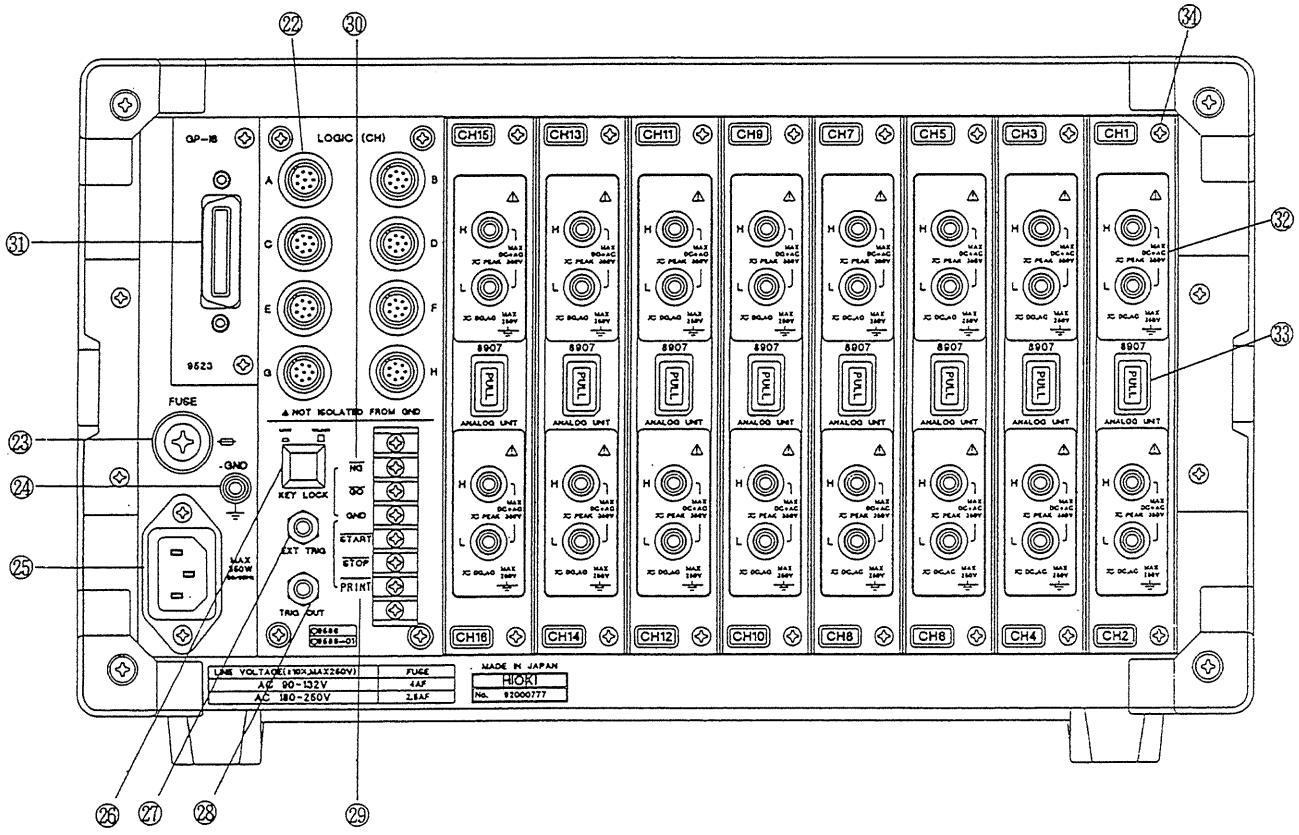
Turns the power supply on and off.

⑳ Plasma display screen

[Plan view]



[Rear panel]



㉑ Printer

㉒ Logic probe connectors

These are the input connectors for the logic inputs, and are only to be used for the optional logic probes. A maximum of eight logic probes can be connected (channels A to H)

㉓ Fuse holder

This houses a fuse.

㉔ Protective grounding terminal (GND)

㉕ Power supply connector

Connect the power cord supplied with the unit here. This is a three-pin connector equipped with a ground terminal.

㉖ KEY LOCK key

Pressing this key puts the 8825 into the locked condition. In order to release this locked condition, press this key again.

㉗ EXT TRIG (external trigger input connector)

This is the input connector used when external triggering is enabled. (active low, or connector short)

㉘ TRIG OUT (trigger output connector)

When triggering has occurred, a signal is output here. (active low)

㉙ Remote connector

START and STOP can be controlled externally through this connector. (active low, or connector short)

㉚ GO/NG output connector

This connector is used for outputting the result of waveform decision or waveform parameter decision. (active low)

㉛ GP-IB interface connector (option at time of order).

A GP-IB interface cable can be connected here.

㉜ Analog input connectors (for 8907 analog units)

These are input connectors for 8907 type analog units, non-balanced input type.

[H]: High level input

[L]: Low level input

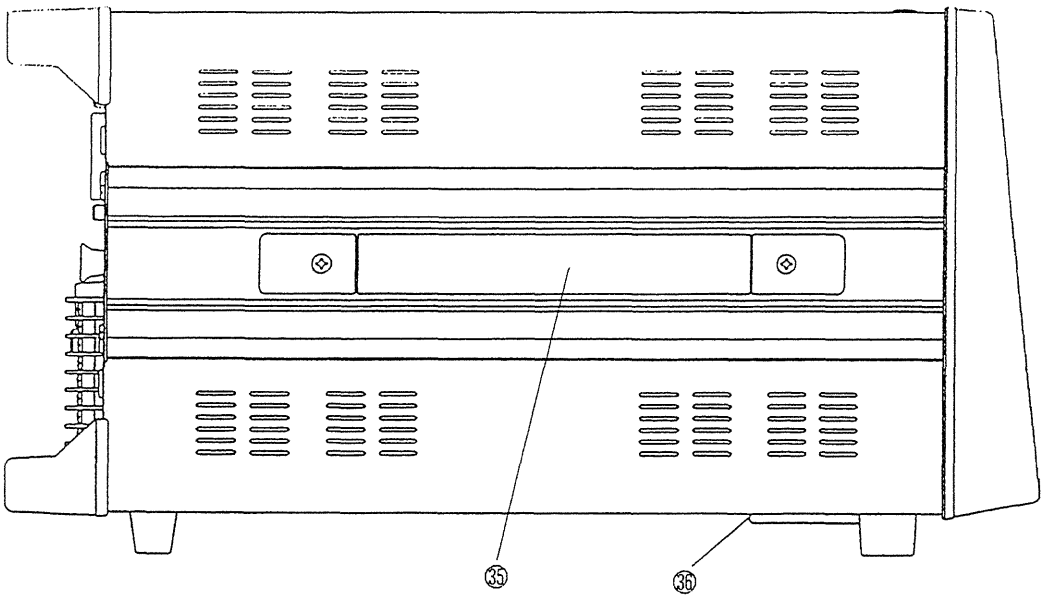
㉝ Pull-out 8907 analog units

By pinching the 8907 analog units with the fingers, they can be withdrawn.

㉞ Fixing screws

These retain the 8907 analog units.

[Side view]

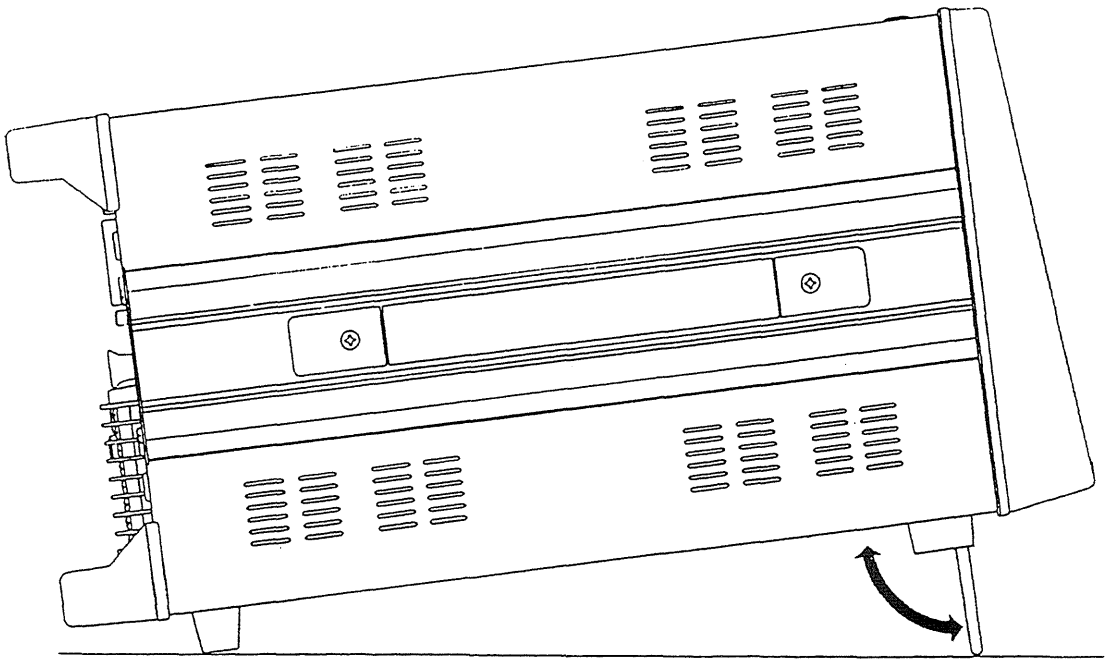


㉟ Handle

This is used for transporting the 8825.

㊱ Stand

The 8825 can be tilted up by using this stand, as shown in the figure.



Here the unit is tilted upwards on its stand.

Section 1

Overview

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1-2 System Operation 1-4

1-1 Product Introduction

The 8825 Memory Hi Corder is a new type of waveform recorder that can perform observation and recording simultaneously.
It provides both analog and logic input channels, and can be used for each and every application, from low speed phenomena to high speed phenomena.

The main features of the 8825 are:

(1) Powerful waveform capture capability

The 8825 can reliably capture sudden events, since it has 12-bit high resolving power (8907 analog units), operates at the very high sampling speed of 200kS/s, and has a maximum memory capacity of 2M words (when one or two channels are being used) or 500K words. (The memory capacity is determined at the time of order).

(2) Quick and easy to see waveform reference and observation

The unit has a 640×480 pixel wide plasma display.
The four gray level display, together with the magnification and compression zoom capability along both the voltage axis and the time axis, and waveform scrolling function makes it easy to examine required sections from the large waveform memory for observation in detail.

(3) Easily understood function key display

Making settings with the function keys has been made easier by incorporating ideas inspired by the GUI (Graphic User Interface) philosophy, by making the function key display large, and by adding illustrations.

(4) Recording of the required portion at the required time

By using a fast thermal printer which has a high resolution of 10 mm/division, only the required portion of the recording need be taken. Further, a screen copy can be easily printed at any time.

(5) Selectable number of input channels

The number of analog input units mounted can be freely selected: up to 16 channels, one plug-in input unit for two channels.

(6) Floating input units

The analog input units are floating, and so each input can be connected to its own independent potentials.

(7) Logic inputs as standard equipment

A 32 channel logic input unit is fitted as standard. The logic inputs all have a common ground with the main unit.

(8) Four function modes corresponding to various types of measurement

The 8825 is provided with several function modes: a memory recorder function mode (also providing an X-Y plot function) for reliably catching high speed phenomena such as transient phenomena; a recorder function mode which is capable of continuous real time recording over a long time period; a continuous X-Y recorder function mode for X-Y plots; and a FFT function mode which enables diversified analysis of captured waveform data.

(9) High powered trigger capability

A digital trigger circuit is used. Many and various settings are available, with functions such as trigger level, trigger slope or trigger filter, or types such as window-in trigger, window-out trigger, or any other digital function.

(10) Convenient waveform decision function, automatically making pass/fail decisions

A good/no-good decision (GO/NG) can be automatically performed, according to whether the waveform is in a standard area or not. The standard area can be easily set up using the graphics editor.

(11) Ability to record on a floppy disk

A floppy disk can be used to keep an external record of waveforms, settings and so forth. Using this, data transfer to a personal computer is also easy.
(Compatible with 3.5 inch 2DD MS-DOS disks for the IBM-PC/AT, or with 2HD disks for the NEC PC-9801)

(12) High grade intelligence

The 8825 is provided with high grade auxiliary functions, such as the use of memory segmentation, cursor measurement, a wealth of calculation functions.

(13) Scaling function

By setting the physical amount of input signal and the name of the units used, it is possible to convert measured data, which are obtained as voltage values, into values in set units.

(14) GP-IB interface (option at time of order)

As an option, the 8825 can be equipped with a GP-IB interface which is in accordance with the new standard IEEE-488.2.
A wide range of commands allow data input and output, and remote operation to be performed.

1-2 System Operation

Fig. 1-1 shows a block diagram of the system.

- The 8825 incorporates a 16-bit microcomputer (CPU), which controls the entire system.

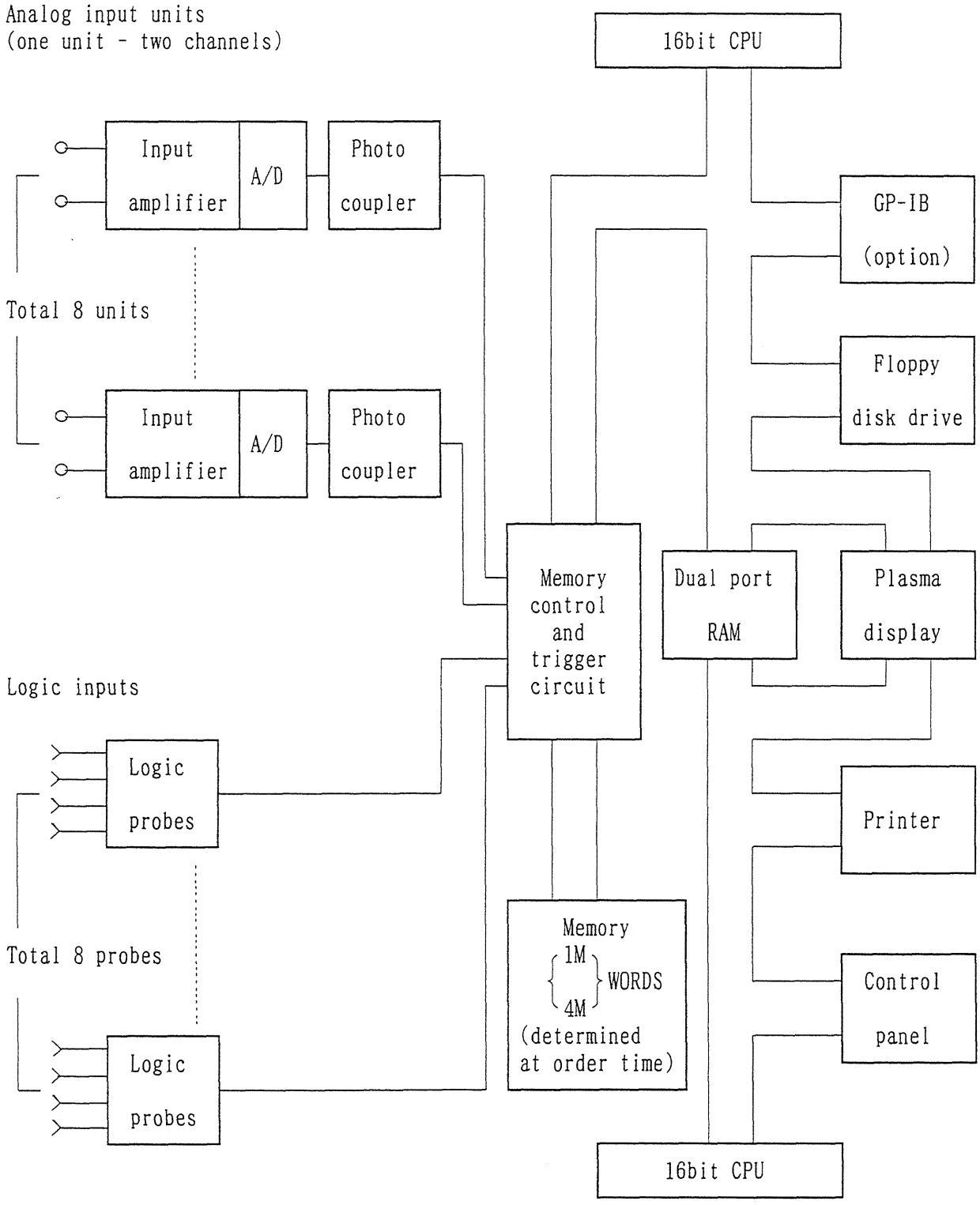
- The 8907 analog input units incorporate 12-bit A/D converters, and are connected to the 8825 main unit via photocouplers. (The photocouplers are in the input units.) Each channel uses a separate power source, which is completely electrically insulated from the main 8825 unit.

- The A/D converted data is recorded in memory under control of the memory controller circuit.

- The 8825 main unit employs a digital trigger circuit, and, in the case of an internal trigger, generates a trigger signal by comparing the digital value after A/D conversion with a set value.

- Measurement data stored in the memory, after being handled by the CPU, is displayed on the plasma display, and is output on the graphic printer. As well, data can be output on the floppy disk or on the GP-IB interface (an option at order time).

BLOCK DIAGRAM



Section 2

Specifications

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2-1 Main Unit Specifications (for the input units, refer to 11-2-2 "Specifications")

(1) General specifications
On the FFT function, refer to the separate manual "8825 FFT Analyzer • GP-IB Interface".

[Basic specifications]

Measurement functions: Recorder (real time recording)
Memory recorder (high speed recording)
X-Y recorder (continuous X-Y recording)
FFT (FFT analysis)

Number of channels (maximum): 16 analog channels + 32 logic channels.
Note) The 32 logic channels are standard equipment for the 8825. (common ground with main unit)

Memory capacity: Maximum 4M words; 1M words (by order).

With 1M memory board: 12 bit × 500K words per channel (when 1 or 2 channels are in use).
12 bit × 200K words per channel (when 3 to 4 channels are in use).
12 bit × 100K words per channel (when 5 to 8 channels are in use).
12 bit × 50K words per channel (when 9 to 16 channels are in use).

With 4M memory board: 12 bit × 2M words per channel (when 1 or 2 channels are in use).
12 bit × 1M words per channel (when 3 to 4 channels are in use).
12 bit × 500K words per channel (when 5 to 8 channels are in use).
12 bit × 200K words per channel (when 9 to 16 channels are in use).

Maximum sampling speed: 200 kS/s (16 channels simultaneously).

Input method: plug-in analog input units, each two channels (floating input).

External control connectors: external trigger input, trigger output, GO/NG output, external start and stop, print input.

Time measurement functions: auto calendar with automatic leap year, 24 hour clock.

Time axis accuracy: ±0.01% (discrepancy between scale and actual time).

Time measurement precision (maximum): 100 ppm (at 25℃).

Backup battery, and lifetime: used for clock and to preserve settings; ten years (reference value at 25℃).

Operational ranges for temperature and humidity: temperature 5℃ to 40℃, relative humidity 35% to 80% (with no condensation).

Temperature and humidity ranges for assured accuracy: temperature 23℃ ± 5℃, relative humidity 35% to 80% (with no condensation).

Temperature and humidity ranges for storage: temperature -10℃ to 50℃, relative humidity 10% to 90% (with no condensation).

Insulation resistance and Dielectric strength: at least 100 MΩ/500VDC; one minute at 1.5 kVAC (between the frame and the power supply).
at least 100 MΩ/500VDC; one minute at 1.5 kVAC (between the input units and the frame).
at least 100 MΩ/500VDC; one minute at 1.5 kVAC (between the various input units).

Power supply: 90 to 132 VAC (180 to 250 VAC by order).

Power consumption: maximum 350 W (when printer off, 70 W).

External dimensions: approx. 230 mm high, 385 mm wide, and 397 mm deep (excluding projections).

Weight: approx. 10.7 kg (main unit only).

[Recorder]

Method of recording: thermosensitive recording method using a thermal line head.

Recording paper: roll type thermosensitive recording paper, 264mm wide and 30m long.

Width of recording: total recording width 256 mm (2048 dots)
waveform portion 240 mm f.s. (1DIV=10mm).

Recording speed: maximum approx. 25 mm/sec.

Paper feed accuracy: ±3% (at 25℃ and 60% relative humidity).

[Display]

Screen: 10 inch plasma display (4 brightness levels) (640 × 480 dots)

Display resolution: 1 DIV = 20 dots (vertically) × 20 dots (horizontally)

- Memory recorder function and recorder function:
  waveform 20 DIV f.s.×25 DIV f.s. (normal)
  24 DIV f.s.×25 DIV f.s. (wide)
  text: 30 lines of 80 characters (8 × 16 dots)
- X-Y recorder function:
  waveform 20 DIV f.s.×20 DIV f.s. (normal)
  24 DIV f.s.×24 DIV f.s. (wide)
  text: 30 lines of 80 characters (8 × 16 dots)

Dots spacing: 0.31 mm × 0.31 mm

Contrast: approx. 100:1

[External data storage]

Device: 3.5 inch floppy disk drive

Capacity: 1.2 MB (2HD) (in PC9801 format)
720 KB (2DD) (in IBM-PC format)

Data format: MS-DOS(*) format

Recorded data: Settings, measurement data, and waveform decision area.
A partial save of measurement data between the A and B cursors can be performed.

(*) MS-DOS is a trademark of Microsoft Corporation.

[Other]

Accessories: (included with main unit)	Power cable - 1 Recording paper - 1 (paper roll) Roll paper attachments - 2 Manual - 1 Spare fuse - 1 (normal blowout type) (for 90-132 VAC power source, 4.0 A/250 V, 30 mm × 6.4 mm dia.) (for 180-250 VAC power source, 2.5 A/250 V, 30 mm × 6.4 mm dia.) Protective cover - 1
Options:	8907 ... analog input unit 8908 ... temperature input unit 8909 ... FFT analog input unit 9586 ... memory board (1M words) * 9586-01 ... memory board (4M words) * 9523 ... GP-IB interface * Memory board size selectable at the time of ordering the main unit.
Accessories purchased separately:	9229 ... recording paper (6 rolls of 30 m) 9303 ... voltage transformer 9305 ... trigger cable 9306 ... logic probe 9307 ... logic probe for line use 9308 ... line dip detector 9151-02 ... GP-IB cable (2 m) -04 ... GP-IB cable (4 m)

(2) Trigger unit

Trigger method:	Digital comparison method
Trigger modes:	in the memory recorder and FFT function ... single, repeat, auto in the recorder function ... single, repeat
Trigger source:	The external and timer trigger sources for each of Channel 1 (A), Channel 2 (B) ... through Channel 8 (H) can be set either on or off. If all are off, the unit runs free. Trigger conditions can be set for each channel individually. With a timer trigger, the start instant, stop instant, and interval time can be set. With an external trigger, the triggering occurs on a falling edge of about 2.5 V, or when the terminals are shorted together.
Trigger combination operator:	logical AND or OR
Types of trigger (analog):	
level trigger:	The voltage value can be digitally set from zero to full scale. Triggering occurs on rising above, or falling below, the set level.
Window trigger:	Upper and lower trigger levels can be set. Triggering occurs when the area is entered.

Window trigger: Upper and lower trigger levels can be set. Triggering occurs when the area is exited.

Types of trigger (logic):

Pattern trigger: Triggering occurs when the logic signal meet the specified pattern of 1, 0, or ×(don't care). Each group of four channels can be ANDed or ORed.

Trigger filter: In the memory recorder function, and the FFT function can be set to OFF, 0.1, 0.2, 0.5, 1.0, 1.5, 2.0, 2.5, 5.0, 10.0 DIV. In the recorder function and the X-Y recorder function, can be set to ON or OFF.

Trigger level resolution: 1% f.s. (f.s. = 20 DIV).

Print trigger: 0, 2, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 95, 100, -95% (in the memory recorder function).

Trigger timing: Start
Stop
Start and stop
(in the recorder function and the X-Y recorder function)

Trigger output: Open collector output (maximum input voltage 30 V).
(with 5 V output voltage, active low, pulse width about 1.5 ms)

Trigger input and output connectors: Mini-jack (3.5 mm dia.)

(3) Memory recorder function

Time axis: 500 μs/DIV.

(TIME/DIV) 1, 2, 5, 10, 20, 50, 100, 200, 500 ms/DIV;
1, 2, 5, 10, 20 s/DIV;
1, 2, 5 min/DIV.

Time axis resolution: 100 points/DIV.

Sampling period: 1/100 of the time axis.

Recording length:

with 1M memory board ... 25, 50, 100, 200, 500(*4), 1000(*3), 2000(*2), 5000(*1)

with 4M memory board ... 25, 50, 100, 200, 500, 1000, 2000(*4), 5000(*3), 10000(*2), 20000(*1)

(*1) when 1 or 2 channels are in use.
(*2) when 3 or 4 channels are in use.
(*3) when 5 through 8 channels are in use.
(*4) when 9 through 16 channels are in use.

Format: single, dual, quad, octo (printer only), hexa (printer only), X-Y single, X-Y quad.

Interpolation function: Available - dot, line.

Recording line settings: dark, normal, light.

Superimposition function: Available.

Waveform magnification and compression ratios (time axis): ×10, ×5, ×2, ×1, ×1/2, ×1/5, ×1/10, ×1/20, ×1/50, ×1/100, ×1/200, ×1/500, ×1/1000.
voltage axis: ×16, ×8, ×4, ×2, ×1, ×1/2.

Waveform scrolling: Available in both the left/right and the up/down directions.

Auto-print:	Can be set to ON or OFF ... Automatically prints the memorized waveform.
Manual print:	Available.
Partial print:	Prints between the A and the B cursors.
Smooth printing:	When smooth printing is set, the time axis density is doubled and the waveform is printed smoothly.
Logging function:	Measured data is recorded as digital values.

(4) Recorder function

Time axis: (TIME/DIV)	200 ms/DIV (display only), or 500 ms/DIV. 1, 2, 5, 10, 20 s/DIV; 1, 2, 5, 10, 20 min/DIV; 1 h/DIV.
Time axis resolution:	100 points/DIV.
Sampling speed:	Constant and not dependent upon the time axis (high speed sampling method). when 1 or 2 channels are in use, ... 120 μs. when 3 or 4 channels are in use, ... 160 μs. when 5 through 8 channels are in use, ... 280 μs. when 9 through 16 channels are in use, ... 560 μs.
Recording length:	25, 50, 100, 200, 500 DIV, CONT
Format:	single, dual, quad, octo (printer only), hexa (printer only).
Interpolation function:	Only line display.
Recording line settings:	dark, normal, light.
Waveform recording:	
with 1M memory board ...	the last 250 DIV are held in memory.
with 4M memory board ...	the last 1000 DIV are held in memory. They can be observed and reprinted by reverse scrolling.
Print function:	Switching ON or OFF, and reprinting function
Logging function:	Measured data is recorded as digital values.

(5) X-Y recorder function

X channel:	Any four channels from channel 1 to channel 16.
Y channel:	Any four channels from channel 1 to channel 16 (up to four combinations).
Effective recording dimensions:	200 mm × 200 mm (20 DIV × 20 DIV) 240 mm × 240 mm (24 DIV × 24 DIV)
X-Y axis resolution:	20 dots/DIV (display); 80 dots/DIV (printer).
Sampling period:	280 μs (dot display) 500 μs to 82 ms (line display).
Recording time:	unlimited.
Format:	X-Y single, X-Y quad.
Interpolation function:	Available - dot, line.
Recording line settings:	dark, normal, light.
Superimposition:	Possible.
Monitor function:	Monitor display on screen

Print function: Manual printing, screen copy.

(6) Auxiliary functions

[Calculation processing](in the memory recorder function)

Waveform processing calculations: the four arithmetic operators, absolute value, exponentiation, common logarithm, square root, moving average, 1st and 2nd differentials, 1st and 2nd integrals, parallel displacement along the time axis, upper value, and lower value.

Waveform parameter calculation: maximum value, minimum value, peak-to-peak value, area, period, frequency, time to maximum value, RMS value, time to minimum value, rise time, fall time, XY area value.

Averaging function: additive averaging, exponential averaging

[Special functions](in the memory recorder function and the FFT function)

Waveform decision function

①Waveform area decision: For an X-Y waveform or an X-T waveform, waveform decision is possible against a standard area.

Decision modes:
out ····· NG (fail) if any part of the waveform goes out of the decision area.
all out ···· NG (fail) if the waveform is entirely outside the decision area.

Stop modes: GO stop, NG stop, GO & NG stop.
On stop, printer output and waveform save can be selected.

Decision output: open collector outputs on the rear panel for GO and NG decision output.
(with 5 V voltage output, active low, pulse width at least 110 ms)

Decision time: not more than 30 ms.

Decision period: approx. 200 ms (500 μs, 25 DIV, 1 channel, during line display. During compressed display or when the recording length is long, this becomes slower.)

②Waveform parameter decision: Decision is possible by setting maximum and minimum values for the results of waveform parameter calculations.

Graphics editor: For constructing decision areas for use for any waveform decision.

Editor commands: "line" (straight line segments), "paint" (filling in), "storage" (waveform input), "erase" (eraser), "parallel" (parallel displacement), "reverse" (reverse video), "clear" (partial deletion), "all clr" (screen deletion), "undo" (reverse the effect of the previous command), "save" (save the decision area), and "end" (finish).

Memory segmentation function:	Segmented use of the memory capacity for each channel is possible. (memory recorder function)
Number of segments:	maximum 63 segments (when the 4M memory board is being used) maximum 15 segments (when the 1M memory board is being used) ①Multi-block memory ②Sequential save

[Other]

Comment printing:	function, channels being used, input range, zero position, the trigger instant, the DIV printing, etc
Cursor measurement functions:	time interval difference between the A and B cursors, potential difference, frequency, position of each cursor, and time from trigger.
Scaling function:	Can be set for each channel.
Comment input function:	Available.
Display copy function:	Available.
Auto list, gauge:	ON, OFF
Grid setting:	OFF, NORMAL, FINE (printer only), FINE <cm>(printer only).
Start condition backup:	ON, OFF
Auto-setup function:	When the power is turned on, settings and waveform decision area stored on a floppy disk can be automatically loaded.
Auto-save function:	Available. Waveform data is automatically saved to a floppy disk.
Remote control:	Start, stop, and print control connectors (threshold levels about 2.5 V, active low or terminal short).
Auto range function:	Available. The optimum time axis and voltage axis ranges for the input waveform are automatically chosen.
Help function:	In the memory recorder function and the recorder function. Shows the position of the screen display with respect to the entire memory. Further, shows the position of the screen display with respect to full scale when each channel is being magnified in the voltage axis direction. When using memory segmentation, the use status of each block (memory recorder only).
GP-IB (Option at time of order):	The electrical and mechanical specifications are according to IEEE488.1-1987. Remote control, including the input units.
Key lock:	All keys can be locked, except the KEY LOCK key (on the back panel).
Display auto-off function:	ON, OFF
Listing print:	After printing waveform data, outputs listing of settings (can be enabled or disabled); except in the "display" screen mode, also output by pressing the PRINT key.

2-2 Tables

In the memory recorder function:

TIME/DIV	Sampling period	Recording time capability*	
		with 1M word memory board	with 4M word memory board
500 μs/DIV	5 μs	2.5s	10s
1 ms/DIV	10	5s	20s
2	20	10s	40s
5	50	25s	1min40s
10	100	50s	3min20s
20	200	1min40s	6min40s
50	500	4min10s	16min40s
100	1 ms	8min20s	33min20s
200	2	16min40s	1h 6min40s
500	5	41min40s	2h46min40s
1 s/DIV	10	1h23min20s	5h33min20s
2	20	2h46min40s	11h 6min40s
5	50	6h56min40s	27h46min40s
10	100	13h53min20s	55h33min20s
20	200	27h46min40s	111h 6min40s
1 min/DIV	600	83h20min	333h20min
2	1.2 s	166h40min	666h40min
5	3.0	416h40min	1666h40min

* If only one or two channels are in use, limits are the following:
  with 1M word memory board ... recording length 5000 DIV
  with 4M word memory board ... recording length 20000 DIV
  Data is valid to three decimal places, with the remainder truncated.

In the recorder function:

TIME/DIV	Channel speed	Time axis resolution	Approximate recording time on one roll (30 m) of recording paper
200 ms/DIV	50 mm/s (only on the display)		
500	20 mm/s		25 min
1 s/DIV	10		50
2	5		100
5	2		250
10	1		500
20	0.5		1000
1 min/DIV	10 mm/min	100 points/DIV	50 h
2	5		100
5	2		250
10	1		500
20	0.5		1000
1 h/DIV	10 mm/h		3000

Section 3

Setup and Preparation

Contents

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3-3 Care of Recording Paper ····· 3-5
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3-1 Points To Be Attended To During Setup

(1) Main power supply and fuse:

The power supply on which the 8825 unit can be used is shown on the rear panel. Be sure to check the voltage of the power supply. The type of fuse to be used is also shown on the back panel. Always use the specified fuse type.

LINE VOLTAGE (±10%, max 250 V)	FUSE	Size
90 V to 132 V AC	4 A/250 V	30 mm × 6.4 mm dia.
180 V to 250 V AC	2.5 A/250 V	30 mm × 6.4 mm dia.

⚠ WARNING

The power supply voltage is determined when the unit is ordered. Take care that a unit specified for 240 V is not exposed to a supply voltage greater than 250 V maximum.

(2) Power cable:

Use only the power cable supplied with the 8825.

(3) Protective grounding:

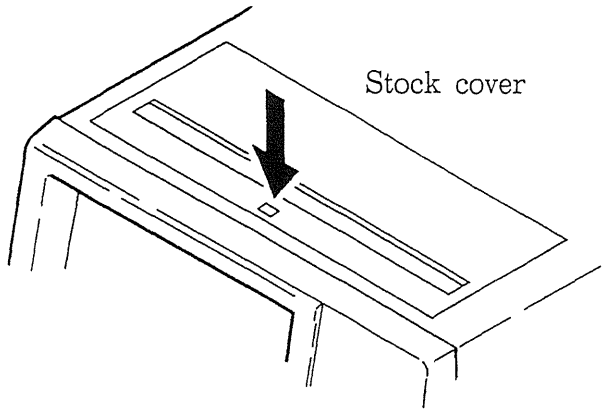
If a grounded power plug cannot be used, connect the unit to a good ground connection.

(4) Environment for use:

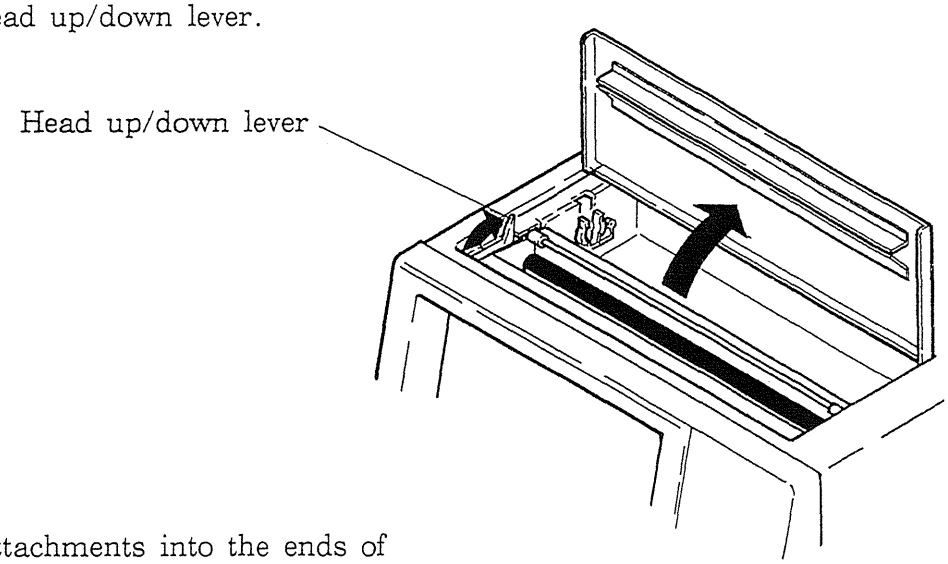
The temperature and humidity ranges for use of the 8825 are 5℃ to 40℃ and 35% to 80% relative humidity. Also, do not expose the unit to direct sunlight, dust, or corrosive gas.

3-2 Loading Recording Paper

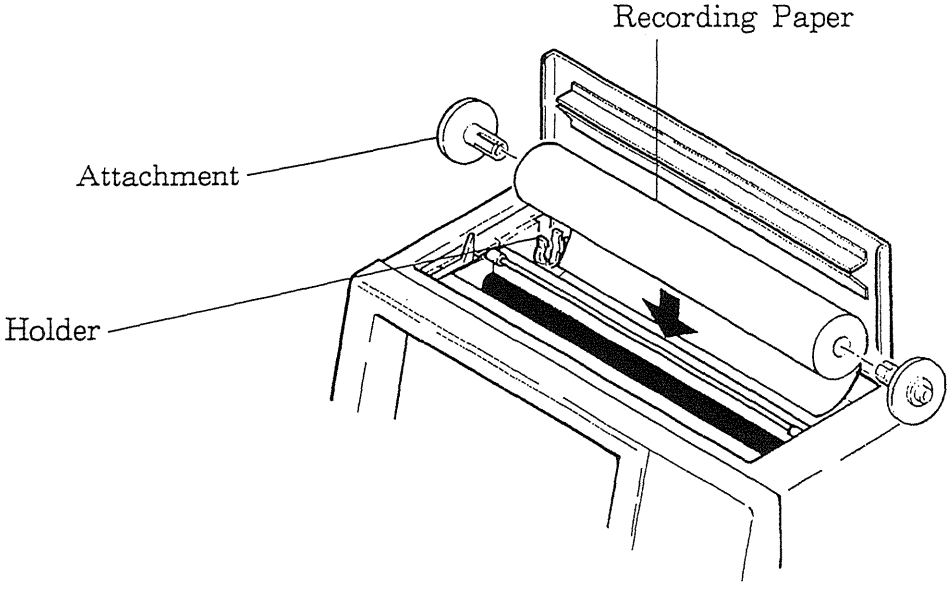
① Press the stock cover and open it.



② Raise the head up/down lever.

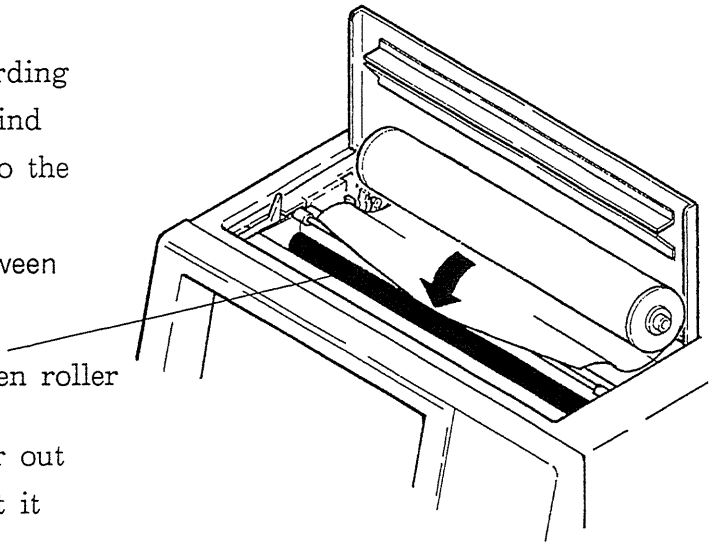


③ Insert the attachments into the ends of the roll of recording paper and set the paper into its holder.



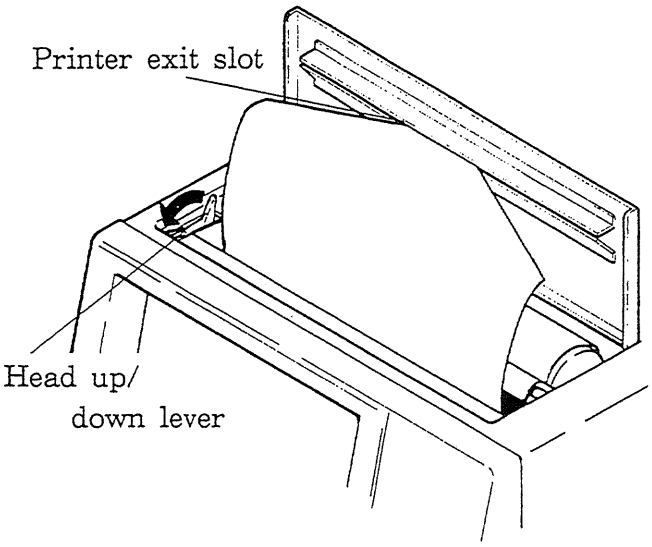
④ Insert the leading edge of the recording paper from above into the gap behind the printer roller, and pull it out to the other side.

NB: Do not insert it into the gap between the roller and the black plastic portion.



⑤ Pull the end of the recording paper out at least 10 cm, and make sure that it is positioned quite straight. If the paper is not pulled through properly, press the FEED key and feed some more paper through.

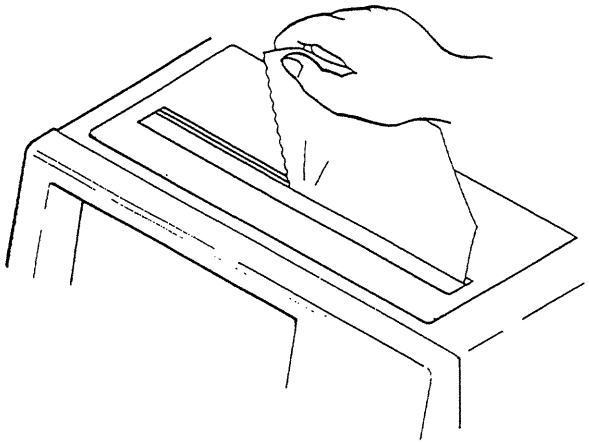
NB: Do this very carefully, because if the recording paper is slanted with respect to the roller there is a danger that later a paper jam will occur.



⑥ Pull the recording paper to the outside through the printer exit slot in the stock cover.

⑦ Put down the head up/down lever.

⑧ Close the stock cover, and finish by tearing off the recording paper against the edge of the printer exit slot.



Note

Always put the unit in the head up condition when it is to be transported or if it is to be stored for a long period of time. If the unit is left to lie in the state where the roller is being subjected to pressure by the head, then the roller may become deformed or the characters may become uneven. Particularly care should be taken not to put the recording paper in back to front by mistake, because if this happens the waveform cannot be drawn.

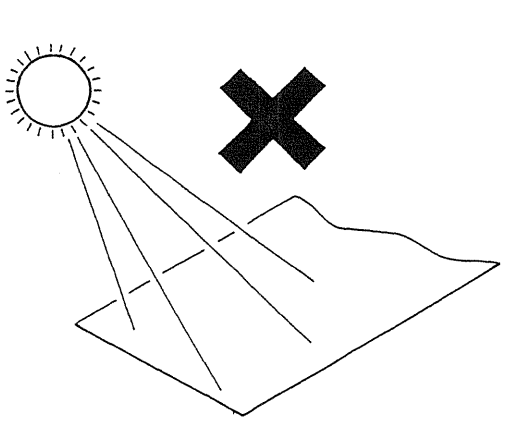
3-3 Care of Recording Paper

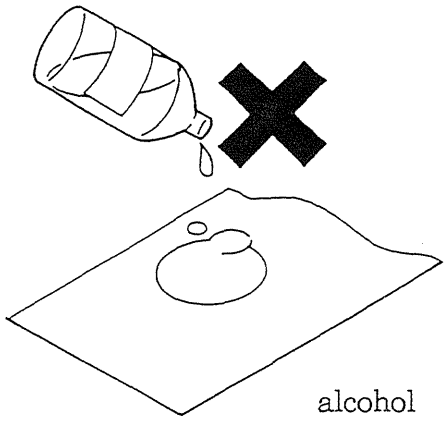
- Thermosensitive recording roll paper which until use is kept in normal conditions will not be affected by the environment. However the paper should not be kept for a long time at a temperature higher than 40℃. Low temperatures cause no problems.
- There is a tendency for the texture of the paper to be discolored if the paper is strongly illuminated for a long time. Therefore, after taking off the wrapping paper, be careful not to leave the roll paper in strong light.

How to store your data

Because the recording paper is thermosensitive paper which takes advantage of thermochemical reactions, attention should be paid to the following points in order to maintain the integrity of the recorded data.

- Do not expose the paper to direct sunlight.
- Keep the paper in conditions below 40℃ and 90% relative humidity.
- The proper way to file and store recorded data is to take the trouble to copy it.
- Thermosensitive paper changes color if it comes into contact with volatile organic solvents such as alcohols, esters, and ketones.
- If thermosensitive paper absorbs a non-volatile organic solvent such as an alcohol, an ester, or a ketone, its colorability is reduced, and fading of the recorded portion can occur. Be careful, because various types of pressure sensitive tape such as cling film or adhesive tape are in fact included in this class of non-volatile organic solvents.
- Do not put recordings and wet diazo copies on top of one another.





3-4 During Measurement

⚠ DANGER

- The permitted input voltage at the input terminals of the 8907 analog input unit and the 8909 FFT analog input unit are 350 V (DC+ ACpeak), and of the 8908 temperature input unit is 100 V (100 V AC/ DC). In order to avoid electric shock accident and damage to the equipment, be extremely careful not to exceed the above voltage.
- The maximum floating voltage for the input units is 250 VAC/DC. In order to avoid electric shock accident and damage to the equipment, be extremely careful not to exceed the above voltage, either between any two channels, or on any individual channel.

⚠ WARNING

- The logic units all have and the 8825 have a common ground.

Section 4

Screen Displays and Settings

Contents

4-1 Types of Screen Display 4-2
4-2 Screen Settings 4-3
4-2-1 Cursor Keys and Function Keys 4-3
4-2-2 Rotary Knob and Knob Select Key 4-4
4-2-3 Example Settings 4-5

4-1 Types of Screen Display

For each function the screen displays can be broadly divided into four screens: "status", "channel", "display", and "system"; and there is also a "floppy disk control" screen.

① The "status" screen

This is selected by pressing the STATUS key. Almost all of the settings can be made in all functions.

②The "channel" screen

This is selected by pressing the CHAN key. The voltage range, the position, and so on can be set for each channel.

③ The "display" screen

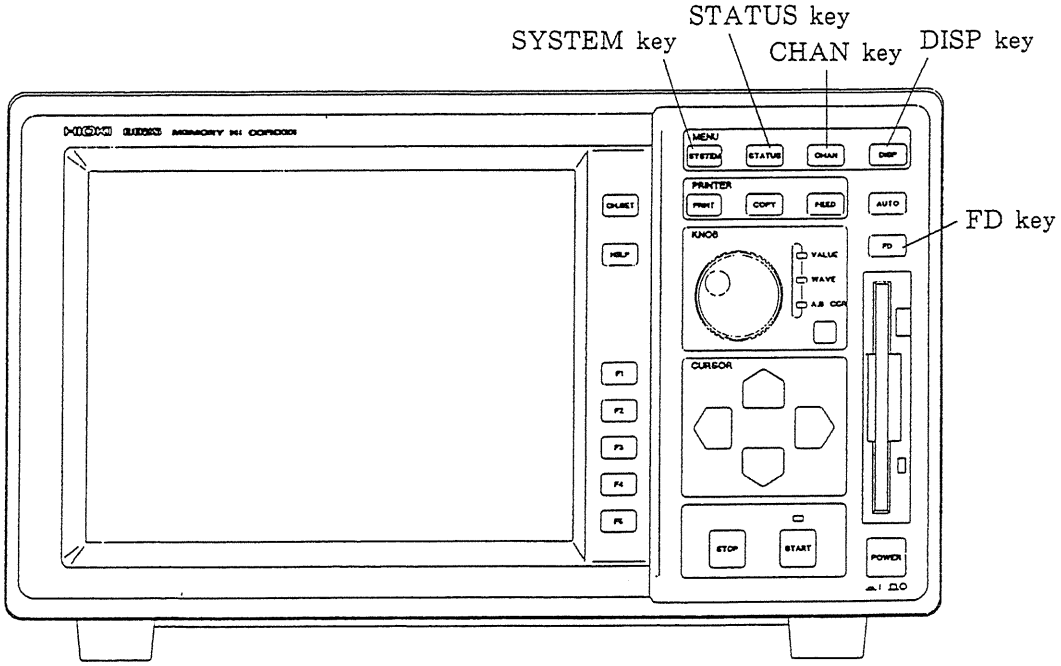
This is selected by pressing the DISP key. This is a screen for displaying the measurement results in each function. The main setting items can be also set on this screen.

④ The "system" screen

This is selected by pressing the SYSTEM key. Here time instant setting, scaling setting, comment input, special function setting, settings related to the GP-IB interface (option at time of order), input level monitoring, and self-checking are performed. Except for special function setting, all these are common to all functions.

⑤ The "floppy disk control" screen

This is selected by pressing the FD key. Floppy disk formatting and file display, deletion, loading, saving and the like are performed here.



4-2 Screen Settings

Settings on the display screens are performed using the following keys:

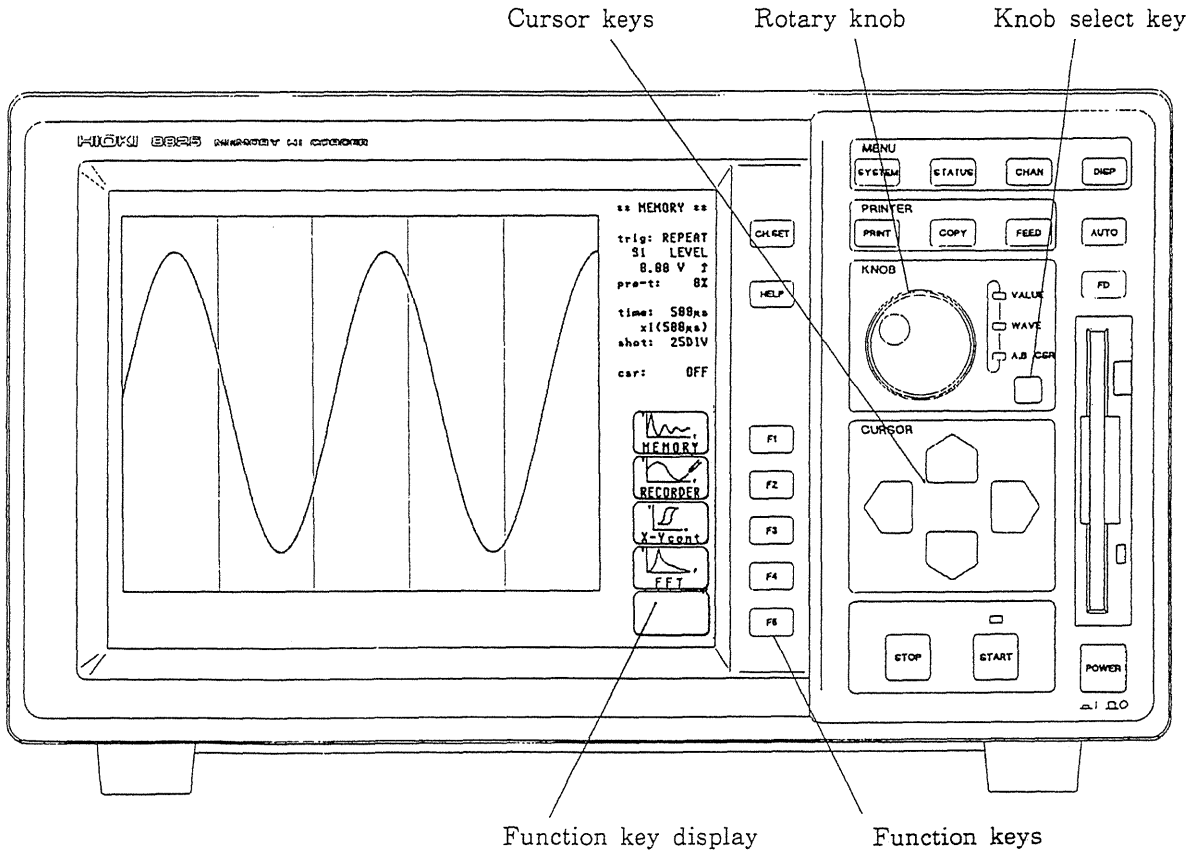
- Cursor keys ····· use these to move the flashing cursor to the item to be set.
- Function keys ····· use these to make the required selection for the current item.
- Rotary knob ····· use for altering numerical values, scrolling waveforms, and moving the A and B cursors.
- Knob select key ····· determines the effect of the rotary knob on the screen.

(All settings can be performed by using just the cursor keys and the function keys.)

4-2-1 Cursor Keys and Function Keys

Use the following procedure for performing settings on the screen.

1. Using the CURSOR key, move the flashing cursor to the position of the item to be set.
2. The available choices for the value of the item to be set appear at the right edge of the screen on the function key display. Set the item by pressing the corresponding function key F1 to F5.



4-2-2 Rotary Knob and Knob Select Key

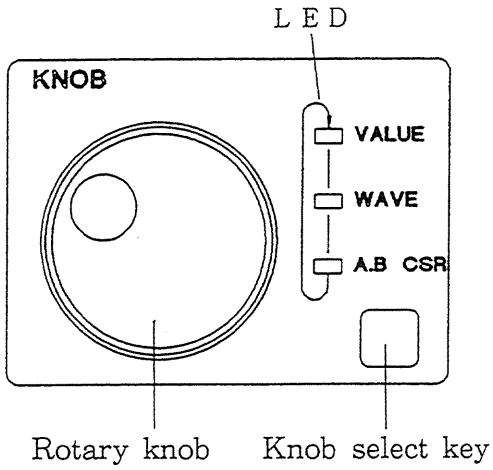
The following procedure can be used to set numerical values using the knob select key and rotary knob.

* Knob select key

When the screen is displaying the "display" screen: each time the knob select key is pressed the effect of turning the rotary knob changes. To the upper left of the knob select key three LEDs show the current rotary knob effect.

Rotary knob effect

VALUE LED ····· Sets a numerical value
WAVE LED ····· Scrolls the waveform
A.B CSR LED ····· Scrolls the A and B cursors



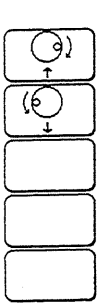
If the display is showing some screen other than the "display" screen: the knob select key is not effective, and automatically the VALUE LED will be illuminated, and turning the rotary knob can only set a numerical value.

*Using the rotary knob

○Setting a numerical value

If the function key display is as shown in the figure to the right, instead of the function keys the numerical value can be set.

Turning clockwise ····· increases the numerical value
Turning counterclockwise ····· decreases the numerical value

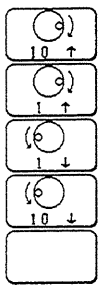

(Function key display)
Increase
Decrease

○Scrolling the waveform

Turning clockwise ····· scrolls the waveform right or up
Turning counterclockwise ····· scrolls the waveform left or down

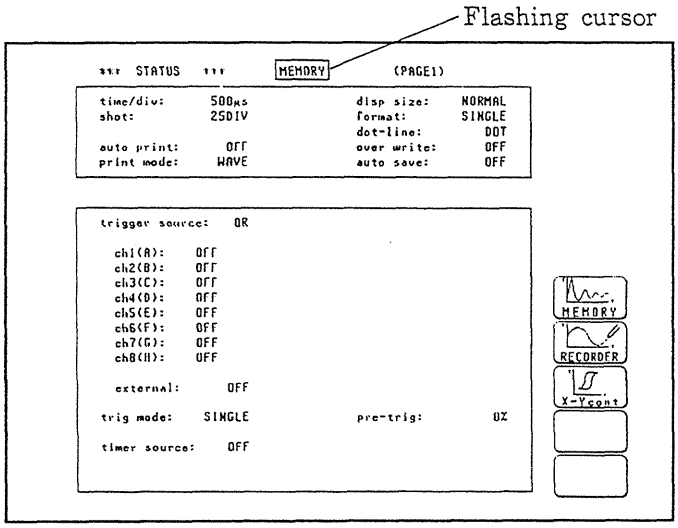
○When scrolling the A and B cursors

Turning clockwise ····· scrolls the A and B cursors right or up
Turning counterclockwise ····· scrolls the A and B cursors left or down

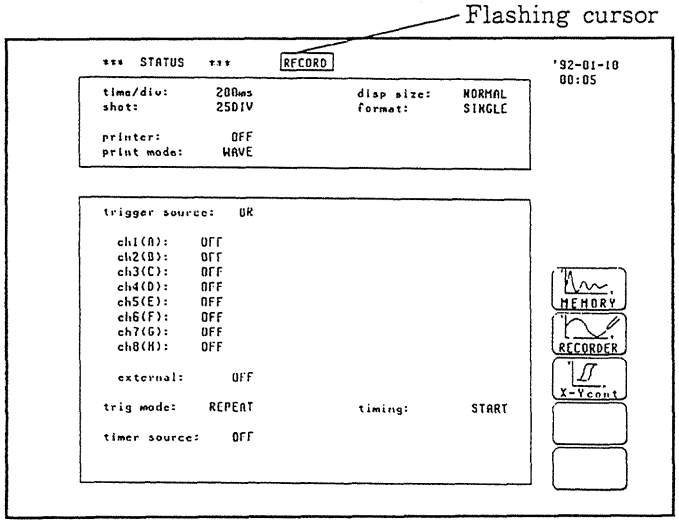

(by tens) } Increase
(by ones) }
(by tens) } Decrease
(by ones) }

Settings will be performed on the "status" screen, for the recorder function.

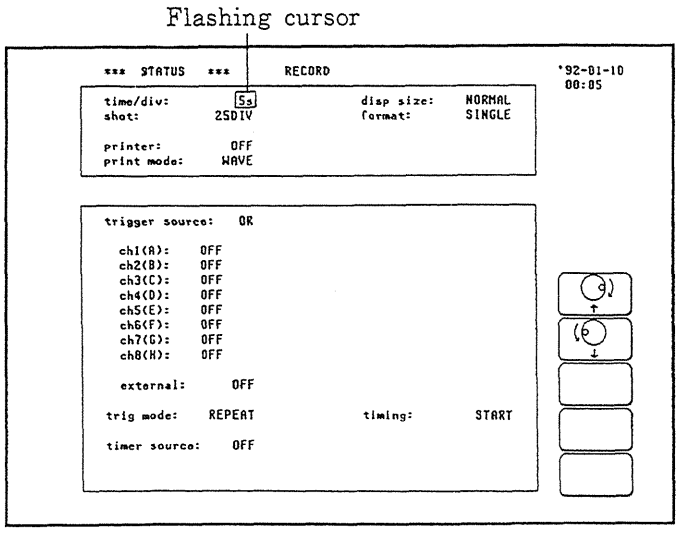
1. Press the STATUS key, and the "status" screen appears.



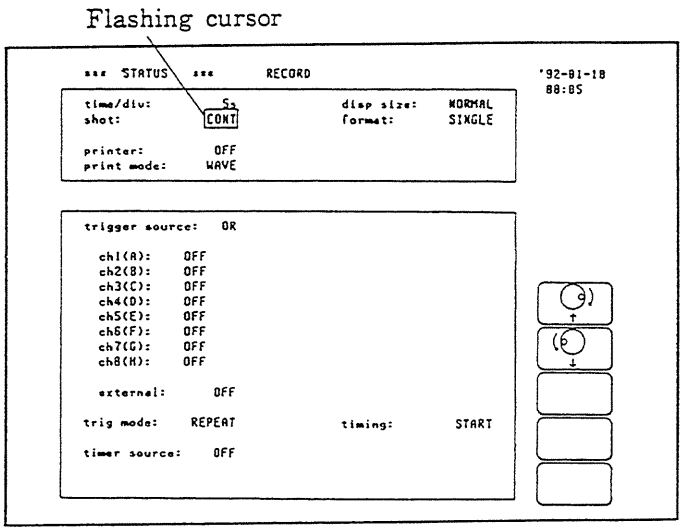
2. To set the function to "recorder": Press function key F2, and the function is set to RECORD.



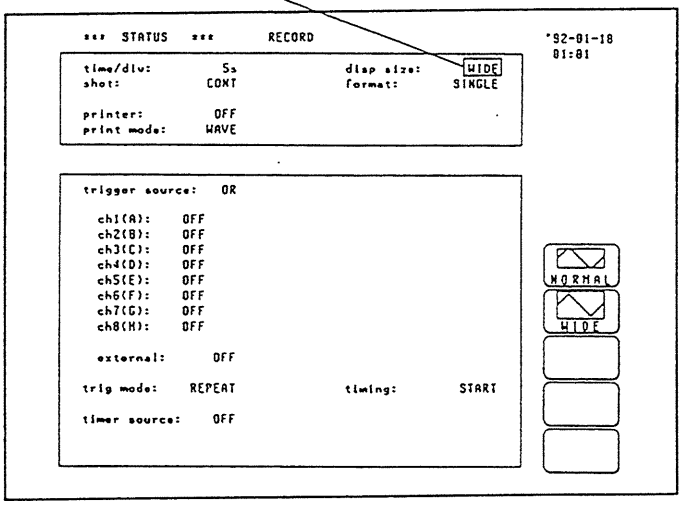
3. To set the time axis range to 5 s.:
   ① Move the flashing cursor to the item "time/div".
   ② By turning the rotary knob, set 5 s. (This can also be done by using the function keys F1 and F2).



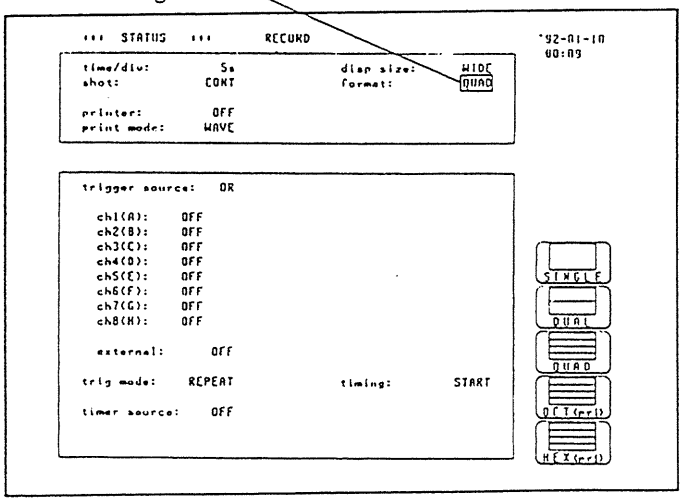
4. To set the recording length to CONT:
   ① By using the cursor keys, move the flashing cursor to the item "shot".
   ② By turning the rotary knob, set the recording length to CONT.
   (This can also be done by using the function keys F1 and F2).



5. To set the display size to WIDE:
   ① By using the cursor keys, move the flashing cursor to the item "disp size".
   ② By pressing the function key F2, set the display size to WIDE.



6. To set the format to QUAD:
   ① By using the cursor keys, move the flashing cursor to the item "format".
   ② By pressing the function key F3, set the format to QUAD.



Section 5

Memory Recorder Function Mode

Contents

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5-1 What is the Memory Recorder Function?

5-1-1 Introduction

In this function mode, once the input signal has been stored in the memory of the 8825, it can be subjected to various forms of processing. By recording the data, a great number of useful ways of using it become possible:

(1) Once an input signal has been stored in the memory, it can be displayed and recorded.

(2) Recording can be performed for all input channels along the same time axis. Allowing the signals to overlap makes it easier to see their relative relationships.

(3) The time axis scale can be set to any of 18 levels, from 500 μs/DIV to 5 min/DIV.

(4) The maximum recording capacity (recording length) is 4M words divided by the number of channels. (corresponding to 2500 DIV, when 16 channels are in use) (if the 4M word memory board is being used)

(5) With the print trigger function, it is possible to inspect the signal before the trigger point.

(6) Magnified and compressed display and recording are available, both along the time axis and along the voltage axis:
Along the time axis ··· ×10, ×5, ×2, ×1, ×1/2, ×1/5, ×1/10, ×1/20, ×1/50, ×1/100, ×1/200, ×1/500, ×1/1000
Along the voltage axis ··· ×16, ×8, ×4, ×2, ×1, ×1/2 (in single and X-Y single formats)
··· ×8, ×4, ×2, ×1, ×1/2, ×1/4 (in dual and X-Y quad formats)
··· ×4, ×2, ×1, ×1/2, ×1/4, ×1/8 (in quad, octo, and hexa formats)

(7) Five types of display format and seven types of recording format can be chosen from.
For a time axis waveform, single, dual, quad, octo (only when printing), and hexa (sixteen channels; only when printing) are available.
And for X-Y display and recording, single and quad are available.

(8) High grade printing is possible.
By using the smooth print function, it is possible to print a waveform smoothly in a quality close to analog.

(9) Partial printing is available.
From a recorded waveform, it is possible to extract and print only the section which one desires to see.

(10) Reprinting is available.
Once a waveform has been recorded, it can be printed as many times as desired.

(11) The memory can be used in segments.
Dead time when continuously recording transient phenomena can be reduced. It is possible to store a maximum of 63 waveforms corresponding to 25 DIV for each channel (when the 4M word memory board is being used)

(12) With the waveform decision function, it is possible to detect abnormal waveforms.

(13) With the wealth of calculation functions, a captured waveform can be analyzed in various different ways.

5-1-2 Finding Reference Material in this Manual

(1) Basic functions

For information about the basic functions, refer to Section 5-4 in this chapter, "Making settings" (5-4-1 to 5-4-17).

(2) Trigger function

See Section 8. The user should select, from the many types of trigger available, one suitable for the objective desired.

(3) Memory segmentation function

See Section 9. With the multi-block function, the memory space can be segmented into a number of blocks, and any memory block can be used. Further, with the sequential save function, dead time when continuously recording sudden phenomena can be reduced.

(4) Waveform decision function

See Section 10. Decisions can be made about the input signal waveform with respect to any waveform decision area that has been set up.
Detection of abnormal waveforms and the like can be taken advantage of.

(5) Calculation function

See Section 11. Many useful calculations can be performed, from the simple arithmetic operations to differentiation and integration computations.

(6) Use of the floppy disk drive

See Section 14. The floppy disk drive allows settings, measurement data, and waveform decision areas for use by the waveform decision function to be recorded and kept.

(7) Scaling function

See Section 12-4. The scaling function allows the units and numerical values for the input voltages to be converted, so that they can be directly read out as physical values of the parameters which are being measured.

(8) Comment input function

See Section 12-5. Instead of making handwritten memos on recordings, comments can be input and printed on.

(9) Display auto-off function

(10) Grid setting

The grid on the screen display and on the printed recordings can be altered according to the application.

(11) Backup function for start condition

If during recording operation the power fails and is restored again, then the start condition is restored, and recording operation starts again.

(12) Channel mark function

During waveform recording, it is possible to print the channel numbers.

See Section 12-3 "Special Function Settings"

(13) When an error occurs, when a warning is issued, or when a waveform decision produces the result NG (fail), it is possible to arrange for a "beep" sound to be produced.

(14) List and gauge functions

These provide voltage axis scales and listings of settings on printed recordings.

(15) Change-over of the time value display

(16) Smooth print function

Smooth waveform printing can be performed of quality close to analog.

(17) Roll mode function

It is possible, after a trigger, to start recording a waveform simultaneously with its display.

(18) Setting the channels to be used.

It is possible to set whether the memory to be used for the measurement data will be divided between 2 channels, 4 channels, or 8 channels, or whether it will be divided between all 16 channels.

See Section 12-3 "Special Function Settings"

(19) Self check function

See Section 12-6. The unit performs a self check and diagnosis simply.

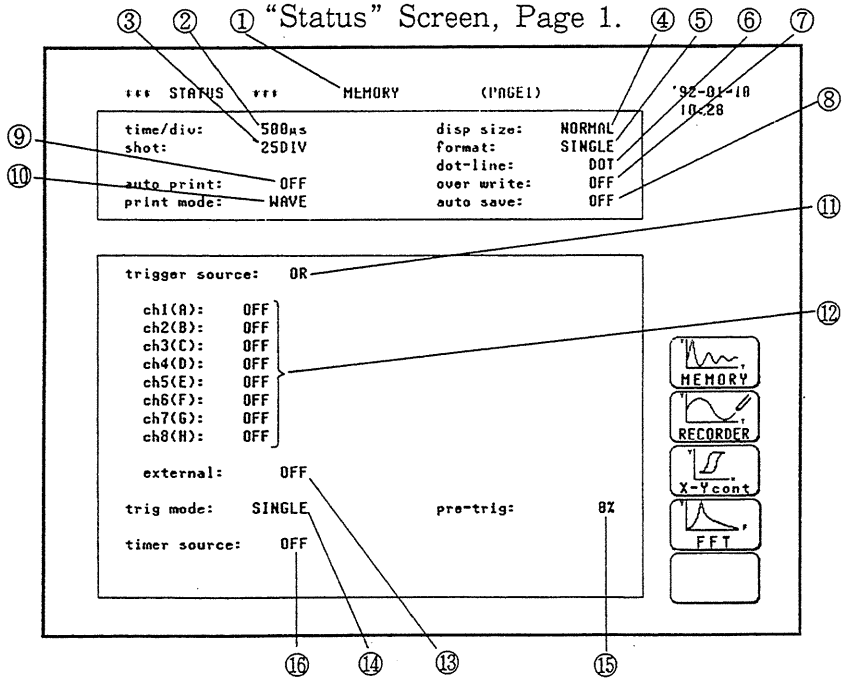
5-2 Display Screens

This section describes the "status" screen, the "channel" screen, and the "display" screen, and gives references to other important parts of this manual.
For the "system" screen, refer to Section 12. For the "floppy disk control" screen, refer to Section 14.

5-2-1 "Status" Screen

- Press the STATUS key, and page 1 of the "status" screen appears.
- Pressing the STATUS key repeatedly cycles through the three pages of the "status" screen.
  (The screen page can also be changed by holding a cursor key down continuously.)
- Page 1 is the screen on which the basic settings which are necessary for measurement are made.
- Page 2 is the screen on which settings related to memory segmentation, waveform decision, and waveform parameter calculation are made.
- Page 3 is the screen on which settings related to waveform processing calculation are made.
- For details about page 2 and page 3, refer to Sections 9, 10, and 11.

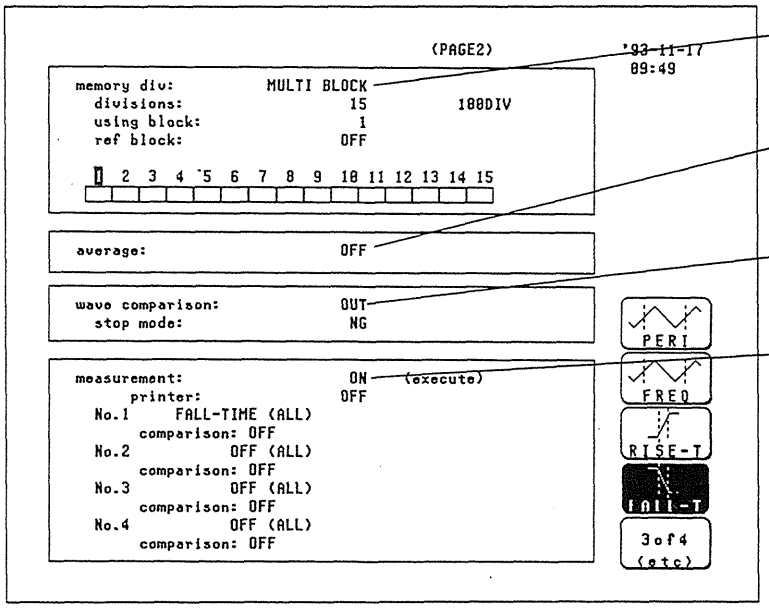
"Status" Screen, Page 1.



① Function mode
② Time axis range
③ Recording length
④ Display size
⑤ Format
⑥ Interpolation function
⑦ Superimposition function
⑧ Auto-save function
⑨ Auto-print function
⑩ Settings for the recording style for the printer

⑪ AND/OR combination operator for the internal and external triggers
⑫ Internal triggers
⑬ External triggers
⑭ Trigger mode
⑮ Pre-trigger
⑯ Timer trigger

"Status" Screen, Page 2.



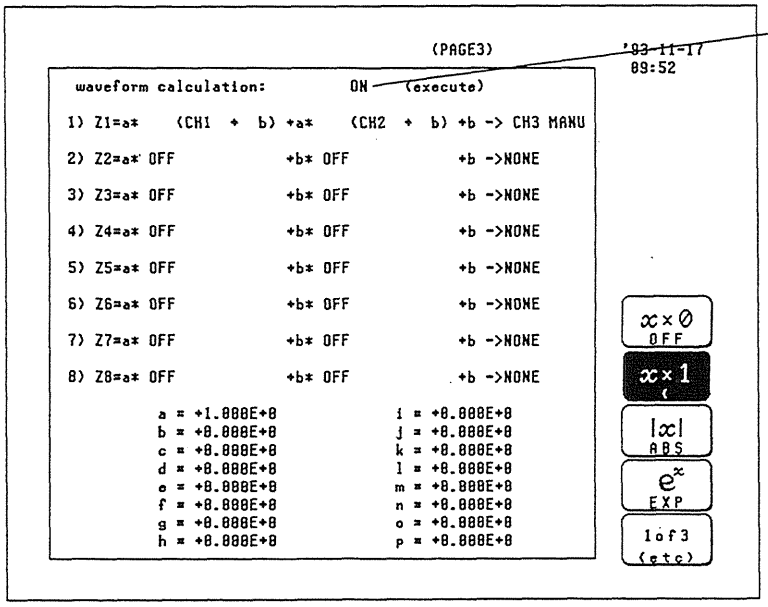
① Memory segmentation function (See Section 9)

② Averaging function (See Section 11)

③ Waveform decision function (See Section 10)

④ Waveform parameter calculation function (See Section 11)

"Status" Screen, Page 3.

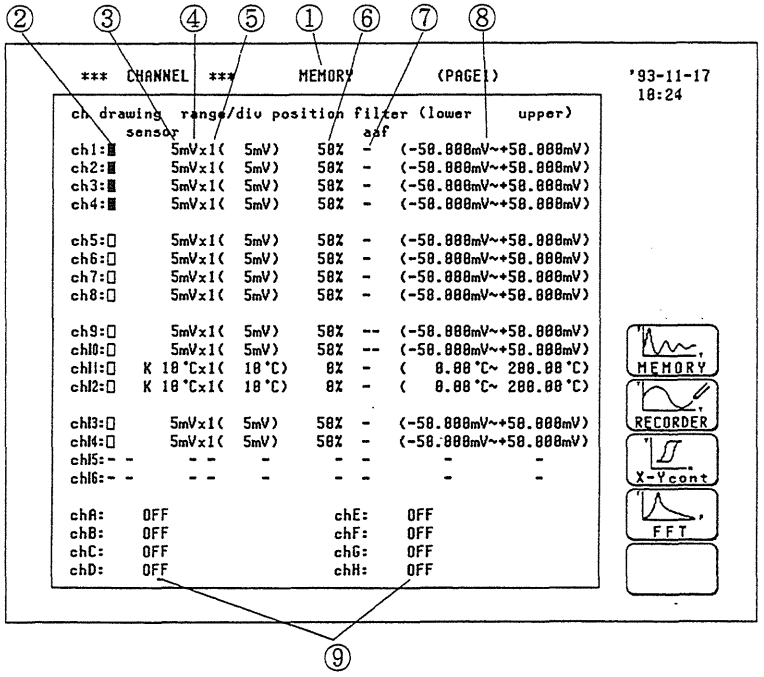


① Waveform processing calculation function (See Section 11)

5-2-2 "Channel" Screen

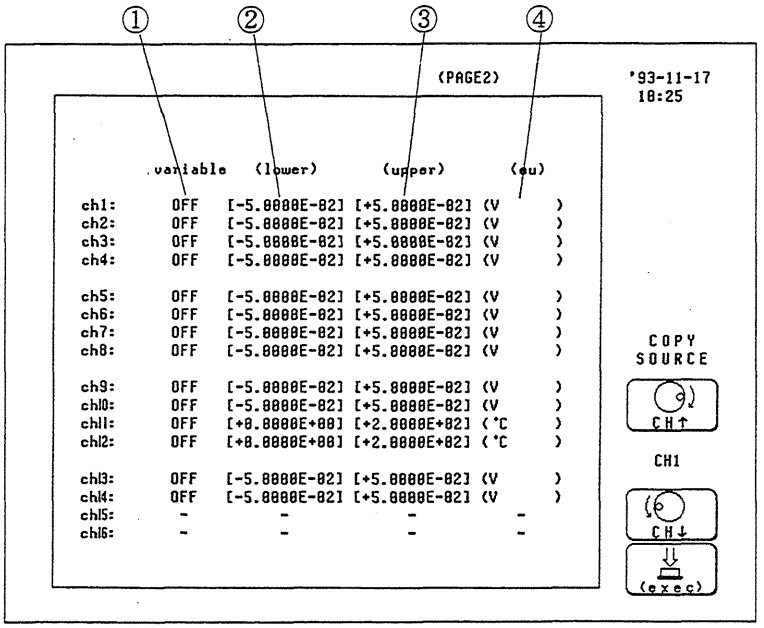
- Press the CHAN key, and the "channel" screen appears.
- Pressing the CHAN key toggles screen between PAGE 1 and PAGE 2.
- The (PAGE 1) screen is for the setting of the input unit and waveform display.
- The (PAGE 2) screen is for the setting of the variable display function.

"Channel" Screen (PAGE 1)



① Function mode
② Waveform display
③ Voltage axis range
④ Input coupling
⑤ Voltage axis magnification
⑥ Position
⑦ Low-pass filter
⑧ Upper limit value, lower limit value (display only)
⑨ Logic display

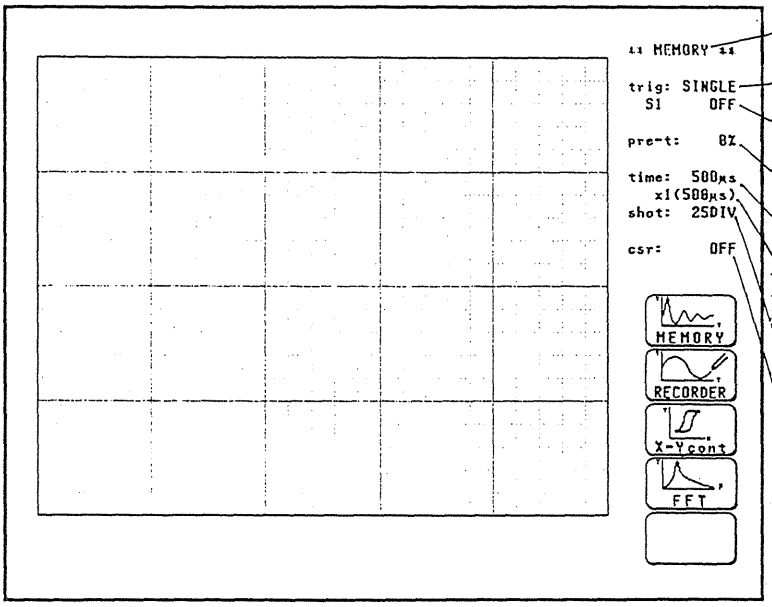
"Channel" Screen (PAGE 2)



① Variable
② Lower limit value
③ Upper limit value
④ Units (display only)

• Press the DISP key, and the "display" screen appears.

"Display" Screen



① Function mode
② Trigger mode
③ Trigger source
④ Pre-trigger
⑤ Time axis range
⑥ Time axis magnification/ compression
⑦ Recording length
⑧ A and B cursors

5-3 Basic Operational Procedures

5-3-1 Operational Flow

The flowchart below illustrates the sequence of operations involved in using the memory recorder function.

Start

↓

Turn the power on

↓

Connect the inputs

↓

"Status" screen

↓

Function setting
- Set the memory recorder function mode

Set the time axis range (TIME/DIV)
- Set the input and storage speed for the input signal waveform

Set the recording length
- Set the length of the recording for one measurement

Set the display size
- Set the size of the screen for display of the waveform

Set the format
- Set the format type for the waveform display screen

Set the interpolation function
- Set dot display or line display

↓

Set the superimposition function
- Set whether waveform superimposition should be performed or not

↓

Set the auto-save function
- Set whether or not to carry out automatic saving to the floppy disk drive

Set the auto-print function
- Set whether or not printing will occur simultaneously with screen display

Set printer output form
- Set whether measurement data will be sent to the printer as a waveform or as numerical values

Set the trigger conditions
- Set the trigger source, the trigger type and conditions, and the print trigger

"Channel" screen

↓

Settings relating to the input units
- Set the channels for which display and recording will be performed, density, voltage axis range, input coupling, and filters.

Measurement
- Press the START key and commence measurement

Record on the printer
- After measurement has been completed, print the results

End

This example illustrates the basic procedure connecting the 8825 to an oscillator and using the memory recorder function to measure a 3 V p-p 1 kHz sine wave input.

(1) Turn on the power.

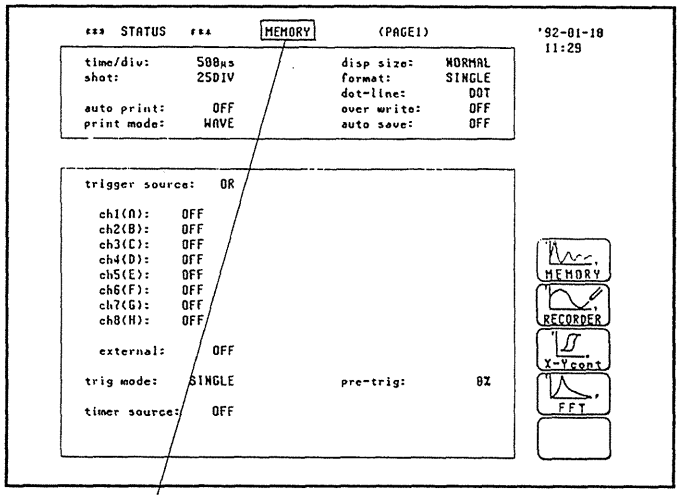
Connect the power cable to the 8825 and turn on the power switch.

(2) Connect the input.

Connect the amplifier to the input terminal of (the 8907 analog unit fitted to) channel 1 of the 8825. Set the amplifer so that it is outputting a sine wave of frequency 1 kHz and output voltage 3 V p-p.

(3) Set the function mode. To set the function mode to the memory recorder function mode:

1. Press the STATUS key. The "status" screen will appear.
2. Using the cursor keys, move the flashing cursor to the "function" item.
3. Choose F1 (MEMORY).

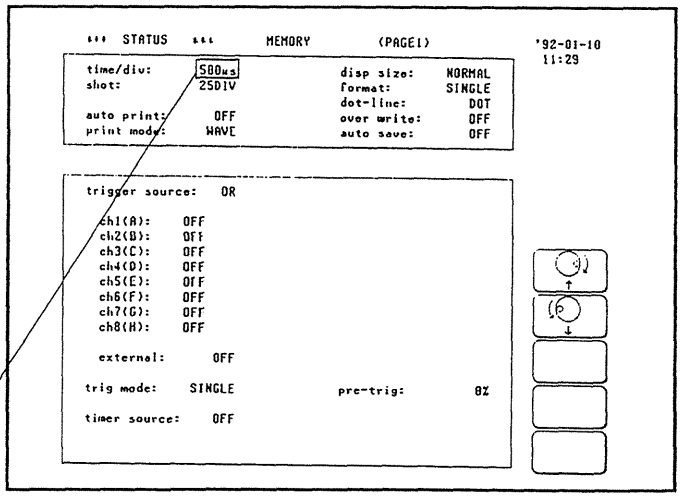


Flashing cursor

(4) Set the time axis range (TIME/DIV).

To set the time axis range to 500 µs/DIV:

1. Using the cursor keys, move the flashing cursor to the "time/div" item.
2. Using F1 and F2 or the rotary knob, set this item to 500 µs.

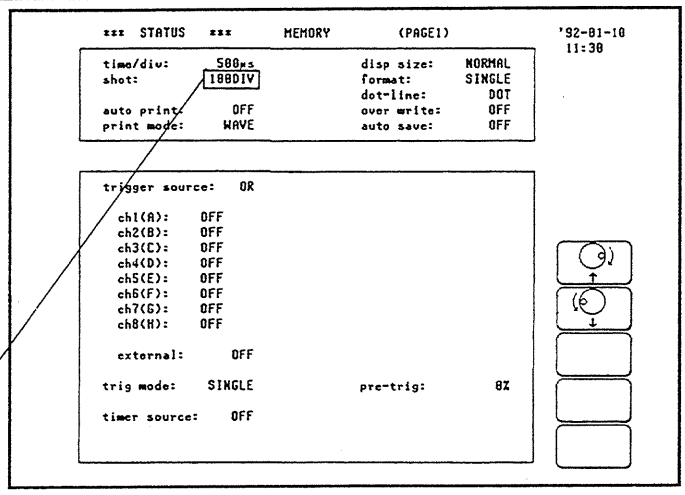


Flashing cursor

(5) Set the recording length.

To set the recording length to 100 DIV:

1. Using the cursor keys, move the flashing cursor to the "shot" item.
2. Using F1 and F2 or the rotary knob, set this item to 100 DIV.

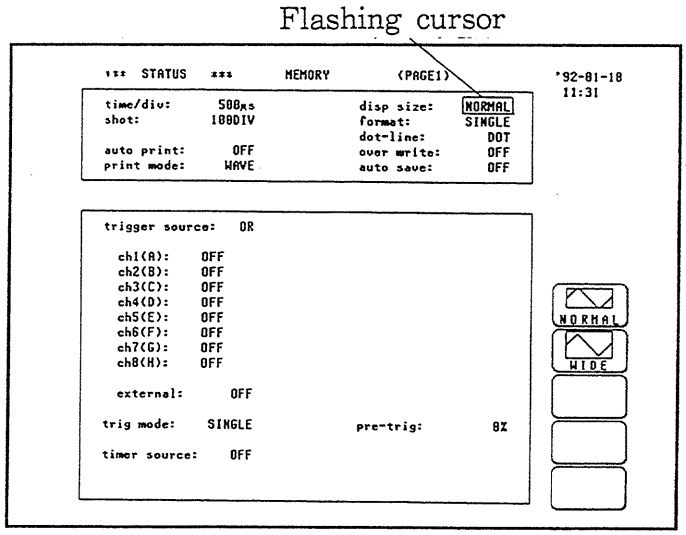


Flashing cursor

(6) Set the display size.

To set the display size (the size of screen for the waveform display) to NORMAL:

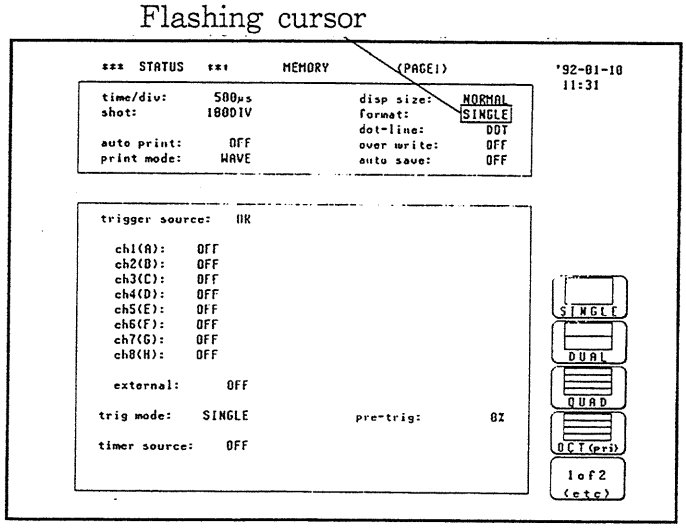
1. Using the cursor keys, move the flashing cursor to the "disp size" item.
2. Choose F1 (NORMAL).



(7) Set the format.

To set the format to SINGLE (perform display and recording of a single graph):

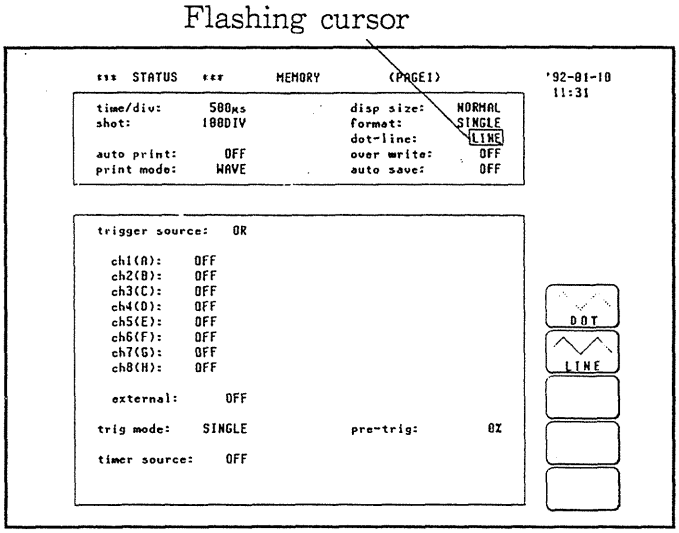
1. Using the cursor keys, move the flashing cursor to the "format" item.
2. Choose F1 (SINGLE).



(8) Set the interpolation function.

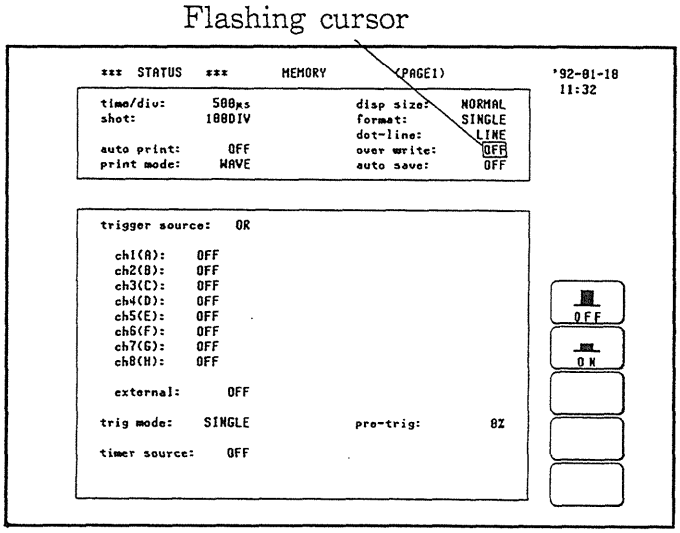
To set the interpolation function to LINE (perform straight line interpolation):

1. Using the cursor keys, move the flashing cursor to the "dot-line" item.
2. Choose F2 (LINE).



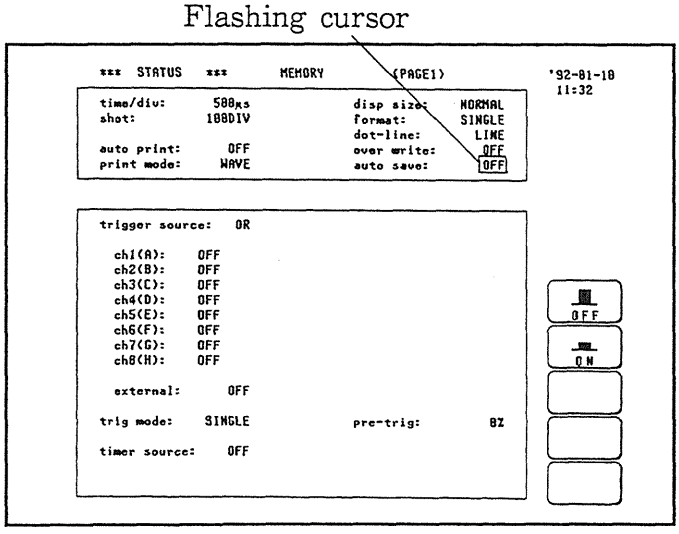
(9) Set the superimposition function. To disable it:

1. Using the cursor keys, move the flashing cursor to the "over write" item.
2. Choose F1 (OFF).



(10) Set the floppy disk auto-save function. To disable it:

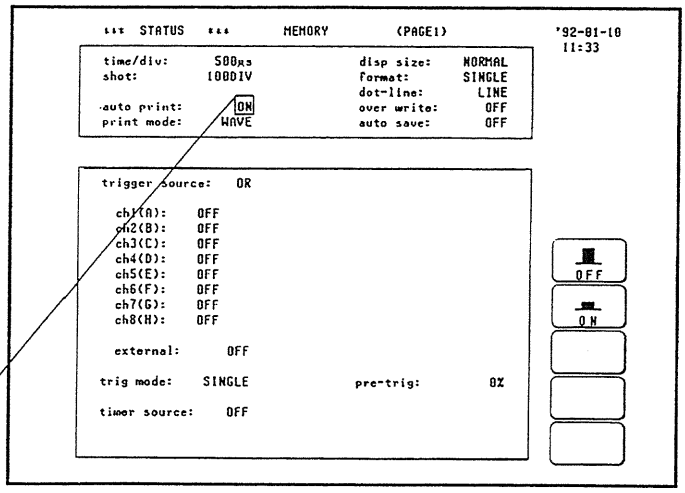
1. Using the cursor keys, move the flashing cursor to the "auto save" item.
2. Choose F1 (OFF).



(11) Set the printer output function.

In order, after measurement is completed, not only to display the waveform, but also to output it on the printer, the auto-print function should be set to ON:

1. Using the cursor keys, move the flashing cursor to the "auto print" item.
2. Choose F2 (ON).

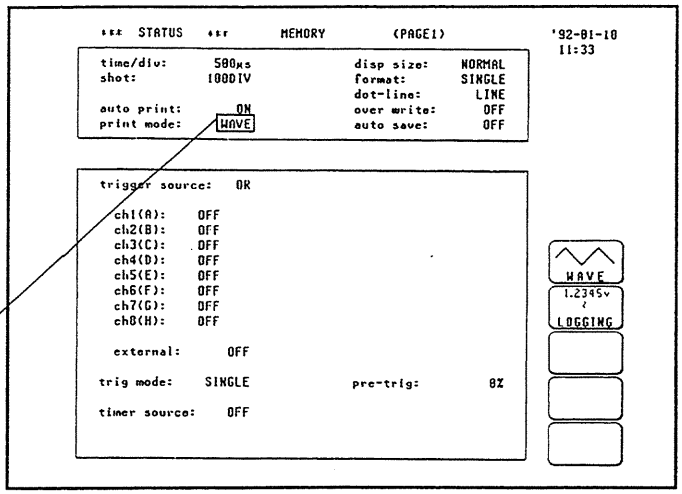


Flashing cursor

(12) Set the recording style for the printer.

To set the printer recording style, not to printing numerical values, but to printing the waveform:

1. Using the cursor keys, move the flashing cursor to the "print mode" item.
2. Choose F1 (wave).



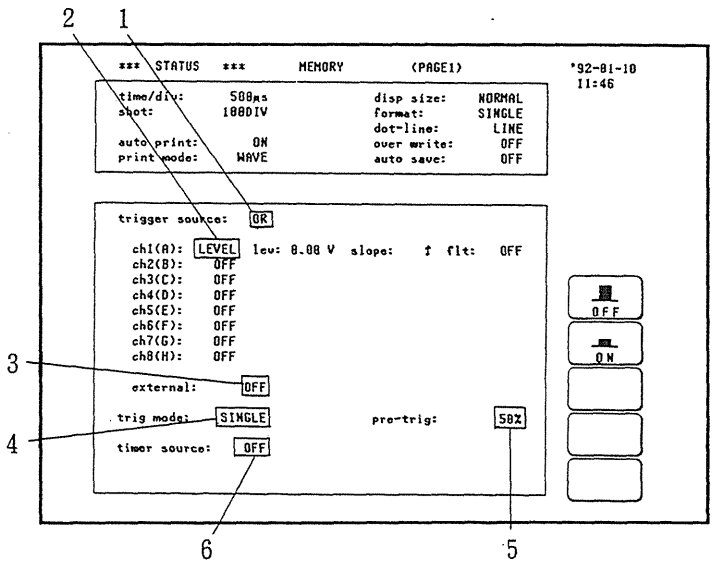
Flashing cursor

(13) Set the trigger conditions.

To set the trigger conditions as shown in the figure on the right:

Using the cursor keys, move the flashing cursor in turn to each item to be set, and, using F1 to F5, select the appropriate values, as explained in the following.

(For details about the trigger function, refer to Section 8 "Trigger Functions".)



1. Set the logical operator AND/OR for combining the triggers.

   Move the flashing cursor to the "trigger source" item. Choose F1 (OR).

2. Make the trigger source settings.

   Move the flashing cursor to the "ch1(A)" item. Choose F2 (LEVEL).

   Move the flashing cursor to the "lev" item. Using F1 to F4 or the rotary knob, set the voltage level to 0 V.

   Move the flashing cursor to the "slope" item. Choose F1 (up).

   Move the flashing cursor to the "flt" item. Choose F1 (OFF).

   In the same way, using F1, set each of the "ch2(B)" to "ch8(H)" items to OFF.

3. Set the external trigger.

   Move the flashing cursor to the "external" item. Choose F1 (OFF).

4. Set the trigger mode.

   Move the flashing cursor to the "trig mode" item. Choose F1 (SINGLE).

5. Set the pre-trigger.

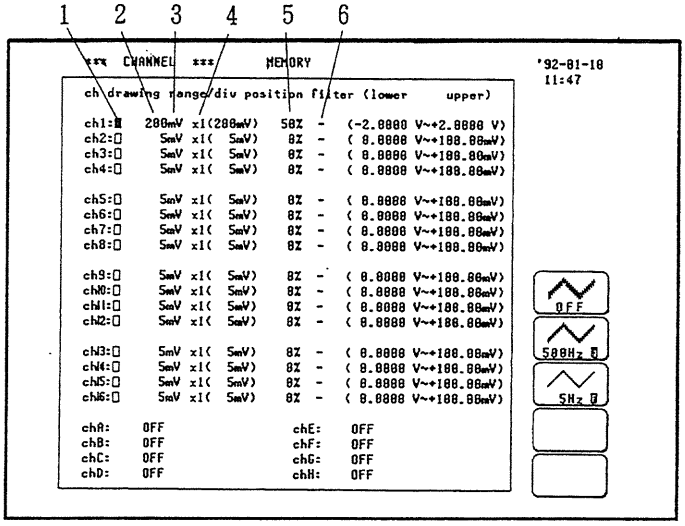
   Move the flashing cursor to the "pre-trig" item. Using F1 and F2 or the rotary knob, set this item to 50%.

6. Set the timer trigger.

   Move the flashing cursor to the "timer source" item. Choose F1 (OFF).

(14) Make the settings for each channel.

- Press the CHAN key, and the "channel" screen will appear.
- For each of the input channels to be set in turn (only channel 1 in this example), make settings as shown in the figure on the right:
  Using the cursor keys, move the flashing cursor in turn to each item to be set, and, using F1 to F5, select the appropriate contents, as explained in the following.

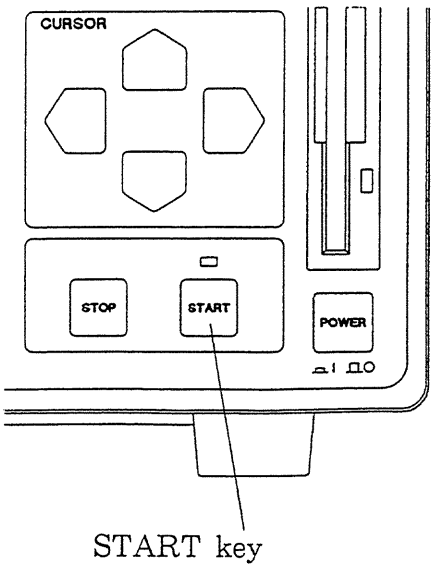


1. Set the waveform display.
   Move the flashing cursor to the "drawing" item. Choose F4 (DARK).
2. Set the voltage axis range.
   Move the flashing cursor to the "range/div" item. Using F1 and F2 or the rotary knob, set this item to 200 mV.
3. Set the input coupling.
   Move the flashing cursor to the input coupling item. Choose F1 (DC).
4. Set the voltage axis magnification/compression ratio.
   Move the flashing cursor to the magnification/compression item. Using F1 and F2 or the rotary knob, set this item to ×1.
5. Set the origin position.
   Move the flashing cursor to the "position" item. Using F1 and F2 or the rotary knob, set this item to 50%.
6. Set the low-pass filter.
   Move the flashing cursor to the "filter" item. Choose F1 (OFF).

(15) Begin measurement.

- Press the START key to initiate the measurement process.
- Data captured during a period of 25 ms before and after the trigger will be stored and displayed.

1. Press the START key. The LED above the key will light up. Because the input is already present, triggering occurs immediately, and when storage in the memory of 100 DIV (50 ms) of data before and after the trigger is completed, the LED goes out and the system enters the STOP condition, and the waveform is shown on the screen.
   After the system has entered the STOP condition, the auto-print function set in step (11) operates, and the waveform is printed out.



5-4 Making Settings

5-4-1 Setting the Function Mode

The 8825 has three function modes: the memory recorder function mode, the recorder function mode, and the X-Y recorder function mode. Select the appropriate function mode for performing measurements.

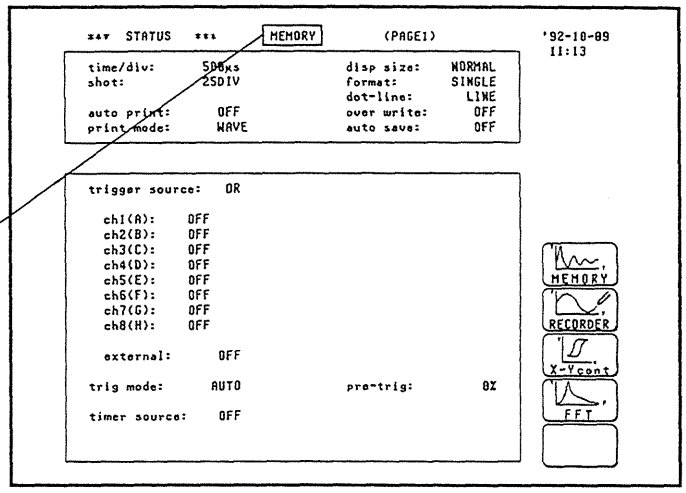
Method (Screens for making this setting: the "status", "channel", and "display" screens)

1. Using the cursor keys, move the flashing cursor to the position shown in the figure below.
2. According to the displays on the function keys, select the desired function mode.

Function key indication — Meaning

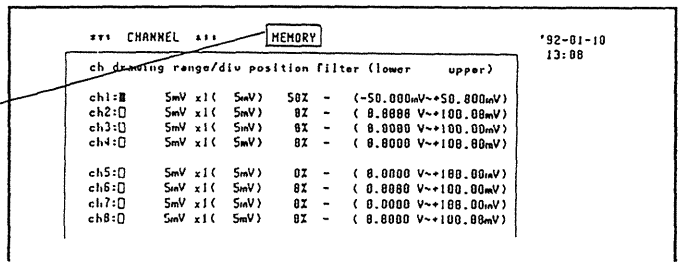
- MEMORY : memory recorder function mode
- RECORDER : recorder function mode
- X-Ycont : X-Y recorder function mode
- FFT : FFT

"Status" screen



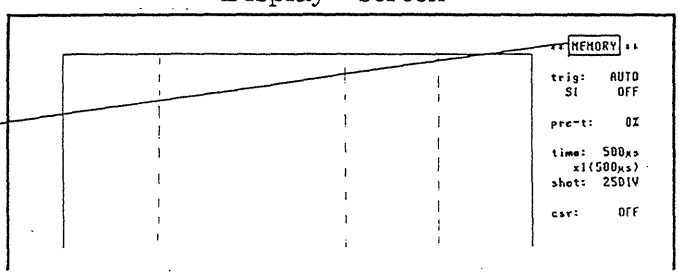
Flashing cursor

"Channel" screen



Flashing cursor

"Display" screen



Flashing cursor

5-4-2 Setting the Time Axis Range (TIME/DIV)

Set the speed for inputting and storing the waveform of the input signal.

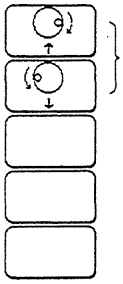
The value set for "time/div" shows the time interval along the time axis direction for 1 DIV.

The sampling period is 1/100th of the set value for the time axis range.

Method (Screens for making this setting: the "status" and "display" screens)

1. Using the cursor keys, move the flashing cursor to the "time/div" item.
2. By using the function keys or the rotary knob, set the time axis range.

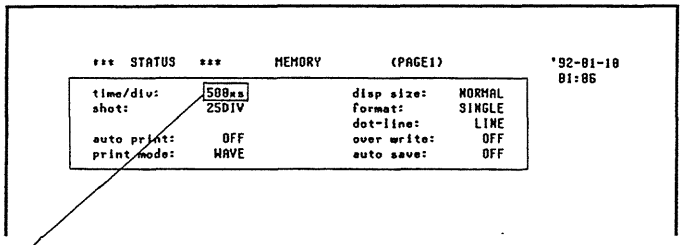
Function key indication



Meaning

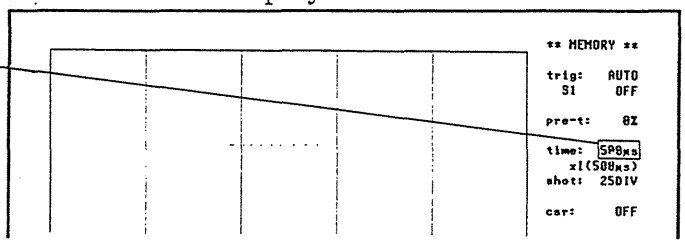
500 μs
1, 2, 5, 10, 20,
50, 100, 200, 500 ms
1, 2, 5, 10, 20 s
1, 2, 5 min

"Status" screen



"Display" screen

Flashing cursor



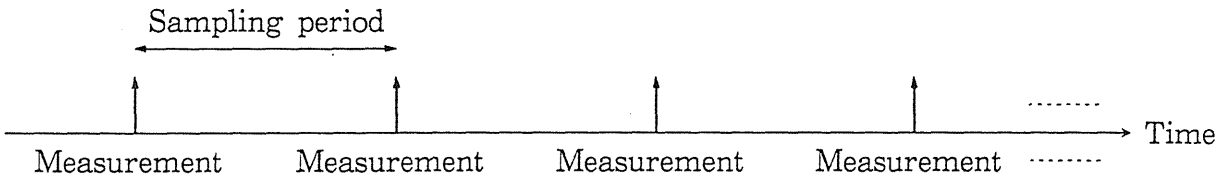
※ On the "display" screen, if the rotary knob is to be used, refer to Section 4-2-2 "Rotary Knob and Knob Select Key."

Background

(1) Sampling

The 8825 converts the input signal analog value into a digital value, and all internal signal processing thereafter is performed using digital values. This A/D conversion process is called sampling.

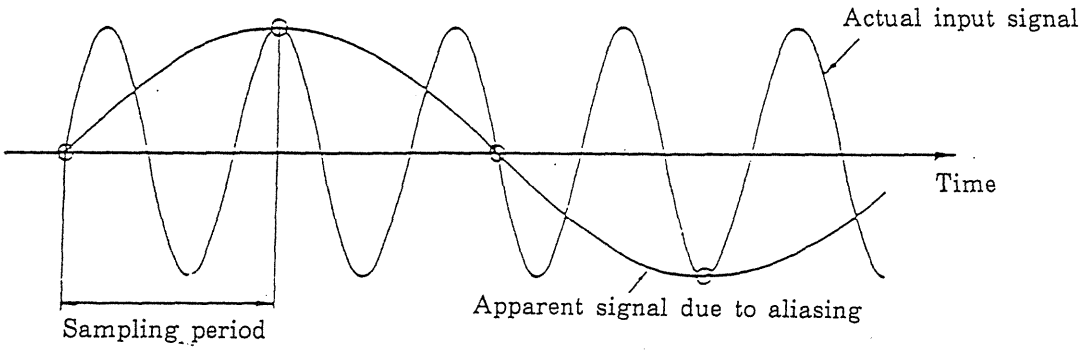
This sampling measures the value of the signal repeatedly at constant intervals.



The rate of taking these measurements is called the sampling rate. The units are S/s, read as samples per second. This is the reciprocal of the sampling period.

(2) Aliasing distortion

If the frequency of the signal being measured is significantly higher than the sampling rate, it is possible for sampling to produce an apparent signal which is actually non-existent.



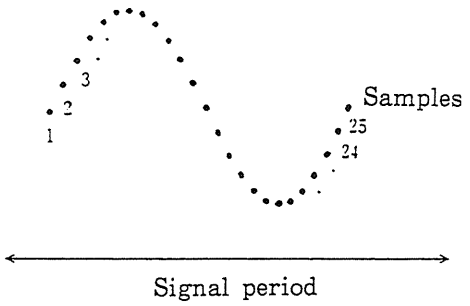
Aliasing distortion cannot be avoided with methods of measurement, like the memory recorder function mode, in which the sampling period for the time axis range may vary widely.

Because the measurement limit frequency (see below) is determined by the time axis range used for measurement, try to use as high speed a range as possible for performing measurements.

When measuring a repeating signal, using the auto ranging function is another useful technique. Refer to Section 5-4-14 "Auto-Range Function."

(3) Measurement limit frequency

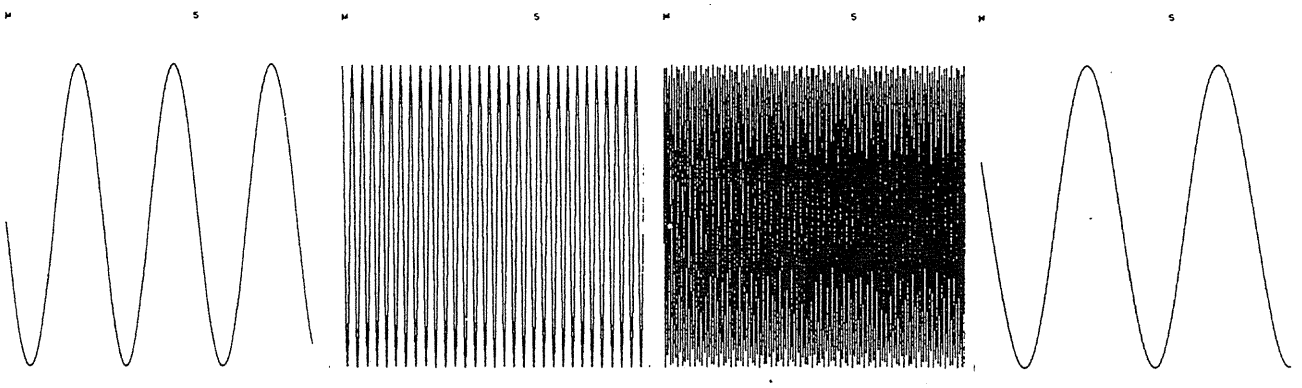
As a general rule, to ensure that sampling catches the peaks of a typical sine wave input, 25 samples are required for each input cycle.



TIME/DIVE	Sampling period	Measurement limit frequency
500 μs/DIV	5 μs	8kHz
1ms/DIV	10	4
2	20	2
5	50	800Hz
10	100	400
20	200	200
50	500	80
100	1ms	40
200	2	20
500	5	8
1s/DIV	10	4
2	20	2
5	50	0.8

(The frequency for each range, when 25 samples per period is taken as the limit.)

(Example) A sine waveform of about 800 Hz was recorded using various different time axis ranges.



500 μs/DIV
the correct waveform

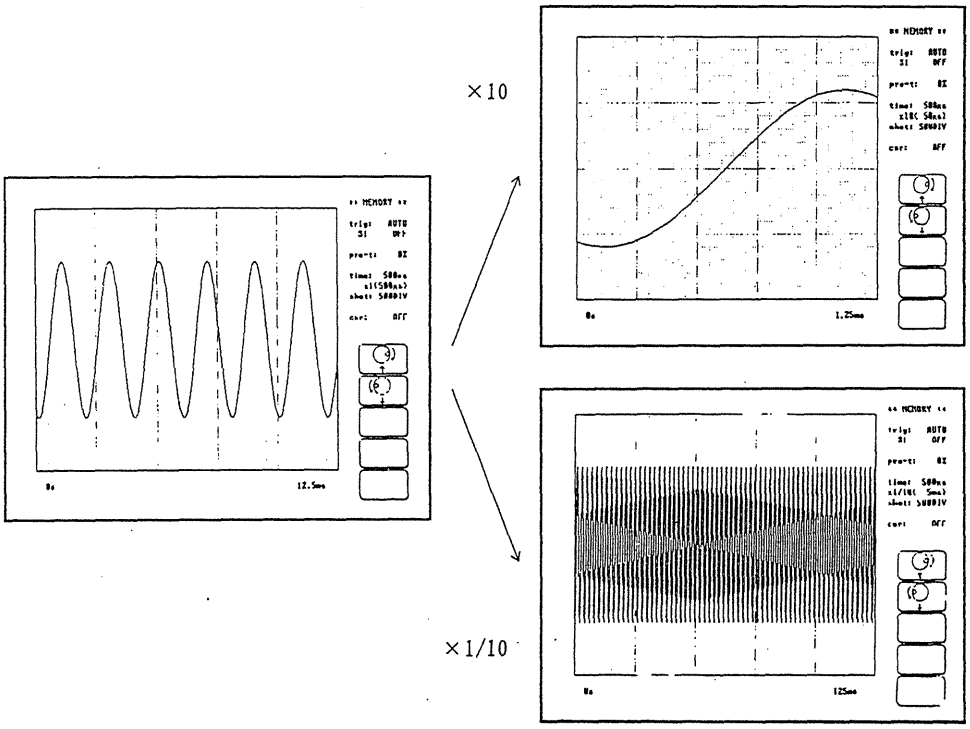
5 ms/DIV
almost the measurement limit frequency

50 ms/DIV
the peaks are not reproduced

10 s/DIV
a signal of about 23.5 mHz is observed, which is an aliasing error

5-4-3 Setting Magnification/Compression Along the Time Axis

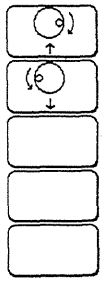
- The magnification/compression ratio along the time axis can be set.
- By magnifying the waveform, detailed observations can be made. By compressing the waveform, an entire change can be promptly apprehended.



Method (Screen for making this setting: the "display" screen)

1. Using the cursor keys, move the flashing cursor to the position shown in the figure below.
2. By using the soft keys or the rotary knob, perform the setting.

Function key indication

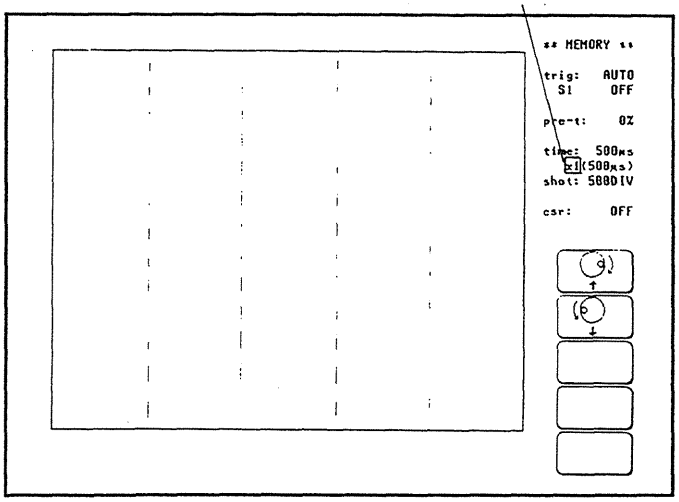


Meaning

×10, ×5, ×2, ×1,
×1/2, ×1/5, ×1/10,
×1/20, ×1/50, ×1/100,
×1/200, ×1/500, ×1/1000

※If the settings are to be made by using the rotary knob, refer to Section 4-2-2 "Rotary Knob and Knob Select Key."

Flashing cursor



- The setting of magnification/compression ratio can be done either before or after other settings.
- When compressing and displaying a long recording, if the interpolation function is set to DOT, the longest time that can be taken for performing the display is about 1 minute 20 seconds.

Related item

A scroll bar display is available, to show where the current screen display is in relation to the whole shot length. See Section 5-4-17 "Help Function" for details.

5-4-4 Setting the Recording Length

The length of recording for one measurement operation (number of DIV) can be set.

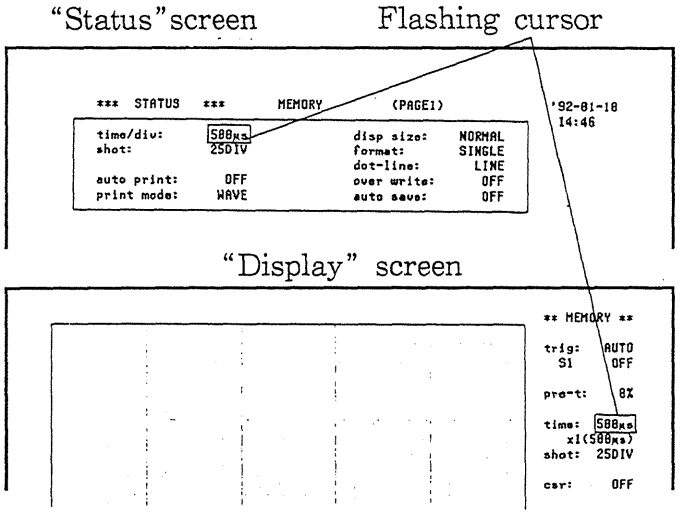
Method (Screens for making this setting: the "status" and "display" screens)

1. Using the cursor keys, move the flashing cursor to the "shot" item.
2. By using the function keys or the rotary knob, set the recording length.

Function key indication

Meaning
25, 50, 100, 200, 500, 1000, 2000, 5000, 10000, 20000 div

※If using the rotary knob in the "display" screen, refer to Section 4-2-2 "Rotary Knob and Knob Select Key."



5-4-5 Setting the Display Size

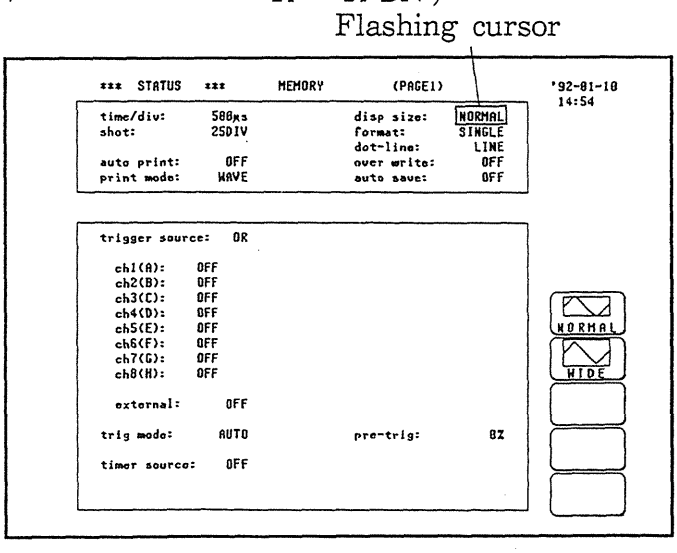
The display size when the input signal waveform is being shown on the screen display can be set.

Method (Screen for making this setting: the "status" screen)

1. Using the cursor keys, move the flashing cursor to the "disp size" item.
2. According to the displays on the function keys, select the desired screen display size.

Function key indication

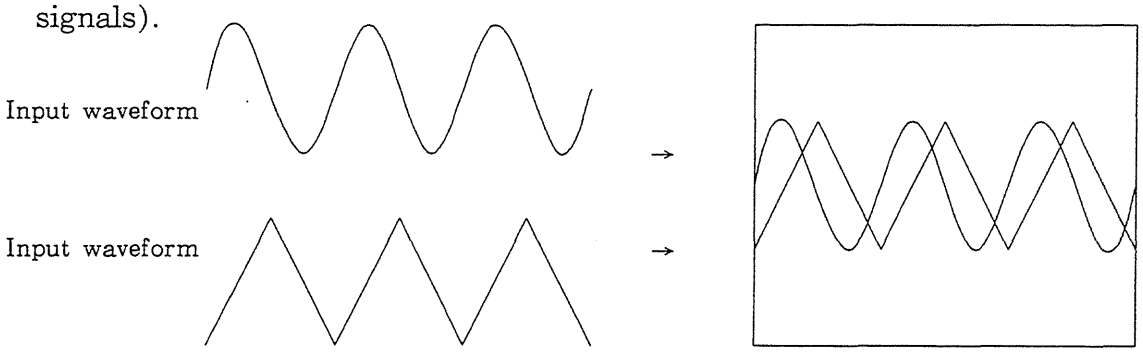
Meaning	Memory recorder and recorder function modes	X-Y recorder function mode
NORMAL : normal screen	(25 × 20 DIV	20 × 20 DIV)
WIDE : wide screen	(25 × 24 DIV	24 × 24 DIV)



- The style can be set for showing input signal waveforms on the screen display and recording them on the printer.
- The styles SINGLE, DUAL, QUAD, OCT (printer only), HEX (sixteen waveforms; printer only), X-Ysingle, and X-Yquad are available. (For X-Ysingle and X-Yquad, refer to Section 5-4-7 "Using X-Y Waveform Plots")

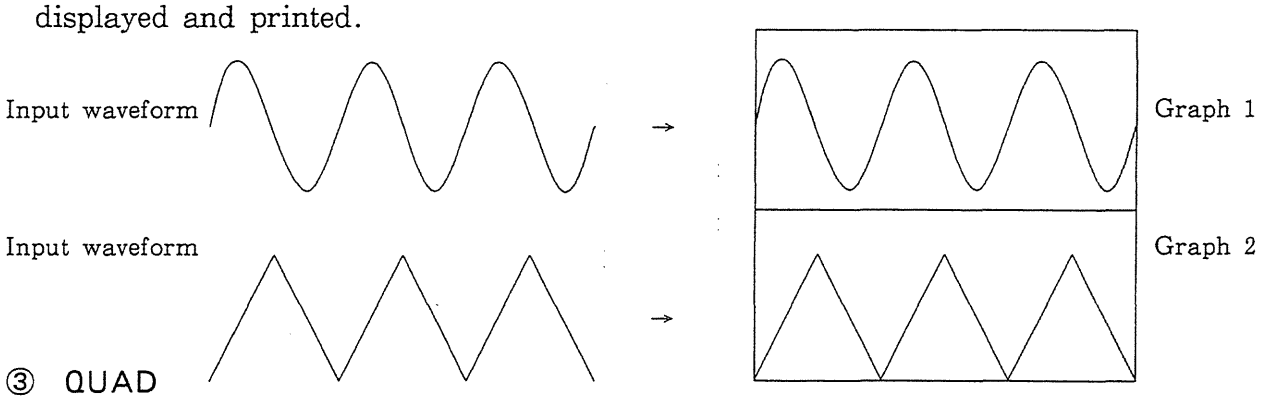
① SINGLE

- Display and record as one graph. (At the most, 16 analog signals and 32 logic signals).



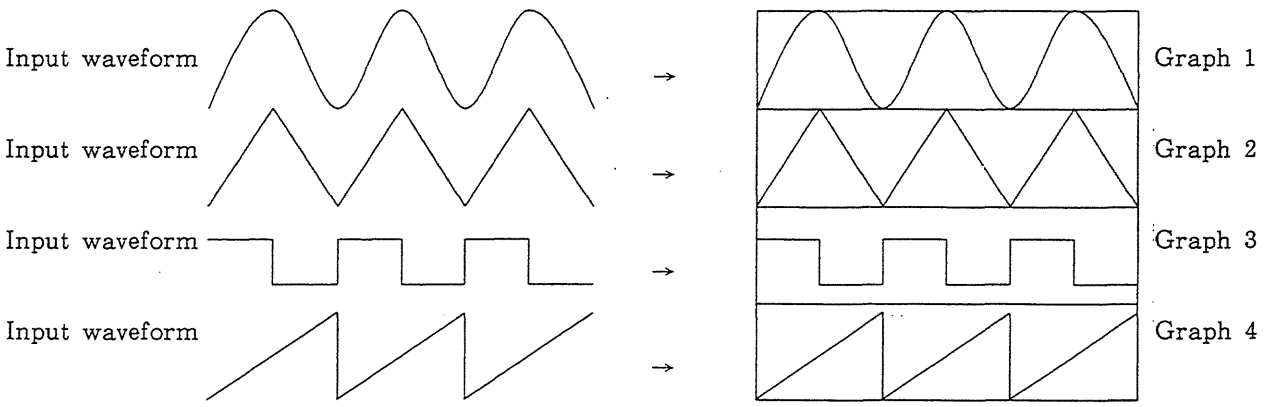
② DUAL

- Display and record as two graphs. (On each graph, at most 16 analog signals and 16 logic signals).
- It is possible to set on which graph each of the input channel waveforms will be displayed and printed.



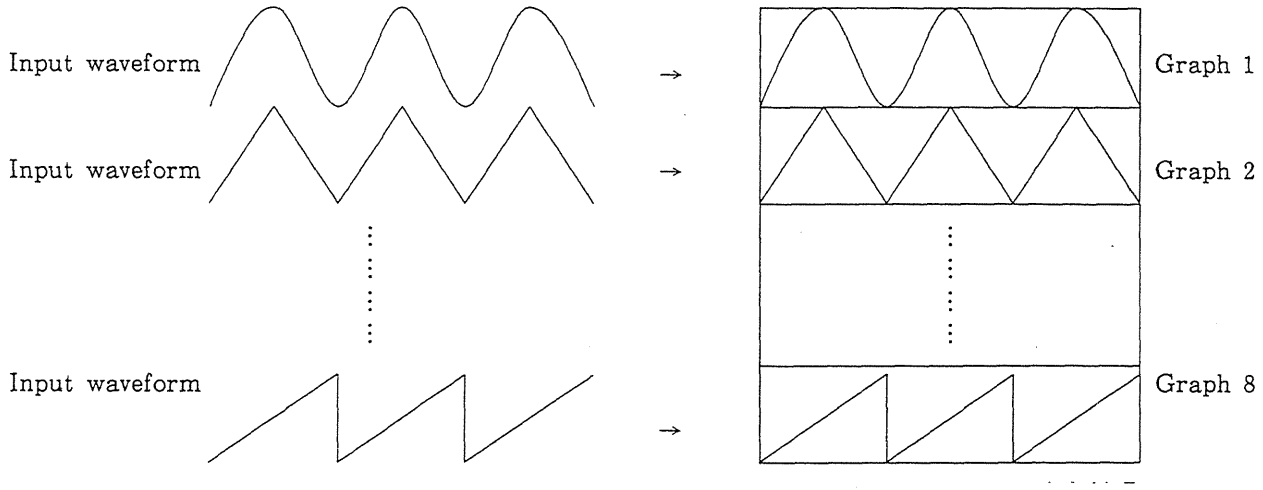
③ QUAD

- Display and record as four graphs. (On each graph, at most 16 analog signals and 8 logic signals).
- It is possible to set on which graph each of the input channel waveforms will be displayed and printed.



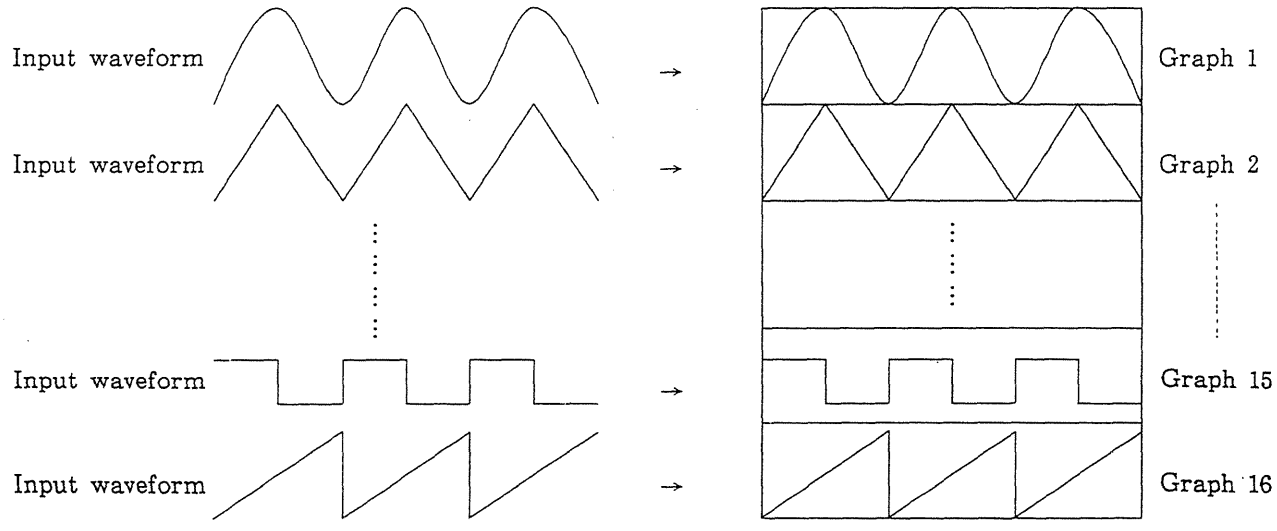
④ OCT (printer only)

- Record on the printer as eight graphs. (On each graph, at most 2 analog signals and 4 logic signals).
- As far as the screen display is concerned, this format is identical to QUAD. (For the printer recording, the graphs cannot be designated. See the note below)



⑤ HEX (printer)

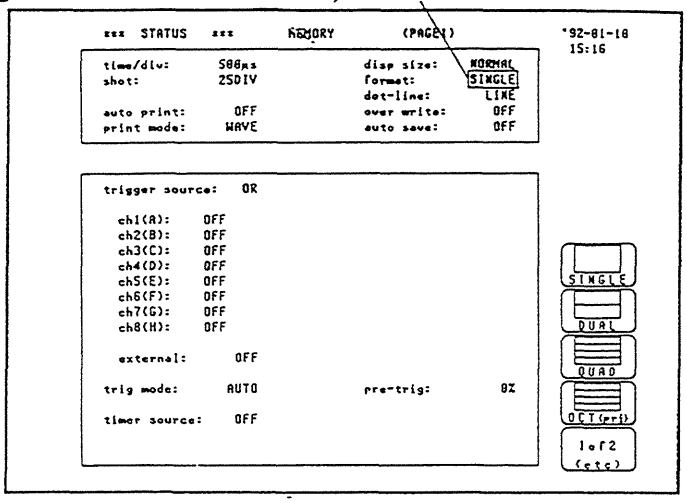
- Record on the printer as sixteen graphs. (On each graph, at most 1 analog signal and 2 logic signals).
- As far as the screen display is concerned, this format is identical to QUAD. (The graphs for printer recording cannot be designated. See the note below)



(NB: The display and recording position for a logic signal cannot be set.)

Method (Screen for making this setting: the "status" screen)

Flashing cursor



1. Using the cursor keys, move the flashing cursor to the "format" item.
2. According to the displays on the function keys, select the desired format.

• Number 1 of 2

Function key indication — Meaning

- SINGLE : SINGLE (one division only)
- DUAL : DUAL (divided into two)
- QUAD : QUAD (divided into four)
- OCT(prt) : OCT (printer only) (divided into eight)
- 1of2 (etc) : go to the next function key setting (Number 2 of 2)

• Number 2 of 2

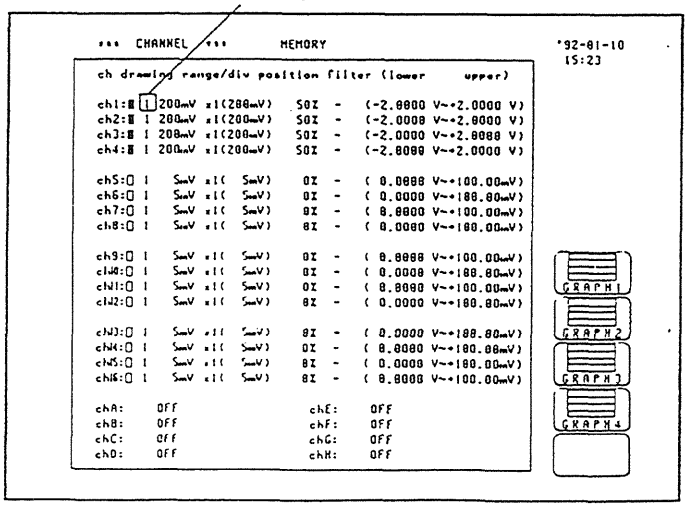
Function key indication — Meaning

- HEX(prt) : HEX (printer only) (divided into sixteen)
- XYsing : X-Y single
- XYquad : X-Y quad
- 2of2 (etc) : go to the earlier function key setting (Number 1 of 2)

NB: For X-Ysingle and X-Yquad, refer to Section 5-4-7 "Using X-Y Waveform Plots."

3. If in step 2. the selection was DUAL, QUAD, OCT, or HEX, then it is necessary to set on which graph the waveforms of each channel will appear. This selection is performed on the "channel" screen.
   (1) Press the CHAN key, and the "channel" screen will appear.
   (2) Move the flashing cursor to the position shown in the figure on the right. Here the setting for channel 1 is performed. Channels 2 to 16 are set in an identical manner. The graphs are selected using the function key displays.

Flashing cursor



Function key indication — Meaning

- GRAPH1 : graph 1
- GRAPH2 : graph 2
- GRAPH3 : graph 3
- GRAPH4 : graph 4

NB: In the cases of OCT (printer only) and HEX (printer only), as far as the printer recording output is concerned, the waveforms for each channel are automatically distributed on each graph according to the table below:

• OCT

	Analog	Logic
graph 1	CH1, CH9	CHA 1 to 4
graph 2	CH2, CH10	CHB 1 to 4
graph 3	CH3, CH11	CHC 1 to 4
graph 4	CH4, CH12	CHD 1 to 4
graph 5	CH5, CH13	CHE 1 to 4
graph 6	CH6, CH14	CHF 1 to 4
graph 7	CH7, CH15	CHG 1 to 4
graph 8	CH8, CH16	CHH 1 to 4

• HEX

	Analog	Logic
graph 1	CH1	CHA 1, 2
graph 2	CH2	CHA 3, 4
graph 3	CH3	CHB 1, 2
graph 4	CH4	CHB 3, 4
graph 5	CH5	CHC 1, 2
graph 6	CH6	CHC 3, 4
graph 7	CH7	CHD 1, 2
graph 8	CH8	CHD 3, 4
graph 9	CH9	CHE 1, 2
graph 10	CH10	CHE 3, 4
graph 11	CH11	CHF 1, 2
graph 12	CH12	CHF 3, 4
graph 13	CH13	CHG 1, 2
graph 14	CH14	CHG 3, 4
graph 15	CH15	CHH 1, 2
graph 16	CH16	CHH 3, 4

• The available magnification/compression ratios along the voltage axis for the various formats are as follows.

SINGLE, X-Y single ····· ×16, ×8, ×4, ×2, ×1, ×1/2

DUAL, X-Y quad ····· ×8, ×4, ×2, ×1, ×1/2, ×1/4

QUAD, OCT, HEX ····· ×4, ×2, ×1, ×1/2, ×1/4, ×1/8

(During printer recording)

OCT ····· ×2, ×1, ×1/2, ×1/4, ×1/8, ×1/16

HEX ····· ×1, ×1/2, ×1/4, ×1/8, ×1/16, ×1/32

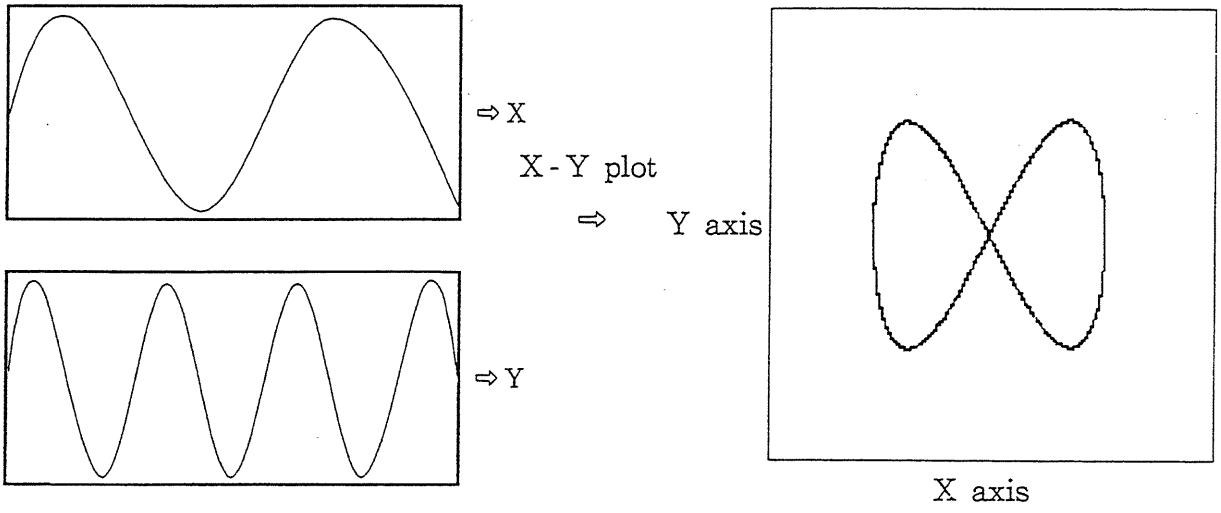
For how to set the magnification ratio, refer to Section 5-4-9.

5-4-7 Using X-Y Waveform Plots

- Setting the format to X-Y single or X-Y quad allows for X-Y combination of waveforms.
- By designating any desired ones of the eight channels as the X axis and the Y axis, four types of X-Y combination can be performed.
- Magnification and compression along the voltage axis are also effective for X-Y plots. (See Notes.)

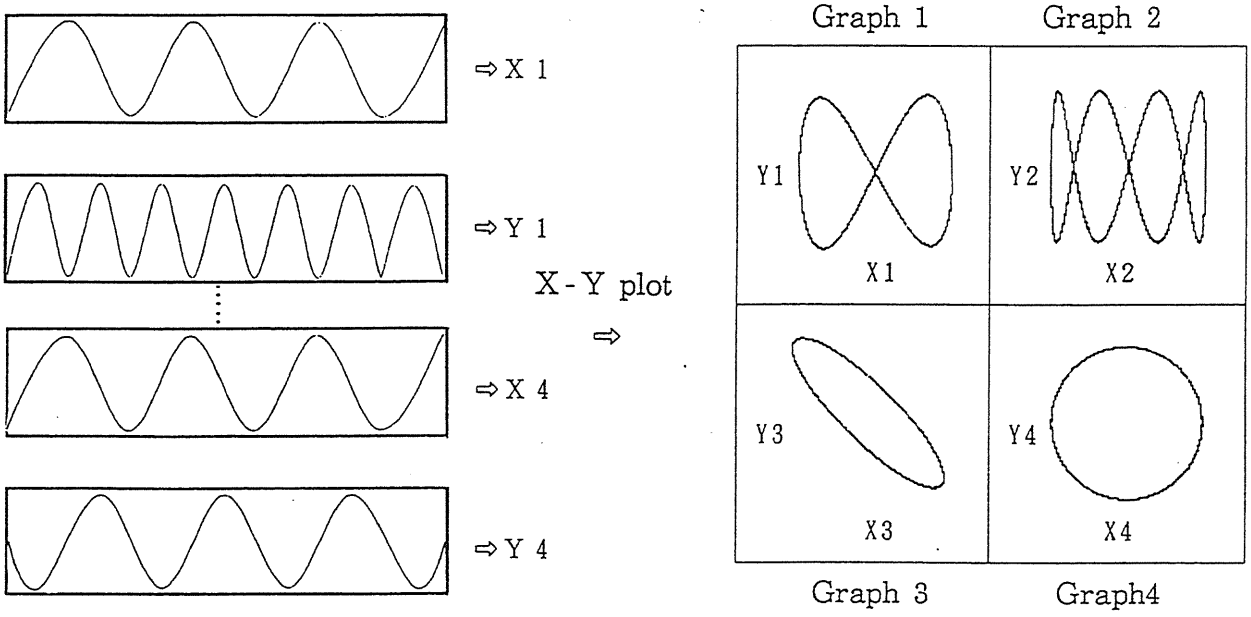
① X-Y single

- The display and printed recording show one X-Y graph.



② X-Y quad

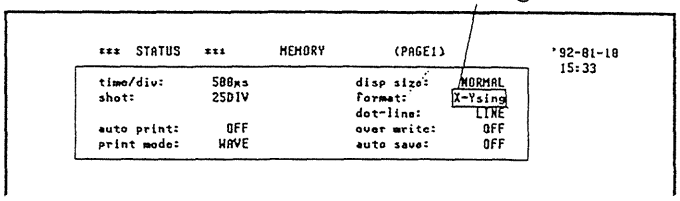
- The display and printed recording show four X-Y graphs.

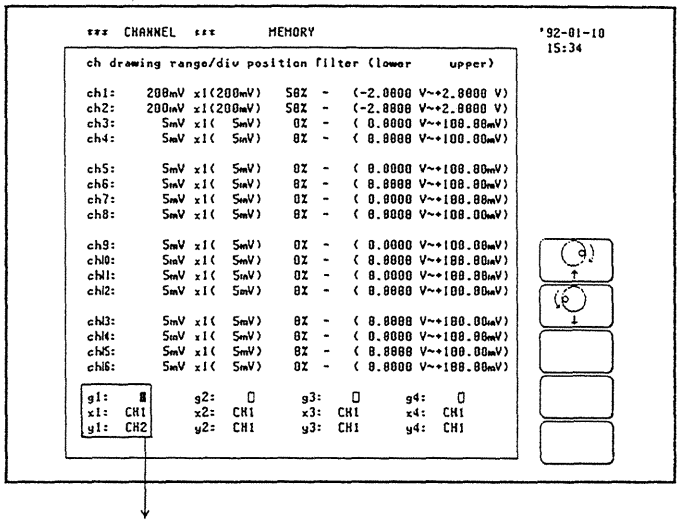


Method (Screens for making this setting: the "status" screen and then the "channel" screen)

1. Using the cursor keys, move the flashing cursor to the "format" item.
2. Press the function key F5 (1 of 2), and change the function key display.
3. As per the function key display, select F2 (for X-Y single) or F3 (for X-Y quad).
4. Press the CHAN key, and the "channel" screen will appear.
5. The settings for graph 1 (g1) will now be made, as an example.
   Move the flashing cursor to the numbers in the figure on the right in order, and make the settings according to the function key display.

Flashing cursor

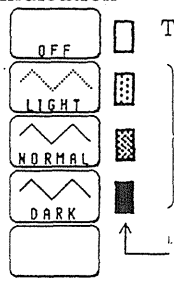




g1: □ — ①
X1: CH1 — ②
Y1: CH2 — ③

① Set the mode for display of the waveform combination:

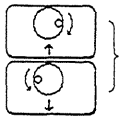
Function key indication — Meaning



- OFF: The waveform is not displayed
- LIGHT / NORMAL / DARK: In order, these become higher intensity from LIGHT to NORMAL to DARK.
- Symbol shown on the screen

② Set the X axis channel:

Function key indication — Meaning



- channel 1 to channel 16

③ Set the Y axis channel:

This is done in the same way as in step ②.

6. For graph 2 (g2) to graph 4 (g4), the settings are made in an identical manner.

• Partial X-Y plots

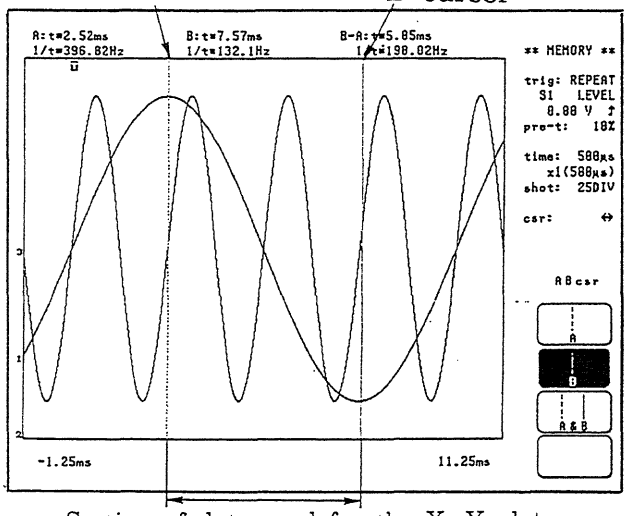
Using the A and B cursors, an X-Y plot can be made for the data between the A and B cursors. (A normal X-Y plot shows the data for the whole recording length.)

Method

1. Display the captured waveform data on the "display" screen in any of SINGLE, DUAL, QUAD, OCT, or HEX formats.
2. Use the A and B cursors to specify the section of data for which the X-Y plot is to be made.
3. Press the STATUS key to change to the "status" screen.

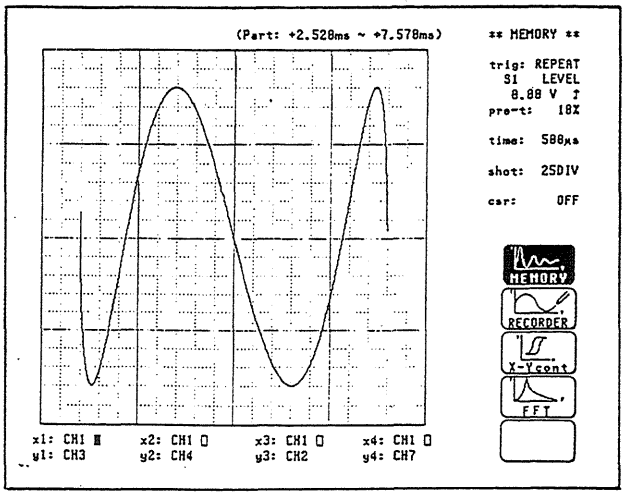
The remainder of the operation is the same as for a normal X-Y plot. Continue from step 1 of the procedure on page 5-28.

• Partial X-Y plot

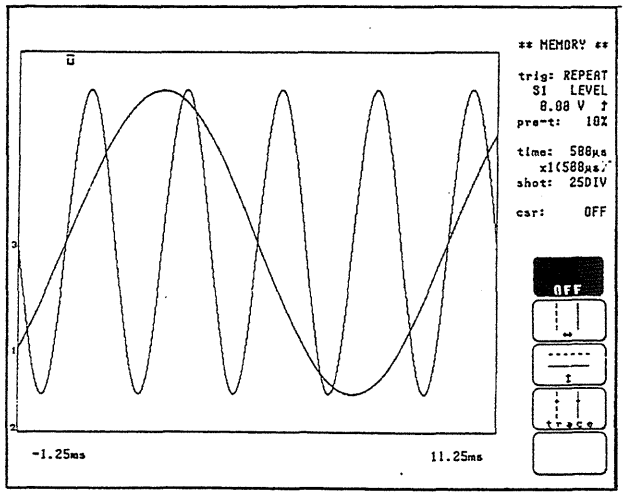


Section of data used for the X-Y plot

⇩

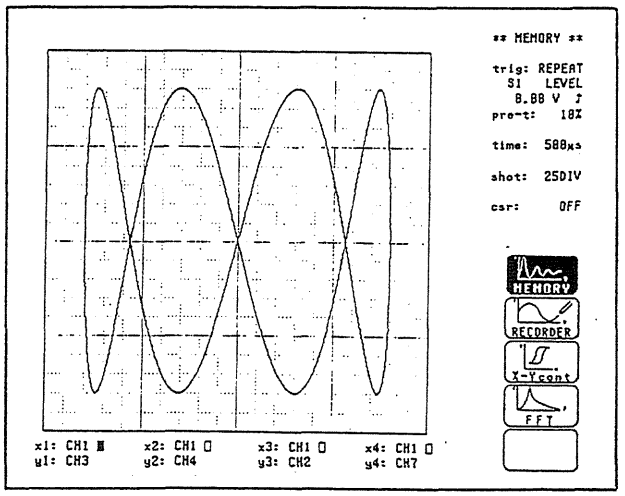


• Normal X-Y plot



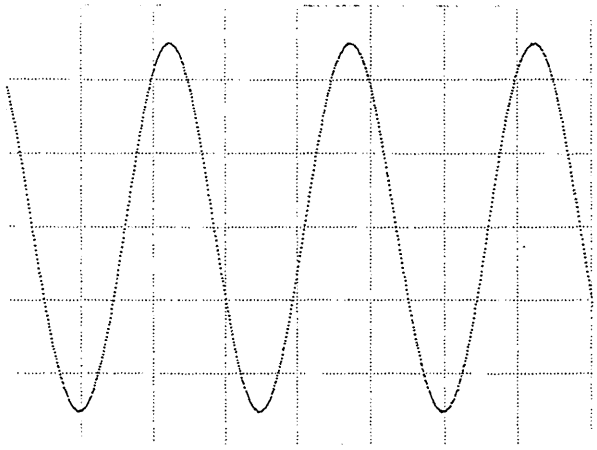
Data for the whole recording length is used for the X-Y plot

⇩

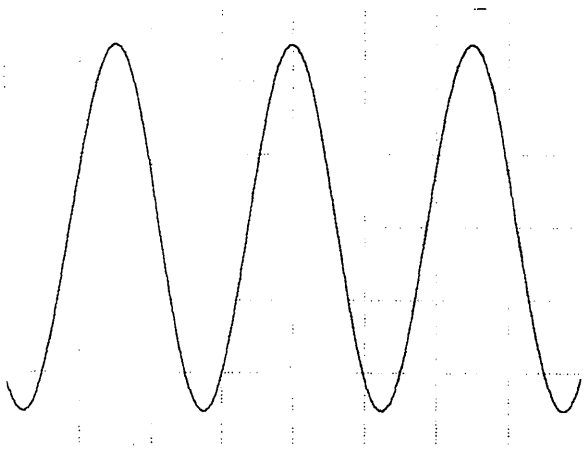


5-4-8 Setting the Interpolation Function

It is possible either to display and record the input signal (the sampled data) just as it is, or after subjecting it to linear interpolation.



DOT display (without interpolation)

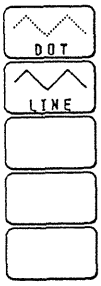


LINE display (with interpolation)

Method (Screen for making this setting: the "status" screen)

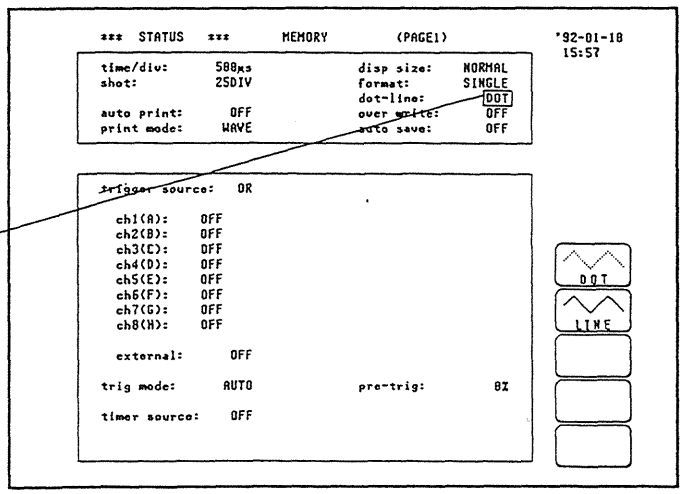
1. Using the cursor keys, move the flashing cursor to the "dot-line" item.
2. According to the displays on the function keys, make the setting.

Function key indication — Meaning



DOT display ··· linear interpolation is not performed. In principle the sampled data is faithfully displayed just as it comes.

LINE display ··· linear interpolation is performed. The display is easier on the eye. High speed display is available when compression is being performed.



- The settings for each of the channels can be made on the "channel" screen or on the "display" screen.
- The 8825 can handle, at the most, 16 analog channels and 32 logic channels.
- For the 16 analog channels it is possible to make the settings for each channel individually, but for the 32 logic channels the ON/OFF setting for an entire group of four channels must be made at one time.

● Making the settings on the "channel" screen:

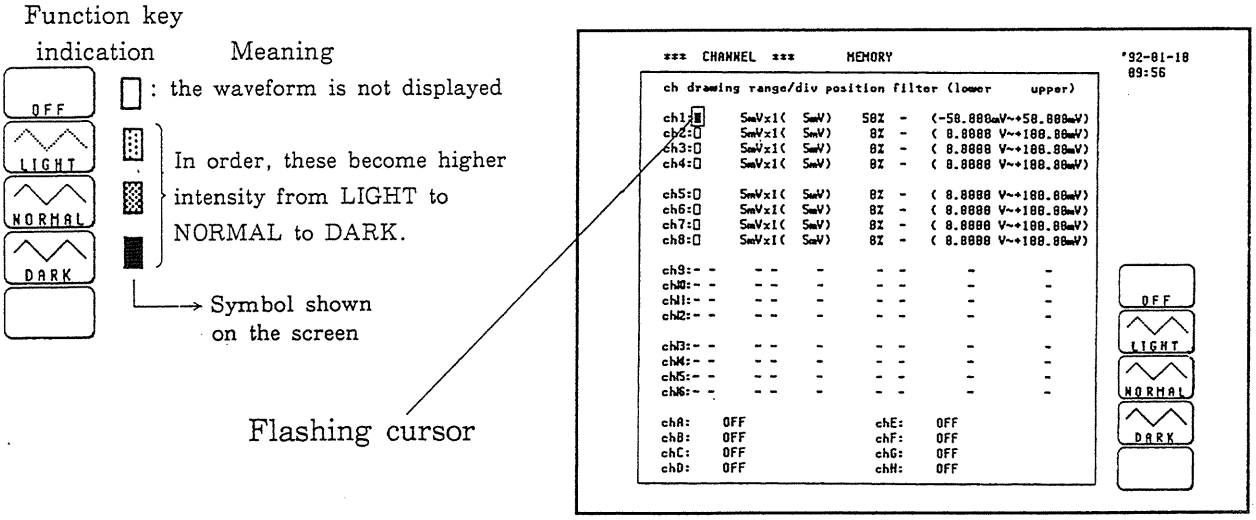
(1) Waveform display (drawing):

Analog:

Settings will be made for the display of an input signal waveform.

Method (Screens for making this setting: the "channel" and "display" screens)

According to the displays on the function keys, select the method of display for the waveform of each channel.



NB:

- If no input unit is fitted, the symbol "-" will be displayed, as for channel 9 to channel 16 in the figure.
- In DUAL, QUAD, OCT (printer only), and HEX (printer only) formats, beside this item, an item for setting the graph will appear. (See Section 5-4-6 "Setting the format.")

Related item

It is possible to copy the contents set for one channel to another channel. For details, refer to Section 12-9 "Copying Function."

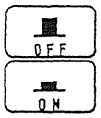
Logic:

Settings will be made for the display of four channels of logic.

Method (Screens for making this setting: the "channel" and "display" screens)

According to the displays on the function keys, for each channel, it is selected whether display will be performed or not.

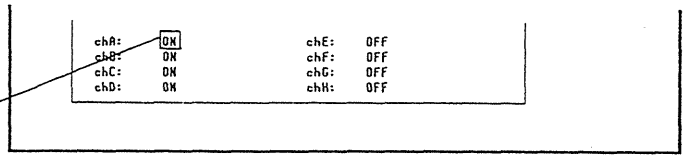
Function key indication — Meaning



: is not displayed

: is displayed

Flashing cursor



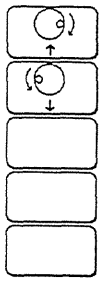
(2) Setting the voltage axis range (range/div)

- For each channel, the voltage axis range (range/div) should be set.
- The value set as range/div denotes the voltage value for 1 DIV along the voltage axis (vertically).

Method (Screens for making this setting: the "channel" and "display" screens)

The settings are made by using the function keys or the rotary knob.

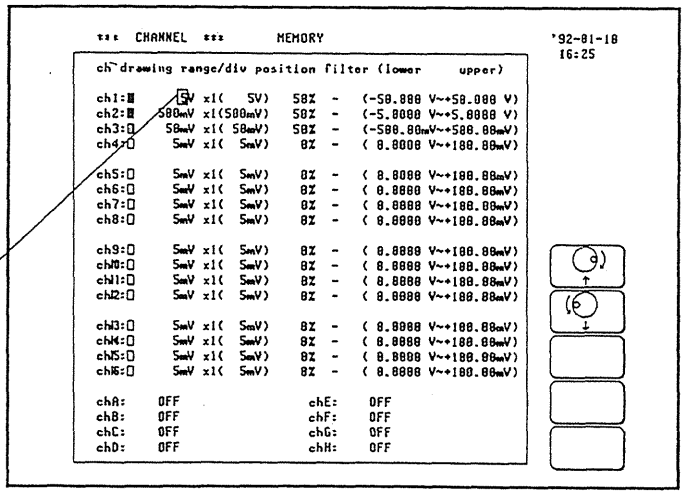
Function key indication — Meaning



5, 10, 20, 50, 100, 200, 500 mV

1, 2, 5, 10, 20 V

Flashing cursor

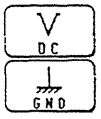


(3) Setting the input coupling

Method (Screens for making this setting: the "channel" and "display" screens)

The selections are made according to the displays on the function keys.

Function key indication — Meaning

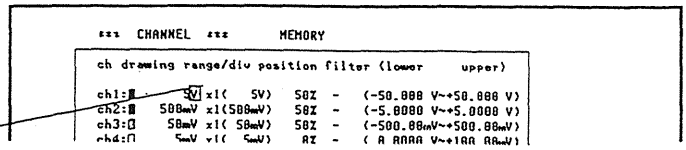


V: The input signal is directly connected to the input amplifier. This allows a DC component to be measured.

⏚: The input signal is not connected. This allows the zero position to be checked.

└Symbol shown on the screen

Flashing cursor



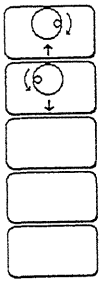
(4) Voltage axis magnification

- For each channel, the magnification ratio along the voltage axis should be set.
- With magnification, detailed observations can be performed which fully exploit the 12-bit A/D resolution.

Method (Screens for making this setting: the "channel" and "display" screens)

The settings are made by using the function keys or the rotary knob.

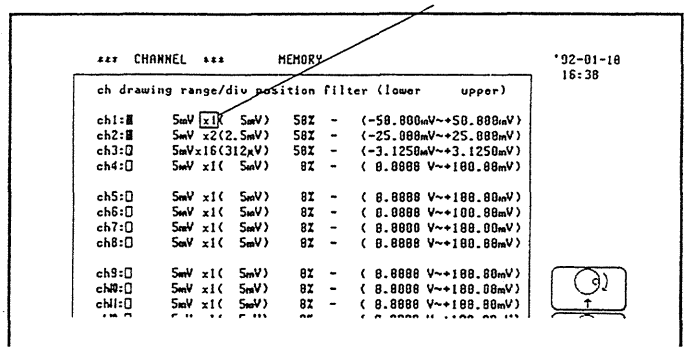
Function key indication



Meaning

×16, ×8, ×4, ×2, ×1, ×1/2

The magnification ratios available vary according to the format. Refer to the note at the end of Section 5-4-6 "Setting the Format."



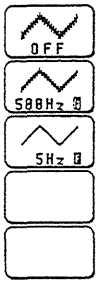
(5) Low-pass filter

- Low-pass filters internal to the input units can be set.
- With such internal filters the frequency bands can be restricted. This has the good effect of getting rid of the following phenomena:
- In the case of level recording in the recorder function mode, because of high speed sampling and high band amplification, the influence of ripple components and noise in the signal can thicken the recording line.
- It can happen that, because ripples are present in the output of transducers and the like, the recording line becomes thick.
- In RMS measurement, a good effect is produced with regard to pulse type noise.

Method (Screens for making this setting: the "channel" and "display" screens)

By using the function keys or the rotary knob, make the setting.

Function key indication



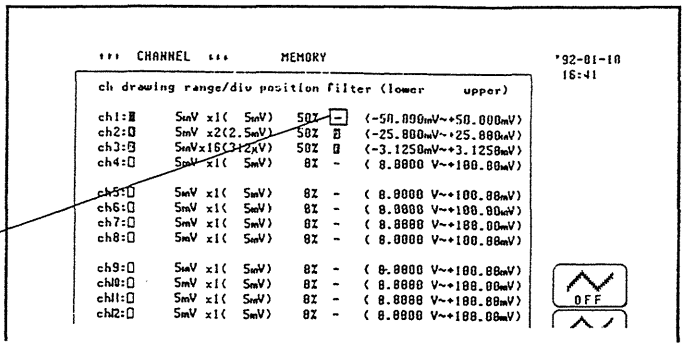
Meaning

—: No low pass filter is used.

F: A filter with 500 Hz cutoff is used.

F: A filter with 5 Hz cutoff is used.

→Symbol shown on the screen



(6) Position

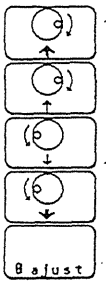
- The position can be set for each channel.
- The range for the position varies according to the magnification ratio along the voltage axis and the display size. (For details, refer to the "Background" section below.)

Method (Screens for making this setting: the "channel" and "display" screens)

By using the function keys or the rotary knob, make the setting.

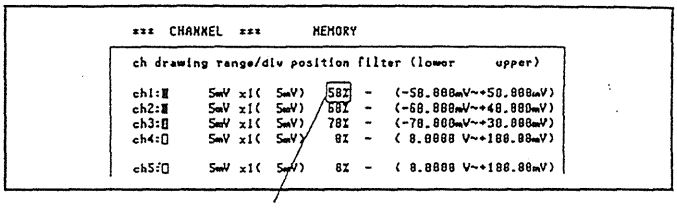
Function key indication

Meaning



When the magnification ratio is 1, from -28% to 128%. For other cases, see the table below.

(See 5-4-10. Zero Adjustment)



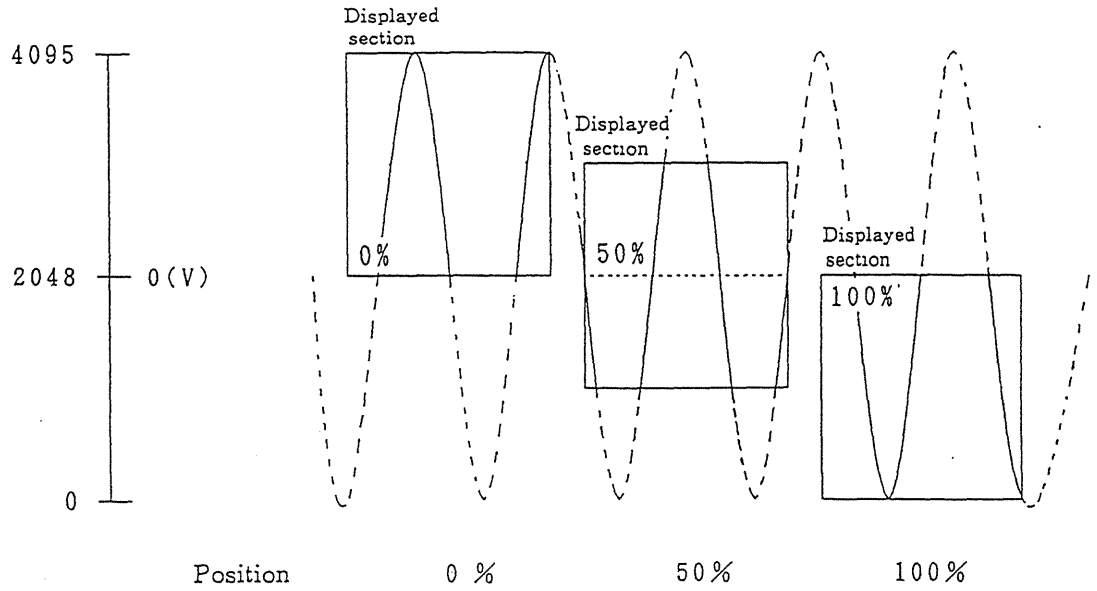
Flashing cursor

Magnification ratio		×16	×8	×4	×2	×1	×1/2
Display size	NORMAL	-1950 to 2050	-926 to 1026	-410 to 510	-156 to 256	-25 to 128	36 to 64
	WIDE	-1934 to 2034	-910 to 1010	-402 to 502	-146 to 246	-18 to 118	46 to 54

(units %)

Background

- The position has the significance shown in the figure below.
- It is possible to display the hidden portion of the waveform, according the relative position of the displayed section at which 0 V appears.



(7) Variable display function

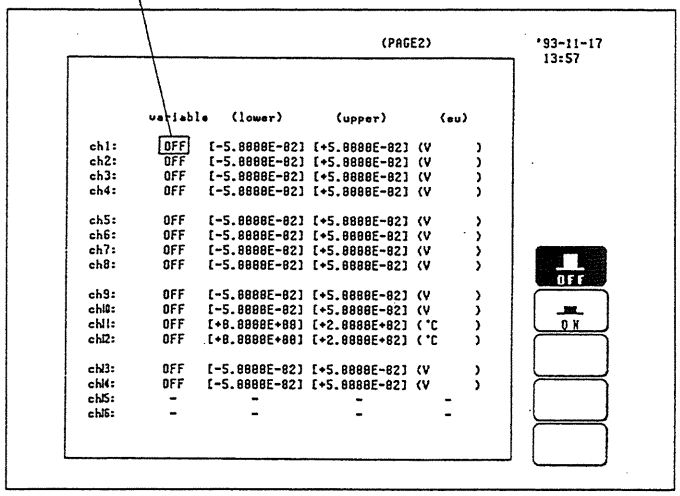
- Using the variable display function, the position and size of the waveform to be displayed can be set as required. (However, in the variable display function the magnification can be set up to 10 times.)
- For the "variable" screen, the upper and lower limit values of the waveform on the "display" screen can be set.
- It is possible to enable or disable the "variable" function for each channel.
- The upper and lower limit values of the waveform processing calculation equation can be set in this step.

Method (Screens for making this setting: the CHANNEL (PAGE 2) screen)

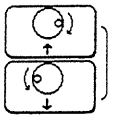
- Using the cursor keys, move the flashing cursor in order of the figure right.

1. Using the CHAN or CURSOR keys, set to the CHANNEL (PAGE 2) screen.
2. Press the function key, F2 (ON).
3. Sets the upper and lower limit values.
   - (lower) and (upper) can be set within the range -9.9999E+29 to +9.9999E+29.
   - It is not possible to set the value so that the lower limit exceeds upper limit.
   - Move the flashing cursor in each digit.

Flashing cursor

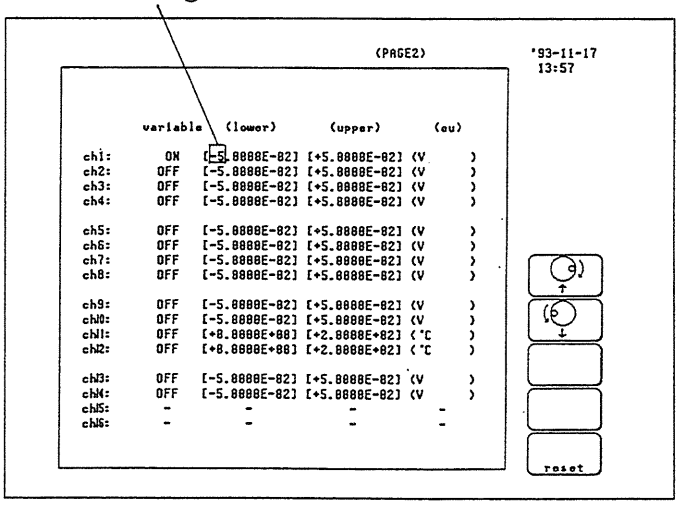


Function key indication Meaning



from 0 through 9 (for the most significant digit, from 9 through +9) (for the exponent, from -29 through +29)

Flashing cursor



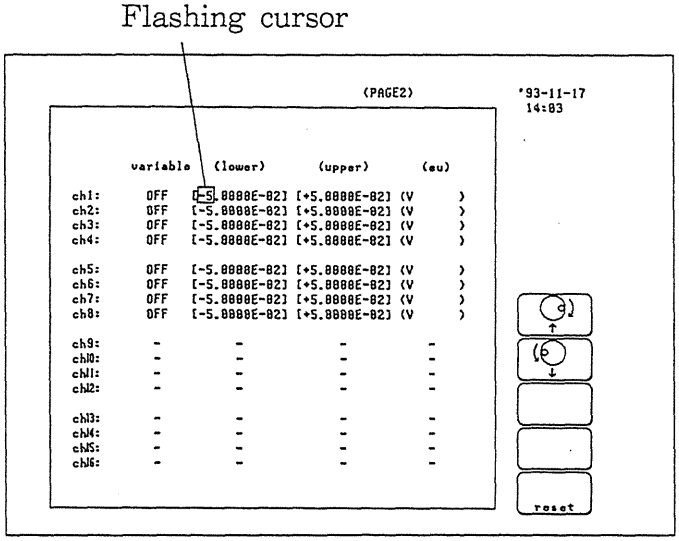
Reset the "variable" upper and lower limit values

- When the flashing cursor is aligned with (lower) or (upper) columns, the upper and lower limit values can be reset to initial condition.
- When the "variable" is set to OFF, the upper and lower limit values on the CHANNEL screen (PAGE 1) are automatically set at the variable (lower) and (upper) columns.

Press the F5 (reset) key.

Function key indication | Meaning

reset : Resets the upper and lower limit values to initial condition



Notes

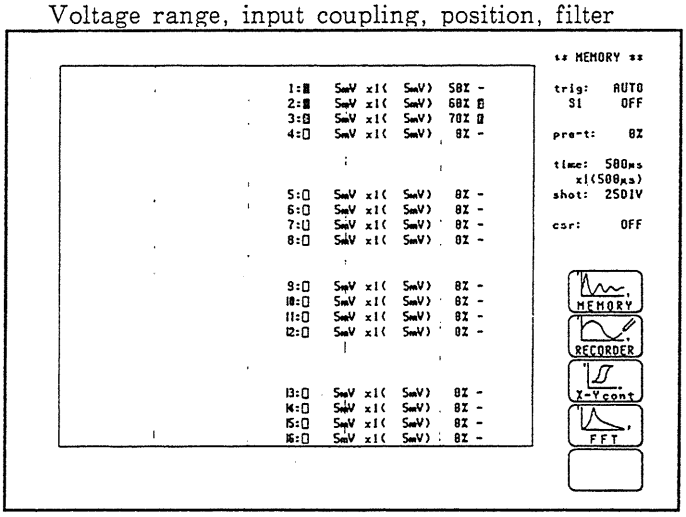
- A dash "-" is shown for channel 9 to 16 that no input unit installed as shown in the figure above.
- For the channel which the "variable" is set to ON, "variable" will appear at the display portion or "lower upper" on the CHANNEL screen (PAGE 1).

Related item

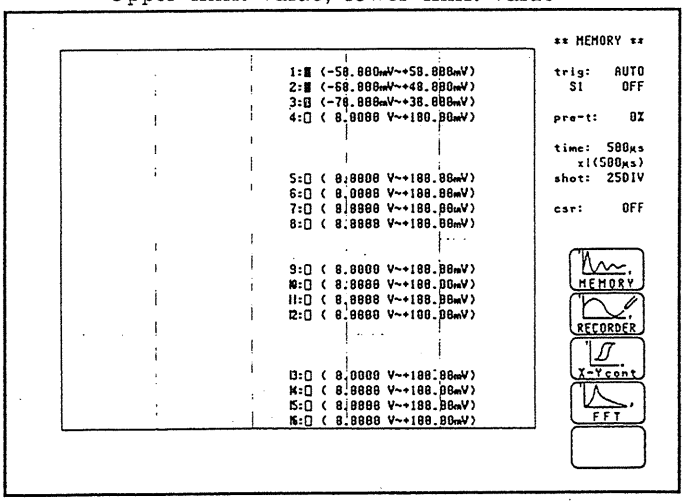
It is possible to copy setting from one channel to another. For details, refer to Section 12-9 "Copy function".

- Making the settings on the "display" screen:
  - Pressing the CH SET key makes it possible partially to overlay the "channel" screen over the "display" screen. Each time this key is pressed, the contents which are displayed are altered.
  - By moving the cursor on this partially displayed portion of the "channel" screen, it is possible to make settings on the "display" screen in an identical manner to that described above with respect to the "channel" screen.

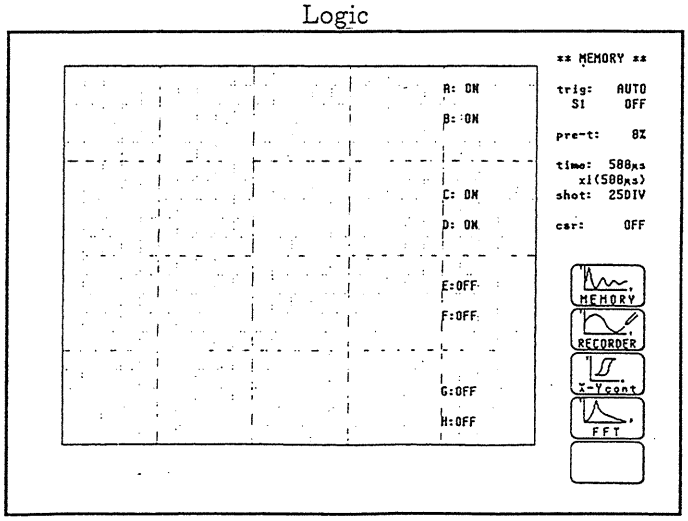
Voltage range, input coupling, position, filter



Upper limit value, lower limit value



Logic



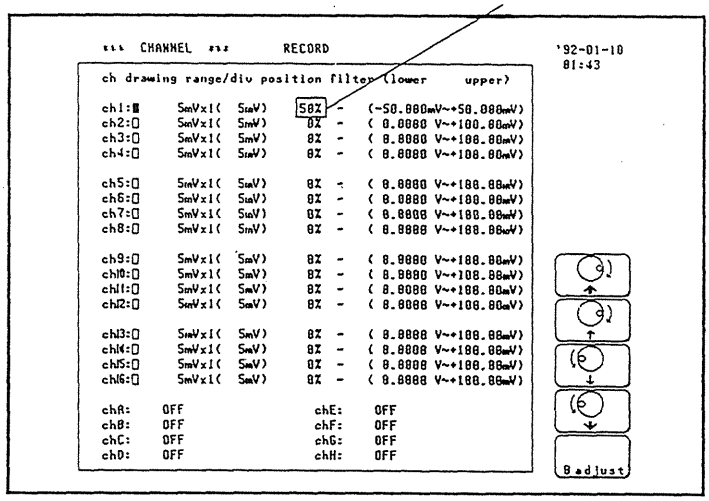
This function provides for accurate adjustment of the waveform to the origin position when a zero voltage is input. Use it for reading precise values from the screen or a printed recording or to ensure accurate results from waveform computations.

Method (Screens for making this setting: the "channel" and "display" screens)

Always allow at least 30 minutes warming up before carrying out this procedure, to ensure that the internal temperature of the unit has stabilized.

1. Using the cursor keys, move the flashing cursor to the "position" item.
2. Press the function key F5 (0 adjust), and all of the channels will be calibrated at once.
   If later the voltage axis range is changed, this function should be executed again.

"Channel" screen Flashing cursor



NB: This setting can be made on the "display" screen in an identical manner. For how to do this, refer to the description of making the settings on the "display" screen in Section 5-4-9 "Settings for Each of the Input Channels."

NOTE

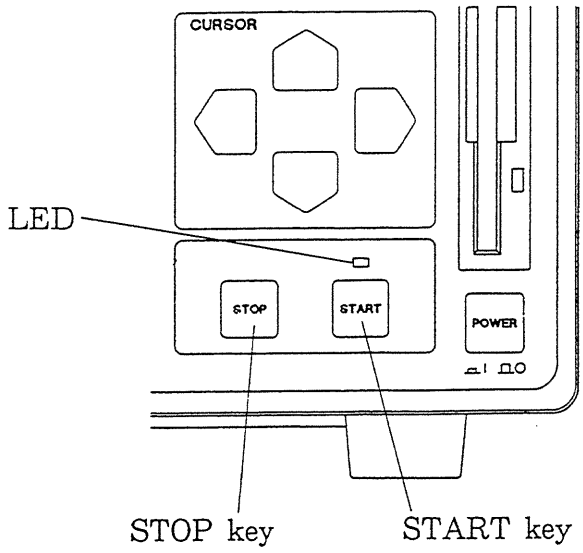
- Zero adjustment should be performed about 30 minutes after turning the power on, so as to let the unit warm up.
- Zero adjustment cannot be performed while measurement is taking place.
- The results of zero adjustment relate only to the input units which are fitted in the 8825 at the time; so, if any input unit is taken out and changed, it is necessary to perform the zero adjustment process again.

5-4-11 Starting and Stopping Measurement

Measurement is started by pressing the START key. While measurement is taking place, the LED above this START key is illuminated. When measurement has finished, the LED goes out.

Method

1. Press the START key.
   Measurement will start.
2. Press the STOP key.
   Measurement will stop.



NOTE

(1) Measurement starting and stopping in the three trigger modes:

a. When the trigger mode is SINGLE:
   Press the START key and, if the trigger conditions hold, an amount of data of length equal to the recording length will be read in and stored. Then, without pressing the STOP key, the system will go into the measurement finished state.

b. When the trigger mode is REPEAT:
   Press the START key and, if the trigger conditions hold, an amount of data of length equal to the recording length will be read in and stored. Thereafter, every time the trigger conditions hold, data will be read in and the contents of the memory will be overwritten.

c. When the trigger mode is AUTO:
   Press the START key and, whether or not the trigger conditions hold, an amount of data of length equal to the recording length will be read in and stored. Thereafter, repeatedly, data will be read in and the contents of the memory will be overwritten.
   Press the STOP key and measurement will terminate.

(2) Stopping measurement:

When the STOP key is pressed, after an amount of waveform data of length equal to the recording length has been read in and stored, operation terminates. However, the auto-save function and the auto-print function, even if currently enabled, are not effective.

Even if the STOP key is pressed, until reading in and storage of waveform data has finished, the LED of the START key is illuminated and measurement operation continues. If at this time the STOP key is pressed again, this stops the reading in and storage of the waveform, or if the trigger mode is REPEAT or AUTO the previously stored waveform is displayed. However, if the roll mode is set to ON (refer to Section 12-3-9 "Setting the Roll Mode"), the waveform is displayed up to the sampled point.

If, after the STOP key has been pressed once, the START key is pressed before the reading in and storage of waveform data has terminated, then a restart occurs, and the situation is identical to that which was the case at the very beginning when measurement started.

5-4-12 Using the A and B Cursors

You can use the A and B cursors to measure time differences, frequencies, voltage differences, and temperature differences getting a direct digital readout on the "display" screen. (if using the scaling function, the scaled values; see Section 12-4 "Scaling Function")

There are two types of cursor: the line cursors and the cross cursors.

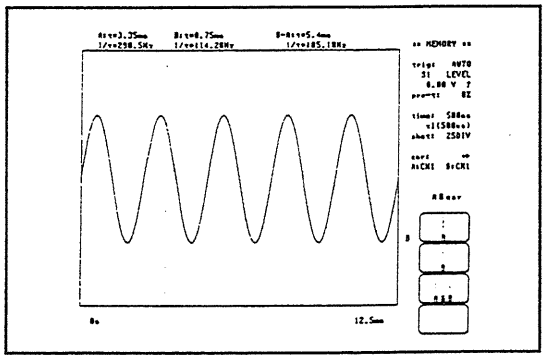
(1) Line cursors (vertical and horizontal)

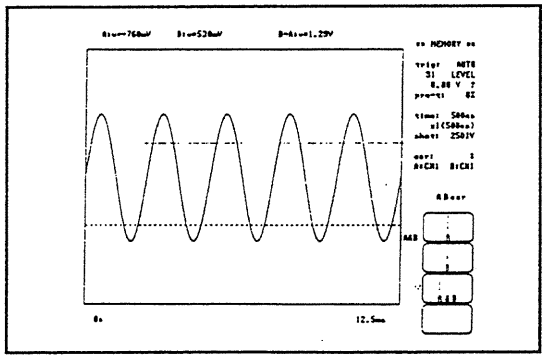
○ A and B cursors used individually

- Vertical cursor
  - t : time from the trigger point
  - 1/t : the frequency, taking t as the period
- Horizontal cursor
  - V : voltage difference (or temperature difference) from 0 V (or ℃)

○ A and B cursors used together

- Vertical cursors
  - t : time interval between the A and B cursors
  - 1/t : the frequency, taking t as the period
- Horizontal cursors
  - V : voltage difference (or temperature difference) between the A and B cursors





(2) The cross cursors

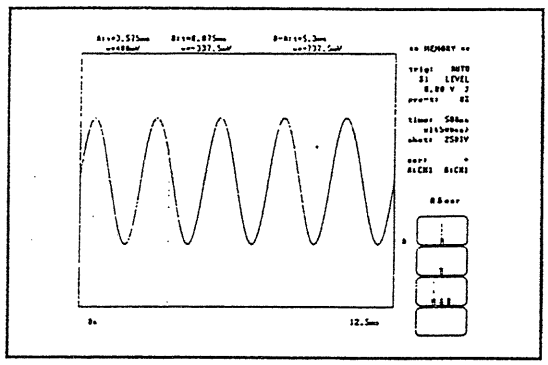
As a cross cursor is moved, the intersection of the cross (the trace point) traces the waveform of the specified channel.

○ A and B cursors used individually

- t : time interval from the trigger position to the trace point
- V : voltage difference (or temperature difference) from 0 V(℃)

○ A and B cursors used together

- t : time interval between the trace points
- V : voltage difference (or temperature difference) between the trace points



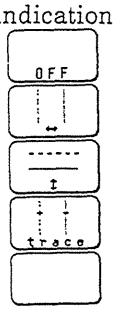
Method (Screen for making this setting: the "display" screen)

(1) Line cursors

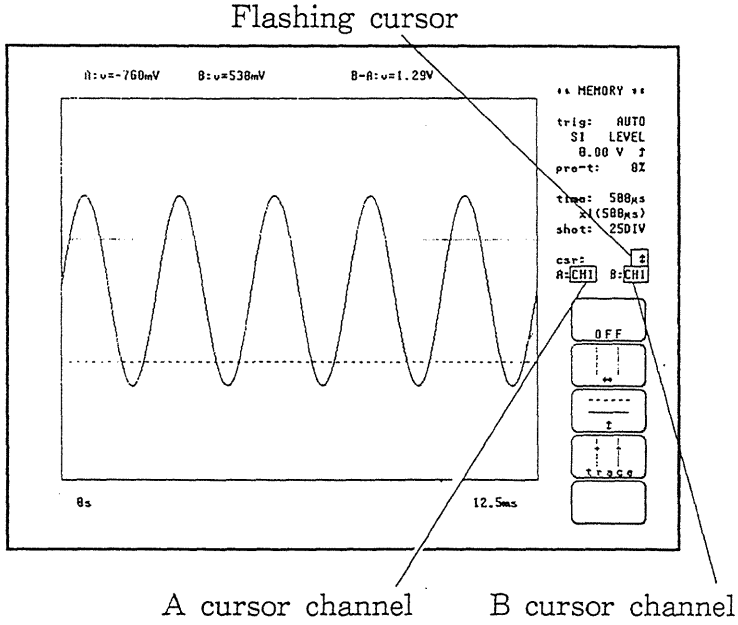
Using the cursor keys, move the flashing cursor to the "csr" item.

1. According to the displays on the function keys, select the desired line cursor.

Function key indication — Meaning

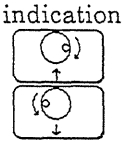


: do not use the A and B cursors
: line cursor (vertical, display t and 1/t)
: line cursor (horizontal, display V)
: cross cursor



2. If in step 1 the line cursor (horizontal) was selected, now select the waveform channel for reading voltage values for each of the A and B cursors.

Function key indication — Meaning

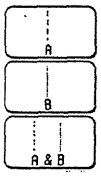


} Channel 1 to Channel 16

NB: • Even if the A and B cursors have different channels specified, the A to B voltage difference is derived from the absolute values of the voltages relating to their respective channels.
• It is not possible to select a channel on which no waveform is being displayed.
• When the line cursors are being used along the time axis, this item does not appear.

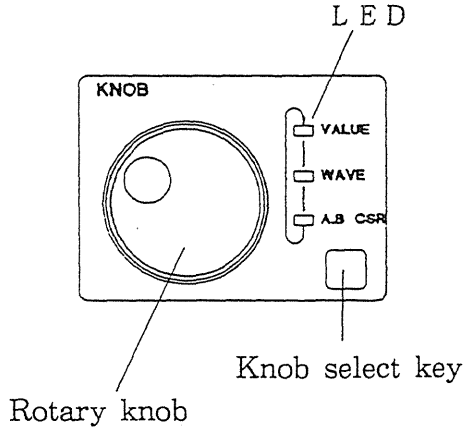
3. Press the knob select key, and the LED for A.B CSR will be illuminated.
4. According to the display on the function keys, select the cursor to be moved.

Function key indication — Meaning



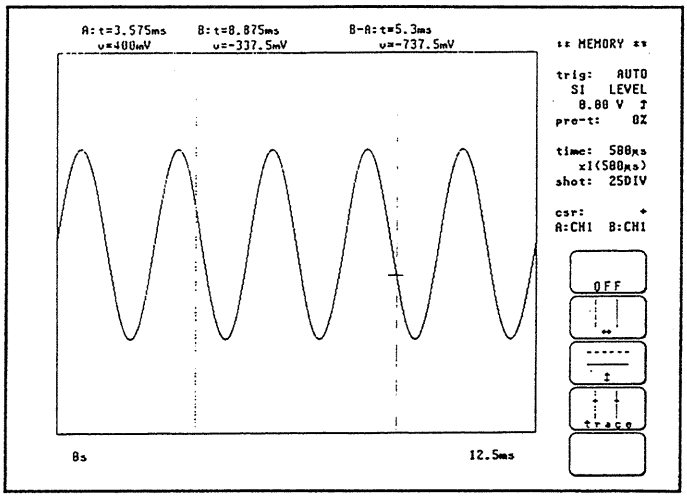
: move the A cursor
: move the B cursor
: move the A and B cursors simultaneously

5. Turn the rotary knob, to move the cursor.
t and 1/t, and V, are derived according to the position of the cursor.
In the case of vertical cursors, it is quite valid for the A or the B cursor to go off the screen.



(2) Cross cursors

1. In step 1 of (1), select F4 (trace).
2. Now designate which channel the cross cursor will trace the waveform of. This setting is made in a manner identical to step 2 of (1).
3. Just as in step 3 of (1), press the knob select key, and the LED for A.B CSR will be illuminated.
4. In a manner identical to step 4 of (1), select the cursor to be moved.
5. Turn the rotary knob, and the cross cursor will move.
   t and V are derived according to the position of the trace points.
   It is quite valid for the A or B cursor to go off the screen.

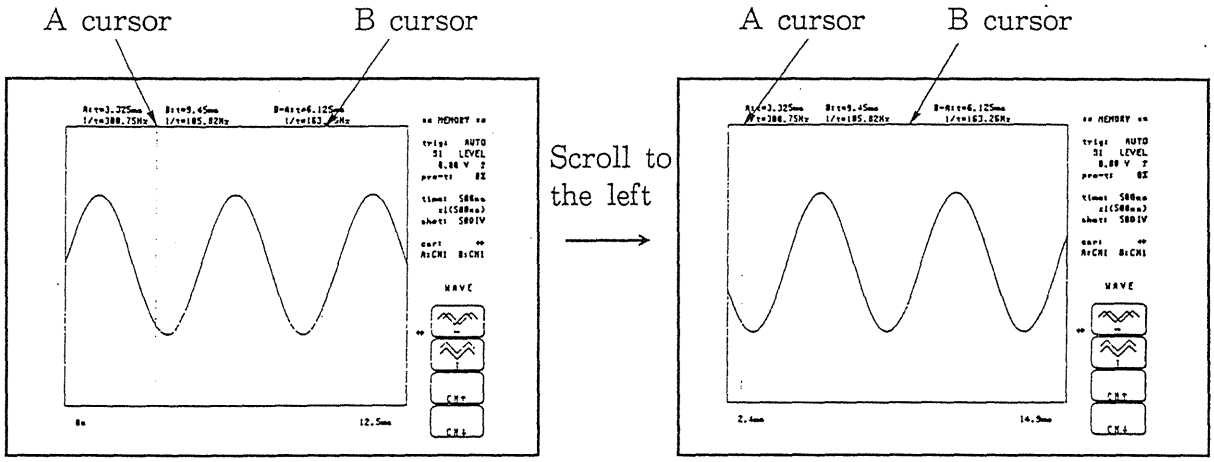


NOTE

○ Waveform scrolling and movement of the cursors:

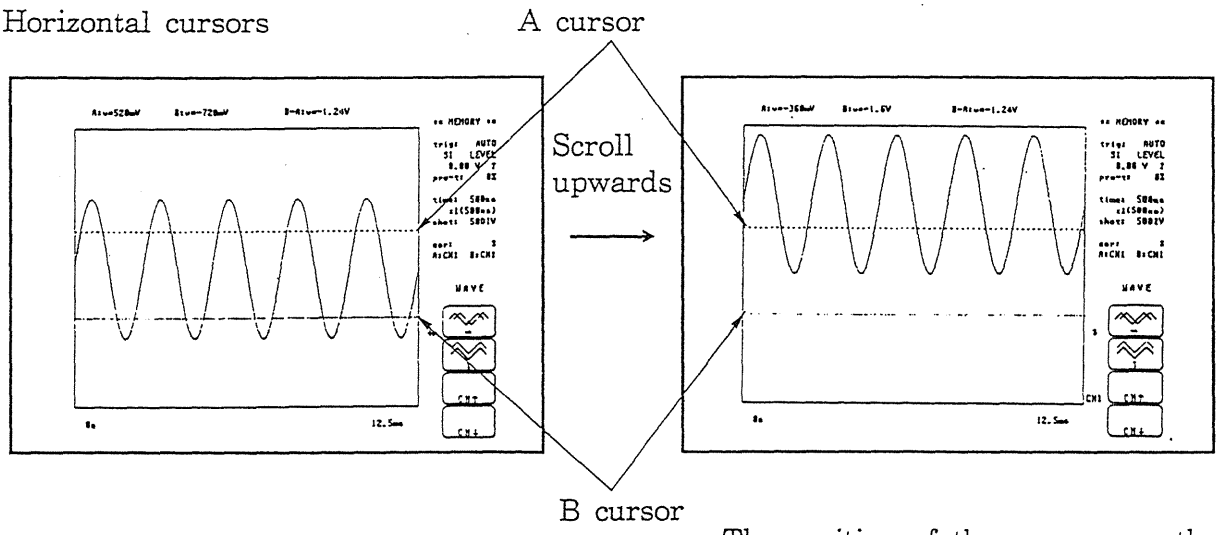
① The case of the vertical cursors or the cross cursors differs from the case of the horizontal cursors, in the movement of the A and B cursors when the waveform is scrolled.

Vertical cursors or the cross cursors
(taking vertical cursors an example)



The cursors move with the waveform, and may go off the screen.

Horizontal cursors

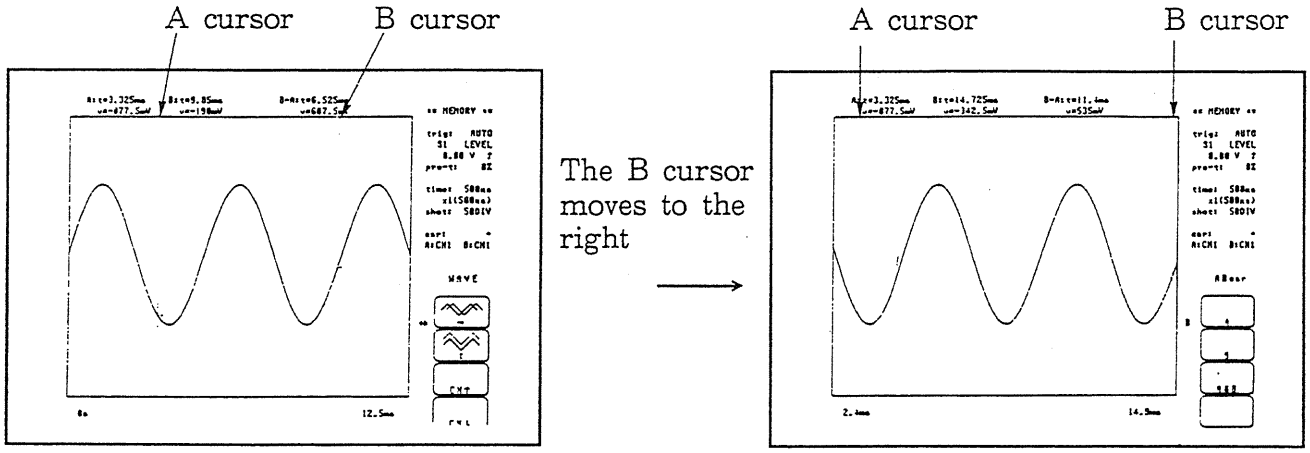


The position of the cursors on the screen does not change.

② The treatment of scrolling of the waveform when the A and B cursors are moved in the case of the vertical cursors or the cross cursors differs from the case of the horizontal cursors.

Vertical cursors or the cross cursors
(taking cross cursors as an example)

The B cursor is set to move.

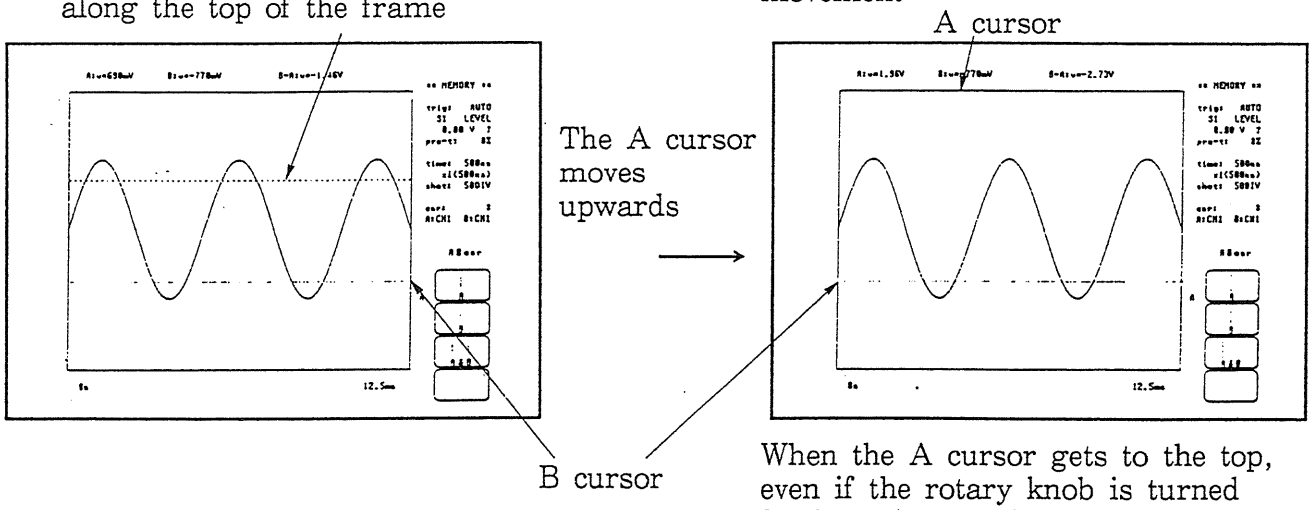


When the B cursor gets to the end, the waveform scrolls to the left. The A cursor moves with the waveform.

Horizontal cursors

The A cursor is aligned along the top of the frame

The A cursor is designated for movement



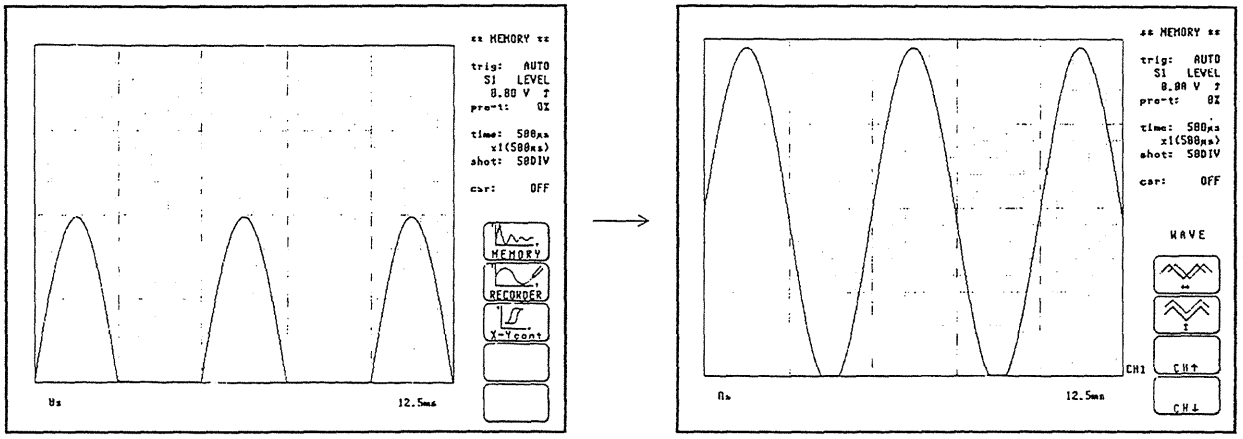
When the A cursor gets to the top, even if the rotary knob is turned further, the waveform is not scrolled.

Related item

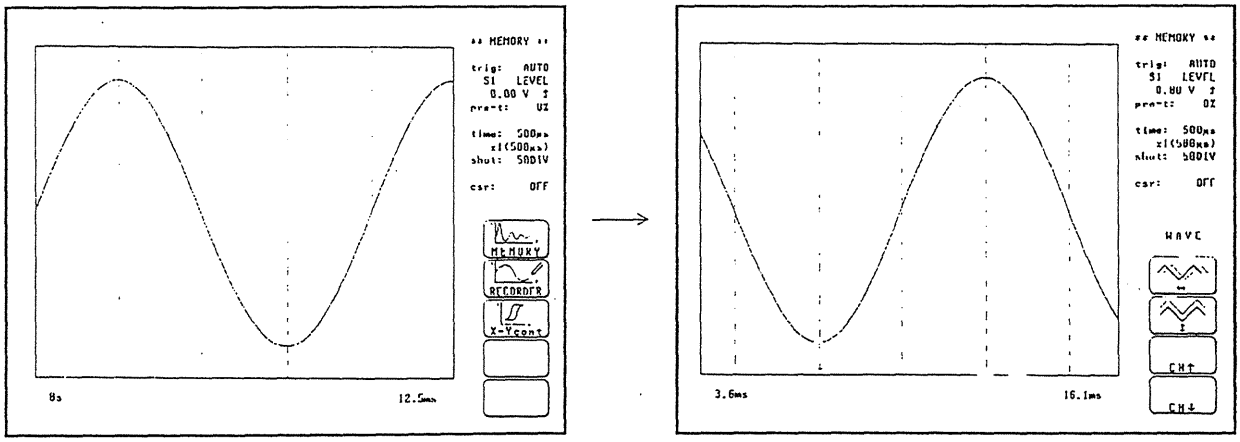
If a vertical cursor or the cross cursor is off the screen, it is possible to find out at which part of the entire recording it is located. Refer to Section 5-4-17 "Help Function."

5-4-13 Waveform Scrolling

The waveform can be scrolled vertically and horizontally on the screen display.



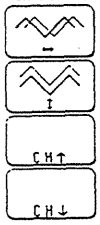
Scrolling vertically



Scrolling horizontally

Method (Screen for making this setting: the "display" screen)

1. Press the knob select key to illuminate the LED for WAVE. (Movement of the rotary knob now performs waveform scrolling).
2. According to the displays on the function keys, select which type of scrolling is required - vertical or horizontal. (If vertical scrolling is selected, the channel for the waveform to be scrolled should be designated.)

		Function key indication	Meaning
			: horizontal scrolling
			: vertical scrolling
Number of the channel whose waveform is to be scrolled	→CH1		: increases the channel number
			: decreases the channel number

3. By turning the rotary knob, the waveform can be scrolled.

5-4-14 Auto-Range Function

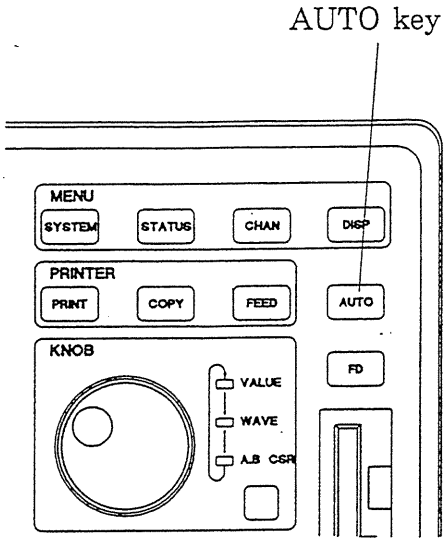
The time axis range (time/div) and the voltage axis range (range/div) for the input waveform are set automatically and shown on the screen display.

Method

Press the AUTO key.

Measurement will start, with the auto-range function enabled.

After range is set, LED on the START key is illuminated, and measurement will start automatically.



NOTE

○ Setting the time axis range

Taking the lowest numbered channel among the channels for which waveform display is on, 1 to 2.5 cycles are automatically set to be recorded as 25 DIV. However, if for the input signal for this channel there is only a small difference between the maximum value and the minimum value in the range of highest sensitivity (5 mV/DIV), the setting is made by taking the next higher channel.

○ If measurement has started using the auto-range function:

Various settings are selected as shown below. (The others are not altered).

a. Conditions related to the input units:

- Voltage range ····· value set automatically
- Position ····· value set automatically
- Low-pass filter ····· OFF
- Variable display function ····· OFF

} For 16 channels

b. Trigger conditions:

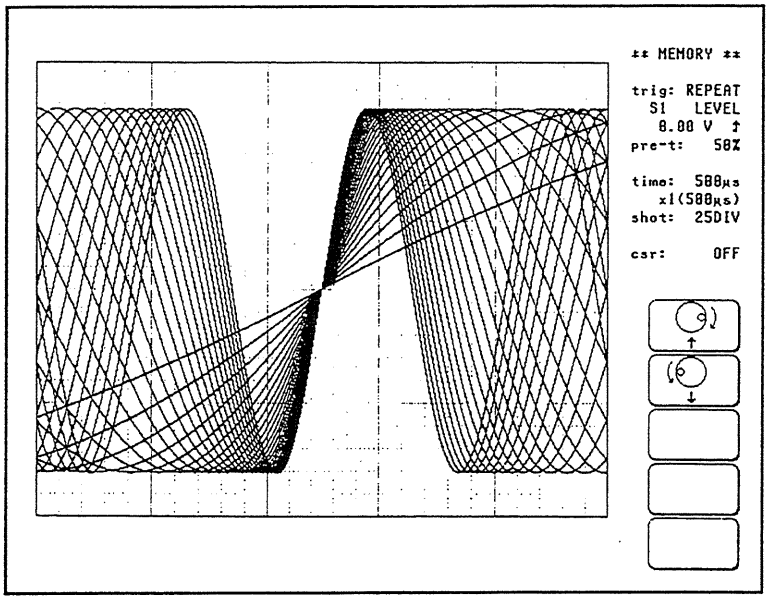
- AND/OR for internal trigger and external trigger ··· OR
- Internal trigger ····· only ON for the lowest numbered one of the channels for which waveform display is on. (However, only in the case that the difference between the maximum and minimum values is significant). OFF for the other seven channels.

- Trigger type ···· Level
- Slope ····· ↑ (rising) } For one channel only
- Trigger level ··· value automatically set
- Filter ····· OFF
- External trigger ····· OFF
- Timer trigger ····· OFF
- Pre-trigger ····· 20%
- Trigger mode ····· AUTO

c. Status conditions:

- Time axis range (time/div) ····· value set automatically
- Magnification/compression ratio along the voltage axis ···· ×1
- Magnification/compression ratio along the time axis ····· ×1
- Memory segmentation function ····· OFF

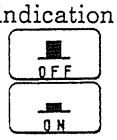
- When the trigger mode is REPEAT or AUTO, it is possible to perform superimposition without deleting a waveform that is already on the screen.
- Using this function allows successive waveforms to be compared.



Method (Screen for making this setting: the "status" screen)

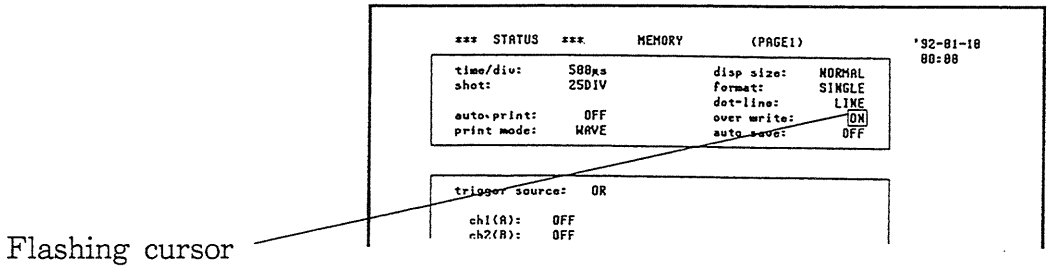
1. Using the cursor keys, move the flashing cursor to the "over write" item.
2. According to the displays on the function keys, set the function ON or OFF.

Function key indication — Meaning



OFF : do not perform superimposition

ON : perform superimposition



Flashing cursor

NOTE

(1) The superimposition function would have no meaning if the trigger mode were SINGLE, because once the data is input and stored the system goes into the measurement terminated state.

(2) When the superimposition function is being used, the following actions cannot be performed: waveform scrolling and waveform decision. Additionally, if printing out is performed, only the most recently stored waveform will be printed.

(3) After waveform superimposition has been performed, when the following settings are performed the superimposed waveform(s) will be deleted and only the most recently read in and stored waveform will be displayed:

- ○ Change of the magnification or compression ratio of the screen (along the time axis or the voltage axis);
- ○ Change of the format, or change of the screen size;
- ○ Change of the interpolation function for the screen display;
- ○ Change of the input channel for display;
- ○ In X-Y format, change of the X axis or the Y axis.

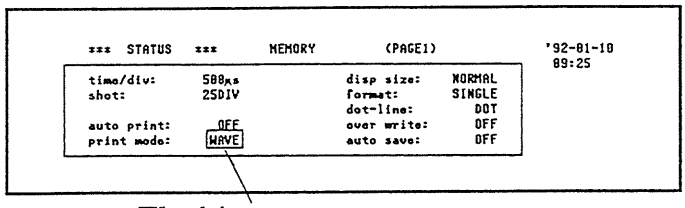
Further, if the START key is pressed, all the superimposed waveform(s) will be deleted. (The most recently read in and stored waveform will also be deleted.)

(1) Setting the style for recording the waveform on the printer (the print mode)

There are two styles for recording the input signal (the sampled data) on the printer, as a waveform (WAVE) and as numerical values (LOGGING), and either of these can be selected.

Method (Screen for making this setting: the "status" screen)

1. Using the cursor keys, move the flashing cursor to the "print mode" item.
2. According to the displays on the function keys, make the selection.



Flashing cursor

Function key indication — Meaning

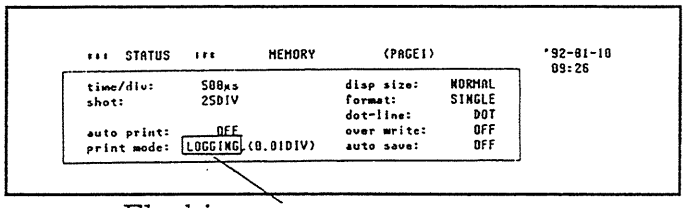
: the input signal is recorded as a waveform

: the input signal is recorded as numerical values

3. If F2 (LOGGING) has been selected, then it is necessary to set at what DIV intervals the data value will be printed out.
   This is done according to the displays on the function keys.

Function key indication — Meaning

0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100 DIV



Flashing cursor

(2) Methods of printing

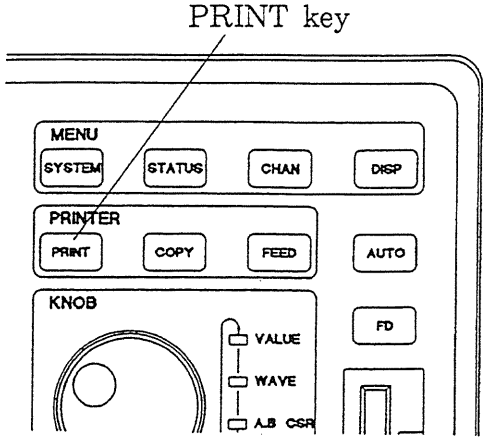
There are the four following ways to print: manual printing, partial printing, auto print function, and screen copy printing.

① Manual printing

This prints out the stored data from one measurement for its entire recording length.

Method

- When measurement is finished, press the PRINT key.
- Because the measurement data is saved in memory, it can be reprinted as many times as required.
- If magnification or compression is enabled, the data is printed out in that state.

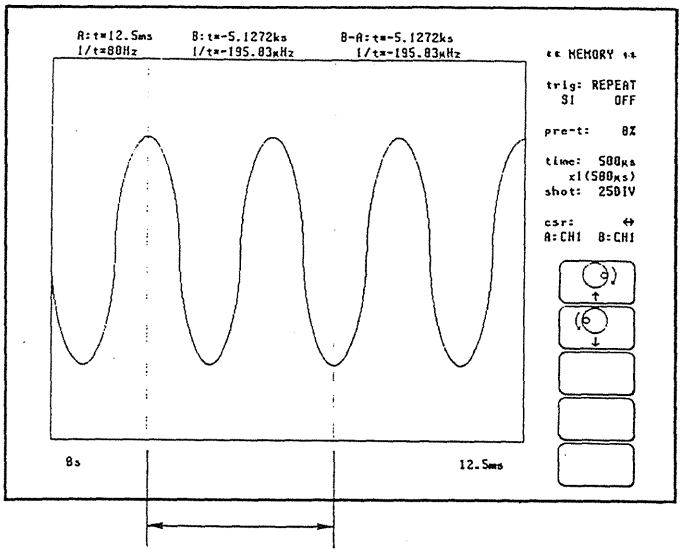


② Partial printing

• Using the A and B cursors (the vertical cursors or the cross cursors), it is possible to print out only the desired portion of the recorded data. The part of the waveform delimited by the cursors is printed. This operation is valid even if the A cursor or the B cursor is off the screen. For details, refer to the Example given below.

Method (Screen for making this setting: the "display" screen)

1. Use the A and B cursors to indicate the part of the waveform to be recorded.
2. Press the PRINT key.
   - For details about the A and B cursors, refer to Section 5-4-12 "Using the A and B Cursors."
   - Partial printing can be used for both waveform printing (WAVE option) and numerical printing (LOGGING option).



This portion is printed out

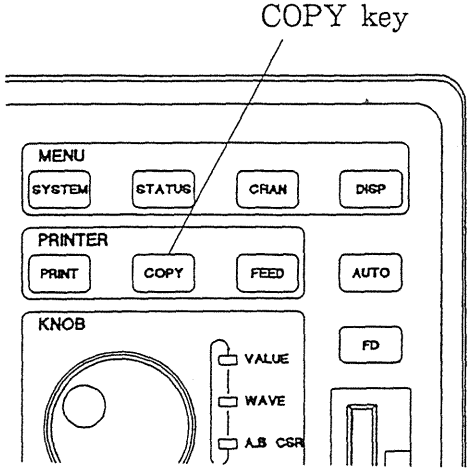
③ Screen copy printing

It is also possible to make a direct hard copy of the screen display exhibited when the "status" screen, the "channel" screen, the "display" screen, the "system" screen, or the "floppy disk control" screen is being shown.

Method

Press the COPY key.

The screen which is being shown is printed out on the printer just as it is.

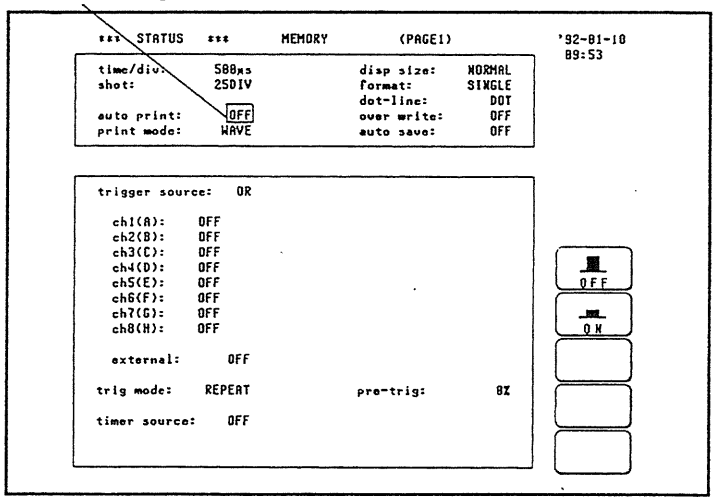


④ Auto-printing

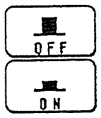
This function automatically prints out the waveform read in during startup operation simultaneously with displaying it on the screen.

Method (Screen for making this setting: the "status" screen)

1. Using the cursor keys, move the flashing cursor to the "auto print" item.
2. According to the displays on the function keys, select F2 (ON).



Function key indication — Meaning



: auto print function enabled

: auto print function disabled

3. Press the START key, and measurement will commence.
   As the waveform is displayed on the screen, it is simultaneously printed out.

• Auto-printing can be used for both waveform printing (WAVE option) and numerical printing (LOGGING option).

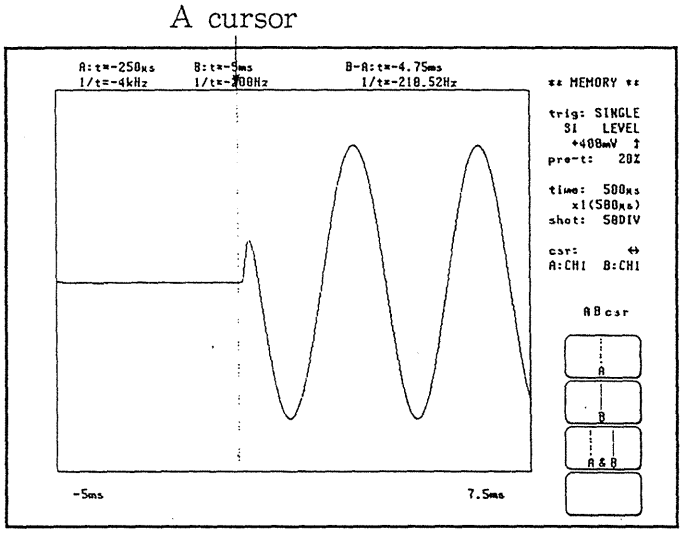
Related items:

- It is possible to supplement manual or auto printing of a waveform with a listing of settings or gauges. (See Section 12-3-6 "Listing and Gauge Functions.")
- It is possible to select either smooth printing of quality close to that of an analog waveform, or normal printing in which the printing speed is twice as fast. (See Section 12-3-9 "Smooth Print Function.")

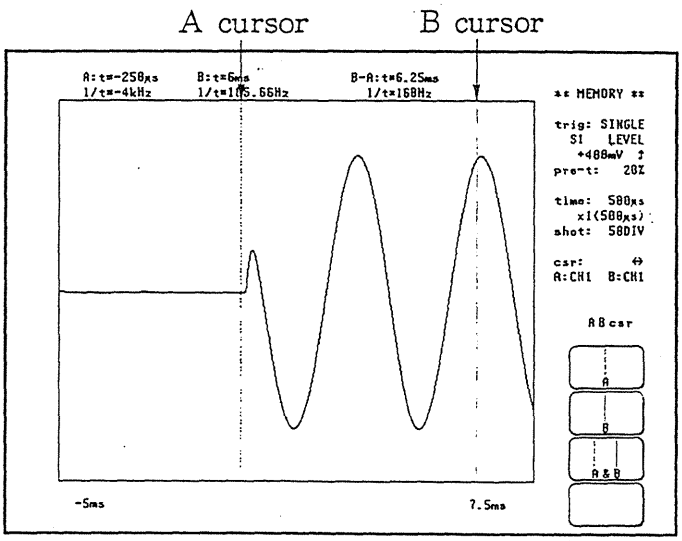
Example

○ For the partial printing function using the A and B cursors (the vertical cursors or the cross cursors), neither of the cursors need be on the screen.

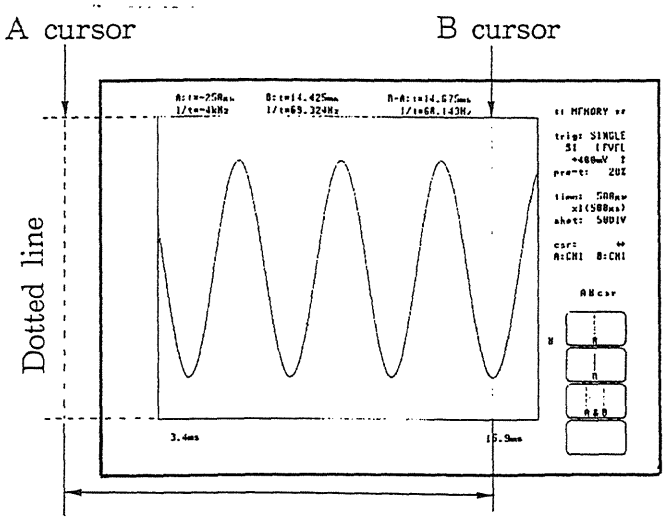
1. Decide the start position for the partial printing, using the A cursor.



2. Move the B cursor to the right to the end of the screen, and the waveform scrolls to the left.
   The A cursor scrolls leftwards along with the waveform.

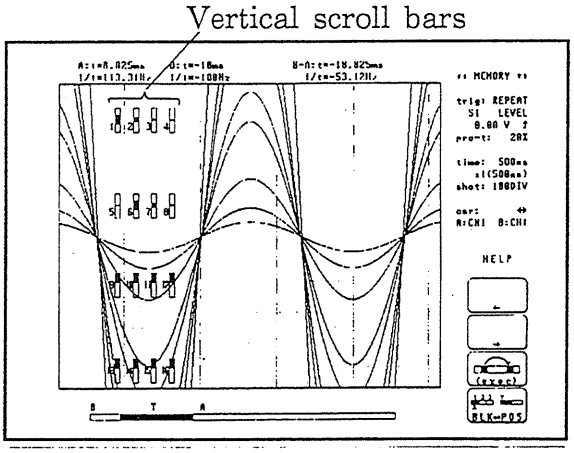


3. Decide the end position for the partial printing, using the B cursor. Even if by this time the A cursor has gone off the screen to the left, when the PRINT key is pressed, the portion of the waveform between the A cursor (off the screen) and the B cursor will be properly printed.

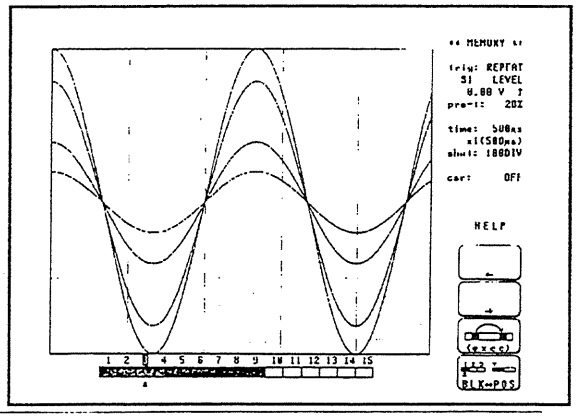


This portion is printed

In the memory recorder function mode, pressing the HELP key superimposes various information on the screen. This includes vertical scroll bars which indicate the relative position of the display in the voltage axis direction, a horizontal scroll bar (position display) which shows the position of the displayed part of the waveform on the time axis with respect to the recording length, and a block display which indicates the memory segmentation situation.



Position display (scroll bars)



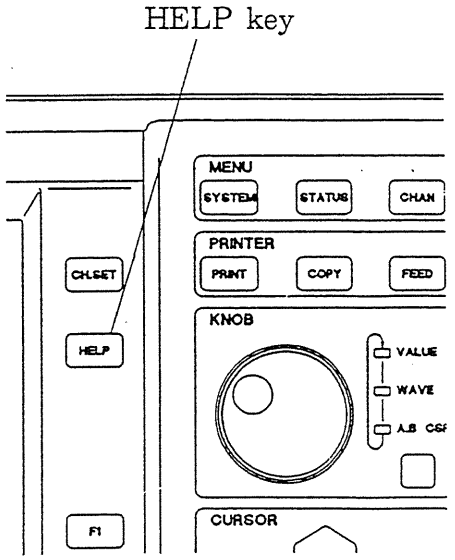
Block display

Method (Screen for making this setting: the "display" screen)

When the "display" screen is being shown, pressing the HELP key switches to the scroll bar (position) display mode.

Pressing F5 (BLK↔POS) alternately switches between the scroll bar display (POS) and the block display mode. However, if memory segmentation ("memory div") is OFF, the block display mode is inoperative. (For memory segmentation, refer to Section 9 "Memory Segmentation Function.")

To turn off the scroll bar or block display, press the HELP key once more.

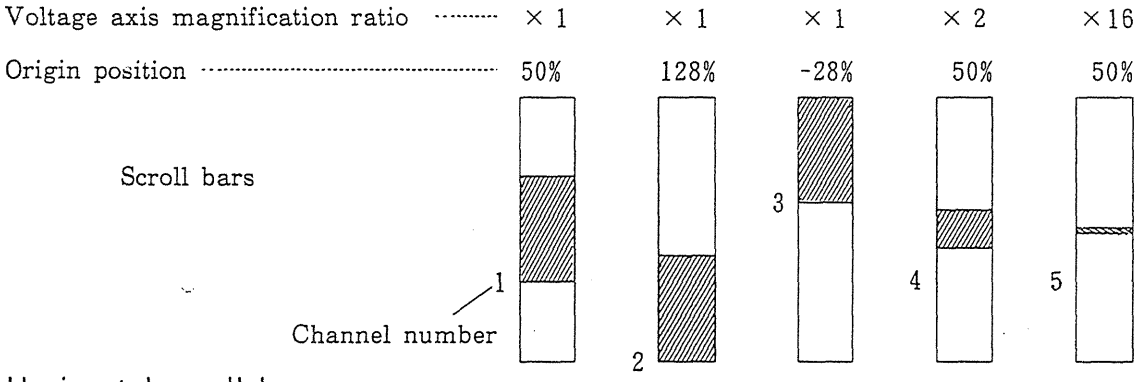


The significance of each of these help information displays is described in more detail in the following.

Vertical scroll bars

- In the position display mode, vertical scroll bars appear, to indicate the relative position on the voltage axis of the displayed portion.
- There is a scroll bar for each channel being displayed, annotated by the corresponding channel number.

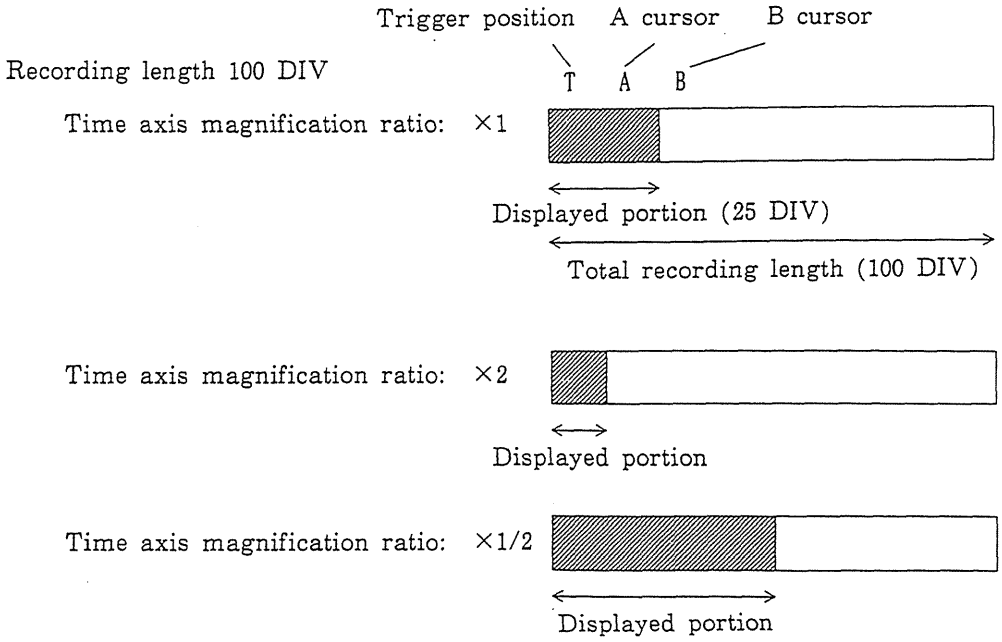
Example:



Horizontal scroll bar

- This shows the position with respect to the recording length of the displayed part of the waveform.
- The positions of the trigger and the A and B cursors, if they are being used, are also shown.
- The horizontal scroll bar can be used to move the position of the displayed part of the waveform quickly.

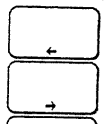
Example:



○ Moving the position of the displayed waveform portion:

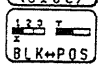
This is done with the function keys.

Function key indication | Meaning



} Set the position for movement.

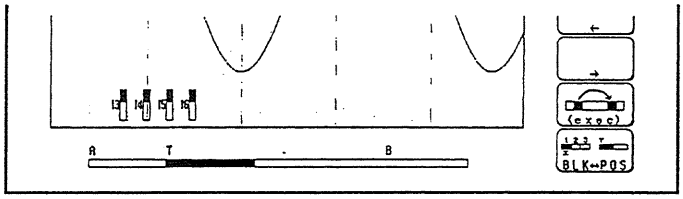
: Execute the movement.



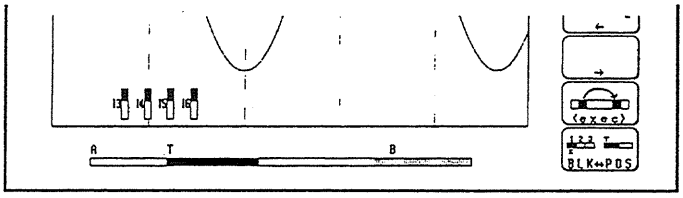
: Toggle between the scroll bar display and the block display mode.

Method

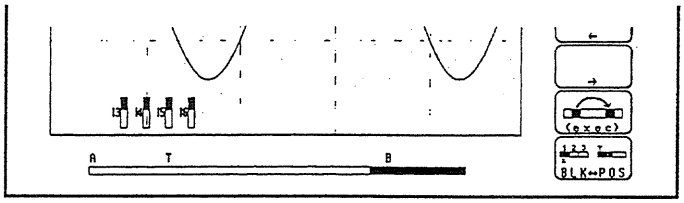
① The horizontal scroll bar shows the position of the displayed portion.



② Press F3 (→) to move the scroll bar bubble (indicated faintly on the screen) to the position to be moved to.

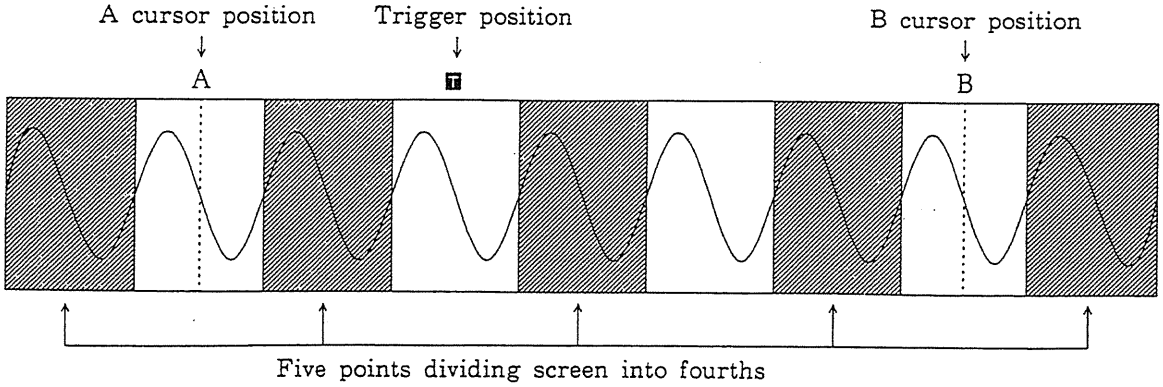


③ Press F4 (exec) to jump immediately to the new position.



NB: There are a total of nine positions on which you can position the display window cursor: five evenly spaced positions (dividing the recording length into fourths), plus the A and B cursor positions, the trigger position and the current position.

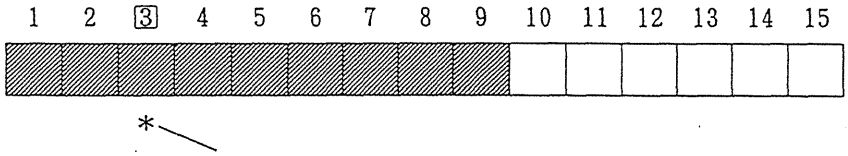
However, when for example the number of divisions (DIV) of the waveform displayed on the screen is long compared to the total recording length, this limitation does not apply.



Block display

- When using the memory segmentation function, this display indicates which memory blocks are in use.
- Using this block display, the memory block that is being displayed on the screen can be changed.
  (For memory segmentation, refer to Section 9 "Memory Segmentation Function.")

Example:



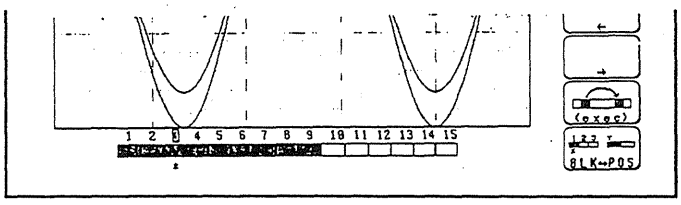
This bar display, with the exception of the "*" mark, is the same as is displayed for the memory segmentation indication item of page 2 of the "status" screen.

○ Changing the memory block displayed on the screen

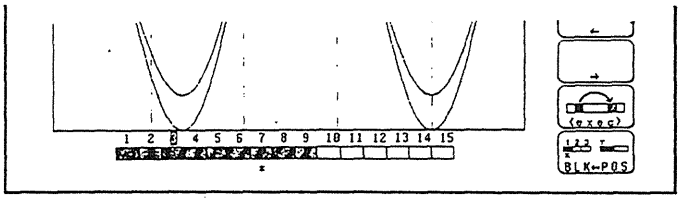
This is performed similarly to the method described above for the horizontal scroll bar, under the heading "Moving the position of the displayed waveform portion."

Method

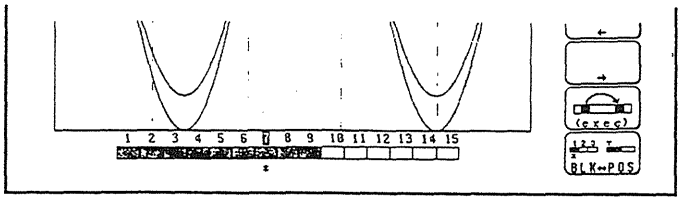
① At the moment the memory block currently displayed on the screen is being shown.



② Press F3 (→) to move the "*" mark to the memory block to be displayed on the screen.



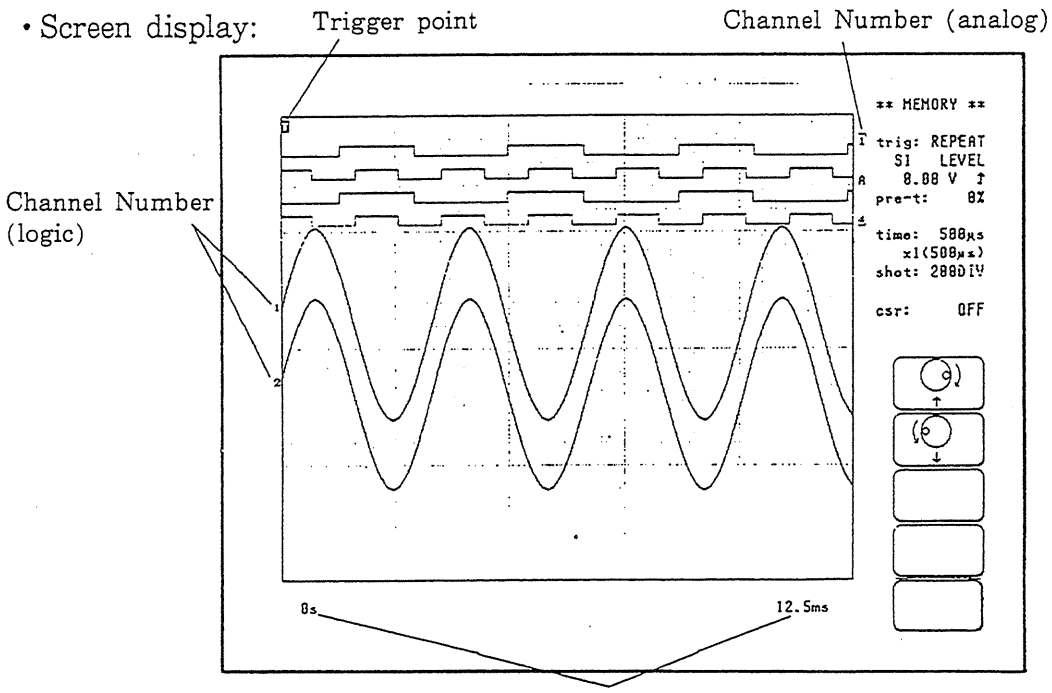
③ Press F4 (exec) to change to the new memory block.



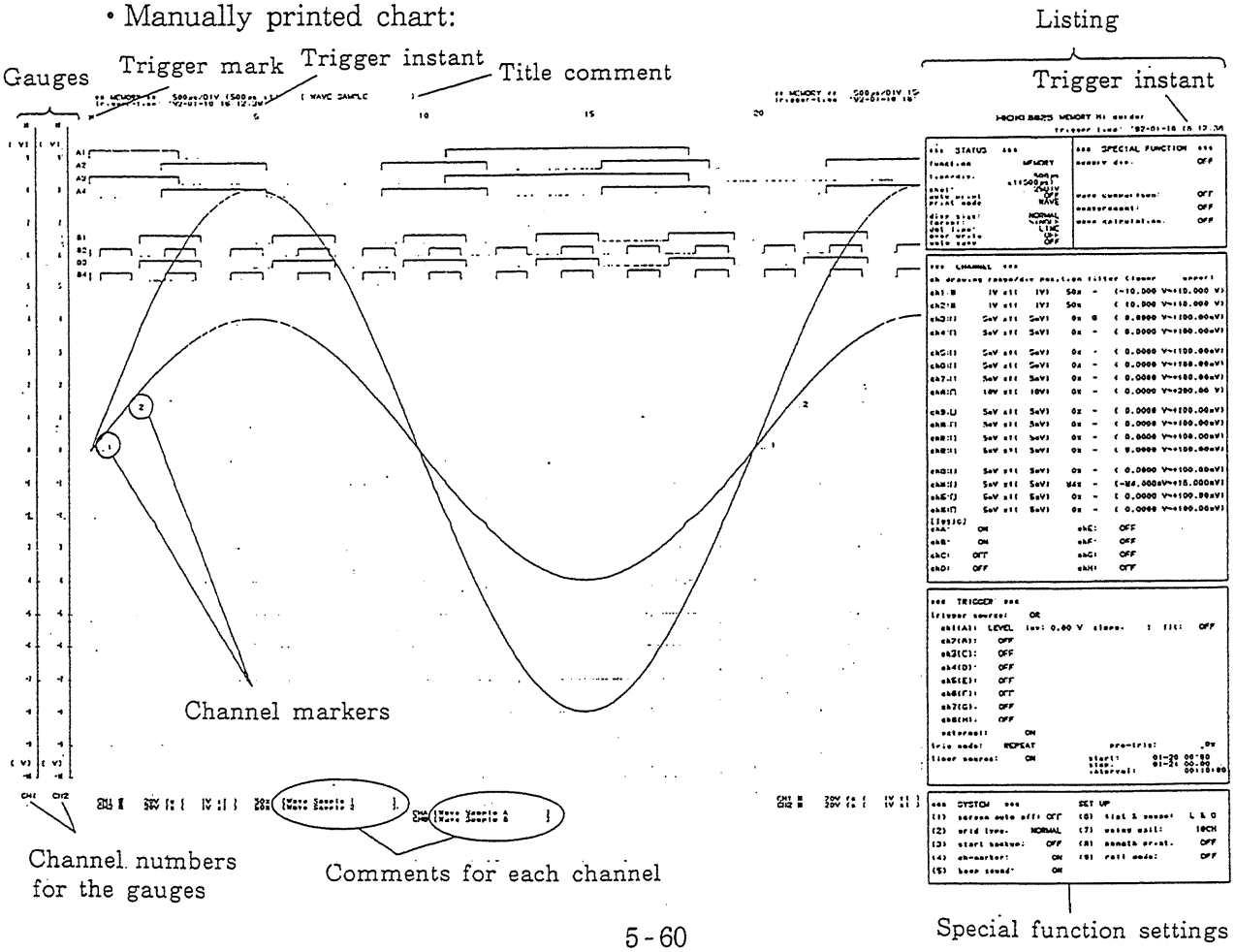
5-5 Interpreting Waveform Displays and Recordings

For each format, an introduction will be given to the "display" screen contents and the recording produced by manual printing.

- SINGLE format:
  - Screen display:

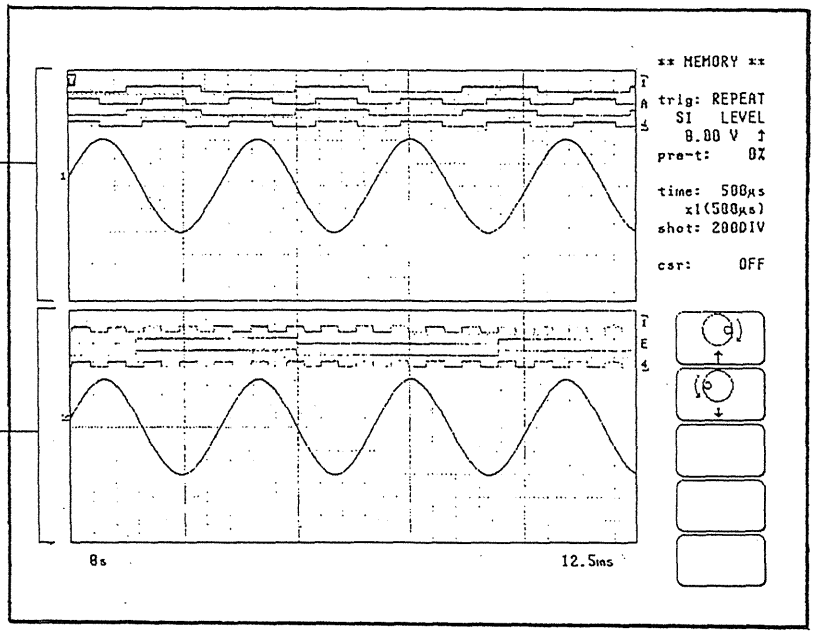


  - Manually printed chart:

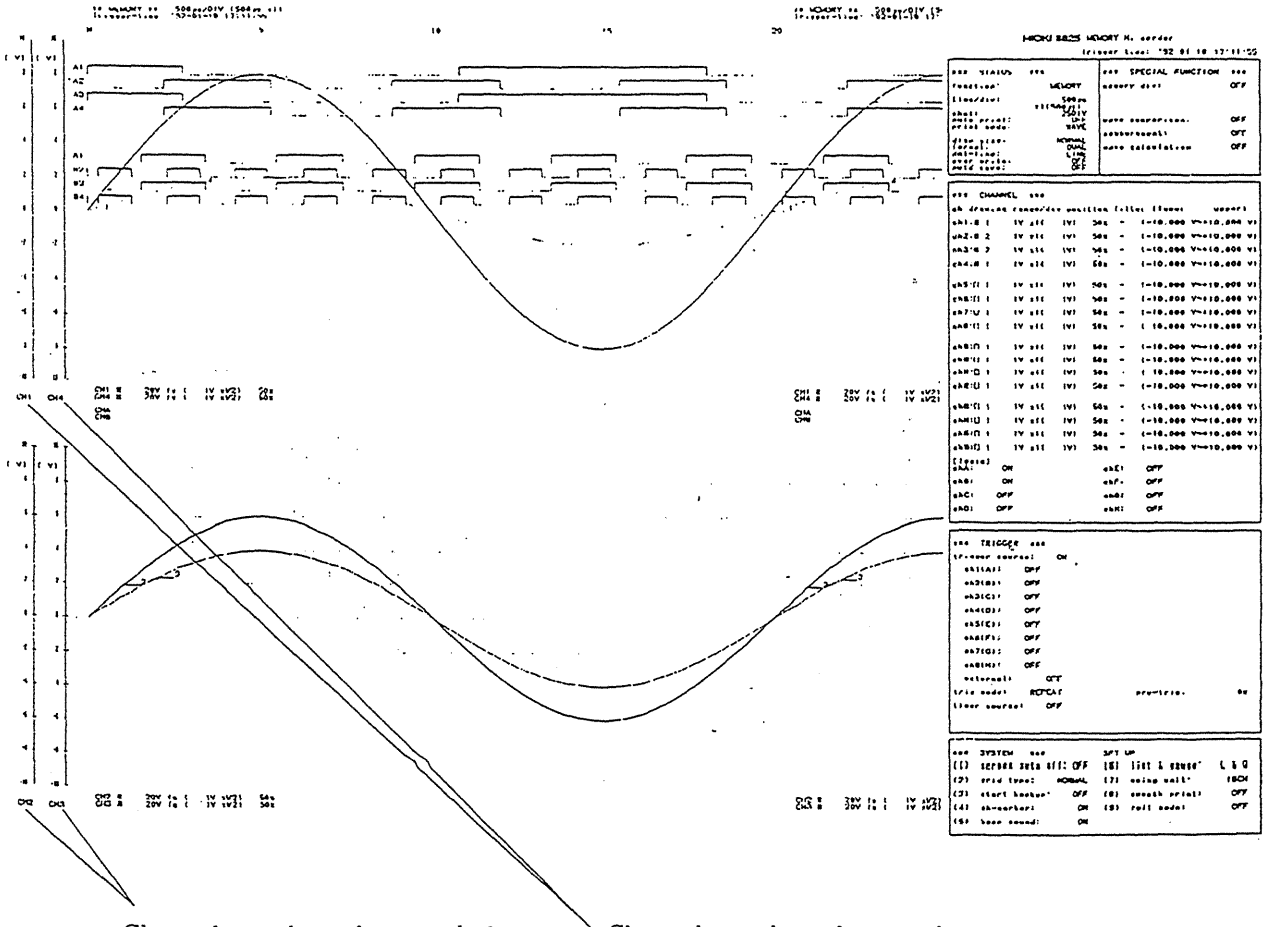


● DUAL format:

• Screen display:

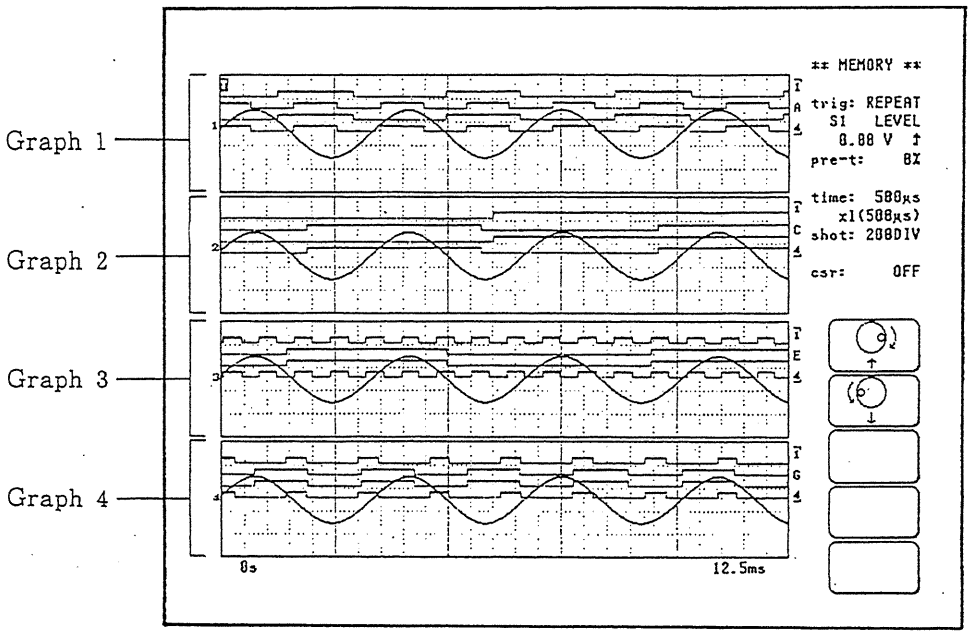


• Manually printed chart:

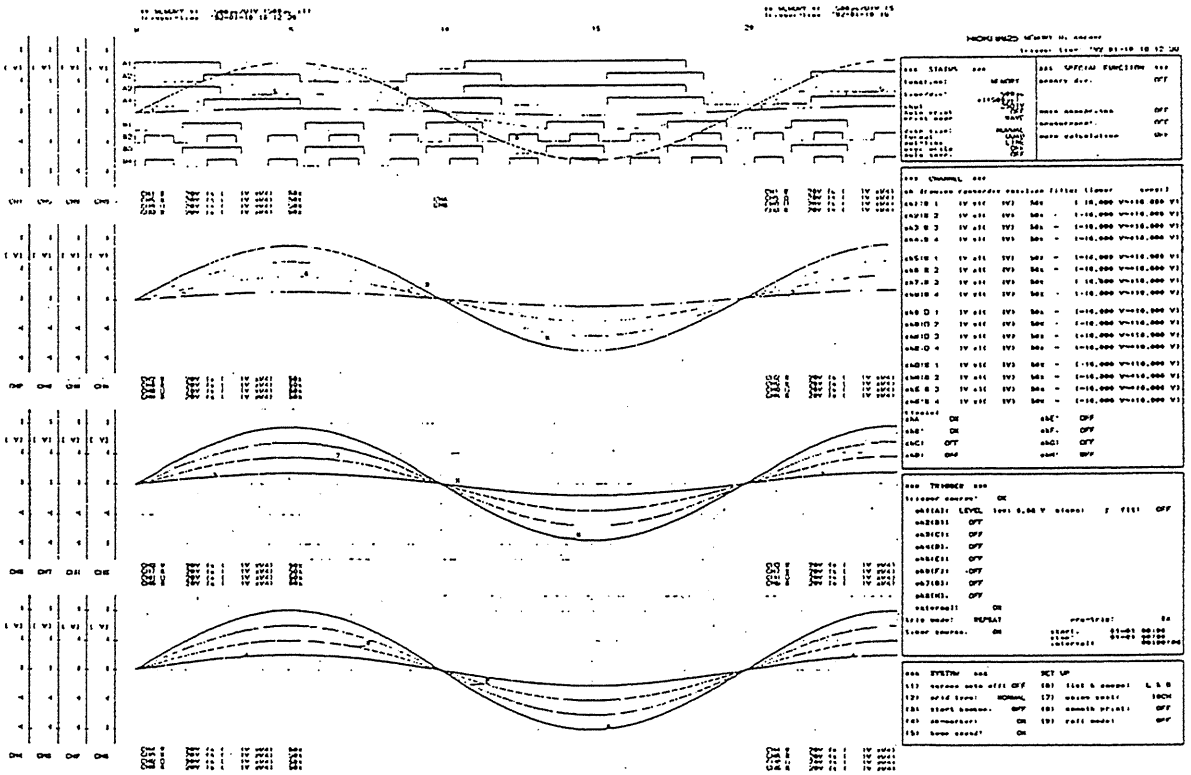


● QUAD format:

• Screen display:

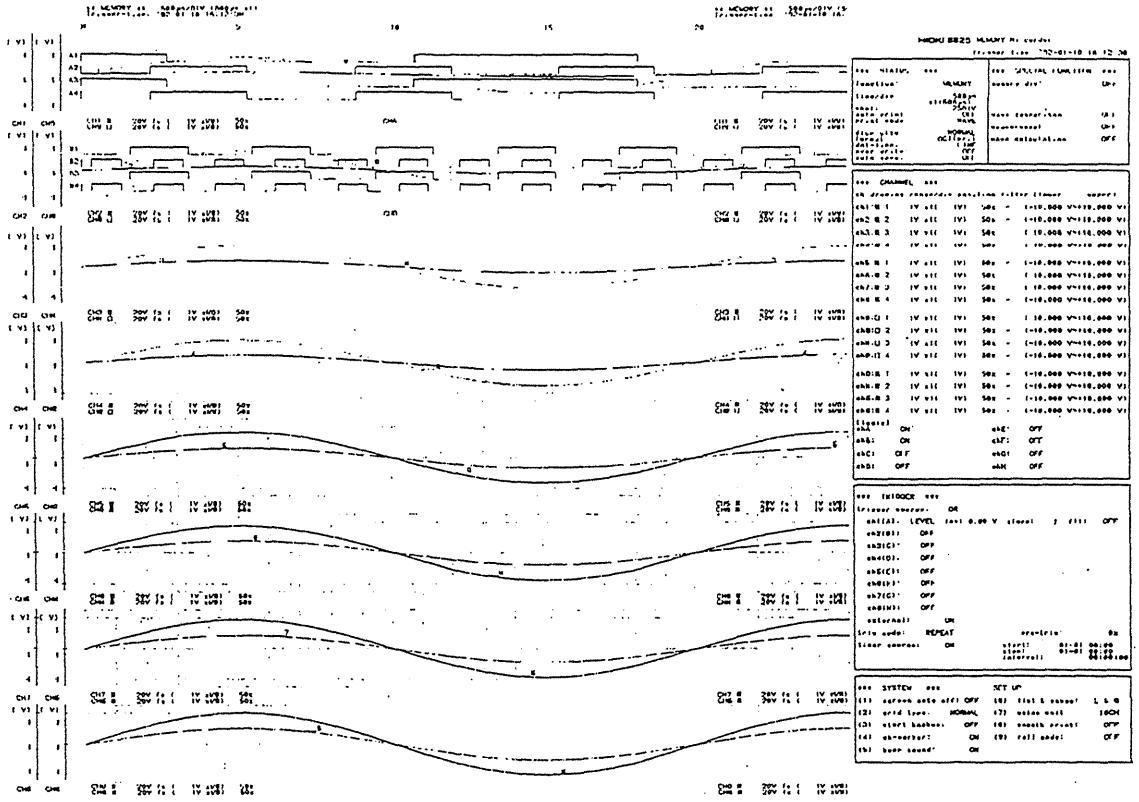


• Manually printed chart:



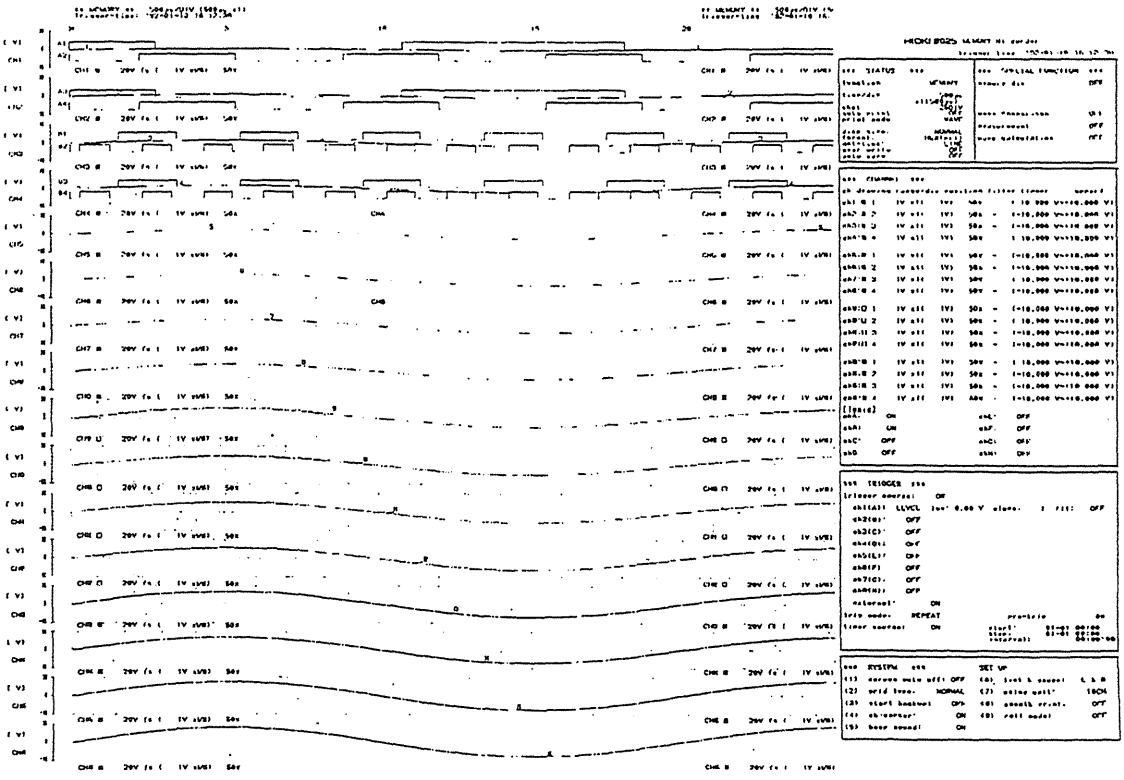
● OCT (printer only) format:

• Manually printed chart: (for the screen display, refer to QUAD)

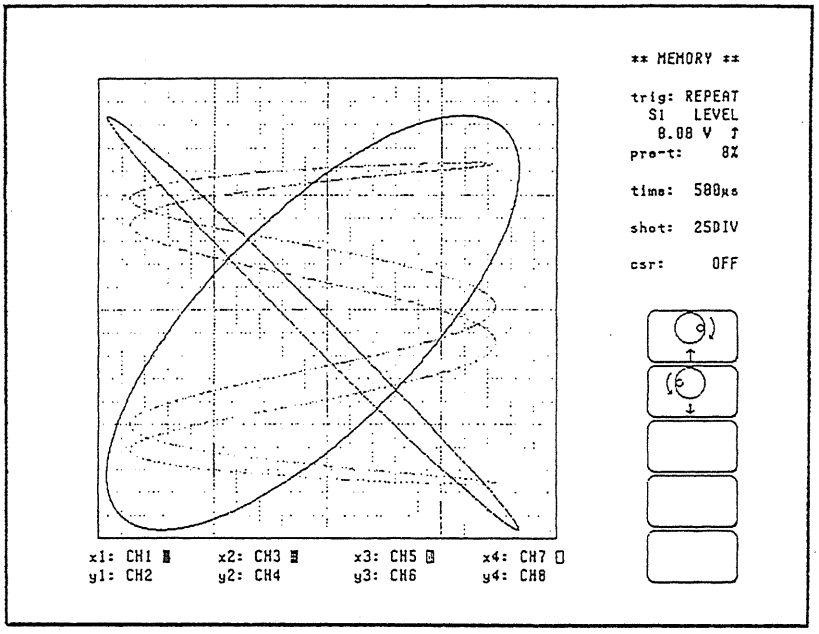


● HEX (printer only) format:

• Manually printed chart: (for the screen display, refer to QUAD)

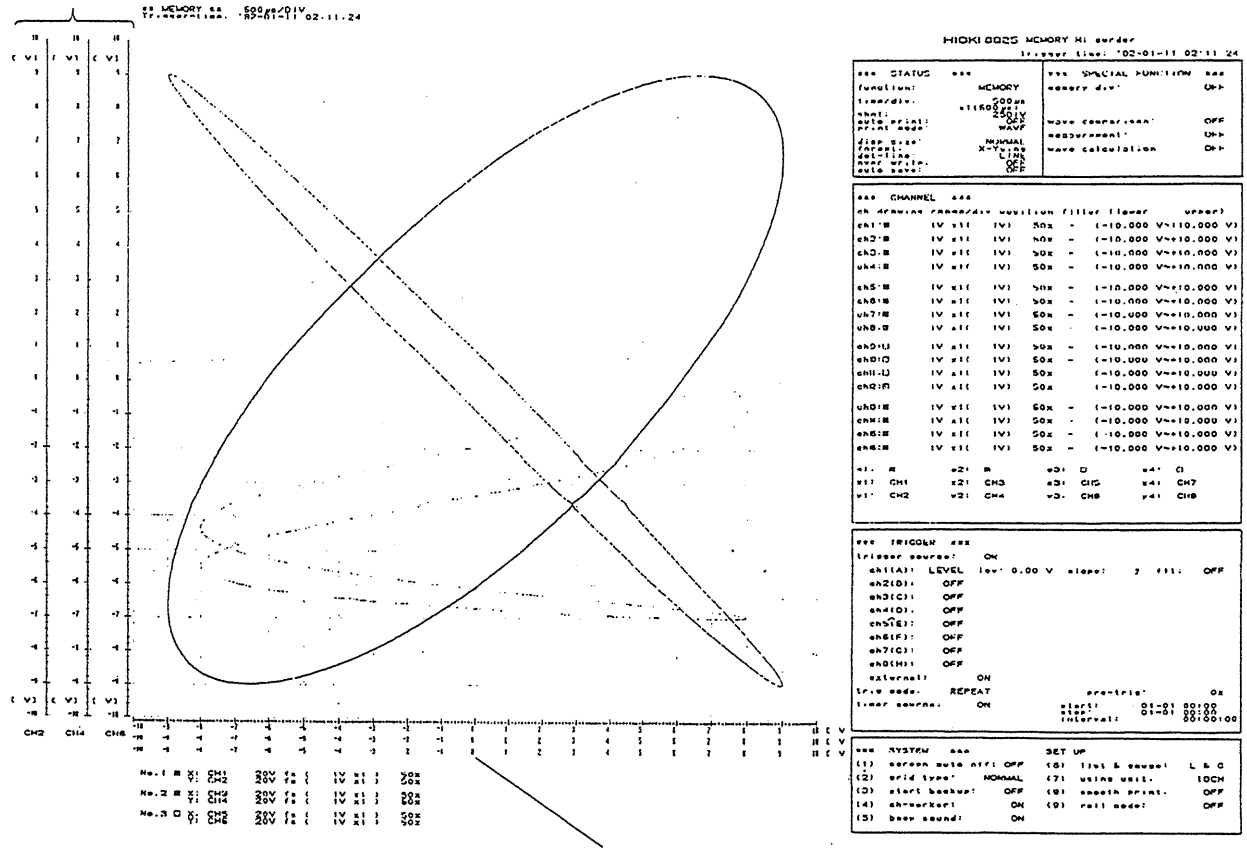


- X-Y single format:
  - Screen display:



  - Manually printed chart:

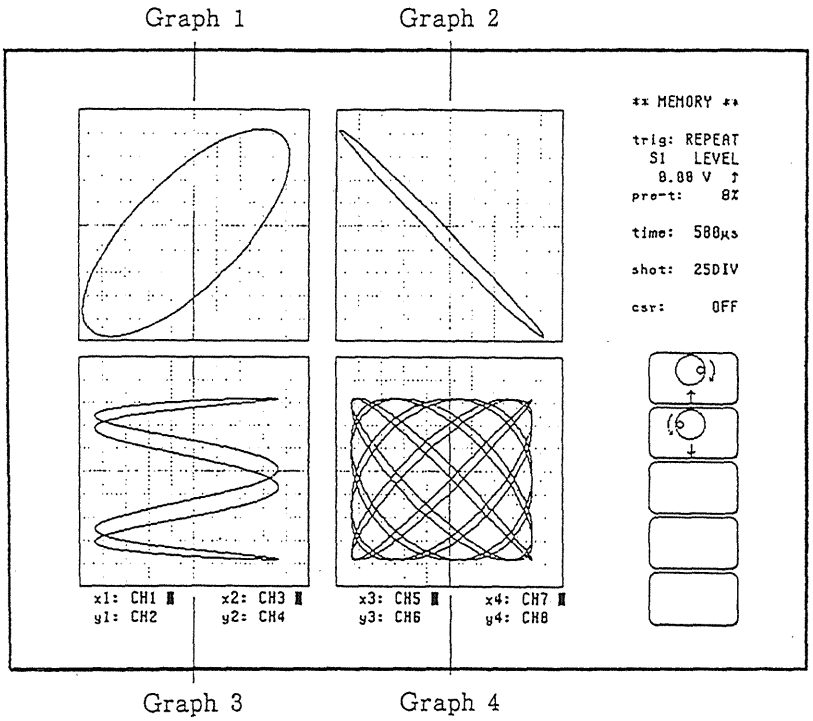
Gauges (Y axis)



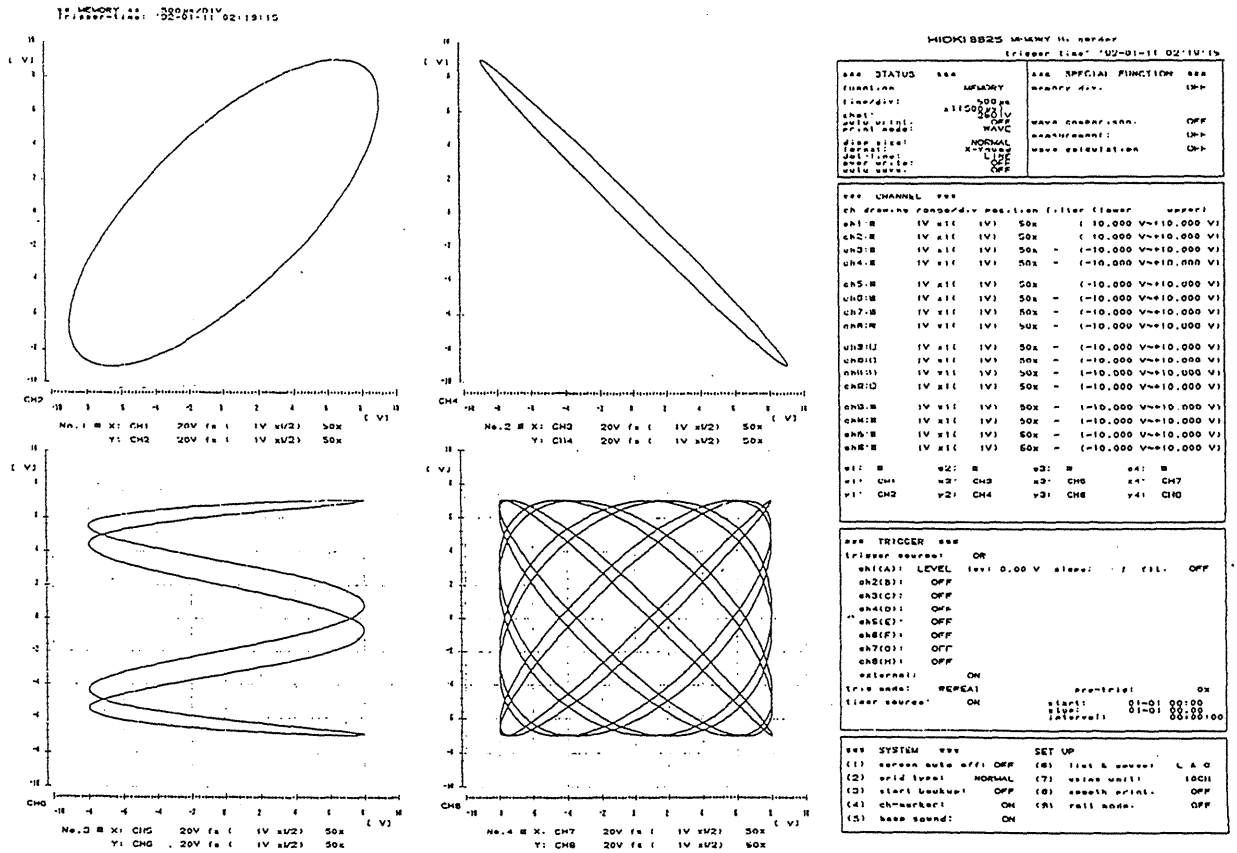
Gauges (X axis)

● X - Y quad format:

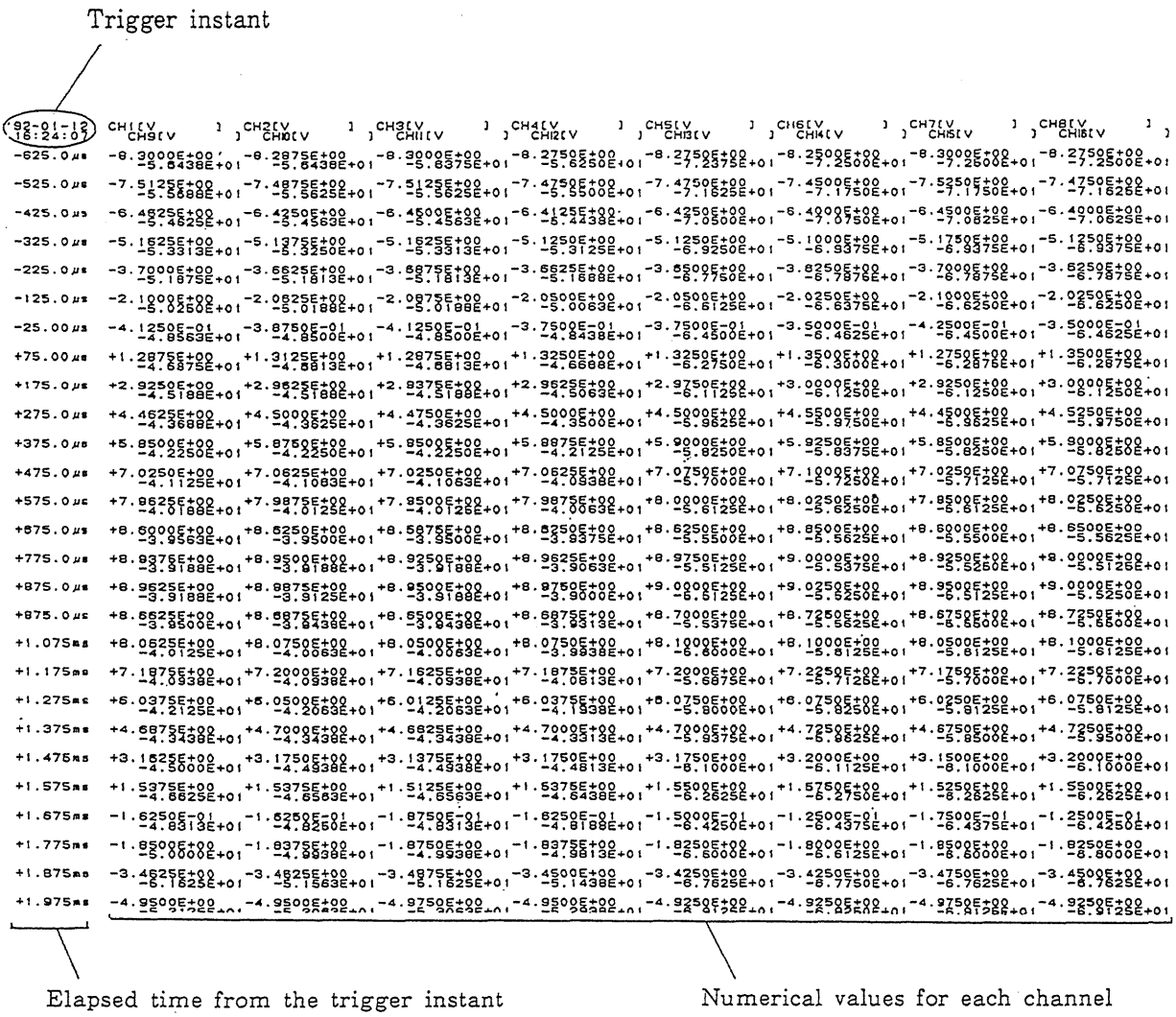
• Screen display:



• Manually printed chart:



● Recording numerical values (LOGGING):



Section 6

Recorder Function Mode

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6-5 Interpreting Waveform Displays and Recordings 6-37

6-1 What is the Recorder Function?

6-1-1 Introduction

In this function mode, the input signal is displayed and recorded in real time.

(1) Real time continuous recording is possible.

(2) Recording can be performed for all input channels along the same time axis. Allowing the signals to overlap makes it easier to see their relative relationships.

(3) The printing speed (chart speed) can be set to any of 13 levels, from 200 ms/DIV to 1 hour/DIV (200 ms/DIV for display only).

(4) High speed sampling.
Because sampling can be done at speeds of from 120 μs to 560 μs independently of the printing speed, envelope observation is possible.

(5) The waveform can be scrolled.
While real time continuous recording is taking place, the last 250 DIV of waveform including the screen (1000 DIV if the 4M word memory board is in use) is held in memory. Accordingly, this previous part of the waveform can be scrolled back to and observed.

(6) There are three display formats and five printed recording formats to chose from.
Time axis waveform, single, dual, quad, octo (printer only), and hexa (printer only) are available.

(7) High grade printing is possible.
Because during printing the time axis resolution capability is high, it is possible to print a waveform smoothly in a quality close to analog.

(8) Reprinting is available.
The waveform held in memory (the last 250 DIV including the screen, or 1000 DIV if the 4M word memory board is in use) can be printed as many times as desired.

6-1-2 Finding Reference Material in this Manual

(1) Basic functions
For information about the basic functions, refer to Section 6-4 in this chapter, "Making settings" (6-4-1 to 6-4-12).

(2) Trigger function ☞ Section 8.
See Section 8. The user should select, from the many types of trigger available, one suitable for the objective desired.

(3) Use of the floppy disk drive
See Section 14. The floppy disk drive allows settings, measurement data, and waveform decision areas for use by the waveform decision function to be recorded and kept.

(4) Scaling function
See Section 12-4. The scaling function allows the units and numerical values for the input voltages to be converted, so that they can be directly read out as physical values of the parameters which are being measured.

(5) Comment input function
See Section 12-5. Instead of making handwritten memos on recordings, comments can be input and printed on.

(6) Display auto-off function

(7) Grid setting
The grid on the charts can be altered according to the application.

(8) Backup function for start key
If during recording operation the power fails and is restored again, then the start condition is restored, and recording operation starts again.

(9) Channel mark function
During waveform recording, it is possible to print the channel numbers.

(10) When an error occurs or when a warning is issued, it is possible to arrange for a "beep" sound to be produced.

(11) List and gauge functions
These provide voltage axis scales and listings of settings on printed recordings.

(6) to (11): See Section 12-3 "Special Function Settings"

(12) Change-over of the time value display

(13) A computer can be connected to the GP-IB interface. (Option when ordering the unit)

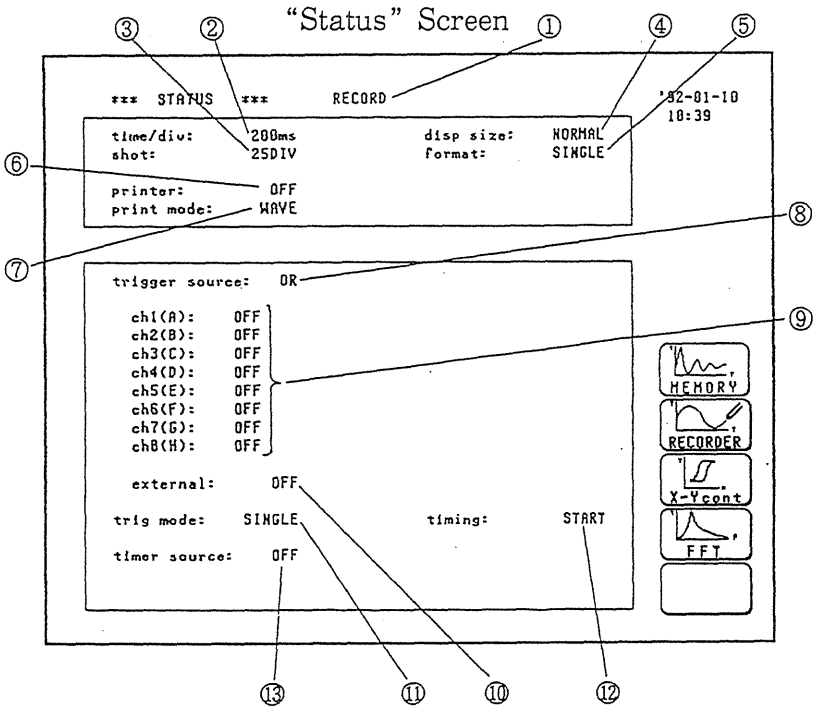
(14) Self check function ☞ Section 12-6 "The self check"
It is possible for the unit to perform self check and diagnosis simply.

6-2 Display Screens

This section describes the "status" screen, the "channel" screen, and the "display" screen, and gives references to other important parts of this manual.
For the "system" screen, refer to Section 12. For the "floppy disk control" screen, refer to Section 14.

6-2-1 "Status" Screen

• Press the STATUS key, and the "status" screen appears.

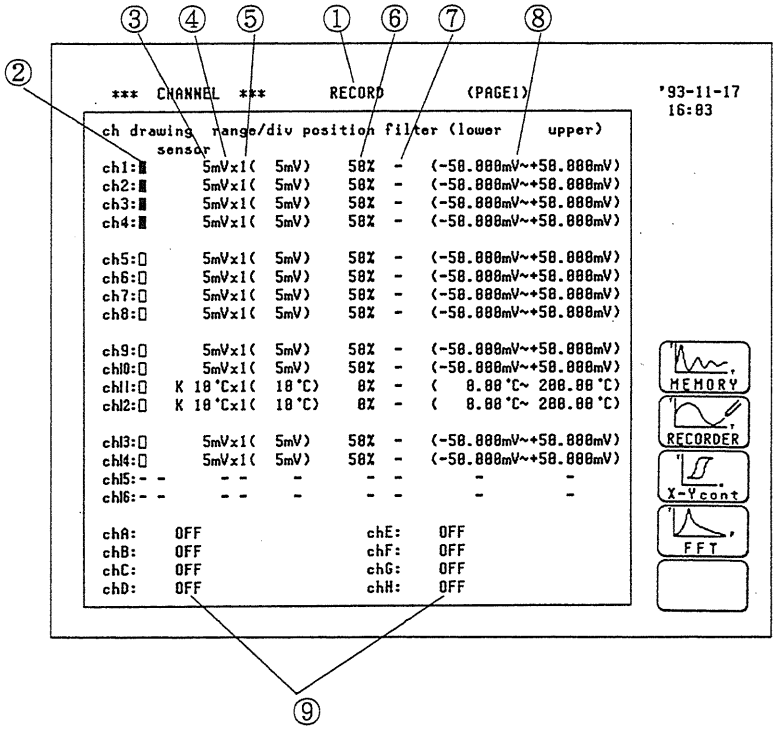


① Function mode
② Time axis range
③ Recording length
④ Display size
⑤ Format
⑥ Print function
⑦ Settings for the recording style for the printer

⑧ AND/OR combination operator for the internal and external triggers
⑨ Internal triggers
⑩ External triggers
⑪ Trigger mode
⑫ Trigger timing
⑬ Timer trigger

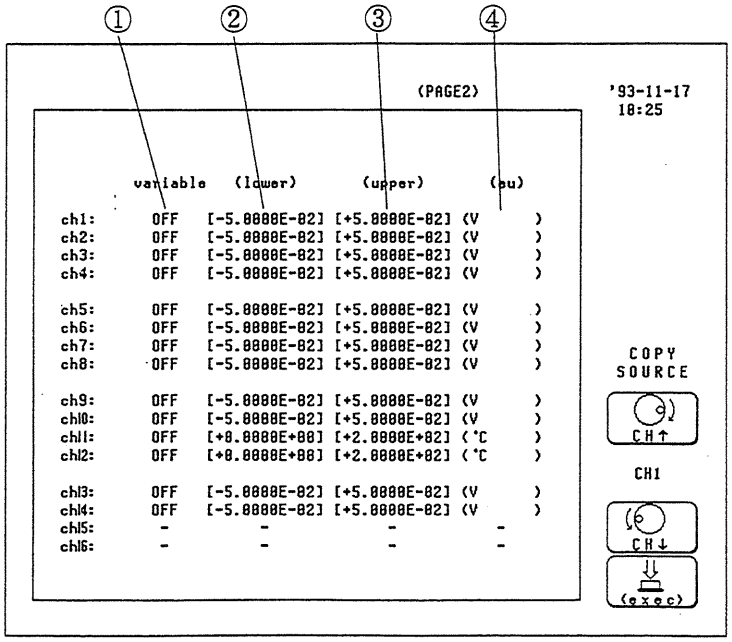
- Press the CHAN key, and the "channel" screen appears.
- Pressing the CHAN key toggles screen between PAGE 1 and PAGE 2.
- The (PAGE 1) screen is for the setting of the input unit and waveform display.
- The (PAGE 2) screen is for the setting of the variable display function.

"Channel" Screen (PAGE 1)



① Function mode
② Waveform display
③ Voltage axis range
④ Input coupling
⑤ Voltage axis magnification
⑥ Position
⑦ Low-pass filter
⑧ Upper limit value, lower limit value (display only)
⑨ Logic display

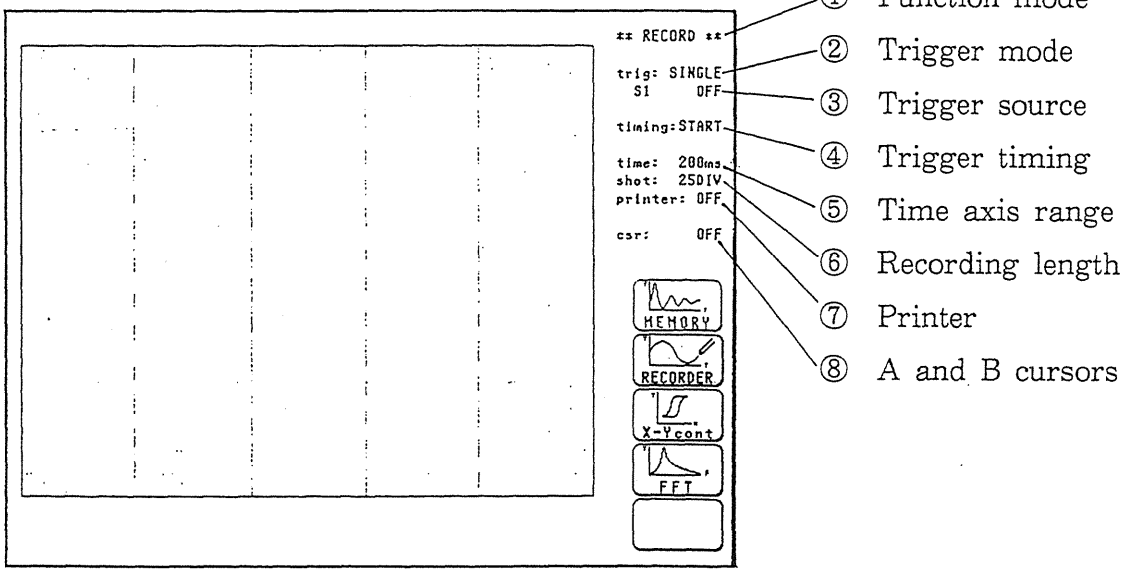
"Channel" Screen (PAGE 2)



① Variable
② Lower limit value
③ Upper limit value
④ Units (display only)

• Press the DISP key, and the "display" screen appears.

"Display" Screen



6-3 Basic Operational Procedures

6-3-1 Operational Flow

The flowchart below illustrates the sequence of operations involved in using the recorder function.

Start

↓

Turn the power on

↓

Connect the inputs

↓

"Status" screen

↓

Function setting
- Set the recorder function mode

↓

Set the time axis range (TIME/DIV)
- Set the input and storage speed for the input signal waveform

↓

Set the recording length
- Set the length of the recording for one measurement

↓

Set the display size
- Set the size of the screen for display of the waveform

↓

Set the format
- Set the format type for the waveform display screen

↓

Set the printer function
- Set whether or not printing will occur simultaneously with screen display

↓

Set printer output form
- Set whether measurement data will be sent to the printer as a waveform or as numerical values

↓

Set the trigger conditions
- Set the trigger source, the trigger type and conditions, and the print trigger

↓

"Channel" screen

↓

Settings relating to the input units
- Set the channels for which display and recording will be performed, density, voltage axis range, input coupling, and filters.

↓

Measurement
- Press the START key and commence measurement

↓

Record on the printer
- Simultaneously with measurement, print the results

↓

End

This example illustrates the basic procedure connecting the 8825 to an oscillator and using the memory recorder function to measure a 3 V p-p, 1 Hz sine wave input.

(1) Turn on the power.

Connect the power cable to the 8825 and turn on the power switch.

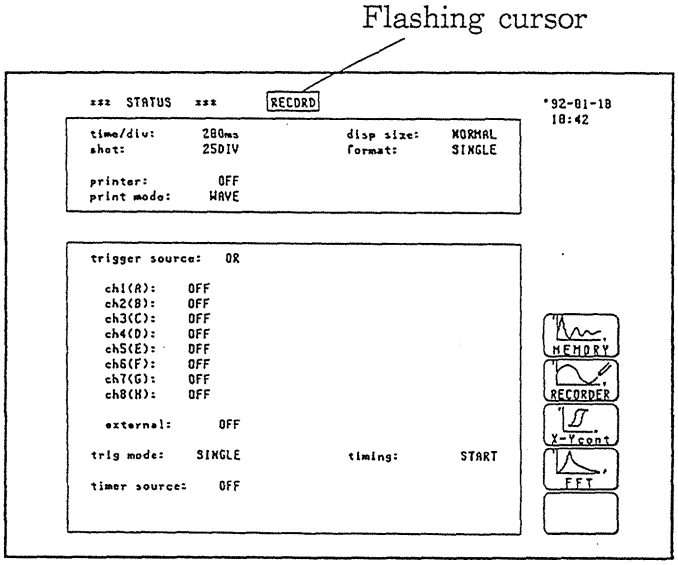
(2) Connect the input.

Connect the oscillator to the input terminal of (the 8907 analog unit fitted to) channel 1 of the 8825. Set the oscillator so that it is outputting a sine wave of frequency 1 Hz and output voltage 3 V p-p.

(3) Set the function mode.

To set the function mode to the recorder function mode:

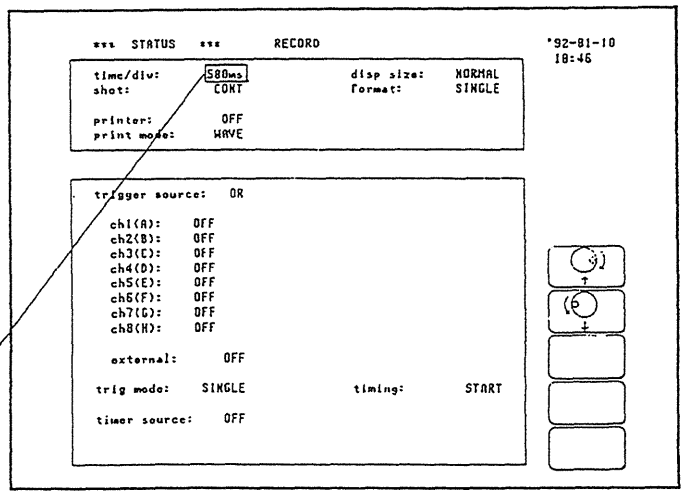
1. Press the STATUS key. The "status" screen will appear.
2. Using the cursor keys, move the flashing cursor to the "function" item.
3. Choose F2 (RECORDER).



(4) Set the time axis range (TIME/DIV).

To set the time axis range to 500 ms/DIV:

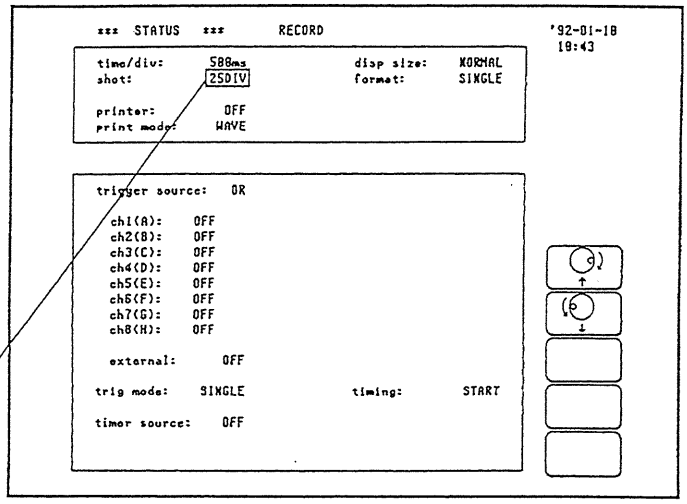
1. Using the cursor keys, move the flashing cursor to the "time/div" item.
2. Using F1 and F2 or the rotary knob, set this item to 500 ms.



(5) Set the recording length.

To set the recording length to CONT:

1. Using the cursor keys, move the flashing cursor to the "shot" item.
2. Using F1 and F2 or the rotary knob, set this item to CONT.

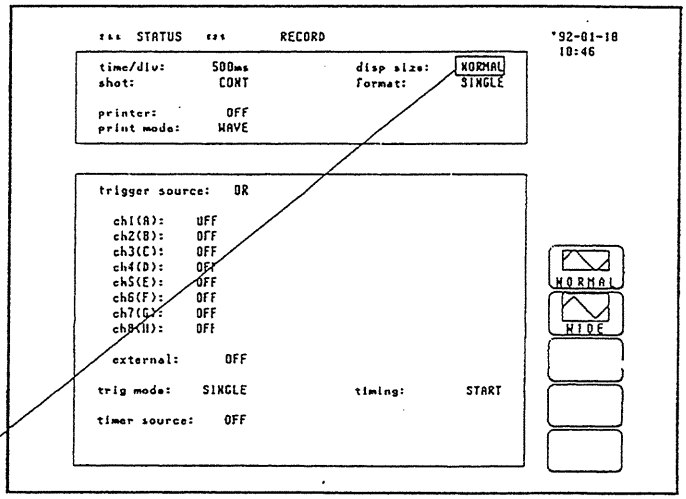


Flashing cursor

(6) Set the display size.

To set the display size (the size of screen for the waveform display) to NORMAL:

1. Using the cursor keys, move the flashing cursor to the "disp size" item.
2. Choose F1 (NORMAL).

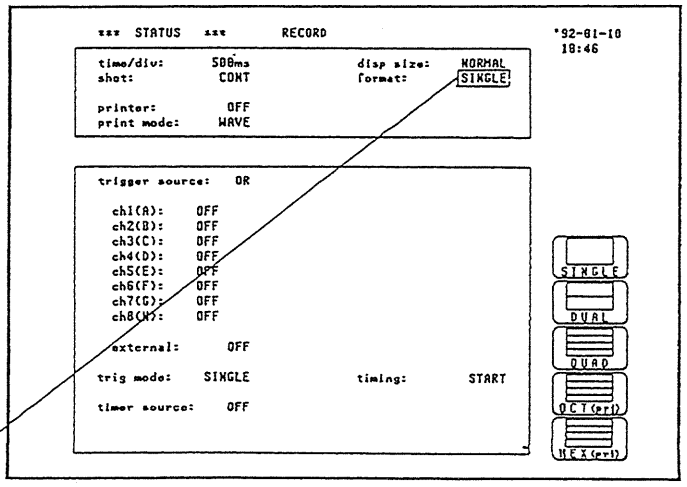


Flashing cursor

(7) Set the format.

To set the format to SINGLE (perform display and recording of a single graph):

1. Using the cursor keys, move the flashing cursor to the "format" item.
2. Choose F1 (SINGLE).

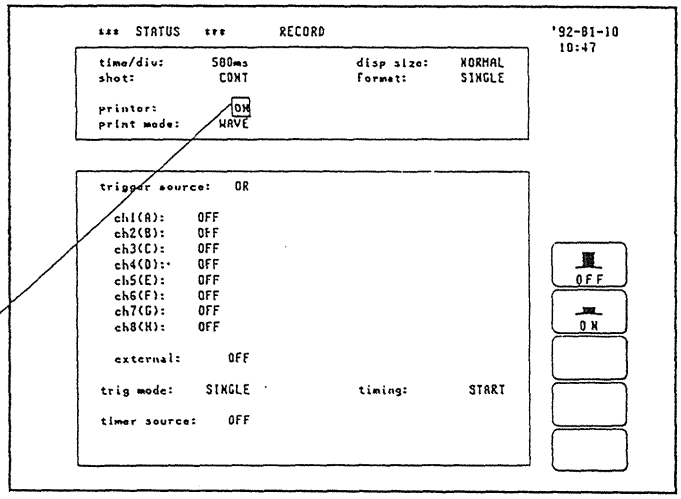


Flashing cursor

(8) Set the printer output function.

In order to output the waveform on the printer during measurement, the printer function should be set to ON:

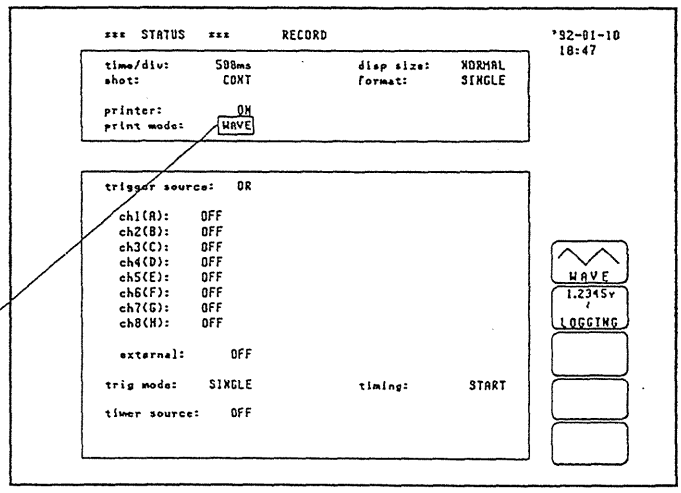
1. Using the cursor keys, move the flashing cursor to the "printer" item.
2. Choose F2 (ON).



(9) Set the recording style for the printer.

To set the printer recording style, not to printing numerical values, but to printing the waveform:

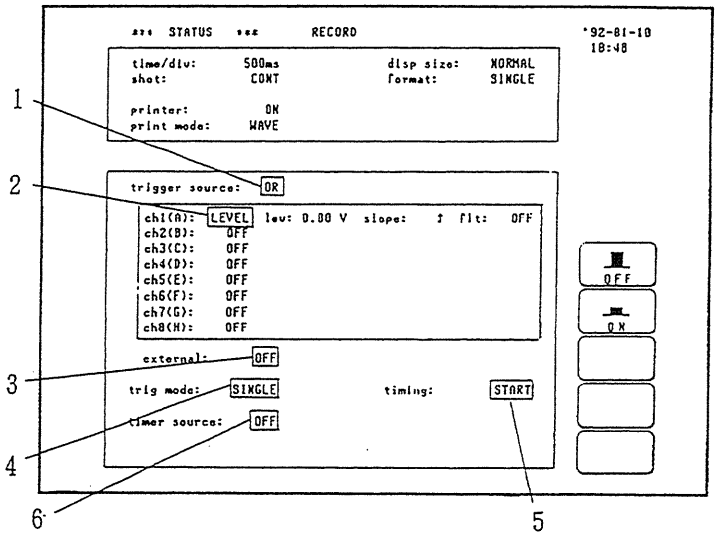
1. Using the cursor keys, move the flashing cursor to the "print mode" item.
2. Choose F1 (wave).



(10) Set the trigger conditions.

To set the trigger conditions as shown in the figure on the right:

Using the cursor keys, move the flashing cursor in turn to each item to be set, and, using F1 to F5, select the appropriate contents, as explained in the following. (For details about the trigger function, refer to Section 8 "Trigger Functions".)



1. Set the logical operator AND/OR for combining the triggers.

Move the flashing cursor to the "trigger source" item. Choose F1 (OR).

2. Set the trigger source.

Move the flashing cursor to the "ch1(A)" item. Choose F2 (LEVEL).

Move the flashing cursor to the "lev" item. Using F1 to F4 or the rotary knob, set the voltage level to 0 V.

Move the flashing cursor to the "slope" item. Choose F1 (up).

Move the flashing cursor to the "flt" item. Choose F1 (OFF).

In the same way, using F1, set each of the "ch2(B)" to "ch8(H)" items to OFF.

3. Set the external trigger.

Move the flashing cursor to the "external" item. Choose F1 (OFF).

4. Set the trigger mode.

Move the flashing cursor to the "trig mode" item. Choose F1 (SINGLE).

5. Set the trigger timing.

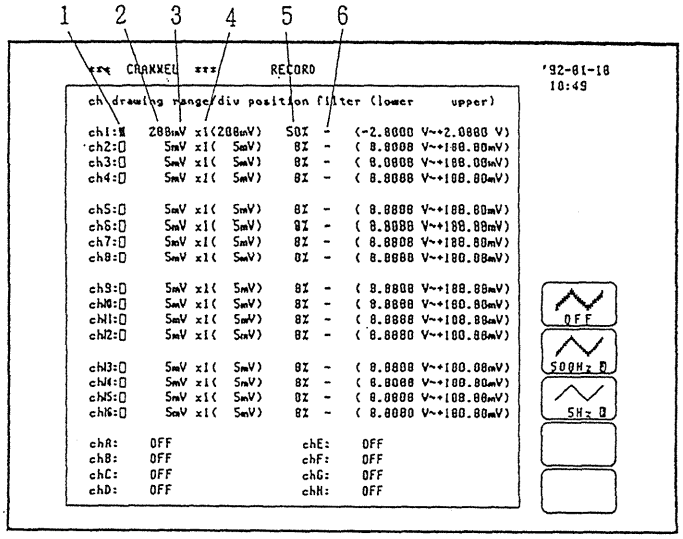
Move the flashing cursor to the "timing" item. Choose F1 (START).

6. Set the timer trigger.

Move the flashing cursor to the "timer source" item. Choose F1 (OFF).

(11) Make the settings for each channel.

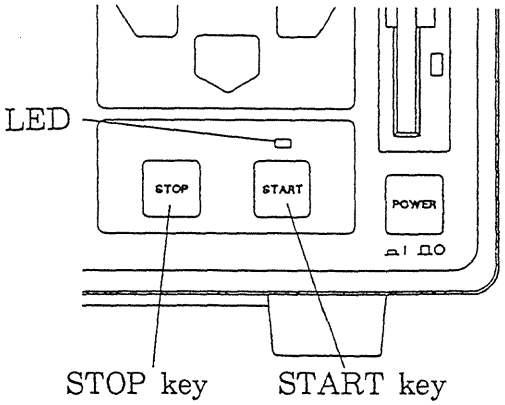
- Press the CHAN key, and the "channel" screen will appear.
- For each of the input channels to be set in turn (only channel 1 in this example), make settings as shown in the figure on the right:
  Using the cursor keys, move the flashing cursor in turn to each item to be set, and, using F1 to F5, select the appropriate contents, as explained in the following.



1. Set the waveform display.
   Move the flashing cursor to the "drawing" item. Choose F4 (DARK).
2. Set the voltage axis range.
   Move the flashing cursor to the "range/div" item. Using F1 and F2 or the rotary knob, set this item to 200 mV.
3. Set the input coupling.
   Move the flashing cursor to the input coupling item. Choose F1 (DC).
4. Set the voltage axis magnification/compression ratio.
   Move the flashing cursor to the magnification/compression item. Using F1 and F2 or the rotary knob, set this item to ×1.
5. Set the origin position.
   Move the flashing cursor to the "position" item. Using F1 and F2 or the rotary knob, set this item to 50%.
6. Set the low-pass filter.
   Move the flashing cursor to the "filter" item. Choose F1 (OFF).

(12) Begin measurement.

- By pressing the START key, the waveform will be displayed on the screen and simultaneously will also be output on the printer.
  Press the START key.
  The LED above the key will light up.
  Because some input has already taken place, triggering occurs immediately, and waveform display and recording (printing) commence.



(13) End measurement.
Because the recording length was set to CONT, waveform display and recording will be performed continuously, until either the recording paper runs out or the STOP key is pressed.
Press the STOP key.
The LED above the START key goes out, and measurement stops.

NB: Because the recordings are made on thermosensitive paper, if printed records are to be kept for any length of time, it is a good idea to take photocopies.

6-4 Making Settings

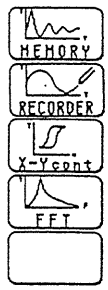
6-4-1 Setting the Function Mode

The 8825 has three function modes: the memory recorder function mode, the recorder function mode, and the X-Y recorder function mode. Select the appropriate function mode for performing measurements.

Method (Screens for making this setting: the "status", "channel", and "display" screens)

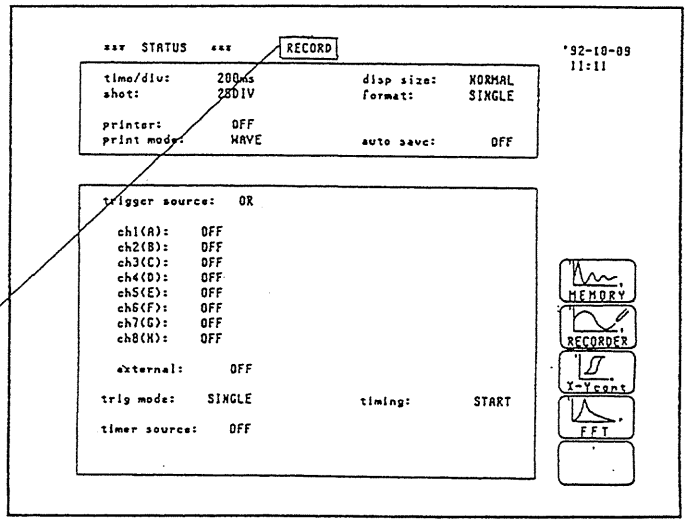
1. Using the cursor keys, move the flashing cursor to the position shown in the figure below.
2. According to the displays on the function keys, select the desired function mode.

Function key indication — Meaning



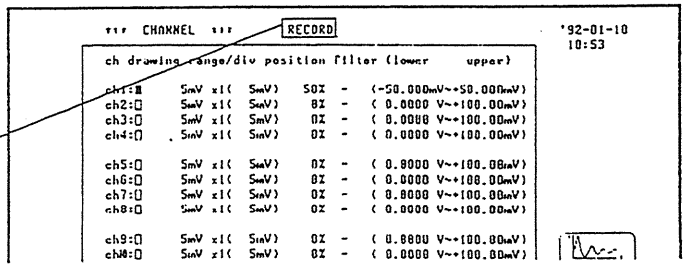
: memory recorder function mode
: recorder function mode
X-Y recorder function mode
: FFT

"Status" screen



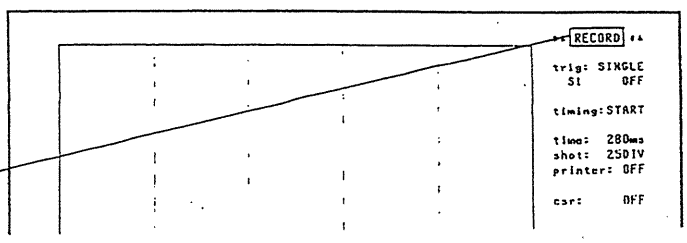
Flashing cursor

"Channel" screen



Flashing cursor

"Display" screen



Flashing cursor

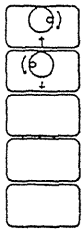
Set the chart speed.

The value set for "time/div" shows the time interval along the time axis direction for 1 DIV.

Method (Screens for making this setting: the "status" and "display" screens)

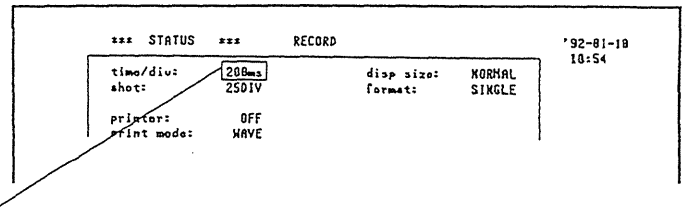
1. Using the cursor keys, move the flashing cursor to the "time/div" item.
2. By using the function keys or the rotary knob, set the time axis range.

Function key indication / Meaning



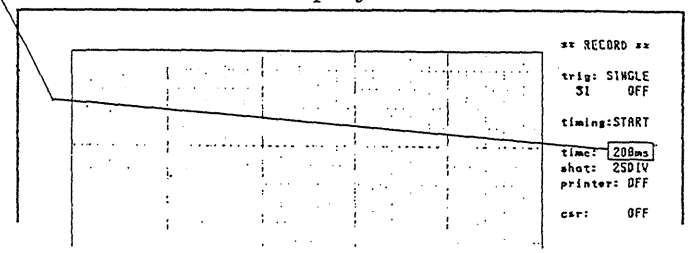
200, 500 ms
1, 2, 5, 10, 20 s
1, 2, 5, 10, 20 min
1 h

"status" screen



Flashing cursor

"display" screen



NB: With the time axis range of 200 ms, the waveform is only displayed on the screen display, but is not recorded on the printer.

※On the "display" screen, if the rotary knob is to be used, refer to Section 4-2-2 "Rotary Knob and Knob Select Key."

6-4-3 Setting the Recording Length

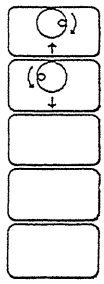
The length of recording for one measurement operation (number of DIV) can be set.

Method (Screens for making this setting: the "status" and "display" screens)

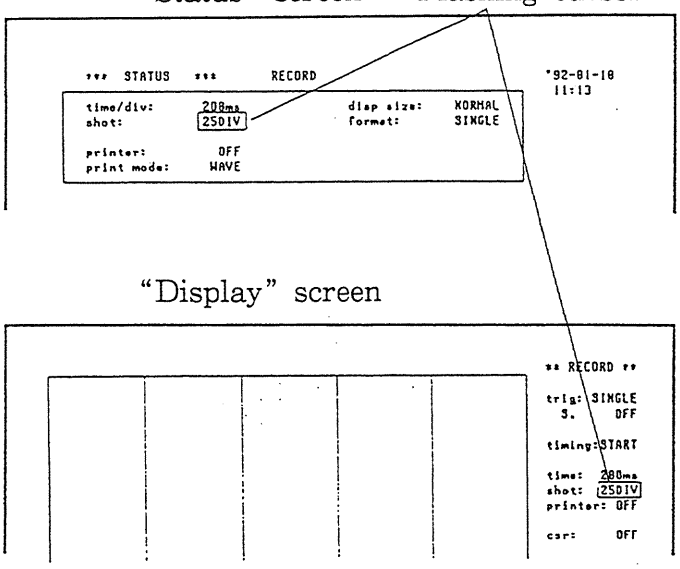
1. Using the cursor keys, move the flashing cursor to the "shot" item.
2. By using the function keys or the rotary knob, set the recording length.

Function key indication | Meaning

25, 50, 100, 200, 500 DIV
CONT (recording continues until either the recording paper runs out or the STOP key is pressed.)



※If using the rotary knob in the "display" screen, refer to Section 4-2-2 "Rotary Knob and Knob Select Key."



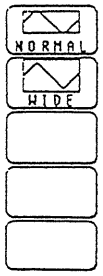
6-4-4 Setting the Display Size

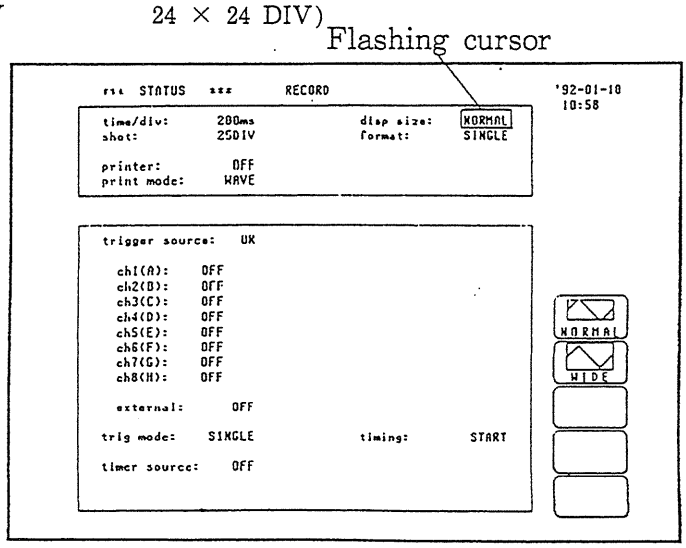
The display size when the input signal waveform is being shown on the screen display can be set.

Method (Screen for making this setting: the "status" screen)

1. Using the cursor keys, move the flashing cursor to the "disp size" item.
2. According to the displays on the function keys, select the desired screen display size.

Function key indication	Meaning	Memory recorder and recorder function modes	X-Y recorder function model
NORMAL	: normal screen	(25 × 20 DIV	20 × 20 DIV)
WIDE	: wide screen	(25 × 24 DIV	24 × 24 DIV)

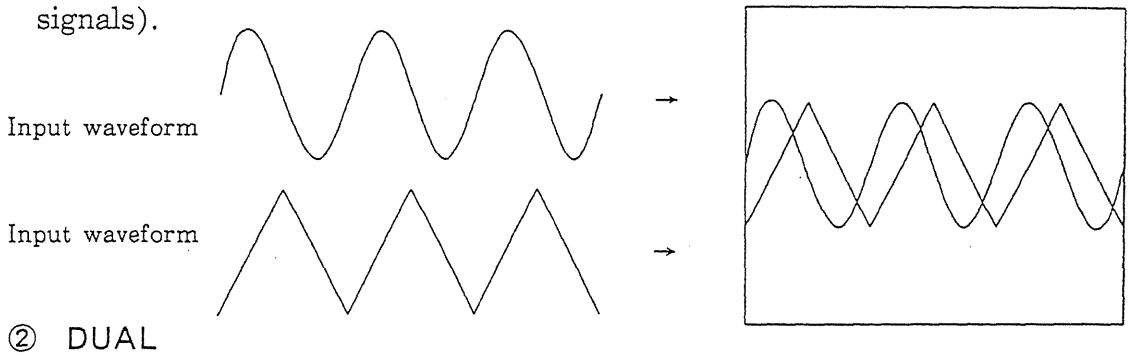




- The style can be set for showing input signal waveforms on the screen display and recording them on the printer.
- The styles SINGLE, DUAL, QUAD, OCT (printer only), and HEX (printer only) are available.

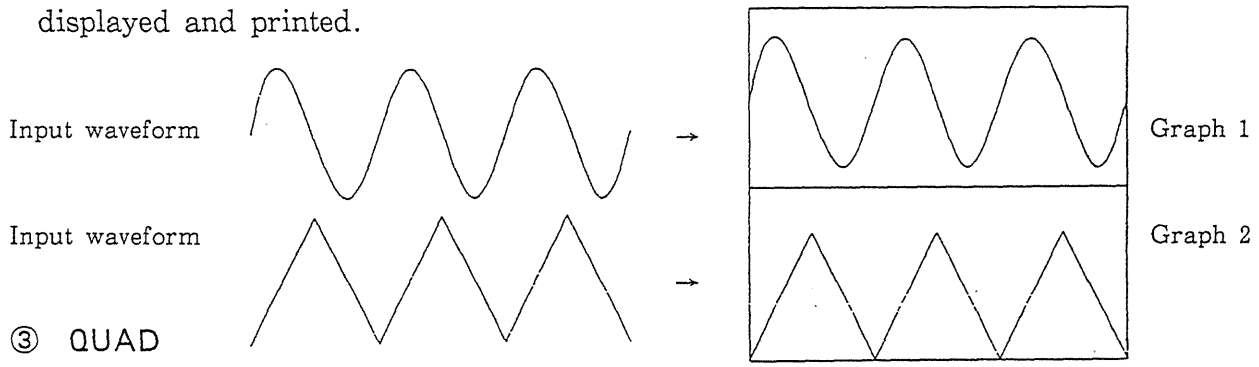
① SINGLE

- Display and record as one graph. (At the most, 16 analog signals and 32 logic signals).



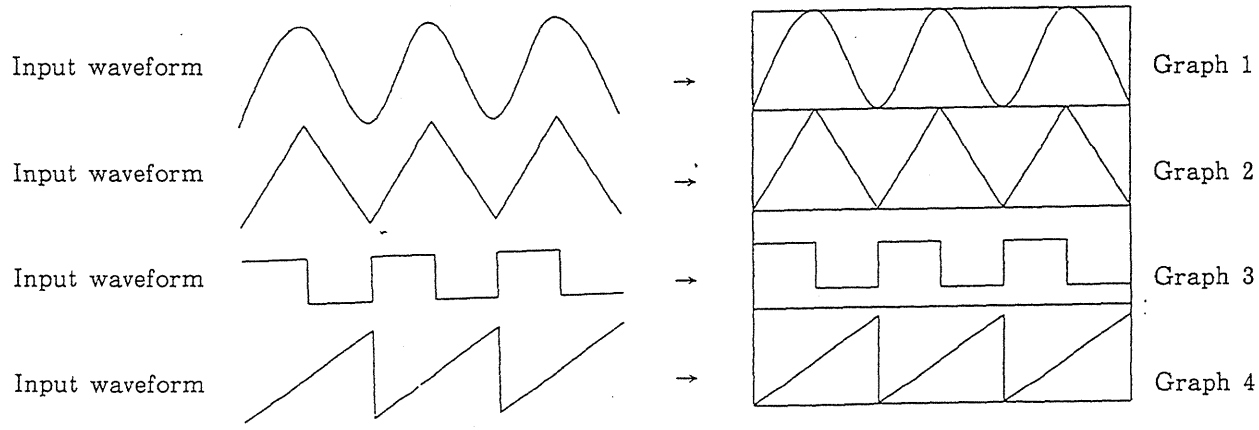
② DUAL

- Display and record as two graphs. (On each graph, at most 16 analog signals and 16 logic signals).
- It is possible to set on which graph each of the input channel waveforms will be displayed and printed.



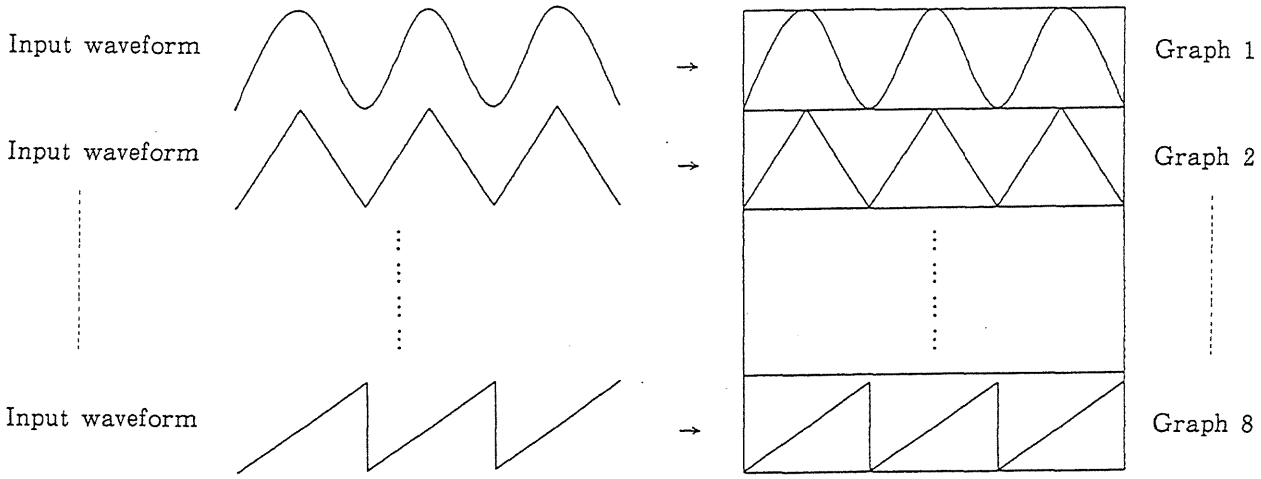
③ QUAD

- Display and record as four graphs. (On each graph, at most 16 analog signals and 8 logic signals).
- It is possible to set on which graph each of the input channel waveforms will be displayed and printed.



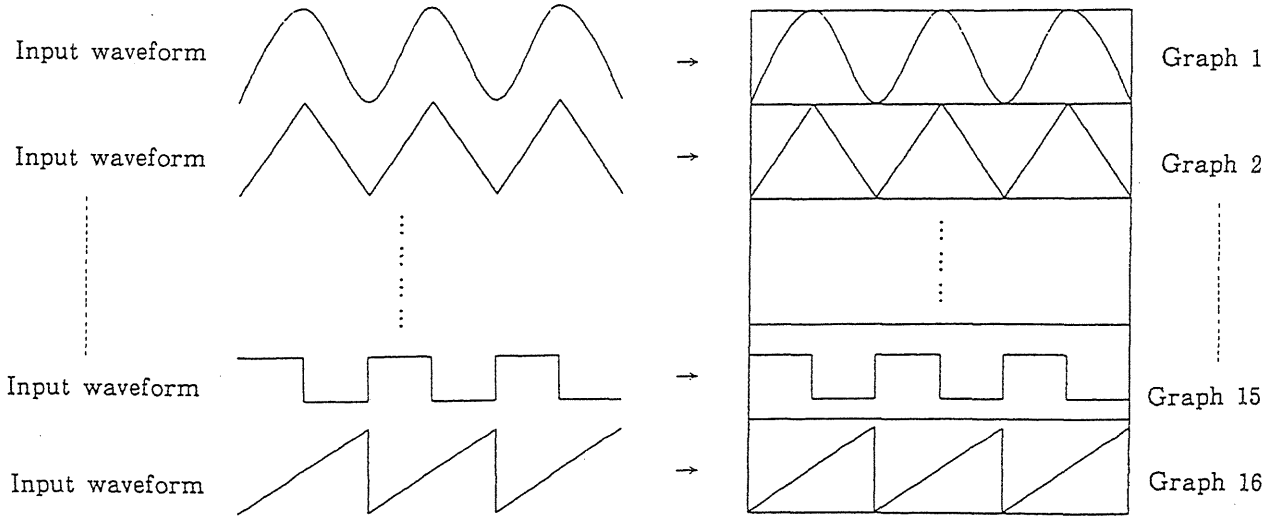
④ OCT (printer only)

- Record on the printer as eight graphs. (On each graph, at most 2 analog signals and 4 logic signals).
- As far as the screen display is concerned, this format is identical to QUAD. (For the printer recording, the graphs cannot be designated. See the note below)



⑤ HEX (printer)

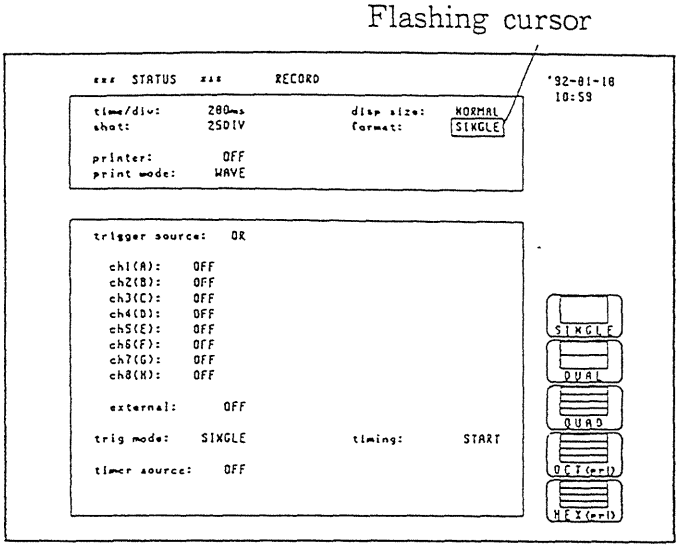
- Record on the printer as sixteen graphs. (On each graph, at most 1 analog signal and 2 logic signals).
- As far as the screen display is concerned, this format is identical to QUAD. (The graphs for printer recording cannot be designated. See the note below)



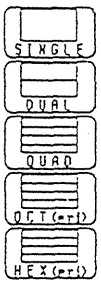
(NB: The display and recording position for a logic signal cannot be set.)

Method (Screen for making this setting: the "status" screen)

1. Using the cursor keys, move the flashing cursor to the "format" item.
2. According to the displays on the function keys, select the desired format.



Function key indication — Meaning



: SINGLE (one division only)

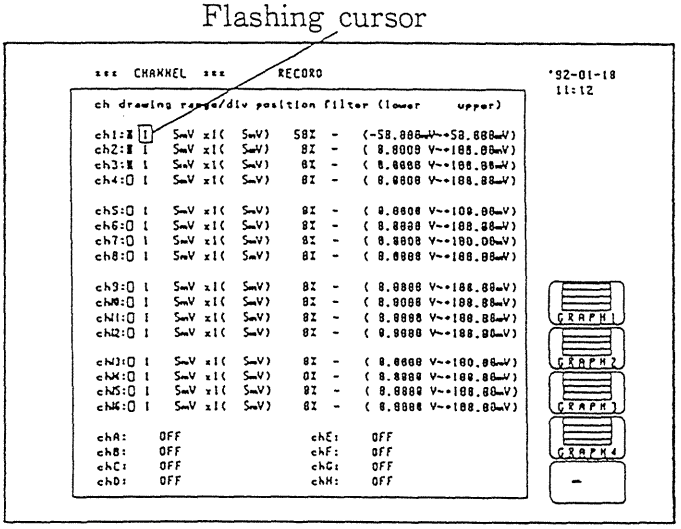
: DUAL (divided into two)

: QUAD (divided into four)

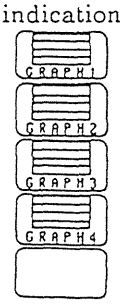
: OCT (printer only) (divided into eight)

: HEX (printer only) (divided into sixteen)

3. If in step 2. the selection was DUAL, QUAD, OCT, or HEX, then it is necessary to set on which graph the waveforms of each channel will appear.
   This selection is performed on the "channel" screen.
   (1) Press the CHAN key, and the "channel" screen will appear.
   (2) Move the flashing cursor to the position shown in the figure on the right. Here the setting for channel 1 is performed. Channels 2 to 16 are set in an identical manner. The graphs are selected using the function key displays.



Function key indication — Meaning



: graph 1

: graph 2

: graph 3

: graph 4

NOTE In the cases of OCT (printer only) and HEX (printer only), as far as the printer recording output is concerned, the waveforms for each channel are automatically distributed on each graph according to the table below:

• OCT

	Analog	Logic
graph 1	CH1, CH9	CHA 1 to 4
graph 2	CH2, CH10	CHB 1 to 4
graph 3	CH3, CH11	CHC 1 to 4
graph 4	CH4, CH12	CHD 1 to 4
graph 5	CH5, CH13	CHE 1 to 4
graph 6	CH6, CH14	CHF 1 to 4
graph 7	CH7, CH15	CHG 1 to 4
graph 8	CH8, CH16	CHH 1 to 4

• HEX

	Analog	Logic
graph 1	CH1	CHA 1, 2
graph 2	CH2	CHA 3, 4
graph 3	CH3	CHB 1, 2
graph 4	CH4	CHB 3, 4
graph 5	CH5	CHC 1, 2
graph 6	CH6	CHC 3, 4
graph 7	CH7	CHD 1, 2
graph 8	CH8	CHD 3, 4
graph 9	CH9	CHE 1, 2
graph 10	CH10	CHE 3, 4
graph 11	CH11	CHF 1, 2
graph 12	CH12	CHF 3, 4
graph 13	CH13	CHG 1, 2
graph 14	CH14	CHG 3, 4
graph 15	CH15	CHH 1, 2
graph 16	CH16	CHH 3, 4

• The available magnification/compression ratios along the voltage axis for the various formats are as follows.

SINGLE ····· ×16, ×8, ×4, ×2, ×1, ×1/2
DUAL ····· ×8, ×4, ×2, ×1, ×1/2, ×1/4
QUAD, OCT, HEX ····· ×4, ×2, ×1, ×1/2, ×1/4, ×1/8

(During printer recording)
OCT ····· ×2, ×1, ×1/2, ×1/4, ×1/8, ×1/16
HEX ····· ×1, ×1/2, ×1/4, ×1/8, ×1/16, ×1/32

See the explanation of how to set the magnification ratio, refer to Section 6-4-6 (4).

- The settings for each of the channels can be made on the "channel" screen or on the "display" screen.
- The 8825 can handle, at the most, 16 analog channels and 32 logic channels.
- For the 16 analog channels it is possible to make the settings for each channel individually, but for the 32 logic channels the ON/OFF setting for an entire group of four channels must be made at one time.

● Making the settings on the "channel" screen:

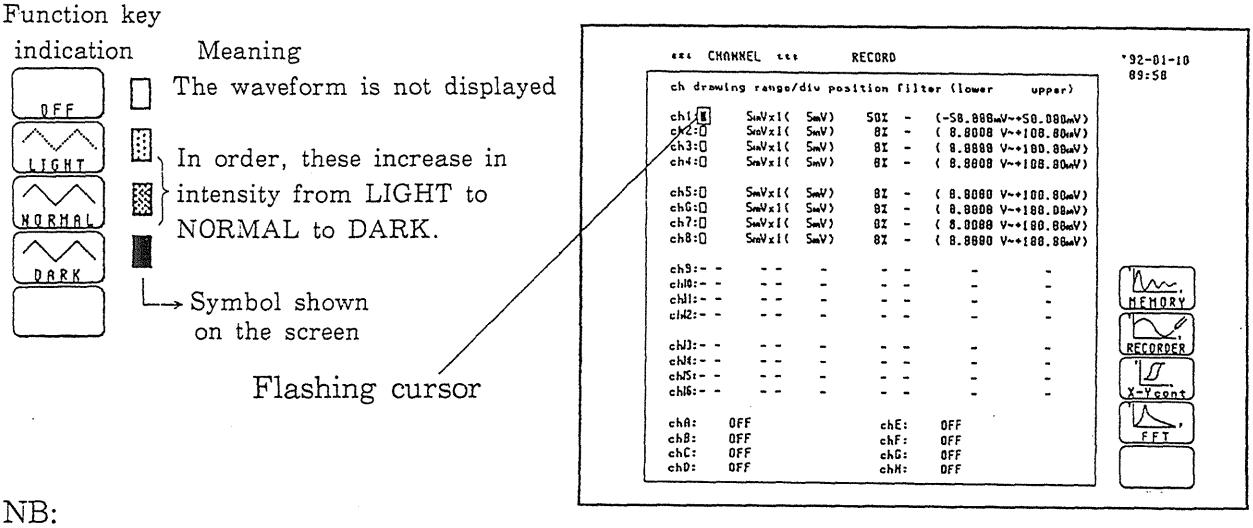
(1) Waveform display (drawing):

Analog:

Settings will be made for the display of an input signal waveform.

Method (Screens for making this setting: the "channel" and "display" screens)

According to the displays on the function keys, select the method of display for the waveform of each channel.



NB:

- If no input unit is fitted, the symbol " - " will be displayed, as for channel 9 to channel 16 in the figure.
- In DUAL, QUAD, OCT (printer only), and HEX (printer only) formats, beside this item, an item for setting the graph will appear. (See Section 6-4-5, "Setting the format.")

Related item

It is possible to copy the contents set for one channel to another channel. For details, refer to Section 12-9 "Copying Function."

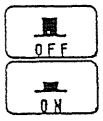
Logic:

Settings will be made for the display of four logic channels.

Method (Screens for making this setting: the "channel" and "display" screens)

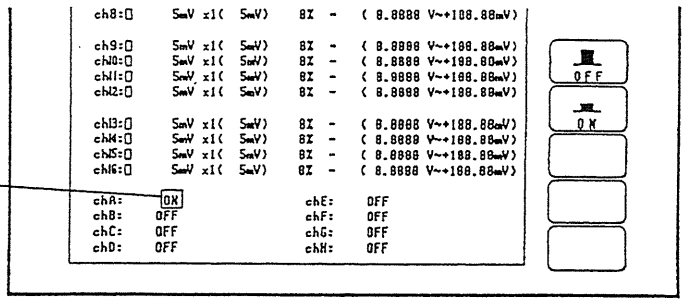
According to the displays on the function keys, for each channel, it is selected whether display will be performed or not.

Function key indication — Meaning



: is not displayed

: is displayed



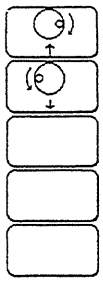
(2) Setting the voltage axis range (range/div)

- For each channel, the voltage axis range (range/div) should be set.
- The value set as range/div denotes the voltage value for 1 DIV along the voltage axis (vertically).

Method (Screens for making this setting: the "channel" and "display" screens)

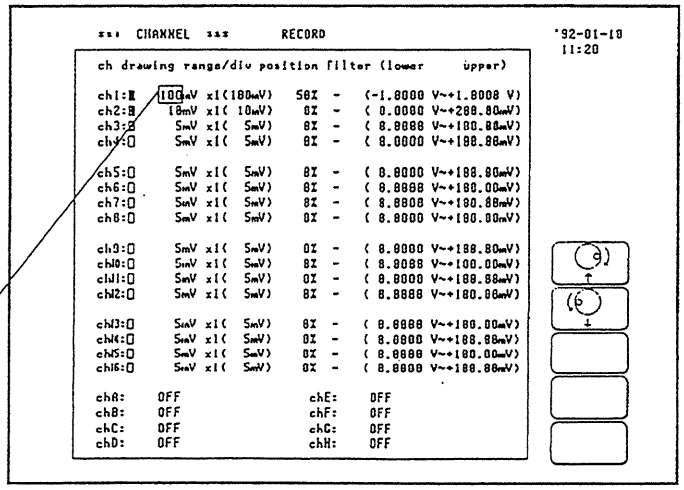
The settings are made by using the function keys or the rotary knob.

Function key indication — Meaning



5, 10, 20, 50, 100, 200, 500 mV

1, 2, 5, 10, 20 V

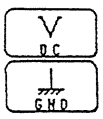


(3) Setting the input coupling

Method (Screens for making this setting: the "channel" and "display" screens)

The selections are made according to the displays on the function keys.

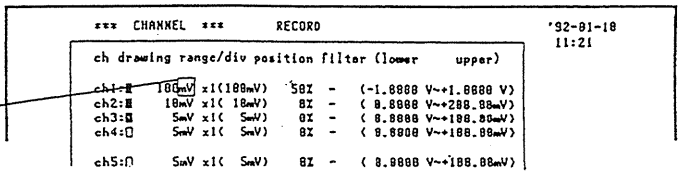
Function key indication — Meaning



V : The input signal is directly connected to the input amplifier. This allows a DC component to be measured.

: The input signal is not connected. This allows the zero position to be checked.

Symbol shown on the screen



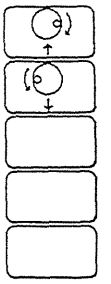
(4) Voltage axis magnification

- For each channel, the magnification ratio along the voltage axis should be set.
- With magnification, detailed observations can be performed which fully exploit the 12-bit A/D resolution.

Method (Screens for making this setting: the "channel" and "display" screens)

The settings are made by using the function keys or the rotary knob.

Function key indication

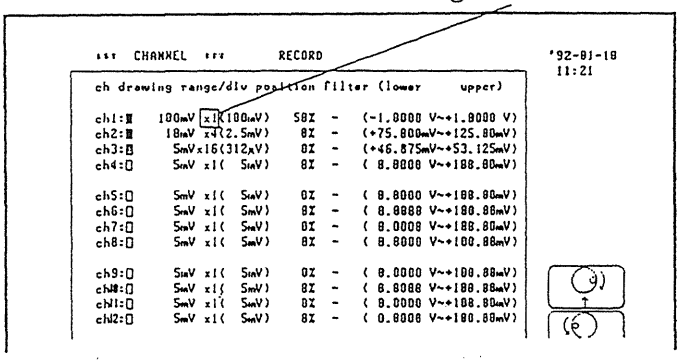


Meaning

×16, ×8, ×4, ×2, ×1, ×1/2

The magnification ratios available vary according to the format. Refer to the note at the end of Section 6-4-5, "Setting the format."

Flashing cursor



(5) Low-pass filter

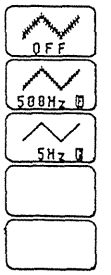
- Low-pass filters internal to the input units can be set.
- With such internal filters the frequency bands can be restricted.

  This has the good effect of getting rid of the following phenomena:
- In the case of level recording in the recorder function mode, because of high speed sampling and high band amplification, the influence of ripple components and noise in the signal can thicken the recording line.
- It can happen that, because ripples are present in the output of transducers and the like, the recording line becomes thick.
- In RMS measurement, a good effect is produced with regard to pulse type noise.

Method (Screens for making this setting: the "channel" and "display" screens)

By using the function keys or the rotary knob, make the setting.

Function key indication



Meaning

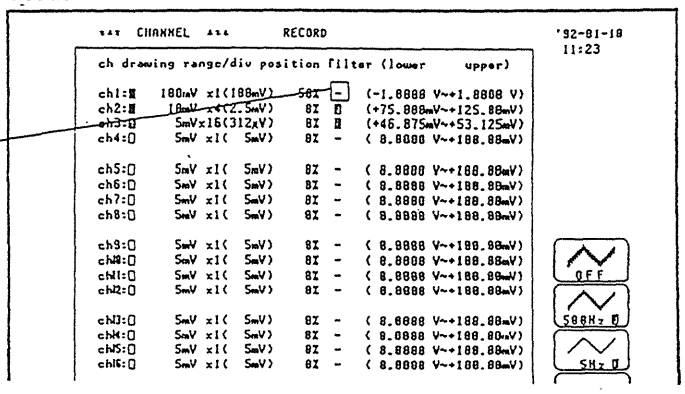
— : No low pass filter is used.

F : A filter with 500 Hz cutoff is used.

F : A filter with 5 Hz cutoff is used.

→ Symbol shown on the screen

Flashing cursor



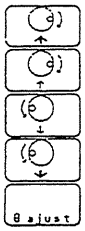
(6) Position

- The position can be set for each channel.
- The range for the position varies according to the magnification ratio along the voltage axis and the display size. (For details, refer to the following "Background" section.)

Method (Screens for making this setting: the "channel" and "display" screens)

By using the function keys or the rotary knob, make the setting.

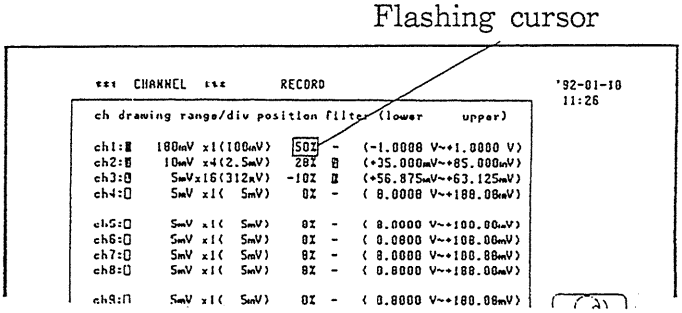
Function key indication



Meaning

When the magnification ratio is 1, from -28% to 128%. For other cases, see the table below.

(See 5-4-10. Zero Adjustment)



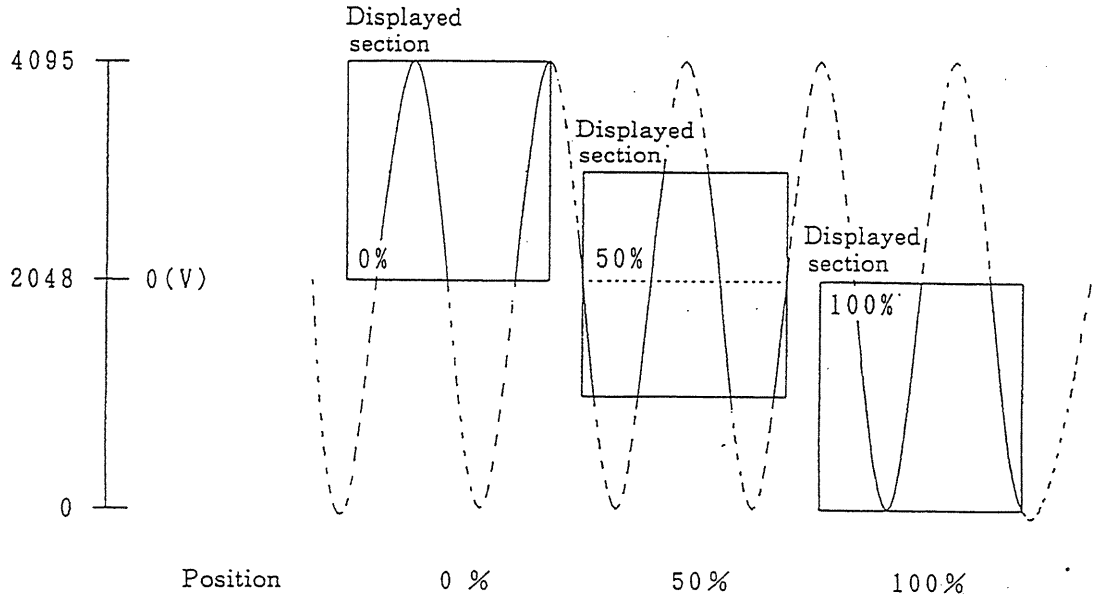
- Allowable position setting range

Magnification ratio		×16	×8	×4	×2	×1	×1/2
Display size	NORMAL	-1950 to 2050	-926 to 1026	-410 to 510	-156 to 256	-28 to 128	36 to 64
	WIDE	-1934 to 2034	-910 to 1010	-402 to 502	-146 to 246	-18 to 118	46 to 54

(units %)

Background

- The position has the significance shown in the figure below.
- It is possible to display the hidden portion of the waveform, according the relative position of the displayed section at which 0 V appears.



(7) Variable display function

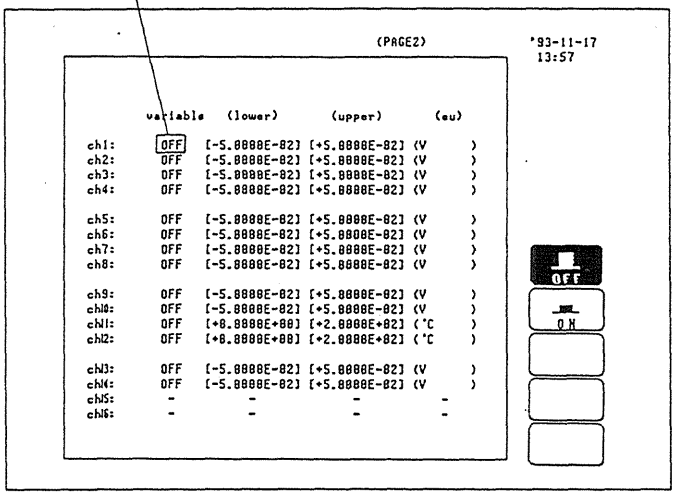
- Using the variable display function, the position and size of the waveform to be displayed can be set as required. (However, in the variable display function the magnification can be set up to 10 times.)
- For the "variable" screen, the upper and lower limit values of the waveform on the "display" screen can be set.
- It is possible to enable or disable the "variable" function for each channel.
- The upper and lower limit values of the waveform processing calculation equation can be set in this step.

Method (Screens for making this setting: the CHANNEL (PAGE 2) screen)

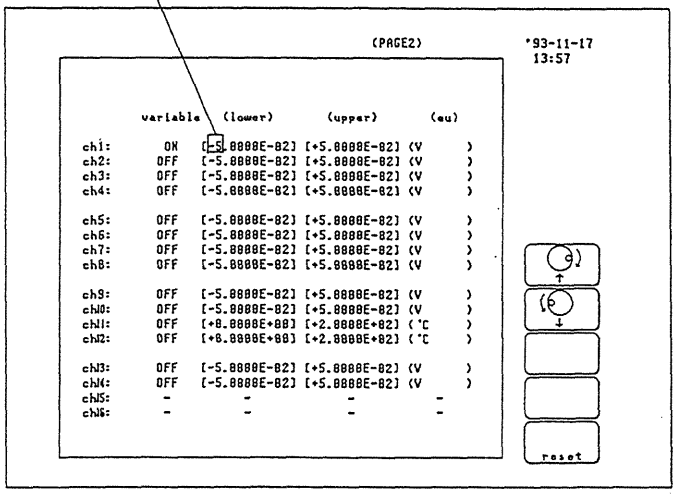
- Using the cursor keys, move the flashing cursor in order of the figure right.

1. Using the CHAN or CURSOR keys, set to the CHANNEL (PAGE 2) screen.
2. Press the function key, F2 (ON).
3. Sets the upper and lower limit values.
   - (lower) and (upper) can be set within the range -9.9999E+29 to +9.9999E+29.
   - It is not possible to set the value so that the lower limit exceeds upper limit.
   - Move the flashing cursor in each digit.

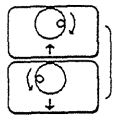
Flashing cursor



Flashing cursor



Function key indication — Meaning



from 0 through 9 (for the most significant digit, from 9 through +9) (for the exponent, from -29 through +29)

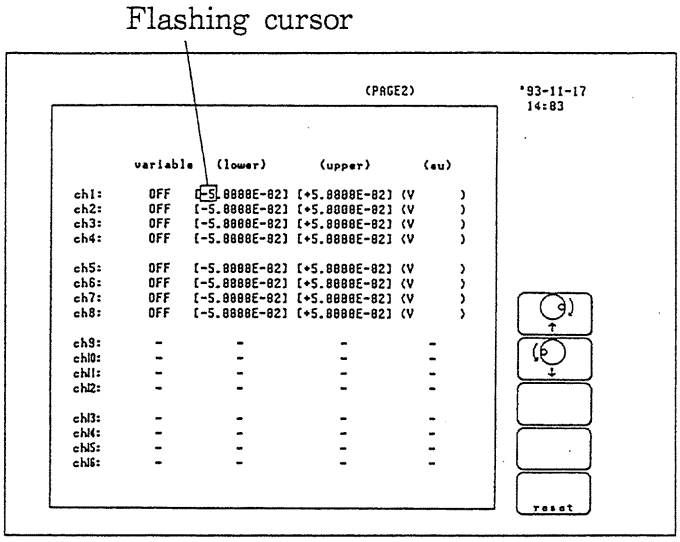
Reset the "variable" upper and lower limit values

- When the flashing cursor is aligned with (lower) or (upper) columns, the upper and lower limit values can be reset to initial condition.
- When the "variable" is set to OFF, the upper and lower limit values on the CHANNEL screen (PAGE 1) are automatically set at the variable (lower) and (upper) columns.

Press the F5 (reset) key.

Function key indication | Meaning

reset : Resets the upper and lower limit values to initial condition



Notes

- A dash " - " is shown for channel 9 to 16 that no input unit installed as shown in the figure above.
- For the channel which the "variable" is set to ON, "variable" will appear at the display portion or "lower upper" on the CHANNEL screen (PAGE 1).

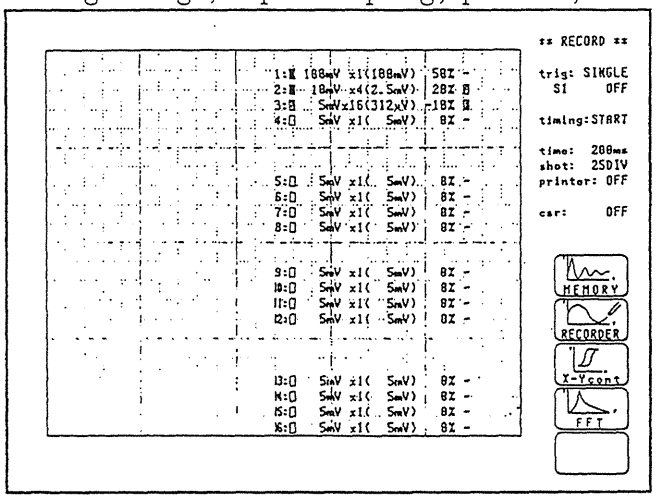
Related item

It is possible to copy setting from one channel to another. For details, refer to Section 12-9 "Copy function".

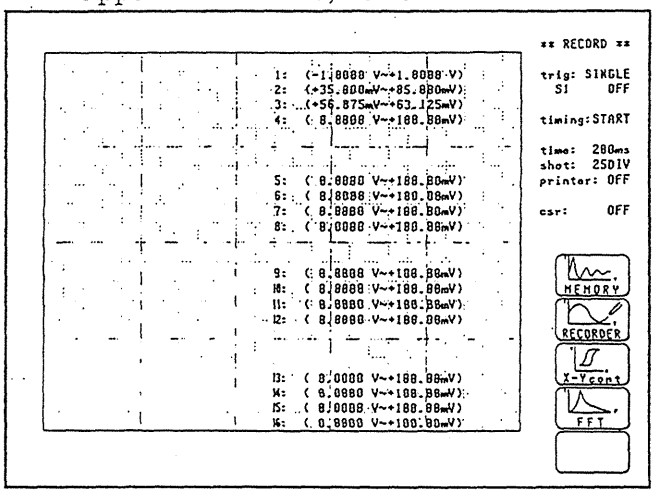
● Making the settings on the "display" screen:

- Pressing the CH SET key makes it possible partially to overlay the "channel" screen over the "display" screen. Each time this key is pressed, the contents which are displayed are altered.
- By moving the cursor on this partially displayed portion of the "channel" screen, it is possible to make settings on the "display" screen in an identical manner to that described above with respect to the "channel" screen.

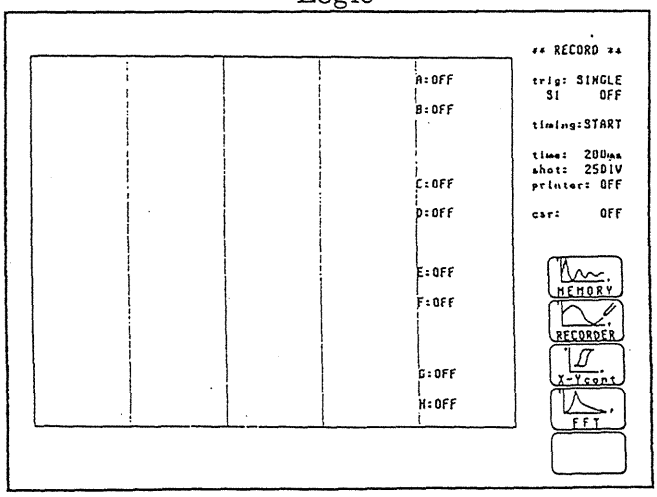
Voltage range, input coupling, position, filter



Upper limit value, lower limit value



Logic



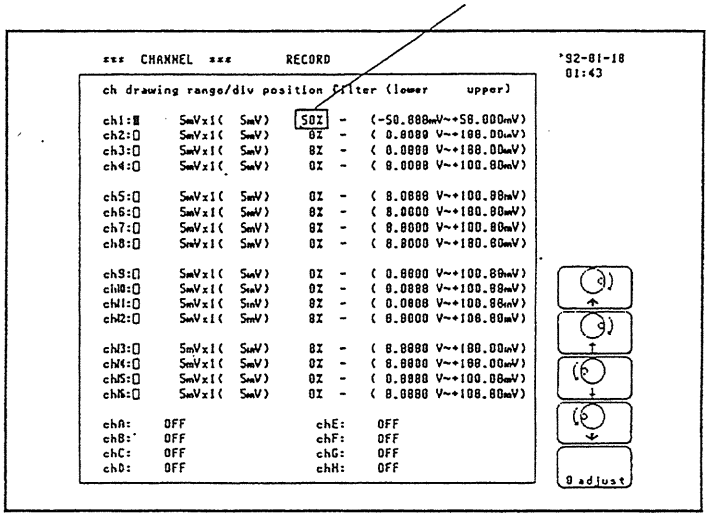
6-4-7 Zero Adjustment

This function provides for accurate adjustment of the waveform to the origin position when a zero voltage is input. Use it for reading precise values from the screen or a printed recording or to ensure accurate results from waveform computations.

Method (Screens for making this setting: the "channel" and "display" screens)

Always allow at least 30 minutes warming up before carrying out this procedure, to ensure that the internal temperature of the unit has stabilized.

1. Using the cursor keys, move the flashing cursor to the "position" item.
2. Press the function key F5 (0 adjust), and all of the channels will be calibrated at once.
   If later the voltage axis range is changed, this function should be executed again.



NB: This setting can be made on the "display" screen in an identical manner. For how to do this, refer to the description of making the settings on the "display" screen in Section 6-4-6 "Settings for Each of the Input Channels."

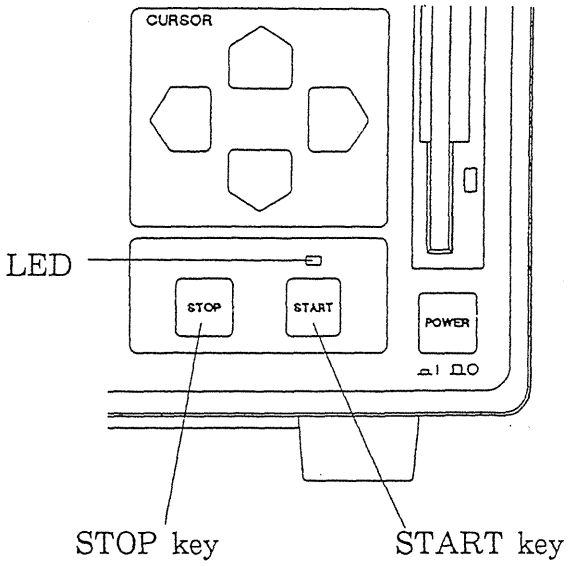
NOTE

- Zero adjustment should be performed about 30 minutes after turning the power on, so as to let the unit warm up.
- Zero adjustment cannot be performed while measurement is taking place.
- The results of zero adjustment relate only to the input units which are equipped to the 8825 at the time; so, if any input unit is taken out and changed, it is necessary to perform the zero adjustment process again.

Measurement is started by pressing the START key. While measurement is taking place, the LED above this START key is illuminated. When measurement has finished, the LED goes out.

Method

1. Press the START key.
   Measurement will start.
2. Press the STOP key.
   Measurement will stop.



NOTE

If the trigger mode is set to REPEAT or the recording length is set to CONT, because measurement will not stop automatically, the STOP key should be pressed.

6-4-9 Using the A and B Cursors

You can use the A and B cursors to measure time differences, frequencies, voltage differences, and temperature differences getting a direct digital readout on the "display" screen. (if using the scaling function, the scaled values; see Section 12-4 "Scaling Function")

In the recorder function mode, only the line cursors (vertical cursors and horizontal cursors) can be used; the cross cursors cannot be used.

You can read the values below using the cursors.

Line cursors (vertical and horizontal)

○ A and B cursors used individually

• Vertical cursor

The value of A or B

t : time from the trigger point

1/t : the frequency, taking t as the period

• Horizontal cursor

v : voltage difference (or temperature difference) from voltage 0 V (or ℃)

○ A and B cursors used together

• Vertical cursors

The value of B-A

t : time interval between the A and B cursors

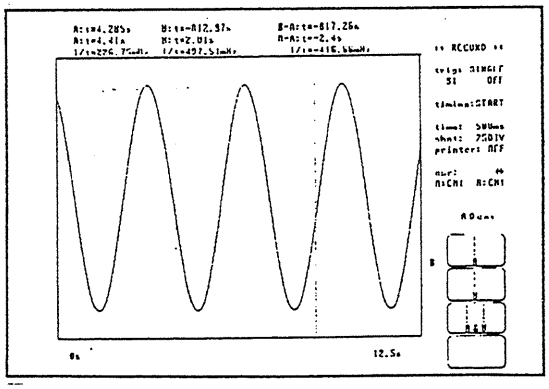
The value of A or B

t : time from the trigger point

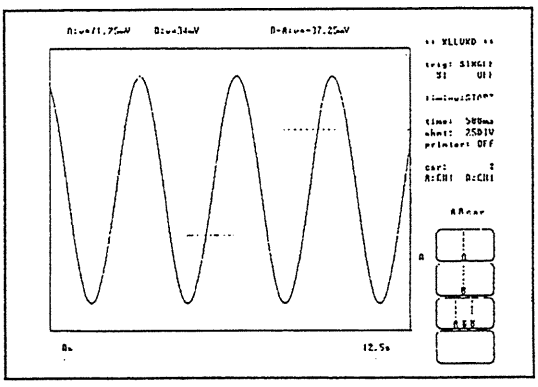
• Horizontal cursors

v : voltage difference between the A and B cursors

v : voltage difference (or temperature difference) between the A and B cursors



Vertical cursors



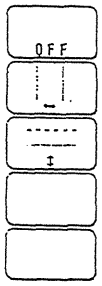
Horizontal cursors

Method (Screen for making this setting: the "display" screen)

Using the cursor keys, move the flashing cursor to the "csr" item.

1. According to the displays on the function keys, select the desired line cursor.

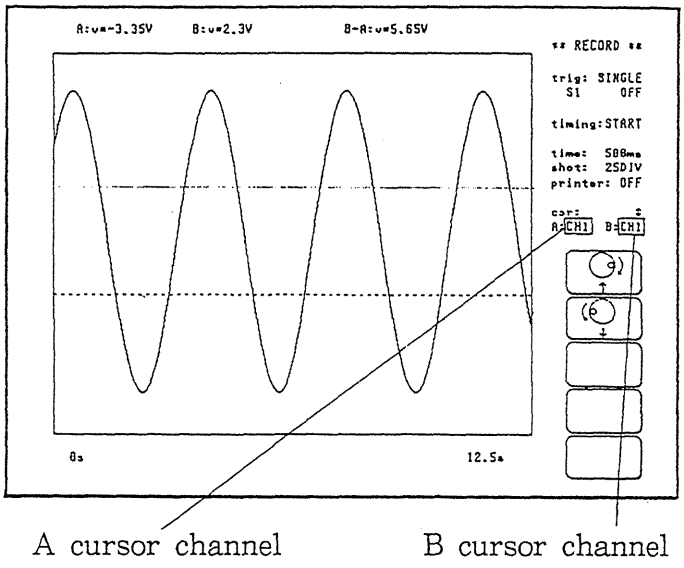
Function key indication — Meaning



: do not use the A.B cursors

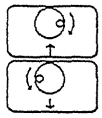
: line cursor (vertical, display t and 1/t)

: line cursor (horizontal, display V)



2. If in step 1 the line cursor (horizontal) was selected, now select the waveform channel for reading voltage values for each of the A and B cursors.

Function key indication — Meaning

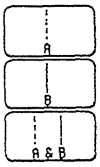


} Channel 1 to Channel 16

NB: • Even if the A and B cursors have different channels specified, the A to B voltage difference is derived from the absolute values of the voltages relating to their respective channels.
• It is not possible to select a channel on which no waveform is being displayed.
• When the line cursors are being used along the time axis, this item does not appear.

3. Press the knob select key, and the LED for A.B CSR will not be illuminated.
4. According to the display on the function keys, select the cursor to be moved.

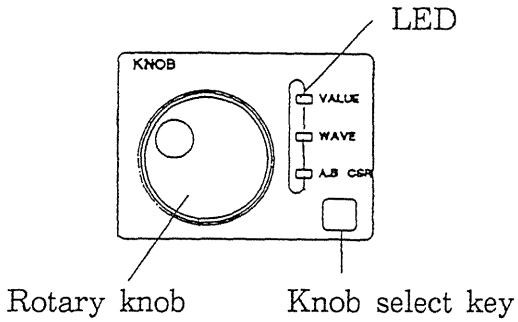
Function key indication — Meaning



: move the A cursor

: move the B cursor

: move the A and B cursors simultaneously



5. Turn the rotary knob, to move the cursor.
t and 1/t, and V, are derived according to the position of the cursor.
In the case of vertical cursors, it is quite valid for the A or the B cursor to go off the screen.

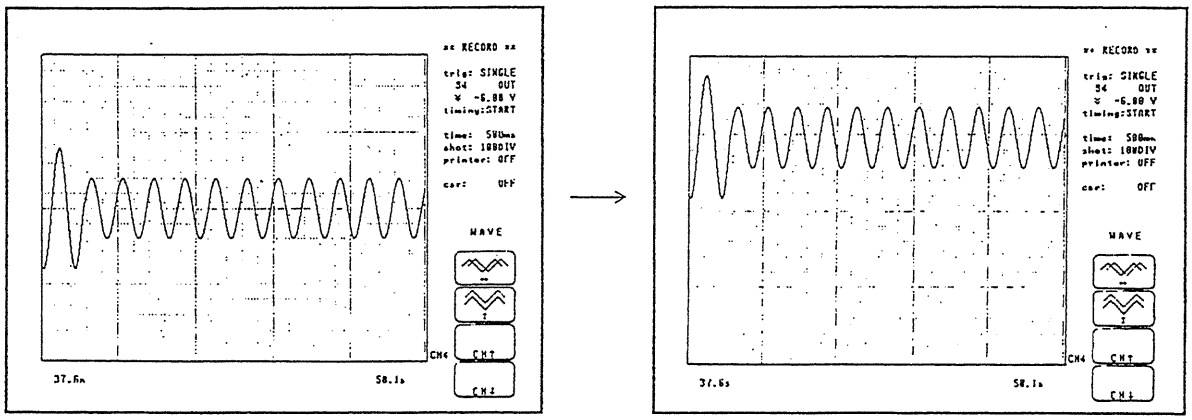
NOTE

The case of the vertical cursors differs from the case of the horizontal cursors, in the movement of the A and B cursors when the waveform is scrolled. Refer to Section 5-4-12 "Using the A and B Cursors" and particularly to the note.

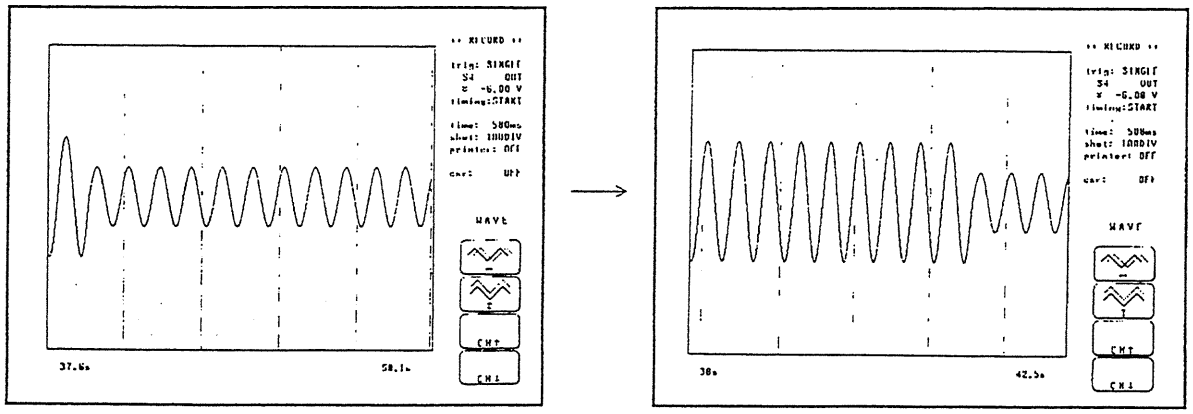
6-4-10 Waveform Scrolling

Although this function provides real time recording, it is also possible to scroll back over the most recently recorded 250 DIV of the waveform (1000 DIV if the 4M word memory board is in use).

The waveform can be scrolled vertically and horizontally on the screen display.



Scrolling vertically

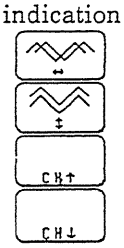


Scrolling horizontally

Method (Screen for making this setting: the "display" screen)

1. Press the knob select key to illuminate the LED for WAVE. (Movement of the rotary knob now performs waveform scrolling).
2. According to the displays on the function keys, select which type of scrolling is required - vertical or horizontal. (If vertical scrolling is selected, the channel for the waveform to be scrolled should be designated.)

Function key indication — Meaning



: horizontal scrolling
: vertical scrolling
: increases the channel number
: decreases the channel number

Number of the channel whose waveform is to be scrolled → CH1

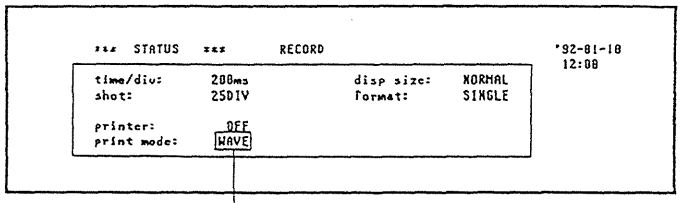
3. By turning the rotary knob, the waveform can be scrolled.

(1) Setting the style for recording the waveform on the printer (the print mode)

There are two styles for recording the input signal (the sampled data) on the printer, as a waveform (WAVE) and as numerical values (LOGGING), and either of these can be selected.

Method (Screen for making this setting: the "status" screen)

1. Using the cursor keys, move the flashing cursor to the "print mode" item.
2. According to the displays on the function keys, make the selection.



Function key indication — Meaning

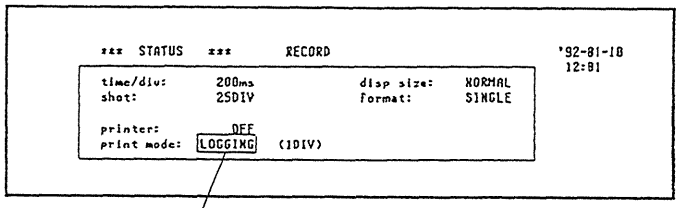
WAVE : the input signal is recorded as a waveform

1.2345v / LOGGING : the input signal is recorded as numerical values

3. If F2 (LOGGING) has been selected, then it is necessary to set at what DIV intervals the data value will be printed out.
   This is done according to the displays on the function keys.

Function key indication — Meaning

1, 2, 5, 10, 20, 50, 100 DIV



(2) Methods of printing

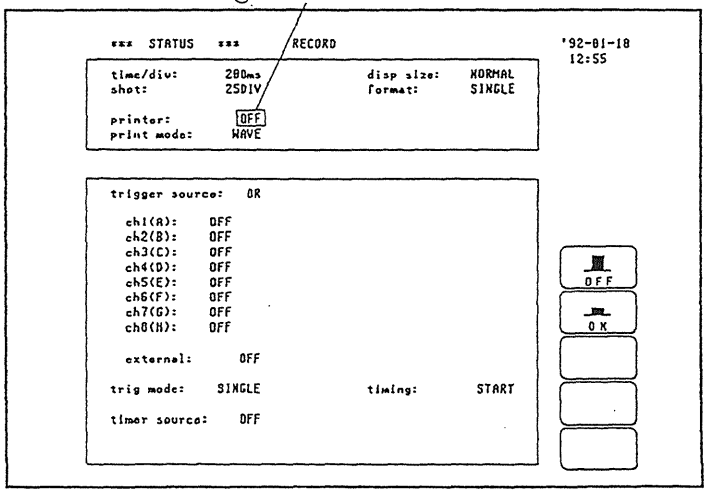
There are the four following ways to print: normal real time continuous recording, manual printing, partial printing, and screen copy printing.

① Normal real time continuous printing

The data is read in and stored and simultaneously recorded on the printer. The waveform is also simultaneously displayed on the screen.

Method (Screens for making this setting: the "status" and "display" screens)

1. Using the cursor keys, move the flashing cursor to the "printer" item.
2. According to the displays on the function keys, make the selection.



Function key indication — Meaning

OFF : do not record on the printer

ON : record on the printer

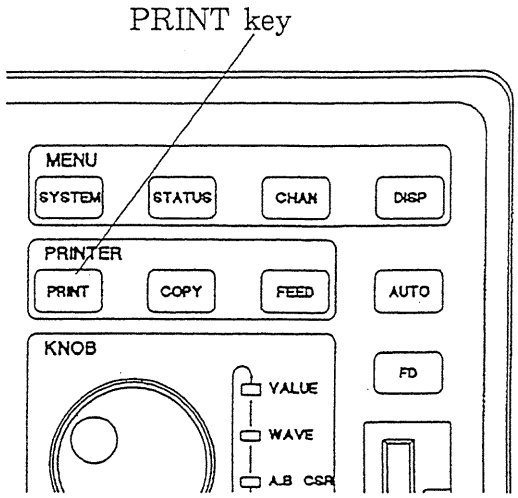
3. Press the START key.
   Data input and storage and simultaneous printer recording is performed.
   If a magnification factor applies to the voltage axis, it is also applied on the printed recording.

② Manual printing

While real time continuous recording is being performed, because the most recently recorded 250 DIV of the waveform (1000 DIV if the 4M word memory board is in use) is held in memory, it is possible to print the waveform by pressing the PRINT key after measurement has terminated.

Method

- When measurement is finished, press the PRINT key.
- Because the measurement data is held in memory, it can be reprinted as many times as required.



③ Partial printing

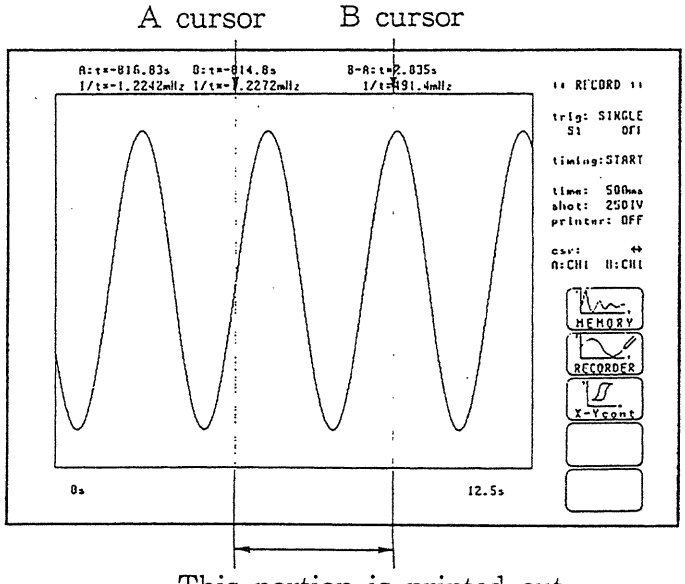
Using the A and B cursors (the vertical cursors), it is possible to print out only the desired portion of the entire length of the recording, up to a maximum of 250 DIV (1000 DIV if the 4M word memory board is in use).

The part of the waveform delimited by the two cursors is printed.

This operation is valid even if the A cursor or the B cursor is off the screen. For details, refer to the Example given in Section 5-4-16, Subsection (2).

Method (Screen for making this setting: the "display" screen)

1. Using the A cursor and the B cursor, indicate the part of the waveform which it is desired to record.
2. Press the PRINT key.
   - For details about the A and B cursors, refer to Section 5-4-12 "Using the A and B Cursors."
   - Partial printing can be used for both waveform printing (WAVE option) and numerical printing (LOGGING option).

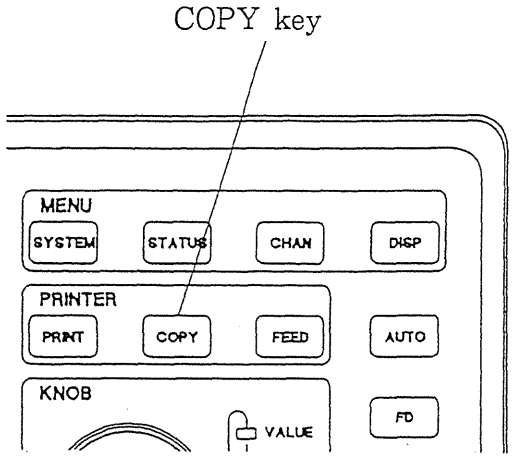


④ Screen copy printing

It is also possible to print a direct hard copy of the screen display exhibited when the "status" screen, the "channel" screen, the "display" screen, the "system" screen, or the "floppy disk control" screen is being shown.

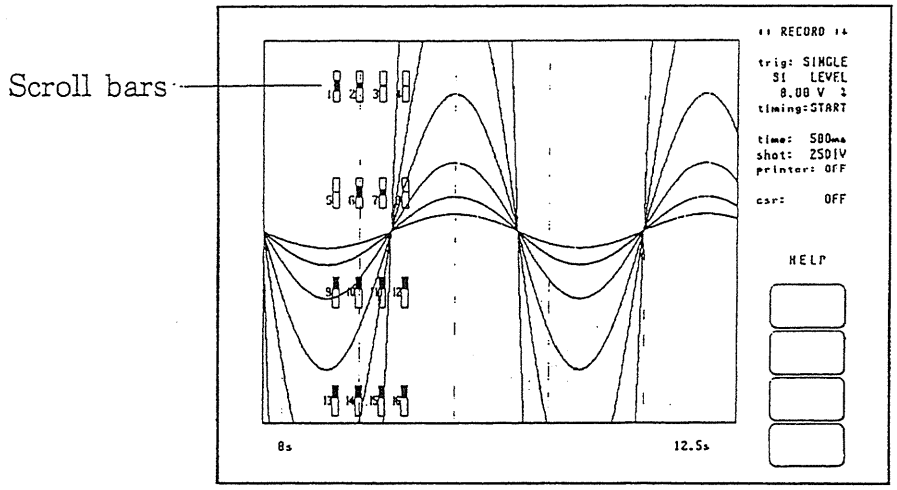
Method

Press the COPY key.



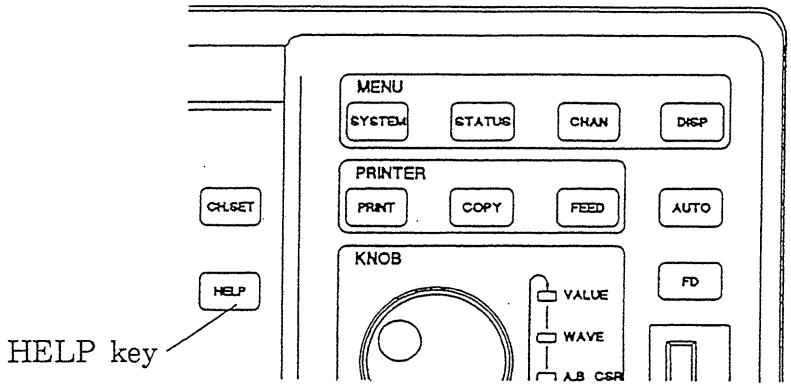
In the recorder function mode, pressing the HELP key on the "display" screen, superimposes vertical scroll bars which indicate the relative position of the display in the voltage axis direction.

- The scroll bar for each channel being displayed is annotated by the corresponding channel number.



Method

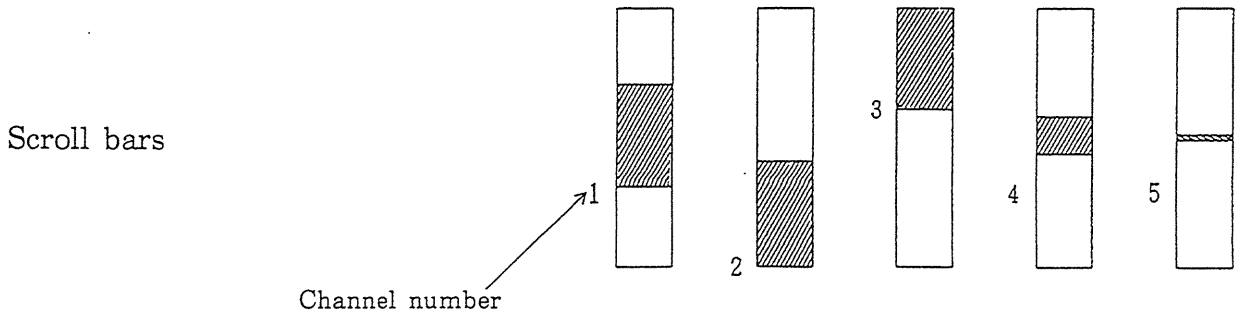
When the "display" screen is being shown, press the HELP key.



Example:

Voltage axis magnification ratio ····· × 1 × 1 × 1 × 2 ×16

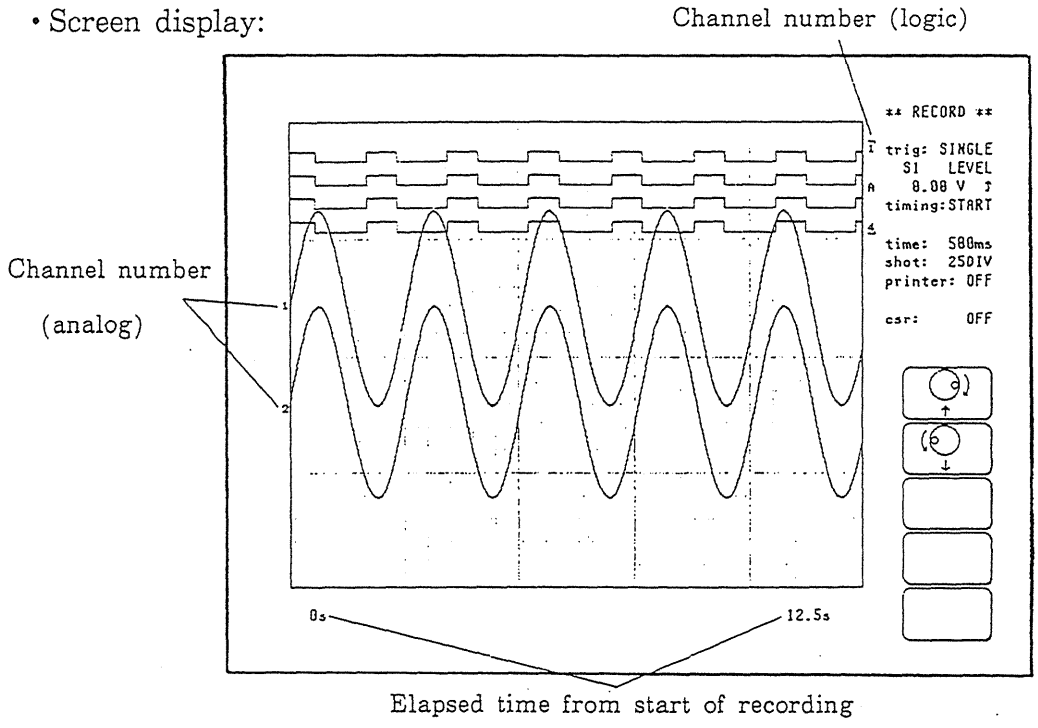
Origin position ····· 50% 128% -28% 50% 50%



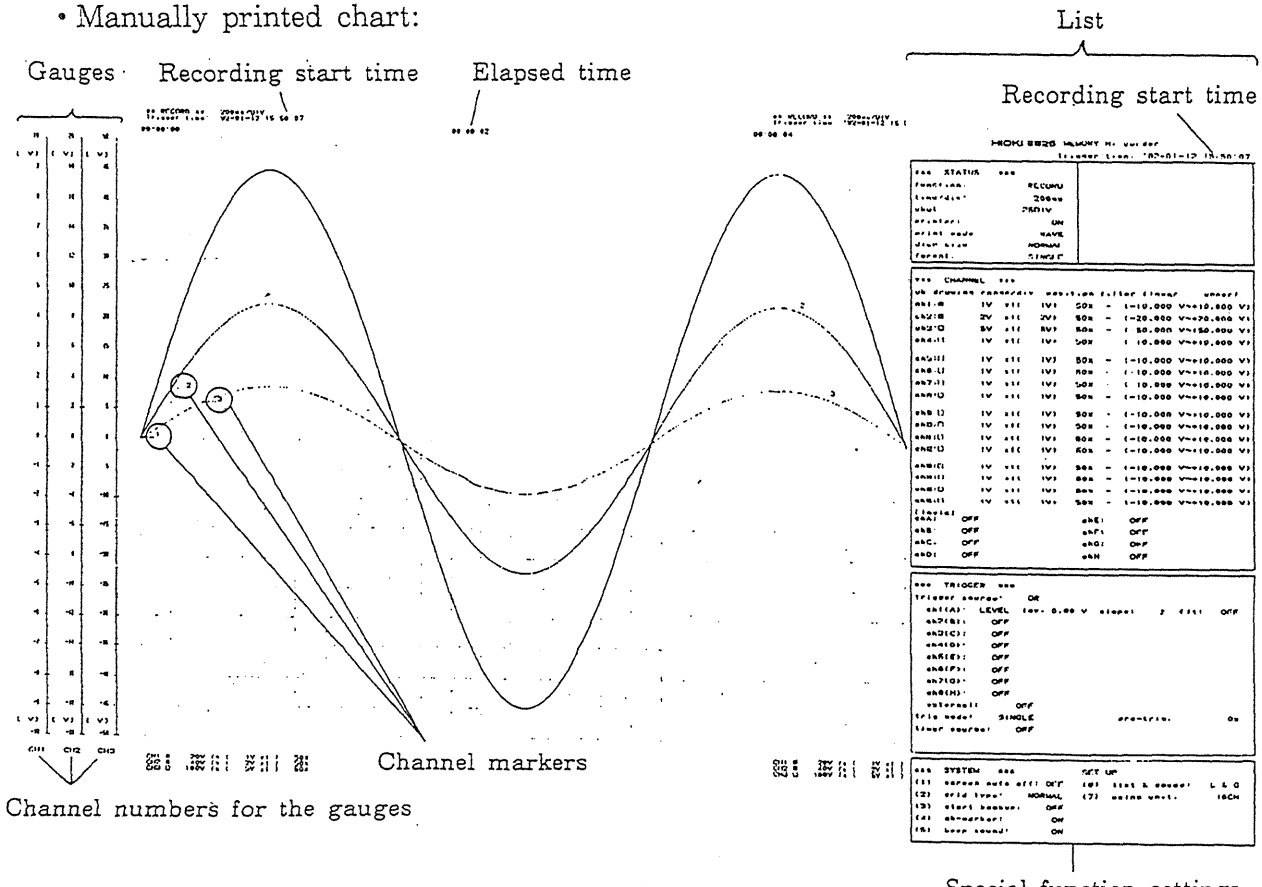
6-5 Interpreting Waveform Displays and Recordings

For each format, an introduction will be given to the "display" screen contents and the recording produced by manual printing.

- SINGLE format:
  - Screen display:

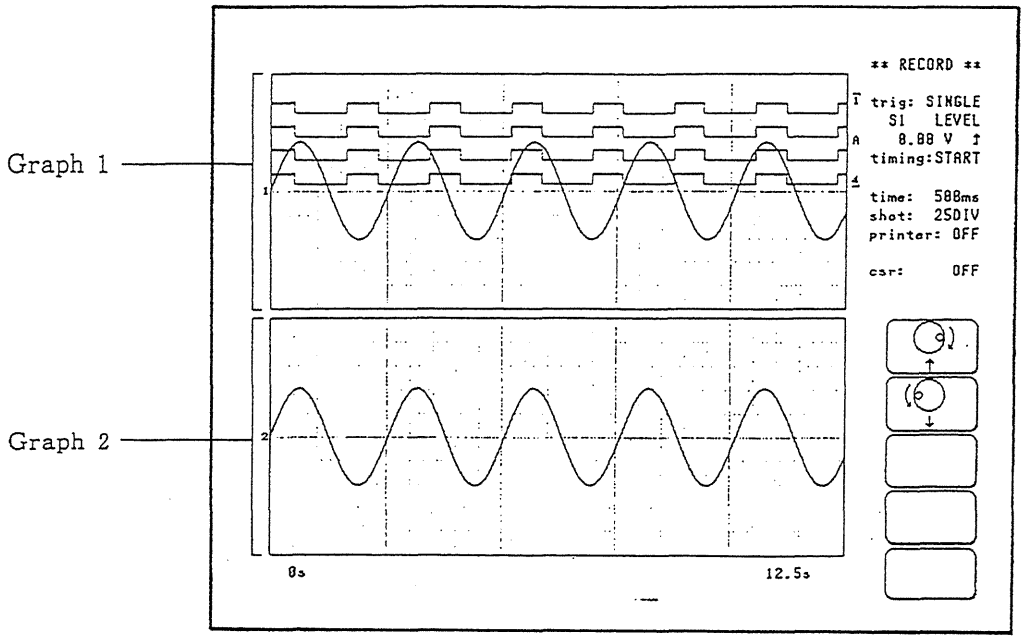


  - Manually printed chart:

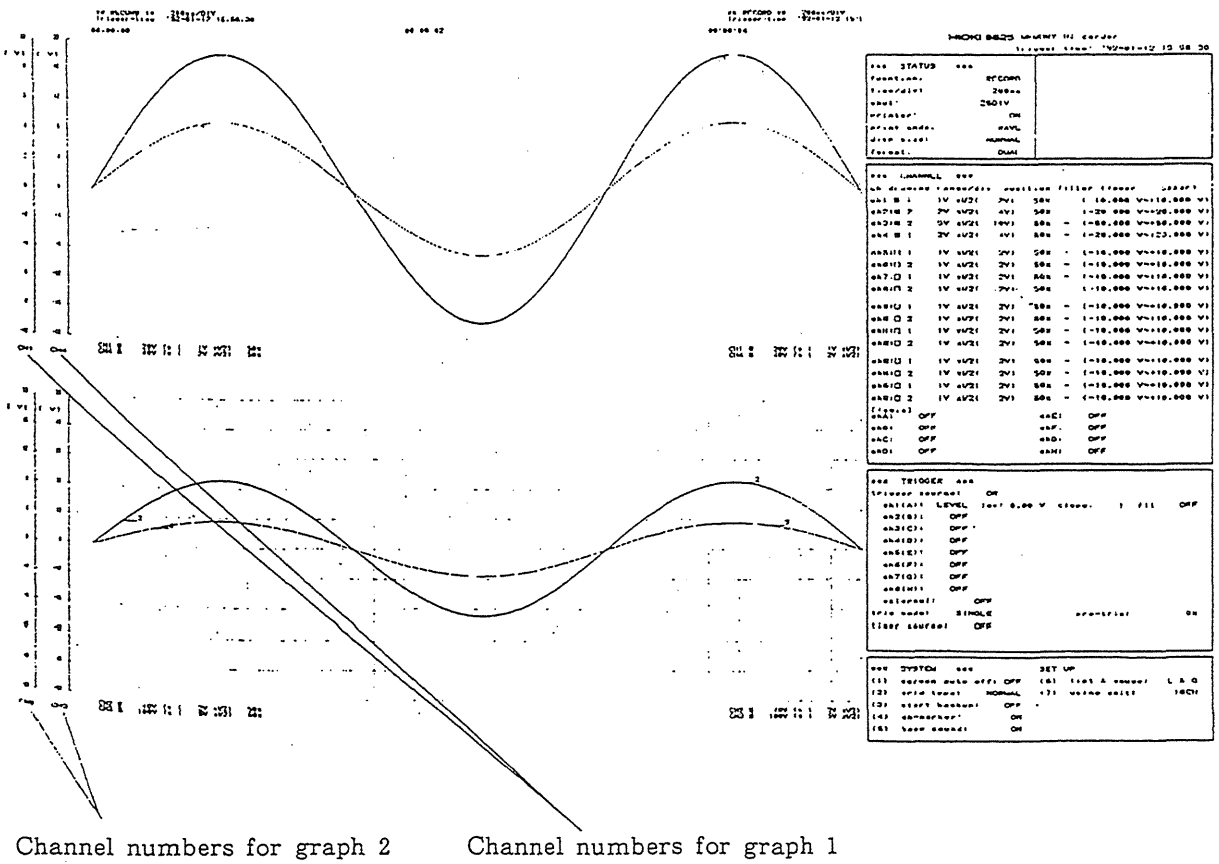


● DUAL format

• Screen display:

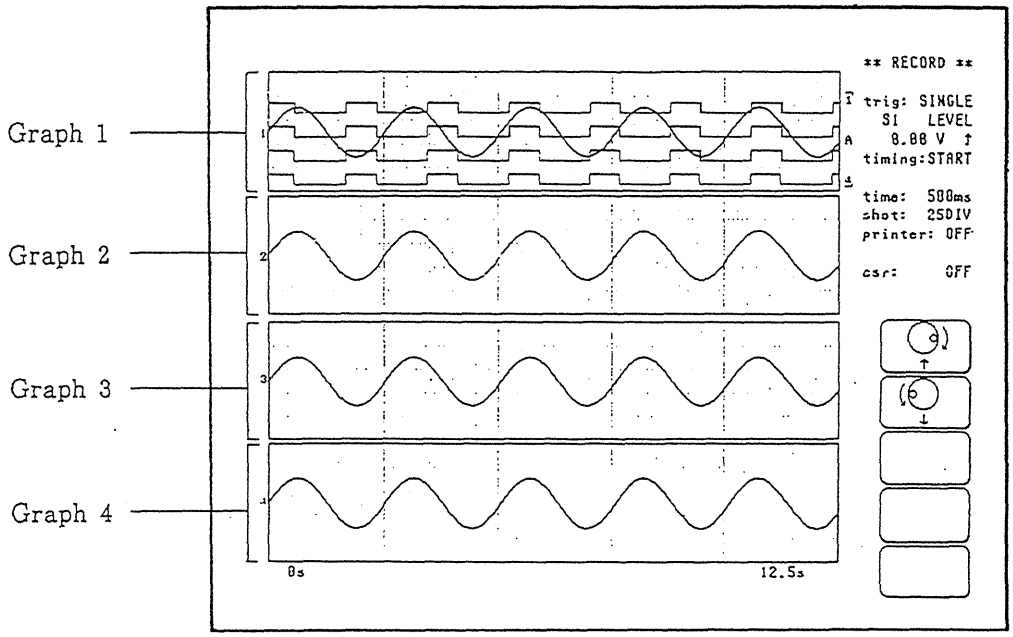


• Manually printed chart:

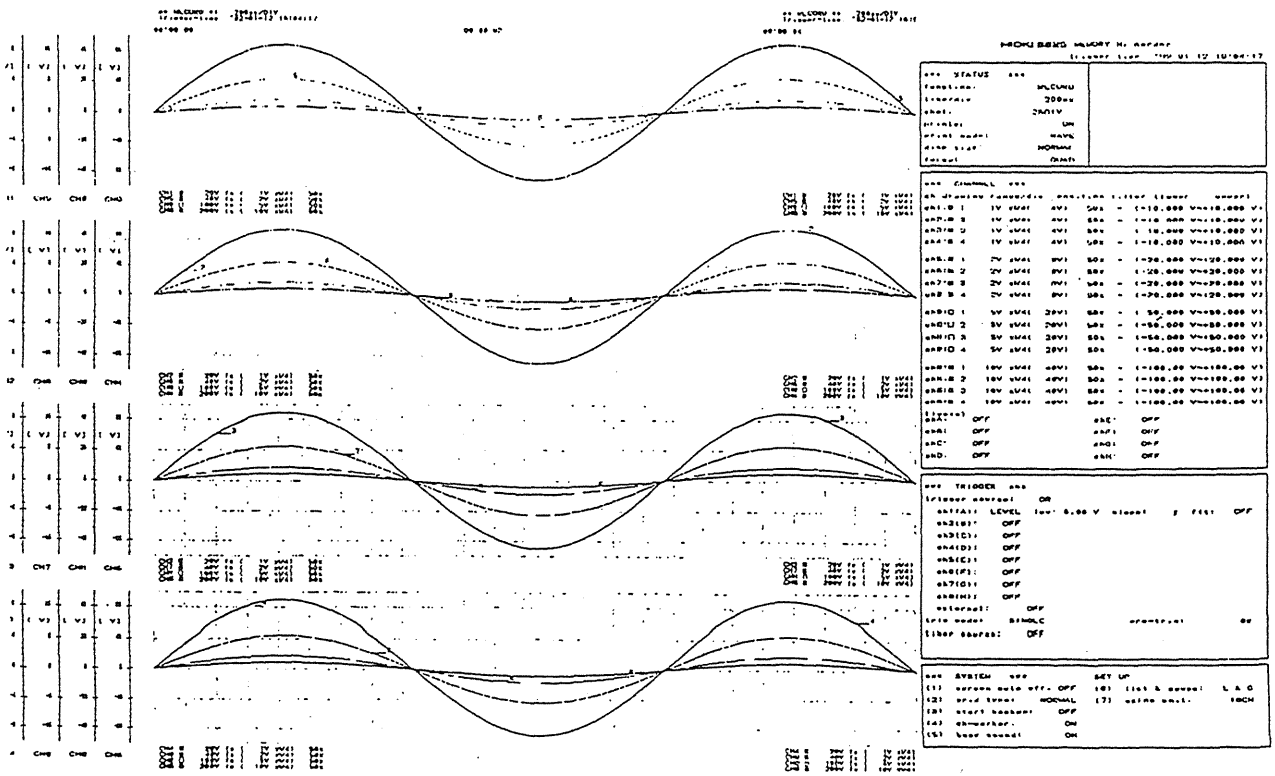


● QUAD format:

• Screen display:

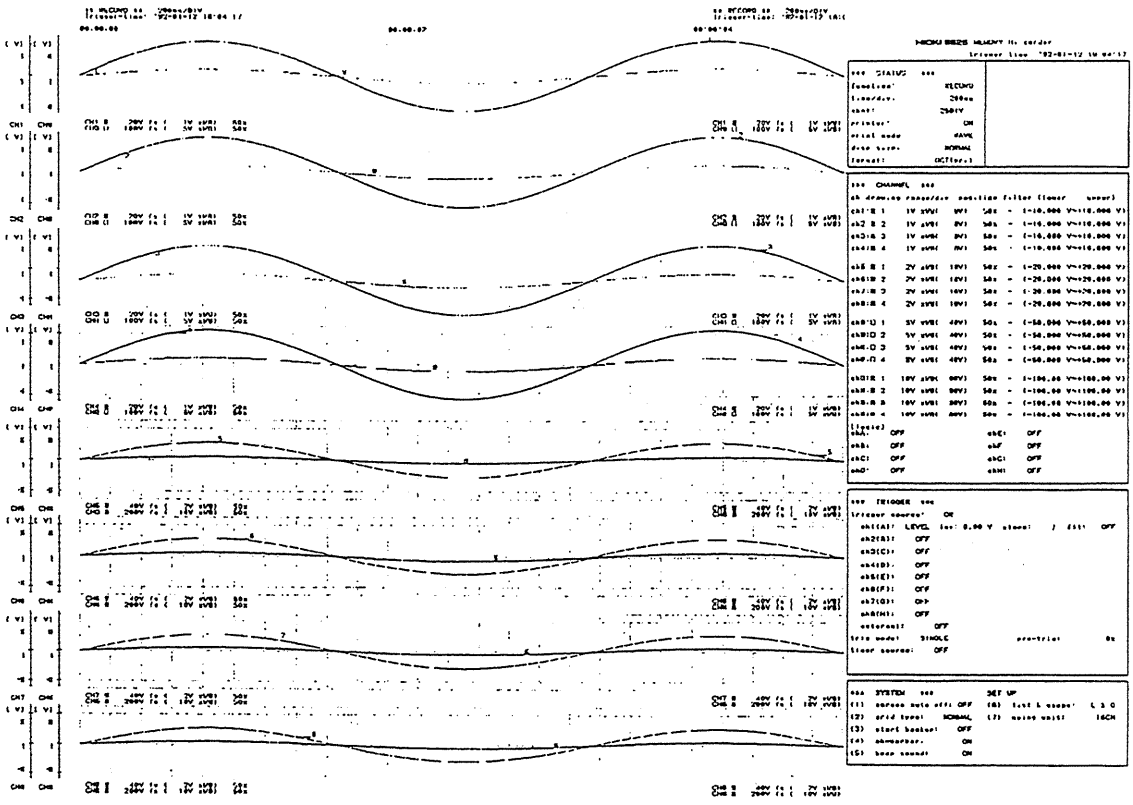


• Manually printed chart:



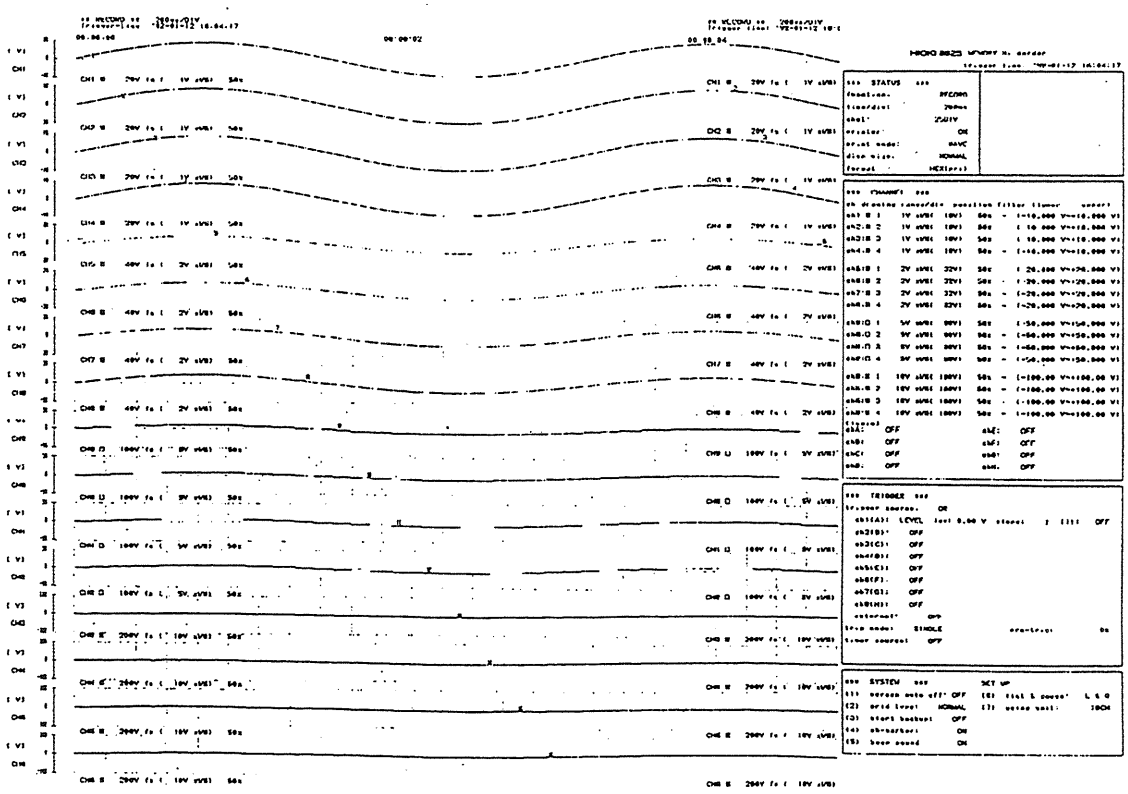
● OCT (printer only) format:

• Manually printed chart: (for the screen display, refer to QUAD)



● HEX (printer only) format:

• Manually printed chart: (for the screen display, refer to QUAD)



- During recording of numerical values (LOGGING):

Trigger instant

92-01-12 16:04:17	CH1[V] CH9[V]	CH2[V] CH10[V]	CH3[V] CH11[V]	CH4[V] CH12[V]	CH5[V] CH13[V]	CH6[V] CH14[V]	CH7[V] CH15[V]	CH8[V] CH16[V]
00:00:00	+5.0000E-02 -4.8125E+01	+6.2500E-02 -4.8063E+01	+2.5000E-02 -4.8063E+01	+6.2500E-02 -4.7938E+01	+7.5000E-02 -8.4000E+01	+1.0000E-01 -6.4250E+01	+2.5000E-02 -8.4125E+01	+7.5000E-02 -8.4125E+01
00:00:00	+3.3375E+00 -4.4813E+01	+3.3750E+00 -4.4750E+01	+3.3375E+00 -4.4750E+01	+3.3625E+00 -4.4625E+01	+3.3750E+00 -6.0750E+01	+3.4000E+00 -8.0875E+01	+3.3500E+00 -8.0875E+01	+3.4000E+00 -8.0750E+01
00:00:00	+8.1750E+00 -4.1938E+01	+6.2000E+00 -4.1938E+01	+6.1625E+00 -4.1938E+01	+6.2000E+00 -4.1813E+01	+6.2250E+00 -5.7875E+01	+6.2250E+00 -5.8000E+01	+6.1750E+00 -5.8000E+01	+6.2250E+00 -5.8000E+01
00:00:00	+8.1500E+00 -4.0000E+01	+8.1750E+00 -3.9938E+01	+8.1375E+00 -3.9938E+01	+8.1750E+00 -3.9813E+01	+8.1750E+00 -5.6000E+01	+8.2000E+00 -5.6125E+01	+8.1250E+00 -5.6000E+01	+8.2000E+00 -5.6000E+01
00:00:00	+8.9750E+00 -3.9188E+01	+9.0000E+00 -3.9125E+01	+8.9625E+00 -3.9125E+01	+9.0000E+00 -3.9000E+01	+9.0000E+00 -5.5125E+01	+9.0250E+00 -5.5250E+01	+8.9750E+00 -5.5125E+01	+9.0250E+00 -5.5250E+01
00:00:01	+8.5500E+00 -3.9625E+01	+8.5750E+00 -3.9563E+01	+8.5375E+00 -3.9563E+01	+8.5750E+00 -3.9438E+01	+8.5750E+00 -5.5625E+01	+8.6000E+00 -5.5750E+01	+8.5250E+00 -5.5625E+01	+8.6000E+00 -5.5625E+01
00:00:01	+6.9250E+00 -4.1250E+01	+6.9375E+00 -4.1188E+01	+6.9125E+00 -4.1188E+01	+6.9375E+00 -4.1063E+01	+6.9500E+00 -5.7125E+01	+6.9750E+00 -5.7375E+01	+6.9250E+00 -5.7250E+01	+6.9750E+00 -5.7250E+01
00:00:01	+4.3250E+00 -4.3813E+01	+4.3500E+00 -4.3750E+01	+4.3125E+00 -4.3813E+01	+4.3500E+00 -4.3688E+01	+4.3500E+00 -5.9750E+01	+4.3750E+00 -6.0000E+01	+4.3250E+00 -5.9875E+01	+4.3750E+00 -5.9875E+01
00:00:01	+1.1250E+00 -4.7063E+01	+1.1375E+00 -4.7000E+01	+1.1125E+00 -4.7000E+01	+1.1500E+00 -4.6875E+01	+1.1500E+00 -6.3000E+01	+1.1750E+00 -6.3125E+01	+1.1250E+00 -6.3000E+01	+1.1750E+00 -6.3000E+01
00:00:01	-2.2500E+00 -5.0438E+01	-2.2375E+00 -5.0375E+01	-2.2625E+00 -5.0375E+01	-2.2250E+00 -5.0250E+01	-2.2250E+00 -6.6375E+01	-2.2000E+00 -6.6500E+01	-2.2750E+00 -6.6500E+01	-2.2250E+00 -6.6375E+01
00:00:02	-5.3000E+00 -5.3438E+01	-5.2750E+00 -5.3375E+01	-5.3125E+00 -5.3438E+01	-5.2750E+00 -5.3313E+01	-5.2750E+00 -6.9500E+01	-5.2500E+00 -6.9625E+01	-5.3000E+00 -6.9500E+01	-5.2500E+00 -6.9500E+01
00:00:02	-7.6000E+00 -5.5750E+01	-7.5875E+00 -5.5688E+01	-7.6125E+00 -5.5688E+01	-7.5750E+00 -5.5563E+01	-7.5750E+00 -7.1750E+01	-7.5500E+00 -7.1875E+01	-7.6250E+00 -7.1750E+01	-7.5750E+00 -7.1750E+01
00:00:02	-8.9375E+00 -5.7000E+01	-8.8250E+00 -5.6938E+01	-8.8500E+00 -5.6938E+01	-8.8000E+00 -5.6813E+01	-8.8000E+00 -7.3000E+01	-8.8000E+00 -7.3125E+01	-8.8500E+00 -7.3000E+01	-8.8000E+00 -7.3000E+01
00:00:02	-8.8250E+00 -5.7000E+01	-8.8000E+00 -5.6938E+01	-8.8375E+00 -5.6938E+01	-8.8000E+00 -5.6813E+01	-8.8000E+00 -7.2875E+01	-8.7750E+00 -7.3125E+01	-8.8250E+00 -7.3000E+01	-8.8000E+00 -7.3000E+01
00:00:02	-7.5750E+00 -5.5750E+01	-7.5625E+00 -5.5688E+01	-7.5750E+00 -5.5688E+01	-7.5500E+00 -5.5563E+01	-7.6500E+00 -7.1750E+01	-7.5250E+00 -7.1875E+01	-7.6000E+00 -7.1750E+01	-7.5500E+00 -7.1750E+01
00:00:03	-5.2500E+00 -5.3438E+01	-5.2375E+00 -5.3375E+01	-5.2625E+00 -5.3375E+01	-5.2250E+00 -5.3250E+01	-5.2250E+00 -6.9375E+01	-5.2000E+00 -6.9500E+01	-5.2750E+00 -6.9500E+01	-5.2250E+00 -6.9375E+01
00:00:03	-2.2125E+00 -5.0375E+01	-2.1875E+00 -5.0313E+01	-2.2125E+00 -5.0313E+01	-2.1750E+00 -5.0188E+01	-2.1750E+00 -6.6375E+01	-2.1500E+00 -6.6500E+01	-2.2250E+00 -6.6375E+01	-2.1750E+00 -6.6375E+01
00:00:03	+1.1825E+00 -4.7000E+01	+1.1875E+00 -4.6938E+01	+1.1500E+00 -4.6938E+01	+1.1875E+00 -4.6813E+01	+1.2000E+00 -6.3000E+01	+1.2250E+00 -6.3125E+01	+1.1500E+00 -6.3000E+01	+1.2000E+00 -6.3000E+01
00:00:03	+4.3750E+00 -4.3813E+01	+4.3875E+00 -4.3750E+01	+4.3625E+00 -4.3750E+01	+4.3875E+00 -4.3625E+01	+4.4000E+00 -5.9750E+01	+4.4250E+00 -5.9875E+01	+4.3500E+00 -5.9750E+01	+4.4250E+00 -5.9750E+01
00:00:03	+6.9500E+00 -4.1188E+01	+6.9750E+00 -4.1125E+01	+6.9500E+00 -4.1125E+01	+6.9875E+00 -4.1000E+01	+7.0000E+00 -5.7125E+01	+7.0250E+00 -5.7250E+01	+6.9500E+00 -5.7250E+01	+7.0000E+00 -5.7250E+01
00:00:04	+8.5625E+00 -3.9563E+01	+8.5875E+00 -3.9563E+01	+8.5500E+00 -3.9563E+01	+8.5875E+00 -3.9438E+01	+8.6000E+00 -5.5500E+01	+8.6250E+00 -5.5750E+01	+8.5500E+00 -5.5625E+01	+8.6000E+00 -5.5625E+01
00:00:04	+8.9750E+00 -3.9188E+01	+8.9875E+00 -3.9125E+01	+8.9625E+00 -3.9125E+01	+9.0000E+00 -3.9000E+01	+9.0000E+00 -5.5125E+01	+9.0250E+00 -5.5250E+01	+8.9750E+00 -5.5250E+01	+9.0250E+00 -5.5125E+01
00:00:04	+8.1375E+00 -4.0000E+01	+8.1500E+00 -3.9938E+01	+8.1250E+00 -4.0000E+01	+8.1500E+00 -3.9876E+01	+8.1500E+00 -5.6000E+01	+8.2000E+00 -5.6125E+01	+8.1250E+00 -5.6000E+01	+8.1750E+00 -5.6000E+01
00:00:04	+6.1375E+00 -4.2000E+01	+6.1625E+00 -4.1938E+01	+6.1250E+00 -4.1938E+01	+6.1625E+00 -4.1813E+01	+6.1750E+00 -5.8000E+01	+6.2000E+00 -5.8125E+01	+6.1500E+00 -5.8000E+01	+6.2000E+00 -5.8000E+01
00:00:04	+3.3000E+00 -4.4875E+01	+3.3125E+00 -4.4813E+01	+3.2750E+00 -4.4813E+01	+3.3125E+00 -4.4688E+01	+3.3250E+00 -6.0875E+01	+3.3500E+00 -6.1000E+01	+3.2750E+00 -6.0875E+01	+3.3500E+00 -6.0875E+01
00:00:05	-2.5000E-02 -4.8188E+01	0.0000E+0 -4.8125E+01	-3.7500E-02 -4.8125E+01	+1.2500E-02 -4.8000E+01	+2.5000E-02 -6.4125E+01	+2.5000E-02 -6.4250E+01	-2.5000E-02 -6.4250E+01	+2.5000E-02 -6.4125E+01

Elapsed time from the trigger instant

Numerical values for each channel

Section 7

X-Y Recorder Function Mode

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7-1 What is the X-Y Recorder Function?

7-1-1 Introduction

This function allows an X-Y plot of any two input channels to be displayed in real time.

(1) The same operation as a normal X-Y recorder is available, to plot any two input channels against each other.

(2) Unlike an X-Y plot produced in the memory recorder function mode, here the time axis information for each channel is not being recorded.

(3) The X-Y plot is retained in memory.

(4) Any of channels 1 through 16 can be selected for each of the X and Y axes. Up to four X-Y plots can be made simultaneously.

(5) High speed sampling.
For dot display the sampling period is fixed at 280 μs, while for line display the fastest sampling period is 500 μs.

(6) Unlimited recording time
Because basically the operation is the same as that of a conventional X-Y recorder, there is no limit on the length of a recording.

(7) Superimposition function
When "display clear" is off, waveforms can be superimposed. (See Section 7-4-2 "Display Clear Function.")

7-1-2 Finding Reference Material in this Manual

(1) Basic functions

For information about the basic functions, refer to Section 7-4 in this chapter, "Making settings" (7-4-1 to 7-4-10).

(2) Trigger function

See Section 8. The user should select, from the many types of trigger available, one suitable for the objective desired.

(3) Use of the floppy disk drive

See Section 14. The floppy disk drive allows settings to be recorded and kept.

(4) Scaling function

See Section 12-4. The scaling function allows the units and numerical values for the input voltages to be converted, so that they can be directly read out as physical values of the parameters which are being measured.

(5) Comment input function

See Section 12-5. Instead of making handwritten memos on recordings, comments can be input and printed on.

(6) Display auto-off function

(7) Grid setting

The grid on the screen display and on the charts can be altered according to the application.

(8) Backup function for start key

If during recording operation the power fails and comes on again, then the start condition is restored, and recording operation starts again.

(9) When an error occurs or when a warning is issued, it is possible to arrange for a "beep" sound to be produced.

(10) List and gauge functions

These provide voltage axis scales and listings of settings on printed recordings.

See Section 12-3 "Special Function Settings"

(11) A computer can be connected to the 8825 by using the GP-IB interface (option at time of order)

(12) Self check function

See Section 12-6. The unit performs a self check and diagnosis simply.

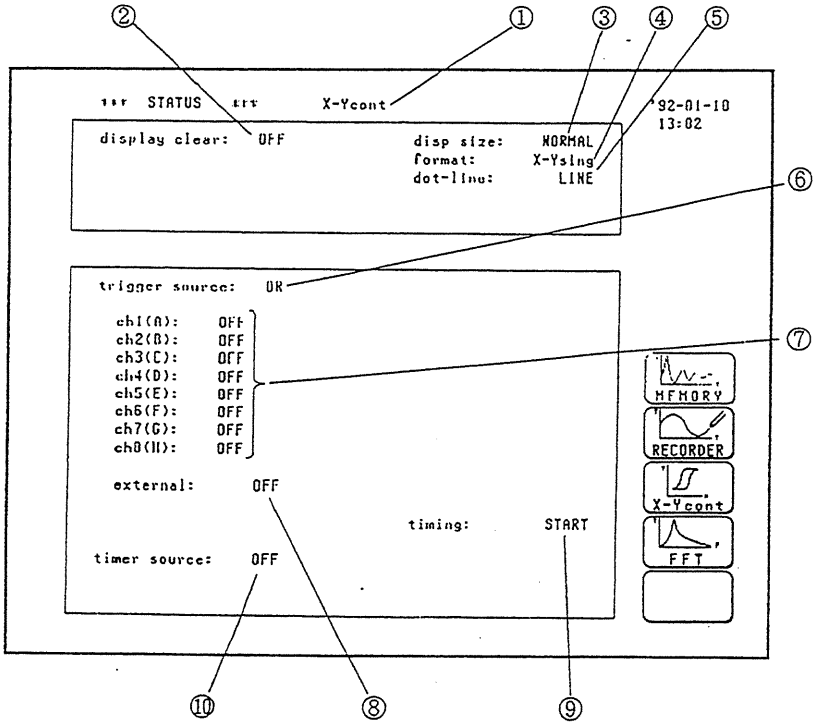
7-2 Display Screens

This section describes the "status" screen, the "channel" screen, and the "display" screen, and gives references to other important parts of this manual.
For the "system" screen, refer to Section 12. For the "floppy disk control" screen, refer to Section 14.

7-2-1 "Status" Screen

• Press the STATUS key, and the "status" screen appears.

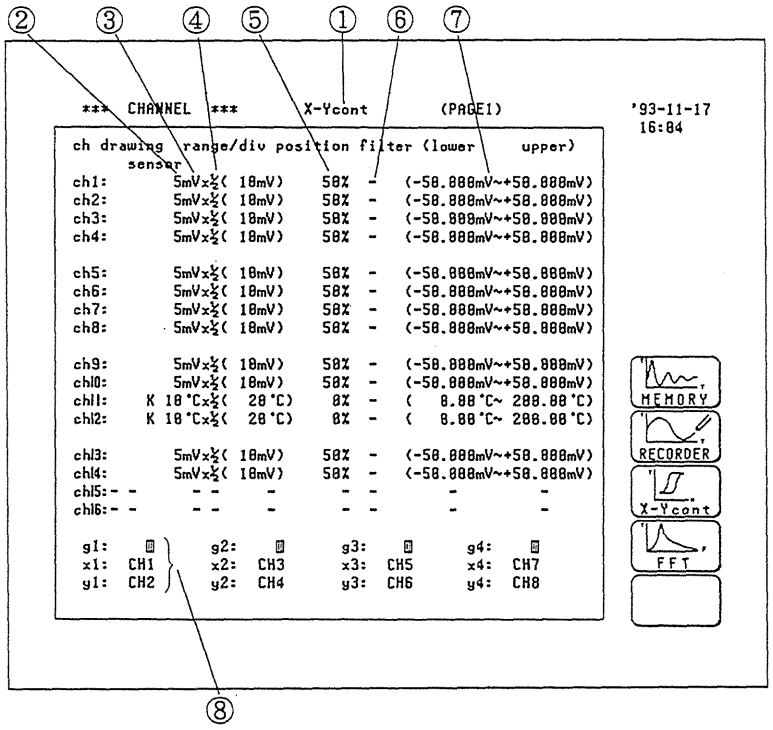
"Status" Screen



① Function mode
② Display clear
③ Display size
④ Format
⑤ Interpolation function
⑥ AND/OR combination operator for the internal and external triggers
⑦ Internal triggers
⑧ External triggers
⑨ Trigger timing
⑩ Timer trigger

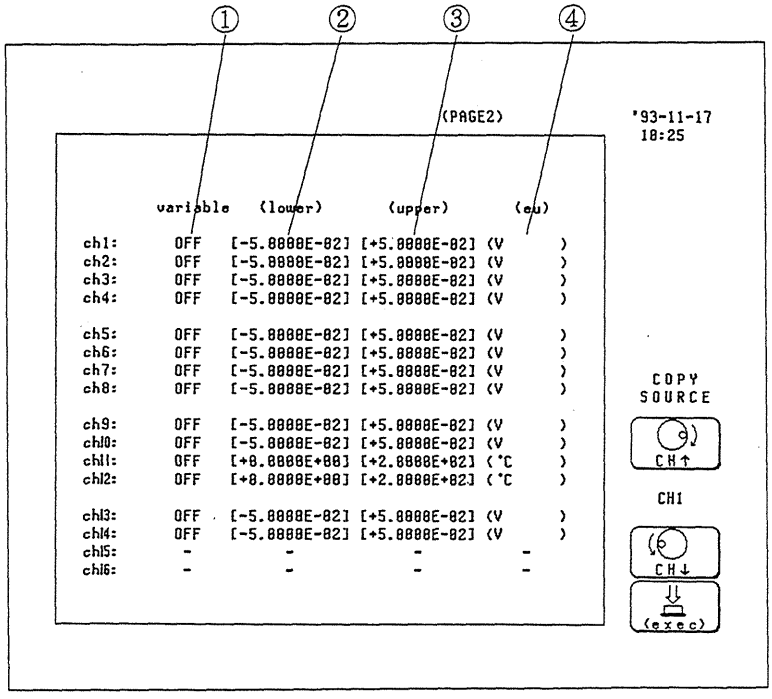
- Press the CHAN key, and the "channel" screen appears.
- Pressing the CHAN key toggles screen between PAGE 1 and PAGE 2.
- The (PAGE 1) screen is for the setting of the input unit and waveform display.
- The (PAGE 2) screen is for the setting of the variable display function.

"Channel" Screen (PAGE 1)



① Function mode
② Voltage axis range
③ Input coupling
④ Voltage axis magnification
⑤ Origin position
⑥ Low-pass filter
⑦ Upper limit value, lower limit value (display only)
⑧ Channels for X and Y axis

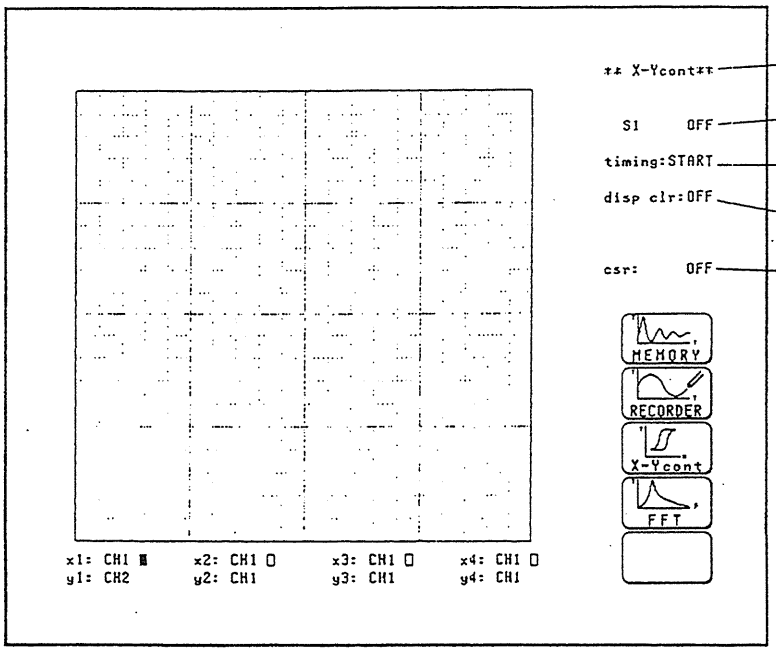
"Channel" Screen (PAGE 2)



① Variable
② Lower limit value
③ Upper limit value
④ Units (display only)

• Press the DISP key, and the "display" screen appears.

"Display" Screen



① Function mode
② Trigger source
③ Trigger timing
④ Display clear
⑤ A and B cursors

7-3 Basic Operational Procedures

7-3-1 Operational Flow

The flowchart below illustrates the sequence of operations involved in using the X-Y recorder function mode.

Start

↓

Turn the power on

↓

Connect the inputs

↓

"Status" screen

↓

Function setting

Set the X-Y recorder function mode

↓

Set the display clear function

Set whether or not to clear the previous waveforms from the screen at the start of measurement.

↓

Set the display size

Set the size of the screen for waveform display.

↓

Set the format

Set the format type for the waveform display screen.

↓

Set the interpolation function

Set dot display or line display.

↓

Set the trigger conditions

Set the trigger source and the trigger type and conditions.

↓

"Channel" screen

↓

Settings relating to the input units

Set the channels for which display and recording will be performed, density, voltage axis range, and filters.

↓

Measurement

Press the START key and commence measurement.

↓

Record on the printer

After measurement has been completed, print the results.

↓

End

This example illustrates the basic procedure in the X-Y recorder function mode, connecting two oscillators to the inputs and displaying the Lissajous figure produced by plotting a 3 V p-p 1, Hz sine wave against a 3 V p-p 2, Hz sine wave.

(1) Turn on the power.

Connect the power cable to the 8825 and turn on the power switch.

(2) Connect the input.

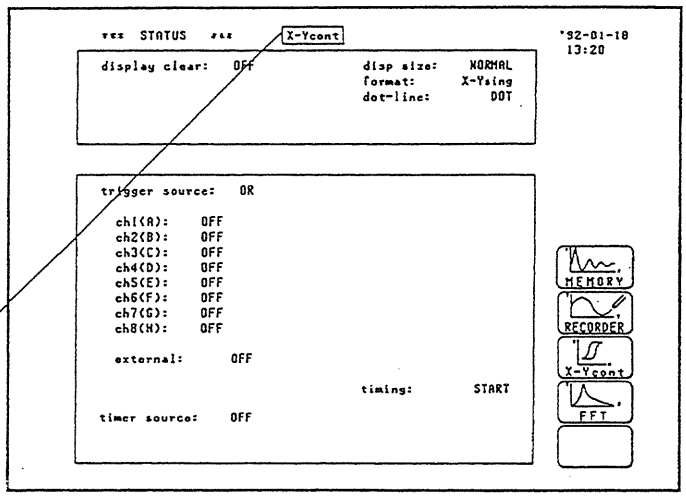
Connect the oscillators to the input terminals of channel 1 and channel 2 of the 8825 (each with an 8907 analog input unit fitted). Set the oscillators so that their outputs are as follows:

The channel 1 oscillator outputs a sine wave of frequency 1 Hz and output voltage 3 V p-p; and

The channel 2 oscillator outputs a sine wave of frequency 2 Hz and output voltage 3 V p-p.

(3) Set the function mode. To set the function mode to the X-Y recorder function mode:

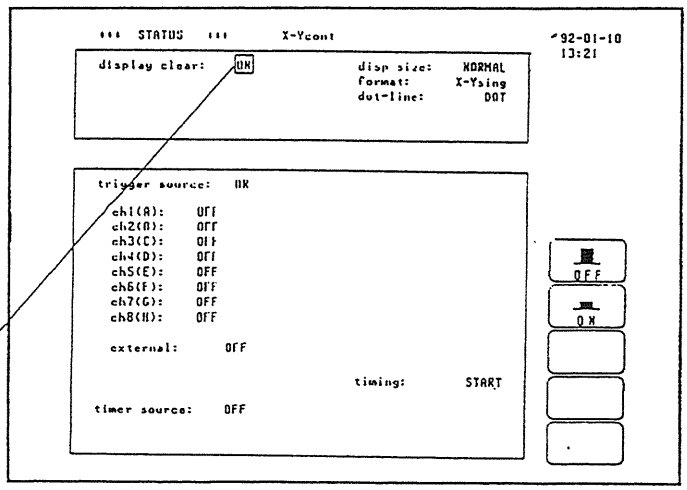
1. Press the STATUS key. The "status" screen will appear.
2. Using the cursor keys, move the flashing cursor to the "function" item.
3. Choose F3 (X-Ycont).



(4) Set the display clear function.

This sets the system so that if a previous X-Y waveform plot is present on the screen display, it will be cleared when the START key is pressed.

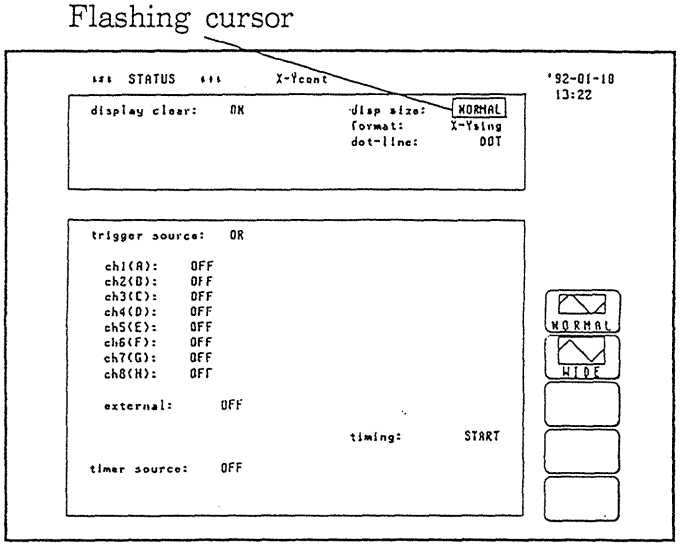
1. Using the cursor keys, move the flashing cursor to the "display clear" item.
2. Choose F2 (ON).



(5) Set the display size.

To set the display size (the size of screen for the waveform display) to NORMAL:

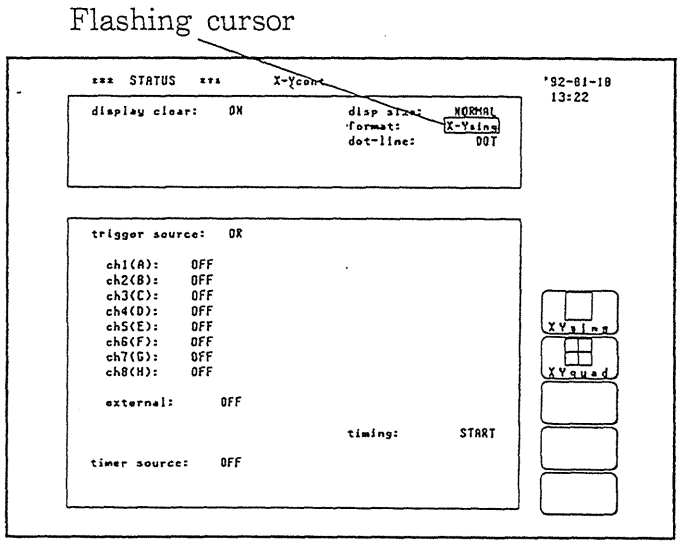
1. Using the cursor keys, move the flashing cursor to the "disp size" item.
2. Choose F1 (NORMAL).



(6) Set the format.

To set the format to SINGLE (display and record a single graph):

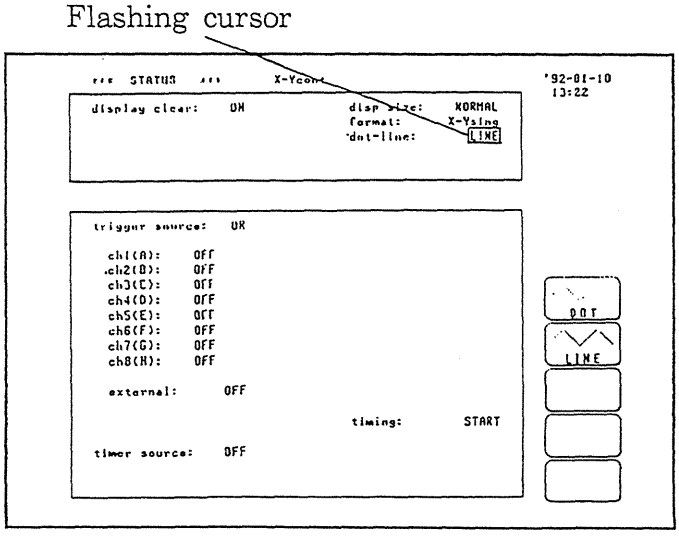
1. Using the cursor keys, move the flashing cursor to the "format" item.
2. Choose F1 (SINGLE).



(7) Set the interpolation function.

To set the interpolation function to LINE (perform straight line interpolation):

1. Using the cursor keys, move the flashing cursor to the "dot-line" item.
2. Choose F2 (LINE).

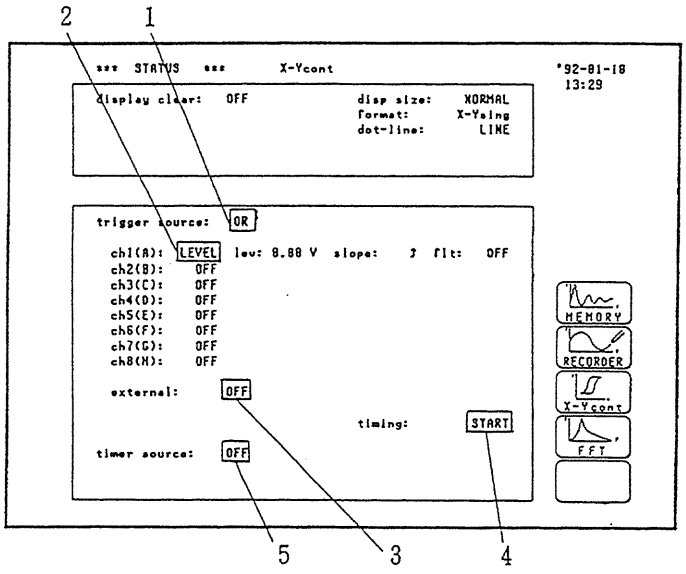


(8) Set the trigger conditions.

To set the trigger conditions as shown in the figure on the right:

Using the cursor keys, move the flashing cursor in turn to each item to be set, and, using F1 to F5, select the appropriate values, as explained in the following.

(For details about the trigger function, refer to Section 8 "Trigger Functions".)



1. Set the logical operator AND/OR for combining the triggers.

Move the flashing cursor to the "trigger source" item. Choose F1 (OR).

2. Set the trigger source.

Move the flashing cursor to the "ch1(A)" item. Choose F2 (LEVEL).

Move the flashing cursor to the "lev" item. Using F1 to F4 or the rotary knob, set the voltage level to 0 V.

Move the flashing cursor to the "slope" item. Choose F1 (up).

Move the flashing cursor to the "flt" item. Choose F1 (OFF).

In the same way, using F1, set each of the "ch2(B)" to "ch8(H)" items to OFF.

3. Set the external trigger.

Move the flashing cursor to the "external" item. Choose F1 (OFF).

4. Set the trigger timing.

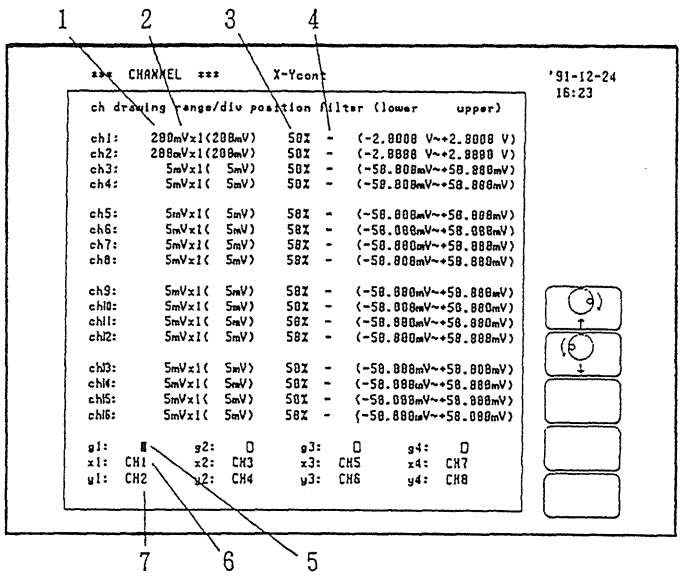
Move the flashing cursor to the "timing" item. Choose F1 (START).

5. Set the timer trigger.

Move the flashing cursor to the "timer source" item. Choose F1 (OFF).

(9) Make the settings for each channel.

- Press the CHAN key, and the "channel" screen will appear.
- Make settings as shown in the figure on the right for the input channels to be set (channel 1 and channel 2): Using the cursor keys, move the flashing cursor in turn to each item to be set, and, using F1 to F5, select the appropriate values, as explained in the following.



Settings for Channel 1:

1. Set the voltage axis range.

   Move the flashing cursor to the "range/div" item. Using F1 and F2 or the rotary knob, set this item to 200 mV.

2. Set the input coupling.

   Move the flashing cursor to the right of the range/div item. Choose F1 (DC).

3. Set the origin position.

   Move the flashing cursor to the "position" item. Using F1 and F2 or the rotary knob, set this item to 50%.

4. Set the low-pass filter.

   Move the flashing cursor to the "filter" item. Choose F1 (OFF).
   Carry out the settings for Channel 2 in an identical manner.

5. Set the display for the combination waveform.

   Move the flashing cursor to the "g1" item. Choose F4 (DARK).

6. Set the X axis channel.

   Move the flashing cursor to the "X1" item. Using F1 and F2 or the rotary knob, set this item to "CH1" (channel 1).

7. Set the Y axis channel.

   Move the flashing cursor to the "y1" item. Using F1 and F2 or the rotary knob, set this item to "CH2" (channel 2).

(10) Begin measurement.

By pressing the START key, the "display" screen will appear, and the waveform will be displayed.

1. Press the START key.
   The LED above the key will light up. Because the inputs are present already, triggering occurs immediately, and the X-Y plot appears on the screen.

(11) End measurement

Recording continues until the STOP key is pressed.

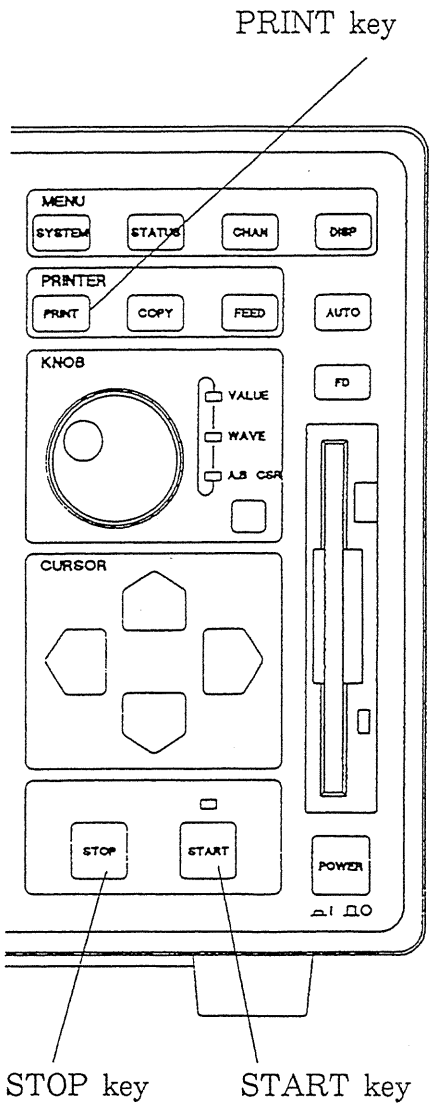
1. Press the STOP key.
   The LED above the START key will go out, and measurement will cease.

(12) Recording on the printer.

The displayed waveform can be recorded on the printer by pressing the PRINT key.

1. Press the PRINT key.
   The waveform shown on the screen is printed out.

NB: Because the recordings are made on thermosensitive paper, if they are to be kept for any length of time, it is a good idea to take photocopies.



7-4 Making Settings

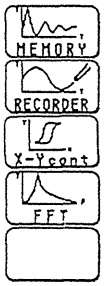
7-4-1 Setting the Function Mode

The 8825 has three function modes: the memory recorder function mode, the recorder function mode, and the X-Y recorder function mode. Select the appropriate function mode for performing measurements.

Method (Screens for making this setting: the "status", "channel", and "display" screens)

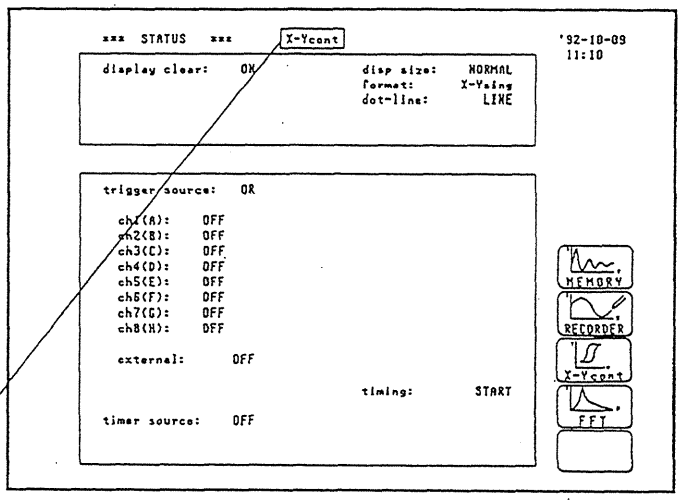
1. Using the cursor keys, move the flashing cursor to the position shown in the figure below.
2. According to the displays on the function keys, select the desired function mode.

Function key indication — Meaning



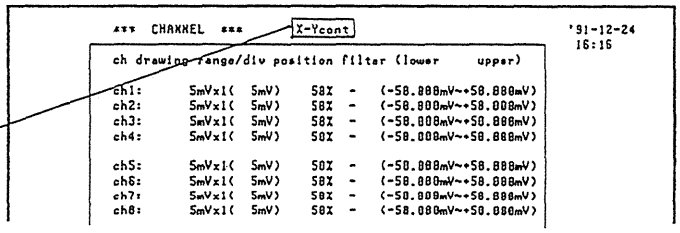
: memory recorder function mode
: recorder function mode
: X-Y recorder function mode
: FFT

"Status" screen



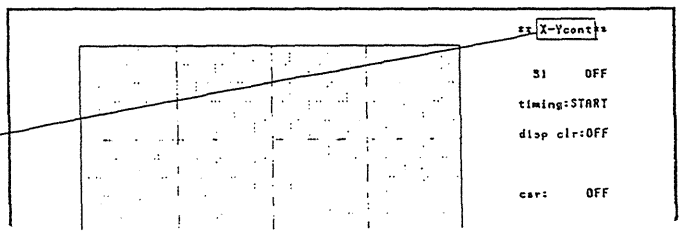
Flashing cursor

"Channel" screen



Flashing cursor

"Display" screen



Flashing cursor

7-4-2 Display Clear Function

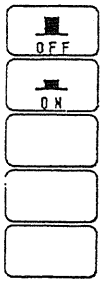
If there is any X-Y plot remaining on the screen display from a previous operation, this setting indicates whether or not to clear the screen when the START key is pressed and measurement commences.

If the screen is not cleared, then the new X-Y plot will be superimposed on the existing one.

Method (Screens for making this setting: the "status" and "display" screens)

1. Using the cursor keys, move the flashing cursor to the position shown in the figure below.
2. According to the displays on the function keys, make the selection.

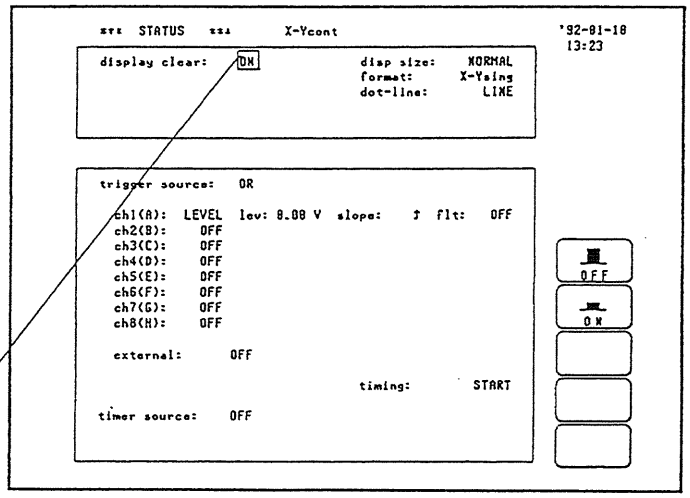
Function key indication — Meaning



: do not clear screen

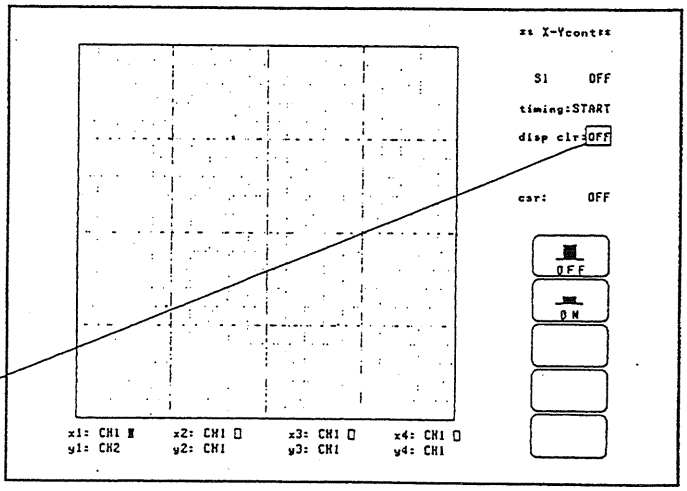
: clear screen

"Status" screen



Flashing cursor

"Display" screen



Flashing cursor

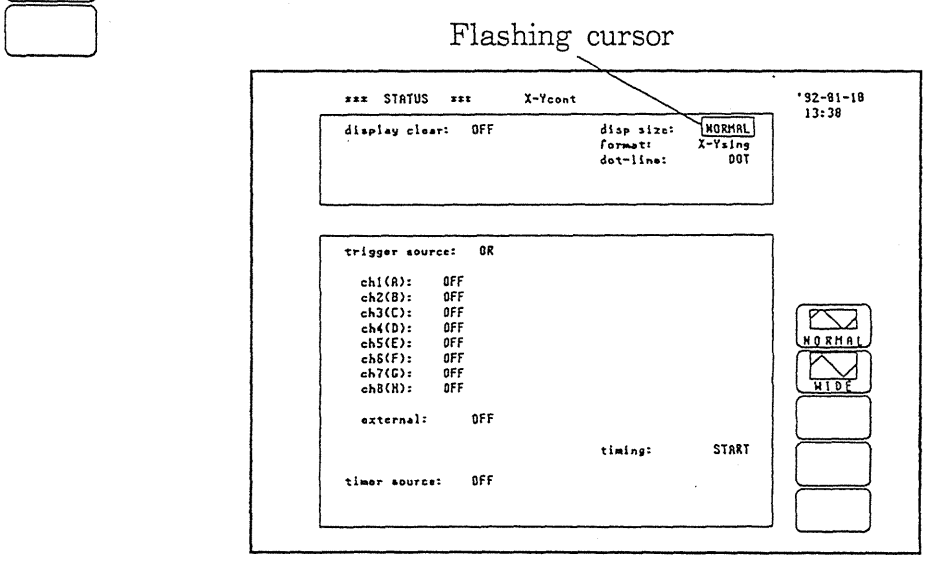
7-4-3 Setting the Display Size

The display size when the input signal waveform is being shown on the screen display can be set.

Method (Screen for making this setting: the "status" screen)

1. Using the cursor keys, move the flashing cursor to the "disp size" item.
2. According to the displays on the function keys, select the desired screen display size.

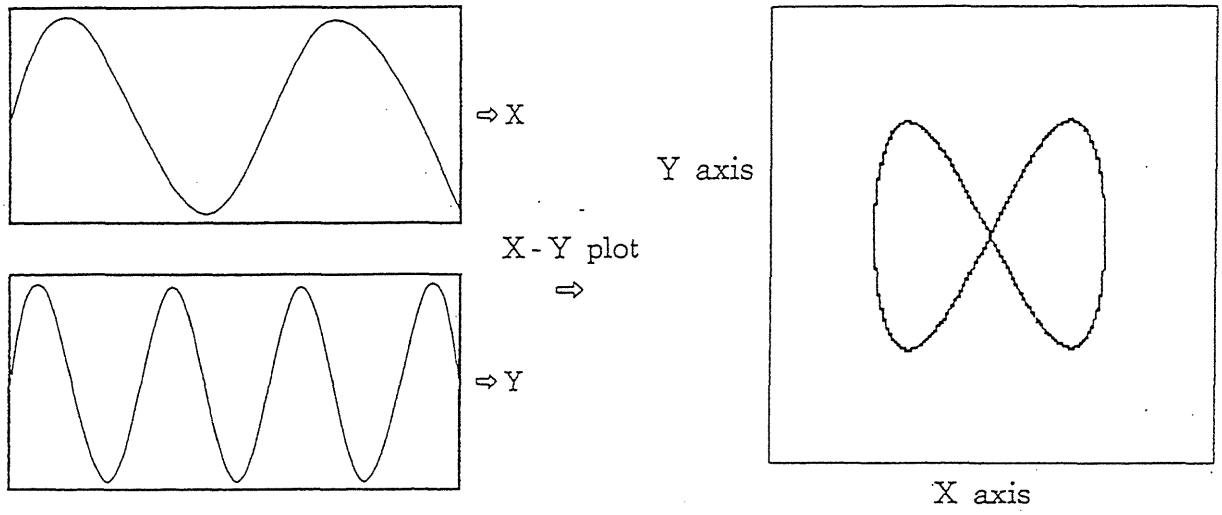
Function key indication	Meaning	Memory recorder and recorder function modes	X-Y recorder function mode
NORMAL	: normal screen	(25 × 20 DIV	20 × 20 DIV)
WIDE	: wide screen	(25 × 24 DIV	24 × 24 DIV)



- Either of two formats, X-Ysingle and X-Yquad, can be selected for displaying the X-Y plots and for recording them on the printer.
- Using the X-Y quad format, up to four X-Y plots can be performed simultaneouly, with any eight channels selected for the X and Y axes.

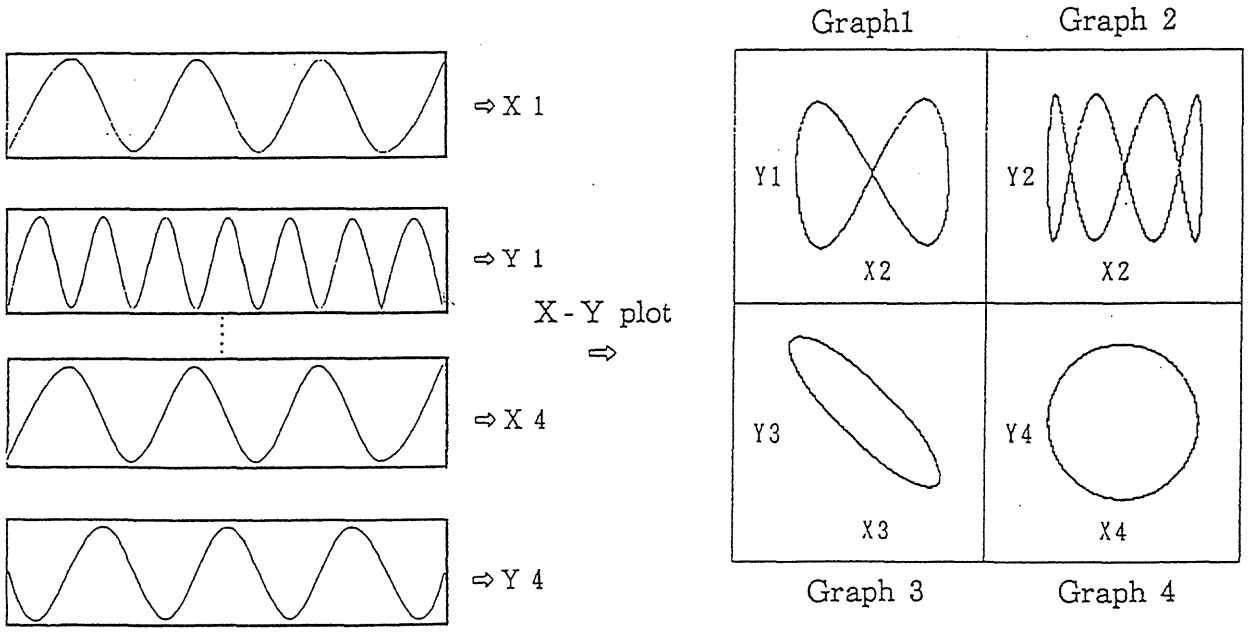
① X-Y single

- A single plot is displayed and recorded.



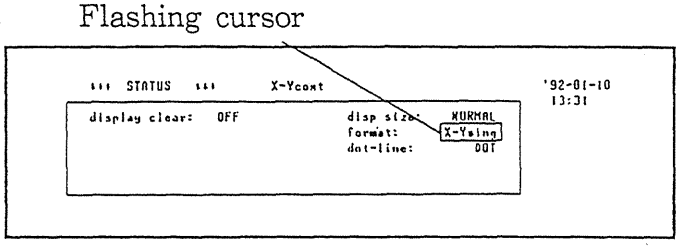
② X-Y quad

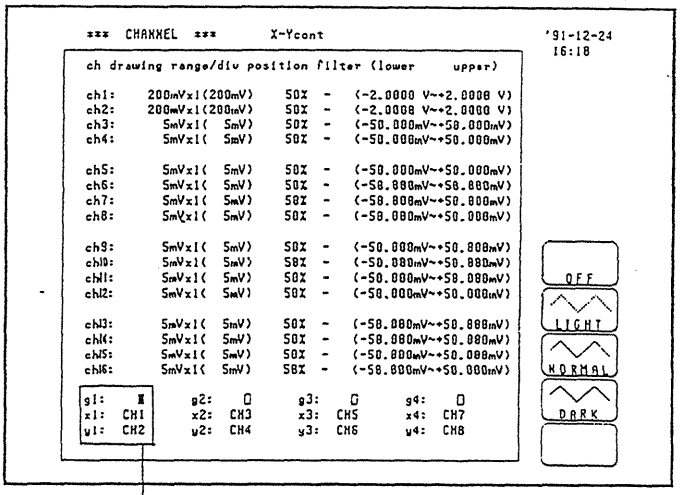
- Four plots are displayed and recorded.

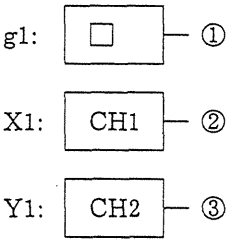


Method (Screens for making this setting: the "status" screen and then the "channel" screen)

1. Using the cursor keys, move the flashing cursor to the "format" item.
2. As per the function key display, select F1 (for X-Y single) or F2 (for X-Y quad).
3. Press the CHAN key, and the "channel" screen will appear.
4. The settings for graph 1 (g1) will now be made, as an example.
   Move the flashing cursor to the items shown by the numbers in the figure on the right in order, and make the settings according to the function key display.

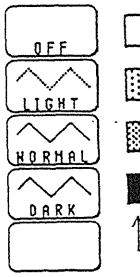






① Set the mode for display of the waveform combination:

Function key indication — Meaning



□: the waveform is not displayed

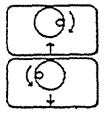
In order, these increase in intensity from LIGHT to NORMAL to DARK.

■

↑ Symbol shown on the screen

② Set the X axis channel:

Function key indication — Meaning



channel 1 to channel 16

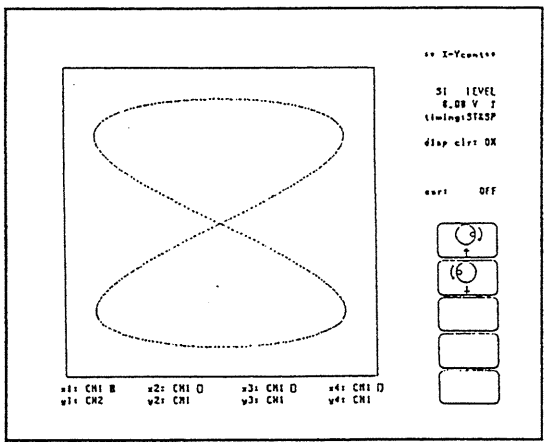
③ Set the Y axis channel:

This is done in the same way as in step ②.

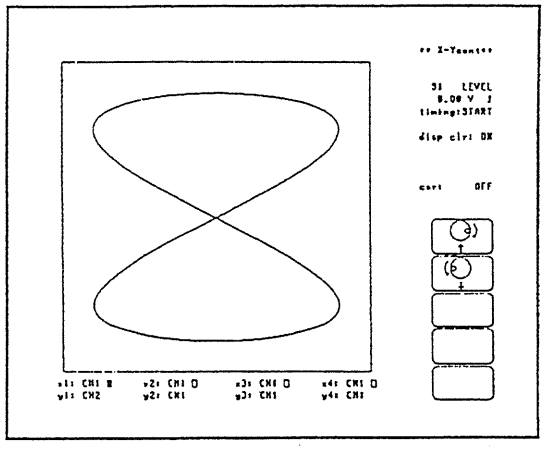
5. For graph 2 (g2) to graph 4 (g4), the settings are made in an identical manner.

7-4-5 Setting the Interpolation Function

It is possible either to display and record the input signal (the sampled data) just as it is, or after subjecting it to linear interpolation.



DOT display. Linear interpolation is not performed. In principle the sampled data is faithfully displayed just as it comes.

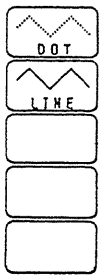


LINE display. Linear interpolation is performed. The display is easier on the eye. However, comparing this to dot display, the sampling rate is lower.

Method (Screen for making this setting: the "status" screen)

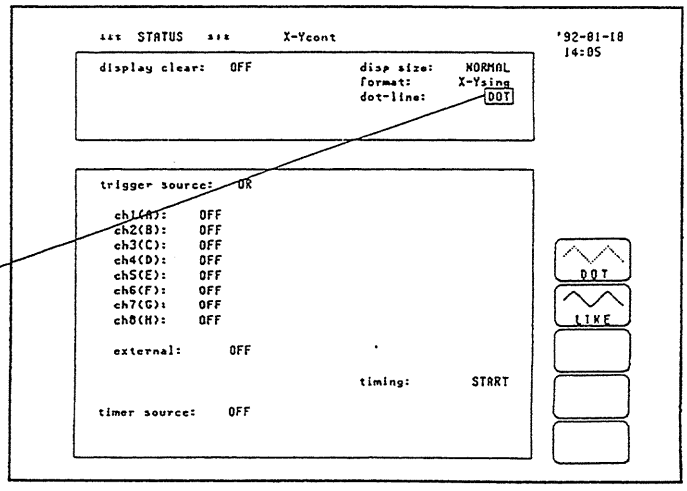
1. Using the cursor keys, move the flashing cursor to the "dot-line" item.
2. According to the displays on the function keys, make the setting.

Function key indication — Meaning



: DOT display

: LINE display



Flashing cursor

NOTE

The sampling rate is different for DOT display and for LINE display. For details, refer to Section 2-1 "Main Unit Specifications", Subsection (5) "The X-Y recorder function".

7-4-6 Settings for Each of the Input Channels

- The settings for each of the channels can be made on the "channel" screen or on the "display" screen.
- The voltage axis range, the input coupling, the position, and the low-pass filter can be set for each channel.
- For each X-Y plot, the display mode and the X axis and Y axis channels can be set.

● Making the settings on the "channel" screen:

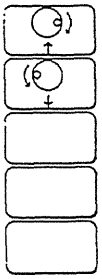
(1) Setting the voltage axis range (range/div)

- For each channel, the voltage axis range (range/div) should be set.
- The value set as range/div denotes the voltage value for 1 DIV along the voltage axis.

Method (Screens for making this setting: the "channel" and "display" screens)

The settings are made by using the function keys or the rotary knob.

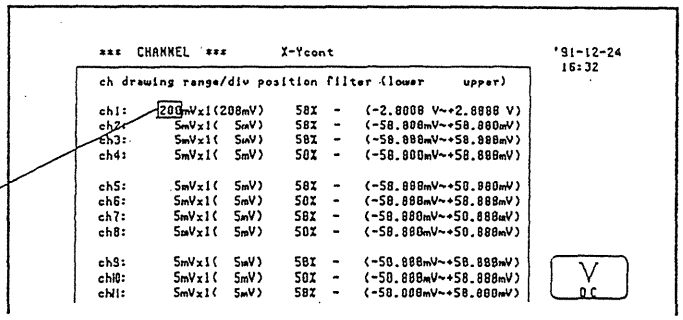
Function key indication



Meaning

5, 10, 20, 50,
100, 200, 500 mV
1, 2, 5, 10, 20 V

Flashing cursor

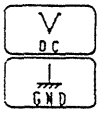


(2) Setting the input coupling

Method (Screens for making this setting: the "channel" and "display" screens)

The selections are made according to the displays on the function keys.

Function key indication



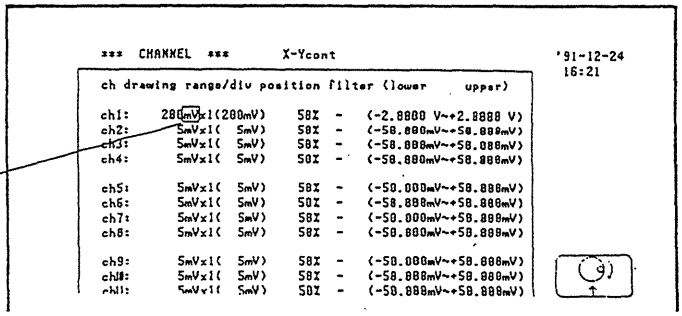
Meaning

V : The input signal is directly connected to the amplifier. This allows a DC component to be measured.

⏚ : The input signal is not connected. This allows the zero position to be checked.

Symbol shown on the screen

Flashing cursor



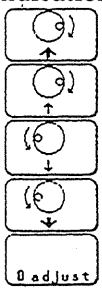
(3) Position

- The position can be set for each channel.
- The range for the position varies according to the magnification ratio along the voltage axis and the display size. (For details, refer to the following "Background" section.)

Method (Screens for making this setting: the "channel" and "display" screens)

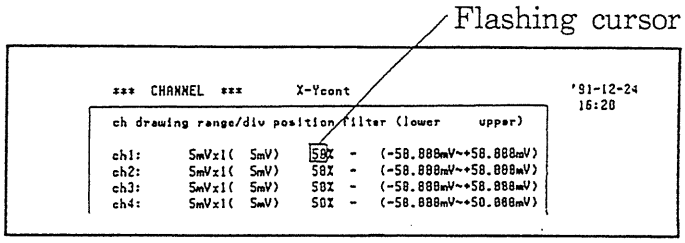
By using the function keys or the rotary knob, make the setting.

Function key indication



Meaning

When the magnification ratio is Normal, from -28% to 128%. For other cases, see the table below.

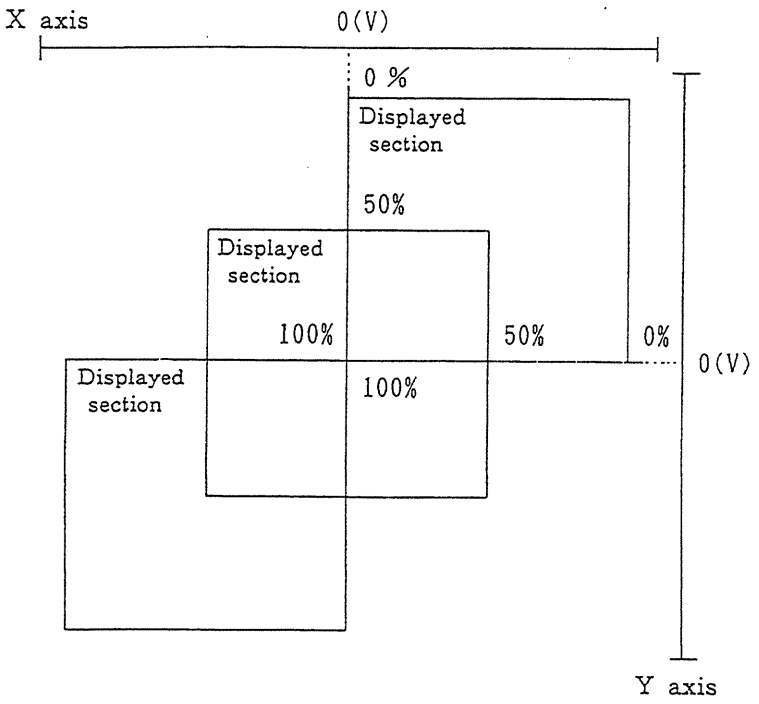


Magnification ratio		×1
Display size	NORMAL	-28 to 128
	WIDE	-18 to 118

(units %)

Background

- The position has the significance shown in the figure below.
- It is possible to display the hidden portion of the waveform, according to at what percent of the displayed section 0 V appears.



(4) Low-pass filter setting

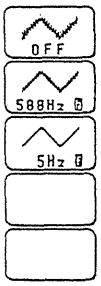
- Low-pass filters internal to the input units can be set.
- With such internal filters the frequency bands can be restricted.

  This has the good effect of getting rid of the following phenomena:
- In the case of level recording in the recorder function mode, because of high speed sampling and high band amplification, the influence of ripple components and noise in the signal can thicken the recording line.
- It can happen that, because ripples are present in the output of transducers and the like, the recording line becomes thick.
- In RMS measurement, a good effect is produced with regard to pulse type noise.

Method (Screens for making this setting: the "channel" and "display" screens)

By using the function keys or the rotary knob, make the setting.

Function key indication



Meaning

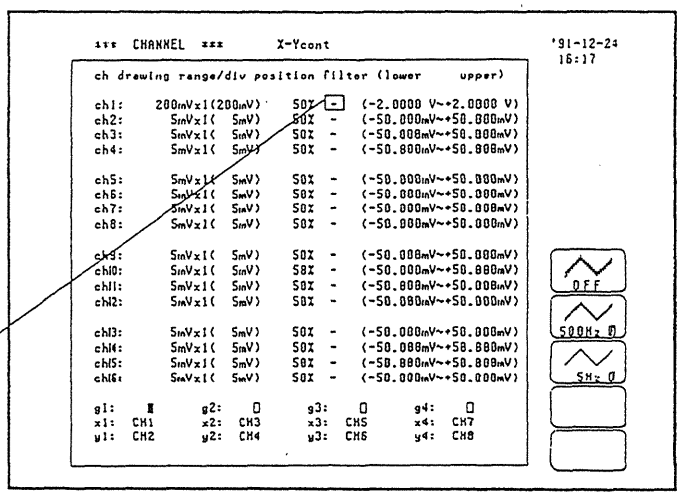
−: No low pass filter is used.

F: A filter with 500 Hz cutoff is used.

F: A filter with 5 Hz cutoff is used.

→Symbol shown on the screen

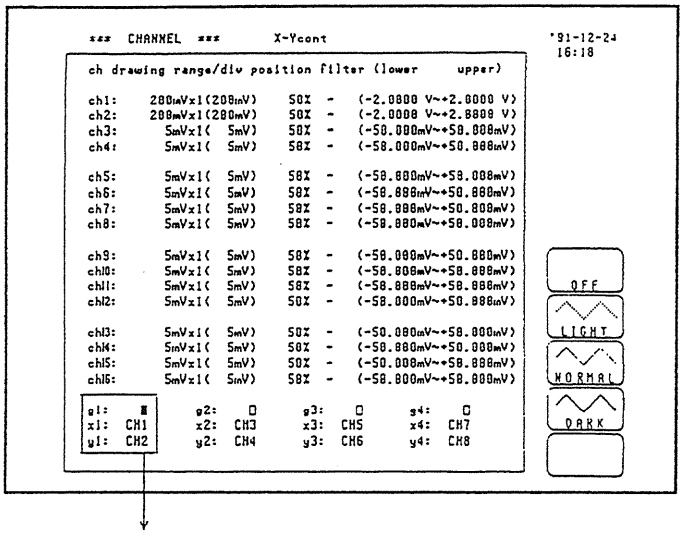
Flashing cursor

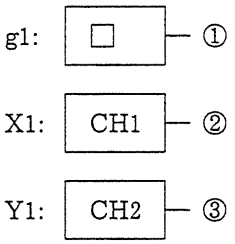


(5) Set the display mode for the X-Y plot.

The settings for Graph 1 (g1) will now be made, as an example.

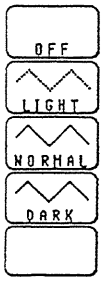
Move the flashing cursor to the items designated by the numbers in the figure on the right in order, and make the settings according to the function key display.





① Set the mode for display of the X-Y plot:

Function key indication — Meaning



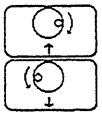
□ : the plot is not displayed

In order, these increase in intensity from LIGHT to NORMAL to DARK.

Symbol shown on the screen

② Set the X axis channel:

Function key indication — Meaning



channel 1 to channel 16

③ Set the Y axis channel:

This is done in the same way as in step ②.

④ For Graph 2 (g2) to Graph 4 (g4), the settings are made in an identical manner.

Related item:

It is possible to copy the settings for one channel to another channel. For details, refer to Section 12-9 "Copying Function."

(6) Variable display function

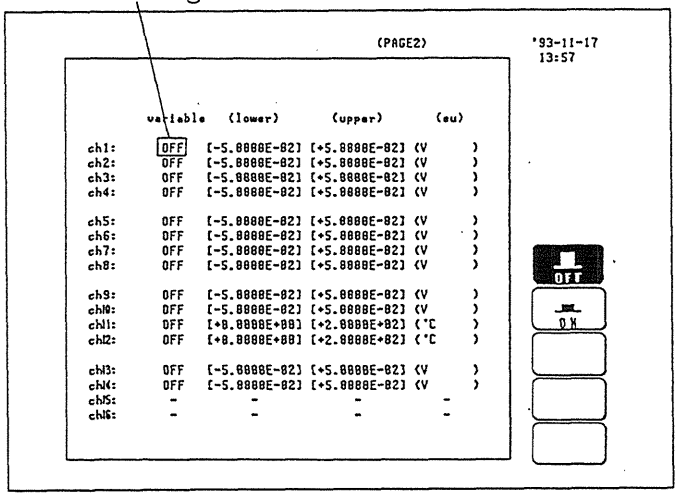
- Using the variable display function, the position and size of the waveform to be displayed can be set as required. (However, in the variable display function the magnification can be set up to 10 times.)
- For the "variable" screen, the upper and lower limit values of the waveform on the "display" screen can be set.
- It is possible to enable or disable the "variable" function for each channel.
- The upper and lower limit values of the waveform processing calculation equation can be set in this step.

Method (Screens for making this setting: the CHANNEL (PAGE 2) screen)

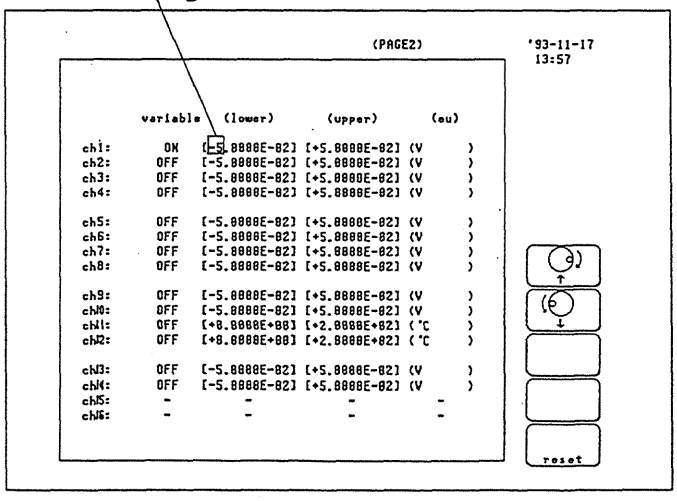
- Using the cursor keys, move the flashing cursor in order of the figure right.

1. Using the CHAN or CURSOR keys, set to the CHANNEL (PAGE 2) screen.
2. Press the function key, F2 (ON).
3. Sets the upper and lower limit values.
   - (lower) and (upper) can be set within the range -9.9999E+29 to +9.9999E+29.
   - It is not possible to set the value so that the lower limit exceeds upper limit.
   - Move the flashing cursor in each digit.

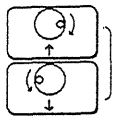
Flashing cursor



Flashing cursor



Function key indication Meaning



from 0 through 9 (for the most significant digit, from 9 through +9) (for the exponent, from -29 through +29)

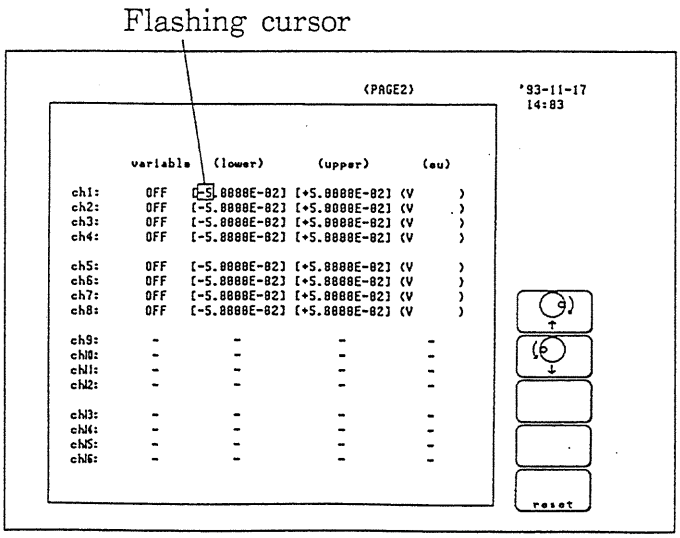
Reset the "variable" upper and lower limit values

- When the flashing cursor is aligned with (lower) or (upper) columns, the upper and lower limit values can be reset to initial condition.
- When the "variable" is set to OFF, the upper and lower limit values on the CHANNEL screen (PAGE 1) are automatically set at the variable (lower) and (upper) columns.

Press the F5 (reset) key.

Function key indication | Meaning

reset : Resets the upper and lower limit values to initial condition



Notes

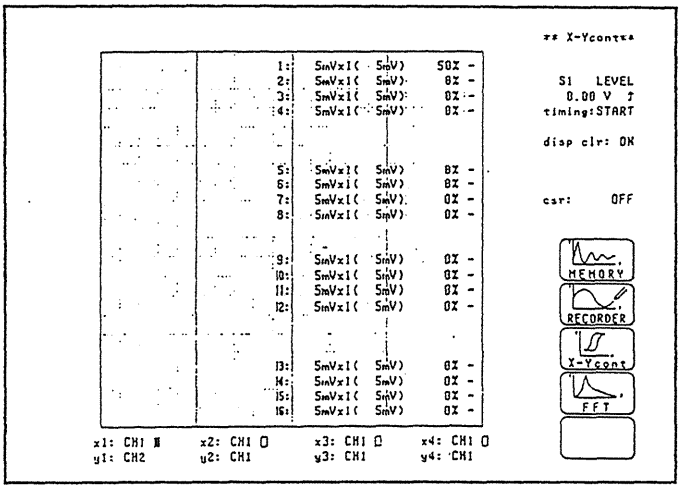
- A dash "-" is shown for channel 9 to 16 that no input unit installed as shown in the figure above.
- For the channel which the "variable" is set to ON, "variable" will appear at the display portion or "lower upper" on the CHANNEL screen (PAGE 1).

Related item

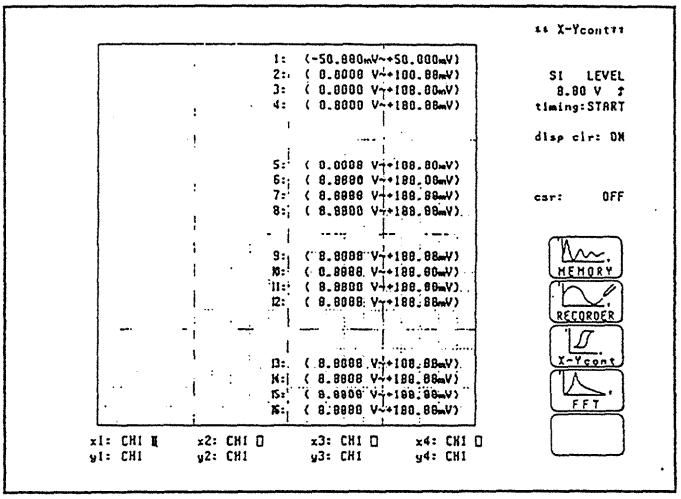
It is possible to copy setting from one channel to another. For details, refer to Section 12-9 "Copy function".

- Making the settings on the "display" screen:
  - By pressing the CH SET key, it is possible partially to overlay the "channel" screen over the "display" screen. Each time this key is pressed, the contents which are displayed are altered.
  - By moving the cursor on this partially displayed portion of the "channel" screen, it is possible to make settings on the "display" screen in an identical manner to that described above with respect to the "channel" screen.

Voltage range, input coupling, position, filter



Upper limit value, lower limit value (display only)

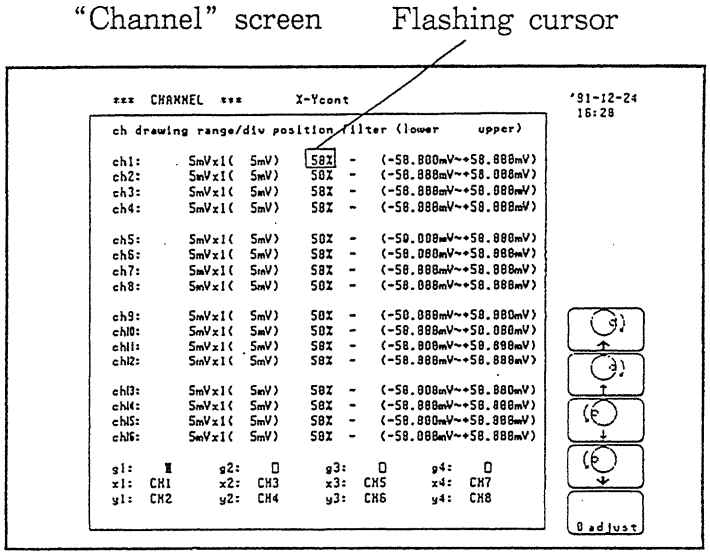


This function provides for accurate adjustment of the waveform to the origin position when a zero voltage is input. Use it for reading precise values from the screen or a printed recording or to ensure accurate results from waveform computations.

Method (Screens for making this setting: the "channel" and "display" screens)

Always allow at least 30 minutes warming up before carrying out this procedure, to ensure that the internal temperature of the unit has stabilized.

1. Using the cursor keys, move the flashing cursor to the "position" item.
2. Press the function key F5 (0 adjust), and all of the channels will be calibrated at once.
   If later the voltage axis range is changed, this function should be executed again.



NB: This setting can be made on the "display" screen in an identical manner. For how to do this, refer to the description of making the settings on the "display" screen in Section 7-4-6 "Settings for Each of the Input Channels."

NOTE

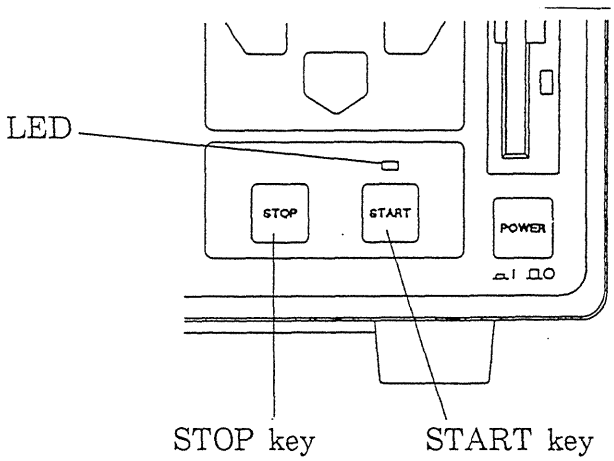
- Zero adjustment should be performed about 30 minutes after turning the power on, so as to let the unit warm up.
- Zero adjustment cannot be performed while measurement is taking place.
- The results of zero adjustment relate only to the input units which are fitted in the 8825 at the time; so, if any input unit is taken out and changed, it is necessary to perform the zero adjustment process again.

7-4-8 Starting And Stopping Measurement

Measurement is started by pressing the START key. While measurement operation is being performed, the LED above this START key is illuminated. When measurement has finished, the LED goes out.

Method

1. Press the START key.
   Measurement will start.
2. Press the STOP key.
   Measurement will stop.



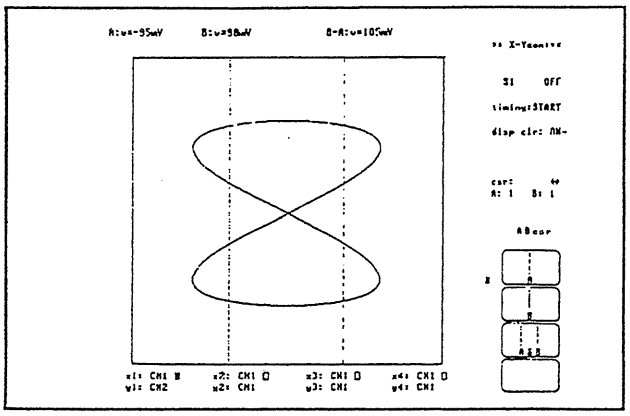
NOTE

Just as in a conventional X-Y recorder, measurement starts when the START key is pressed and continues as long as desired until the STOP key is pressed. However, if the trigger timing is set to STOP or to START&STOP, then measurement is terminated at the time instant that the trigger conditions hold.

7-4-9 Using the A and B Cursors

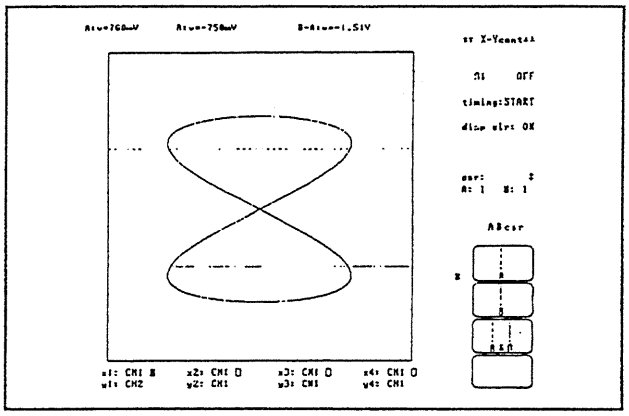
- You can use the A and B cursors to measure voltage differences (if using the scaling function, the scaled values; see Section 12-4 "Scaling Function") getting a direct digital readout on the "display" screen.
  Using the A and B cursors, potential differences (when scaling is being performed, with the scaling factor see Section 12-4, "The scaling function") on the "display" screen can be read out as digital values.
- The A and B cursors can be used along the X axis or along the Y axis.
- It is possible to set the A cursor and the B cursor to operate on different graphs.

○ A and B cursors used individually
V : voltage difference (or temperature difference) from 0 V (or ℃)



X axis

○ A and B cursors used together
V : voltage difference (or temperature difference) between the A and B cursors



Y axis

Method (Screen for making this setting: the "display" screen)
Using the cursor keys, move the flashing cursor to the "csr" item, and make the setting according to the displays on the function keys.

1. Select along which of the X axis and the Y axis the A and B cursors will move:

Function key indication — Meaning

: do not use the A and B cursors

: Along the X axis

: Along the Y axis

2. Designate the plot on which the A cursor will be used.

Function key indication — Meaning

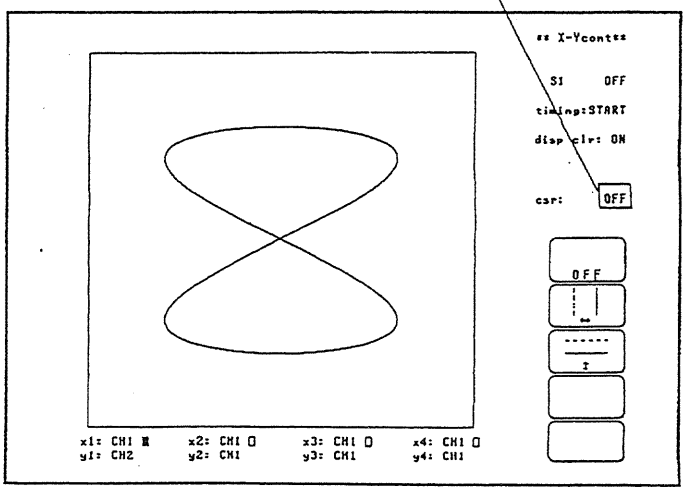
: Graph 1 (X1, Y1)

: Graph 2 (X2, Y2)

: Graph 3 (X3, Y3)

: Graph 4 (X4, Y4)

Flashing cursor



3. Designate the plot on which the B cursor will be used.

   This is done in a manner identical to step 2.

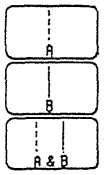
   NB: Even if the A and B cursors have different channels specified, the A to B voltage difference is derived from the absolute values of the voltages relating to their respective channels.

   However if the unit is different during scaling, the A to B voltage diference is not derived.

4. Press the knob select key, and the LED for A.B CSR will be illuminated.

5. According to the display on the function keys, select the cursor to be moved.

Function key indication | Meaning



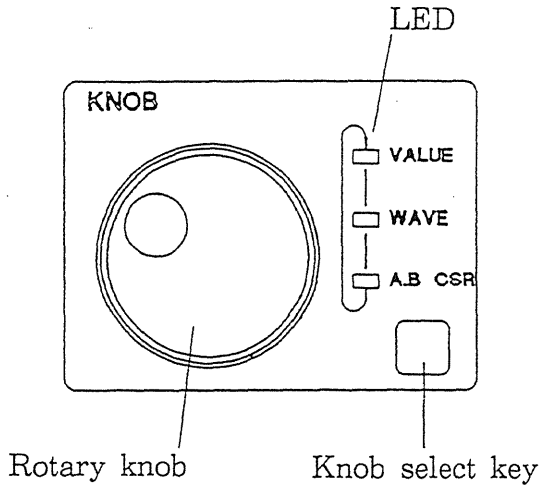
: move the A cursor

: move the B cursor

: move the A and B cursors simultaneously

6. Turn the rotary knob, to move the cursor.

   The potential difference is derived according to the position of the cursor.



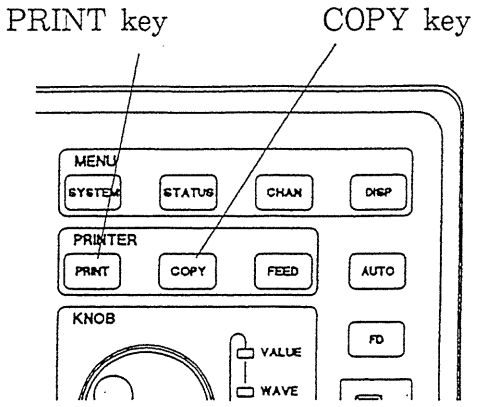
There are two methods of printing: manual printing and screen copy printing.

① Manual printing

Pressing the PRINT key prints the X-Y plot.

Method

When measurement is finished, press the PRINT key. (Even if the A and B cursors are being displayed on the screen, they will not appear on the printout.)



② Screen copy printing

This prints out a direct copy of the screen display exhibited when the "status" screen, the "channel" screen, the "display" screen, the "system" screen, or the "floppy disk control" screen is being shown.

Method

Press the COPY key.

NOTE

If the PRINT key is pressed while the "status" screen is being displayed, a listing will be printed out. This is the same as the listing printed out after the waveform, when the listing function is enabled.

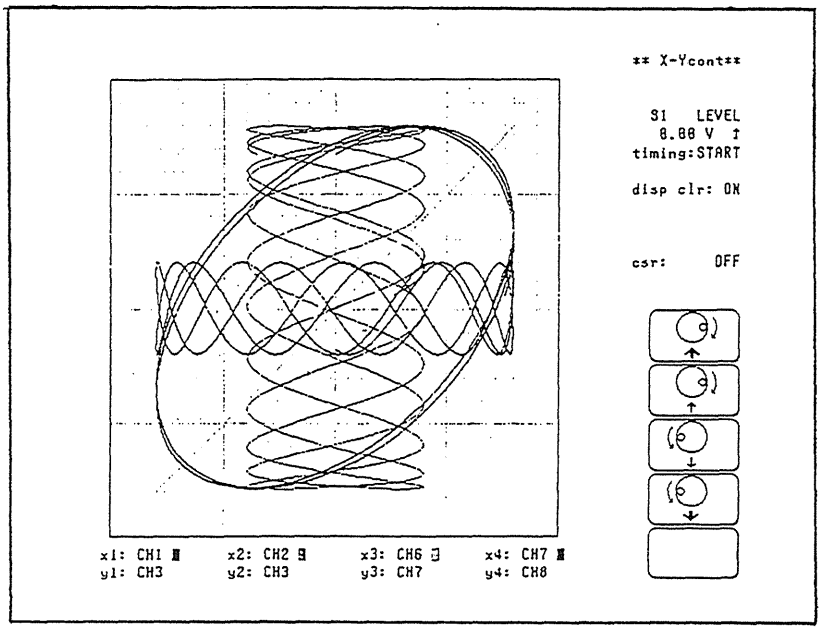
Related item:

It is possible to supplement manual printing of an X-Y plot with a listing of settings or gauges. (See Section 12-3-6 "Listing and Gauge Functions" and Section 7-5 "Interpreting Displays and Recordings.")

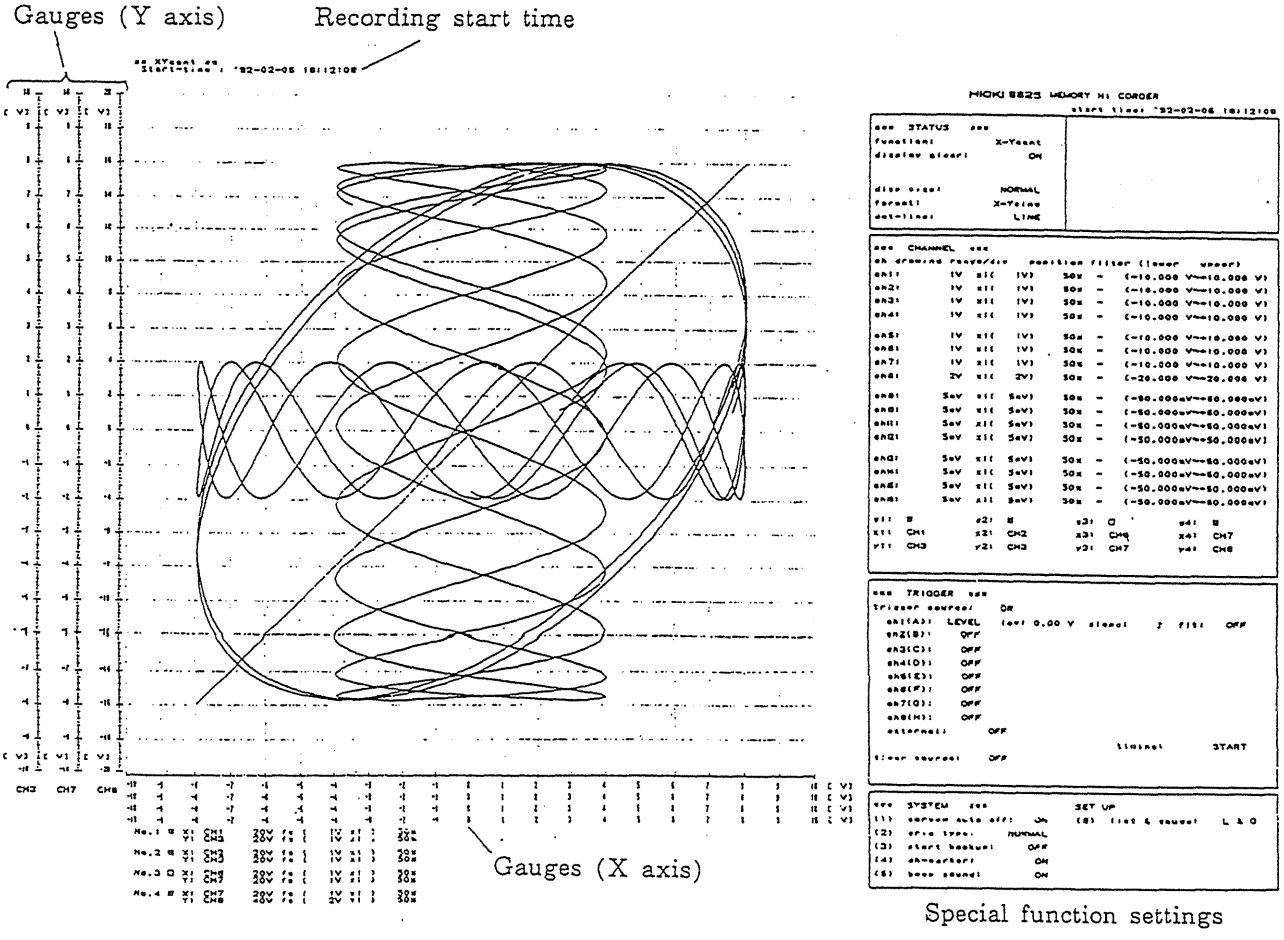
7-5 Interpreting Displays and Recordings

For each format, an introduction will be given to the "display" screen contents and the recording produced by manual printing.

- X-Y single format:
  - Screen display:

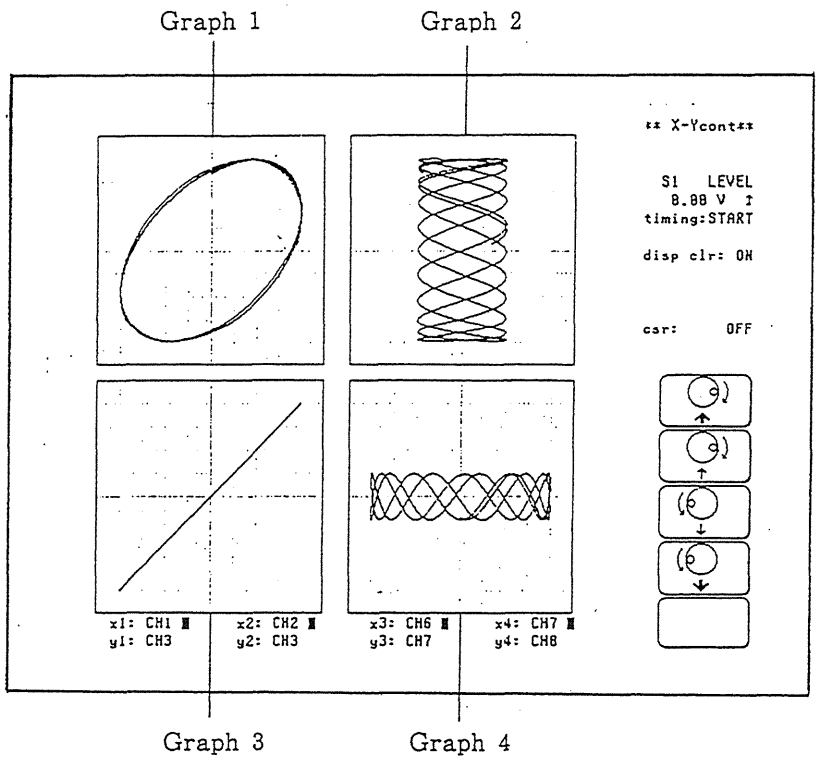


  - Manually printed chart:

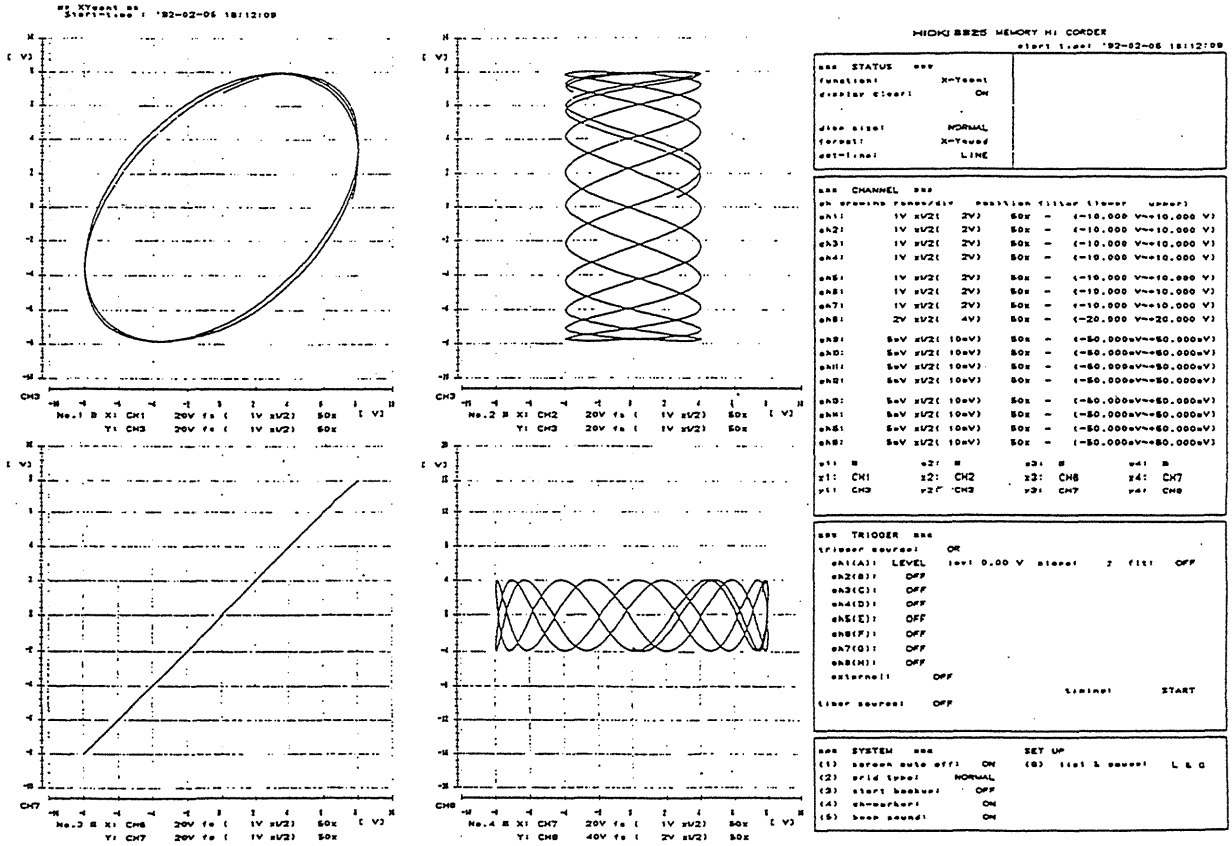


● X - Y quad format:

• Screen display:



• Manually printed chart:



Section 8

Trigger Functions

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8-3 Setting the trigger type 8-4
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8-1 Overview

(1) The term "trigger" refers to a signal which determines the timing to start or stop recording or internal data capture.

(2) There are three types of signal which can be used for triggering (trigger sources):

Channel 1 (A) to channel 8 (H)

: internal triggers

- The trigger is derived from the input signals to channels 1 to 8 or the logic inputs to channel groups A to H.
- The trigger function monitors the state of the signals, and is activated when a predetermined signal state occurs.

External

External trigger

- Triggering occurs when the EXT TRIG terminals are shorted, or when the input voltage drops below about 2.5 V.
- This is used for synchronization to other apparatus.
- This is also used for operation of several 8825 units synchronized in parallel.

Timer source

Timer trigger

- The timer trigger applies between predetermined times for starting and stopping operation.
- Use the timer trigger for fixed time recording.

The final effective trigger can be selected to be either the logical AND or the logical OR combination of these three trigger sources. This selection is referred to in the menus under the heading "trigger source".

(3) Setting the trigger mode (except for the X-Y recorder function mode)

This determines whether or not the trigger is repeatedly accepted after the measurement operation has terminated.

(4) Pre-trigger and trigger timing settings

The pre-trigger setting determines how much of the captured data is actually before the trigger event.

The trigger timing setting refers to which of the start and stop events are controlled by the trigger.

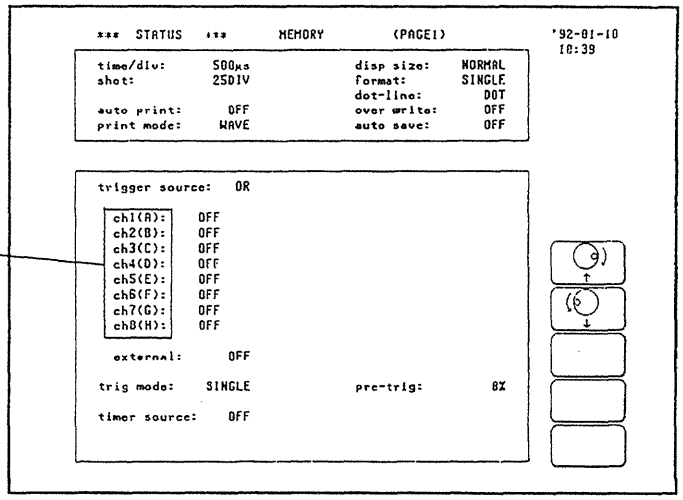
8-2 Internal Triggers

- The analog input channels and logic inputs to be used as the basis of trigger signals must be selected.
- It is not possible to use all eight of the analog and all 32 of the logic inputs simultaneously as triggers.

Either analog channel 1 or logic channel group A (1 to 4)
Either analog channel 2 or logic channel group B (1 to 4)
⋮ ⋮
Either analog channel 7 or logic channel group G (1 to 4)
Either analog channel 8 or logic channel group H (1 to 4)

} The following eight trigger sources can be used.

"status" screen



Trigger sources

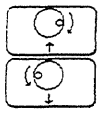
Making trigger settings on the "display" screen

On the "display" screen, the trigger settings can be made for one channel at a time.

Method (Screen for making this setting: the "display" screen)

The settings are made by using F1 and F2 or the rotary knob.

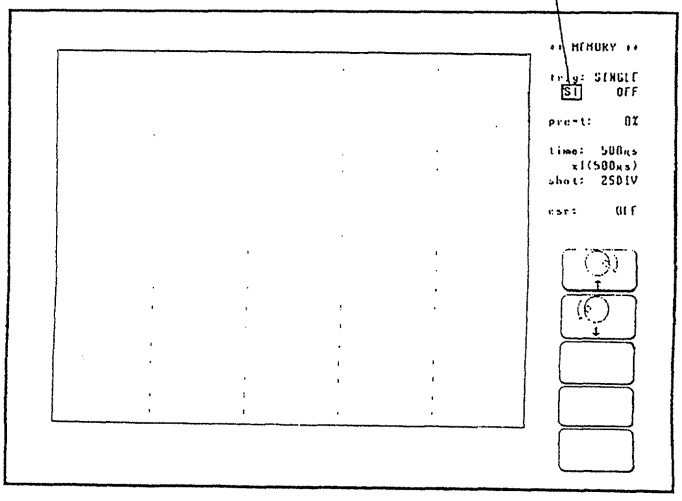
Function key indication — Meaning



} S1 to S8

"display" screen

Flashing cursor



8-3 Setting the trigger type

The following trigger types are available:

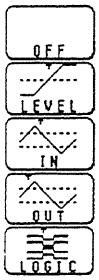
- Analog triggers (using an analog input signal)
  - window-in trigger (trigger filter)
  - level trigger (trigger filter)
  - window-out trigger (trigger filter)
- Logic triggers, using the logic inputs (trigger filter)

Method (Screens for making this setting: the "status" and "display" screens)

This example illustrates settings for channel 1 (logic channel group A). The remaining channels 2 (logic channel group B) to 8 (logic channel group H) are set in an identical manner.

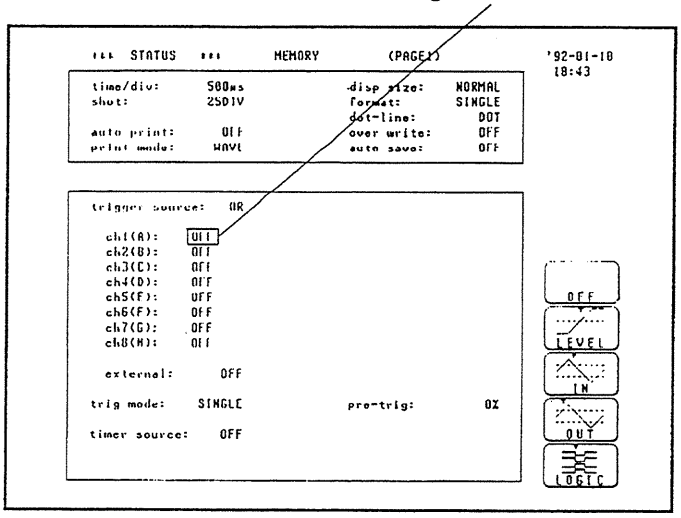
1. Using the cursor keys, move the flashing cursor to the position shown in the figure below.
2. According to the displays on the function keys, select the trigger type.

Function key indication — Meaning



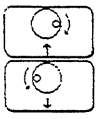
: trigger not used
: level trigger (See 8-3-1)
: window-in trigger (See 8-3-2)
: window-out trigger (See 8-3-2)
: logic trigger (See 8-3-3)

"status" screen Flashing cursor



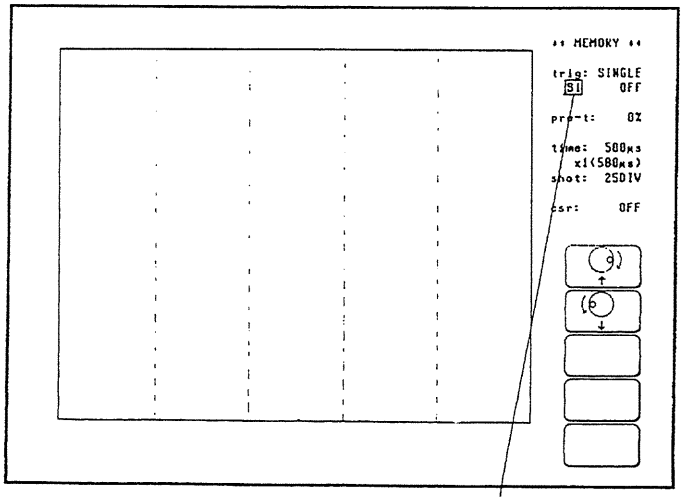
3. If the settings are being made using the "display" screen, the source channels should be designated. This designation is performed by using F1 and F2 or the rotary knob.

Function key indication — Meaning



} S1 to S8

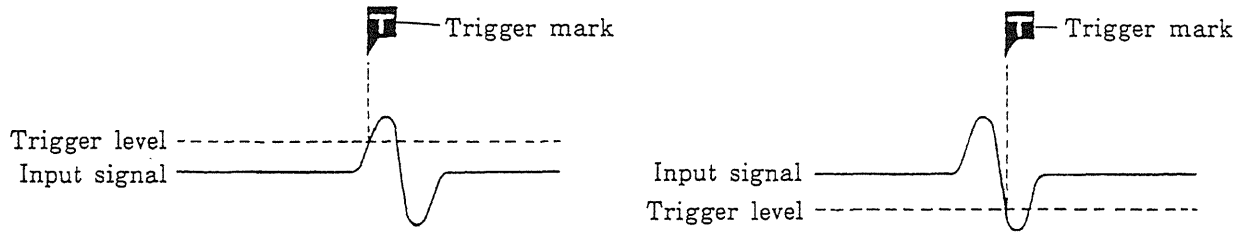
"display" screen



Flashing cursor

8-3-1 Level Trigger

This trigger occurs when the input signal crosses a predetermined voltage level in a particular direction ("slope": ⤴ or ⤵).



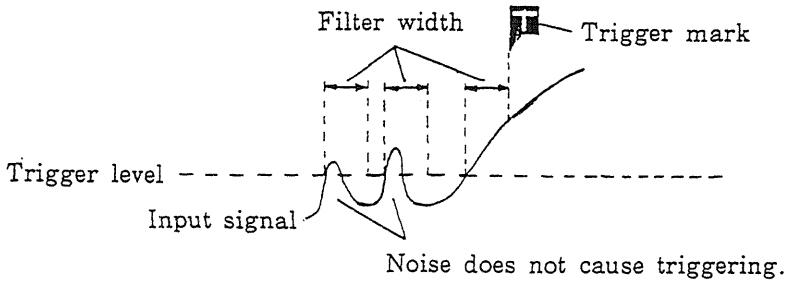
Upward trigger direction ("slope" = ⤴)

Downward trigger direction ("slope" = ⤵)

• The trigger filter

When the trigger filter is being used, triggering only occurs when the trigger conditions have been satisfied over an interval equal to the filter width. This provides a mechanism for avoiding spurious triggers caused by noise.

Trigger direction ⤴



Method (Screens for making this setting: the "status" and "display" screens)

This example illustrates settings for channel 1 (logic channel group A). The remaining channels 2 (logic channel group B) to 8 (logic channel group H) are set in an identical manner.

Using the cursor keys, move the flashing cursor in order to the items designated by the numbers in the figure on the right, and make the settings.

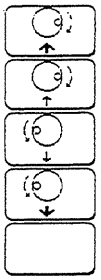
1. Set the type of trigger

Select F2 (LEVEL).

2. Set the trigger level

By using the function keys F1 to F4 or the rotary knob, set the trigger level.

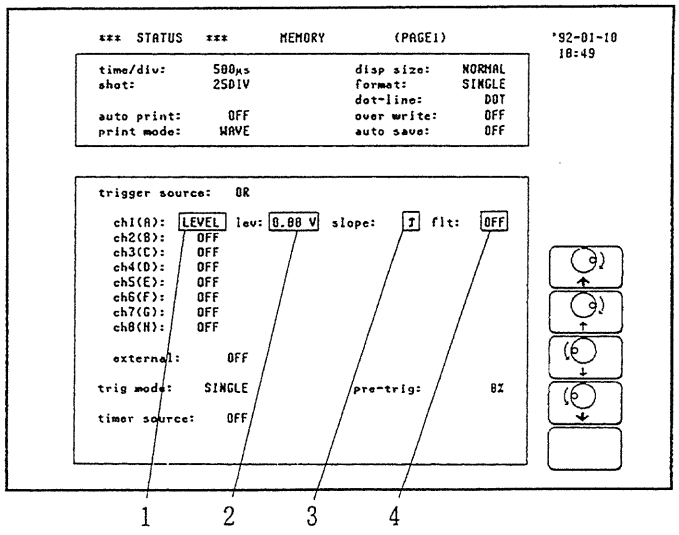
Function key indication



Meaning

} trigger voltage level

"status" screen

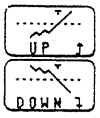


3. Select the trigger direction (slope)

Make the setting by using the function keys.

Function key indication

Meaning



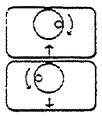
↑ : Triggering will occur when the input signal crosses the threshold value (the trigger level) from below going upwards.

↓ : Triggering will occur when the input signal crosses the threshold value (the trigger level) from above going downwards.

4. Set the trigger filter

Make the setting using the function keys F1 and F2 or the rotary knob. (This setting cannot be made on the "display" screen.)

Function key indication

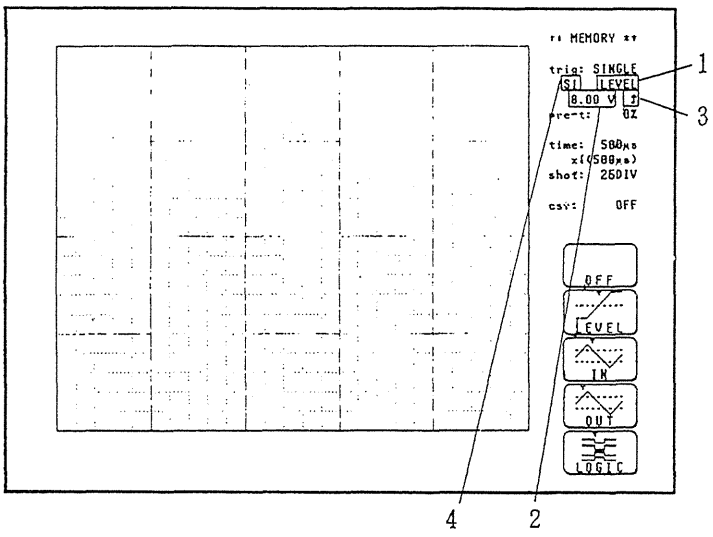


Meaning

} OFF, 0.1, 0.2, 0.5, 1.0, 1.5, 2.0, 2.5, 5.0, 10.0 div (for the memory recorder function and the FFT function modes)
the filter width is expressed in units of div.

NB: In the recorder function mode and the X-Y recorder function mode, it is only possible to set this to ON or OFF.

"display" screen



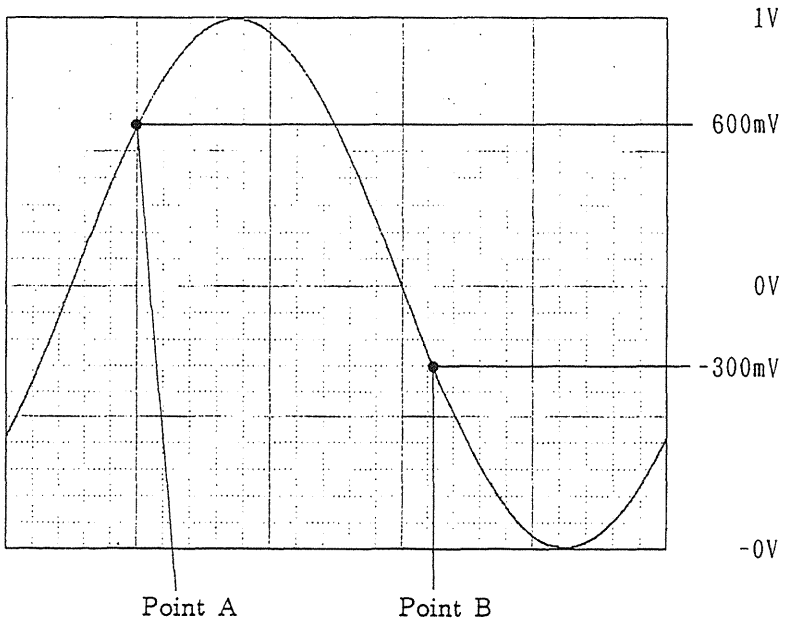
1. Type of trigger
2. Trigger level
3. Trigger slope (direction)
4. Source channel

Example

In order to cause triggering at point A or at point B of a 2 V peak-to-peak sine wave as shown in the figure below, the following settings are made:

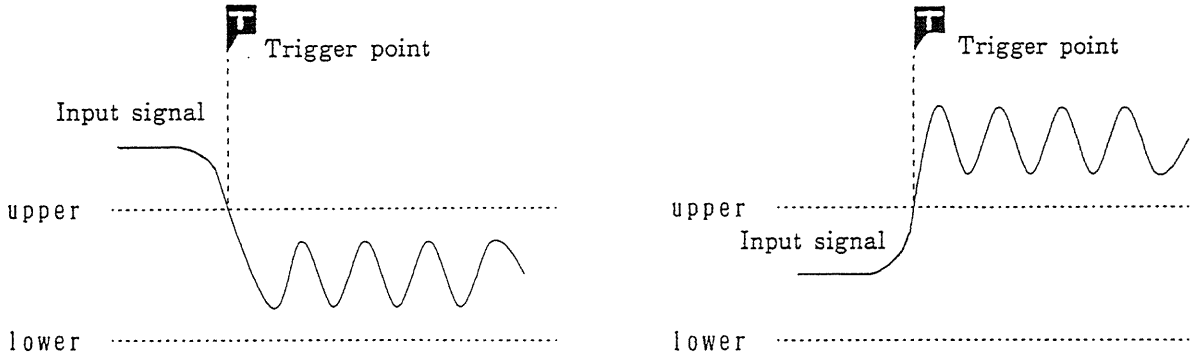
Point A ····· trigger level 600 mV, trigger direction rising (↑)

Point B ····· trigger level -300 mV, trigger direction falling (↓)



8-3-2 Window-in and Window-out Triggers

Each of the two types of window trigger specifies an upper limit level and a lower limit level. A window-in trigger is activated when the input signal enters the range between these limits, whereas a window-out trigger is activated when the input signal leaves this range.



Method (Screens for making this setting: the "status" and "display" screens)

This example illustrates settings for channel 1 (logic channel group A). The remaining channels 2 (logic channel group B) to 8 (logic channel group H) are set in an identical manner.

Using the cursor keys, move the flashing cursor to the items shown in the figure on the right in the order indicated by the numbers, and make the settings.

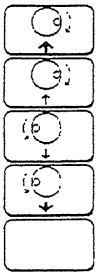
1. Set the trigger type

   Select whichever of F3 (IN) or F4 (OUT) is desired.

2. Set the lower trigger level

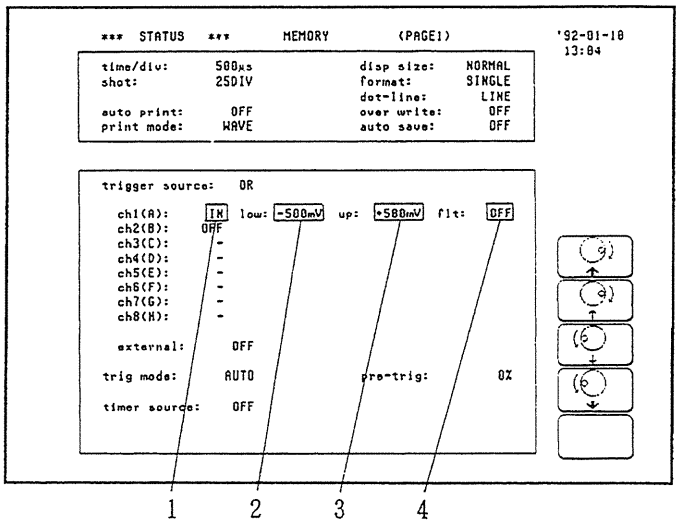
   By using the function keys F1 to F4 or the rotary knob, make the setting.

Function key indication — Meaning



} trigger level (voltage value) (cannot be set higher than the upper trigger level)

"status" screen



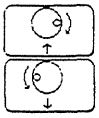
3. Set the upper trigger level

   This is done in a manner identical to step 2. (The upper trigger level cannot be set lower than the lower trigger level.)

4. Set the trigger filter

This is done by using the function keys F1 and F2 or the rotary knob. (This setting cannot be made on the "display" screen.)

Function key indication | Meaning

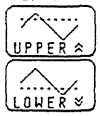


OFF, 0.1, 0.2, 0.5, 1.0, 1.5, 2.0, 2.5, 5.0, 10.0 div (for the memory recorder and the FFT function modes)
The filter width is expressed in units of div.

NB: In the recorder function mode and the X-Y recorder function mode, it is only possible to set this to ON or OFF.

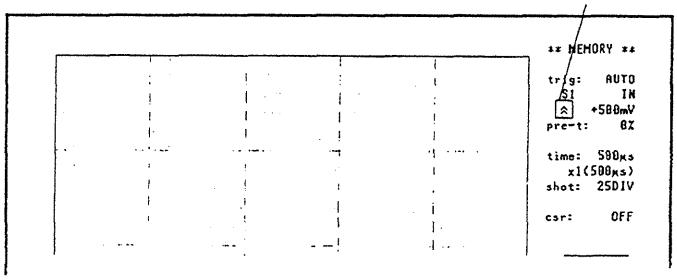
When setting the upper limit value and the lower limit value on the "display" screen, the setting is made by using the function keys which bear the displays upper (⩓) and lower (⩔)

Function key indication | Meaning



: upper
: lower

"display" screen Flashing cursor



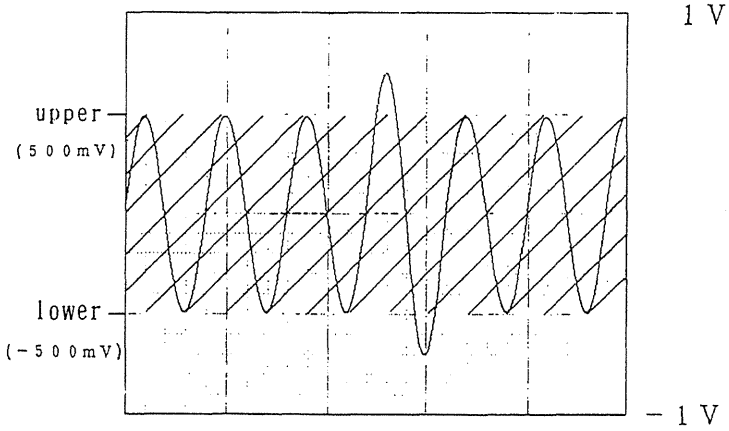
Example

In order to cause triggering when the signal as shown in the figure below leaves the hatched area, the following settings are made:

Window trigger

upper limit ····· 500 mV

lower limit ····· -500 mV



Logic triggers are derived from the logic inputs.

A trigger pattern and logical operator (AND or OR) are specified, and triggering occurs when the conditions are satisfied.

However, if a trigger filter is being used, triggering only occurs when the trigger conditions have been satisfied over an interval equal to the filter width.

Method (Screens for making this setting: the "status" and "display" screens)

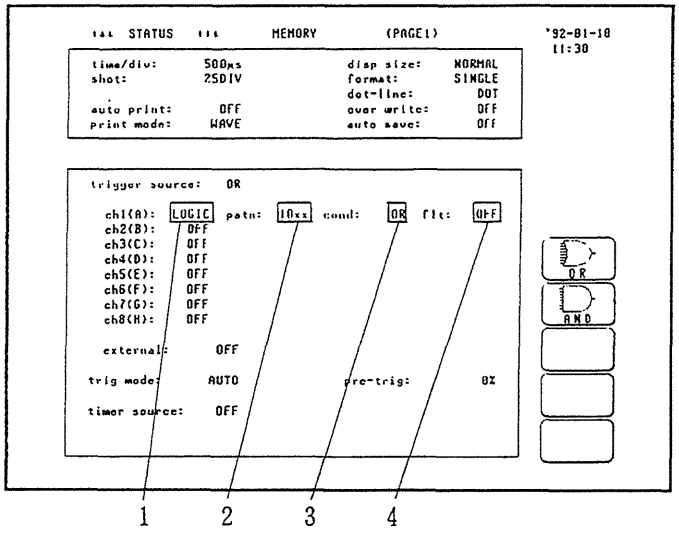
This example illustrates settings for channel 1 (logic channel group A). The remaining channels 2 (logic channel group B) to 8 (logic channel group H) are set in an identical manner.

Using the cursor keys, move the flashing cursor to the items shown in the figure on the right in the order indicated by the numbers, and make the settings.

1. Set the trigger type:

Select F5 (LOGIC).

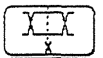
"status" screen



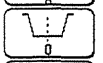
2. Set the trigger pattern:

- This is the logic pattern for when triggering should take place.
- In the case of channel 1 (logic channel group A), the settings are made for logic inputs CHA1 to CHA4 in order from the left.
- The settings are made according to the function key displays.

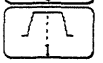
Function key indication — Meaning



: the signal is disregarded



: low level signal



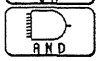
: high level signal

3. Set the AND/OR logical operator for the trigger pattern:

The setting is made according to the function key displays.

Function key indication — Meaning

: triggering occurs if any one of the logic input signals conforms to the trigger pattern.

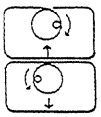


: triggering only occurs if all of the logic input signals conform to the trigger pattern.

4. Set the trigger filter (This setting cannot be made on the "display" screen):

This is done by using the function keys F1 and F2 or the rotary knob.

Function key indication



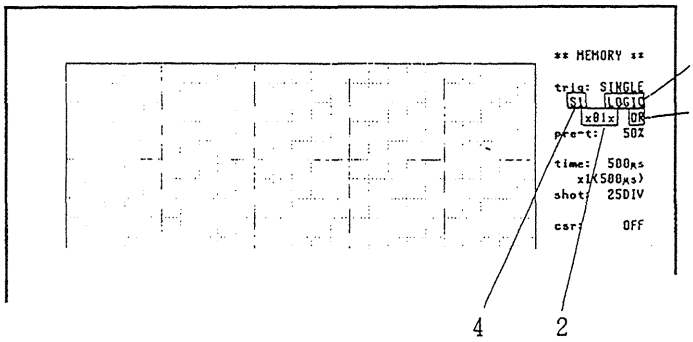
Meaning

OFF, 0.1, 0.2, 0.5, 1.0, 1.5, 2.0, 2.5, 5.0, 10.0 div (for the memory recorder function mode)

the filter width is expressed in units of div.

NB: In the recorder function mode and the X-Y recorder function mode, it is only possible to set this to ON or OFF.

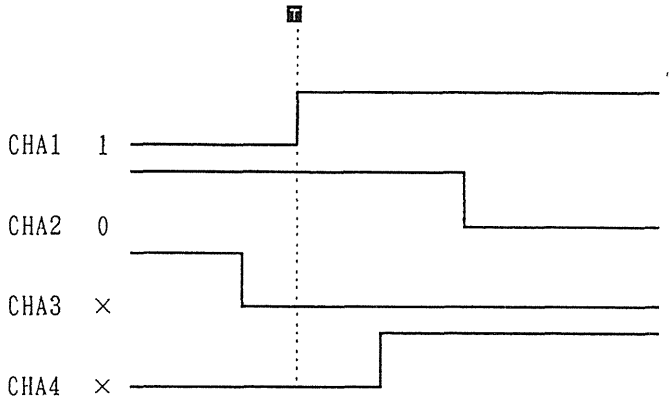
"display" screen



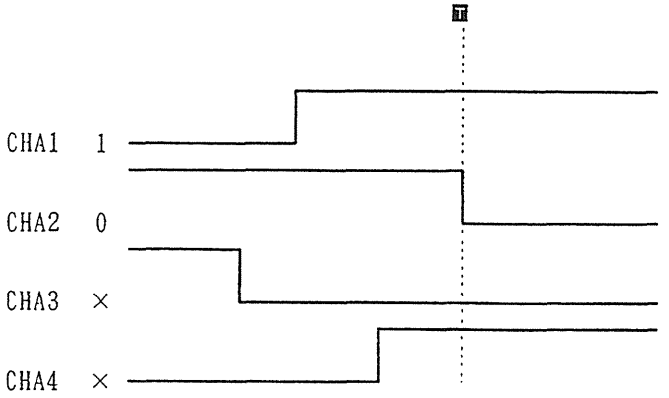
1. Type of trigger
2. Trigger pattern
3. AND/OR operator for the trigger pattern
4. Source channel

Example:

(1) If the trigger pattern has been set to "10××" with the operator OR, then triggering occurs as shown in the figure on the right.

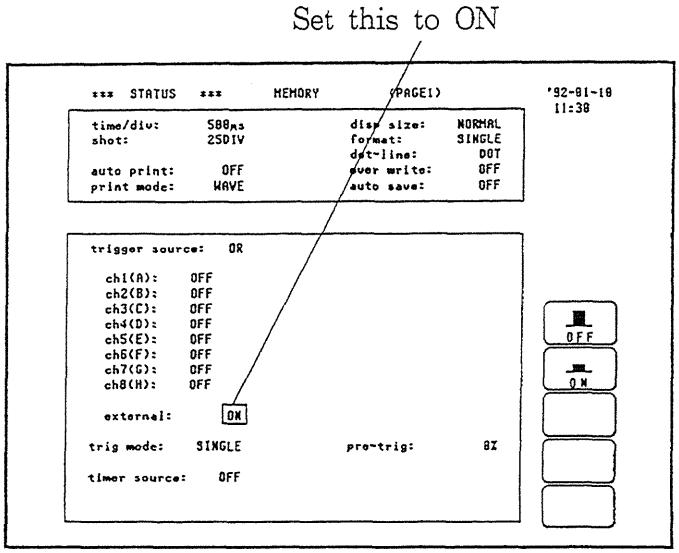


(2) If the trigger pattern has been set to "10××" with the operator AND, then triggering occurs as shown in the figure on the right.

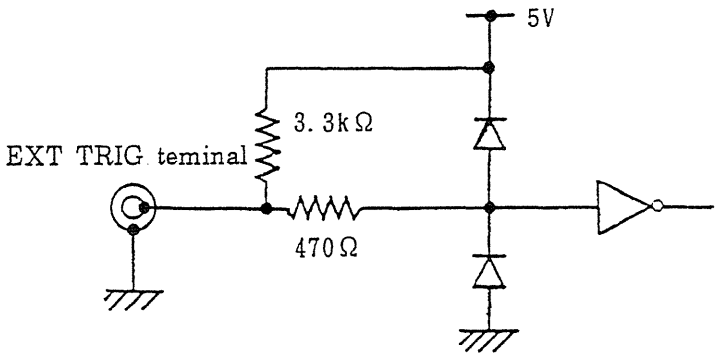


8-4 External Trigger

It is possible to use an external input as a trigger source. External triggering is performed either by shorting out the EXT TRIG terminal, or by the supplied signal falling to less than about 2.5 V.



Circuit diagram of the input circuit

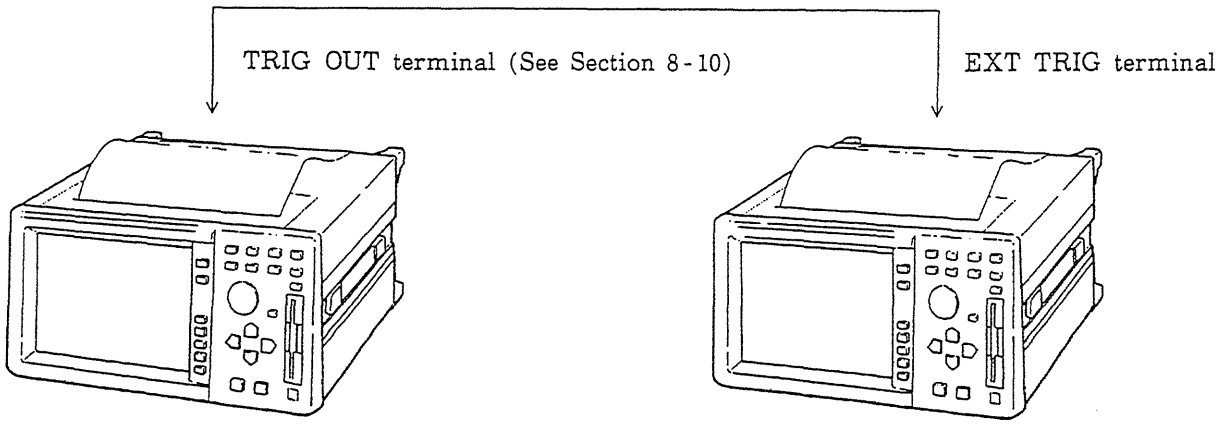


(Maximum input voltage: -5 V to +10 V)

Rear panel

EXT TRIG terminal

The external trigger facility can be used to synchronize a number of 8825 units for parallel operation.



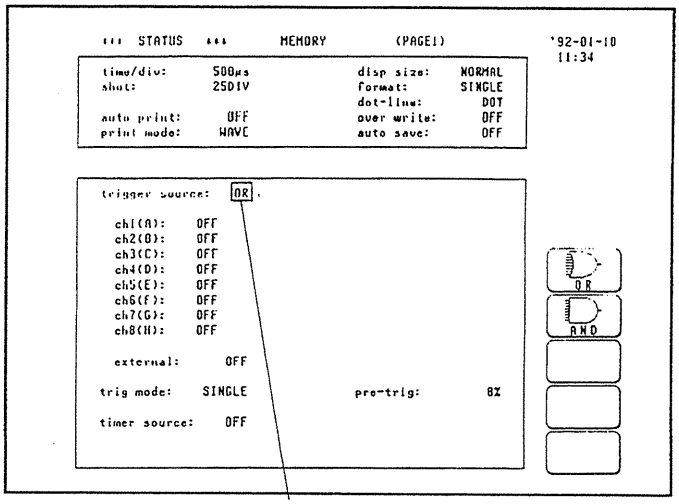
Set external to ON

8-5 Internal and External Trigger Logical Operator

• This setting determines whether the internal and external triggers are ANDed or ORed to produce the finally effective trigger.

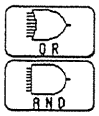
Method (Screen for making this setting: the "status" screen)

1. Using the cursor keys, move the flashing cursor to the position shown in the figure on the right.
2. According to the displays on the function keys, select the desired logical operator - AND or OR.



Flashing cursor

Function key indication — Meaning



: triggering occurs if any one of the trigger conditions holds.

: triggering occurs only if all of the trigger conditions hold.

Example

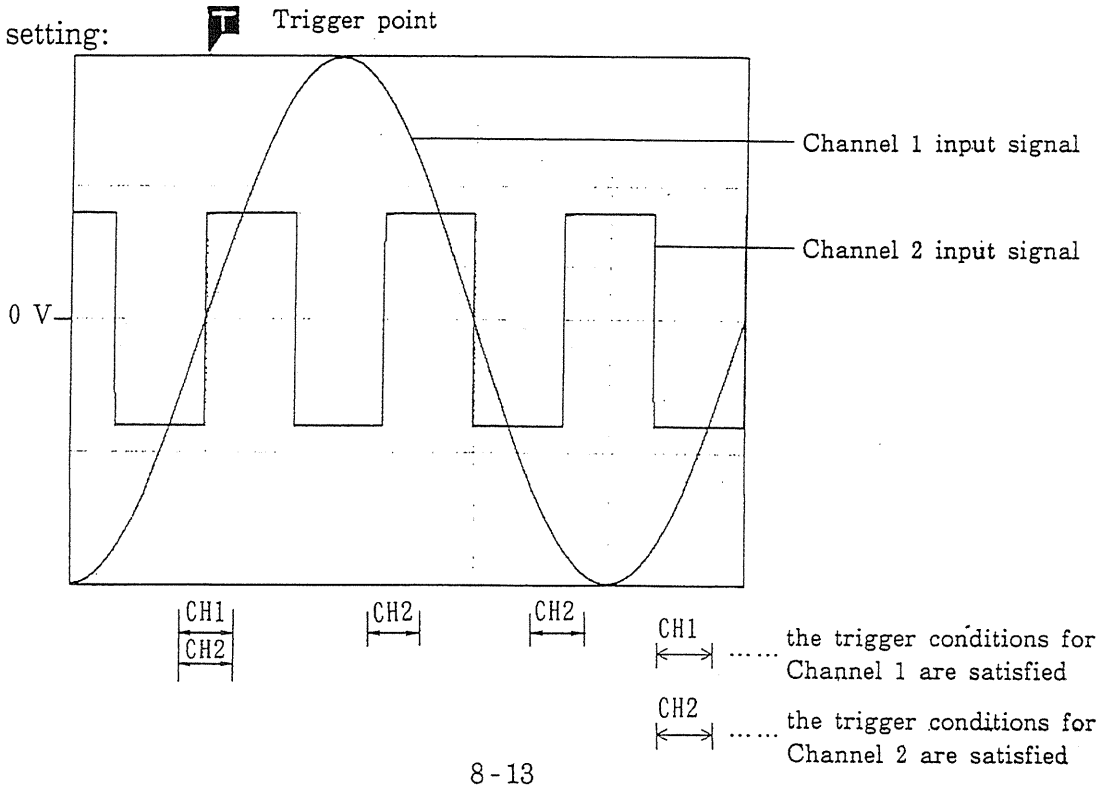
If the settings are made as follows:

ch1(A): LEVEL lev: 0.00V slope: ↑ flt: OFF

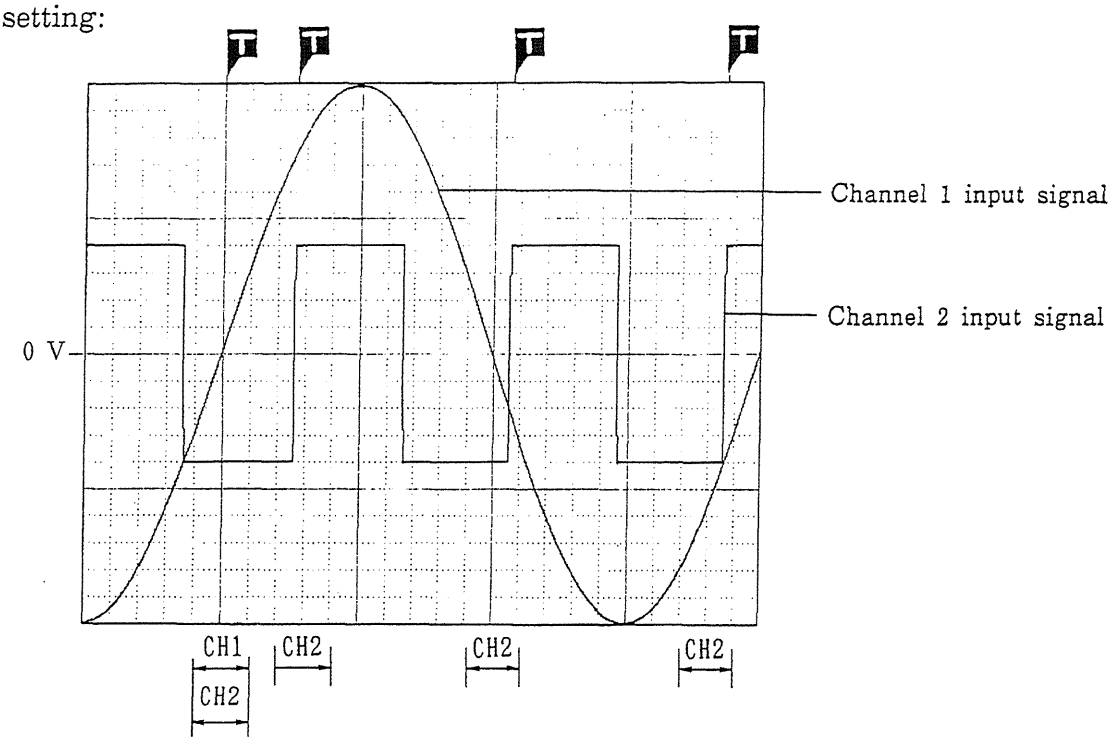
ch2(B): LEVEL lev: 0.00V slope: ↑ flt: OFF

then triggering depends on the AND/OR setting as follows.

• AND setting:



• OR setting:


Channel 1 input signal
Channel 2 input signal
0 V
CH1
CH2
CH2
CH2
CH2
CH1 ..... the trigger conditions for Channel 1 are satisfied
CH2 ..... the trigger conditions for Channel 2 are satisfied

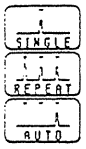
8-6 Trigger Modes (Memory Recorder, Recorder, and FFT Function Modes)

- Except in the X-Y recorder function, the trigger mode is variable. It determines whether or not the trigger is repeatedly accepted after the recording operation has terminated.
- If all the trigger sources are off, then when recording operation has terminated the next measurement operation begins immediately.

Method (Screens for making this setting: the "status" and "display" screens)

1. Using the cursor keys, move the flashing cursor to the "trig mode" item.
2. According to the displays on the function keys, make the selection.

Function key indication — Meaning

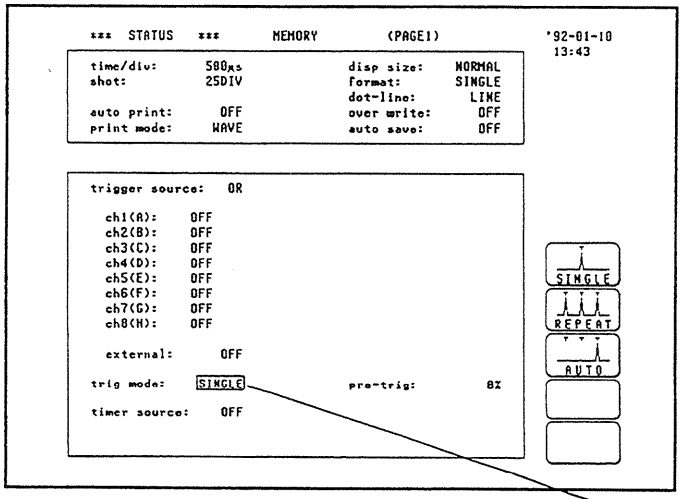


: The trigger is activated once after the START key is pressed. It does not repeat.

: Triggering occurs repeatedly. Measurement takes place each time the trigger event occurs.

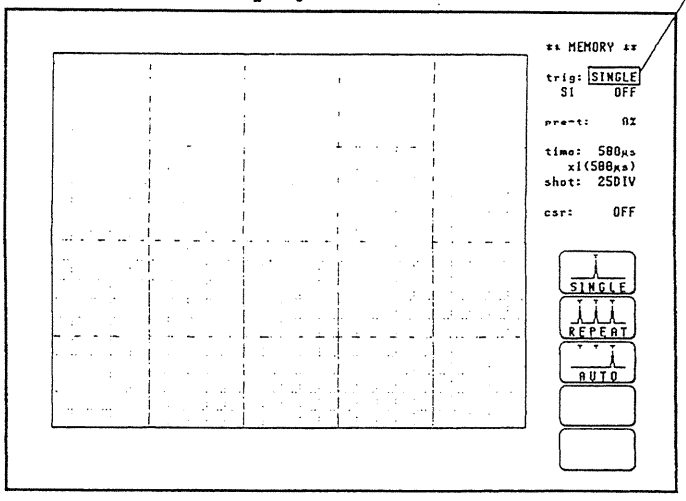
: Triggering occurs repeatedly, but if approximately 1 second elapses without the trigger applying, recording starts automatically. This is convenient for checking input waveforms. (Memory recorder function mode only.)

"status" screen



Flashing cursor

"display" screen



8-7 Pre-Trigger (Memory Recorder, and FFT Function Modes)

- The pre-trigger function allows the signal before the trigger event to be captured. The setting determines the proportion in percent (%) of the recording length of the signal that comes before the trigger.
- The moment the trigger occure, the time related to the waveform being recorded can be set.
- Not only the waveform after the trigger but also the waveform before the trigger can be recorded.
- If all the trigger sources are disabled (OFF), pre-trigger setting cannot be performed.

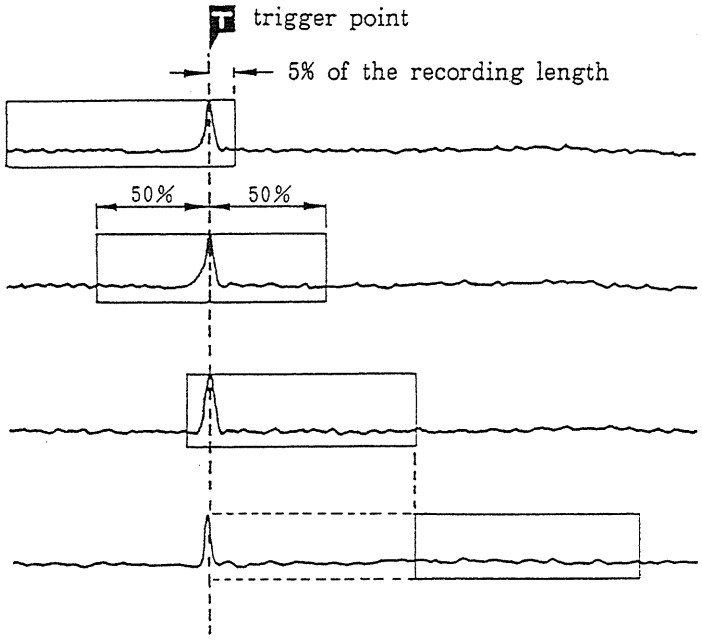
[ ] ··· range that can be recorded (recording length)

95%: 95% of the recording before the trigger

50%: 50% before and 50% after trigger

5%: 95% of the recording after the trigger

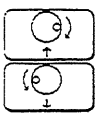
-95%: recording is about one recording length after the trigger



Method (Screens for making this setting: the "status" and "display" screens)

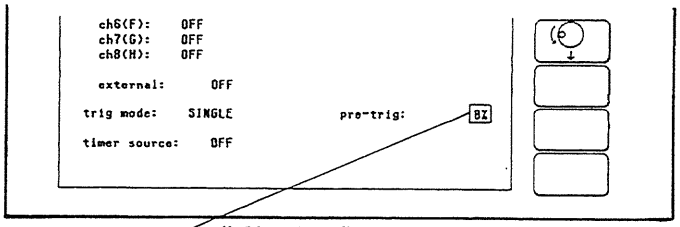
1. Using the cursor keys, move the flashing cursor to the "pre-trig" item.
2. By using the function keys F1 and F2 or the rotary knob, make the setting.

Function key indication



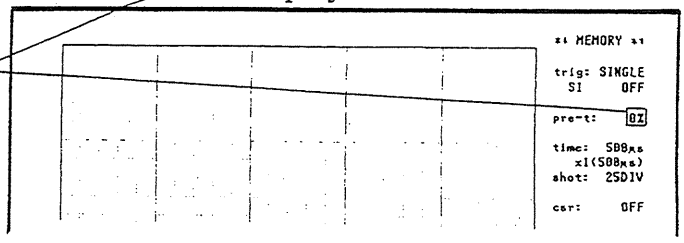
Meaning: 0, 2, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 95, 100, -95%

"status" screen



"display" screen

Flashing cursor

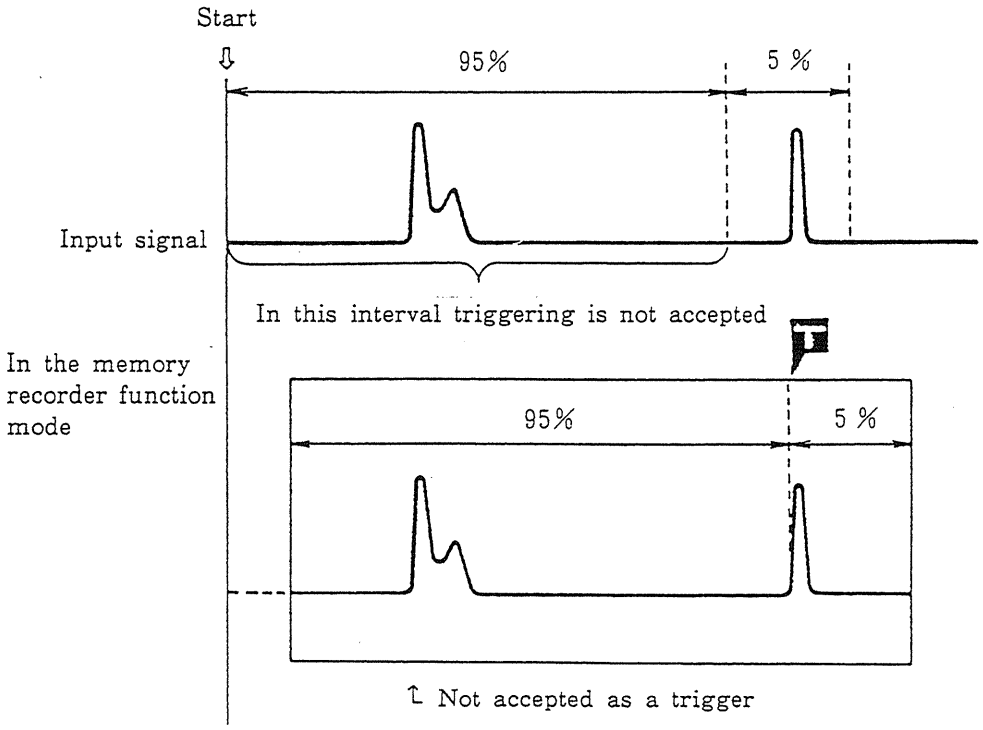


NOTE

In the memory recorder and the FFT function modes, when the pre-trigger setting is from 2% to 100%, the trigger is not accepted during some predetermined time interval from the start of measurement. (During this interval, the message "pre-trig wait" is shown on the display screen.)

(In the trigger accept condition, during the time interval until triggering occurs, the message "wait for trig" is shown on the display screen.)

[Example: when the pre-trigger is set to 95%]



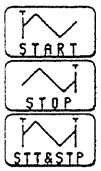
8-8 Trigger Timing (Recorder Function Mode and X-Y Recorder Function Mode)

The trigger timing setting refers to which of the start and stop events are controlled by the trigger.

Method (Screens for making this setting: the "status" and "display" screens)

1. Using the cursor keys, move the flashing cursor to the "timing" item.
2. According to the displays on the function keys, select which of the start and stop events are to be controlled by the trigger.

Function key indication — Meaning

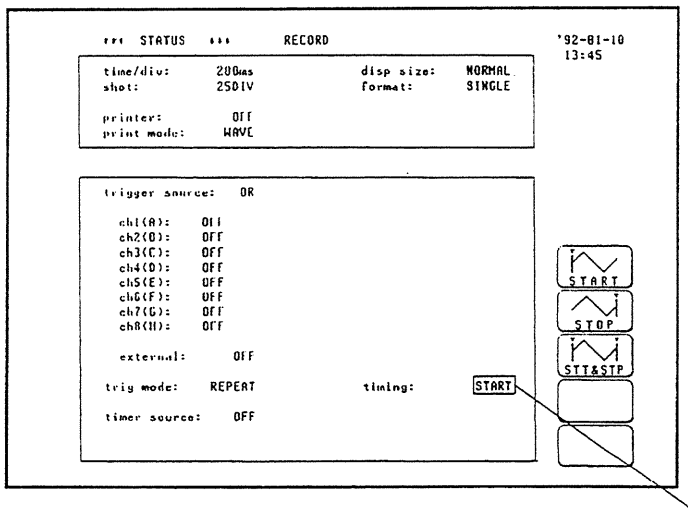


: Triggering affects the start of recording only. Recording continues until the STOP key is pressed.

: Triggering affects the end of recording only. Recording starts from the time instant when the START key is pressed.

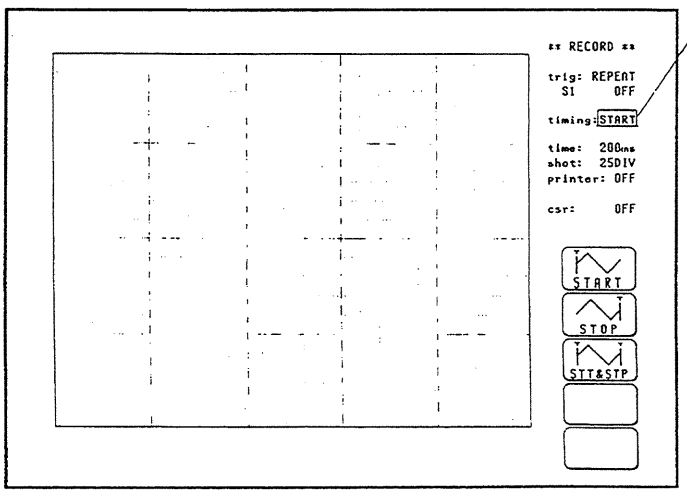
: Triggering controls both starting and stopping recording. Recording takes place from the time instant when triggering occurs until the next time instant when triggering occurs.

"status" screen



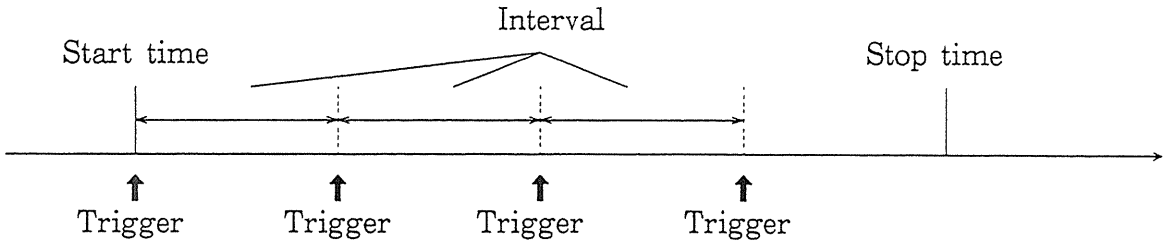
Flashing cursor

"display" screen



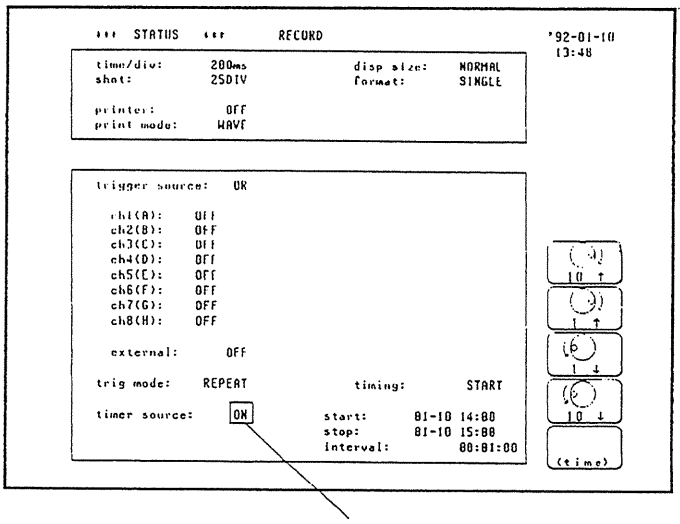
8-9 Timer Trigger

- This is used when recording at a predetermined time is required.
- Triggering occurs regularly from the set start time instant until the stop time instant at constant time intervals.

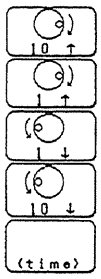


Method (Screen for making this setting: the "status" screen)

1. Using the cursor keys, move the flashing cursor to the "timer source" item.
2. Select F2 (ON).
3. To set the start time instant:
   (1) Move the flashing cursor to the "start" item.
   (2) By using the function keys F 1 to F5 or the rotary knob, make the setting.



Function key indication — Meaning



set the numerical values for month, day, hour, and minute

: set the start or the stop time to the current time

4. To set the stop time instant:
   (1) Move the flashing cursor to the "stop" item.
   (2) This step is identical to substep (2) of step 3 above.
5. Set the time interval (in days, hours, minutes, and seconds):
   (1) Move the flashing cursor to the "interval" item.
   (2) This step is identical to substep (2) of step 3 above.

NOTE

- The start time and the stop time must be after the START key is pressed.
- When the trigger mode is SINGLE, regardless of the setting for the time interval, triggering occurs only once at the start time.
  However, in the recorder function mode and the X-Y recorder function mode, if the trigger timing has been set to START&STOP, the recording starts at the set start time, and is terminated after the set time interval has elapsed.
- In the OR setting between triggers, if the trigger other than the timer trigger is being set, the trigger occures before the start time. Further, even though the stop time is past, measurement will not be completed, because of witing for another trigger.

8-10 Trigger Output Terminal

The trigger output signal is taken from the TRIG OUT terminal on the back panel of the 8825.

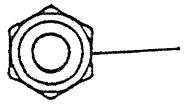
Rear panel

TRIG OUT t

TRIG OUT t

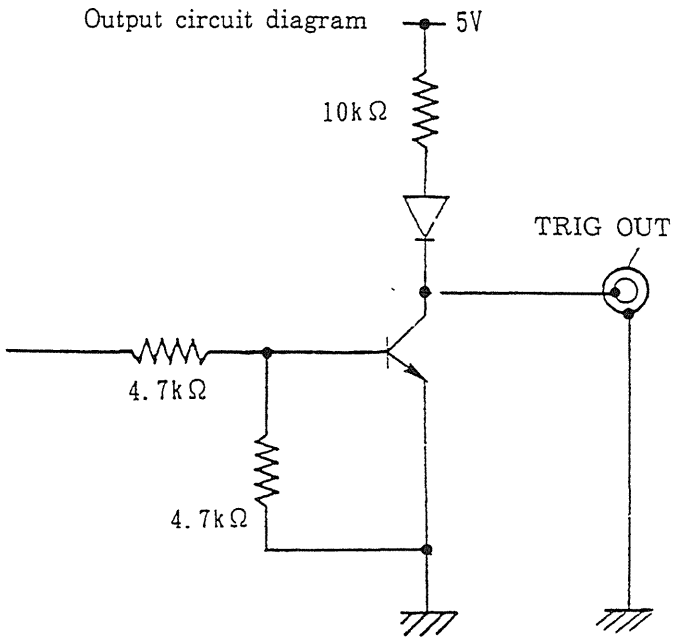
Rear panel

EXT TRIG



TRIG OUT

Output circuit diagram



Open collector output,
with 5 V output
Active low
Pulse width approximately 1.5 ms

Mini-jack, ϕ3.5 mm

Maximum input voltage range
-20 to +30 V
Maximum input current
500 mA
Maximum input power
200 mW

Output circuit diagram TRIG OUT terminal

NB: If the AUTO key is pressed in order to use the auto range function, a trigger signal is output. While using the trigger output terminal, care is required if using the auto range function. (Only in the memory recorder function mode.)

Section 9

Memory Segmentation Function

Contents

9-1 What is the Memory Segmentation Function? 9-2
9-2 Sequential Save Function 9-3
9-3 The Multi-Block Function 9-6
9-4 Tables 9-9

9-1 What is the Memory Segmentation Function?

This function allows the memory to be divided into blocks in the memory recorder function mode. There are two different functions for different applications of the segmented memory.

○ The sequential save function

The sequential save function segments the memory, then allows successive blocks to be used to hold successively triggered recordings, without displaying or recording on the printer, thus reducing the recording and display dead time.

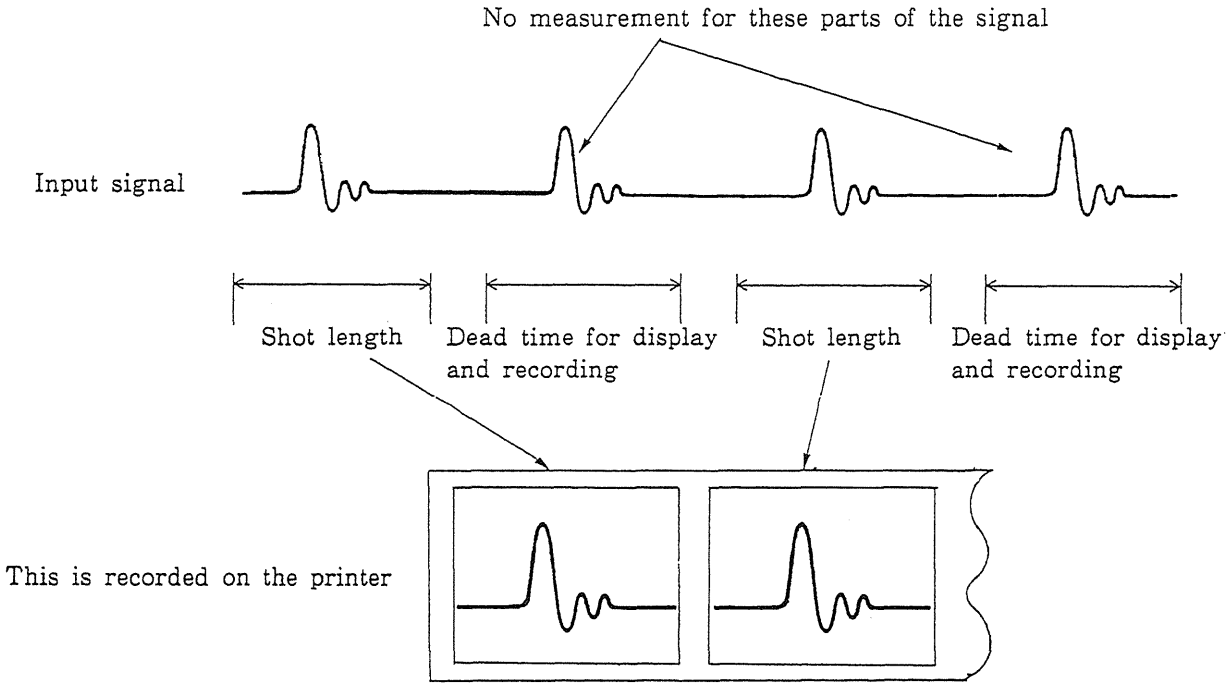
○ The multi-block function

The memory space is segmented into as many blocks as required, so that the user can select any memory block as required.

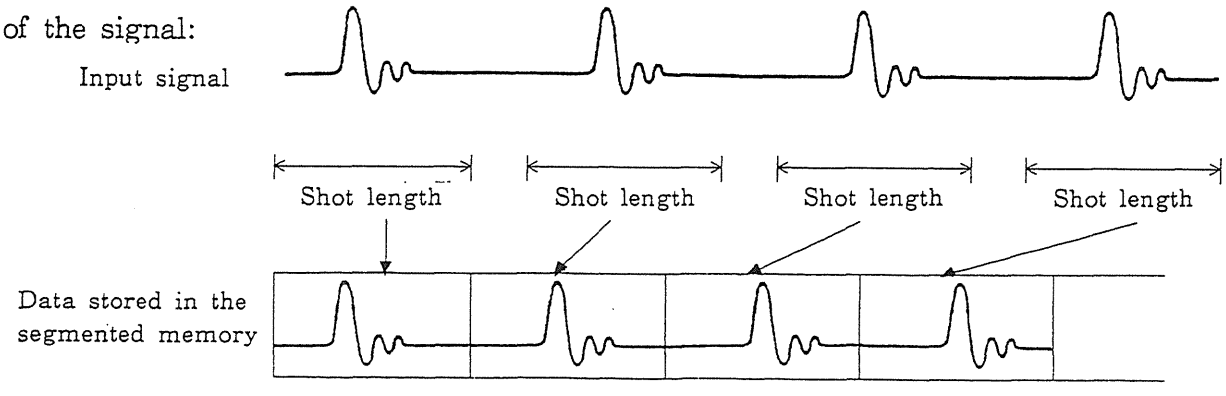
9-2 Sequential Save Function

- This function makes it possible to make measurements without losing any required information.
- Any block in which an input signal is recorded can be shown on the "display" screen. (Thereafter, it can be recorded on the printer.)
  [During measurement operation, until all blocks have been filled with data, nothing is displayed or printed.]

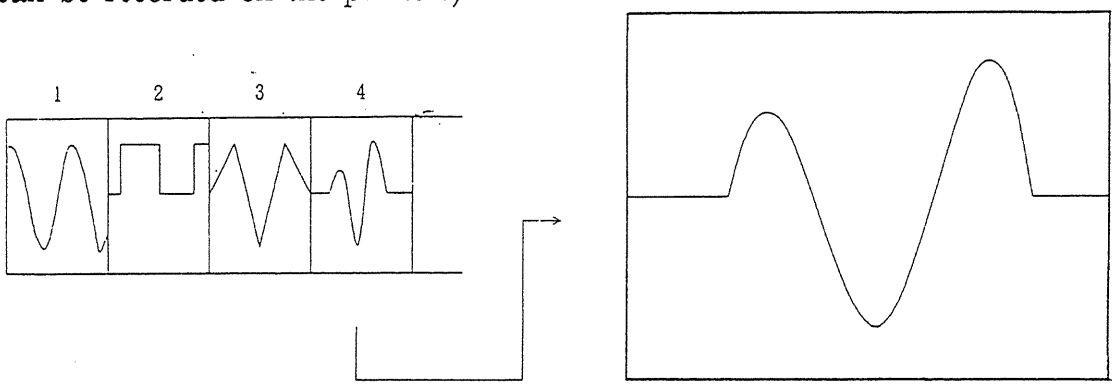
For example, if the trigger mode is set to REPEAT and continuous recording on the printer is performed (with the auto print function):



If however the sequential save function is used, because the dead time is very small, measurement is performed as shown below without missing out any necessary parts of the signal:



• Any block in which the input signal has been previously recorded by using the sequential save function can be shown on the "display" screen. (Thereafter, it can be recorded on the printer.)



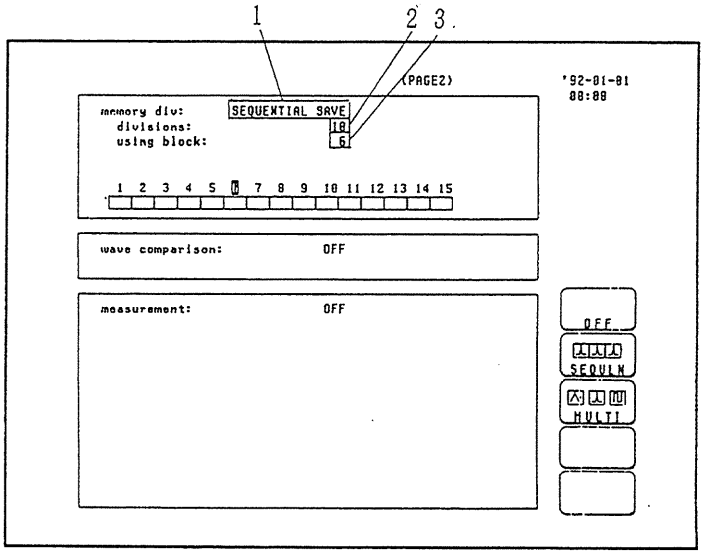
Displaying and printing block 4 of the data

Method (Screen for making this setting: the "status" screen, Page 2)

• From Page 1 of the "status" screen, press the STATUS key to get to Page 2. (This can also be done by pressing a cursor key and holding it down.)

• Using the cursor keys, move the flashing cursor as described below in order to the items designated by the numbers in the figure below, and perform the settings.

1. Setting the memory segmentation function (memory div):



Select F2 (SEQUENTIAL).

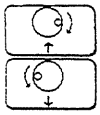
Function key indication	Meaning
OFF	: do not use the memory segmentation function
SEQUEN	: sequential save function
MULTI	: multi-block function (See Section 9-3)

2. Setting the number of memory blocks ("divisions")

The maximum number of memory blocks that can be used is automatically determined in terms of the recording length that has been set. (This number can be 3, 7, 15, 31, or 63).

The number of blocks that will be used from this maximum number should be set.

The setting is made using the function keys F1 and F2 or the rotary knob.

Function key indication	Meaning
	from 2 to the maximum number of memory blocks that can be used

NB: For the relationship between the maximum number of memory blocks and the recording length, see Section 9-4 "Tables."

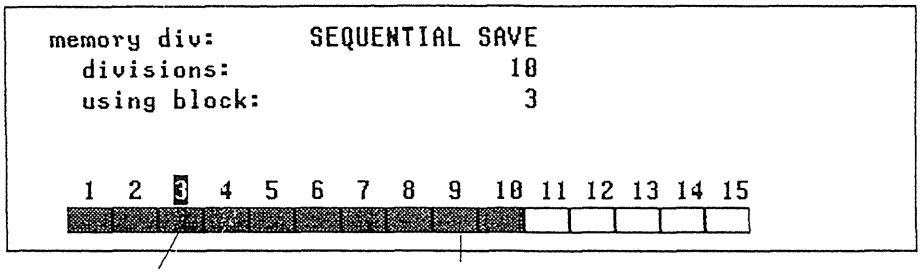
3. Setting the block that will be displayed ("using block")

Set the number of the memory block whose input signal waveform will be shown on the screen display. This is done in a manner identical to Step 2.

4. The memory block display

This shows which of the memory blocks hold captured data, and which is the current "(using block)", i.e. the block whose waveform is currently being shown on the screen display.

In the following example, the maximum number of memory blocks is 15; 10 of these memory blocks have been filled with input waveform data; and the waveform recorded in the sixth one of these memory blocks is currently being displayed:



Using blick Blocks holding captured data

NOTE

Relationship between the trigger mode and the sequential save function

- When the trigger mode is SINGLE

  After the START key is pressed, data is captured and stored in order from memory block 1 onwards for the number of blocks specified by the "divisions" setting made in Step 2, and the measurement operation then automatically terminates and the waveform stored in the block specified by the "using block" setting made in Step 3 is displayed on the screen display.

- When the trigger mode is REPEAT or AUTO

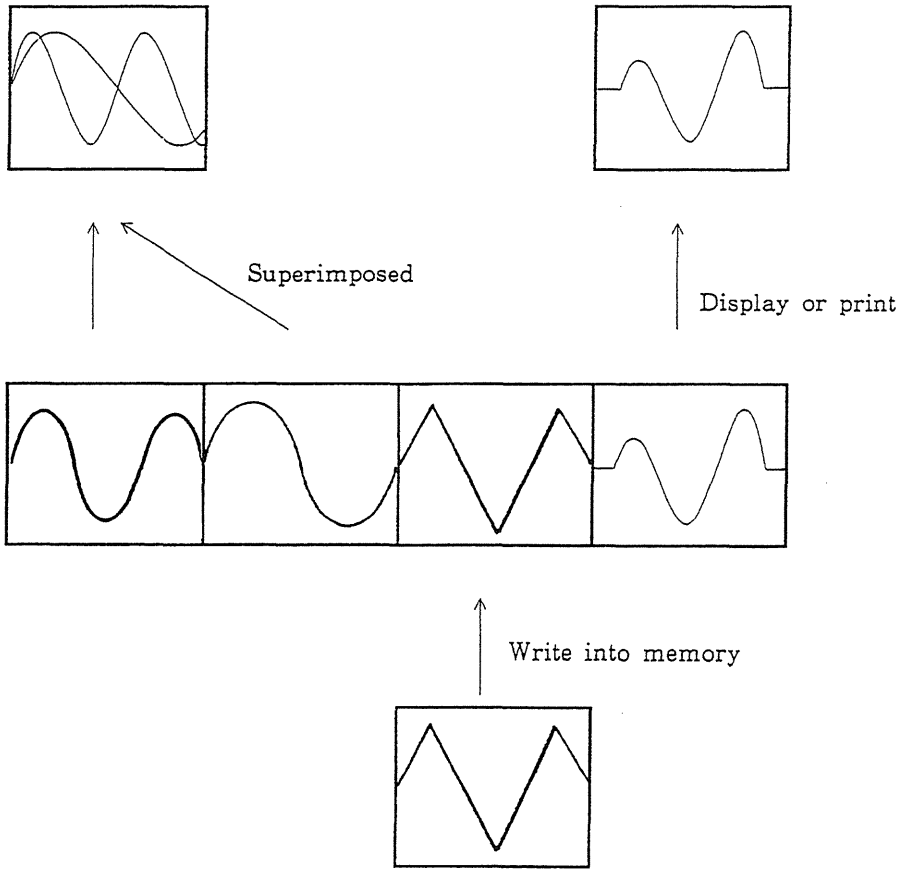
  After the START key is pressed, data is captured and stored in order from memory block 1 onwards for the number of blocks specified by the "divisions" setting made in Step 2; but after this last block the data capture process returns to memory block 1 again, and waveform data continues to be stored from this memory block 1 onwards as before, and so on cyclically. On each cycle, at the stage that waveform data is stored in the last block as specified by the "divisions" setting, the waveform stored in the block specified by the "using block" setting made in Step 3 is displayed on the screen display. (If the auto print function is ON, a printed recording is also made.) When the STOP key is pressed, this process terminates.

Related item

The "using block" setting and the memory block utilization can be displayed on the screen. Refer to Section 5-4-17 "Help Function" for details.

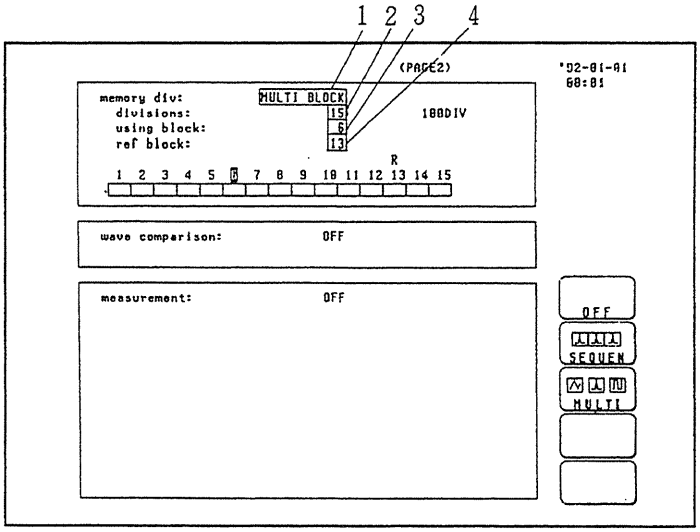
9-3 The Multi-Block Function

- Measurement data can be stored in any block. A block that has already been used, can be reused as required, overwriting the existing waveform data in it.
- The measurement data held in any block can be shown on the display screen, and can then also be printed.
- The measurement data held in any two different blocks can be superimposed on the screen, to make comparison of two waveforms easy.



Method (Screen for making this setting: the "status" screen, Page 2)

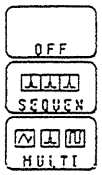
- From Page 1 of the "status" screen, press the STATUS key to get to Page 2. (This can also be done by pressing a cursor key and holding it down.)
- Using the cursor keys, move the flashing cursor as described below in order to the items designated by the numbers in the figure below, and perform the settings.



1. Setting the memory segmentation function (memory div):

Select F3 (MULTI).

Function key indication — Meaning



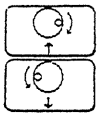
: the memory segmentation function is not used
: sequential save function (See Section 9-2)
: multi-block function

2. Setting the number of memory blocks (divisions):

Set the number of memory blocks into which the memory is to be segmented.

The setting is made using the function keys F1 and F2 or the rotary knob.

Function key indication — Meaning



} 3, 7, 15, 31, or 63

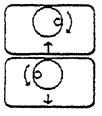
3. Setting the memory block that will be used ("using block")

Select the number of the memory block into which the input signal waveform will be written.

Next, select the number of the memory block to be displayed on the screen.

This setting is made using the function keys F1 and F2 or the rotary knob.

Function key indication — Meaning



} 1 to the maximum set memory block

4. Setting the reference block ("ref block")

For a superimposed display of the waveform data from two blocks, the second block is specified as the "reference block". It can then be compared with the current block (the "using block").

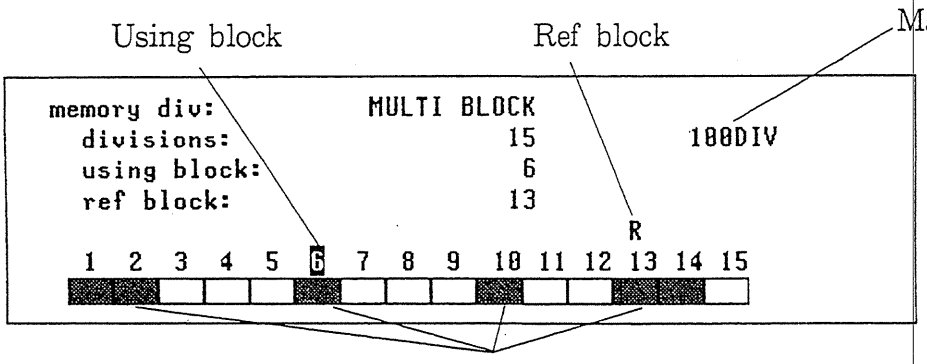
Select the reference block using the same procedure as in Step 3.

NB: The waveform data in the "using block" and the reference block must have the same recording length in order to be used in a superimposed display.

5. The memory block display

This indicates graphically which of the memory blocks hold waveform data, and which is the current "(using block)", i.e. is the block in which waveform data will next be written.

In the following example, the number of memory blocks is 15:



NOTE

- Setting the number of memory blocks takes priority over the setting of the recording length. Because of this, if a small number of memory blocks is set along with a long recording length, then if the number of memory blocks is increased, the recording length will automatically be decreased. For the relationship between the number of memory blocks and the recording length, refer to Section 9-4 "Tables."

Related item:

The "using block" setting and the memory block utilization can be displayed on the screen. Refer to Section 5-4-17 "Help Function" for details.

9-4 Tables

The tables below show the relationship between the number of memory blocks and the recording length, according to the number of channels in use, both for when the size of the memory is 1M words and for when it is 4M words (the memory capacity is determined when the 8825 unit is ordered).

Notes on the tables

In multi-block operation the number of memory blocks has priority. After setting the number of memory blocks, read out the maximum recording length for storage in one block under the appropriate column for the number of channels in use.

In sequential save operation, the recording length has priority. Look down the column of the table corresponding to the number of channels in use, for the set recording length, then read off the number of memory blocks that can be used from the left.

• 1M words:

Number of channels / Number of memory block	16 channels	8 channels	4 channels	2 channels
3	100 DIV	200 DIV	500 DIV	1000 DIV
7	50	100	200	500
15	25	50	100	200

• 4M words:

Number of channels / Number of memory block	16 channels	8 channels	4 channels	2 channels
3	500 DIV	1000 DIV	2000 DIV	5000 DIV
7	200	500	1000	2000
15	100	200	500	1000
31	50	100	200	500
63	25	50	100	200

Section 10

Waveform Decision Function

Contents

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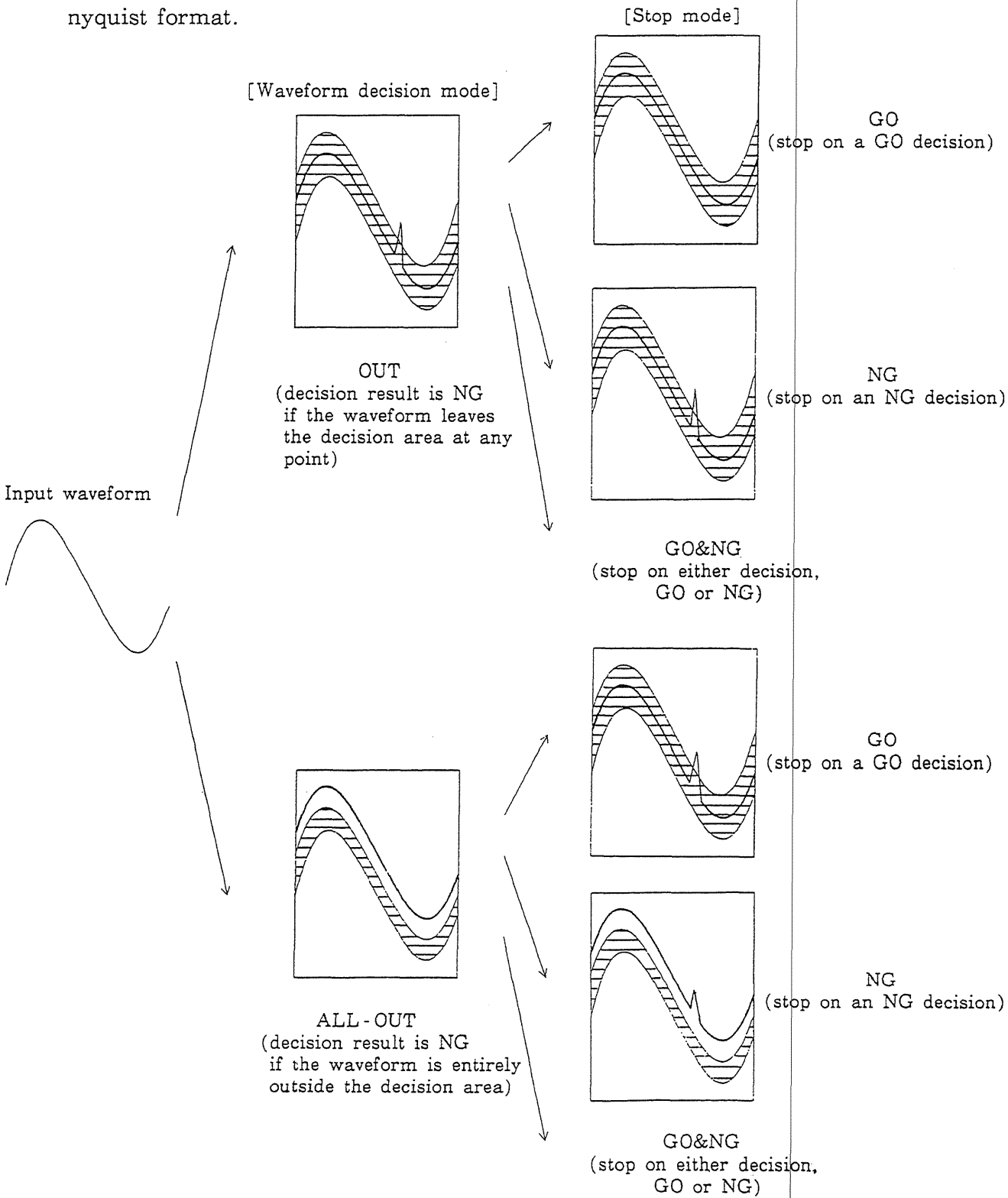
10-2 Waveform Decision Settings 10-3
10-3 Using the Graphics Editor 10-5
10-4 Using the Pass/Fail Decision Output 10-14
10-5 Example Waveform Decision Settings 10-16

10-1 Overview

- This function provides a pass/fail decision (GO/NG) for the input signal with respect to an arbitrarily defined decision area.
- It can be used to detect abnormalities in the input waveform.
- The decision result is output from the rear panel, for production line applications.
- The waveform decision function can be used in the memory recorder function single format and X-Ysing format, and in the FFT function single format and nyquist format.



10-2 Waveform Decision Settings

The waveform decision function can be used in the memory recorder function single format and in X-Ysing format,and in the FFT funciotn single format and nyquist format.

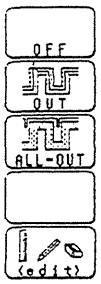
Method (Screen for making this setting: the "status" screen, Page 2)

- From Page 1 of the "status" screen, press the STATUS key to get to Page 2. (This can also be done by pressing a cursor key and holding it down.)
- Using the cursor keys, move the flashing cursor as described below in order to the items designated by the numbers in the figure below, and perform the settings.

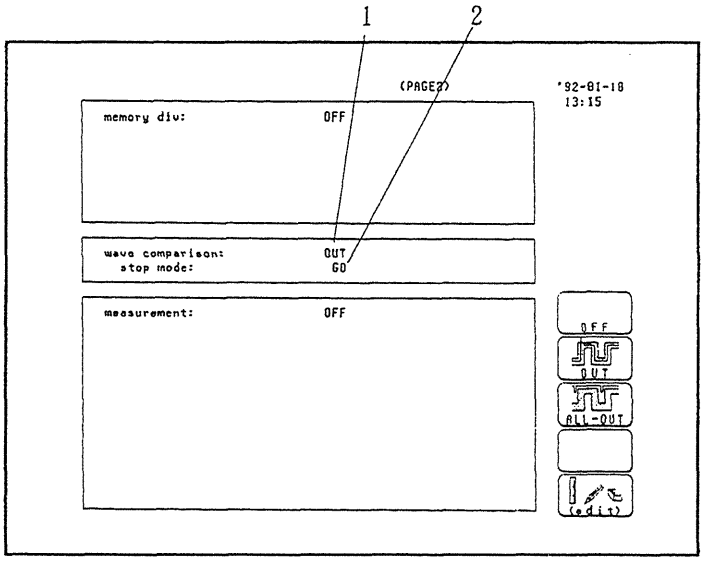
1. Setting the waveform decision mode (wave comparison)

Make the selection according to the displays on the function keys.

Function key indication — Meaning



: do not perform waveform decision
: make an NG decision if the waveform leaves the decision area at any point.
: make an NG decision if the waveform is entirely outside the decision area.
: enter the editor in order to set up the waveform decision area.
:

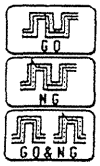


2. Setting the stop mode

Select whether operation should stop after a GO result, an NG result, or either.

Make the selection according to the displays on the function keys.

Function key indication — Meaning



GO: stop operation only after a pass.

NG: stop operation only after a fail.

GO&NG: stop operation regardless of the decision result.

3. Setting up the waveform decision area

- Enter the editor to set up the waveform decision area.
- In order to enter the editor, in step 1 above, move the flashing cursor to the "wave comparison" item, and select the function key F5 (edit).
- For detailed explanation of the editor, refer to Section 10-3 "Using the Graphics Editor."

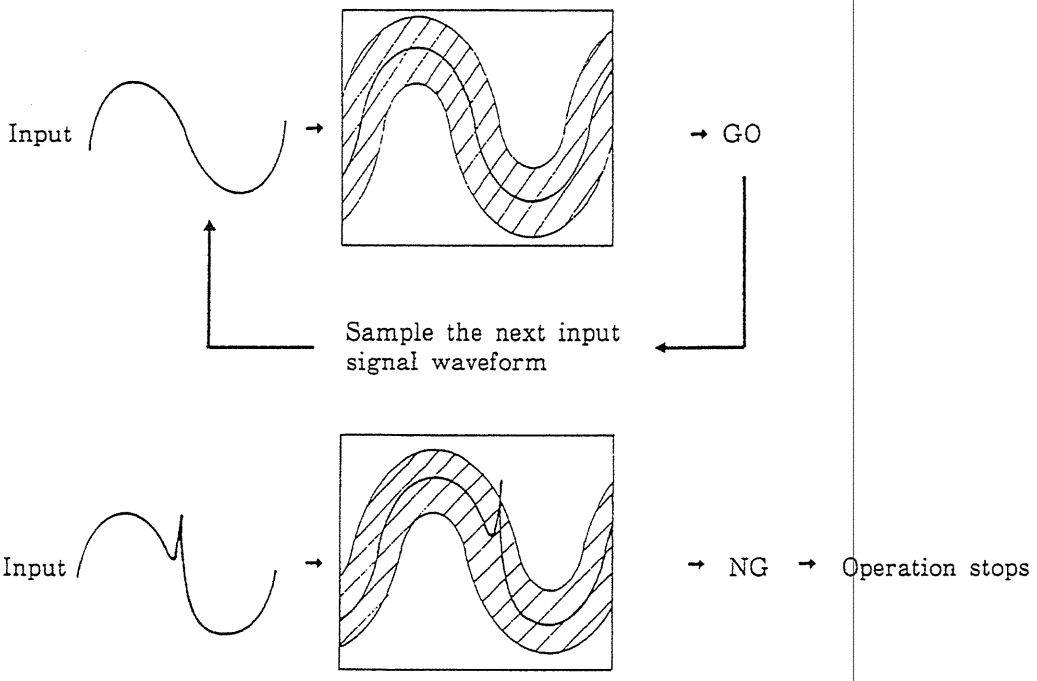
○ Trigger mode and stop operation

When the trigger mode is SINGLE, measurement continues until operation stops, and then when operation stops also measurement is terminated.

When the trigger mode is REPEAT or AUTO, after operation stops, the 8825 returns to its starting state. Measurement is only terminated by pressing the STOP key.

Example:

When the trigger mode is SINGLE, the waveform decision mode is OUT, and the stop mode is NG, then sampling of the input signal waveform continues until an NG decision.



NB: If the trigger mode is REPEAT or AUTO, the above series of operations is repeated.

NOTE

- If the waveform decision mode is set to OUT or ALL-OUT, waveform display (drawing) is set to only NORMAL or OFF.
- If the auto-print function is ON, the waveform is printed after operation has stopped.
- If the auto-save function is ON, the data is saved to the floppy disk drive after operation has stopped.
- When using the memory segmentation function (sequential save), the data is saved in the memory blocks only after operation has stopped.

10-3 Using the Graphics Editor

- The graphics editor allows you to draw the waveform decision area directly on the screen.
- The graphics editor can be used in the memory recorder function single format and X-Y single format, and in the FFT function single format and nyquist format.

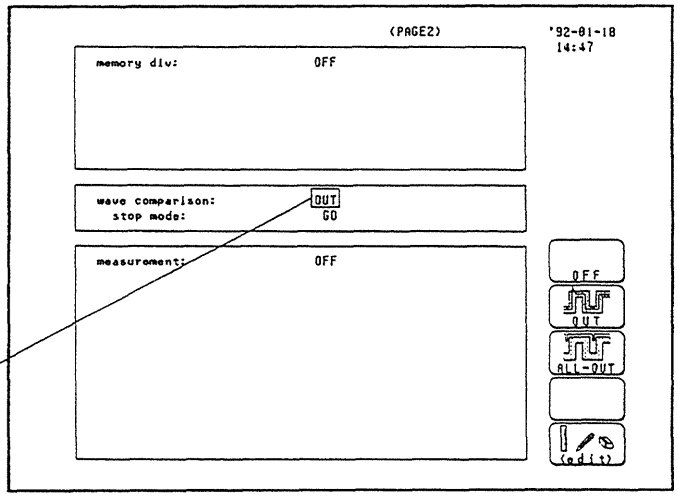
NB: The waveform decision area set up by using the editor is shown in low intensity (LIGHT).

Method (Screen for making this setting: the "status" screen, Page 2)

- From Page 1 of the "status" screen, press the STATUS key to get to Page 2. (This can also be done by pressing a cursor key and holding it down.)

1. How to enter the editor:

- Using the cursor keys, move the flashing cursor to the "wave comparison" item.
- According to the displays on the function keys, select F5 (edit), to enter the editor.

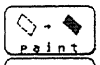
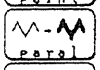
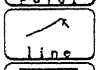
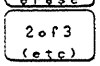


Flashing cursor

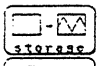
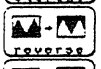
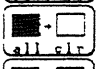
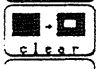
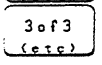
2. Details of the commands available in the editor:

The waveform decision area can be set up by selecting the appropriate commands according to the displays on the function keys. Three sets of function key displays can be cycled.

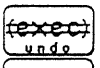
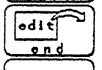
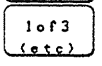
• Set 1 of 3

Function key indication	Meaning
	: fill in the interior of an area delimited by a closed line (See page 10-8).
	: smear the pattern on the screen by parallel displacement (See page 10-10).
	: draw straight lines (See page 10-7).
	: erase (See page 10-11).
	: change the function key definitions to Set 2 of 3.

• Set 2 of 3:

Function key indication	Meaning
	: import a waveform into the editor (See page 10-9).
	: reverse intensities (See page 10-9).
	: clear the screen (See page 10-12).
	: clear a rectangular area (See page 10-12).
	: change the function key definitions to Set 3 of 3.

• Set 3 of 3:

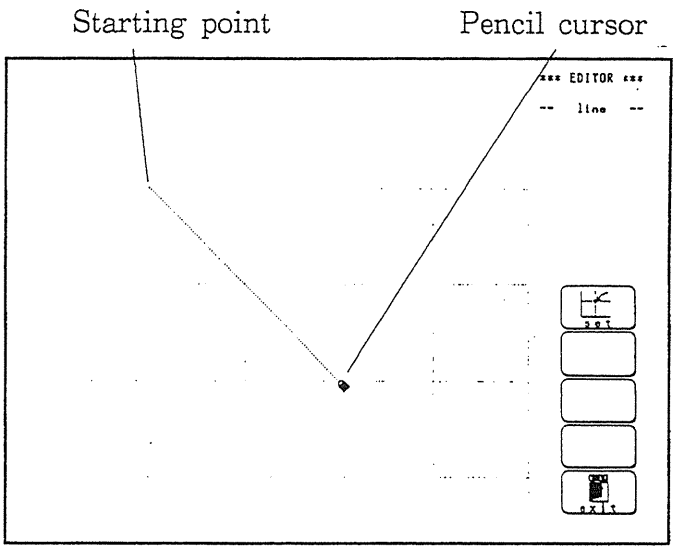
Function key indication	Meaning
	: undo the previous operation (See page 10-13).
	: save the decision area in memory (See page 10-13).
	: finish defining the decision area and leave the editor (See page 10-13).
	: change the function key definitions to Set 1 of 3.

line: Draw a straight line.

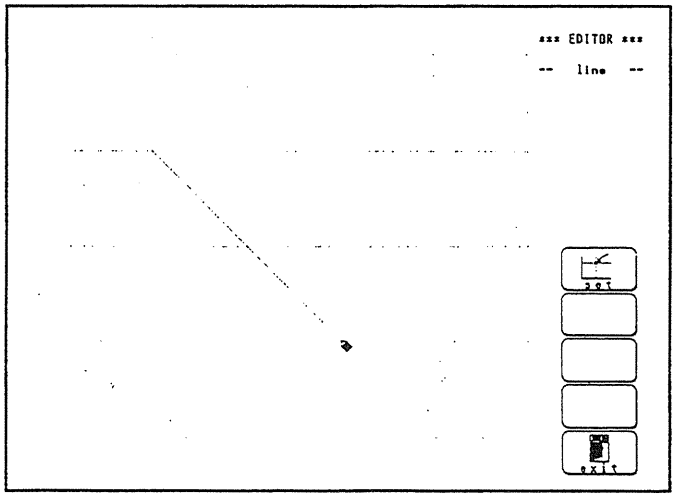
Press the function key F3 (line) to enter the line mode.

Example operation:

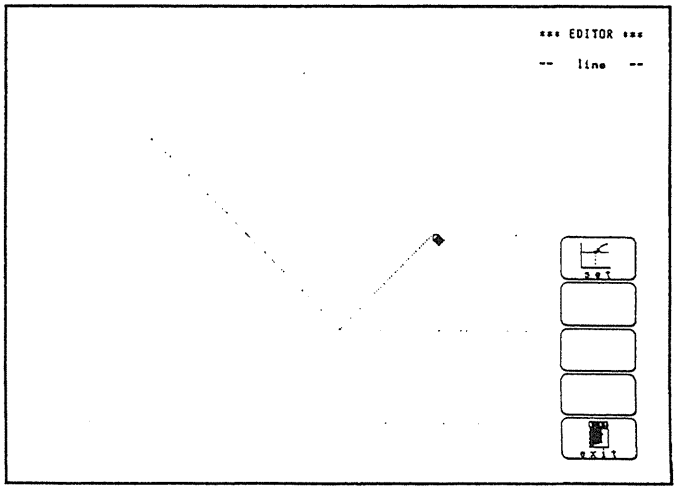
1. Using the cursor keys, move the pencil cursor to the starting point for the line.
2. Press the function key F1 (set), and a dot appears at the position of the pencil cursor.
3. Using the cursor keys, move the pencil cursor. A dotted straight line will be drawn out between the starting point and the pencil cursor as it moves.



4. Press the function key F1 (set) to confirm, and the dotted line becomes fixed and turns into a solid line.



5. Using the cursor keys, move the pencil cursor again.
6. Press the function key F1 (set) to draw a solid line linking to the position of the previous pencil cursor.
7. Press the function key F5 (exit) to leave the line mode.

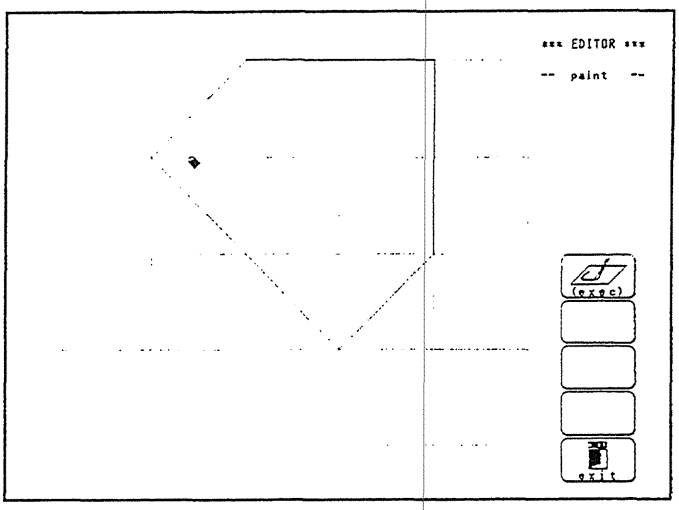


paint: Fill in the interior of a closed line surrounding the pencil cursor.

Press the function key F1 (paint) to enter the paint mode.

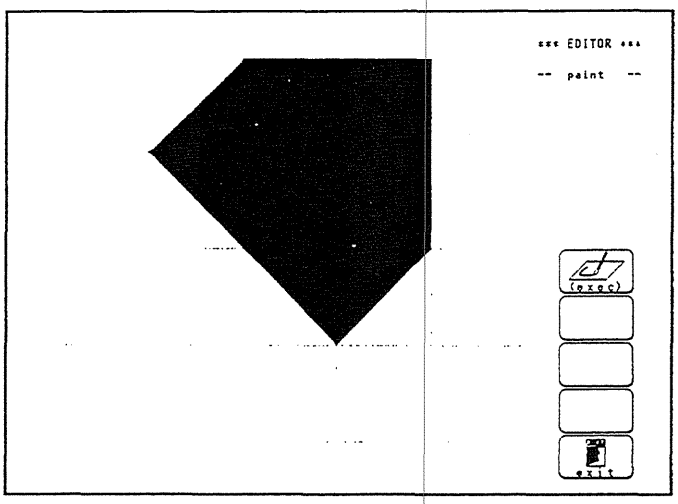
Example operation:

1. Using the cursor keys, move the pencil cursor to within the area to be filled in.



2. Press the function key F1 (exec), and the portion of the screen surrounded by a line will be filled in.
3. Press the function key F5 (exit) to leave the paint mode.

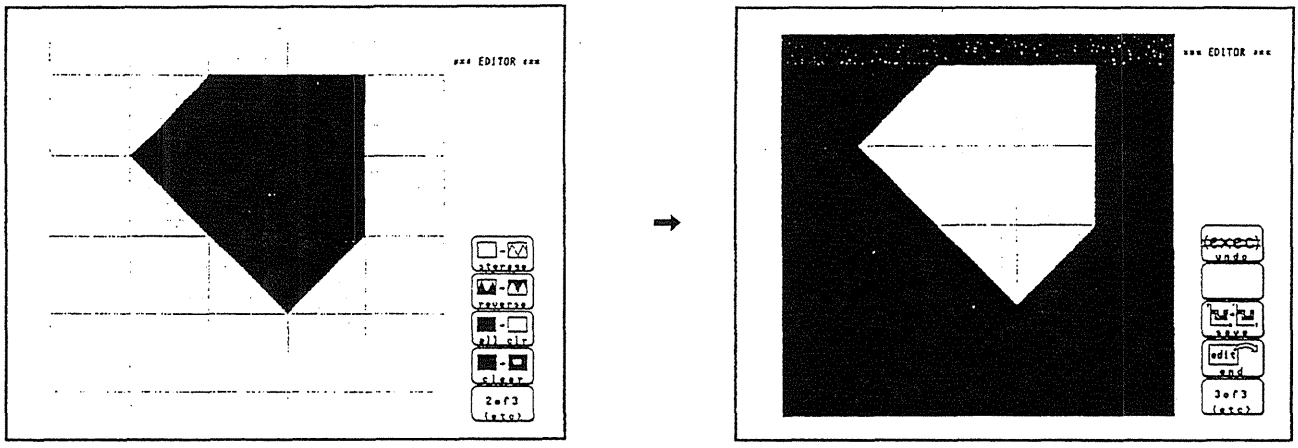
   NB: Take care that the required area is completely surrounded. Otherwise the "paint" may leak out and fill the screen. This problem can be overcome by the use of the undo function.



reverse: Reverse the sense of all area.

Press the function key F2 (reverse) to reverse the video.

Example:



reverse

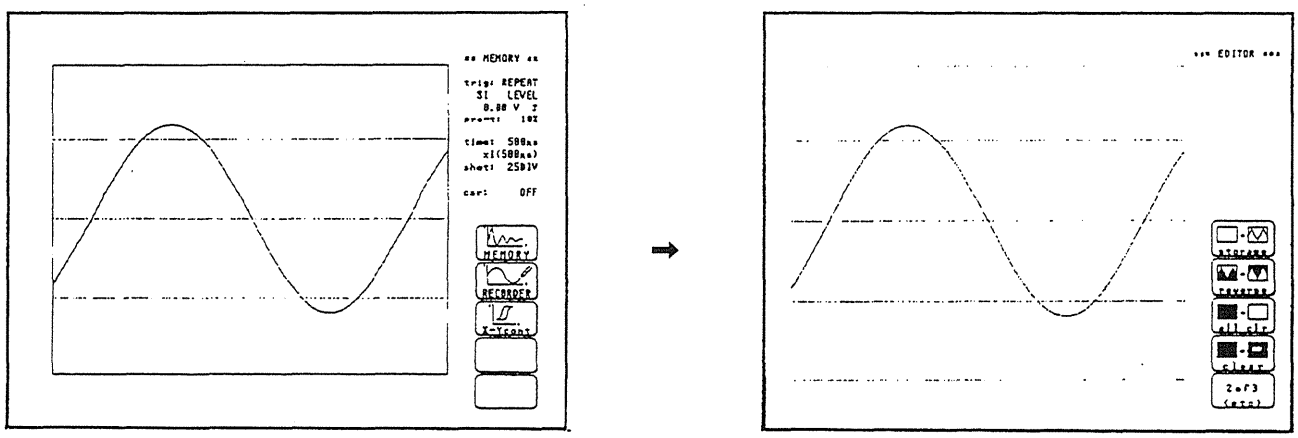
storage: Import a waveform into the editor.

Press the function key F1 (storage), to bring the waveform which was being shown on the "display" screen into the graphics editor.

Example:

Waveform shown
on the "display" screen

Editor screen after the "storage"
command has been executed



NB: A waveform that has been imported into the graphic editor will be displayed at low intensity (LIGHT), irrespective of the original setting.

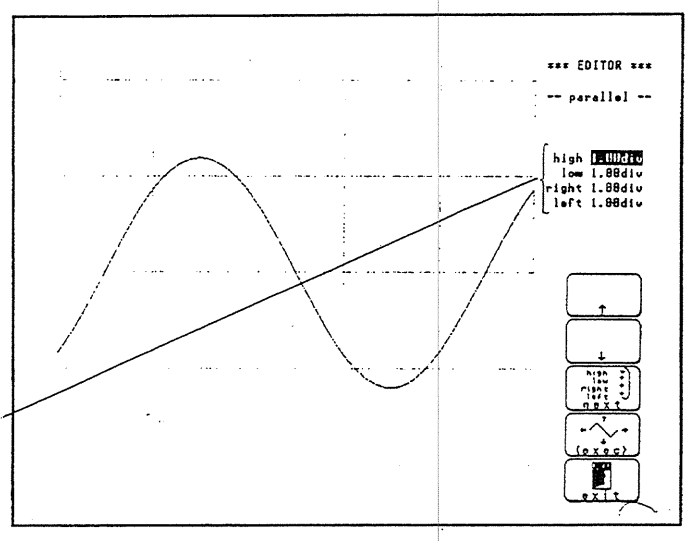
parallel: Spread out the display pattern by parallel movement

Press the function key F2 (paral) to enter the parallel mode.

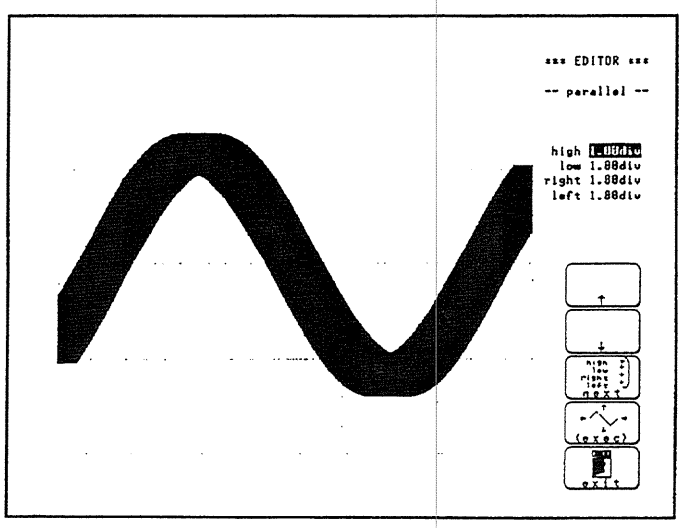
Example operation:

1. Set the amounts for the parallel spreading
   Set the numerical values using function keys F1 (↑) and F2 (↓).
   Move the cursor to the next value to change using function key F3 (next).

   The parallel movement amounts are indicated as follows



   high: amount of upward spreading
   low: amount of downward spreading
   right: amount of rightward spreading
   left: amount of leftward spreading
   (The amounts are variable in 0.05 division steps vertically and horizontally.)



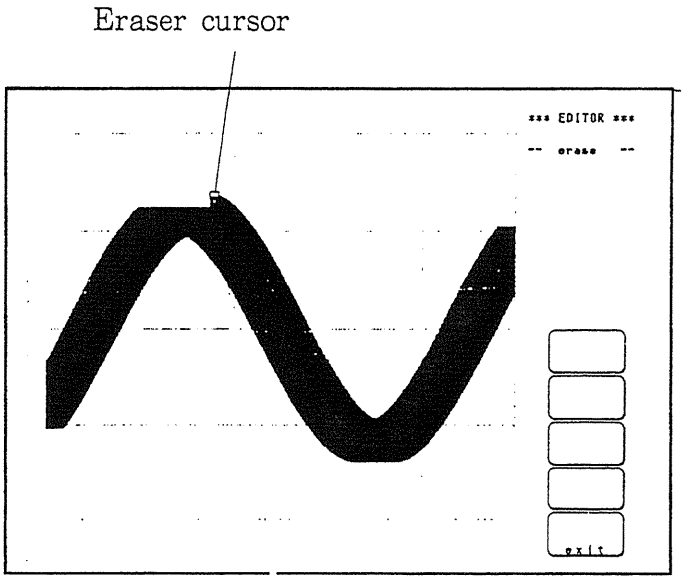
2. Press the function key F4 (exec) to perform the parallel spreading and set up the decision area.
3. Press the function key F5 (exit) to leave the parallel mode.

erase: This is the eraser function. Delete by moving the eraser cursor with the cursor keys.

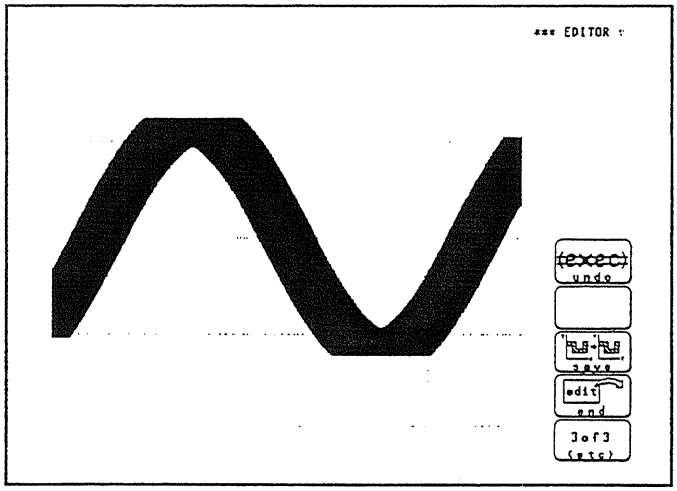
Press the function key F4 (erase) to enter the erase mode.

Example operation:

1. Using the cursor keys, move the pencil cursor to the initial point for erasure.
2. Press F1 (set), and the pencil cursor changes into the eraser cursor.
3. Move the eraser cursor by using the cursor keys, and delete the portions not required.



4. Press the function key F5 (exit) to leave the erase mode.

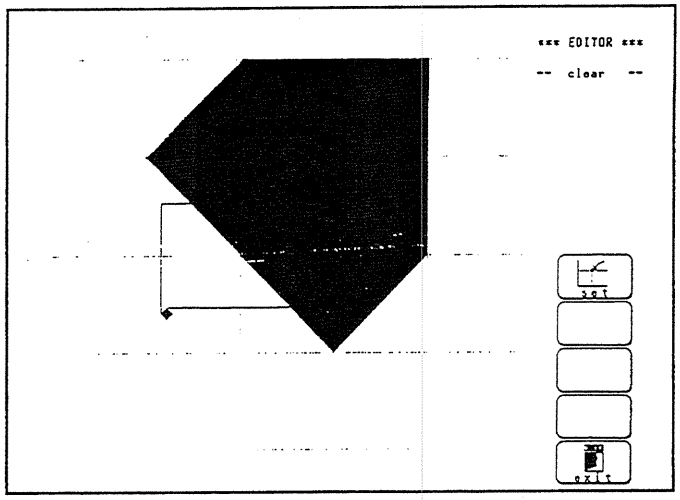


clear: Clear a rectangular area.

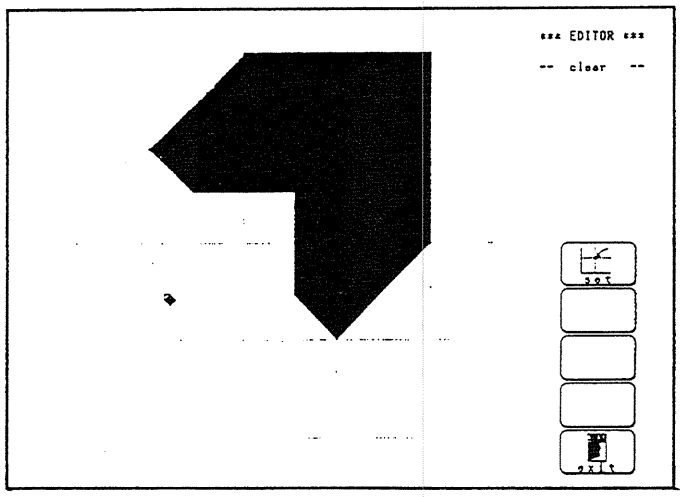
Press the function key F4 (clear) to enter the clear mode.

Example operation:

1. Using the cursor keys, move the pencil cursor to the point to be used as the initial point.
2. Press F1 (set) to set the initial point.
3. Move the pencil cursor by using the cursor keys. A rectangle will be drawn in dotted lines, following the movement of the pencil cursor, with the pencil cursor and the initial point as diagonally opposite corners.



4. Press F1 (set) to clear the area inside the rectangle.
5. Press the function key F5 (exit) to leave the clear mode.



all clear: Clear the entire screen display.

Press the function key F3 (all clr) to clear the entire screen display.

undo: Undo the previous operation.

This undoes the effect of any operation other than "save" and "end".

save: Save the decision area in memory.

end: Leave the editor, saving the decision area in memory if required.

After pressing function key F4 (end), select F3 (save) or F5 (nosave).

a. F4 (end), F3 (save) ... save the decision area in memory, then exit from the graphics editor. The decision area can then be used for waveform decisions.

b. F4 (end), F5 (nosave) ... exit from the graphics editor without saving the decision area in memory. The decision area is then lost.

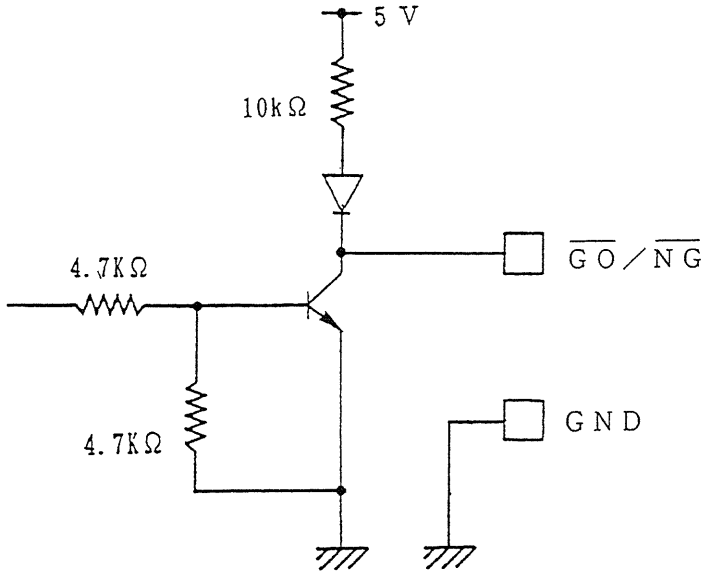
Note

If you exit the graphics editor immediately after starting it, or after a save command without any intervening commands, then pressing the end soft key exits immediately.

10-4 Using the Pass/Fail Decision Output

- Terminals on the rear panel provide an output of the waveform decision result. The signal between the GO and GND terminals is the GO (pass) output, and the signal between the NG and GND terminals is the NG (fail) output. The output circuits are as shown below.

Output circuit

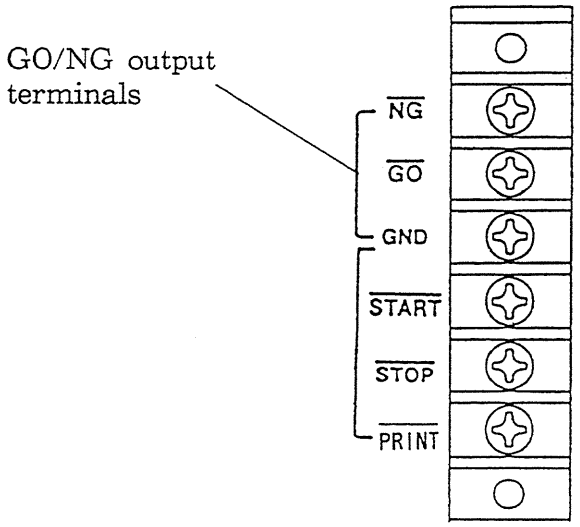


Open collector
with 5 V output,
active low

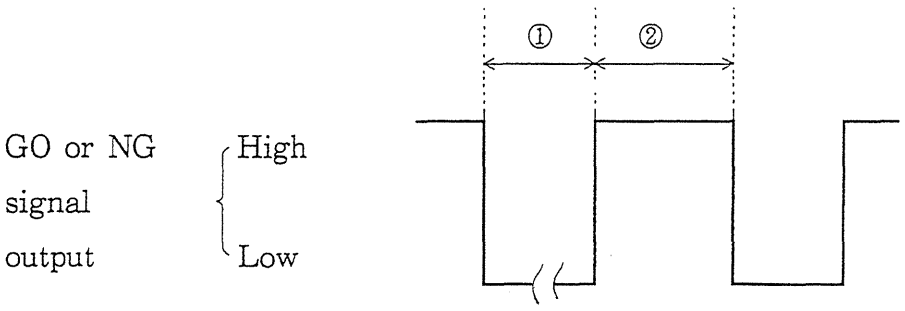
Input voltage range
-20 V to +30 V
Maximum input current
500 mA
Maximum input power
200 mW

Output terminals

Rear panel



● GO/NG output signals



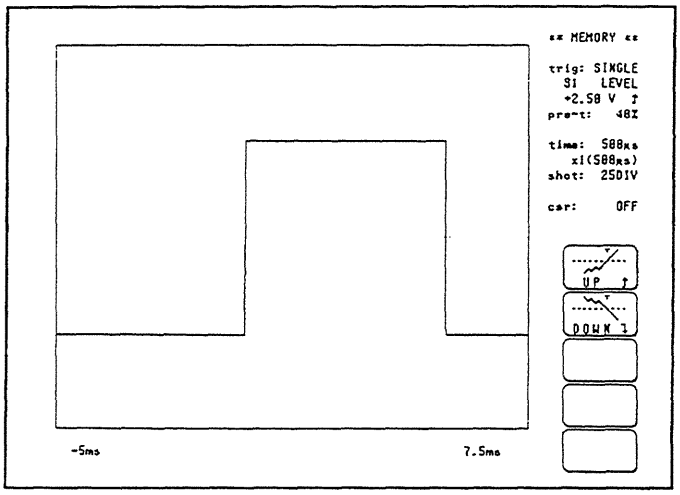
① Low signal output period (minimum about 110 ms)
In this time interval data sampling is performed and the waveform data is set up. The slower the time axis, and the longer the recording length, the longer this period. One or other of the $\overline{GO}$ and $\overline{NG}$ signals goes low.

② High signal output period (minimum about 25 ms)
The decision is made in this interval. Both the $\overline{GO}$ and $\overline{NG}$ outputs are high level.

10-5 Example Waveform Decision Settings

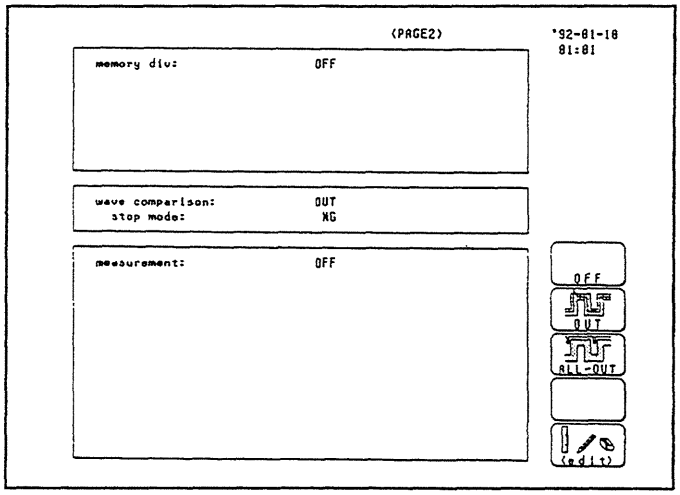
○ Rising and falling edges from a logic IC are input, and a decision area is derived from this output. This is used to test ICs for undershoot and overshoot waveform problems.

(1) First a reference waveform is captured. A trigger is used so that the same waveform is always drawn on the screen, then this is captured, and displayed in high intensity (DARK).

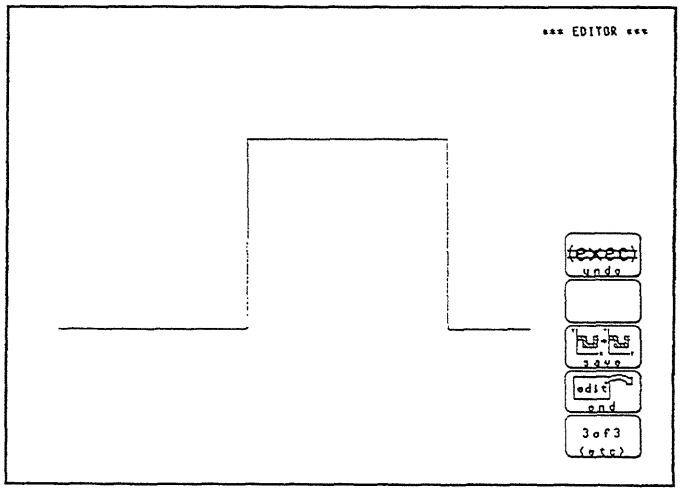


(2) Using this waveform as a reference, the area to be used for waveform decision will now be set up.

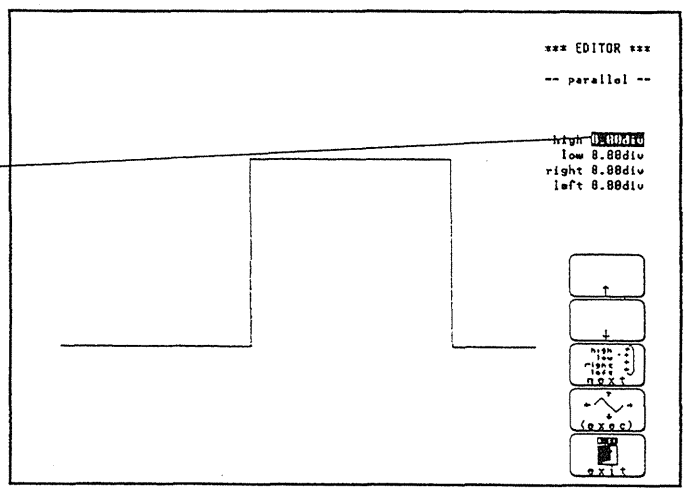
1. On page 2 of the "status" screen, set the "wave comparison" item so that stopping occurs if the waveform goes out of the decision area.
2. Press function key F5 (edit) to enter the graphics editor.



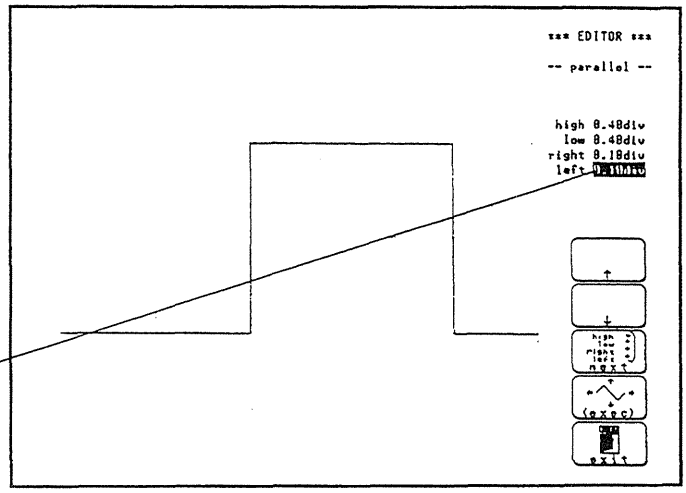
3. Press function key F1 (storage) to import the waveform into the editor and display it on the screen.



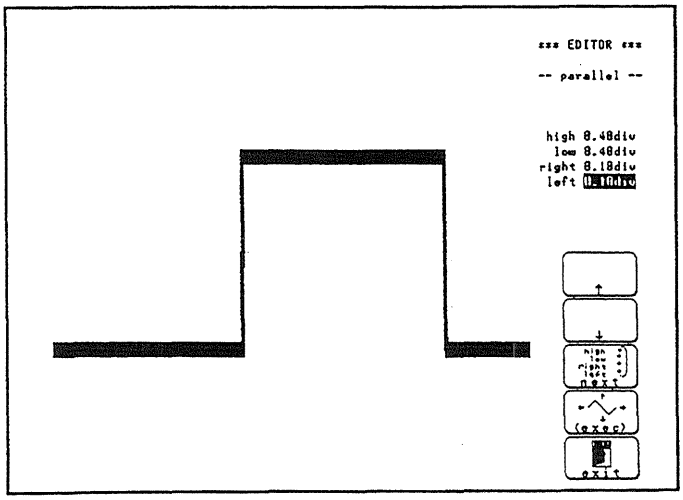
4. Press function key F2 (paral), for parallel spreading of the waveform.



5. Set the amounts of parallel spreading, using the function keys F1 (↑), F2 (↓), and F 3 (next).



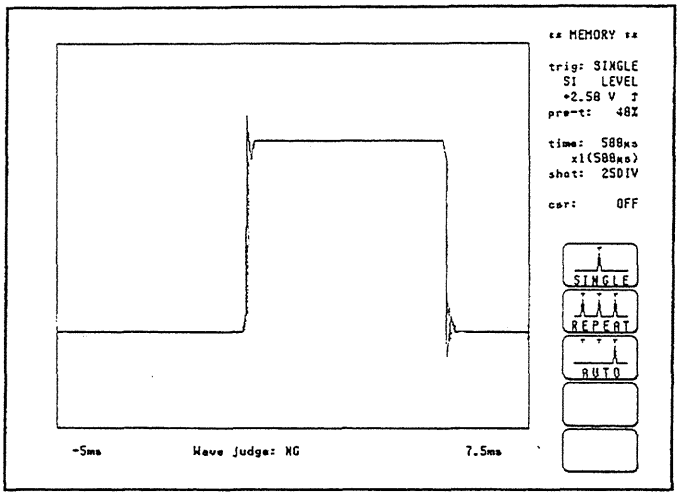
6. Press the function key F4 (exec) to carry out the spreading.
7. Press the function key F5 (exit) to leave the parallel mode.



8. Press F4 (end) and key F3 (save) in turn, to leave the editor and save the waveform decision area.

(3) In order to perform a series of waveform decision operations only once, set the trigger mode to SINGLE.

(4) Press the START key to initiate the waveform decision process.



Example waveform
when the decision is NG (fail).

Notes

The waveform decision function comprises two operations: ① capturing the data and ② making the decision. These are repeated alternately, and therefore during the decision making, no data is captured. Note therefore that this function cannot be used for continuous monitoring of the input signal. The time required to make the decision is approximately 25 to 30 ms. (This does not include the time to capture the data or the display time.)

The following table shows the approximate time for the decision cycle, when making a decision on approximately two cycles of a sine wave on the screen.

Number of channels for decision	Time axis	Recording length	Compression factor	Dot/line display	Decision cycle
1 Ch	500 µs	25 DIV	1/1	Dot	About 180 ms
2 Ch	500 µs	25 DIV	1/1	Line	About 200 ms
1 Ch	500 µs	500 DIV	1/20	Line	About 830 ms

Section 11

Calculation Functions

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11-1 Summary of Calculation Functions

Section 11 describes the following four types of calculation function.

1. Waveform processing calculation

   This is a calculation whose result is shown as a waveform.

   The following varieties are available:

   the four arithmetic operations, taking the absolute value, exponentiation, taking the common logarithm, taking the square root, taking the moving average, differentiation (once and twice), integration (once and twice), and parallel displacement along the time axis.

2. Waveform parameter calculation

   This is a calculation whose result appears as a numerical value.

   The following varieties are available:

   Maximum value, minimum value, time to maximum value, time to minimum value, peak to peak value, average value, effective value, area value, period, frequency, rise time, fall time, X-Y area.

3. Waveform parameter decision

   By comparing the result of a waveform parameter calculation with a previously set value, a GO/NG (pass/fail) decision is reached.

4. Averaging function

   This is a function which the averaging of the repeatedlly captured waveform data is shown as a waveform.

11-2 Waveform Processing Calculation

11-2-1 Summary

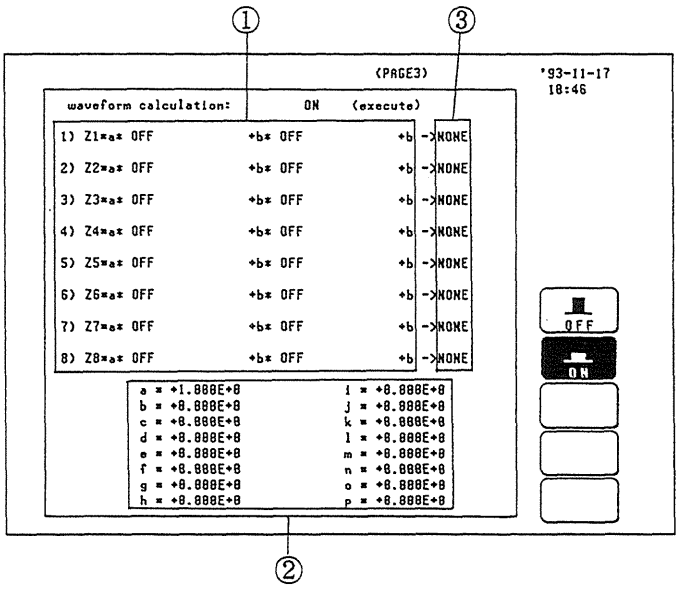
The following operations can be performed on measurement data: the four arithmetic operations (+, -, *, /), taking the absolute value (ABS), exponentiation (EXP), taking the common logarithm (LOG), taking the square root (SQR), taking the moving average (MOV), differentiation (once and twice - DIF and DIF2), integration (once and twice - INT and INT2), and parallel displacement along the time axis (SLI). The result of the calculation is shown as a waveform.
Further, the display scale in the vertical direction can be set either manually or automatically.

11-2-2 Method of Calculation

- The settings relating to the calculation functions are made on Page 3 of the "status" screen.
- From Page 1 of the "status" screen, press the STATUS key twice to get to Page 3. (This can also be done by pressing a cursor key and holding it down.)

Method (Screen for making this setting: the "status" screen, Page 3)

1. Press the function key F1 (ON) to turn wave calculation ON. The screen shown on the right appears.



2. ① Set the calculation equation. Altogether eight equations can be set, denoted by "Z 1" through "Z8".
   ② Set the constant values that will be used in the calculation equations. Altogether sixteen constant values can be set, denoted by "a" through "p".
   ③ Select which of the sixteen channels 1 through 16 should receive the calculated results from the equations Z1 through Z8. Also set the display scale in the vertical direction.
3. There are two ways to perform the calculation:
   - After selecting F1 (ON) in step 1, press the START key. After the waveform has been read in, the calculation will be performed and the result will be shown on the screen display.
   - If calculation is to be performed on data read in from a floppy disk or on measurement data that has already been read in, after pressing the function key F1 (ON) in step 1, move the flashing cursor to the right to the (execute) item, and press the function key F1 (exec). The result will be shown on the screen display.

Notes

- If using the memory segmentation, waveform calculation function are not available.
- If using the waveform processing calculation functions, the recording length is limited. (when memory capacity is 1 M word; up to 100 divisions, and when the 4 M word; up to 500 divisions)
- When setting the scaling, the waveform processing calculation is not influenced and calculation performs as voltage value.
- If scaling has been set on the channel number stored the result of the calculation, only the units are valid and the units conversion is possible.

Example: When the result of the calculation are stored in the channel 3.

● Logging

Channel of the calculated result

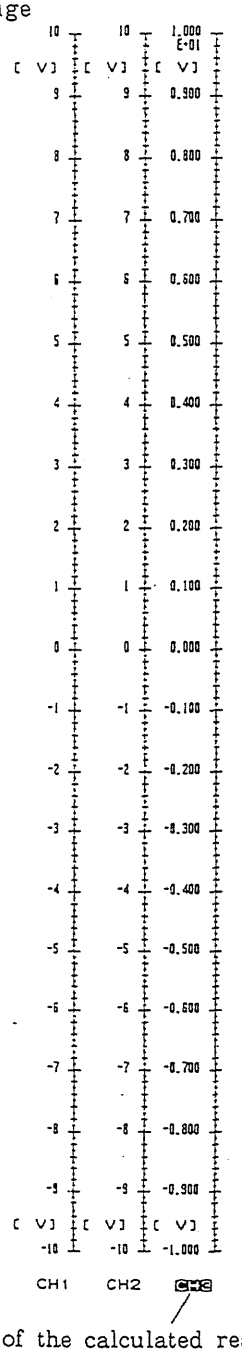
'92-02-04 09:15:21	CH1	CH2	CH3 [V]
0.000 s	-4.2625 V	0.0000 V	-4.2625E+00
+500.0μs	-3.2750 V	+1.9750 V	-3.2750E+00
+1.000ms	-1.9625 V	-125.00mV	-1.9625E+00
+1.500ms	-450.00mV	-1.9875 V	-4.5000E-01
+2.000ms	+1.1125 V	+112.50mV	+1.1125E+00
+2.500ms	+2.5625 V	+1.9625 V	+2.5625E+00
+3.000ms	+3.7750 V	-237.50mV	+3.7750E+00
+3.500ms	+4.6000 V	-1.9750 V	+4.6000E+00
+4.000ms	+4.9875 V	+225.00mV	+4.9875E+00
+4.500ms	+4.8875 V	+1.9375 V	+4.8875E+00
+5.000ms	+4.3125 V	-350.00mV	+4.3125E+00

● Waveform parameter calculation

Channel of the calculated result

'92-02-04 09:15:21	CH1	CH2	CH3 [V]
MIN	-4.937 V	-2.000 V	-4.937 V
MAX	+5.025 V	+1.987 V	+5.025 V
RMS	3.310 V	1.401 V	3.310 V
FREQ	100.4 Hz	505.0 Hz	100.4 Hz

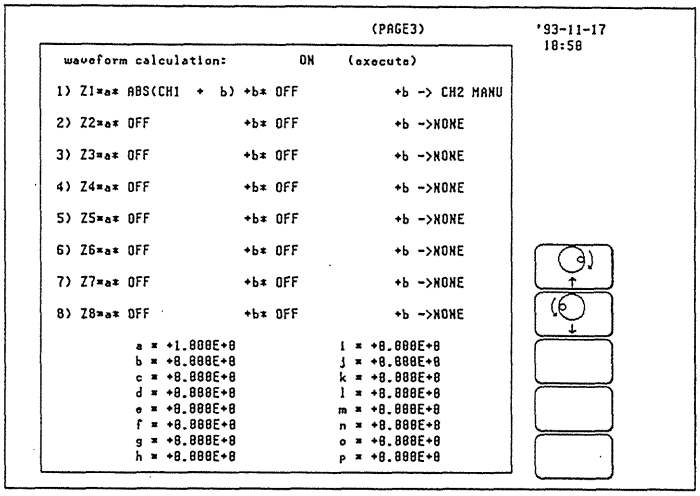
● Gauge



Channel of the calculated result

(1) Setting the calculation equations

Eight calculation equations can be set: Z1 through Z8.
Put the flashing cursor, in order, to the positions shown in the figure on the right by the numbers and make the settings according to the displays on the function keys.

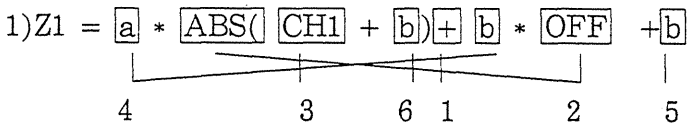


1. To select the four arithmetic functions:

Function key indication — Meaning

- : addition
- : subtraction
- : multiplication
- : division

} See Section 11-2-5 (1)



2. To set calculation functions other than the four arithmetic functions:
Three sets of function key displays can be cycled:

Set 1 of 3:

Function key indication — Meaning

- : Same meaning as the constant zero.
- : Use measurement data as it is.
- : Absolute value See Section 11-2-5 (2)
- : Exponentiation See Section 11-2-5 (3)
- : Change the function key definitions to Set 2 of 3.

Set 2 of 3:

Function key indication — Meaning

- : Common logarithm See Section 11-2-5 (4)
- : Square root See Section 11-2-5 (5)
- : Moving average See Section 11-2-5 (6)
- : Parallel displacement along the time axis See Section 11-2-5 (7)
- : Change the function key definitions to Set 3 of 3.

Set 3 of 3:

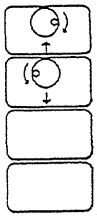
Function key indication — Meaning

- : Differentiate See Section 11-2-5 (8)
- : Integrate See Section 11-2-5 (9)
- : Differentiate twice See Section 11-2-5 (10)
- : Integrate twice See Section 11-2-5 (11)
- : Change the function key definitions to Set 1 of 3.

For detailed explanation of all the various types of calculation, refer to Section 11-2-5 "Details of the various calculations."

3. Set which channel will be used for supplying the measurement data.

Function key indication | Meaning



For Z1, channel 1 through channel 16.
For Z2, channel 1 through channel 16, and Z1.
For Z3, channel 1 through channel 16, and Z1 and Z2.
For Z4, channel 1 through channel 16, and Z1 through Z3.

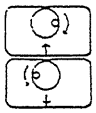
4. Set the coefficients.

5. Set an offset value for the results of the calculation.

6. Set an offset value for the measurement data. (If MOV or SLI was selected in Step 2, this is a number of points. See Step 7.)

The settings in Steps 4 through 6 are all done in an identical manner:

Function key indication | Meaning

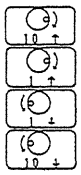


a, b, ... p
(For the setting of numerical values for a, b, ... p, refer to (2) "Setting the values of the constants".)

7. Setting the number of points for movement

If MOV (moving average) or SLI (parallel displacement) was selected in Step 2, set the number of points for movement.

Function key indication | Meaning | Number of points



For MOV (moving average) ··· from 1 to 4000

For SLI (parallel displacement) ··· from -4000 to 4000

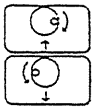
In Steps 4 through 6, a, b, ... p can be used as many times as required.

NB: The order of calculation is as follows: first X1 and Y1 are calculated and Z1 is calculated. Then Z1 through Z4 are calculated in order.

(2) Setting the values of the constants.

- Sixteen constants in total, a through p, can be set.
- Each can be set to any value within the range -9.999E+9 to +9.999E+9.
- Move the flashing cursor to each digit in turn, and, using the function keys F1 and F2 or the rotary knob, set its numerical value.

Function key indication | Meaning

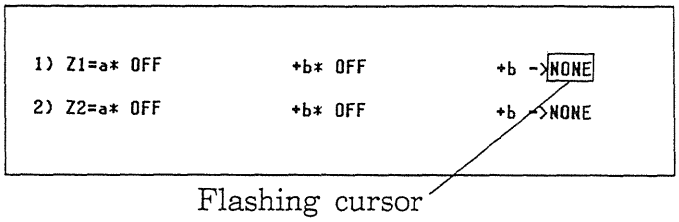


0 through 9
(for the last digit, the exponent portion, -9 to +9)

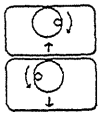
Frashing cursor
a = +0.000 E+0
Mantissa Exponent

(3) Select the channels to receive the results of the calculation.

- Set the channels in memory into which each of the calculation results obtained from the calculation equations Z1 to Z8 will be stored.
- Move the flashing cursor to the position shown in the figure on the right, and, using the function keys F1 and F2 or the rotary knob, make the settings.



Function key indication | Meaning



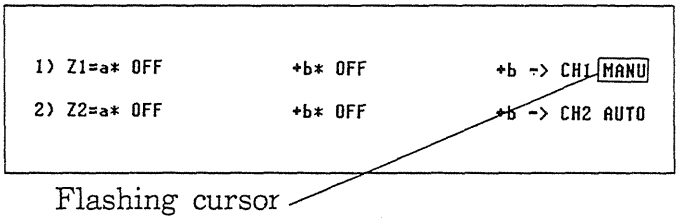
Channels 1 through 16, or NONE

For a calculation equation which is not used, set NONE (the calculation result is not recorded).

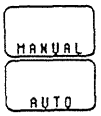
NB: If a channel which is used as a source during the course of a calculation equation and the channel in which the results of the calculation are stored are the same, after the calculation has been performed the source data is lost.

(4) Choosing the method for setting screen scaling

- This setting determines whether the screen scaling is done manually or automatically.
- Move the flashing cursor to the position shown in the figure on the right, and make the settings according to the displays on the function keys.



Function key indication | Meaning



: set the screen scaling manually (See (5)).
: set the screen scaling automatically.

If the function key F2 (AUTO) is selected, after the calculations have been performed, the upper limit value and the lower limit value will be determined automatically from the calculation results.

(5) Setting the screen vertical scaling

- If in Step 4 the function key F1 (MANUAL) is selected, the upper limit value and the lower limit value for display and recording of the calculated results can be set manually, using the variable display function on the CHAN screen (PAGE 2). For details, refer to Section 5-4-9 (7) "Variable display function".

(6) Displaying the units of the calculation result

Although these units are usually volts, when scaling is being performed the name of the units which have been set (up to 7 characters) is displayed. No scaling processing other than the unit naming is carried out.

For more details, refer to Section 12-4 "Scaling function."

NOTE

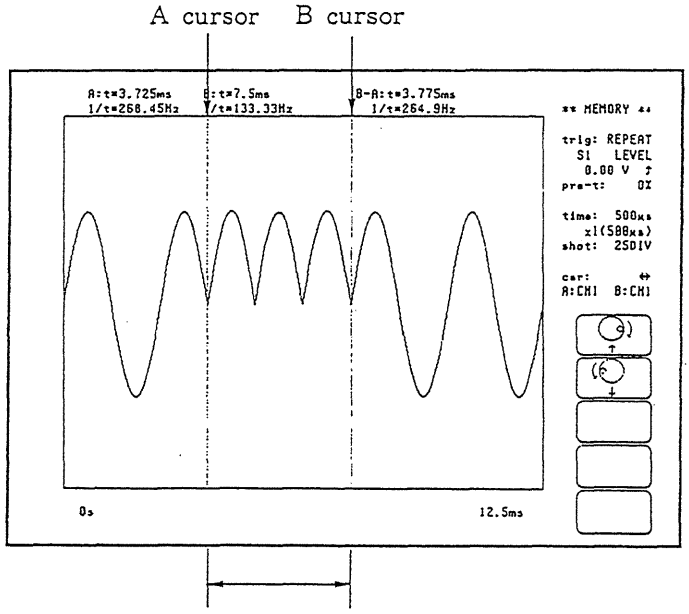
In (4) step when selecting F2 (AUTO), setting the calculated result as follows make the calculated waveform display easier in the eyes.

Format	Magnification ratio	Position
SINGLE, X-Ysing	×1	50%
DUAL, X-Yquad	×1/2	50%
QUAD, OCT, HEX	×1/4	50%

11-2-4 Waveform Calculation Positions

When the A and B cursors are not displayed, or if the horizontal cursors are being used, the calculation is performed for all the data.

Using the A and B cursors (vertical cursors or cross cursors), it is possible to designate the calculation position for the waveform: calculation will only be performed for the data between the A cursor and the B cursor.



Calculated waveform (absolute value)

Calculation is only performed for the waveform data in this interval.

(1) The four arithmetical operations (+, -, ×, /)

According to the operators set, the four arithmetical operations are performed.

(2) Absolute value (ABS)

The calculation equation is set up as follows:

$b_i = |d_i|$ $(i=0, 1, \ldots n)$

b_i = the ith data item of the result of the calculation

d_i = the ith data item of the source channel

(3) Exponential (EXP)

The calculation equation is set up as follows:

$b_i = exp(d_i)$ $(i=0, 1, \ldots n)$

b_i = the ith data item of the result of the calculation

d_i = the ith data item of the source channel

(4) Common logarithm (LOG)

The calculation equation is set up as follows:

when $d_i > 0$, $b_i = \log 10(d_i)$

when $d_i = 0$, $b_i = 0$

when $d_i < 0$, $b_i = \log 10 \mid d_i \mid$

$(i=0, 1, \ldots n)$

b_i = the ith data item of the result of the calculation

d_i = the ith data item of the source channel

Background

When calculation of the natural logarithm is required, because $\log_e X = \frac{\log_{10} X}{\log_{10} e}$, it can be done in the following manner:

$Z1 = aX1 + bY1 + c$ $\quad a = +2.303E+0 \left(\fallingdotseq \frac{1}{\log_{10} e}\right)$

$X1 = LOG(CH1 + d)$ $\quad b = +0.000E+0$

$Y1 = OFF$ $\quad c = +0.000E+0$

$d = +0.000E+0$

(5) Square root (SQR)

The calculation equation is set up as follows:

when $d_i \geqq 0$, $b_i = \sqrt{d_i}$

when $d_i < 0$, $b_i = \sqrt{|d_i|}$ $(i=0, 1, \ldots n)$

b_i = the ith data item of the result of the calculation

d_i = the ith data item of the source channel

(6) Moving average (MOV)

The calculation equation is set up as follows:

$$b_i = \frac{1}{k} \sum_{t=i-\frac{k}{2}}^{i+\frac{k}{2}} d_t \quad (i=0,\ 1,\ \ldots\ n)$$

b_i = the ith data item of the result of the calculation

d_t = the tth data item of the source channel

k = the number of points for averaging (1 to 4000)

(7) Parallel displacement along the time axis (SLI)

The number of points for displacement is specified, and then a displacement is performed along and parallel to the time axis.

The calculation equation is set up as follows:

$b_i = d_{i-k}$ $(i=0,\ 1,\ \ldots\ n)$

b_i = the ith data item of the result of the calculation

d_i = the ith data item of the source channel

k = number of points for displacement (- 4000 to 4000)

NB: For the part of the calculation result data, either at the start or the end, for which there is no source data in the source channel, a value of 0 V is supplied.

(8) Differentiation once (DIF)
(9) Integration once (INT)
(10) Differentiation twice (DIF2)
(11) Integration twice (INT2)

} Refer to the next page "Calculation equations for differentiation and integration".

Calculation equations for differentiation and integration:

① Differentiation:

The calculation of the first and second differential coefficients uses the fifth degree Lagrange interpolation formula, and the result for one data point is obtained from the five data points centered on the given data point.

Using d_0 to d_n to denote the data at sampling times t_0 to t_n, the values of the differential coefficients for these data points are calculated as follows:

Equations for calculating the first differential coefficient:

Point t_0 : $b_0 = \frac{1}{12h}[-25 \cdot d_0 + 48d_1 - 36d_2 + 16d_3 - 3d_4]$

Point t_1 : $b_1 = \frac{1}{12h}[-3d_0 - 10d_1 + 18d_2 - 6d_3 + d_4]$

Point t_2 : $b_2 = \frac{1}{12h}[d_0 - 8d_1 + 8d_3 - d_4]$

⋮

Point t_i : $b_i = \frac{1}{12h}[d_{i-2} - 8d_{i-1} + 8d_{i+1} - d_{i+2}]$

⋮

Point t_{n-2} : $b_{n-2} = \frac{1}{12h}[d_{n-4} - 8d_{n-3} + 8d_{n-1} - d_n]$

Point t_{n-1} : $b_{n-1} = \frac{1}{12h}[-d_{n-4} - 6d_{n-3} - 18d_{n-2} + 10d_{n-1} + 3d_n]$

Point t_n : $b_n = \frac{1}{12h}[3d_{n-4} - 16d_{n-3} + 36d_{n-2} - 48d_{n-1} + 25d_n]$

b_0 to b_n are the data values resulting from the calculation.

h is Δt ··· the sampling period (See Section 2-2 "Tables")

Equations for calculating the second differential coefficient:

Point t_0 : $b_0 = \frac{1}{12h^2}[35d_0 - 148d_1 + 114d_2 - 56d_3 + 11d_4]$

Point t_1 : $b_1 = \frac{1}{12h^2}[11d_0 - 20d_1 + 6d_2 + 4d_3 - d_4]$

Point t_2 : $b_2 = \frac{1}{12h^2}[-d_0 + 16d_1 - 30d_2 + 16d_3 - d_4]$

⋮

Point t_i : $b_i = \frac{1}{12h^2}[-d_{i-2} + 16d_{i-1} - 30d_i + 16_{i+1} - d_{i+2}]$

⋮

Point t_{n-2} : $b_{n-2} = \frac{1}{12h^2}[-d_{n-4} + 16d_{n-3} - 30d_{n-2} + 16d_{n-1} - d_n]$

Point t_{n-1} : $b_{n-1} = \frac{1}{12h^2}[-d_{n-4} + 4d_{n-3} + 6d_{n-2} - 20d_{n-1} + 11d_n]$

Point t_n : $b_n = \frac{1}{12h^2}[11d_{n-4} - 56d_{n-3} + 114d_{n-2} - 104d_{n-1} + 35d_n]$

② Integration:

The calculation of the first and second integrals is done using the trapezoidal formula.

Using d_0 to d_n to denote the data at sampling times t_0 to t_n, the values of the integrals for these data points are calculated as follows:

Equations for calculating the first integral:

Point t_0 : $I_0 = 0$

Point t_1 : $I_1 = \frac{1}{2}(d_0 + d_1)h$

Point t_2 : $I_2 = \frac{1}{2}(d_0 + d_1)h + \frac{1}{2}(d_1 + d_2)h = I_1 + \frac{1}{2}(d_1 + d_2)h$

⋮

Point t_n : $I_n = I_{n-1} + \frac{1}{2}(d_{n-1} + d_n)h$

I_0 to I_n are the data resulting from the calculation.

h is Δt ··· the sampling interval (See Section 2-2 "Tables.")

Equations for calculating the second integral:

Point t_0 : $II_0 = 0$

Point t_1 : $II_1 = \frac{1}{2}(I_0 + I_1)h$

Point t_2 : $II_2 = \frac{1}{2}(I_0 + I_1)h + \frac{1}{2}(I_1 + I_2)h = II_1 + \frac{1}{2}(I_1 + I_2)h$

⋮

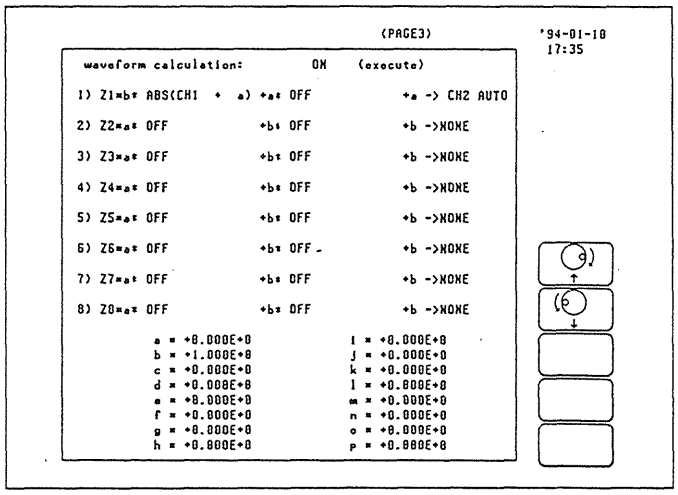
Point t_n : $II_n = II_{n-1} + \frac{1}{2}(I_{n-1} + I_n)h$

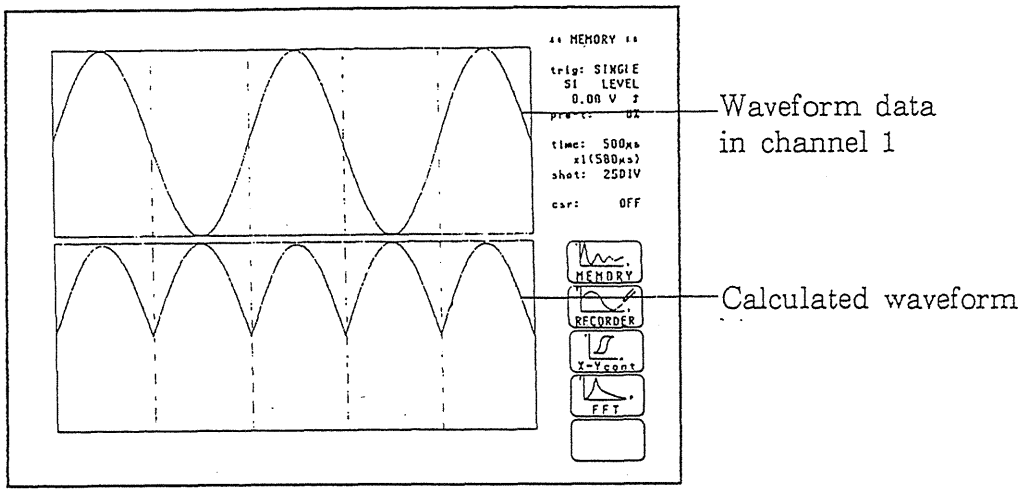
II_0 to II_n are the data values resulting from the calculation.

Calculation settings will be made for taking the absolute value of the channel 1 waveform data.

The calculated result Z1 will be stored in channel 2, and the display scaling will be done automatically.

The settings are as in the figure below.





(The above display is obtained when the format is set to DUAL, and when graph 1 is set to show the waveform data in channel 1 while graph 2 is set to show the calculation result Z1.)

11-3 Waveform Parameter Calculation and Decision

11-3-1 Summary

It is possible to perform calculation on sampled waveform data or on waveform data which is the result of waveform calculation processing, and this calculation can be of the following types: maximum value, time to maximum value, minimum value, time to minimum value, peak to peak value, average value, effective value, area value, period, frequency, rise time, fall time, X-Y area. The result of each of these types of calculation appears as a numerical value.

Further, by setting an upper limit value and a lower limit value, it is possible to perform a decision (waveform parameter decision) as to whether the result of one of these calculations falls in the specified range or not.

If the A and B cursors are not being used, the calculation is performed for all of the data. When the cursors are used, the calculation is performed for the data between the A cursor and the B cursor.

11-3-2 Method of Calculation

- The settings relating to the calculation functions are made on Page 2 of the "status" screen.
- From Page 1 of the "status" screen, press the STATUS key once to get to Page 2. (This can also be done by pressing a cursor key and holding it down.)

Method (Screen for making this setting: the "status" screen, Page 2)

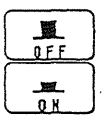
Put the flashing cursor, in order, to the positions shown in the figure on the right by the numbers and make the settings.

1. Enable the waveform parameter calculation function (measurement).

Press the function key F2 (ON). The screen shown on the right appears.

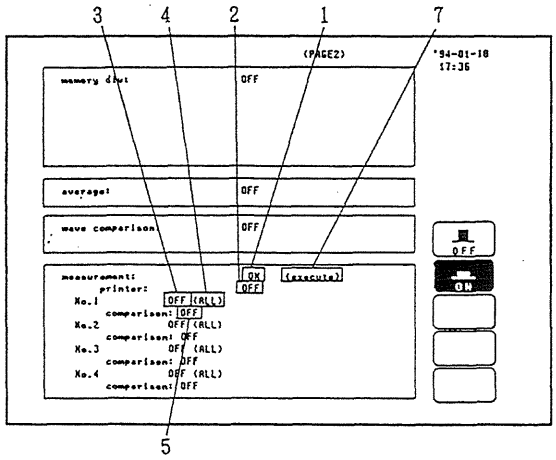
2. Set the printer (printer).

Function key indication — Meaning



: The calculated result is not printed.

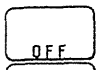
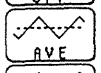
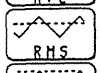
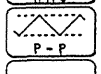
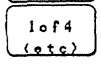
: When the calculation has been completed, the calculated result is printed.



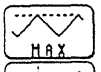
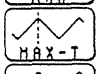
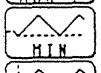
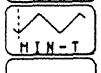
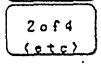
3. Setting the calculations.

Up to four calculations, numbered 1 through 4, can be set simultaneously.
They are selected according to the displays on the function keys.
Four sets of function key displays can be cycled:

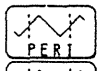
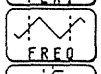
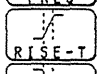
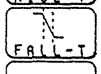
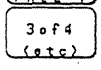
Set 1 of 4:

Function key indication	Meaning
	: No calculation is performed.
	: Average value See Section 11-3-5 (1)
	: Effective value See Section 11-3-5 (2)
	: Peak to peak value See Section 11-3-5 (3)
	: Change the function key definitions to Set 2 of 4.

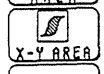
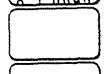
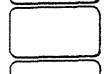
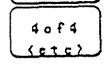
Set 2 of 4:

Function key indication	Meaning
	: Maximum value See Section 11-3-5 (4)
	: Time to maximum value See Section 11-3-5 (5)
	: Minimum value See Section 11-3-5 (6)
	: Time to minimum value See Section 11-3-5 (7)
	: Change the function key definitions to Set 3 of 4.

Set 3 of 4:

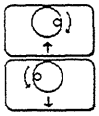
Function key indication	Meaning
	: Period See Section 11-3-5 (8)
	: Frequency See Section 11-3-5 (9)
	: Rise time See Section 11-3-5 (10)
	: Fall time See Section 11-3-5 (11)
	: Change the function key definitions to Set 4 of 4.

Set 4 of 4:

Function key indication	Meaning
	: Area value See Section 11-3-5 (12)
	: X-Y area value See Section 11-3-5 (13)
	
	
	: Change the function key definitions to Set 1 of 4.

For detailed explanation of all the various types of calculation, refer to Section 11-3-5 "Details of the Various Calculations."

4. Select the channel or channels for which calculation will be performed.

Function key indication	Meaning
	ALL, channel 1 through channel 16.

- If the setting "ALL" is made, calculation will not be performed for any channels for which display and recording are off.
- If "X-Y area" was selected in step 3, the setting is done differently. See the explanation in Section 11-3-5 (13).

5. Select whether or not waveform parameter decision will be performed (comparison).

Function key indication	Meaning
	: Decision will not be performed.
	: Decision will be performed.

6. For waveform parameter decision, set the upper limit value and the lower limit value.

This only appears if ON is selected in step 5.
For more details, refer to Section 11-3-3 "Waveform Parameter Decision."

7. There are two ways to perform the calculation:

- After selecting F2 (ON) in Step 1, press the START key. After the waveform has been read in, the calculation will be performed and the result will be shown on the screen display together with the display of the waveform.
  If in Step 2 the function key F2 (ON) was selected, then the result of the calculation will be printed.
- If calculation is to be performed on data loaded in from a floppy disk or on measurement data that have already been read in, in Step 1, after pressing the function key F1 (ON), move the flashing cursor to the right side of the screen to the (execute) item, and press the function key F1 (exec). The result will be shown on the screen display.
  If in Step 2 the function key F2 (ON) was selected, then the result of the calculation will be printed.

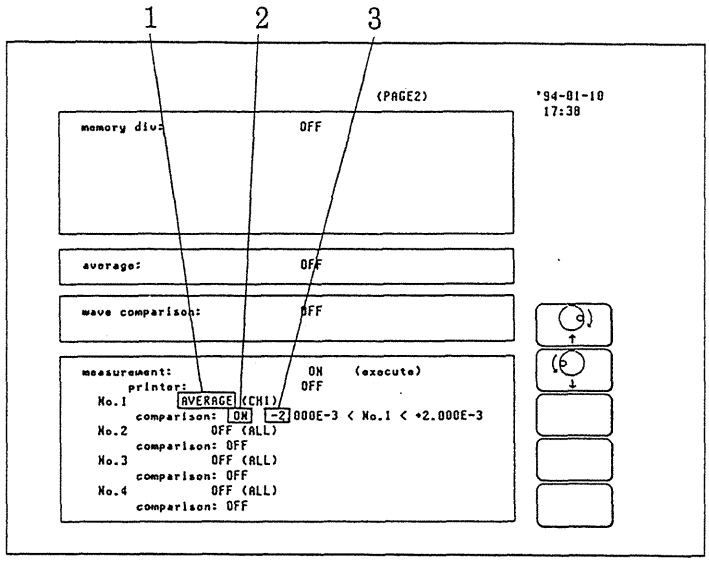
NOTE

- The calculations are performed in order from number 1 to number 4.
- Calculations can be performed for an input channel for which no input unit is installed, if waveform calculation results have been stored in it, or data has been loaded into it from a floppy disk.
- If a scaling factor has been set, it is effective.
  (RMS and Area calculations are carried out after scaling has been performed.)
- If "wave calculation" is on, waveform parameter calculation is also performed on the waveform, after the waveform processing calculation.

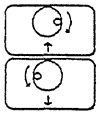
- An upper limit value and a lower limit value are set, and then a pass/fail (GO/NG) decision is made as to whether the result of a waveform parameter calculation falls in the specified range or not.
- For each of the waveform parameter calculations 1 to 4, a corresponding waveform parameter decision can be set.

Method (Screen for making this setting: the "status" screen, Page 2)

Using the cursor keys, move the flashing cursor as described below in order to the items designated by the numbers in the figure on the right, and perform the settings.



1. Set whether or not to perform waveform parameter calculation. (See Section 11-3-2 "Method of Calculation")
2. Set whether or not to perform a waveform parameter decision:
   Press the function key F2 (ON), and the upper limit value and the lower limit value will be displayed.
3. Set the upper limit value and the lower limit value:
   - These values can be set in the range -9.9999E+9 to +9.9999E+9.
   - Move the flashing cursor to each digit in turn, and, using the function keys F1 and F2 or the rotary knob, set its numerical value.

Function key indication	Meaning
	0 through 9 (for the last digit, the exponent, -9 to +9)

NB: If the lower limit is set to be greater than or equal to the upper limit, then the result of the decision will always be NG (fail).
If NG decision occurs, * mark is put on the calculated value of the channel considered as NG, and displayed on the upper display screen. Further when printing calculated result, * mark appears.

Stop mode

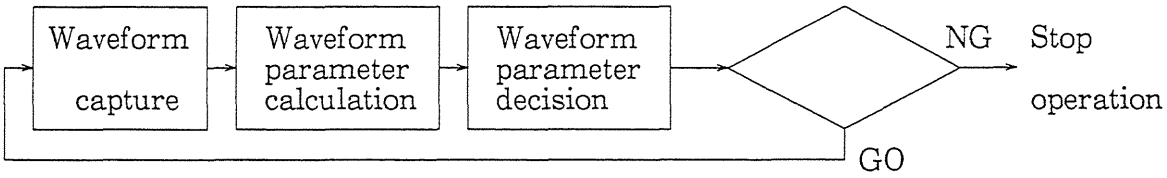
If, in the condition with waveform parameter calculation and decision set to ON, the START key is pressed so that measurement is started, if the result of the calculation does not lie between the upper limit value and the lower limit value, (so that the result of the waveform parameter decision is NG), then the 8825 stops operating.

When operation stops, the following procedures take place:

- If the auto print function is enabled (ON), when operation stops the waveform is printed.
- If the auto save function is enabled (ON), when operation stops the data is saved to the floppy disk.
- If the memory segmentation function (sequential save) is enabled (ON), data is recorded in the memory block only when operation is stopped.

Example:

If the trigger mode is SINGLE, the flow proceeds according to the following pattern:



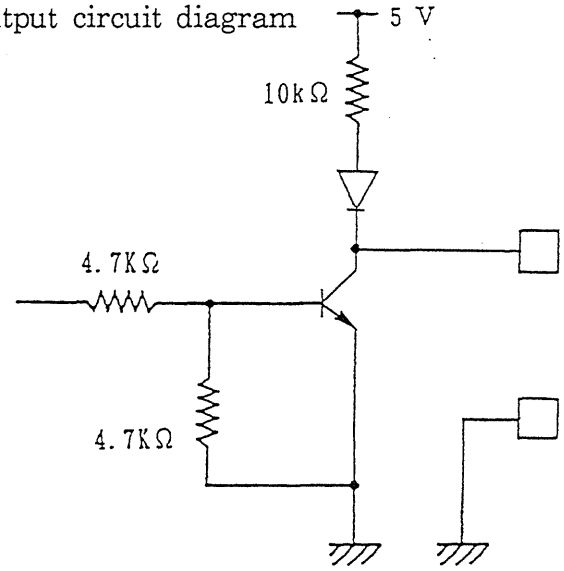
Note: If the trigger mode is REPEAT or AUTO, the above series of operations is repeated.

GO/NG (pass/fail) decision output

- The output of the results of waveform parameter decisions can be taken from the back panel of the 8825.

The GO (pass) decision output is provided between the GO and GND terminals, and the NG (fail) decision output is provided between the NG and GND terminals. The output circuits are as shown below.

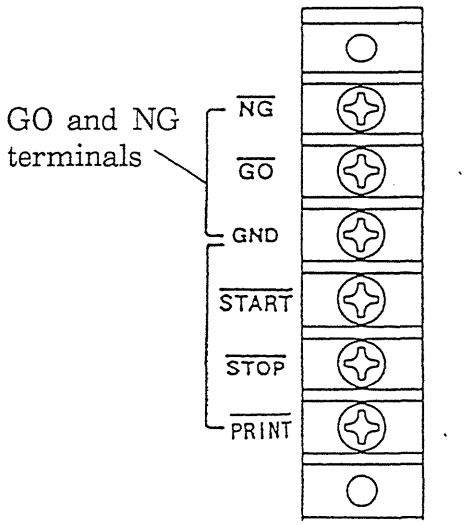
Output circuit diagram



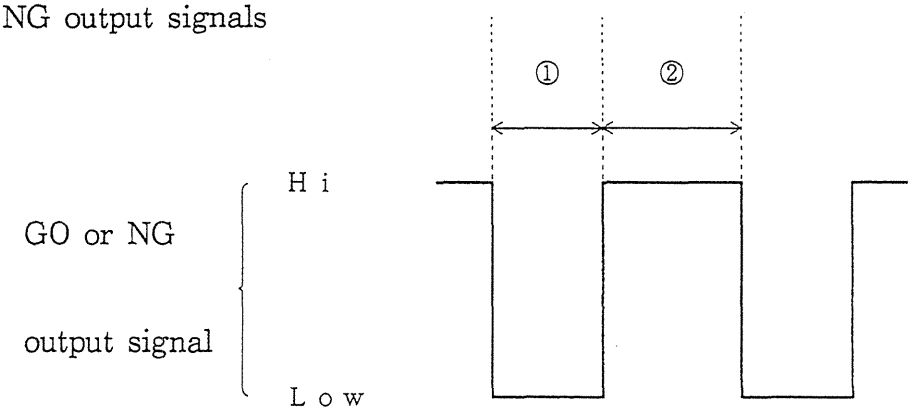
Open collector output
5 V voltage output, active low

Maximum input voltage:
-20 V to +30 V
Maximum input current:
500 mA
Maximum input power:
200 mW

Back panel



● GO and NG output signals



① Low level output period (For a GO decision, minimum about 14 ms; for a NG decision, minimum about 140 ms)
Low level output period (Pass dicision; Sequential save)
During this period data sampling takes place and the waveform data is created. The slower the time axis set, and the longer the recording time, the longer this time period becomes. Either the $\overline{GO}$ or the $\overline{NG}$ output, whichever is appropriate, goes low.

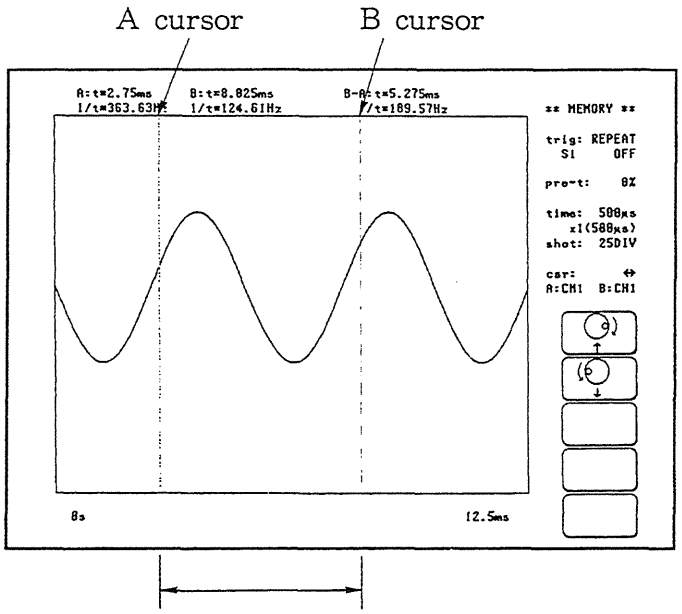
② High level output period (minimum about 100 ms)
The decision process takes place during this time period. Both the $\overline{GO}$ and the $\overline{NG}$ outputs are high at this time.
However, this decision time period may well become longer, depending upon the details of the calculations required.

Notes

- If several waveform parameter decisions are set, they are ANDed together; in other words, if any one of them results in a NG (fail) decision, operation stops.
- If the waveform decision function is enabled (ON), for stopping operation and for output the result of the waveform decision is given priority, and therefore the result of the waveform parameter decision is disregarded.
  For details of the waveform decision function, see Section 10.

If the A and B cursors are not being used, or if the horizontal cursors are being used, the calculation is performed for all of the data (for a recording length up to 200 DIV).

When the A and B cursors are being used as vertical or cross cursors, it is possible to designate the position for waveform calculation, and the calculations are only performed for the data between the A cursor and the B cursor.



Calculation is performed for the waveform data in this interval.

11-3-5 Details of the Various Calculations

(1) Average value

The average value (in volts) of the waveform data is shown.

The equation used for the calculation is as follows:

$$\text{Average value } \bar{d} = \frac{1}{n+1}\sum_{i=0}^{n} d_1$$

n ····· number of data samples

d_1 ····· the ith data value of the source channel

(2) Effective (RMS) value

The effective value (in volts) of the waveform data is shown.

The equation used for the calculation is as follows:

$$\text{Effective value } RMS = \sqrt{\frac{\sum_{i=0}^{n} d_i^2}{n+1}}$$

n ····· number of data samples

d_1 ····· the ith data value of the source channel

※If Scaling has been set, calculation will be executed after scaling the waveform data.

(3) Peak-to-peak value

The peak-to-peak value (the difference between the maximum value and the minimum value) of the waveform data is shown (in volts).

(4) Maximum value

The maximum value of the waveform data is shown (in volts).

(5) Time to maximum value

The time period from the moment that triggering occurred till the maximum value is attained is shown (in seconds).

If the points of maximum value are shown two or more, regard the first point of captured waveform data as the maximum value.

(6) Minimum value

The minimum value of the waveform data is shown (in volts).

(7) Time to minimum value

The time period from the moment that triggering occurred till the minimum value is attained is shown (in seconds).

If the points of minimum value are shown two or more, regard the first point of captured waveform data as the minimum value.

(8) Period

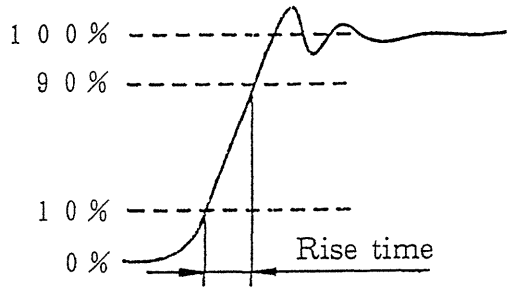
(9) Frequency

- These are, respectively, the period of the signal waveform (in seconds) and its frequency (in Hz).
- The midpoint of the amplitude of the signal waveform is found, and then the period or frequency, as appropriate, is calculated, based upon the time period from the instant that the signal first passes that level when rising or falling to the next instant that it again thus passes that level.

(10) Rise time

(11) Fall time

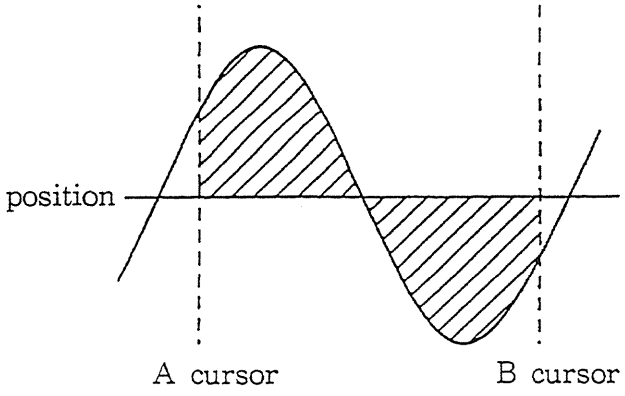
- The time (in seconds) is displayed which is taken by the signal waveform, either to rise from the 10% level to the 90% level, or to fall from the 90% level to the 10% level, respectively.



- The calculation is performed based upon the computed 0% and 100% values of the sampled waveform data.
- If the A and B cursors are not being used, then the time period taken by the very first occurring rising or falling edge of the entire sampled waveform data is displayed.
- If the A and B cursors are in use, then the time period taken by the first rising edge or falling edge that occurs in the portion of the sampled waveform data between them is displayed.

(12) Area value

- The value of the area from the origin position for the waveform (the point corresponding to 0 V) to the signal waveform is shown in volt-seconds.
- If the A and B cursors are in use, the area of the space bounded by the cursors (the hatched area in the figure) is displayed.



- The equation used for the calculation is as follows:

$$\text{Area value } A = \sum_{i=0}^{n} | d_i |$$

n ··· number of data samples

d_i ··· the ith data value of the source channel

NB: • Depending on the waveform, it can happen that no calculated result will be displayed for (8), (9), (10), and (11).

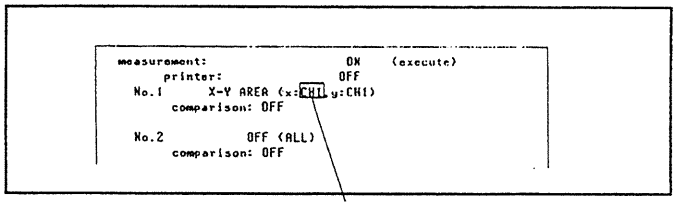
- If scaling has been set, calculation will be executed after scaling the waveform data. Further, the set units are used as the units of waveform values.

(13) X-Y area

- For an X-Y plot, this shows the value of the area enclosed (in volts-squared). (This does not depend upon the current format)
- Actually the X-Y waveform is defined by a line, and the area bounded by the line (including the area of the line) is calculated.
- For formats other than the X-Y format, if the A and B cursors (vertical cursors or cross cursors) are set, the X-Y plot is generated for the section of data between the two cursors (see Section 11-3-4), and its area is calculated.
- In the X-Y format, it is not possible to delimit an area between the A and B cursors.

Specifying the channels

Using the cursor keys, move the flashing cursor to the position as shown in the figure on the right, and set the X axis channel and the Y axis channel.

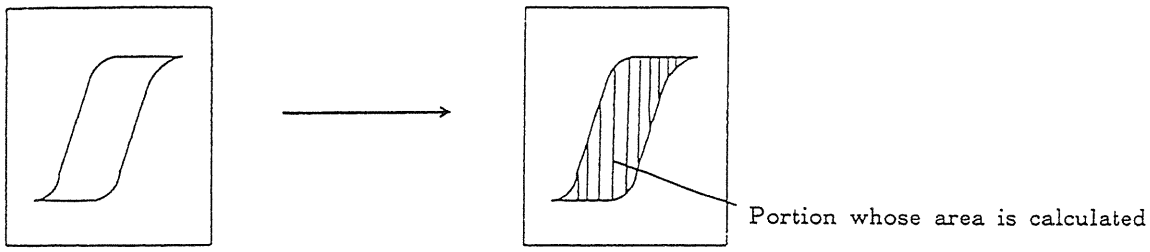


Flashing cursor

The settings can be made by using the function keys F1 and F2 or the rotary knob.

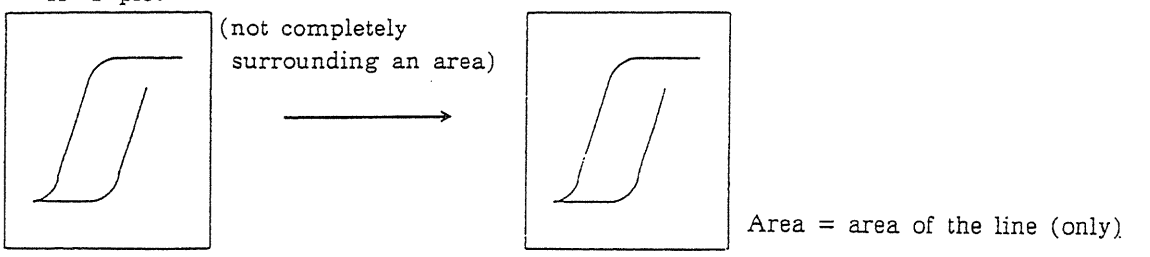
* Portion for which calculation is performed

X-Y plot

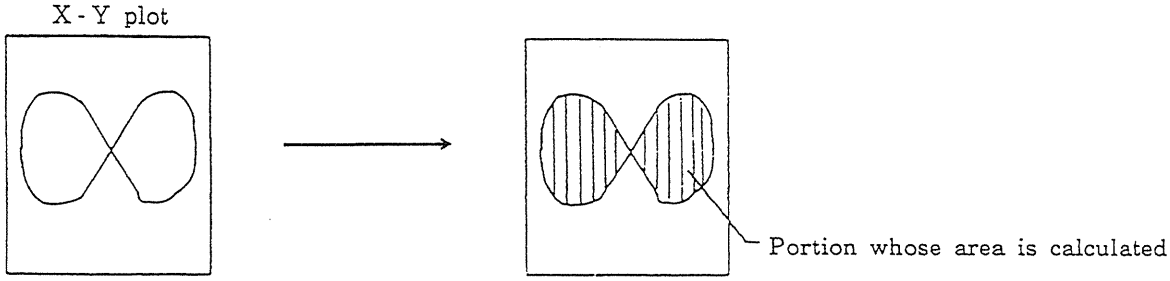


X-Y plot

(not completely surrounding an area)



X-Y plot



11-3-6 Example of Settings

In order to perform four different types of calculation for the waveform data in channel 1, the settings are as in the figures below.

● Settings

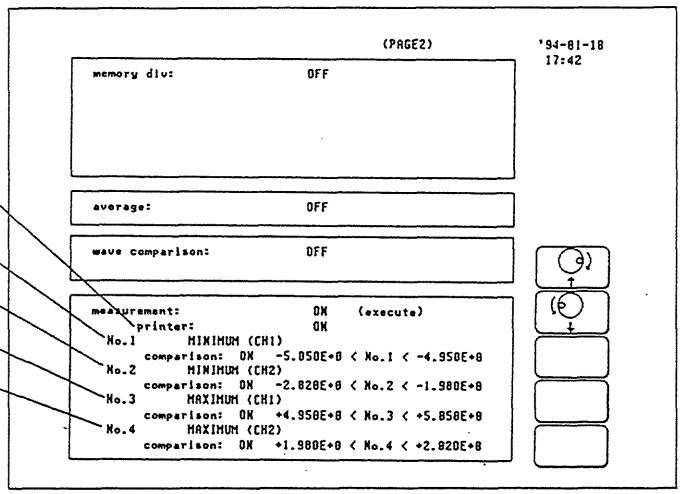
Print if the calculation and the calculated result

Calculation and decision of the minimum value in channel 1.

Calculation and decision of the minimum value in channel 2.

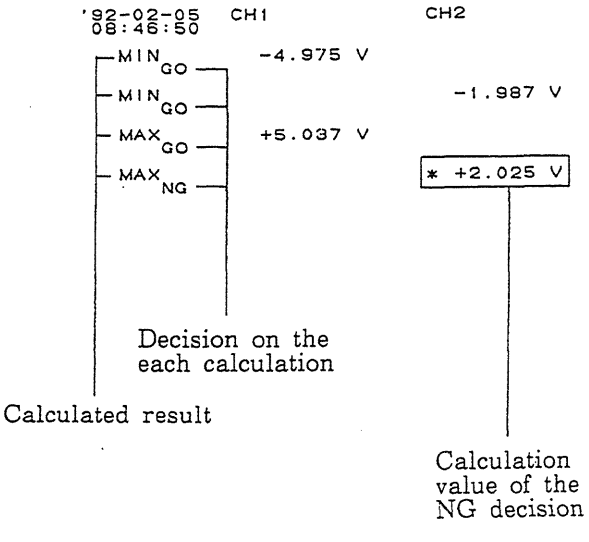
Calculation and decision of the maximum value in channel 1.

Calculation and decision of the maximum value in channel 1.

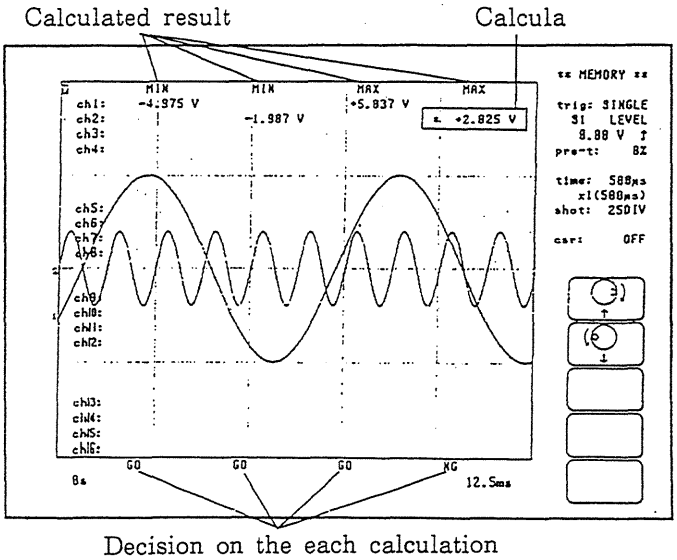


● Calculation and the calculated result

・Recording paper



・Display screen

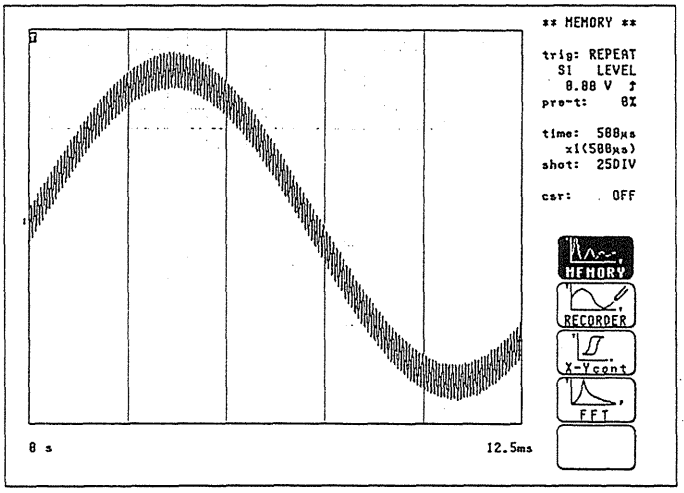


11-4 Averaging Function

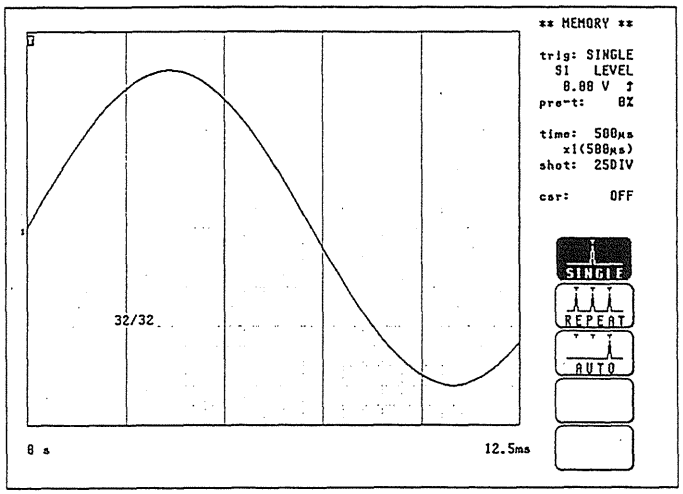
11-4-1 Outline of the averaging function

- Setting the memory recorder storage mode to averaging provides a sliding average value for the waveform.
- This enables noise components to be removed, and the underlying signal observed.
- The larger this value, the move the waveform is smoothed, and the more noise components are removed.

Waveform with noise components



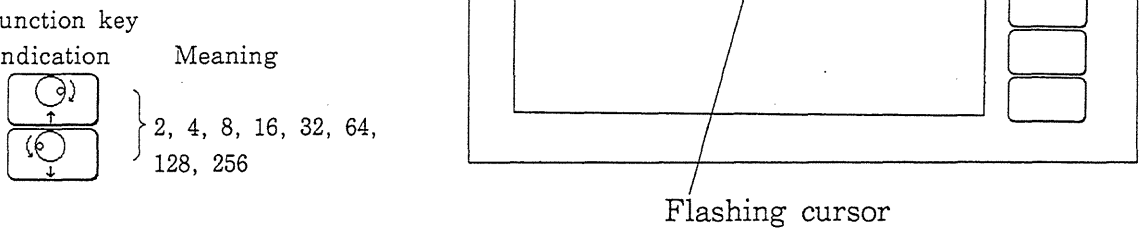
Averaging waveform



11-4-2 Setting Avaraging Function

Method (Screens for making this setting: the STATUS (PAGE 2) screens)

1. Using the keys, move the flashing cursor to the "average" item.
2. Select the number of times for averaging according to the displays on the function keys or the rotary knob.



Flashing cursor

Function key indication

Meaning: 2, 4, 8, 16, 32, 64, 128, 256

3. Press the START key to begin measurement.

- After starting, the specified number of times for averaging and the number of times of captured waveform data at that time are displayed on the screen.

Notes

- The averaging does not apply to logic channels, which simply show the last captured value.
- When using the memory segmentation function, the averaging function cannot be used.
- When the averaging function is enabled, no waveform processing computations are carried out as data is captured.
- For an averaged waveform after data capture it is possible to carry out waveform computations by manual operation.

Reference

① Averaging and the trigger mode

When the trigger mode is SINGLE:

1. After the START key is pressed, once the trigger conditions hold, data is captured.
2. After the specified number of samples have been captured measurement automatically stops.
3. If the STOP key is pressed to abandon measurement, the data captured up to the point of abandonment is subjected to averaging, and the waveform is displayed.

When the trigger mode is REPEAT:

1. After the START key is pressed, once the trigger conditions hold, data is captured, and after the specified number of samples have been captured, averaging is applied to the data, and the waveform is displayed to the screen.
2. Each time a data sample is captured, a sliding average is calculated, and the display waveform is rewritten.

When the trigger mode is AUTO:

- After the START key is pressed, even if the trigger conditions do not hold, once a certain time interval has elapsed. It is therefore possible to apply averaging to signals which are not synchronized, yielding meaningless data.

② Sliding averaging

- Additive averaging

The averaging method comprises two slightly different algorithms, that for the initial samples, which is a simple averaging method, and that for the continuing samples which is a true sliding average.

The simple averaging method gives the mean value of the values captured:

$$A_n = [(n-1)A_{n-1} + Z_n]/\ n$$

n : number of samples
A_n : n th average value
Z_n : n th measurement value

- Exponential averaging

The sliding average method is used once the number of captures samples exceeds the averaging length. This gives the greatest weighting to the latest samples, and progressively reduces the weightings for the previous samples. The value is determined by the following expression:

$$A_n = [(N-1)A_{n-1} + Z_n]/\ N$$

N : Specified averaging length
n : number of samples captured
A_n : n th average value
Z_n : n th measurement value

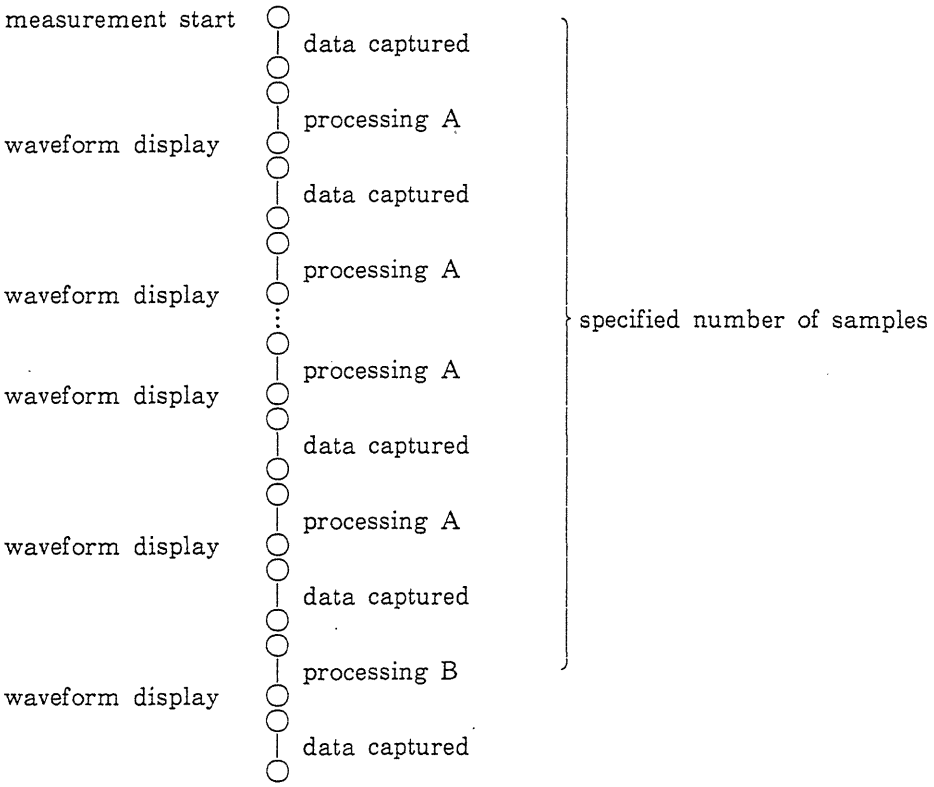
③ Upper limit on recording length

- In the averaging mode, the upper limit on recording length is different according to using channels.
- Limit on recording length

Using channels / Memory capcity	2 channels	4 channels	8 channels	16 channels
1 M word	1000	500	200	100
4 M word	5000	2000	1000	500

④ Times taken for averaging processing

- Depending on the number of using channels, the product of the time axis range and the shot length, and the specified averaging length, following time vary.
  (1) The time from starting measurement until the specified number of samples has been captured and waveform displayed.
  (2) If the trigger mode is REPEAT, the required after the specified number of samples is initially captured to rewrite the waveform display for each new data sample.



Time of captured data ≒ Recording length × time axis range (TIME/DIVE)
Time of processing A ≒ 2.0 ms × recording length (DIV) × number of channels (additive averaging)
Time of processing B ≒ 1.5 ms × recording length (DIV) × number of channels (exponential averaging)

Section 12

"System" Screen

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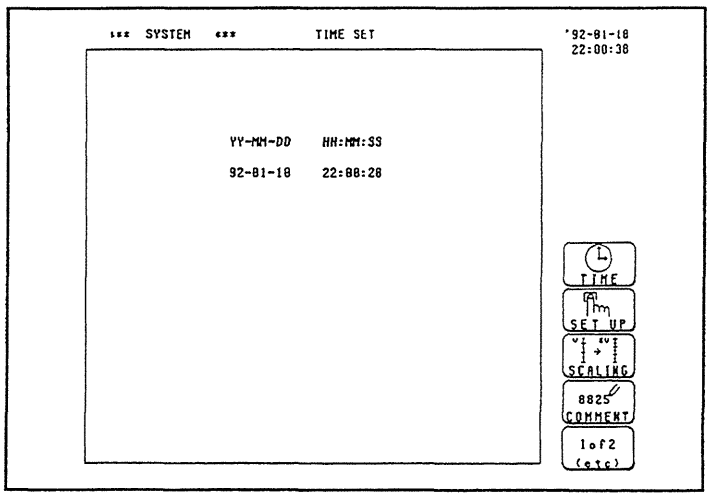
12-1 What is the "System" Screen?

In any function mode, pressing the SYSTEM key causes the "system" screen to be displayed.

On the "system" screen, functions are available for setting the clock, setting the scaling, appending comments, setting the special functions, making settings related to the GP-IB interface, and making settings related to monitoring the input levels and to the self check function. Apart from the special function settings, the settings are common to all function modes.

The item to be set is selected according to the function key displays on the "system" screen, and a "setting" screen will be displayed.



"system" screen

Function key displays on the "system" screen

Set 1 of 2:

Function key indication	Meaning
INITIALIZE	: Set the clock (See Section 12-2)
SET UP	: Set special functions (See Section 12-3)
SCALING	: Set the scaling (See Section 12-4)
8825 COMMENT	: Append a comment (See Section 12-5)
1 of 2 (etc)	: Change the function key definitions to Set 2 of 2.

Set 2 of 2:

Function key indication	Meaning
SELF CHECK	: Self check (See Section 12-6)
INTERFACE	: GP-IB interface settings (See Section 12-7)
MONITOR	: Input level monitor (See Section 12-8)
2 of 2 (etc)	: Change the function key definitions to Set 1 of 2.

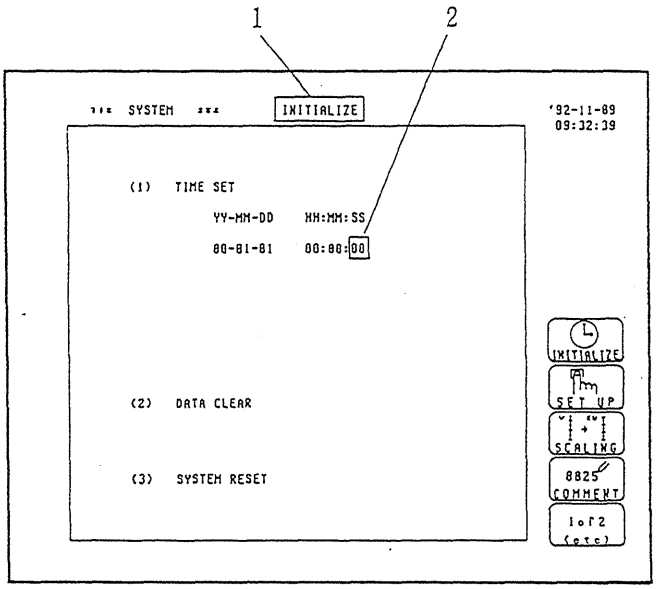
12-2 Initialization

- Setting the clock (TIME SET), clearing waveform data (DATA CLAER), and initialization of setting item (SYSTEM RESET) are available.

Method (Screen for making this setting: the "system" screen (INITIALIZE))

- Using the cursor keys, move the flashing cursor in order to the position shown in the figure on the right by the reference numbers, and make the settings.

1. Press the function key F1 (INITIALIZE).
2. Move the flashing cursor to the setting item. According to the displays on the function keys, make the setting.



For the detail on each functions, refer to section 12-2-1 to 12-2-3.

12-2-1 Setting the Clock

- The 8825 real time clock includes a calender with automatic leap year discrimination, and a twenty-four hour clock.
- The current date and time are shown on the "status" screen and on the "channel" screen to the nearest minute, and additionally the "system"screen shows the seconds setting.
- This clock is used for the time trigger function.
- The clock is also used for indicating the data capture start time in a printed listing of waveform information.

Method (Screen for making this setting: the "system" screen (INITIALIZE))

1. Using the cursor keys, move the flashing cursor to the "TIME SET"item.
2. Set the data and the time. The format is YY-MM-DD HH:MM:SS.

Function key indication | Meaning

With these keys the numerical values of year, month, day, hour, minute, and second can be set by cycling them upward and downward.

: When this key is pressed, the time and date settings just established are canceled and are reset to the current time and date as shown on the upper right corner of the display screen.

: At the instant this key is pressed, the clock/calendar is reset to and starts to run from the set date and time.

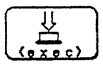
12-2-2 Clearing Waveform Data

• Clear waveform data.

Method (Screen for making this setting: the "system" screen (INITIALIZE))

1. Using the cursor keys, move the flashing cursor to the "DATA CLEAR"(2) item.
2. Press the function key F1 (exec) and clearing data will be performed.

Function key indication | Meaning



: Clear the waveform data.

Note

• When using the memory segmentation function, data in all block are cleared.

12-2-3 System Reset

• Pressing the stop key, make all settings revert to the factory settings in the function same as powering on.

Method (Screen for making this setting: the "system" screen (INITIALIZE))

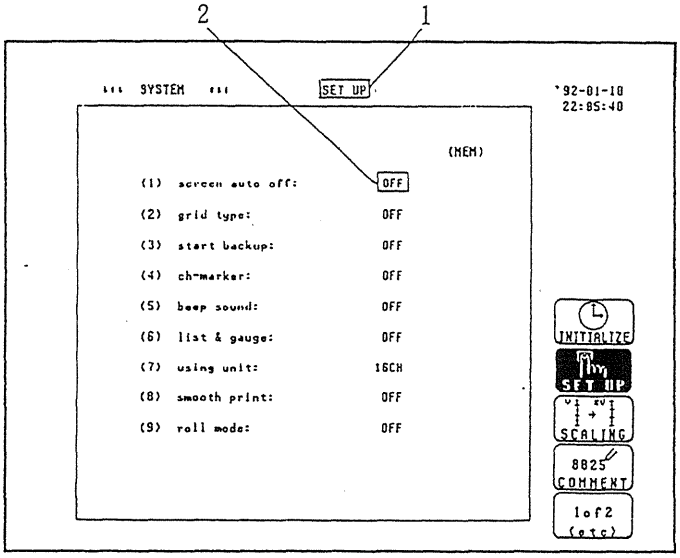
1. Using the cursor keys, move the flashing cursor to the "SYSTEM RESET"(3) item.
2. Press the function key F1 (exec) and the system reset will be performed.

12-3 Special Function Settings

The following special functions are available: the screen auto off or screen saver function, grid type selection, the start key backup function, channel marker function, setting the beep sound, listing and gauge functions, setting the time value display (time axis), channel selection (using unit), the smooth print function, and roll mode setting.

Method (Screen for making this setting: the "system" screen, (SET UP))

- Using the cursor keys, move the flashing cursor in order, to the positions shown in the figure on the right by the reference numbers, and make the settings.



1. Press the function key F2 (set up).
2. Move the flashing cursor to each item to be set in turn, and make the setting according to the function key displays.

For details relating to each of the functions, refer to Sections 12-3-1 to 12-3-9, which follow.

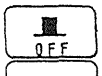
12-3-1 Screen Saver Function

- When this function is enabled, if for a continuous period of ten minutes no operation key is pressed, the display is automatically switched off. Pressing any key turns the display on again.
- Eliminating unnecessary display operation prolongs the operational life of the display.

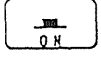
Method (Screen for making this setting: the "system" screen, (SET UP))

1. Using the cursor keys, move the flashing cursor to (1) "screen auto off".
2. Make the selection according to the function key displays.

Function key indication — Meaning



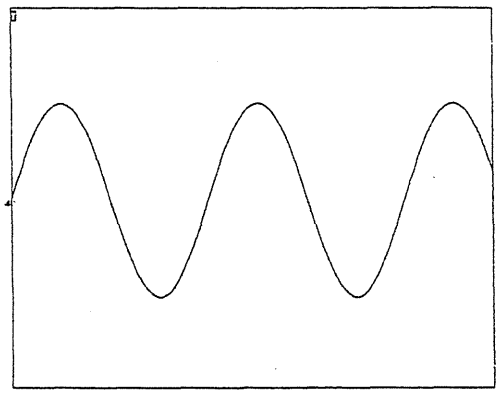
: Function disabled. The screen always stays on.



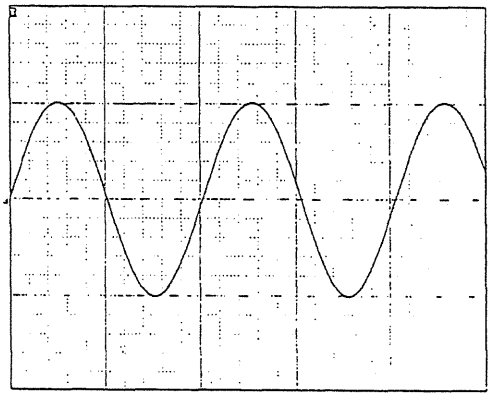
: The screen goes off automatically after 10 minutes.

- The grid shown on the display screen or printed recordings can be enabled or disabled.
- Further, on printed recordings, is possible to select the type of grid.
- There are four settings: OFF, NORMAL, FINE(cm) and FINE(DIV). However, when either of the FINE settings is selected, the display screen still shows the NORMAL grid.

○ The "display" screen

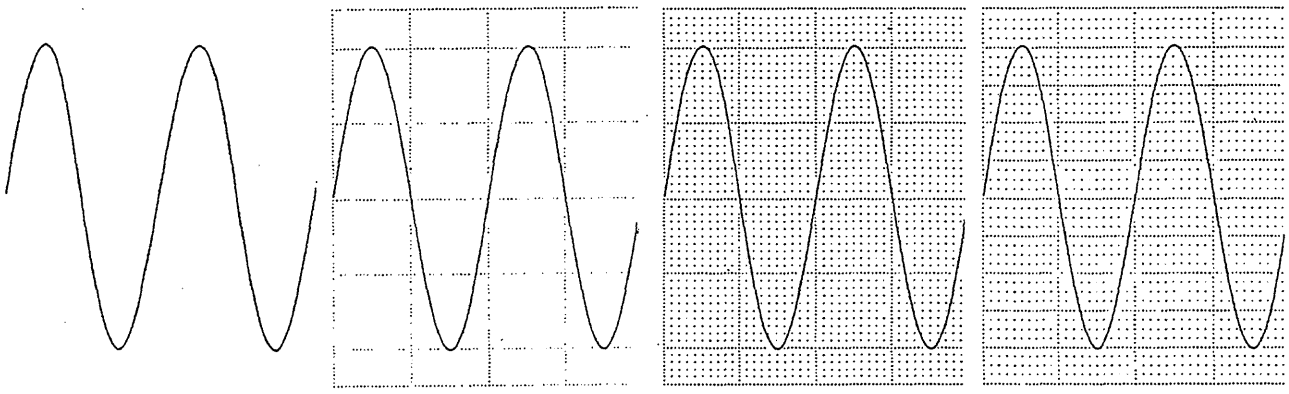


grid: OFF



grid: NORMAL or FINE

○ Printed recordings (in QUAD format)



grid: OFF grid: NORMAL grid: FINE(cm) grid: FINE(DIV)

Method (Screen for making this setting: the "system" screen (SET UP))

1. Using the cursor keys, move the flashing cursor to (2) "grid type".
2. Make the selection according to the function key displays.

Function key indication	Meaning
OFF	: OFF
NORMAL	: NORMAL
FINE(cm)	: Grid with 1 cm spacing (printed recording only)
FINE(DIV)	: Grid with full scale divided into 10 divisions (printed recording only)

Note

The FINE(DIV) setting is only effective in QUAD, OCT or HEX format. In SINGLE or DUAL format it is the same as FINE(cm).

12-3-3 Start Key Backup Function

If the power supply fails during recording operation (while the LED above the START key is illuminated), and then the power supply is restored, so that the 8825 goes back to the start condition, then, if "start key backup" is set to ON, recording starts immediately. If triggering is set, then startup is in the waiting-for-trigger state.

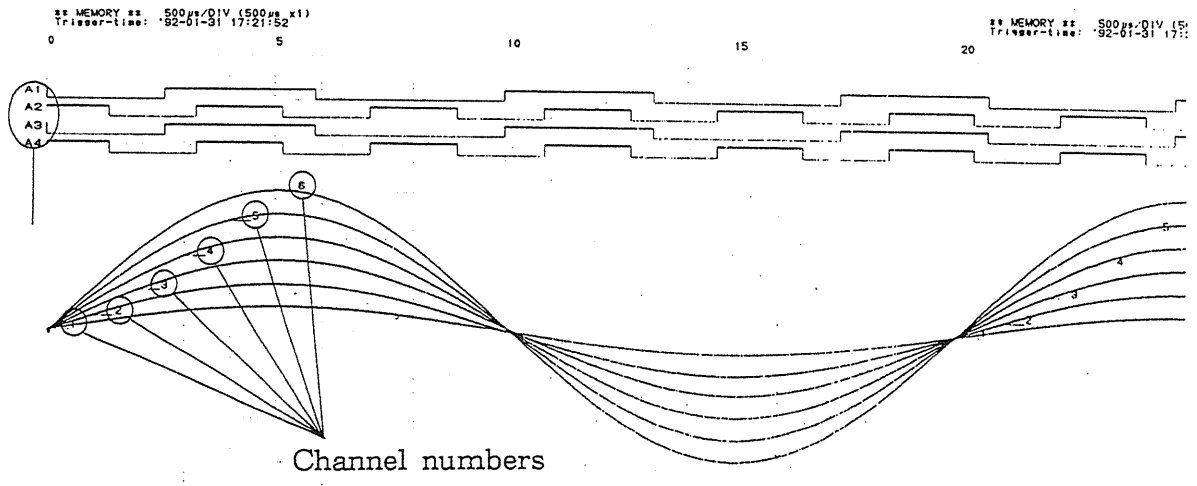
Method (Screen for making this setting: the "system" screen (SET UP))

1. Using the cursor keys, move the flashing cursor to (3) "start backup".
2. Make the selection according to the function key displays.

Function key indication	Meaning
OFF	: Start key backup is not enabled.
ON	: Start key backup is enabled.

12-3-4 Channel Marker Function

If the channel marker function is enabled, then the channels are identified by number on the printed recording.



Channel numbers

NB: The channel numbers are not printed when in X-Y format in the memory recorder function mode, or in the X-Y recorder function mode.

Method (Screen for making this setting: the "system" screen (SET UP))

1. Using the cursor keys, move the flashing cursor to (4) "ch-marker".
2. Make the selection according to the function key displays.

Function key indication	Meaning
OFF	: Channel numbers will not be printed.
ON	: Channel numbers will be printed.

12-3-5 Setting the Beep Sound

- If the "beep sound" is set to ON, then when an error occurs or a warning is made, or when waveform decision results in an NG (fail) verdict, the speaker produces a beep sound.

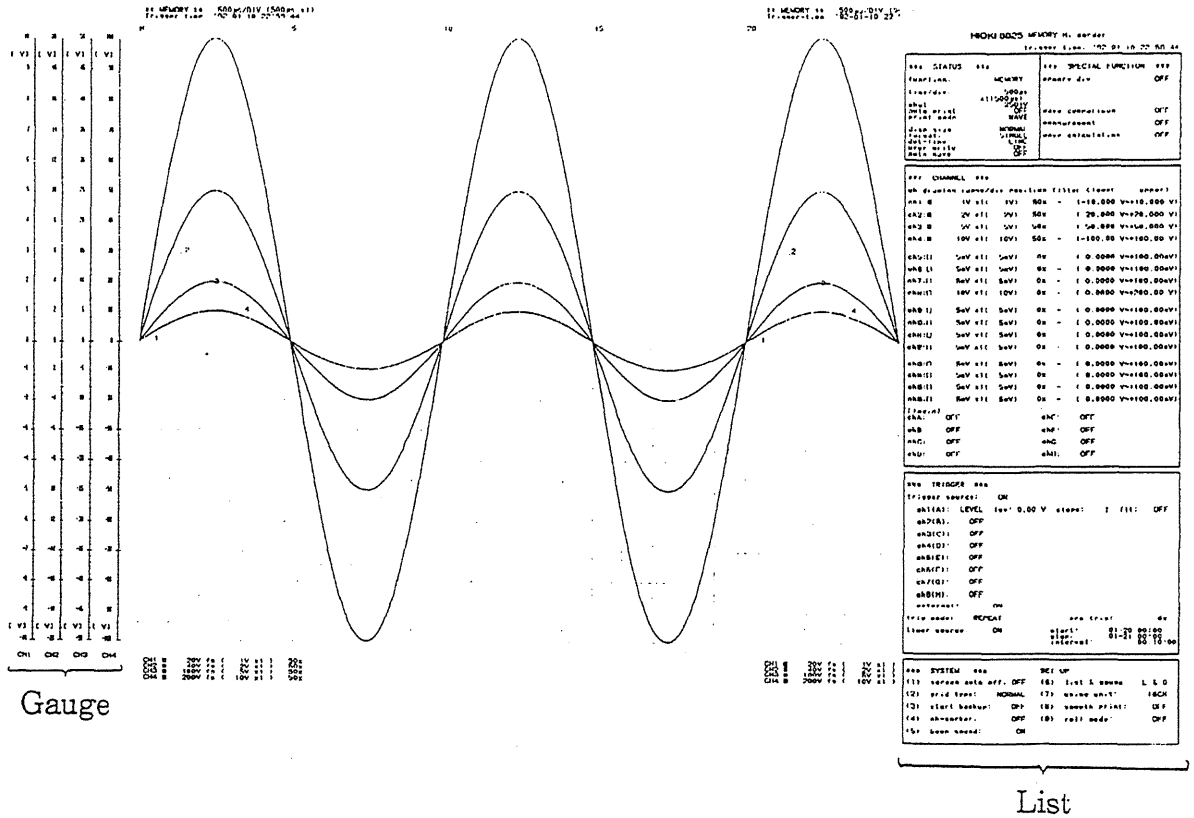
Method (Screen for making this setting: the "system" screen (SET UP))

1. Using the cursor keys, move the flashing cursor to (5) "beep sound".
2. Make the selection according to the function key displays.

Function key indication	Meaning
OFF	: The "beep" sound will not be produced.
ON	: The "beep" sound will be produced.

12-3-6 Listing and Gauge Functions

When a waveform is printed out (except for screen dumps), gauges showing the voltage axis scales can be printed at the beginning, and a listing of settings and other information can be printed at the end.



Method (Screen for making this setting: the "system" screen (SET UP))

1. Using the cursor keys, move the flashing cursor to (6) "list&gauge".
2. Make the selection according to the function key displays.

Function key indication	Meaning
	: No gauges or listing.
	: Print listing only.
	: Print gauges only.
	: Print both gauges and listing.

NB: Gauges are printed only for the channels for which the waveform is being drawn.

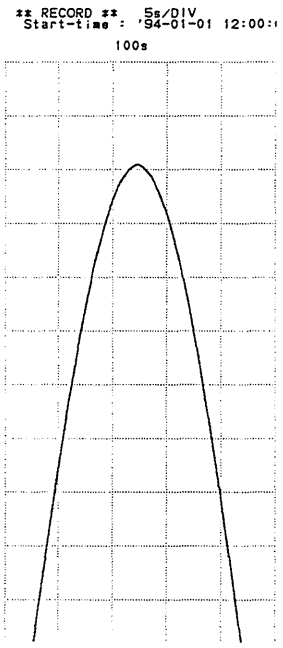
12-3-7 Setting the time value display (time axis)

- It is possible to set the time value for printing out in the recording paper or number of divisions.

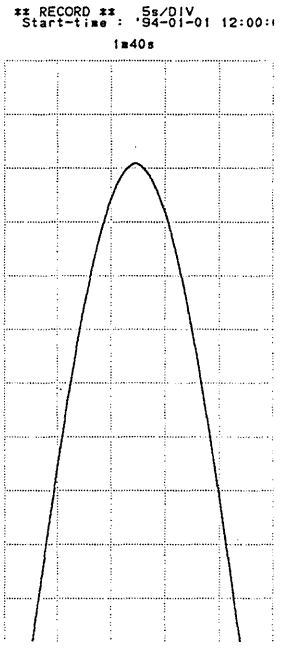
Method

1. Using the cursor keys, move the flashing cursor to (7) "time axis".
2. Making the selection according to the function key displays.

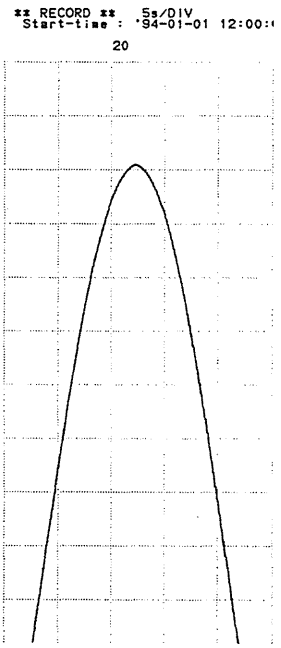
Function key indication	Meaning
	: display the time from the trigger point (unit: fixed)
	: display the time from the trigger point (unit: base 60)
	: display the number of DIV from trigger point



TIME display (unit: fixed)



TIME display (base 60)



DIV display

12-3-8 Channel Selection (using unit)

- This function is available in the memory recorder function mode and in the recorder function mode.
- The memory for measurement data can be divided among 2, 4, or 8 channels, or can be divided up among all of the 16 channels.

Memory capacity

16 channels		8 channels		4 channels		2 channels	
Analog CH1 + logic CHA	Analog CH2 + logic CHB	Analog CH1 + logic CHA	Analog CH2 + logic CHB	Analog CH1 + logic CHA	Analog CH2 + logic CHB	Analog CH1 + logic CHA	Analog CH2 + logic CHB
Analog CH3 + logic CHC	Analog CH4 + logic CHD	Analog CH3 + logic CHC	Analog CH4 + logic CHD	Analog CH3 + logic CHC	Analog CH4 + logic CHD		
Analog CH5 + logic CHE	Analog CH6 + logic CHF	Analog CH7 + logic CHG	Analog CH8 + logic CHH				
Analog CH7 + logic CHG	Analog CH8 + logic CHH						
Analog CH9	Analog CH10						
Analog CH15	Analog CH16						

- Maximum recording length that can be set

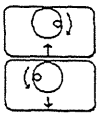
Memory used capacity \ Number of channels	16	8	4	2
1M words	500 DIV	1000 DIV	2000 DIV	5000 DIV
4M words	2000 DIV	5000 DIV	10000 DIV	20000 DIV

(The memory capacity, 1M words or 4M words, is specified when the 8825 is ordered.)

Method (Screen for making this setting: the "system" screen (SET UP))

1. Using the cursor keys, move the flashing cursor to (7) "using unit".
2. Select the number of channels to be used with the function keys F1 and F2 or the rotary knob.

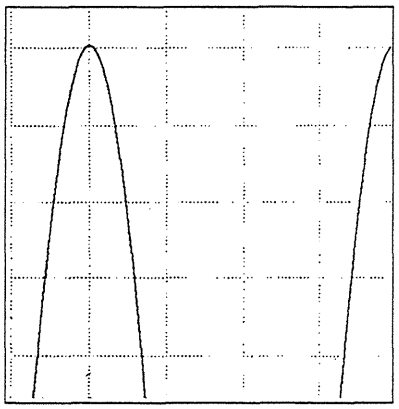
Function key indication — Meaning



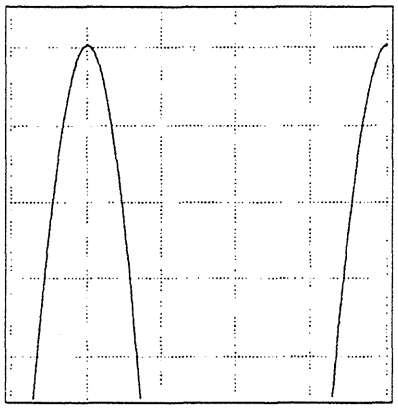
} 2, 4, 8, 16 channels

12-3-9 Smooth Print Function

- This function is only available in the memory recorder function mode.
- With the smooth print function enabled (ON), smooth printing of quality close to that of an analog waveform is available at a time axis density of 200 dots/ division. However, the chart printing speed will only be 1/2 of the normal speed.



OFF



ON

Method (Screen for making this setting: the "system" screen (SET UP))

1. Using the cursor keys, move the flashing cursor to (8) "smooth print".
2. Make the selection according to the function key displays.

Function key indication	Meaning
OFF	: Smooth printing will not be performed.
ON	: Smooth printing will be performed.

12-3-10 Setting the Roll Mode

- This function is only available in the memory recorder function mode.
- After the start of measurement, because usually (with roll mode disabled - OFF) display of the waveform is only performed after one shot length of data has been completely sampled, during low speed sampling it takes a long time from triggering to the initial display of the waveform.
- If roll mode is enabled (ON), after triggering it is possible to start waveform display simultaneously with sampling the waveform. (Scrolling is performed just as during operation in the recorder function mode.)

Method (Screen for making this setting: the "system" screen (SET UP))

1. Using the cursor keys, move the flashing cursor to (9) "roll mode".
2. Make the selection according to the function key displays.

Function key indication	Meaning
OFF	: Off
ON	: On

12-4 Scaling Function

- There are two types of method of scaling. Select your useful method.
- Method 1 (RATIO): By setting an external physical amount to correspond to a one volt input signal (eu/v), the offset (offset), and the name of the units used (eu), a measurement value which has been obtained as a voltage can be converted into a value in the external units.
- Method 2 (POINT): By setting the voltage values of two points of the input signal (volt up, low), conversion values (sc up, low) of the two points, and the external units name (eu), a measurement value which has been obtained as a voltage value can be converted into a value in the external units.
- The scaled values appear on the gauge scales, as range values (the upper and lower limit values along the vertical axis), and as the value of V obtained using the A and B cursors.
- Scaling can be performed for each channel independently.

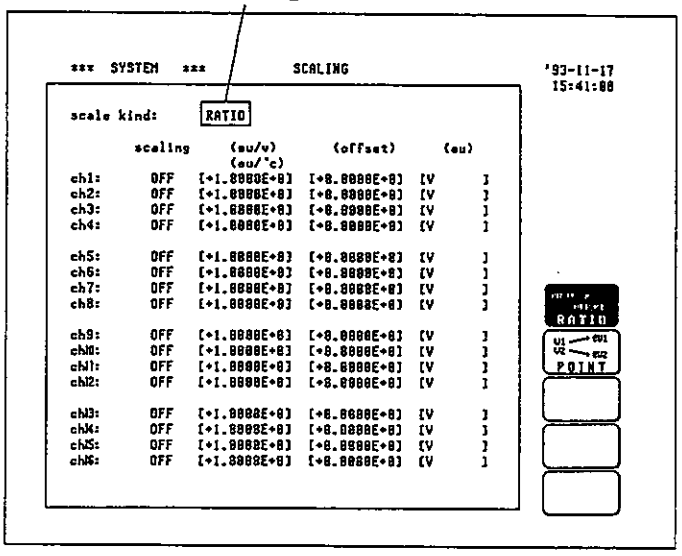
1. Method 1 (RATIO) setting

Method (Screen for making this setting: the "system" screen (SCALING))

- Using the cursor keys, move the flashing cursor in order, to the items shown in the figure on the right by the reference numbers, and perform the settings.

1. Press F3 (SCALING), and the scaling setting screen will appear.
2. Press F2 (RATIO).
3. Press the function key whether or not to perform scaling.

Flashing cursor



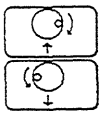
Function key indication — Meaning

- OFF : No scaling
- 1.234E+05 ON(SCI) : Scaling can be performed (indicates the exponent in integer)
- 123.4E+03 ON(ENG) : Scaling can be performed (indicates the exponent in multiple of 3)

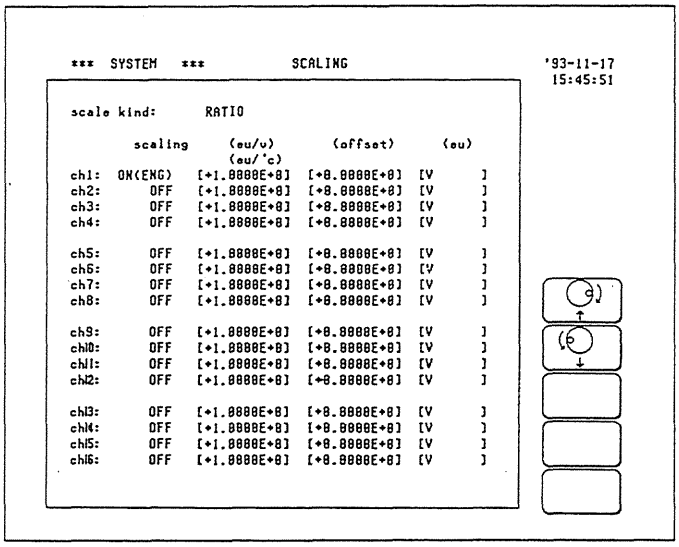
4. Set (eu/v) and (offset).

- (eu/v) and (offset) can be set within the range -9.999E+9 to +9.999E+9.
- Move the flashing cursor to each digit to set it.

Function key indication | Meaning



from 0 through 9 (for the most significant digit and the exponent, from -9 through +9



5. Set the external unit name (eu).

- Input the name for the physical units for each channel can be input.
- The unit name can be up to seven characters long.
- Bring the flashing cursor into the (eu) column and a character selection window will appear.

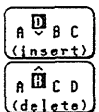
(1) Use the rotary knob to select each character in turn.

(2) Press the function key F5 (set), and the flashing cursor will move one character to the right in the unit name field so that the next character can be set (the right cursor key has the same effect).

Repeat steps (1) and (2) to set the entire external unit name.

Function key display

Function key indication | Meaning



: Insert one character before the position of the flashing cursor.

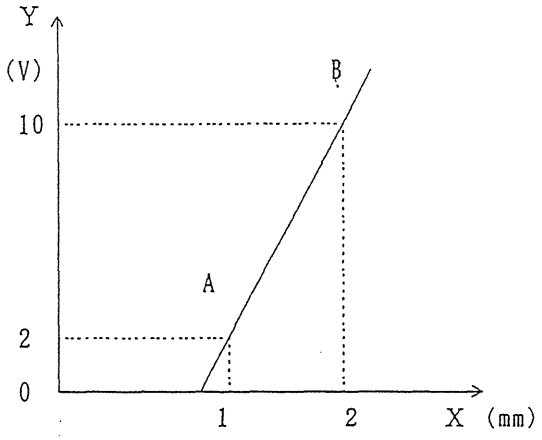
: Delete the character at the flashing cursor position.

: Delete all the characters at and after the position of the flashing cursor.

: Move the flashing cursor one space to the right.

Example of scaling operation

Setting the scaling for measurement values produced when using a displacement sensor with characteristics as shown by the following graph.



$$Y = 8X - 6 \quad \cdots\cdots\cdots\cdots \quad (1)$$
(V) (mm)

$$\Downarrow$$

$$X = 0.125Y + 0.75 \quad \cdots\cdots \quad (2)$$
(mm) (V)

Inverting equation (1) results in equation (2). If scaling is performed as specified, then the results of measurement, which have been obtained as voltage values, are scaled into displacement values in mm.

For example, for point A, at which Y = 2 V;
the displacement X is (+1.250E-1)×2 +(+7.500E-1) = 1 (mm),
and for point B, at which Y = 10 V;
the displacement X is (+1.250E-1)×10 +(+7.500E-1) = 2 (mm).

Related item

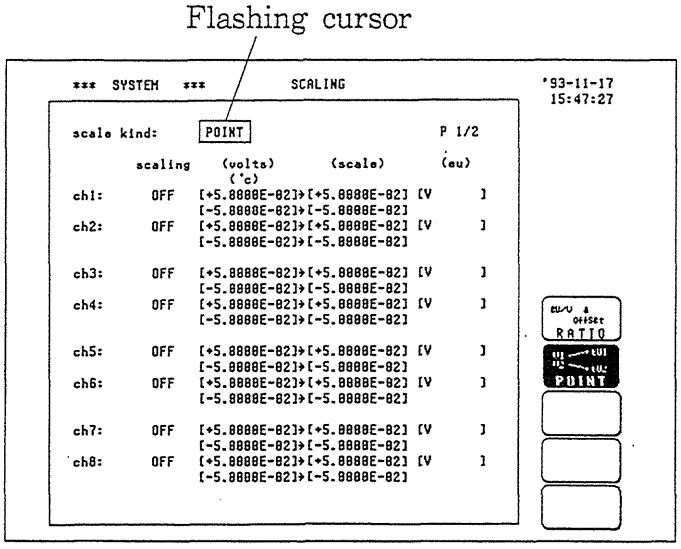
The settings which have been made for any one channel can be copied to another channel. For details, refer to Section 12-9 "Copying Function."

2. Method 2 (POINT) setting

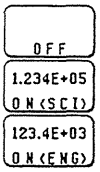
Method (Screen for making this setting: the "system" screen (SCALING : POINT)

- Using the cursor keys, move the flashing cursor in order, to the items shown in the figure on the right by the referance numbers, and perform the settings.

1. Press F3 (SCALING), and the scaling setting screen will appear.
2. Choose F2 (POINT).
3. Press the function key whether or not to perform scaling.



Function key indication — Meaning



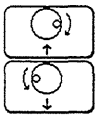
: No sclaing

: Scaling can be performed (indicates the exponent in integer)

: Scaling can be performed (indicates the exponent in multiple of 3)

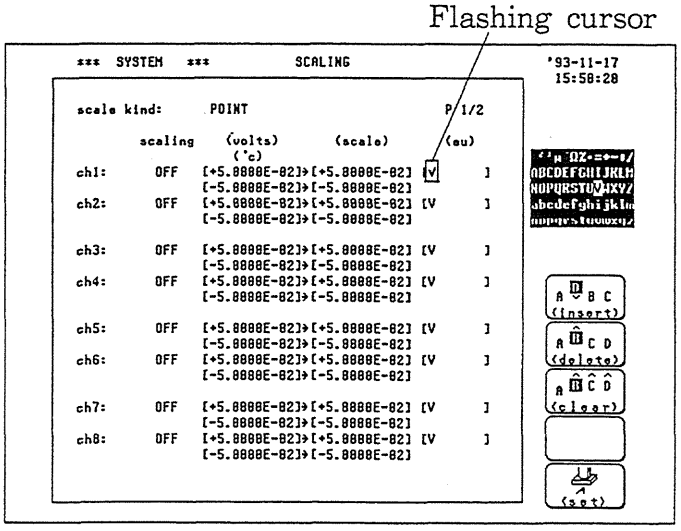
4. Set (volt up, low) and (sc up, low).
   - (up) and (low) can be set within the range -9.9999E+29 to +9.9999E+29.
   - It is not possible to set so that the value (volt low) exceeds (volt up).
   - Move the flashing cursor to each digit to set it.

Function key indication — Meaning



from 0 through 9 (for the most significant digit from -9 to 9) (for the exponent from -29 to 29)

5. Set the external unit name (eu).
   - Input the name for ths physical units for each channel can be input.
   - The unit name can be up to seven characters long.
   - Bring the flashing cursor into the (eu) column and a character selection window will appear.



(1) Use the rotary knob to select each character in turn.

(2) Press the function key F5 (set), and the flashing cursor will move one character to the right in the unit name field so that the next character can be set. (the right cursor key has the same effect).

Repeat steps (1) and (2) to set the entire external unit name.

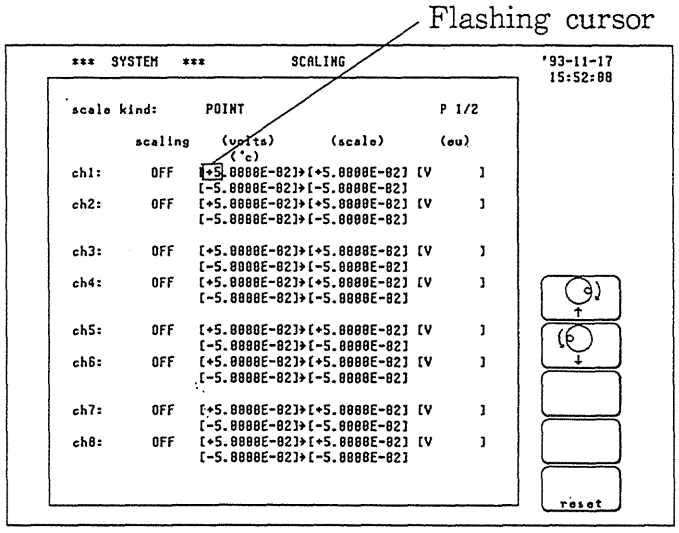
For the explanation of the function key display is same method 1 (RATIO) setting.

Scaling (volt up, low) reset

- When the flashing cursor is in the (volt up) or (volt low) columns, the scaling value (volt up) and (volt low) can be reset.
- The value of the (upper) and (lower) columns on the "display" screen is automatically set into the scaling (volt up) and (volt low) columns.

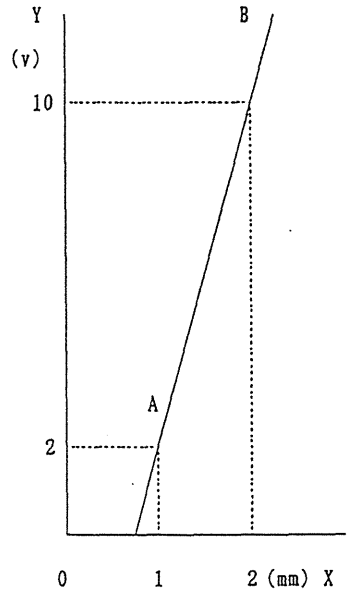
Press F5 (reset).

Function key indication	Meaning
reset	: Sets the upper and lower limit values to (volt up) and (volt low)



Example of scaling operation

Setting the scaling for measurement values produced when using a displacement sensor with characteristics as shown by the following graph.



$Y = 8X - 6$ ..... (1)
(V) (mm)

Using two points, A: (2 V, 1 mm) and B: (10 V, 2 mm) of the equation (1), if scaling is performed as specified, then the results of measurement, which have been obtained as voltage values, are scaled into displacement values in mm.

	(v up)	(sc up)
B:	[+1.0000E + 01]	→[+2.0000E + 00] [mm]
A:	[+2.0000E + 00]	→[+1.0000E + 00]
	(v low)	(sc low)

Example

The following example procedure assume that the minimum value of the waveform data, 1 V, is converted into 0 kg, and maximum value, 8 V, is converted into 5 kg for the measurement result as shown in the figure 1, and explains the method of full scale display.

Method 1

1. On the "scaling" as shown in the figure 2, set the scaling for the channel 1 to ON (SCI) or ON (ENG), "v low" to +1.0000E+00, "v up" to +8.0000E+00, "sc low" to +0.0000E+00, "sc up" to +5.0000E+00, and the unit to kg.
2. On the "variable" screen as shown in the figure 3, sets to the "variable" for the channel 1 to ON, "lower" to +0.0000E+00, and "upper" to +5.0000E+00.
3. Return to the "display" screen as shown in the figure 4, and the values are converted into the waveform display +0.0000E+00 to +5.0000E+00 kg.

Fig. 1
"Display" screen
before conversion

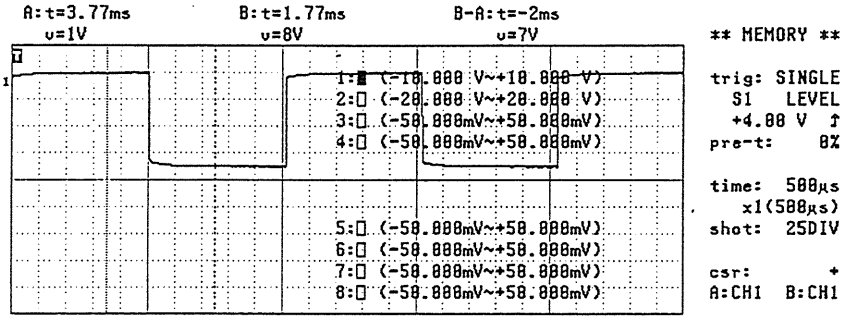


Fig. 2
"Scaling" screen

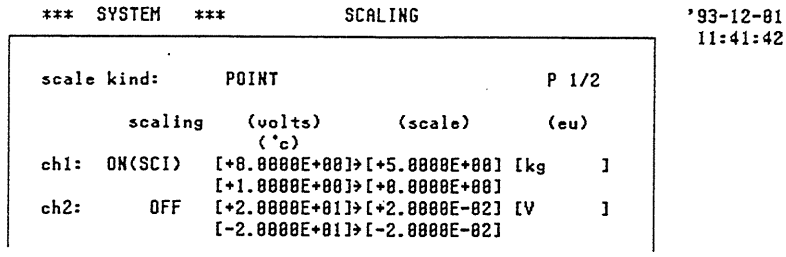


Fig. 3
"Variable" screen

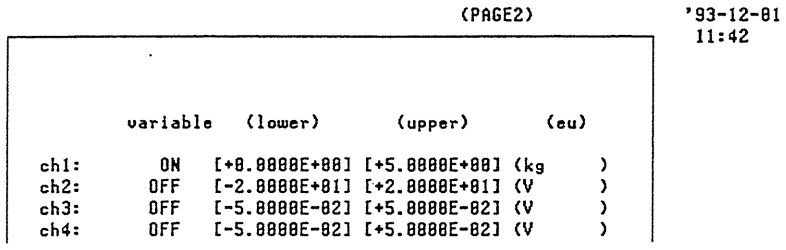
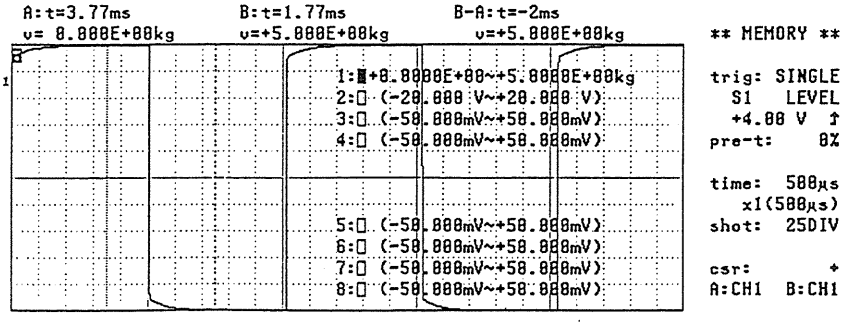


Fig. 4
"Display" screen
after conversion



Method 2

1. On the "variable" screen as shown in the figure 5, set the "variable" for the channel 1 to ON, "lower" to +1.0000E+00, and "upper" to +8.0000E+00. (At this time the scaling for the channel 1 should be set to OFF)
2. On the "scaling" screen as shown in the figure 6, sets the "scaling" for the channel 1 to ON (SCI) or ON (ENG), "v low" to +1.0000E+00, "v up" to +8.0000E+00, "sc low" to +0.0000E+00, "sc up" to +5.0000E+00, and units to kg. (When setting "v low" or "v up" , press F5 (reset) so that the values +1.0000 E+00 and +8.0000E+00 are automatically set into the "v low" and "v up" columns. After that, set "sc low" and "sc up".)
3. Return the "display" screen as shown in the figure 4, and the values are converted into +0.0000E+00 to +5.0000E+00 kg of the waveform display.

Fig. 1
"Display" screen
before conversion

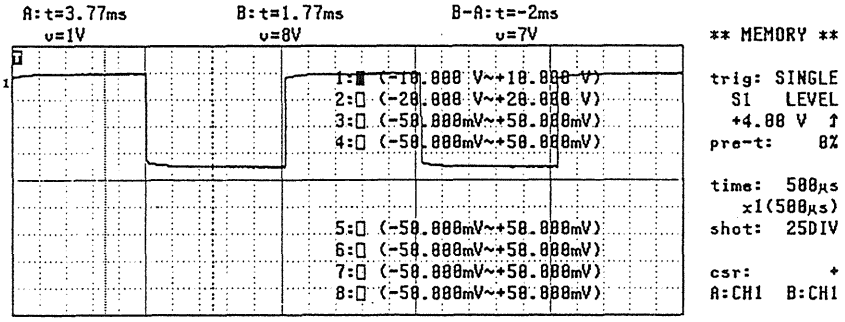


Fig. 2
"Variable" screen

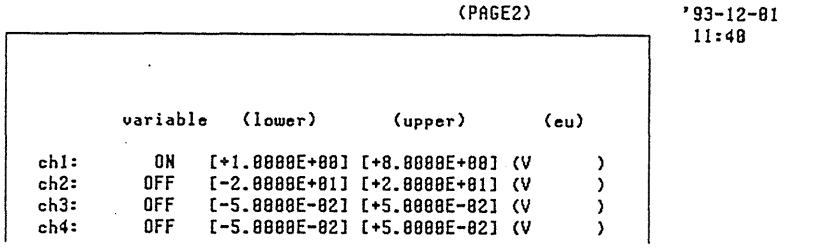


Fig. 3
"Scaling" screen

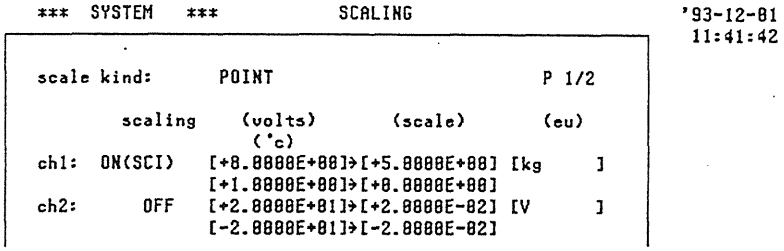
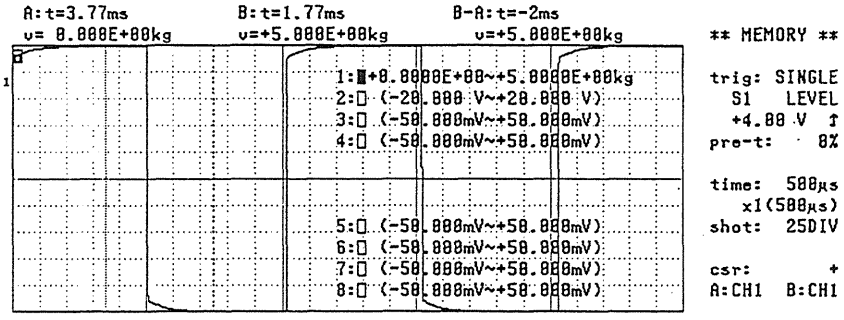


Fig. 4
"Display" screen
after conversion



Notes

- When setting the type of scaling to "POINT", scaling will be performed as following expression.

$$Y = \frac{\text{sc up} - \text{sc low}}{\text{v up} - \text{v low}} X + \frac{\text{sc low} \times \text{v up} - \text{v low} \times \text{sc up}}{\text{v up} - \text{v low}}$$

- The setting range of the portion underlined, (_____), is as follow.

  -9.9999E+9 ≦ the value underlined ≦ -1.0000E-9

  underline = 0

  +1.0000E-9 ≦ the value underlined ≦ +9.9999E+9

  If the setting value is out of this range, an error message, "ERROR 397: Out of range. (scaling)" will be displayed, and the value of "v up" is set to the portion "sc up" and the value of "v low" is set to the portion "sc low".

Notes

- When using both variable and scaling functions, the setting range of "variable" upper and lower limits after scaling is as follows.

  -9.9999E+29 ≦ setting value ≦ -1.0000E+29

  Setting value = 0

  +1.0000E-29 ≦ setting value ≦ +9.9999E+29

  If the setting value is out of this range, the error message "ERROR 396: Out of range. (variable)" will be displayed.

  If the setting value is within the following range, the value on the right side is set to the upper or lower values.

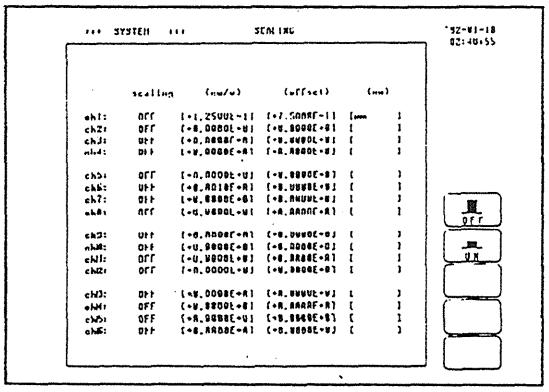
		Setting value	< -9.9999E+29 ;	-1.0000E+29
-1.0000E+29	<	setting value	< 0.0000E+00 ;	-1.0000E-29
0.0000E+00	<	setting value	< +1.0000E-29 ;	+1.0000E-29
+9.9999E+29	<	setting value	;	+1.0000E+29

Notes

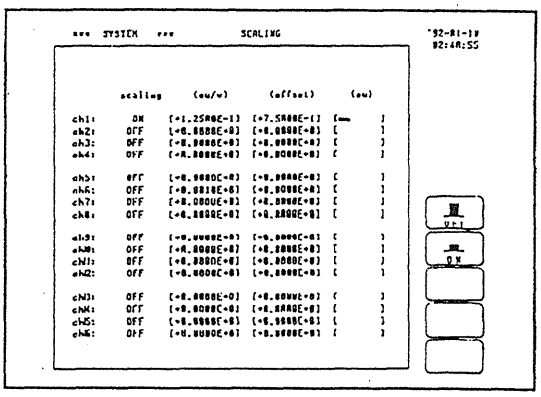
The scaled values appear as shown below on the gauge scales, as range values (the upper and lower limit values along the vertical axis), and as the value of V obtained using the A and B cursors. (When scaling the channel 1 only)

When the waveform parameter calculation is set, scaling will be executed after the calculation. (Exception: effective value area value)

Scaling off

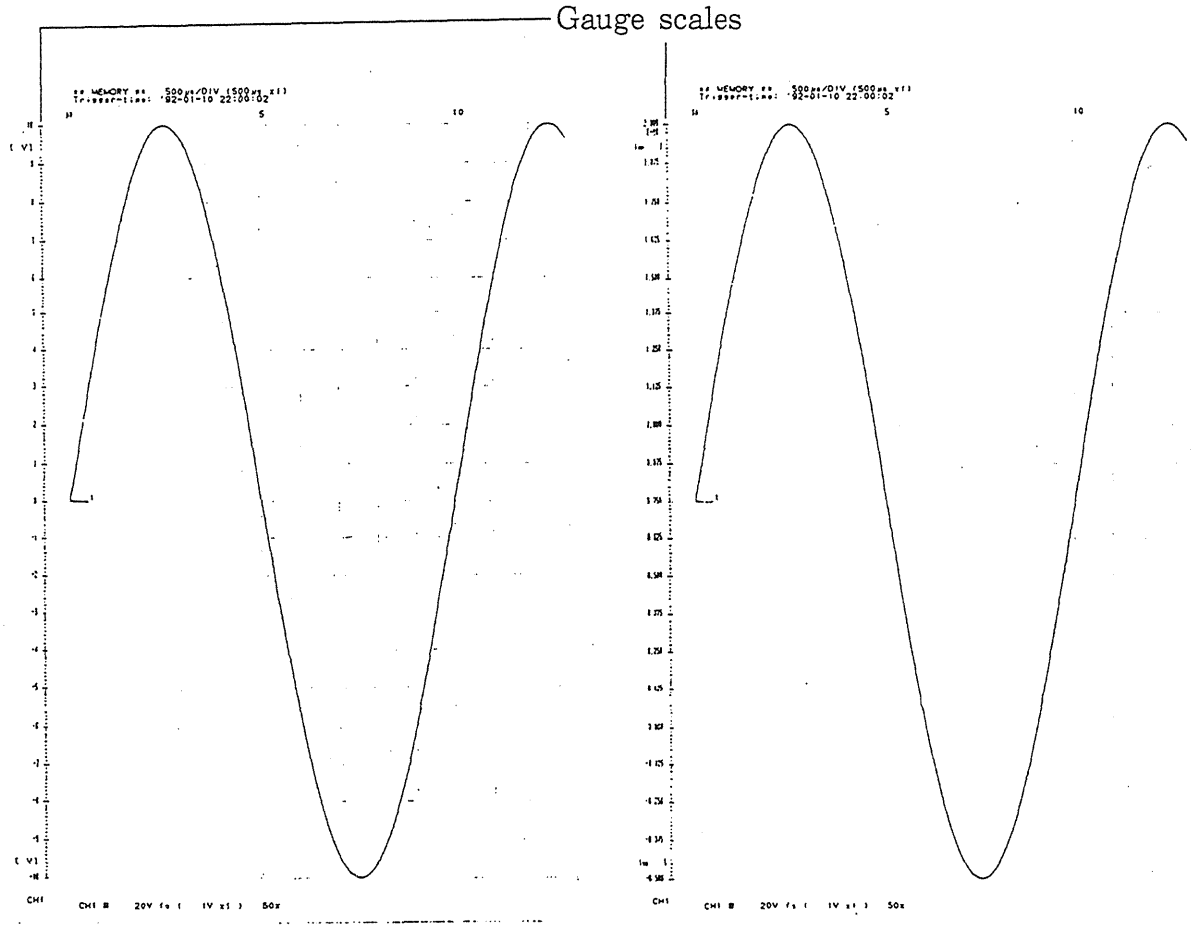


Scaling on



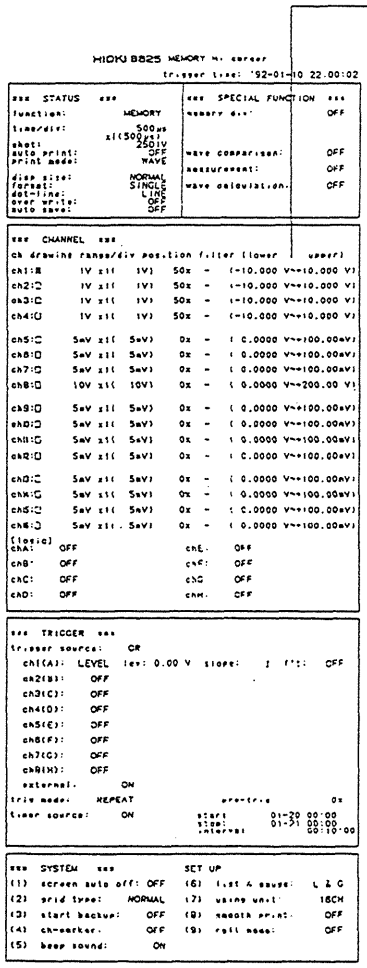
Printed recording

Gauge scales



Listing

Range values (the upper and lower limit values along the vertical axis)



HIOKI 8825 MEMORY Hi corder

trigger time: '92-01-10 22:00:02

*** STATUS ***

function: MEMORY

time/div: 500μs x1(500μs/ 250)

shot: 1V

auto print: OFF

print mode: WAVE

disp size: NORMAL

format: SINGLE

dot-line: LINE

over write: OFF

auto save: OFF

*** SPECIAL FUNCTION ***

memory div: OFF

wave comparison: OFF

measurement: OFF

wave calculation: OFF

*** CHANNEL ***

ch	drawing	range/div	position	filter	(lower	upper)
ch1:	1V	x1(1V)	50%	-	(-10.000	V~+10.000 V)
ch2:	1V	x1(1V)	50%	-	(-10.000	V~+10.000 V)
ch3:	1V	x1(1V)	50%	-	(-10.000	V~+10.000 V)
ch4:	1V	x1(1V)	50%	-	(-10.000	V~+10.000 V)
ch5:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
ch6:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
ch7:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
ch8:	10V	x1(10V)	0%	-	(0.0000	V~+200.00 V)
ch9:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chA:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chB:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chC:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chD:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chE:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chF:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chG:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chH:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)

[logic]

chA: OFF chE: OFF

chB: OFF chF: OFF

chC: OFF chG: OFF

chD: OFF chH: OFF

*** TRIGGER ***

trigger source: CH

ch1(A): LEVEL lev: 0.00 V slope: ↑ filt: OFF

ch2(B): OFF

ch3(C): OFF

ch4(D): OFF

ch5(E): OFF

ch6(F): OFF

ch7(G): OFF

ch8(H): OFF

external: ON

trig mode: REPEAT pre-trig: 0%

timer source: ON start: 01-20 00:00

stop: 01-21 00:00

interval: 00:10:00

*** SYSTEM ***

SET UP

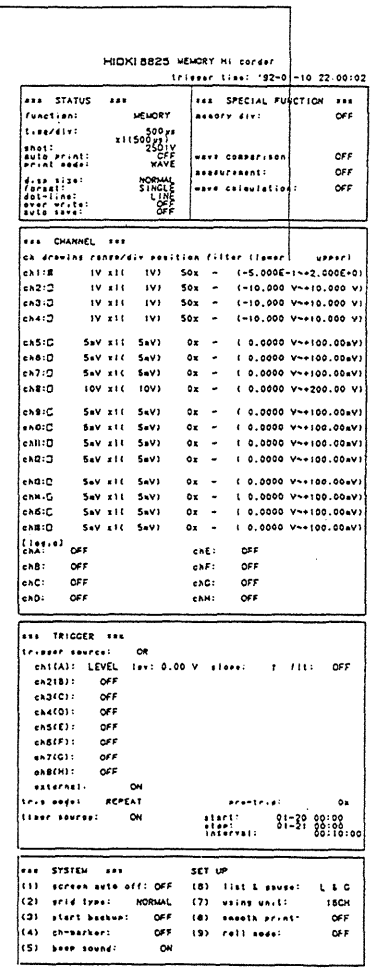
(1) screen auto off: OFF (6) list & save: L & G

(2) grid type: NORMAL (7) using unit: 18CH

(3) start backup: OFF (8) smooth print: OFF

(4) ch-marker: OFF (9) roll mode: OFF

(5) beep sound: ON



HIOKI 8825 MEMORY Hi corder

trigger time: '92-0 -10 22:00:02

*** STATUS ***

function: MEMORY

time/div: 500μs x1(500μs/ 250)

shot: 1V

auto print: OFF

print mode: WAVE

disp size: NORMAL

format: SINGLE

dot-line: LINE

over write: OFF

auto save: OFF

*** SPECIAL FUNCTION ***

memory div: OFF

wave comparison OFF

measurement: OFF

wave calculation: OFF

*** CHANNEL ***

ch	drawing	range/div	position	filter	(lower	upper)
ch1:	1V	x1(1V)	50%	-	(-5.000E-1	V~+2.000E+0)
ch2:	1V	x1(1V)	50%	-	(-10.000	V~+10.000 V)
ch3:	1V	x1(1V)	50%	-	(-10.000	V~+10.000 V)
ch4:	1V	x1(1V)	50%	-	(-10.000	V~+10.000 V)
ch5:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
ch6:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
ch7:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
ch8:	10V	x1(10V)	0%	-	(0.0000	V~+200.00 V)
ch9:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chA:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chB:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chC:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chD:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chE:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chF:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chG:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)
chH:	5mV	x1(5mV)	0%	-	(0.0000	V~+100.00mV)

[logic]

chA: OFF chE: OFF

chB: OFF chF: OFF

chC: OFF chG: OFF

chD: OFF chH: OFF

*** TRIGGER ***

trigger source: CH

ch1(A): LEVEL lev: 0.00 V slope: ↑ filt: OFF

ch2(B): OFF

ch3(C): OFF

ch4(D): OFF

ch5(E): OFF

ch6(F): OFF

ch7(G): OFF

ch8(H): OFF

external: ON

trig mode: REPEAT pre-trig: 0%

timer source: ON start: 01-20 00:00

stop: 01-21 00:00

interval: 00:10:00

*** SYSTEM ***

SET UP

(1) screen auto off: OFF (6) list & save: L & G

(2) grid type: NORMAL (7) using unit: 18CH

(3) start backup: OFF (8) smooth print: OFF

(4) ch-marker: OFF (9) roll mode: OFF

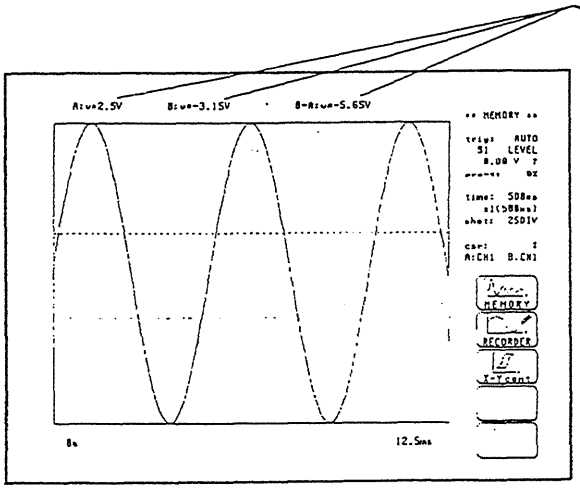
(5) beep sound: ON

Values when scaling is off

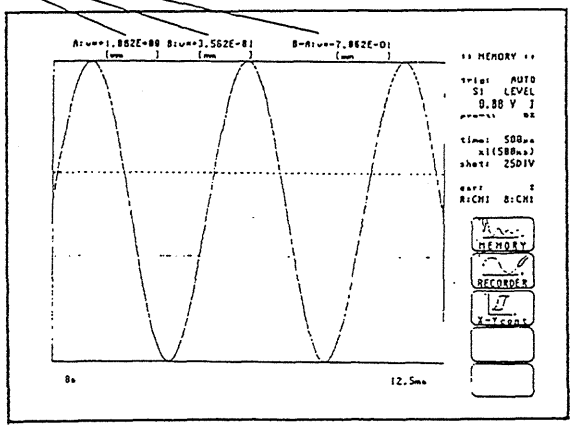
Values when scaling is on

Screen display

Values at the A and B cursors



Scaling is OFF.



Scaling is ON.

12-5 Appending Comments

(1) Heading (title comment)

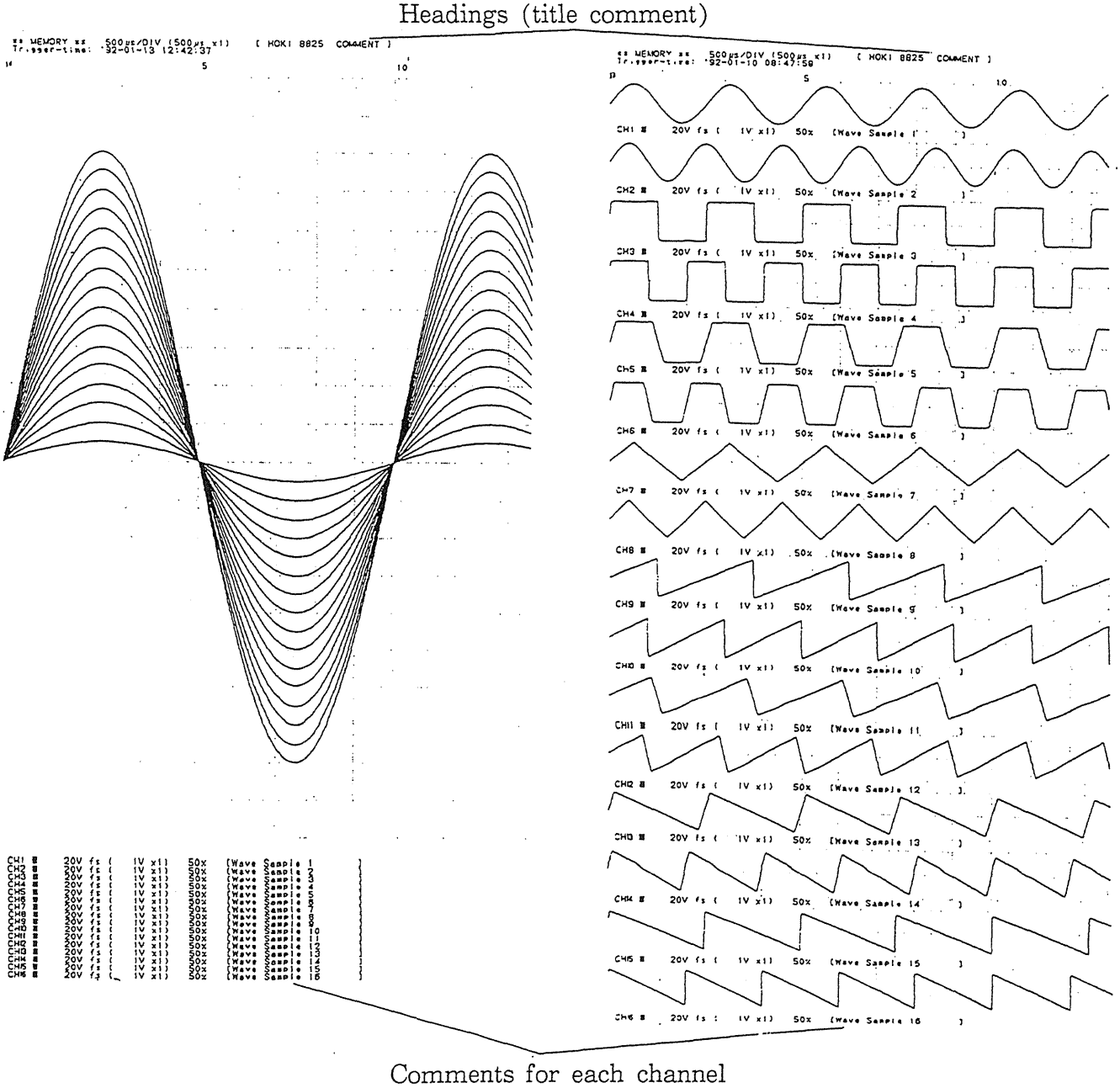
A heading of up to 20 characters can be included on the printed recording. If a heading (title comment) is input, it will be included on the printed recording in all function modes.

(2) Comments for each channel

A comment of up to 20 characters can be attached to each channel on the printed recording. If a comment is input, it will be included on the printed recording in all function modes.

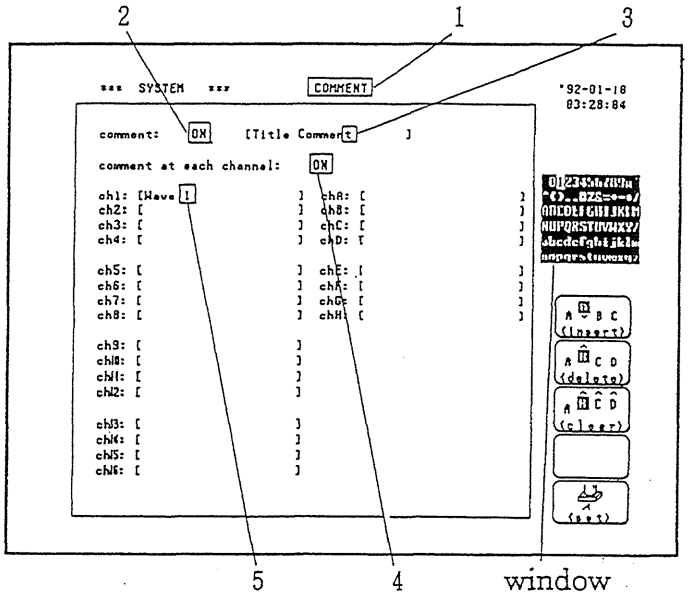
In SINGLE format

In HEX format



Method (Screen for making this setting: the "system" screen, (COMMENT))

- Using the cursor keys, move the flashing cursor to the items in the figure on the right designated by the reference numerals in order, and make the settings.



1. Press the function key F4 (COMMENT), and the comment setting screen will appear.
2. Press the function key F2 (ON), to input the comments.
3. Inputting a heading (title comment)

   Bring the flashing cursor in the area within the brackets and a character selection window will appear.

(1) Use the rotary knob to select each character in turn.

(2) Press the function key F5 (set) to select the character indicated by the cursor in the character selection window, and the flashing cursor will move one character to the right in the comment field so that the next character can be set (the right cursor key has the same effect).

Repeat these steps (1) and (2) to set up the entire comment.

Function key display

Function key indication	Meaning
(insert)	: Insert one character before the position of the flashing cursor.
(delete)	: Delete one character at the position of the flashing cursor.
(clear)	: Delete all the characters at and after the position of the flashing cursor.
(set)	: Move the flashing cursor one space to the right.

4. Press the function key F2 (ON), to input a comment for a particular channel.
5. Inputting a comment attached to a particular channel

   This is done just as in step 3. (Maximum 20 characters)

Related item

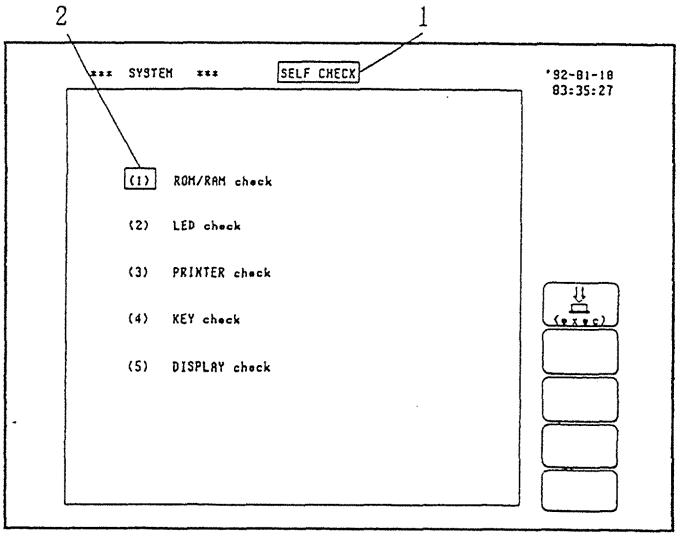
Any setting made for one channel can be copied to another channel. For details, refer to Section 12-9 "Copying Function."

12-6 Self Check

There are five types of self-check: the ROM/RAM check, the LED check, the printer check, the keyboard check, and the screen check.

Method (Screen for making this setting: the "system" screen)

- Using the cursor keys, move the flashing cursor in order, to the items shown in the figure on the right by the reference numbers, and make the settings.



1. After pressing the function key F5 (1 of 2), press the function key F1 (SELF CHECK), and the self check setting screen will appear.
2. In order to execute a self check, move the flashing cursor to the appropriate one of (1) through (5), and press the function key F1 (exec).

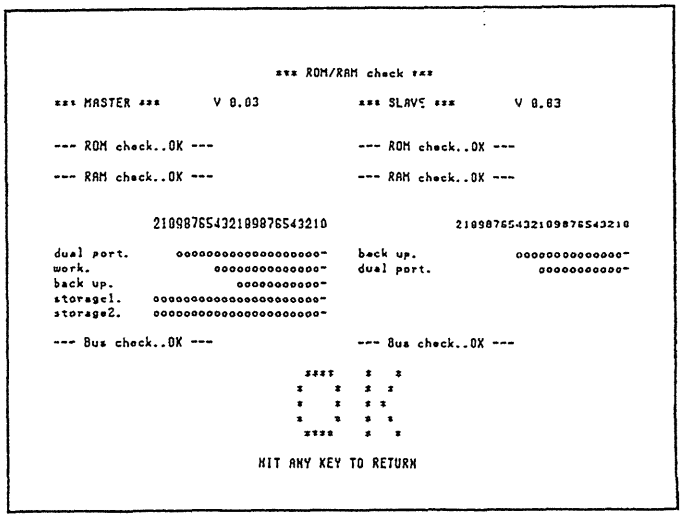
The self checks (1) through (5) are listed in detail in the following sections.

12-6-1 ROM/RAM Check

- This check tests the internal memory (ROM and RAM) of the 8825.
- The result is displayed on the screen
  - OK: passed
  - NG: failed
- The ROM/RAM check does not affect the contents of the RAM.

Method (Screen for making this setting: the "system" screen (SELF CHECK))

1. Using the cursor keys, move the flashing cursor to (1) "ROM/RAM check".
2. Press the function key F1 (exec) and the ROM/RAM check will be performed. When the self check has been completed, press any key. The system will revert to the self check setting screen. During the self check, all keys are disabled. If "OK" appears the self check was satisfactory.



Screen display after the self check has been completed satisfactorily.

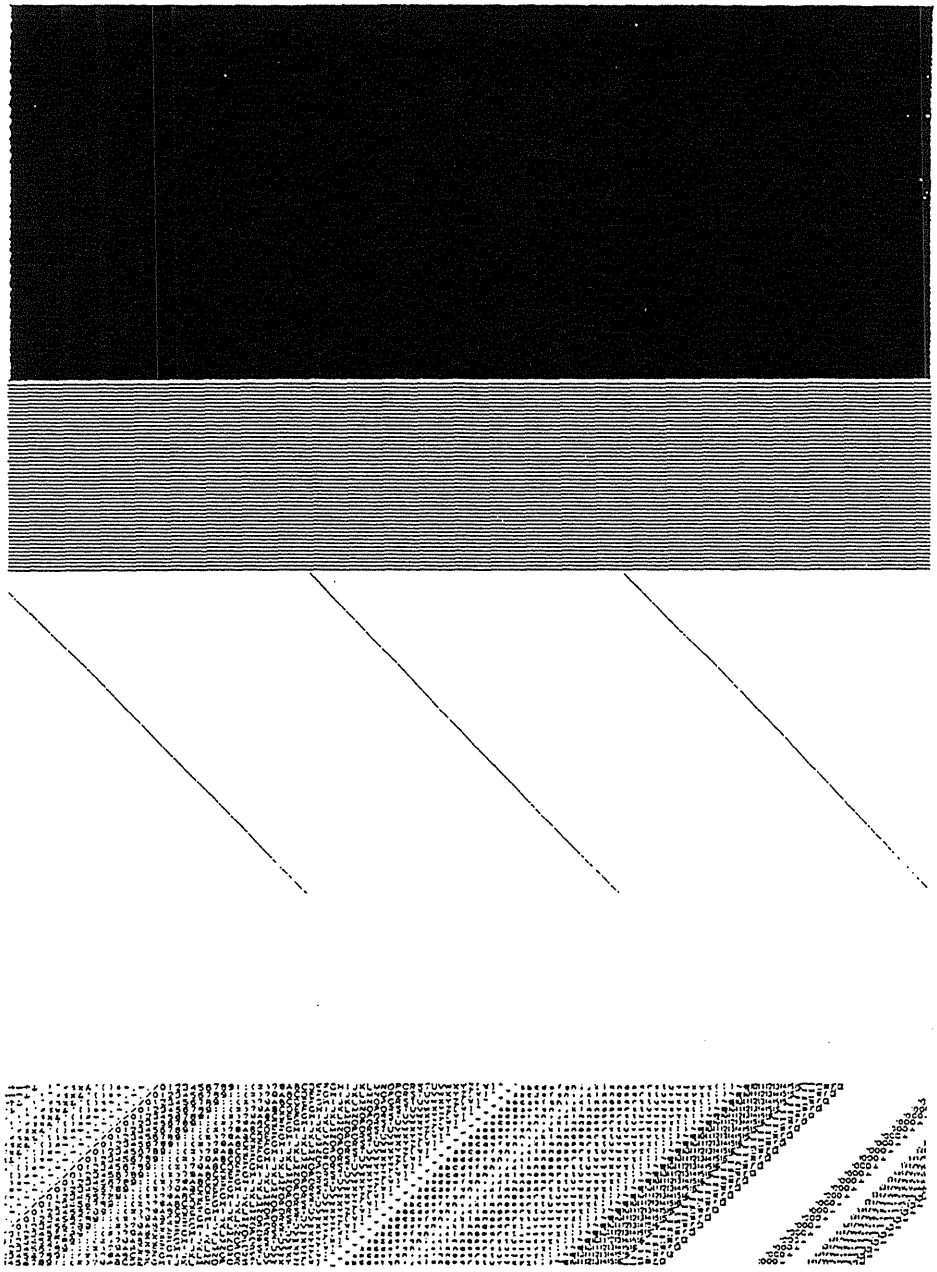
12-6-2 LED Check

- This check tests the LED indicators.
- Check that all four of the LEDs on the front panel of the 8825 are flashing simultaneously.

Method (Screen for making this setting: the "system" screen (SELF CHECK))

1. Using the cursor keys, move the flashing cursor to (2) "LED check".
2. Press the function key F1 (exec) and the LED check will be performed.
   To terminate the LED check, press any key.

• This check tests printer operation.



Printer test pattern

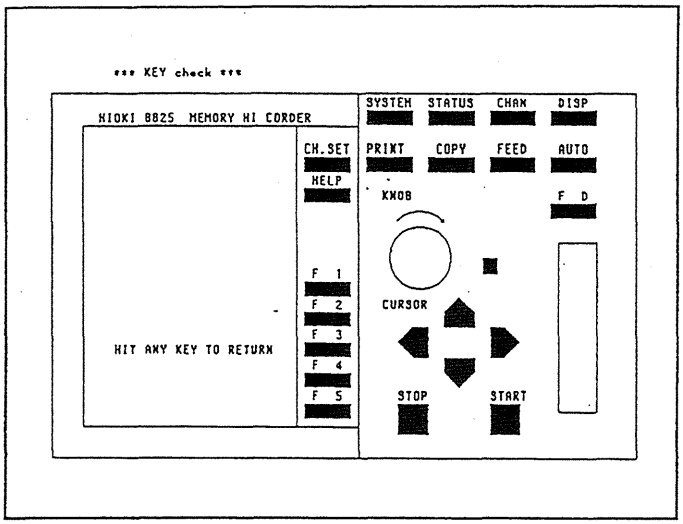
Method (Screen for making this setting: the "system" screen (SELF CHECK))

1. Using the cursor keys, move the flashing cursor to (3) "PRINTER check".
2. Press the function key F1 (exec) and the printer check will be performed.
   To abandon the printer check during execution, press the STOP key.

• This check tests whether the keys are operating normally for input.

Method (Screen for making this setting: the "system" screen (SELF CHECK))

1. Using the cursor keys, move the flashing cursor to (1) "KEY check".
2. Press the function key F1 (exec) and the "KEY check" screen shown in the figure below will appear.



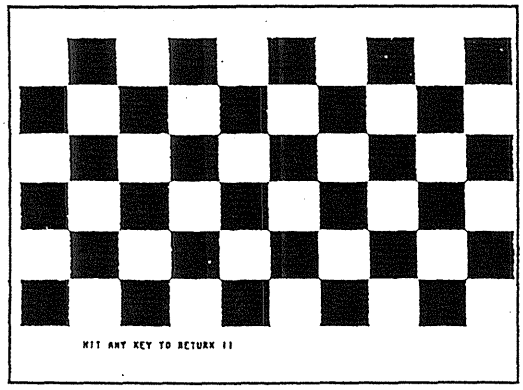
3. Press any key on the front panel of the 8825, and the corresponding key on the "KEY check" screen will be filled in.
4. Turn the rotary knob to the right and left each at least once, and press each of the keys at least once, and the keyboard check will be finished. Then pressing any key returns to the self check screen.
   (If something is wrong with the keys, and if any one of the keys cannot be recognized, then the keyboard self check cannot be terminated. In this case, press the START key and the STOP key together, and the system will return to the self check screen.)

• This checks the display screen.

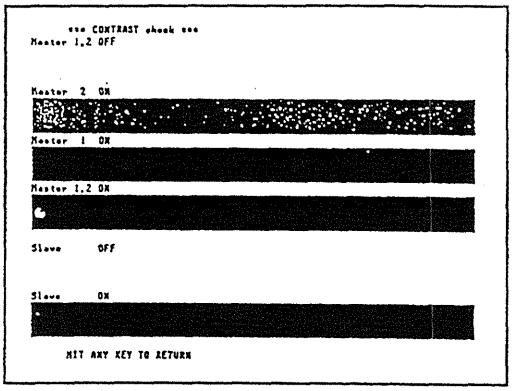
• There are three test patterns: DISPLAY, CONTRAST, and CHARACTER.

Method (Screen for making this setting: the "system" screen (SELF CHECK))

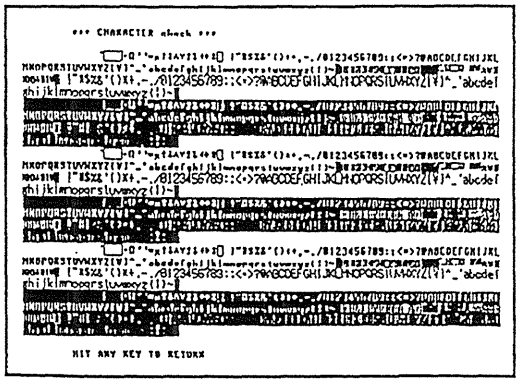
1. Using the cursor keys, move the flashing cursor to (5) "DISPLAY check".
2. Press the function key F1 (exec) and the DISPLAY test pattern will be shown. Next, press any key twice more to cycle through the CONTRAST test pattern and the CHARACTER test pattern. Finally, press any key to terminate this self check and return to the self check screen.



DISPLAY test pattern



CONTRAST test pattern



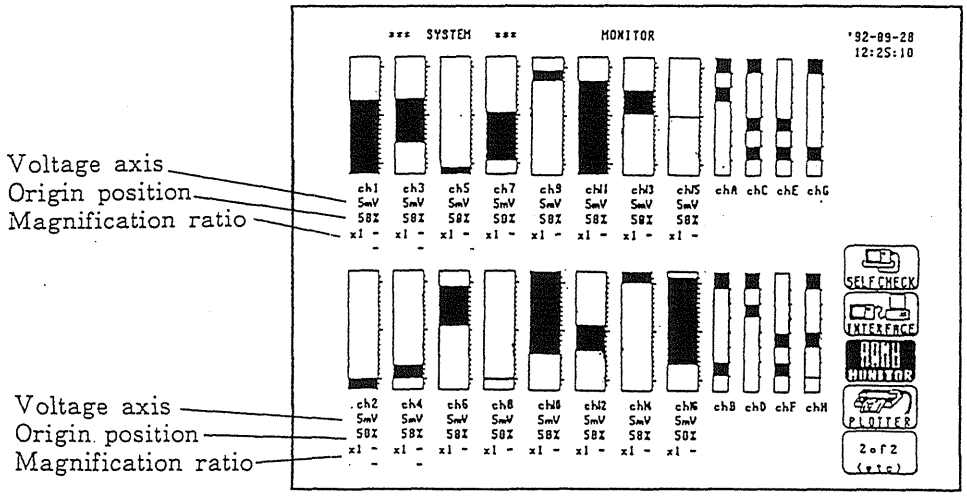
CHARACTER test pattern

12-7 Interface Settings

- Settings which relate to the GP-IB interface can be made. (The GP-IB interface is an option when the 8825 is ordered.)
- When a GP-IB interface board is fitted, it will be possible to display an interface setting screen.
- For detailed explanation of the GP-IB interface settings, refer to the documentation for the GP-IB interface for the 8825 Memory HiCorder, which is issued separately.

12-8 Input Level Monitor Function

- This function makes it possible to make the settings for the voltage axes, the magnification ratios, and the origin positions while monitoring the levels of the input waveforms in real time.
- Each channel from channel 1 through channel 16, and logic channel group CHA through logic channel group CHH, can be displayed.

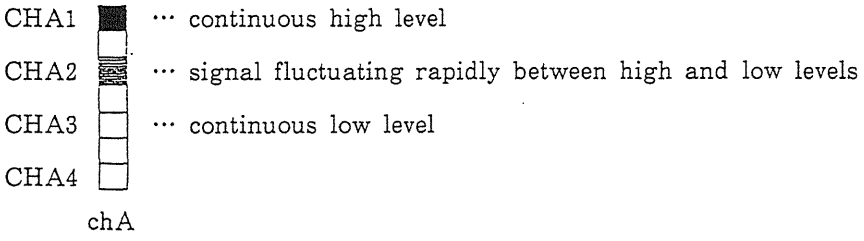


Method (Screen for making this setting: the "system" screen)

1. After pressing function key F5 (1of2), press the function key F3 (MONITOR).
2. Using the cursor keys, move the flashing cursor to each item (voltage axis, origin position, and magnification ratio) of the channel for which settings are to be made.
3. Set the voltage axis, the origin position, and/or the magnification ratio. Each of these settings is made in a manner identical to that done on the "channel" screen. For details, refer to the sub-sections "Settings for each of the input channels" in the sections of this manual relating to each operational function mode.

Logic level display

High and low logic levels are displayed as shown below



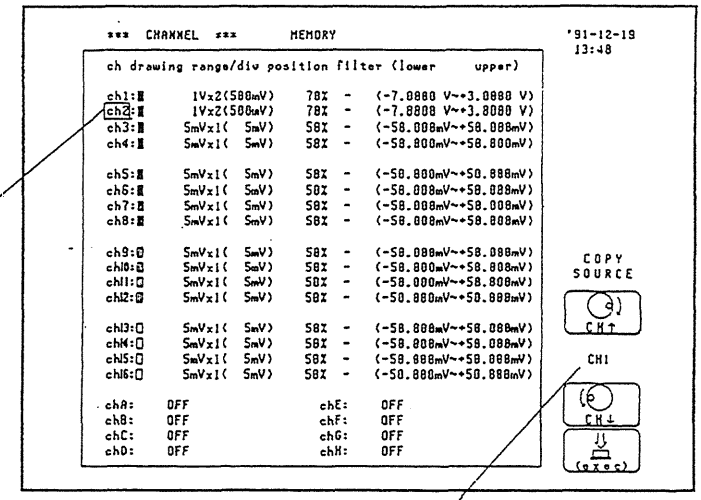
12-9 Copying Function

On the "channel" screen, and on the scaling and comment setting screens from the "system" screen, it is possible to copy settings from one channel to another. This includes measurement conditions, comments, and scaling settings.

Method (Screens for making this setting: the "channel" screen and the "system" (SCALING) and (COMMENT) screens)

"channel" screen

1. Using the cursor keys, move the flashing cursor to the channel which is to be the destination channel to be copied into.



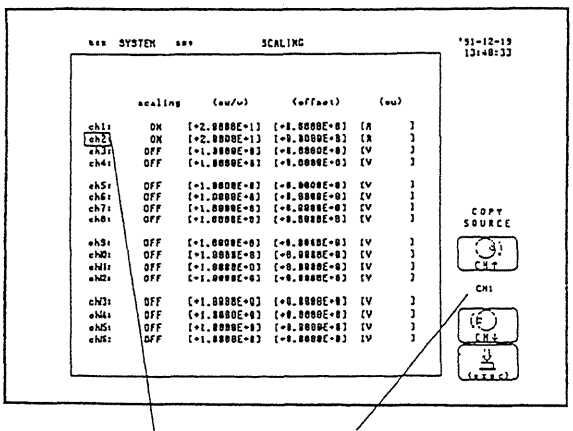
2. Using function keys F2 and F4 or the rotary knob, designate the source channel for the copy.

Function key indication — Meaning

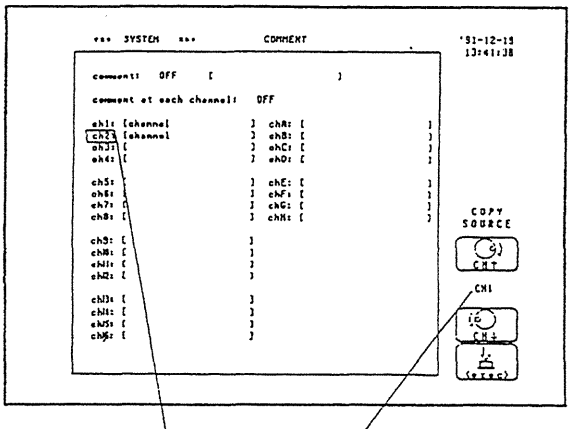
- CH↑ : increases the channel number
- CH1 : indicates the source channel for the copy
- CH↓ : decreases the channel number
- (exec) : executes the copy

3. Press function key F5 (exec) and the copy is performed.

"system" screen (SCALING)

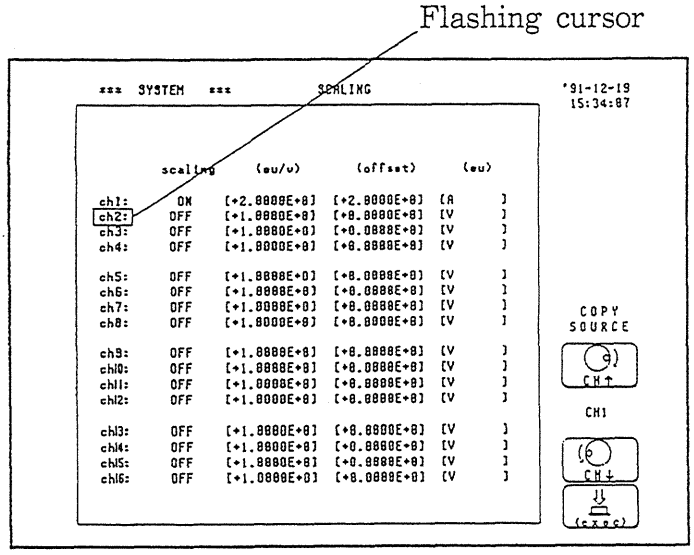


"system" screen (COMMENT)



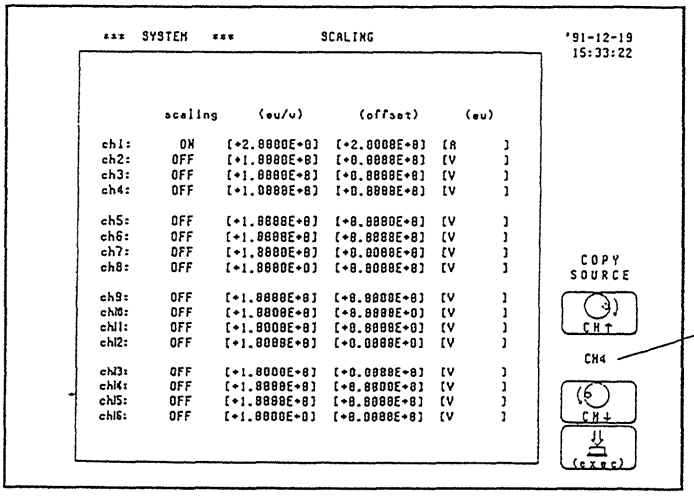
Example

An example will be given of making a copy on the "system" screen (SCALING).



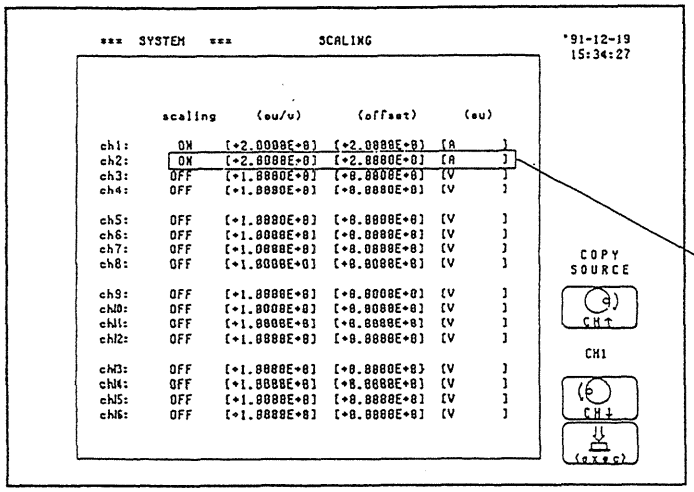
The specified items for channel 1 will be copied to channel 2.

1. Move the flashing cursor to channel 2 (the destination channel), as shown in the figure on the left.



2. Using the function keys F2 and F4 or the rotary knob, designate channel 1 as the source channel for the copy.

Designate channel 1 as the source channel



3. Press the function key F5 (exec) and the copy will be performed.

The specified items for channel 1 have been copied to channel 2.

Section 13

Printer Operations

Contents

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13-2 Screen Copy Function 13-2
13-3 B4 Print Function 13-3
13-4 Manual Print Function 13-4
13-5 Feed Function 13-4
13-6 Head Temperature Protection Function 13-4

13-1 Head Up and Paper End

- When the printer head is up, the printer will not operate.

  An attempt to carry out a printing operation produces the following error message:

  "ERROR 2: Set printer lever."

  Lower the head up/down lever.

- If the printer paper runs out, printing stops.

  The next attempt to carry out a printing operation produces the following error message:

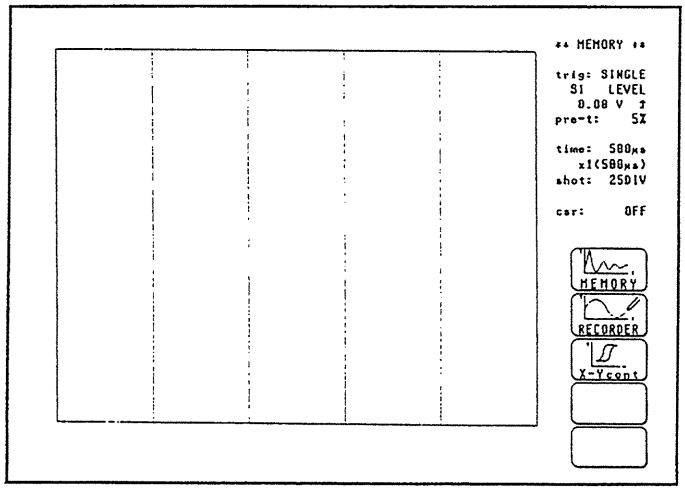
  "ERROR 1: Set printer paper."

  See Section 3-2 "Loading Recording Paper" for the procedure for reloading printer paper.

13-2 Screen Copy Function

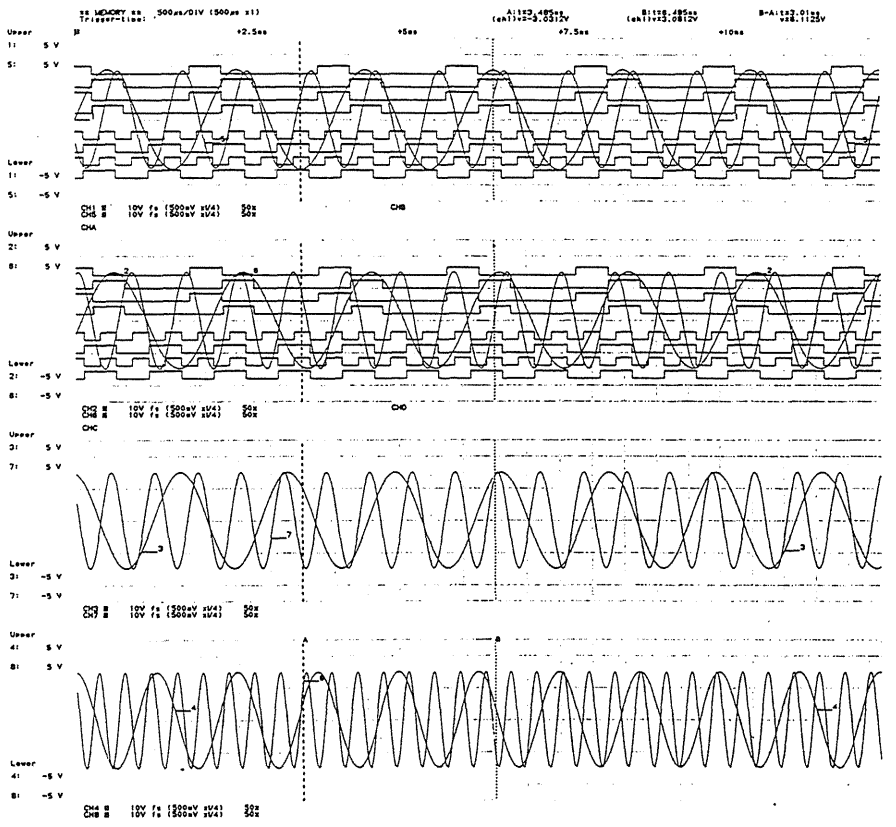
Pressing the COPY key at any time, except during recording, causes a copy of the display screen to be printed.

Screen hard copy (display screen)



13-3 B4 Print Function

- When the DISPLAY screen is displayed, press the FEED key and COPY key simultaneously to print out the waveform at B4 size. (Slightly press FEED earlier than the COPY key.)
- If the A and B cursors are displayed on the screen, A and B cursors are also printed out.



Notes

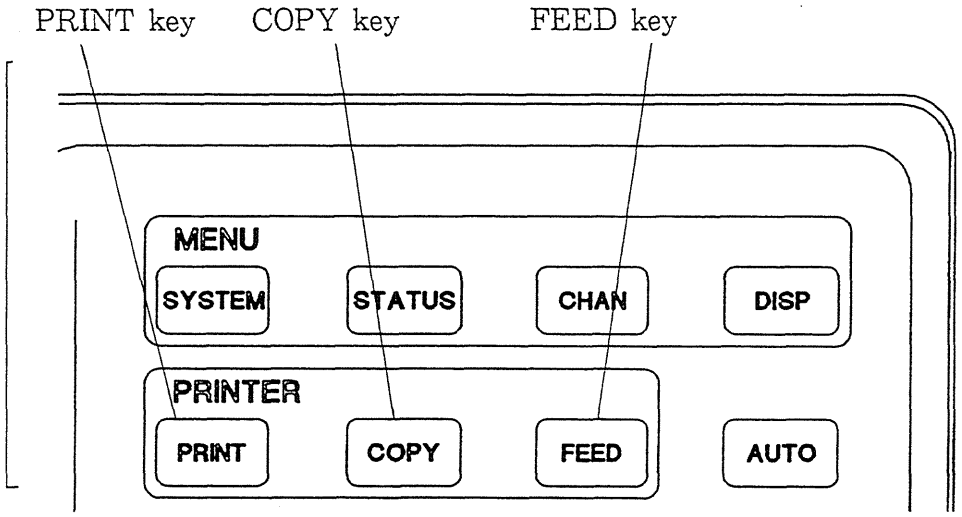
- In the FFT function, it is not possible to print out at B4 size.
- In the B4 print function, even if the display size setting is WIDE, the waveform will be displayed at NORMAL size.

13-4 Manual Print Function

Waveform data held in memory can be printed as many times as required by pressing the PRINT key.
If the listing and/or gauge functions are enabled on the "system" screen, listings of settings and gauges for the axes can also be printed.
In the memory recorder function, the smooth print function setting provides waveform printing close to analog quality, but at half the printing speed.

13-5 Feed Function

Except during recording, pressing the FEED key feeds the printer paper.



13-6 Head Temperature Protection Function

The printer has a thermal head equipped with a temperature protection circuit. This cuts out operation of the printer if the head temperature reaches a certain level. It is therefore possible for the printer to stop operating while in use, and temporarily feed blank paper.
The tendency of the head temperature to rise is exacerbated by a greater black area being printed, and by a faster paper feed speed. Additionally, higher ambient temperatures make it more likely that the head temperature will rise and trip the protective mechanism.
When the temperature protection circuit operates, disabling printing, once the head temperature has cooled appropriately printing is once more possible.
If printing stops repeatedly, it may be advisable to adjust the input unit ranges to reduce the area of black printed, or to change the recording style using LIGHT or DOT settings.

Section 14

Floppy Disk Operations

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14-1 Floppy Disk Functions 14-2
14-2 What Can Be Recorded and How Much 14-3
14-3 Using the Floppy Disk Drive 14-4
14-4 Settings on the Floppy Disk Control Screen 14-5
14-5 Detailed Explanation of the Commands 14-7
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14-1 Floppy Disk Functions

(1) 3.5 inch 2HD or 2DD floppy disks can be used. 2HD disks are formatted in NEC PC-9801 format, and 2DD disks in IBM-PC/AT MS-DOS format. The recording capacity on PC-9801 format 2HD disks is 1.2M bytes, and on IBM-PC /AT format 2DD disks is 720Kbytes.

NB: 2DD floppy disks formated in PC-9801 640K-bytes format can not be used.

(2) Saving the setting state of the unit on a floppy disk allows you to return to identical conditions for performing measurements.

(3) If measurement data is recorded on a floppy disk, afterwards it can be read out, analyzed, and compared with other data.
By recording the waveform decision area, it is possible to perform waveform decision using the same area as many times as required.

(4) It is possible to record by transferring only one portion of the captured waveform to the floppy disk. (Partial save function).

(5) With the memory recorder function mode, during startup it is possible automatically to record the captured waveform on the floppy disk. (Auto save function).

(6) It is possible, when the power is turned on, automatically to read a setting state or a waveform decision area which has been recorded on a floppy disk and to set it up. (Auto setup function)

(7) The following commands can be used:

FORMAT: formats a floppy disk in MS-DOS format.
SAVE : writes to the floppy disk.
LOAD : reads out from the floppy disk to the 8825.
DELETE : erases from the floppy disk.
INFO. : Gives detailed information about a file on the floppy disk.

Notes

- If a floppy disk is inserted upside down, backwards, or in the wrong direction, it is possible to damage the floppy disk or the 8825.
- While the floppy disk unit is operational (the LED on the floppy disk unit is on) do not remove the floppy disk.
- When transporting the 8825, be sure to remove any floppy disk.

14-2 What Can Be Recorded and How Much

- On the FFT function, refer to the separate manual "8825 FFT Analyzer • GP-IB Interface".

(1) Setting state (FUNC)

① It is possible to save the setting state for each of the function modes: the memory recorder function mode, the recorder function mode, and the X-Y recorder function mode.

② When a setting state on the floppy disk is read into the 8825, the 8825 is restored to that setting state.

Space occupied on the floppy disk for each function:

Memory recorder function mode
Recorder function mode
X-Y recorder function mode
} ··· 3 blocks

NB: 1 block = 1024 bytes

(2) Measurement data (WAVE)

① It is possible to save the measurement data of a waveform which has been captured by the memory recorder function mode.

② When measurement data is read into the 8825, it is stored in the memory channel specified on the floppy disk. (For details, refer to the description of LOAD in Section 14-5 "Detailed Explanation of the Commands.")

③ When waveform measurement data is saved on a floppy disk, the setting state is also simultaneously saved. When this is loaded the unit is set to the condition when the measurement data was recorded, and it can therefore be checked using the listing function.

Memory capacity required for measurement data (in blocks):

$$\frac{(\text{Recording length (divisions)} \times 100) \times 2 \times \text{number of channels}}{1024} + 2 \text{ blocks (rounded upwards)}$$

(Logic channels CHA to CHD, and CHE to CHH, are considered as one channel each)

(3) Waveform decision area (AREA)

① For the memory recorder function mode, it is possible to save a waveform decision area which has been created.

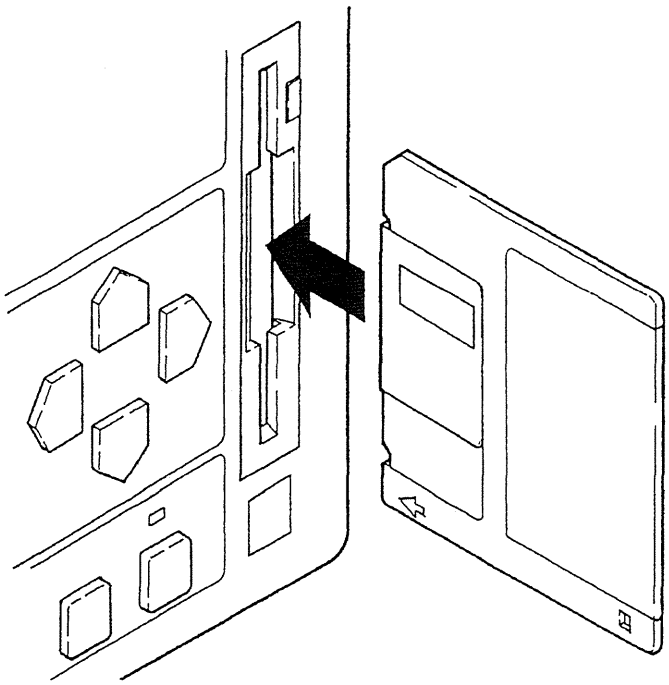
② Only the settings necessary for waveform decision when a waveform decision area has been created are saved simultaneously.

Memory capacity required for a waveform decision area ··· 32 blocks.

14-3 Using the Floppy Disk Drive

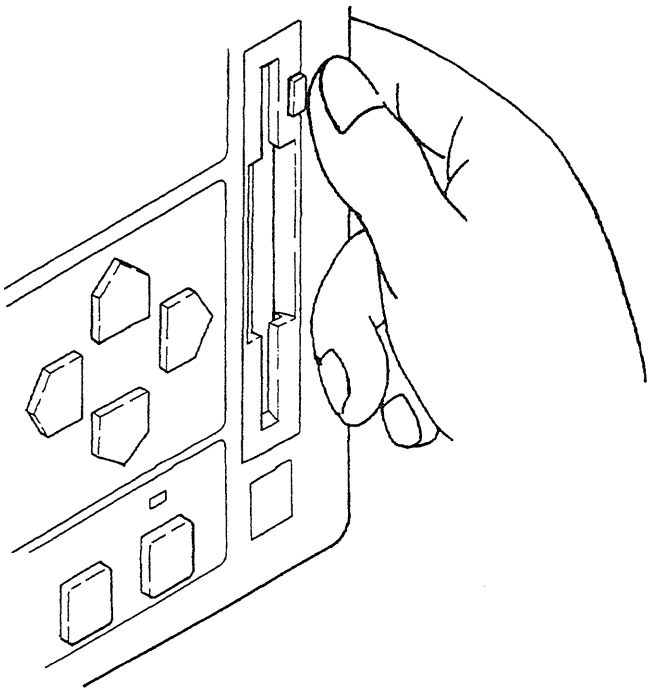
How to insert a floppy disk:

Hold the disk with its written-on face to the left, and push it all the way into the slot in the proper orientation.



How to remove a floppy disk:

Press the button as shown in the figure below and the disk is ejected. Because it pops out quite smartly, be careful not to let it drop.



14-4 Settings on the Floppy Disk Control Screen

This section describes settings on the floppy disk control screen. Refer to Section 14-5 "Detailed Explanation of the Commands" for an in-depth explanation of each of the commands.

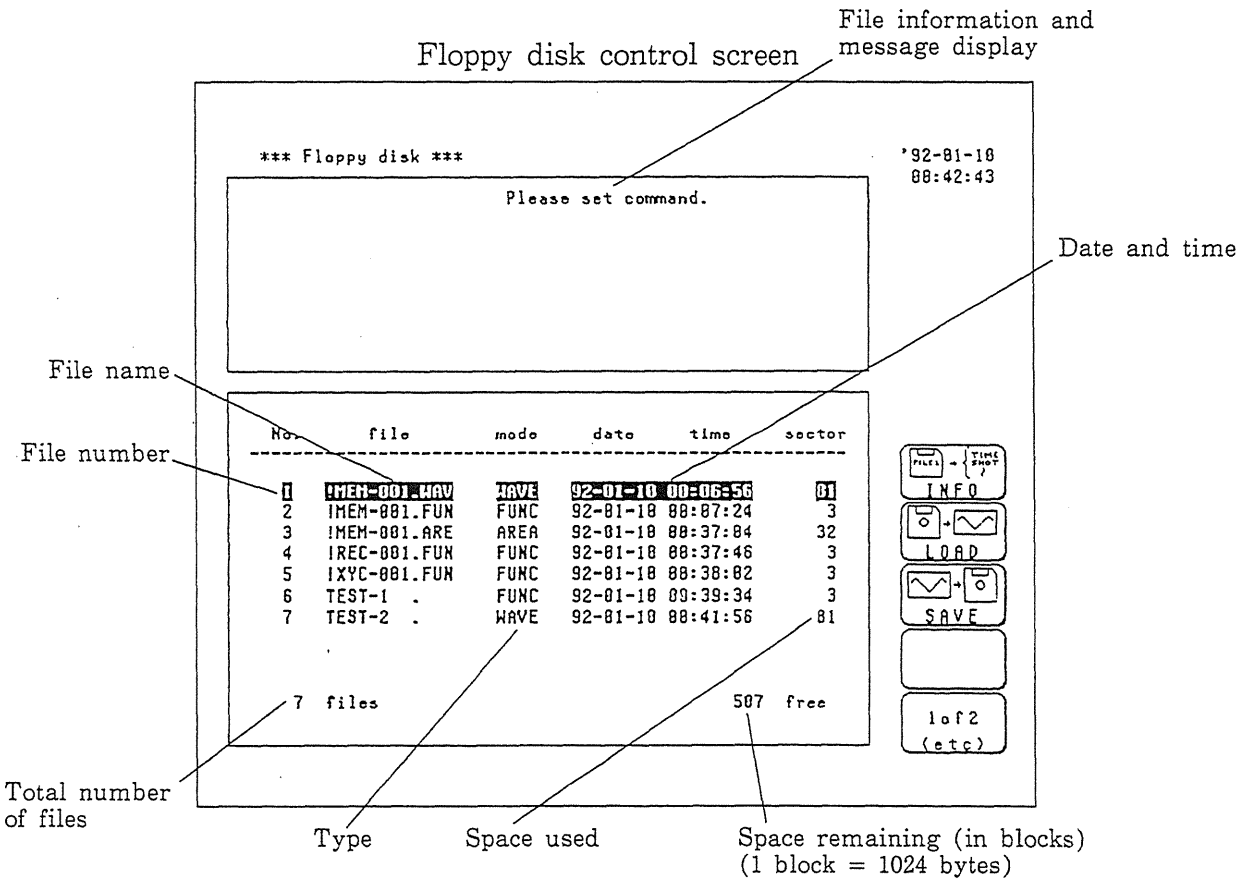
1. Put in a floppy disk.
2. Press the FD key and the floppy disk control screen will appear. While information about the files recorded on the disk is being loaded, the following message appears:

   Now loading. Please wait.

NB: If the floppy disk is not formatted in MS-DOS format, the following error message is displayed:

ERROR 72: Illegal format.

Press the stop key and, after the error message has disappeared, format the disk. For details, refer to Section 14-5 "Detailed Explanation of the Commands".



● File Name ··· The file names which were set during SAVE commands are displayed. The following files have special meanings:

!MEM-○○○.WAV
!MEM-○○○.FUN
!MEM-○○○.ARE
!REC-○○○.FUN
!XYC-○○○.FUN
(3-digit number)

} These are names of files made during auto setup. Refer to the explanation of the SAVE command.

#AUTO○○○.WAV (3-digit number) This is a file created by the auto save function.

STARTUP. STARTUPA. These are files used by the auto setup function. For details, refer to Section 14-8 "Auto Setup Function".

● Type ··· This indicates the type of the contents of the file.

FUNC Setting state

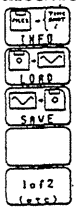
WAVE Measurement data
AREA Waveform decision area

} Only in the memory recorder function mode.

3. If more than nine files are stored on the floppy disk, the file names can be seen by scrolling them up and down with the cursor keys.
4. The commands can be selected with a function key.
   The following commands are available.

• Number 1 of 2

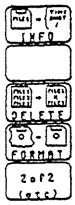
Function key indication — Meaning



: Display file information (See page 14-14)
: Read data into the 8825 unit from a floppy disk (See page 14-11)
: Save data onto a floppy disk (See page 14-9)
: Go to the next function key setting (Number 1 of 2)

• Number 2 of 2

Function key indication — Meaning



: Display file information (See page 14-14)
: Delete a specified file from a floppy disk (See page 14-13)
: Format a floppy disk (See page 14-7)
: Go to the earlier function key setting (Number 2 of 2)

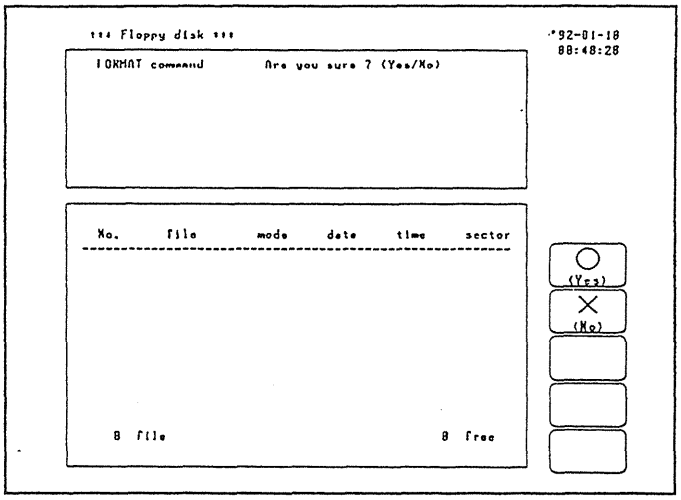
For an in-depth explanation of each of the commands, refer to Section 14-5 "Detailed Explanation of the Commands".

5. When finished with the floppy disk control screen, press the FD key or the MENU key (SYSTEM, STATUS, CHAN, DISP). If the FD key is pressed, the screen is changed to the screen before the operation of pressing the FD key. If the MENU key is pressed, the screen is changed to each functions screen.

14-5 Detailed Explanation of the Commands

FORMAT: The floppy disk is formatted in MS-DOS format. Before using a floppy disk on the 8825, ensure that it is correctly formatted.

1. Press the function key F4 (FORMAT) and the screen shown on the right appears.
2. Select the appropriate function key according to the displays.



Function key indication — Meaning

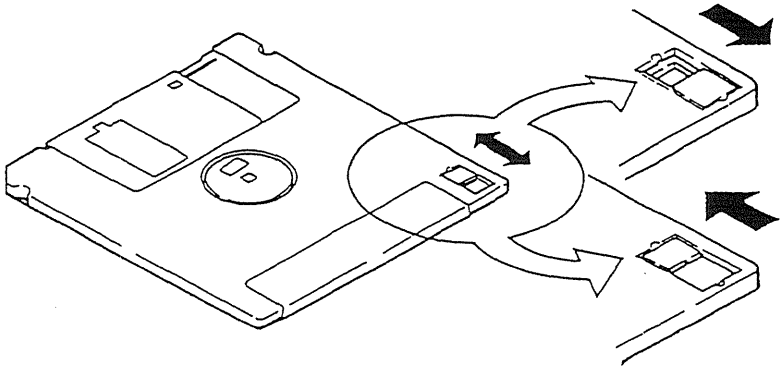
(Yes) : Pressing this key starts the formatting operation.

(No) : Pressing this key cancels formatting.

- During the formatting process the following message appears: "Now formatting. Please wait".
- Formatting a 2HD disk takes about one minute.

NB:

- Function keys other than F1 (YES) and F2 (NO) have no effect.
- If the write-protect tab on the floppy disk is in the set position, the disk cannot be formatted. To allow formatting, move the write-protect tab to the unset position.



Write-protect set position

Write-protect unset position

SAVE: Transfers a setting state, measurement data, or a waveform decision area from the 8825 to the floppy disk.

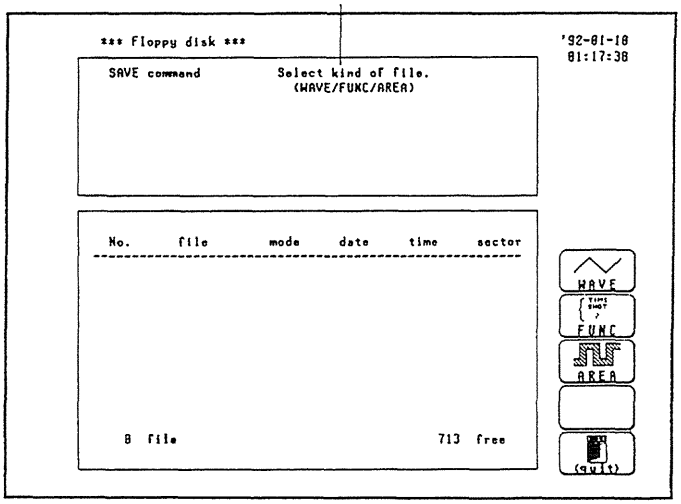
The information which can be transferred to the floppy disk depends upon the function:

Memory recorder function mode ····· setting state, measurement data, or waveform decision area.
Recorder function mode ····· setting state, measurement data.
X-Y recorder function mode ····· setting state only.
FFT function mode ····· Setting state, measurement data, or waveform decision area.

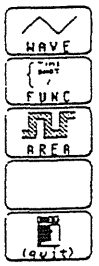
(1) Memory recorder function, recorder function, and FFT function modes

1. Press the function key F3 (SAVE) and the screen shown on the right appears.
2. Then press the appropriate function key corresponding to the type of information to be transferred, according to the function key displays:

Type of information to be transferred (the kind of file created)



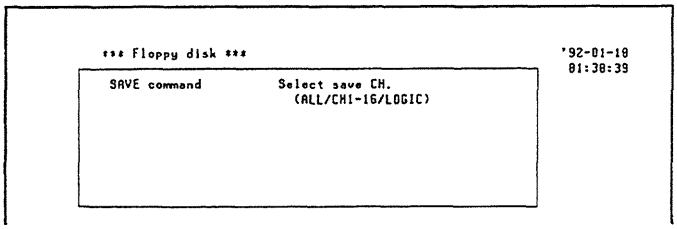
Function key indication — Meaning



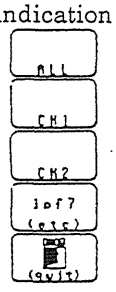
: measurement data
: setting state
: waveform decision area (only for the memory recorder function and the FFT function)
: Pressing this key cancels the SAVE command.

• After pressing the function key F2 (FUNC) or the function key F3 (AREA), next enter the file name, as described in step 5.

3. However, after pressing the function key F1 (WAVE) in step 1, the screen shown on the right appears.
4. Next specify the measurement data to be transferred, according to the function key settings.



Function key indication — Meaning



: Transfer the measurement data of all channels whose waveforms are shown on the display screen. (Excluding those channels which are set OFF.)

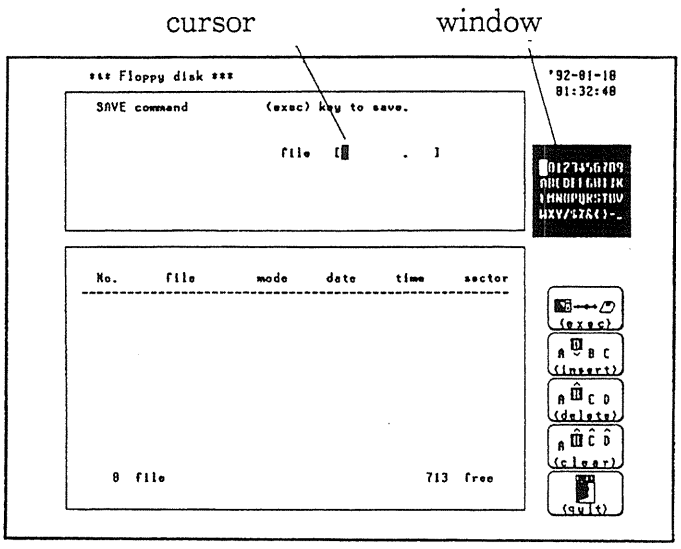
} Transfer only the measurement data for the corresponding channel (channels 1 through 16, logic channel groups CHA through CHD, and logic channel group CHE through CHH). Each time this key is pressed the indicated channels change.

: Exit from the SAVE command.

5. Next input the file name. As shown on the right, a character selection window will appear.

a. Use the rotary knob to select each character in turn.

b. Pressing the right direction cursor key moves the cursor one space to the right.
Repeat actions a. and b. as appropriate.



NB: File names are left justified and cannot include spaces.

- If no file name is input by the user, a file name is automatically set by the 8825. (This can happen only if all the files have been deleted, since otherwise the file name used in the previous operation persists.) See the notes below.

Explanation of the function keys

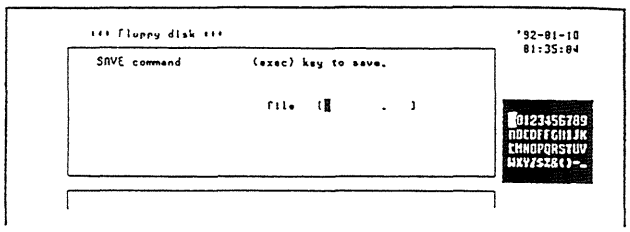
Function key indication	Meaning
(exec)	: Starts the transfer.
(insert)	: Inserts one character just before the position of the cursor.
(delete)	: Deletes one character at the position of the cursor.
(clear)	: Deletes all characters at and after the position of the cursor.
(quit)	: Cancels the SAVE command.

6. Press function key F1 (exec) to start the data transfer.
During data transfer, the following message appears:
"Now saving. Please wait"
If a file already exists with the same name as the one which has been set, the following message appears:
"File already exists.
Overwrite OK ? (Yes/No)"
Press the function key F1 (Yes) to overwrite the existing file.

NB: Make sure the write-protect tab is in the unset position.

(2) X-Y recorder function mode

1. Press the function key F3 (SAVE) and the screen shown on the right will appear. Input a file name and the setting state will be transferred. Then refer to steps 5 and following in (1) above.



Notes

• Automatic creation of file names

If nothing is entered in the filename entry, a file name is automatically created when the SAVE command is executed. This can only happen if all the files have been deleted, since otherwise the file name used in the previous operation persists.

!MEM - ○○○ . WAV

Function mode	3-digits	Type of file
MEM	001 to 999	WAV (measurement data)
(memory recorder)		FUN (setting state)
REC		ARE (waveform decision area)
(recorder)		
XYC		
(X-Y recorder)		

• Time taken for saving

This depends on the type of file

FUNC (setting state) ····· about 2 seconds.

AREA (waveform decision area) ····· about 4 seconds.

WAVE (measurement data) ····· for a recording length of 50 divisions and 16 channels, about 30 seconds.

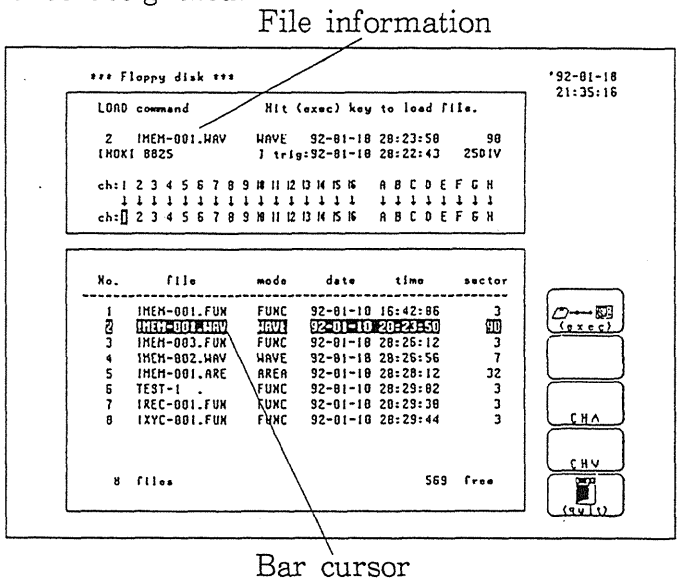
In the case of WAVE (measurement data), the time taken for saving is approximately proportional to the recording length and to the number of channels.

After the save has been completed, a time of about 0.2 seconds multiplied by the total number of files is required to redisplay the file information on the floppy disk control screen.

LOAD: Transfers data from the floppy disk to the 8825.

- When the type of file is WAVE (measurement data), then the destination channel for receiving the data should be designated.

1. Using the up and down cursor keys or the rotary knob, move the bar cursor and designate the file to be transferred.
2. Press the function key F2 (LOAD). A screen appears as shown on the right with details about the file.
3. When the type of file is WAVE, select the types of transfer.



● Type of transfer and conditions

- No waveform in memory → Waveform saved using partial save → Selact load (①)
- No waveform in memory → Waveform saved not using partial save → Simple load (5.)
- Waveform present in memory → Whole waveform fits in memory → Simple load (5.)
- Waveform present in memory → Previously transferred length shorter than recording length → Append load (②)

① Select load (FULL, MINIMUM)

Function key indication	Meaning
LOAD FULL	: Fill memory corresponding to the length when the partical save was carried out.
LOAD MINIMUM	: Fill memory corresponding to the minimum recording length which includes the partical save waveform.
(quit)	: Exit from LOAD command

② Append load (from START, APPEND)

Function key indication	Meaning
LOAD fromSTART	: Fill from the start of memory.
LOAD APPEND	: Append to yhe end of previously transferred waveform.
(quit)	: Exit from LOAD command

4. When the type of file is WAVE, then, because the recorded memory channels are displayed, the destination channel can be specified.

Function key indication	Meaning
(exec)	: Starts the transfer.
	Channel 1 through 16
CH∧	
CH∨	
(quit)	: Exit from LOAD command

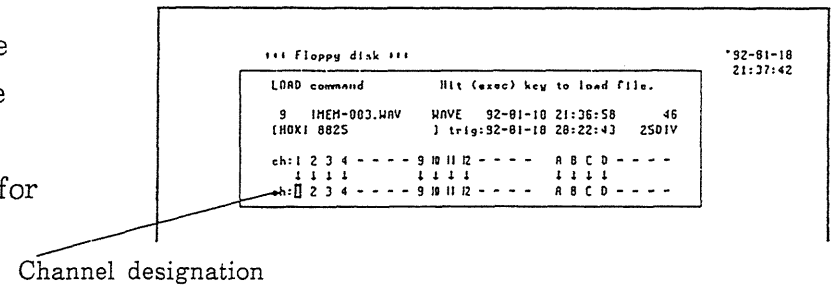
5. Pressing the function key F1 (exec) causes the LOAD command to be executed.
6. When the loading is finished, the floppy disk control screen is displayed again.

Notes

- WAVE data is compatible with the 8840.
- It is possible to transfer data on the 8825 to the 8840, and equally in reverse it is possible to transfer data saved on the 8840 to the 8825.

Channel specification

1. The channels which are recorded in the file are displayed.
   A dash " - " is shown for channels that are not recorded.



   1, 2, 3, and 4 correspond to the data for analog channels 1, 2, 3, and 4, and A, B, C, and D correspond to the data of logic input channel groups A, B, C, and D, respectively.
2. This screen is for establishing into which channels of the memory of the 8825 the data will be transferred. At first the screen appears as described above in step 1; pressing the function key F1 (exec) immediately transfers the data to the same channels in memory, i.e. as when the data was saved.
   To change the channels into which the data will be loaded, move the cursor using the right and left cursor keys and set the channels with the function keys F3 (CH∧) and F4 (CH∨), before carrying out the transfer.

NB: Data transfer takes place in the order of Channel 1 through Channel 16 and then CHA through CHH.
If a channel is designated more than once, that channel is written into several times. The data transferred last takes precedence.

Notes

- If the recording length in the file is longer than the recording length set on the 8825, only the initial portion of the waveform data from its start as far as the recording length of the 8825 will be loaded, and the remaining portion of the data will not be loaded. If the recording length of the 8825 is longer than the recording length of the file, then the last portion of the recording length not filled by the waveform data is filled with zeros.
- When FUNC (setting state) data is transferred, the settings relating to existing waveforms in memory in the 8825 are updated. This will be reflected in subsequent listings of settings.
- Time taken for loading

  This depends on the type of file

  FUNC (setting state) ····· about 2 seconds

  AREA (waveform decision area) ····· about 4 seconds

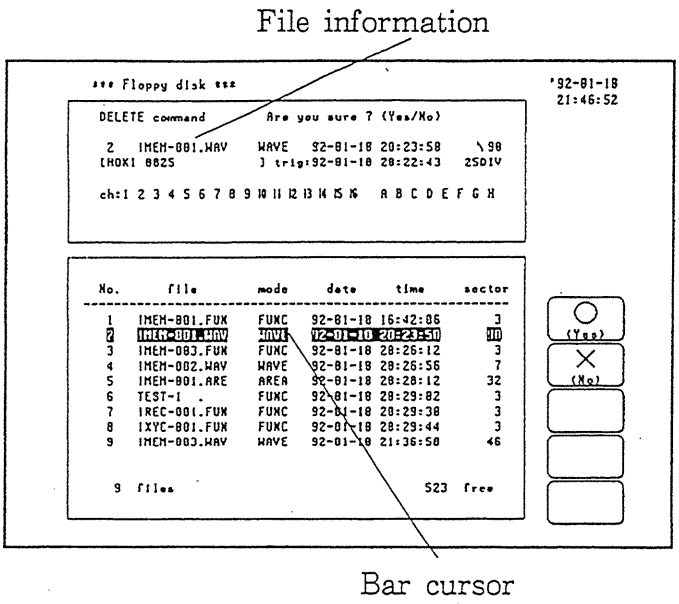
  WAVE (measurement data) ····· for a recording length of 50 divisions and 16 channels, about 30 seconds.

  For a WAVE (measurement data) file, the time taken for loading is approximately proportional to the recording length and to the number of channels.

  After the load has been completed, a time of about 0.2 seconds multiplied by the total number of files is required to redisplay the file information on the floppy disk control screen.

DELETE: Deletes a designated file from the floppy disk.

1. Using the up and down cursor keys or the rotary knob, select the file to be deleted.
2. Press the function key F3 (DELETE). A screen appears as shown on the right with details about the file.
3. Make the selection according to the displays on the function keys.



Function key indication — Meaning

(Yes) : Deletes the designated file.

(No) : Cancels the DELETE command.

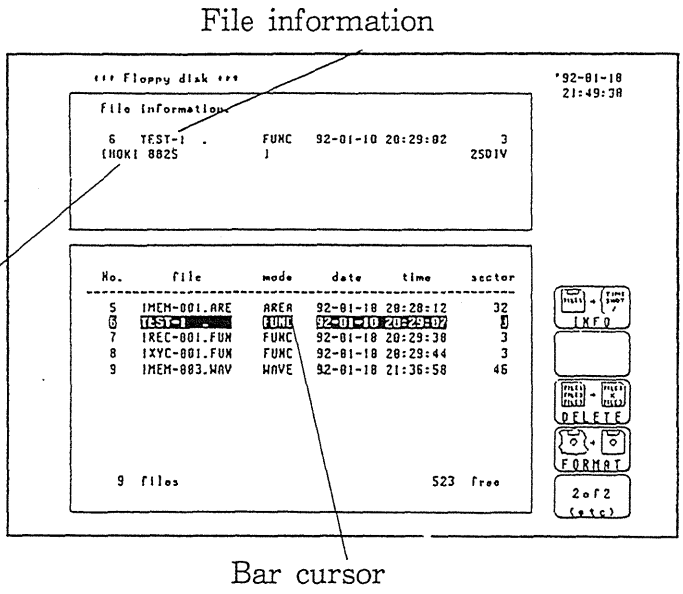
After the deletion has been completed and while directory display is being performed, the following message appears on the display:

"Now deleting. Please wait."

NB: Function keys other than F1 (Yes) and F2 (No) have no effect.

INFO.: Provides detailed information about a file.

1. Using the up and down cursor keys or the rotary knob, select the file about which the details are required.

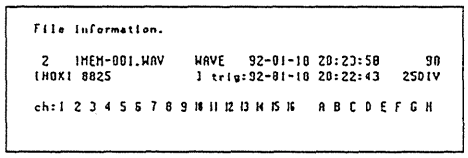


2. Press the function key F1 (INFO), and a screen will appear as shown on the right with detailed information about the file.
   A heading (title comment) input from the "system" screen is shown here.

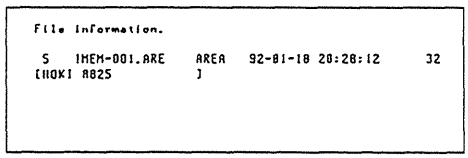
   NB: The details of the file are also shown when LOAD and DELETE are executed.

   When the type of file is WAVE or AREA, the screen appears as shown on the right.

When the file type is WAVE



When the file type is AREA

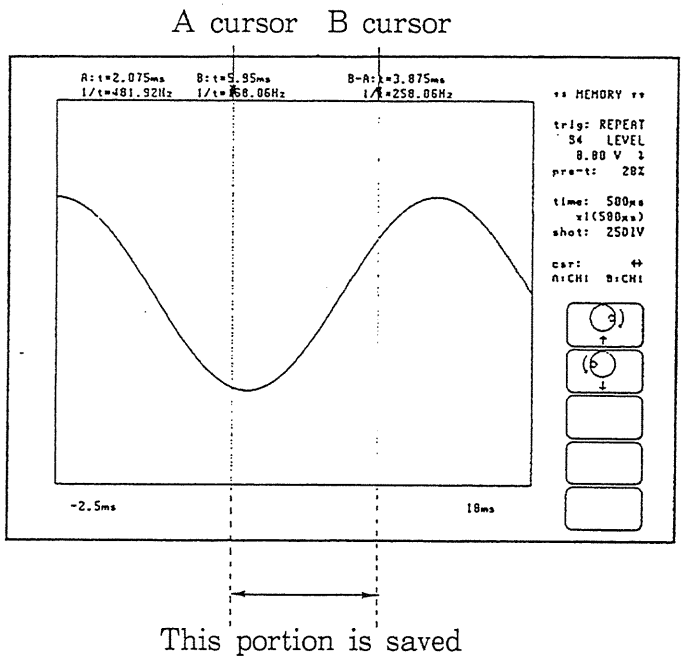


14-6 Partial Save Function

In the memory recorder function and the recorder function modes, the portion of the captured waveform delimited by the A and B cursors can be saved to the floppy disk as measurement data.

Method (Screen for making this setting: the floppy disk control screen)

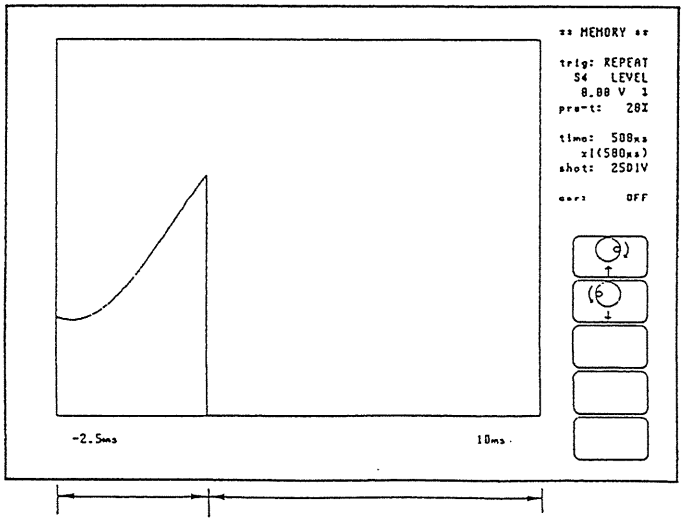
1. After measurement is finished, select the portion to save with the A and B cursors, which may be the vertical cursors or the cross cursors.
2. Press the FD key, and, after the floppy disk control screen appears, perform a save to the floppy disk by an identical procedure to that employed for normal measurement data. (See the SAVE command in Section 14-5 "Detailed Explanation of the Commands.")



Notes

The recording length of a waveform which is partially saved is determined as the minimum recording length which includes the designated range. The remainder of the recording length is filled by measurement data if such measurement data exists, while if such measurement data does not exist it is filled by zeros.

Example



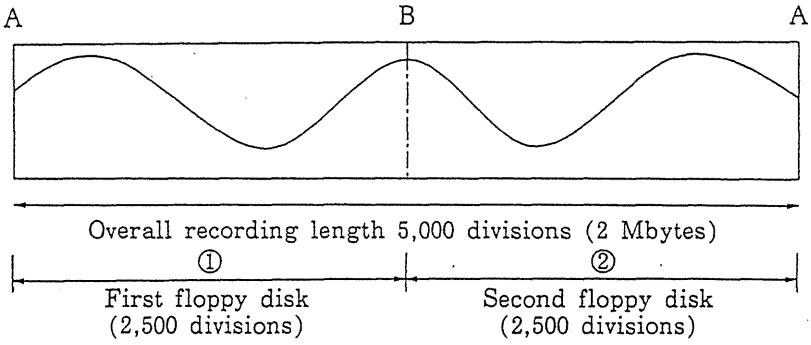
Designated portion

If measurement data exits, the remainder is filled by the data.

The portion where there is no waveform data is made up with zeros.

Reference

(1) The following example procedure assume the recording length is 5,000 divisions, and saved the waveform data corresponding to one channel on two of 2DD floppy disks.



1. Positions the A cursor at the beginning of the recording ("A" in the figure above), and B cursor at 2,500 divisions from the beginning ("B" in the figure above).
   (See Section 5-4-12. "Using the A and B cursor" of the 8825 manual.)
2. Switch to the floppy disk control screen, and carry out a save. This saves the first section (① in the figure above) to a first floppy disk. Actually this saves 250,001 points of the waveform data. (1 DIV = 100 points)
3. Return to the DISPLAY screen, and move the B cursor one division to the right, and move the A cursor to the right end of the display ("A'" in the figure above).
4. Again carry out a save operation, This saves the second section (② in the figure above) to a second floppy disk. This saves the remaining 250,000 points if the waveform data.
5. Thus the single waveform has been saved to two floppy disks.

(2) The following procedure loads a single waveform saved on two floppy disks into the unit.

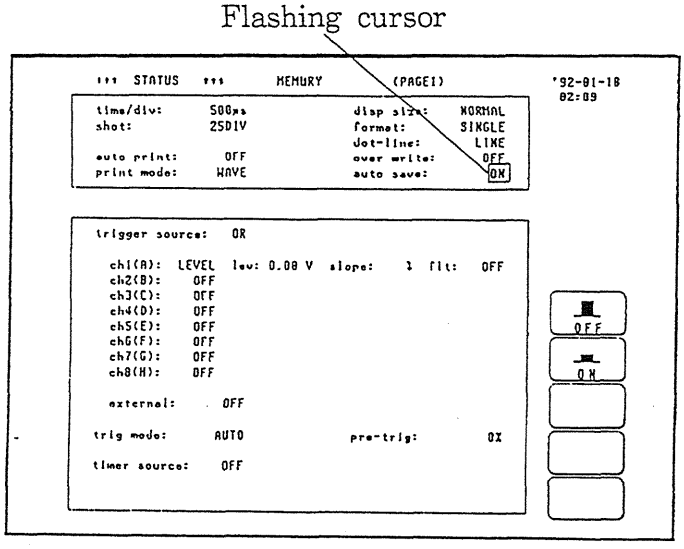
1. On the SYSTEM screen, "INITIALIZE", DATA CLEAR is executed.
2. Load the waveform data saved as the first section ① in the procedure (1) above.
3. Select function key F1 (FULL), and load the waveform equal to the recording length of a waveform which is partically saved into memory from the beginning.
4. Next load the waveform data saved as the second section ② in the procedure (1) above.
5. Select function key F2 (APPEND), and load the waveform into memory following in from the first section.
6. Thus the single waveform saved two floppy disks has been loaded into the unit.

14-7 Auto Save Function

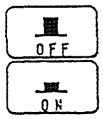
In the memory recorder function and the FFT function modes, this function automatically records a captured waveform on the floppy disk during the measurement process.

Method (Screen for making this setting: the "status" screen)

1. Press the STATUS key and the "status" screen will appear.
2. By using the cursor keys, move the flashing cursor to the "auto save" item.
3. According to the displays on the function keys, select the desired action.



Function key indication — Meaning



: Auto save will not be performed.

: Auto save will be performed.

With the above, the setting for the auto save function is completed.
After inserting a floppy disk and performing measurement and capturing data into the memory of the 8825, this data is shown on the display and is also automatically saved onto the floppy disk.

NB: • Check that the waveform can be recorded in the space remaining on the floppy disk. If the remaining space is not sufficient, the waveform will be captured and displayed without being saved.
During a save, capturing of the waveform is not performed.
The following message appears:
"Auto saving"

• The channels that are saved are those for which ON appears.
For a logic waveform all the channels are saved, whichever channels may be displayed.

• Make sure the write-protect tab on the floppy disk is in the unset position.
When data is saved by the auto save function the filename used follows this pattern:

File name	Type
#AUTO001.WAV	WAVE

Shows that this is a file made by the auto save function

3 digits, 001 to 999

Notes

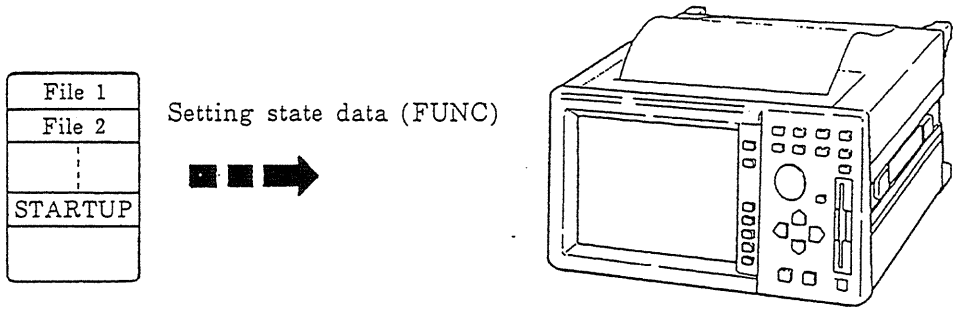
- When the waveform decision function is ON:

  When the waveform decision action has stopped, the measurement data is saved.
- When the memory segmentation function (sequential save) is ON:

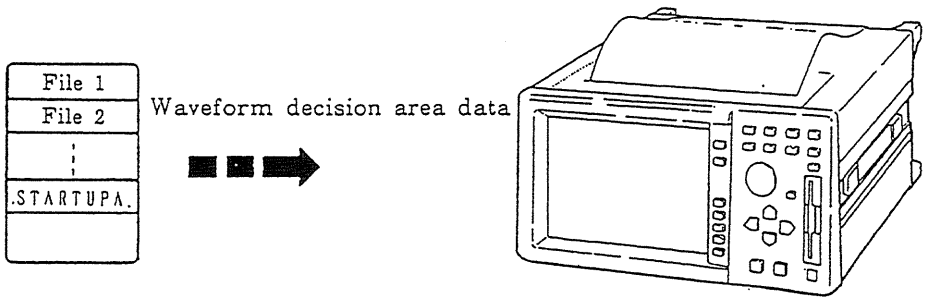
  When captured waveform data has been saved into all the specified memory blocks, it is saved in order from the first memory block.

14-8 Auto Setup Function

(1) When the power is switched on with a floppy disk inserted, the setting up of the 8825 is performed automatically by reading the setting state (FUNC) file called STARTUP on the floppy disk. Thus, just by switching on the power with the floppy disk in, the same measurement conditions can be established.



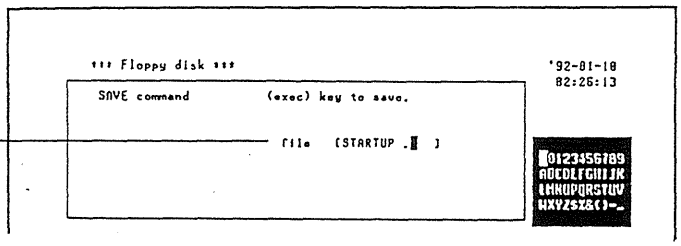
(2) When the power is switched on with a floppy disk inserted, by reading the waveform decision area (AREA) file called STARTUPA on the floppy disk, waveform decision area and waveform decision conditions are automatically set up in the 8825. This function is useful for repeating waveform decisions the same decision area, for example for testing.



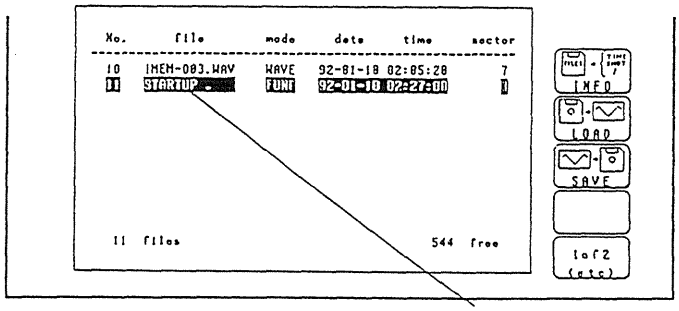
Procedure

(1) Auto setup function for setting state (FUNC)

1. Set all of the required conditions on the "status" screen, the "trigger" screen, the "display" screen, and the "system" screen.
2. Press the FD key and the floppy disk control screen will appear.



3. Press the function key F3 (SAVE) and the function key F2 (FUNC) in that order.
4. Set the file name to [STARTUP.]
5. Press the function key F3 (exec) and the save will be performed.



Auto setup file

This creates a file called STARTUP. on the floppy disk.

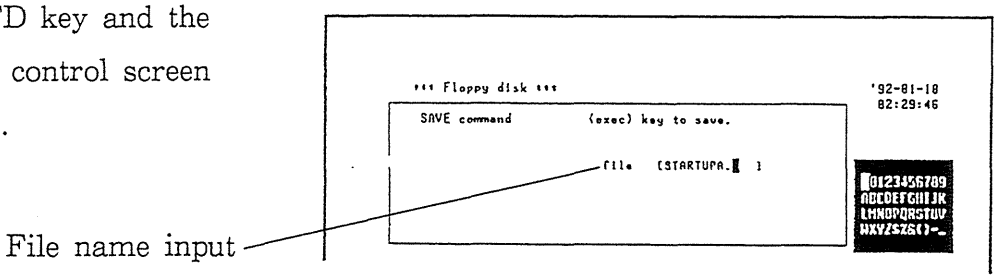
This completes the setting up of the auto setup function.

Next check the operation of the auto setup function as follows.

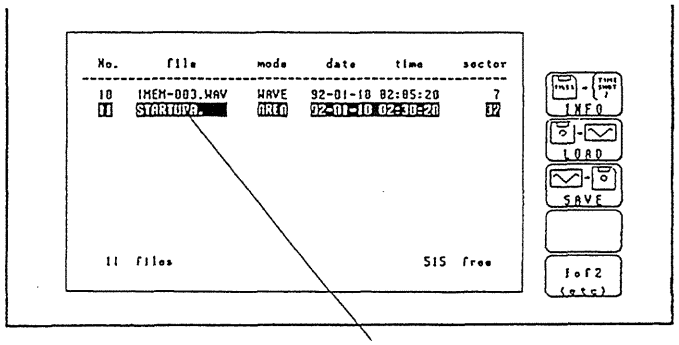
6. Press the FD key again and the floppy disk control screen will disappear.
7. Change the setting state to be different from the one when step 1 was performed.
8. Check that a floppy disk is inserted into the floppy disk drive, and turn the power temporarily off and then on again. The setting state should now no longer be set as it was in step 7, but should have been reset to what it was when step 1 was performed.

(2) Auto setup function for waveform decision area.

1. Set the waveform decision area which it is desired to record.
   At the same time, set the setting state (waveform decision mode, stop mode) for when the waveform decision is performed.
   For details, see Section 10-3 "Using the editor."
2. Press the FD key and the floppy disk control screen will appear.



3. Press the function key F3 (SAVE) and the function key F3 (AREA) in that order.
4. Set the file name to [STARTUPA.]
5. Press the function key F1 (exec) and the save will be performed.
   This creates a file called STARTUPA. on the floppy disk.



   With this the setting up of the auto setup function is completed.
   Next the operation of the auto setup function should be checked in the following manner.
6. Press the FD key again and the floppy disk control screen will disappear.
7. Set a waveform decision area different from the one set in step 1.
8. Check that a floppy disk is inserted into the floppy disk drive, and turn the power temporarily off and then on again. The waveform decision area should now no longer be set as it was in step 7, but should have been automatically reset to what it was previously set to in step 1.

14-9 Example Floppy Disk Operation

In this example a waveform which was captured on channel 1, then saved on a floppy disk is read back in and superimposed on a newly recorded waveform, to be compared with it.

(1) In the memory recorder function mode, the input signal on channel 1 is recorded with the following settings:

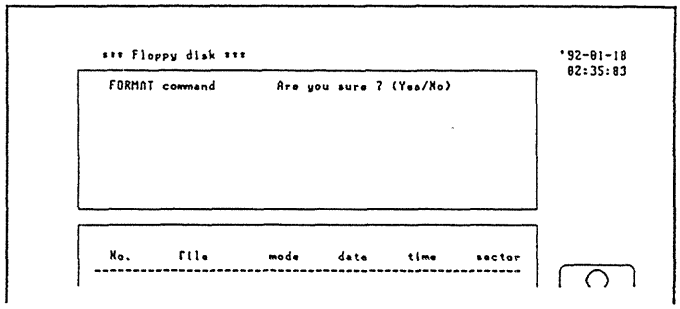
Time axis range ····· 500 μs/divisions

Recording length ····· 25 divisions

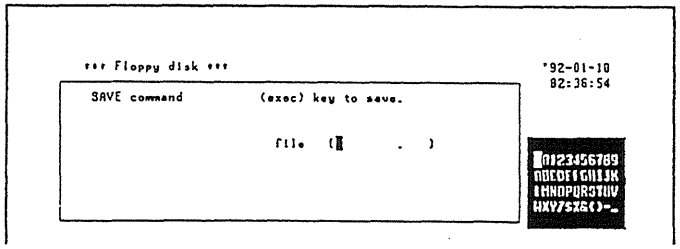
(2) A floppy disk is inserted into the 8825 main unit floppy disk drive.

(3) The FD key is pressed, and the floppy disk control screen is displayed.

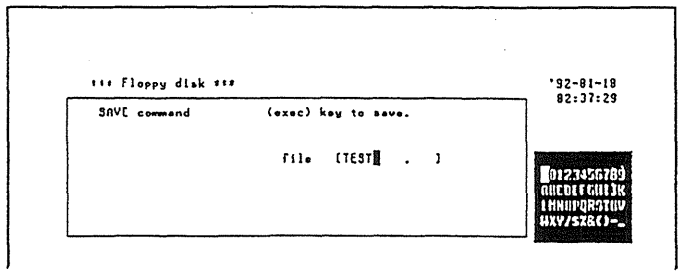
If the floppy disk is a new one, it should be formatted by pressing the function key F4 (FORMAT) and then the function key F1 (Yes) in that order.



(4) The measurement data is recorded on the floppy disk by pressing the function key F3 (SAVE), the function key F1 (WAVE), and the function key F2 (CH1) in that order.



(5) The file name is set to "TEST". The letters of this file name are input in order by turning the rotary knob so as to select characters from the window, and by pressing the right cursor key.

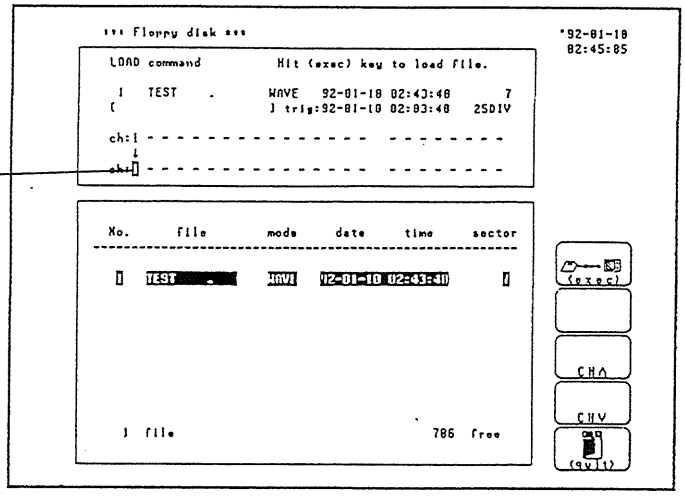


(6) The function key F1 (exec) is pressed and the save is performed.

(7) In the same setting state, a new waveform is recorded on channel 1.

Now both the waveform which has been recorded as "TEST" on the floppy disk and this latest waveform which has been recorded on channel 1 will be simultaneously displayed for comparison.

(8) From the "display" screen, the FD key is pressed, and the floppy disk control screen appears.



(9) The file "TEST" will now be loaded from the floppy disk into channel 2 of the the 8825 main unit. With the bar cursor the file "TEST" is selected, and the function key F2 (LOAD) is pressed.

(10) With the function keys F3 (CH∧) and F4 (CH∨), the screen is set so as to load into the memory for channel 2.

ch:1·····

↓

ch:2 ·····

(11) By pressing the function key F1 (exec), the load is executed.

(12) By pressing the FD key again, and by making the display of channel 2 either DARK or LIGHT, now this waveform which has been recorded on channel 1 and the waveform "TEST" on the floppy disk are simultaneously displayed. In this manner, it is possible to compare a waveform recorded on the floppy disk with a currently measured waveform.

14-10 Internal File Format

A file saved on a floppy disk begins with a header record, in the following format. This will be required in order to read data stored on the floppy disk into a personal computer.

Note that bytes in this header record are numbered from 1, rather than being conventional byte offsets (from 0).

HIOKI8825V 1.00 2MEMWAVE91-08-02 12:16:11 20%HIOKI 8825 Sample 01 100/DIV 25 DIV 2501W12 10ms/DIV 80/DIV 16 2111111111111111100 8907 1V/DIV 30% OFF DC (channels 2 through 15 are the same) 8907 2V/DIV 50% OFF DC

Byte number: Example data	Meaning	Number of characters
1:HIOKI8825	ID	(9)
10:V␣1.00	Version	(6)
16:␣2	Length of header	(2)
18:MEM	Function mode	(3)
21:WAVE	Type of file	(4)
25:91-08-02␣12:16:11	Trigger instant	(17)
42:␣␣␣20%	Pre-trigger	(6)
48:HIOKI␣8825␣Sample␣01	Title comment	(20)
68:␣␣100/DIV	Time axis data per division	(8)
76:␣␣25␣DIV	Recording length	(8)
84:␣␣␣␣2501	Total number of data values	(7)
91:W	Length of data word	(1)
92:12	A/D resolution	(2)
94:␣␣10ms/DIV	Time/division	(9)
103:␣80/DIV	Voltage axis data per division	(8)
111:␣␣16	Number of analog channels	(3)
114:␣␣2	Number of logic channels	(3)
117:11111111111111100	Data save conditions	(16+2)
135:8907␣␣1V␣/DIV␣␣␣30%␣␣␣OFF␣DC	Channel 1 ※1	(28)
⟩ (channels 2 through 15 are the same)		
555:8907␣␣2V␣/DIV␣␣␣50%␣␣␣OFF␣DC	Channel 16 ※1	(28)

※1: model number (4), voltage range (9), origin position (6), filter (6), input coupling (3)

Details of the data values

ID : The name of the type of device the data was stored from.

Version : The ROM version.

Length of header : The length of the header record at the beginning of the file (unit is blocks, 1 block = 1024 bytes).

Function : The function mode of the saved data:
MEM ····· memory recorder function mode;
REC ····· recorder function mode;
XYc ····· XY recorder function mode.

Type of file : The type of the saved data:
WAVE ····· measurement data;
FUNC ····· setting state;
AREA ····· waveform decision area.

Trigger instant : The time instant of triggering.

Pre-trigger : The proportion of the recording length before the trigger.

Title comment : Heading comment attached to a set of data.

Time axis data per division : The number of data samples per division.

Recording length : The recording length (shot length) of the saved data.

Total number of data samples : The total number of saved data samples.

Length of data word : The length of one data sample.
W= 16 bits (2 bytes).

A/D resolution : The A/D resolution.

Time/division : Shows time axis information for the saved waveform.

Voltage axis data per division : The resolution per one division.

Number of analog channels : The number of analog input units. (maximum value)

Number of logic channels : The number of logic channels, in units of 16 channels.

Data save condition : Shows whether the data for the corresponding channel was saved;
0 ··· not saved;
1 ··· saved.

Channel 1 to channel 16 : Show the information in the corresponding channel: model number, voltage range, origin position, filter, and input coupling.

Internal structure of a measurement data file

The following example shows the case when channel 1, channel 3 and logic data have been saved.

File information (1024 × 2 bytes)
Waveform data (channel 1) (total number of data samples × 2 bytes)
Waveform data (channel 3) (total number of data samples × 2 bytes)
Waveform data (logic) (total number of data samples × 2 bytes)

① Analog data

Sample 1 (upper byte)	Sample 1 (lower byte)	Sample 2 (upper byte)	Sample 2 (lower byte)	...

Sample 1 (16 bits) Sample 2 (16 bits)

② Logic data

CHA	CHB	CHC	CHD	CHA	CHB	CHC	CHD	...

Sample 1 (16 bits) Sample 2 (16 bits)

14-11 Sample Program for IBM-PC(VGA) Series

This program runs on an IBM-PC(VGA) series computer, and reads and lists the data from a file on floppy disk.

```
10 SCREEN 12: CLS
20 'Read Header from File ********************************************************
30 DIM D1(1000), D2(1000)
40 INPUT "File name=",FI$
50 OPEN FI$ FOR BINARY AS #1
60 FLAG=1
70 FOR I=0 TO 1024*2-1
80 A$=INPUT$(1,#1):IF A$=CHR$(&H1A) THEN FLAG=0
90 IF FLAG=0 THEN 150
100 IF I>=639 THEN 150
110 IF I>=582 THEN HG$=HG$+A$:GOTO 150
120 IF I>=358 THEN HF$=HF$+A$:GOTO 150
130 IF I>=134 THEN HE$=HE$+A$:GOTO 150
140 HD$=HD$+A$
150 NEXT
160 'Display Header ***************************************************************
170 ID$=MID$(HD$,  1, 9):LOCATE 2,  1:PRINT "ID=";ID$
180 VR$=MID$(HD$, 10, 6):LOCATE 2, 21:PRINT "Version=";VR$
190 HL$=MID$(HD$, 16, 2):LOCATE 2, 41:PRINT "Header len.=";HL$
200 FU$=MID$(HD$, 18, 3):LOCATE 3,  1:PRINT "Function=";FU$
210 KI$=MID$(HD$, 21, 4):LOCATE 3, 21:PRINT "Kind=";KI$
220 TT$=MID$(HD$, 25,17):LOCATE 3, 41:PRINT "Trig. Time=";TT$
230 PT$=MID$(HD$, 42, 6):IF FU$<>"FFT" THEN LOCATE 6,61:PRINT "Pen Trig.=";PT$
240 CO$=MID$(HD$, 48,20):IF FU$<>"FFT" THEN LOCATE 7, 1:PRINT "Comment=";CO$
250 TP$=MID$(HD$, 68, 8):IF FU$<>"FFT" THEN LOCATE 5, 1:PRINT "X axis=";TP$
260 SH$=MID$(HD$, 76, 8):IF FU$<>"FFT" THEN LOCATE 5,21:PRINT "Shot len.=";SH$
270 TD$=MID$(HD$, 84, 7):IF FU$<>"FFT" THEN LOCATE 5,61:PRINT "No.of Date=";TD$
280 DL$=MID$(HD$, 91, 1):IF FU$<>"FFT" THEN LOCATE 6,21:PRINT "Date len.=";DL$
290 AD$=MID$(HD$, 92, 2):IF FU$<>"FFT" THEN LOCATE 6,41:PRINT "A/D=";AD$
300 TI$=MID$(HD$, 94, 9):IF FU$<>"FFT" THEN LOCATE 5,41:PRINT "TIME=";TI$
310 YP$=MID$(HD$,103, 8):IF FU$<>"FFT" THEN LOCATE 6, 1:PRINT "Y axis=";YP$
320 AN$=MID$(HD$,111, 3):IF FU$<>"FFT" THEN LOCATE 4, 1:PRINT "Analog=";AN$
330 LN$=MID$(HD$,114, 3):IF FU$<>"FFT" THEN LOCATE 4,21:PRINT "Logic=";LN$
340 AC$=MID$(HD$,117, VAL(AN$)):IF FU$<>"FFT" THEN LOCATE 4,41:PRINT ;AC$
    'Analog channel ON,OFF
350 LC$=MID$(HD$,133, VAL(LN$)):IF FU$<>"FFT" THEN LOCATE 4,61:PRINT ;LC$
    'Logic channel ON,OFF
360 'Display Graph ****************************************************************
370 IF ID$<>"HIOKI8825" THEN 1290
380 IF KI$<>"WAVE" THEN 1310
390 K$=MID$(SH,5,1):IF K$="k" THEN KK=1000 ELSE KK=1
400 IF FU$="MEM" THEN NUM=VAL(SH$)*VAL(TP$):DIV=1
410 IF FU$="REC" THEN NUM=VAL(SH$)*VAL(TP$)*2:DIV=2
420 IF FU$="FFT" THEN 1330
430 X=30:Y=255:XW=600:YW=250
440 XB=25:YB=INT(2^VAL(AD$)/VAL(YP$)/2.5)
450 YD=YB*VAL(YP4)/YW
460 LOCATE 7, 41:PRINT "(ZOOM=x1)"
470 LOCATE 7, 61:PRINT "MAG=x1/";(NUM)/DIV/(VAL(TP$)*XB)
480 LINE (X,Y-YW/2)-(X+XW,Y-YW/2):LINE -(X+XW,Y+YW/2)
490 LINE -(X,Y+YW/2):LINE -(X,Y-YW/2)
500 FOR L=1 TO XB-1
510 LINE (X+L*XW/XB,Y-YW/2)-(X+L*XW/XB,Y+YW/2),,,&H1111
```

```
520 NEXT
530 FOR L=1 TO YB-1
540 LINE (X,Y-YW/2+L*YW/YB)-(X+XW,Y-YW/2+L*YW/YB),,,&H1111
550 NEXT
560 'Display analog wave and Channel information ******************************
570 FOR CH=1 TO VAL(AN$)
580 IF MID$(AC$, CH$, 1)="0" THEN 940
590 IF CH>=9 THEN 700
600 PP=VAL(MID$(HE$,1+(CH-1)*28+13,5))
610 COLOR ((CH-1 MOD 4)+2
620 LOCATE 10+((CH-1) MOD 8)+INT((CH-1)/4)*6, 7:PRINT;STR$(CH)
630 LOCATE 10+((CH-1) MOD 8)+INT((CH-1)/4)*6, 6:PRINT "CH"
640 LOCATE 10+((CH-1) MOD 8)+INT((CH-1)/4)*6,11:PRINT;MID$(HE$,1+(CH-1)*28,4)
650 LOCATE 10+((CH-1) MOD 8)+INT((CH-1)/4)*6,15:PRINT;MID$(HE$,1+(CH-1)*28+4,9)
660 LOCATE 10+((CH-1) MOD 8)+INT((CH-1)/4)*6,24:PRINT;MID$(HE$,1+(CH-1)*28+13,6)
670 LOCATE 10+((CH-1) MOD 8)+INT((CH-1)/4)*6,30:PRINT;MID$(HE$,1+(CH-1)*28+19,6)
680 LOCATE 10+((CH-1) MOD 8)+INT((CH-1)/4)*6,36:PRINT;MID$(HE$,1+(CH-1)*28+25,3)
690 GOTO 790
700 PP=VAL(MID$(HF$,1+(CH-9)*28+13,5))
710 COLOR ((CH-1) MOD 4)+2
720 LOCATE 10+((CH-9) MOD 8)+INT((CH-9)/4)*6,45:PRINT;STR$(CH)
730 LOCATE 10+((CH-9) MOD 8)+INT((CH-9)/4)*6,44:PRINT "CH"
740 LOCATE 10+((CH-9) MOD 8)+INT((CH-9)/4)*6,49:PRINT;MID$(HF$,1+(CH-9)*28,4)
750 LOCATE 10+((CH-9) MOD 8)+INT((CH-9)/4)*6,53:PRINT;MID$(HF$,1+(CH-9)*28+4,9)
760 LOCATE 10+((CH-9) MOD 8)+INT((CH-9)/4)*6,62:PRINT;MID$(HF$,1+(CH-9)*28+13,6)
770 LOCATE 10+((CH-9) MOD 8)+INT((CH-9)/4)*6,68:PRINT;MID$(HF$,1+(CH-9)*28+19,6)
780 LOCATE 10+((CH-9) MOD 8)+INT((CH-9)/4)*6,74:PRINT;MID$(HF$,1+(CH-9)*28+25,3)
790 A$=INPUT$(1,#1):B$=INPUT$(1,#1)
800 DT=(ASC(A$) AND 2^(VAL(AD$)-8)-1)*256+ASC(B$)
810 YY=Y+((2^(VAL(AD$)-1))-(DT+YB*VAL(YP$)*(PP-50)/100))/YD
820 IF YY<Y-YW/2 THEN YY=Y-YW/2
830 IF YY>Y+YW/2 THEN YY=Y+YW/2
840 PSET (X,YY),((CH-1) MOD 4)+2
850 FOR J=1 TO VAL(TD$)-1
860 K = X+J*XW/(NUM)
870 A$=INPUT$(1,#1):B$=INPUT$(1,#1)
880 DT=(ASC(A$) AND 2^(VAL(AD$)-8)-1)*256+ASC(B$)
890 YY=Y+((2^(VAL(AD$)-1))-(DT+YB*VAL(YP$)*(PP-50)/100))/YD
900 IF YY<Y-YW/2 THEN YY=Y-YW/2
910 IF YY>Y+YW/2 THEN YY=Y+YW/2
920 LINE -(K,YY),((CH-1) MOD 4)+2
930 NEXT
940 NEXT
950 'Display Logic wave ******************************************************
960 FOR CH=1 TO VAL(LN$)
970 IF MID$(LC$, CH, 1)="1" THEN 1230
980 FOR LG=1 TO 16
990 LINE (10,Y-(8-LG+1)/40*YW+YW*(CH-1)/2-YW/4)
    -(25,Y-(8-LG+1)/40*YW+YW*(CH-1)/2-YW/4),INT((LG-1)/4)+2
1000 NEXT
1010 FOR J=0 TO VAL(TD$)-1
1020 A$=INPUT$(1,#1):B$=INPUT$(1,#1)
1030 IF (FU$="REC" AND (J MOD 2)=1) THEN GOTO 1230
1040 AA=ASC(A$):BB=ASC(B$)
1050 FOR LG=1 TO 8
1060 K=X+J*XW/(NUM)
1070 BIT=(2-INT((LG-1)/4))*4-4+((LG-1) MOD 4)
1080 IF J=0 THEN 1110
1090 IF (INT(AA/(2^(BIT))) AND 1)=(INT(AA /(2^(BIT))) AND 1) THEN 1110
1100 LINE (K,Y-(8-LG+1)/40*YW+YW*(CH-1)/2-YW/4)
     -(K,Y-(8-LG+1)/40*YW+YW*(CH-1)/2-YW/4-1*YW/60),INT((LG-1)/4+2
```

```
1110 PSET (K,Y-(8-LG+1)/40*YW+YW*(CH-1)/2-YW/4-(INT(AA/(2^(BIT))) AND 1)*YW/60),
     INT((LG-1)/4)+2
1120 NEXT
1130 FOR LG=9 TO 16
1140 K=X+J*XW/(NUM)
1150 BIT=(4-INT((LG-1)/4))*4-4+((LG-1) MOD 4)
1160 IF J=0 THEN 1190
1170 IF (INT(BB/(2^(BIT))) AND 1)=(INT(BBB/(2^(BIT))) AND 1) THEN 1190
1180 LINE (K,Y-(8-LG+1)/40*YW+YW*(CH-1)/2-YW/4)
     -(K,Y-(8-LG+1)/40*YW+YW*(CH-1)/2-YW/4)
1190 PSET (K,Y-(8-LG+1)/40*YW+YW*(CH-1)/2-YW/4-(INT(BB/(2^(BIT))) AND 1)*YW/60),
     INT((LG-1)/4)+2
1200 NEXT
1210 AAA = AA: BBB = BB
1220 NEXT
1230 NEXT
1240 'End of display ********************************************************
1250 COLOR 7:LOCATE 23,1
1260 CLOSE :END
1270 COLOR 7:LOCATE 22,1
1280 CLOSE :END
1290 LOCATE 11,1:PRINT "This is not a 8825's file."
1300 GOTO 1260
1310 LOCATE 11,1:PRINT "This is not a wave file."
1320 GOTO 1260
1330 'Display FFT wave ******************************************************
1340 LOCATE 2,61:PRINT "Date len.=";DL$
1350 LOCATE 4.41:PRINT "Comment=";CO$
1360 CM$=MID$(HG$, 1, 3):LOCATE 4, 1:PRINT "Channel mode=";CM$
1370 FO$=MID$(HG$, 4, 4):LOCATE 5,41:PRINT "Format=";FO$
1380 FR$=MID$(HG$, 8, 6):LOCATE 5, 1:PRINT "Freq. range=";FR$
1390 IF FO$="DUAL" THEN GOTO 1850
1400 IF FO$="NYQU" THEN GOTO 2720
1410 'Display Single format *************************************************
1420 M1$=MID$(HG$, 14, 3):LOCATE 13, 1:PRINT "Mode=";M1$
1430 C1$=MID$(HG$, 17, 4):LOCATE 14, 1:PRINT "Channel=";C1$
1440 IF(M1$="STR" OR M1$="LIN" OR M1$="RMS" OR M1$="PSP" OR M1$="ACR"
     OR M1$="HIS" OR M1$="OCT") THEN CM=1
1450 IF(M1$="TRF" OR M1$="CSP" OR M1$="CCR" OR M1$="IMP" OR M1$="COH")
     THEN CM=2
1460 IF CM=2 THEN C2=MID$(HG, 39,4):LOCATE 14,17:PRINT C2$
1470 Y1$=MID$(HG$, 21, 9):LOCATE 15, 1:PRINT "Y axis=";Y1$
1480 X1$=MID$(HG$, 30, 6):LOCATE 16, 1:PRINT "X axis=";X1$
1490 X=170:Y=96:XW=400:YW=256:XB=10:YB=10
1500 IF(M1$="STR" OR M1$="ACR" OR M1$="CCR" OR M1$="IMP") THEN PNUM=1000
1510 IF(M1$="LIN" OR M1$="RMS" OR M1$="PSP" OR M1$="HIS" OR M1$="TRF"
     OR M1$="COH" OR M1$="OCT") THEN PNUM=401
1520 LINE (X,Y)-(X+XW,T):LINE-(X+XW,Y+YW):LINE-(X,Y+YW):LINE -(X,Y)
1530 FOR L=1 TO XB-1
1540 LINE (X+L*XW/XB,Y)-(X+L*XW/XB,Y+YW),,,&H1111
1550 NEXT L
1560 FOR L=1 TO YB-1
1570 LINE (X,Y+L*YW/YB)-(X+XW,Y+L*YW/YB),,,&H1111
1580 NEXT L
1590 GOSUB 3190:D1(0)=IDAT:LOCATE 28,41:PRINT;D1(0)
1600 MIN=D1(0):MAX=D1(0)
1610 FOR I=1 TO 999
1620 GOSUB 3190:D1(I)=IDAT:IF I<PNUM-1 THEN LOCATE 28,41:PRINT;D1(I)
1630 IF (D1(I)<MIN AND I<PNUM-1) THEN MIN=D1(I)
1640 IF (D1(I)>MAX AND I>PNUM-1) THEN MAX=D1(I)
1650 NEXT
1660 LOCATE 28, 41:PRINT "          "
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1670 LOCATE  7,  1:PRINT "Max="; MAX
1680 LOCATE 22,  1:PRINT "Min="; MIN
1690 IF(M1$="STR") THEN LOCATE 23,22:PRINT "0s":LOCATE 23.63:PRINT "400/";FR$
1700 IF(M1$="ACR" OR M1$="CCR" OR M1$="IMP") THEN LOCATE 23.22:
     PRINT "-200/";FR$:LOCATE 23,63:PRINT "200/";FR$
1710 IF((M1$="LIN" OR M1$="RMS" OR M1$="PSP" OR M1$="TRF" OR M1$="CSP"
     OR M1$="COH") AND X1$="LIN-Hz") THEN LOCATE 23,23:PRINT "0Hz":LOCATE 23,67:
     PRINT;FR$
1720 IF((M1$="LIN" OR M1$="RMS" OR M1$="PSP" OR M1$="TRF" OR M1$="CSP"
     OR M1$="COH") AND X1$="LOG-Hz") THEN LOCATE 23,23:PRINT "1/400*";FR$:
     LOCATE 23,67:PRINT;FR$
1730 IF X1$="LOG-Hz" AND PNUM<>1000 AND M1$<>"OCT" THEN 1790
1740 PSET (X,Y+YW-((D1(0)-MIN)*YW/(MAX-MIN))),4
1750 FOR I=1 TO PNUM-1
1760 LINE -(X+I*XW/PNUM,Y+YW-((D1(I)-MIN)*YW/(MAX-MIN))),4
1770 NEXT
1780 GOTO 1250
1790 XX = XW/LOG(XW)
1800 PSET (X,Y+YW-((D1(0)-MIN)*YW/(MAX-MIN))),4
1810 FOR I=1 TO PNUM-1
1820 LINE -(X+LOG(I)*XX,Y+YW-((D1(I)-MIN)*YW/(MAX-MIN))),4
1830 NEXT
1840 GOTO 1250
1850 'Display Dual format g1 ************************************************
1860 M1$=MID$(HG$, 14, 3):LOCATE  9, 1:PRINT "Mode=";M1$
1870 C1$=MID$(HG$, 17, 4):LOCATE 10, 1:PRINT "Channel=";C1$
1880 IF(M1$="STR" OR M1$="LIN" OR M1$="RMS" OR M1$="PSP" OR M1$="ACR"
     OR M1$="HIS" OR M1$="OCT") THEN CM=1
1890 IF(M1$="TRF" OR M1$="CSP" OR M1$="CCR" OR M1$="IMP" OR M1$="COH")
     THEN CM=2
1900 IF CM=2 THEN C2$=MID$(HG$, 39, 4):LOCATE 10, 17:PRINT C2$
1910 Y1$=MID$(HG$, 21, 9):LOCATE 11, 1:PRINT "Y axis=";Y1$
1920 X1$=MID$(HG$, 30, 6):LOCATE 12, 1:PRINT "X axis=";X1$
1930 X=170:Y=96:XW=400:YW=128:XB=10:YB=10
1940 IF(M1$="STR" OR M1$="ACR" OR M1$="CCR" OR M1$="IMP") THEN PNUM=1000
1950 IF (M1$="LIN" OR M1$="RMS" OR M1$="PSP" OR M1$="HIS" OR M1$="TRF"
     OR M1$="COH" OR M1$="OCT") THEN PNUM=401
1960 LINE (X,Y)-(X+XW,Y):LINE -(X+XW,Y+YW):LINE-(X,Y+YW):LINE -(X,Y)
1970 FOR L=1 TO XB-1
1980 LINE (X+L*XW/XB,Y)-(X+L*XW/XB,Y+YW),,,&H1111
1990 NEXT L
2000 FOR L=1 TO YB-1
2010 LINE (X,Y+L*YW.YB)-(X+XW,Y+L*YW/YB),,,&H1111
2020 NEXT L
2030 GOSUB 3190: D1(0)=IDAT:LODATE 28,41:PRINT;D1(0)
2040 MIN=D1(0):MAX=D1(0)
2050 FOR I = 1 TO 999
2060 GOSUB 3190:D1(I)=IDAT:IF I<PNUM-1 THEN LOCATE 28,41:PRINT;D1(I)
2070 IF (D1(I)<MIN AND I<PNUM-1) THEN MIN=D1(I)
2080 IF (D1(I)>MAX AND I<PNUM-1) THEN MAX=D1(I)
2090 NEXT
2100 LOCATE 28,41:PRINT "          "
2110 LOCATE  7, 1:PRINT "Max= ";MAX
2120 LOCATE 14, 1:PRINT "Min= ";MIN
2130 IF(M1$="STR") THEN LOCATE 15,22:PRINT "0s":LOCATE 15,63:
     PRINT "400/";FR$
2140 IF (M1$="ACR" OR M1$="CCR" OR M1$="IMP") THEN LOCATE 15,22:
     PRINT "-200/";FR$:LOCATE 15,63:PRINT "200/";FR$
2150 IF((M1$="LIN" OR M1$="RMS" QR M1$="PSP" OR M1$="TRF" OR M1$="CSP"
     OR M1$="COH") AND X1$="LIN-Hz") THEN LOCATE 15.22:PRINT "0Hz":
     LOCATE 15.67:PRINT;FR$
```

```
2160 IF((M1$="LIN" OR M1$="RMS" OR M1$="PSP" OR M1$="TRF" OR M1$="CSP"
    OR M1$="COH") AND X1$="LOG-Hz") THEN LOCATE 15.22:PRINT "1/400*";FR$:
    LOCATE 15,67:PRINT;FR$
2170 IF X1$="LOG-Hz" AND PNUM<>1000 AND M1$<>"OCT" THEN 2230
2180 PSET (X,Y+YW-((D1(0)-MIN)*YW/(MAX-MIN))),4
2190 FOR I=1 TO PNUM-1
2200 LINE -(X+I*XW/PNUM,Y+YW-((D1(I)-MIN)*YW/(MAX-MIN))),4
2210 NEXT
2220 GOTO 2280
2230 XX=XW/LOG(XW)
2240 PSET (X,Y+YW-((D1(0)-MIN)*YW/(MAX-MIN))),4
2250 FOR I=1 TO PNUM-1
2260 LINE -(X+LOG(I)*XX,Y+YW-((D1(I)-MIN)*YW/(MAX-MIN))),4
2270 NEXT
2280 'Display Dual format g2 ************************************************
2290 M2$=MID$(HG$, 36, 3):LOCATE 18, 1:PRINT "Mode=";M2$
2300 C2$=MID$(HG$, 39, 4):LOCATE 19, 1:PRINT "Channel=       ";C2$
2310 IF(M2$="STR" OR M2$="LIN" OR M2$="RMS" OR M2$="PSP" OR M2$="ACR"
    OR M2$="HIS" OR M2$="OCT") THEN CM=1
2320 IF(M2$="TRF" OR M2$="CSP" OR M2$="CCR" OR M2$="IMP" OR M2$="COH")
    THEN CM=2
2330 IF CM=2 THEN C1$=MID$(HG$, 17, 4):LOCATE 19, 12:PRINT C1$
2340 Y2$=MID$(HG$, 43, 9):LOCATE 20, 1:PRINT "Y axis=";Y2$
2350 X2$=MID$(HG$, 52, 6):LOCATE 21, 1:PRINT "X axis=";X2$
2360 X=170:Y=240:XW=400:YW=128:XB=10:YB=10
2370 LINE (X,Y)-(X+YW,Y):LINE -(X+XW,Y+YW):LINE -(X,Y+YW):LINE -(X,Y)
2380 IF(M2$="STR" OR M2$="ACR" OR M2$="CCR" OR M2$="IMP") THEN PNUM=1000
2390 IF(M2$="LIN" OR M2$="RMS" OR M2$="PSP" OR M2$="HIS" OR M2$="TRF"
    OR M2$="COH" OR M2$="OCT") THEN PNUM=401
2400 FOR L=1 TO XB-1
2410 LINE (X+L*XW/XB,Y)-(X+L*XW/XB,Y+YW),,,&H1111
2420 NEXT L
2430 FOR L=1 TO YB-1
2440 LINE (X,Y+L*YW/YB)-(X+XW,Y+L*YW/YB),,,&H1111
2450 NEXT L
2460 GOSUB 3190:D2(0)=IDAT:LOCATE 28,41:PRINT;D2(0)
2470 MIN=D2(0):MAX=D2(0)
2480 FOR I=1 TO 999
2490 GOSUB 3190:D2(I)=IDAT:IF I<PNUM-1 THEN LOCATE 28,41:PRINT;D2(I)
2500 IF (D2(I)<MIN AND I<PNUM-1) THEN MIN=D2(I)
2510 IF (D2(I)>MAX AND I<PNUM-1) THEN MAX=D2(I)
2520 NEXT
2530 LOCATE 28,41:PRINT "          "
2540 LOCATE 16, 1:PRINT "Max= ";MAX
2550 LOCATE 23, 1:PRINT "Min= ";MIN
2560 IF(M2$="STR") THEN LOCATE 24,22:PRINT "0s":LOCATE 24,63:PRINT "400/";FR$
2570 IF(M2$="ACR" OR M2$="CCR" OR M2$="IMP") THEN LOCATE 24,22:
    PRINT "-200/"FR$:LOCATE 24,63:PRINT "200/";FR$
2580 IF((M2$="LIN" OR M2$="RMS" OR M2$="PSP" OR M2$="TRF" OR M2$="CSP"
    OR M2$="COH") AND X2$="LIN-Hz") THEN LOCATE 24,22:PRINT "0Hz":
    LOCATE 24,67:PRINT;FR$
2590 IF((M2$="LIN" OR M2$="RMS" OR M2$="PSP" OR M2$="TRF" OR M2$="CSP"
    OR M2$="COH") AND X2$="LOG-Hz") THEN LOCATE 24,22:
    PRINT "1/400*";FR$:LOCATE 24,67:PRINT;FR$
2600 IF X2$="LOG-Hz" AND PNUM<>1000 AND M1$<>"OCT" THEN 2660
2610 PSET (X,Y+YW-((D2(0)-MIN)*YW/(MAX-MIN))),6
2620 FOR I=1 TO PNUM-1
2630 LINE -(X+I*XW/PNUM.Y+YW((D2(I)-MIN)*YW/(MAX-MIN))),6
2640 NEXT
2650 GOTO 1270
2660 XX=XW/LOG(XW)
2670 PSET (X,Y+YW-((D2(0)-MIN)*YW/(MAX-MIN))),6
```

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2680 FOR I=1 TO PNUM-1
2690 LINE -(X+LOG(I)*XX,Y+YW-((D2(I)-MIN)*YW/(MAX-MIN))),6
2700 NEXT
2710 GOTO 1270
2720 'Display Nyquist format ************************************************
2730 M1$=MID$(HG$, 14, 3):LOCATE 14, 1:PRINT "Mode=";M1$
2740 C1$=MID$(HG$, 17, 4):LOCATE 15, 1:PRINT "Channel=";C1$
2750 IF(M1$="STR" OR M1$="LIN" OR M1$="RMS" OR M1$="PSP" OR M1$="ACR"
     OR M1$="HIS" OR M1$="OCT") THEN CM=1
2760 IF(M1$="TRF" OR M1$="CSP" OR M1$="CCR" OR M1$="IMP" OR M1$="COH")
     THEN CM=2
2770 IF CM=2 THEN C2$=MID$(HG$, 39, 4);LOCATE 15,17:PRINT C2$
2780 Y1$=MID$(HG$, 21, 9);LOCATE 16, 1:PRINT "Y axis=(Imag)"
2790 X1$=MID$(HG$, 30, 6);LOCATE 17, 1:PRINT "X axis=(Real)"
2800 X=170:Y=96:XW=300:YW=300:XB=10:YB=10
2810 IF(M1$="STR" OR M1$="ACR" OR M1$="CCR" OR M1$="IMP") THEN PNUM=1000
2820 IF(M1$="LIN" OR M1$="RMS" OR M1$="PSP" OR M1$="HIS" OR M1$="TRF"
     OR M1$="COH" OR M1$="OCT" THEN PNUM=401
2830 LINE (X,Y)-(X+XW,Y):LINE -(X+XW,Y+YW):LINE -(X,Y+YW):LINE -(X,Y)
2840 FOR L=1 TO XB-1
2850 LINE (X+L*XW/XB,Y)-(X+L*XW/XB,Y+YW),,,&H1111
2860 NEXT L
2870 FOR L=1 TO YB-1
2880 LINE (X,Y+L*YW/YB)-(X+XW,Y+L*YW/YB),,,&H1111
2890 NEXT L
2900 GOSUB 3190:D1(0)=IDAT:LOCATE 28,41:PRINT;D1(0)
2910 MIN1=D1(0):MAX1=D1(0)
2920 FOR I=1 TO 999
2930 GOSUB 3190:D1(I)=IDAT:IF I<PNUM-1 THEN LOCATE 28,41:PRINT;D1(I)
2940 IF (D1(I)<MIN1 AND I<PNUM-1) THEN MIN1=D1(I)
2950 IF (D1(I)>MAX1 AND I<PNUM-1) THEN MAX1=D1(I)
2960 NEXT
2970 LOCATE 28,41:PRINT "          "
2980 GOSUB 3190:D2(0)=IDAT:LOCATE 28,41:PRINT;D2(0)
2990 MIN2=D2(0):MAX2=D2(0)
3000 FOR I=1 TO 999
3010 GOSUB 3190:D2(I)=IDAT:IF I<PNUM-1 THEN LOCATE 28,41:PRINT;D2(I)
3020 IF (D2(I)<MIN2 AND I<PNUM-1) THEN MIN2=D2(I)
3030 IF (D2(I)>MAX2 AND I<PNUM-1) THEN MAX2=D2(I)
3040 NEXT
3050 LOCATE 28,41:PRINT "          "
3060 MAX=ABS(MAX1)
3070 IF MAX<ABS(MIN1) THEN MAX=ABS(MIN1)
3080 IF MAX<ABS(MAX2) THEN MAX=ABS(MAX2)
3090 IF MAX<ABS(MIN2) THEN MAX=ABS(MIN2)
3100 MIN=MAX*-1
3110 LOCATE  8, 1:PRINT "Max=";MAX
3120 LOCATE 24, 1:PRINT "Min=";MIN
3130 PSET (X+((D1(0)-MIN)*XW/(MAX-MIN)),Y+YW-((D2(0)-MIN)*YW/(MAX-MIN))),4
3140 FOR I=1 TO PNUM-1
3150 LINE -(X+((D1(I)-MIN)*XW/(MAX-MIN)),Y+YW-((D2(I)-MIN)*YW/(MAX-MIN))),4
3160 NEXT
3170 GOTO 1250
3180 '*ISUB
3190 A$=""
3200 B$=INPUT$(1,#1)
3210 IF B$=CHR$(&HD) THEN 3240
3220 A$=A$+B$:
3230 GOTO 3200
3240 B$=INPUT$(1,#1)
3250 IDAT=VAL(A$)
3260 RETURN
```

Section 15

Rear Panel

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15-1 Summary

The section "Identification of Controls and Indicators" at the beginning of this volume lists the various connections which can be made to the rear panel of the 8825.

This section deals with the external start/stop function and the key lock function.

15-2 External Start/Stop Function

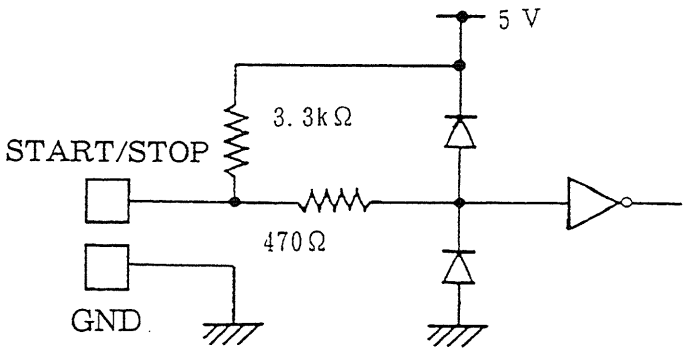
The external control terminals on the rear panel provide start and stop functions for recording in all measurement function modes.

START : Uses an active low input signal with a threshold level of about 2.5 V, or terminal short between the START and GND terminals.

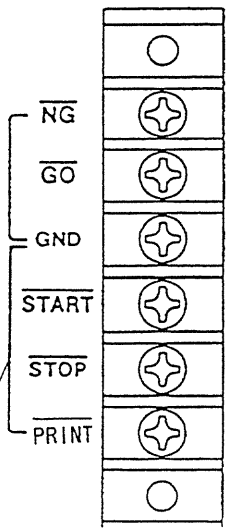
STOP : Uses an active low input signal with a threshold level of about 2.5 V, or terminal short between the STOP and GND terminals.

PRINT : Uses an active low input signal with a threshold of about 2.5 V, or terminal short between the RINT and GND terminals.

Input circuit diagram



Rear panel



External start/stop terminals

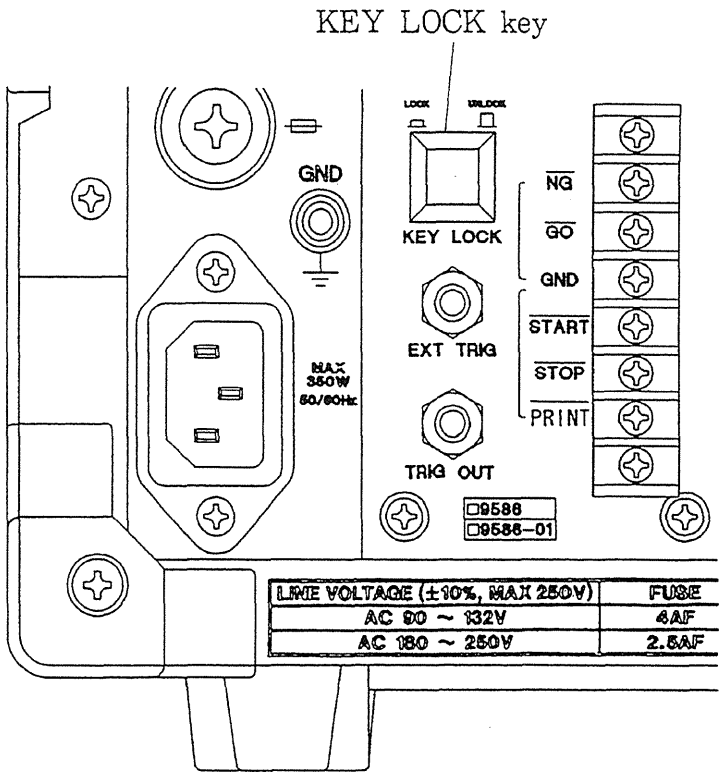
15-3 Key Lock Function

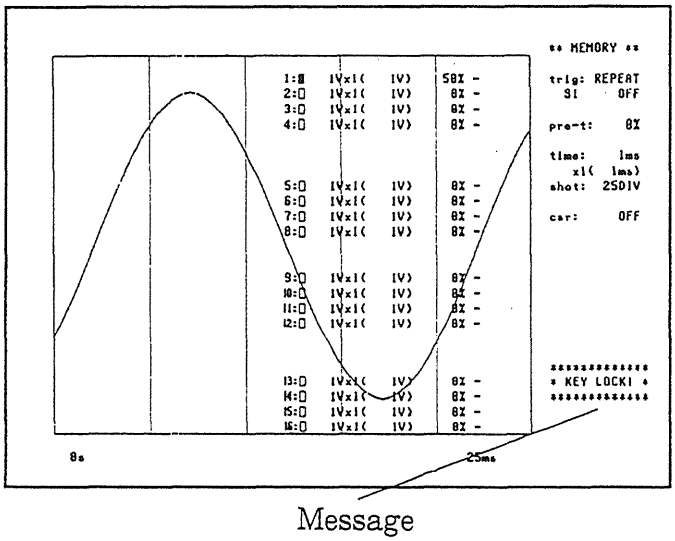
The KEY LOCK key switches to the key lock state. In this state, the message "KEY LOCK" appears on the screen, and all keys on the front panel are disabled.

This function can be used to prevent inadvertent operation of the controls during recording.

The key lock state does not change even if the unit is powered off and on again.

To release the key lock state, press the KEY LOCK key again.





Message

Section 16

Input Units

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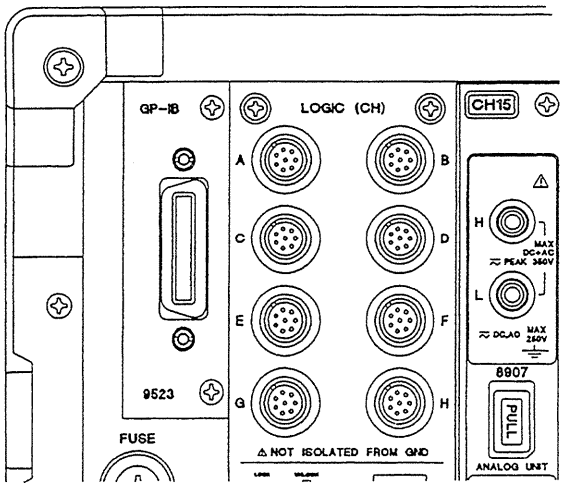
16-1 Logic Inputs

The 8825 has an internal logic input unit, which can record a maximum of 32 channels of logic signals.
For operation details, refer to Section 5-4-9 "Settings for Each of the Input Channels" and Section 8 "Trigger Functions."

16-1-1 Logic Input Unit

The connections to the logic input section are on the rear panel of the 8825.

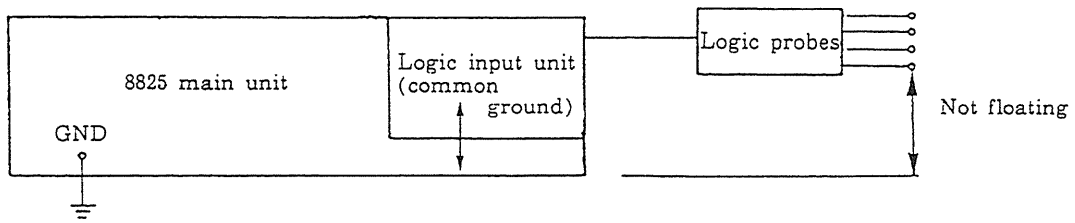


The logic inputs have a common ground with the 8825 GND.

NB: If no logic probe is connected, the corresponding logic waveform is displayed on the screen as high level.

⚠ Warning

- The logic input unit allows eight probes to be connected, but these are not floating, having a common ground with the main unit.
- Do not connect logic probes other than those supplied by Hioki to the logic inputs.



(1) Using the 9306 logic probe

Switchable between voltage input and contact input. Allows a wide range of measurements from electronic circuits to relay timings.

⚠ Warning

- The 8825 allows a maximum of eight 9306 units to be connected, but in this case the units have a common ground.
- Refer to the documentation for the 9306.

(2) Using the 9307 line logic probe

Can detect the on/off state of an AC line. Since a line voltage up to 250 V can be input, this allows timing measurement of relay sequencers and so forth.

⚠ Danger

- Insulation is provided in the probes between the input and output, and between channels. To avoid the danger of electric shock or damage to the equipment, ensure that the applied voltage never exceeds the maximum floating voltage.
- Refer to the instruction manual for the 9307.
- If using an early model (serial number 1987 191974 and earlier), when connected to the 8825 the indicator does not light. (All other functions operate correctly.)

(3) Using the 9308 line dip detector

Detects instantaneous dips on a commercial power line (100 or 120 V AC). The dip level is switchable between approximately 80% and 90%.

⚠ Danger

- The low side banana plug (black) is directly connected to the input clip (black); take care to avoid electric shock.
- An 8907 analog unit is required.
- Refer to the instruction manual for the 9308.

16-2 8907 Analog Unit

This section describes the 8907 analog unit and input cables.
Follow carefully the advice of Section 16-2-3 "Safety requirements."

16-2-1 Overview

The 8907 analog unit is the analog unit for the 8825 Memory HiCorder.
The 8907 allows line voltages up to 100 V AC to be recorded directly.

16-2-2 Specifications

(Accuracy at 23℃±5℃, after 1 hour warming-up time) Accuracy guaranteed for six months.

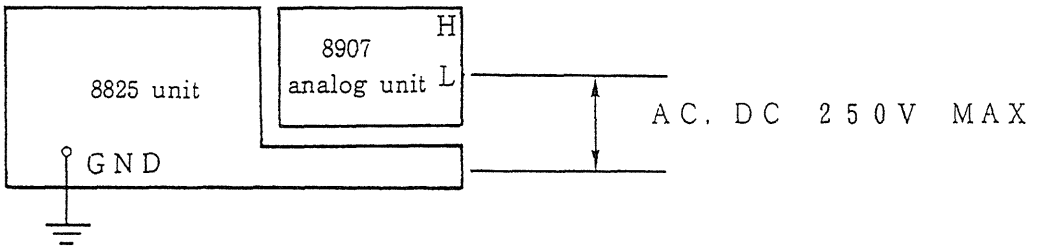
Measurement ranges	: 5, 10, 20, 50, 100, 200, 500 mV/DIV 1, 2, 5, 10, 20 V/DIV
DC amplitude accuracy	: ±0.25% f.s.
Zero position accuracy	: ±0.1% f.s. (after zero adjustment)
Temperature characteristic	: gain ±0.02% f.s./℃ Zero position ±0.015% f.s./℃ (after the zero adjustment)
Frequency characteristic	: DC to 100 kHz ±3 dB
Noise	: 180 μVp-p (typical) maximum sensitivity range, with input shorted
Common mode exclusion ratio	: 80 dB minimum (at 50 Hz or 60 Hz and with signal source resistance 100 Ω maximum)
Input type	: Unbalanced (floating)
Input resistance and capacitance	: 1 MΩ±1%, about 30 pF (at 100 kHz)
A/D resolution	: 12 bits
Maximum sampling speed	: 200 kS/s
Input terminals	: 2 terminals (for banana plugs)
Permitted input voltage	: 350 V (DC+AC peak)
Maximum floating voltage	: 250 V AC or DC (between input unit and frame, and between input units)
Dimensions and weight	: 175 mm (H) × 30 mm (W) × 160 mm (D) approx. (excluding projections); 330 g approx.
Accessories	: 9574 input cables (2)

⚠ Danger

If any metallic portions of the input cables are exposed, there is a danger of electric shock. Use only the 9574 input cables supplied.

⚠ Danger

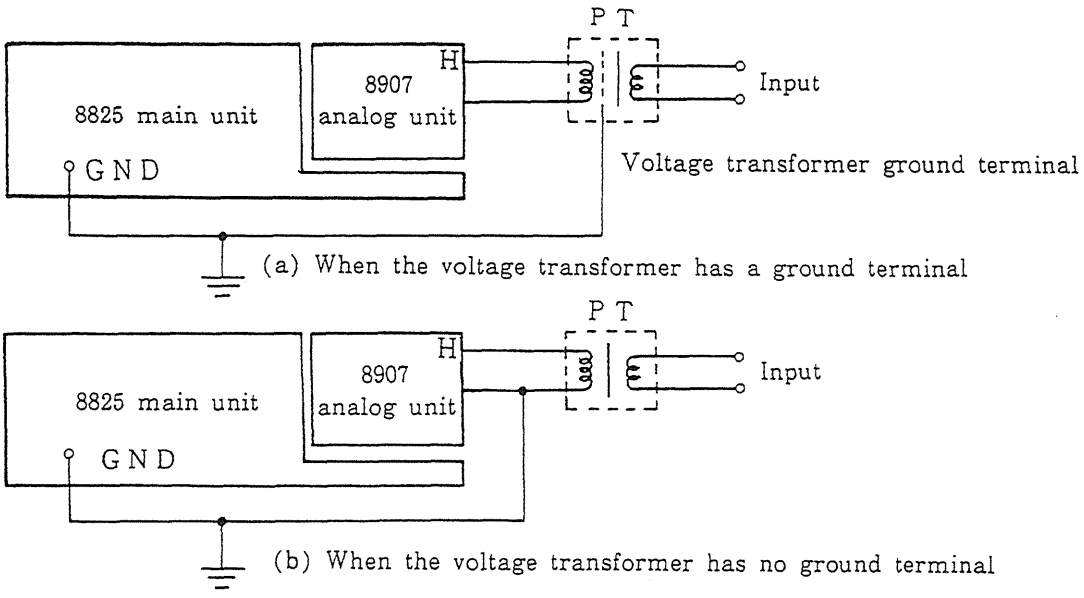
- The 8907 input and the 8825 frame are insulated.
- The maximum floating voltage between the inputs of the 8907 units and the frame of the 8825, or with other analog units, is 250 V AC/DC. To avoid the danger of electric shock or damage to the equipment, ensure that the applied voltage never exceeds the maximum floating voltage.
- The maximum floating voltage does not change even when using an attenuator with the input, for example.



⚠ Danger

- The maximum permitted input to the 8907 is 350 V (DC + AC peak). To avoid the danger of electric shock or damage to the equipment, ensure that the applied voltage never exceeds this level.

- When making measurements on an AC power line for example, using a voltage transformer, ensure that the transformer is appropriately grounded as illustrated below.



This section describes how to replace the analog input units.

The following procedure describes how to remove an analog input unit; reverse the procedure to insert the replacement.

① Remove the input cables from all the input units.

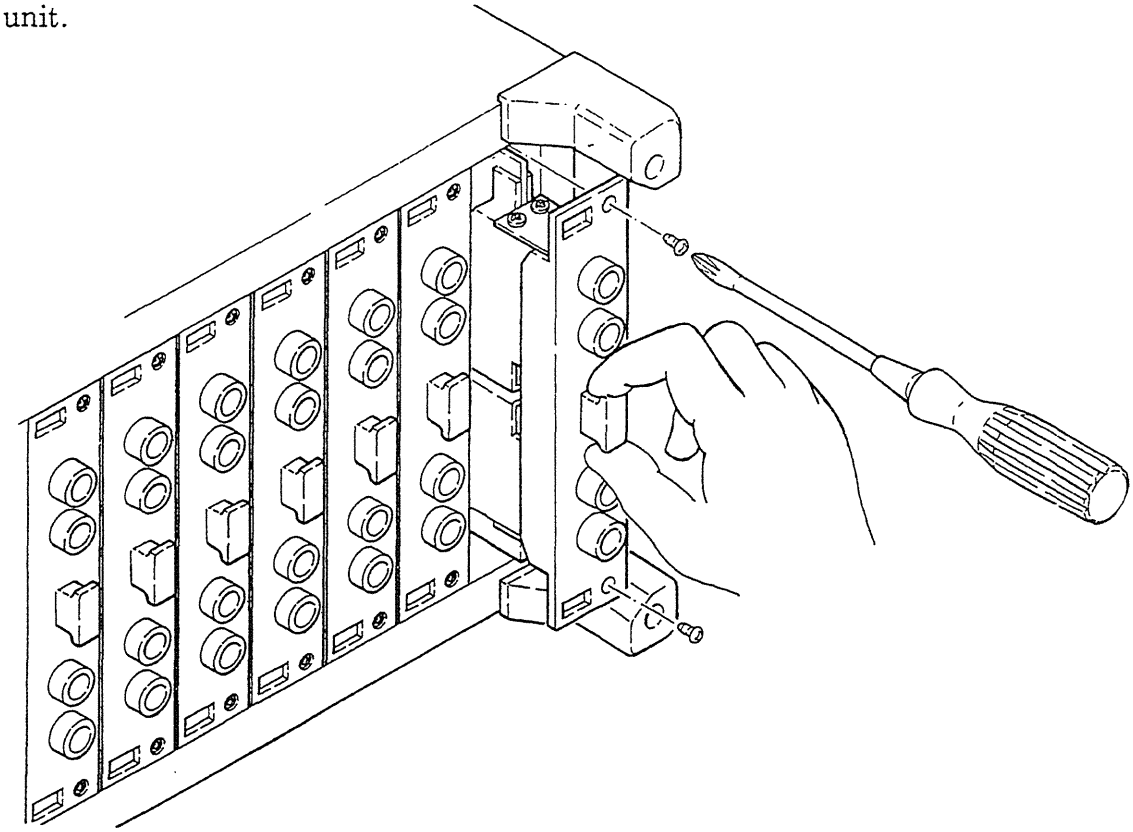
② Power off the 8825 main unit, and disconnect the power cord.

⚠ Danger

To avoid the danger of electric shock, always disconnect the input cables and the power cord before replacing input units.

③ Remove the two fixing screws with a phillips screwdriver, as shown in the figure below.

④ Holding the handles at the center of the input unit, withdraw it from the main unit.



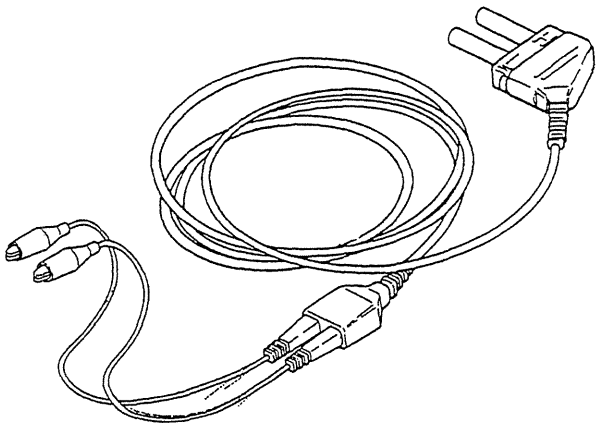
⚠ Danger

- To avoid the danger of electric shock, never operate the 8825 unit with an input unit removed.
- If you should wish to use the unit after removing an input unit, fit a blanking panel.

16-2-5 Input Cables

Only use the special-purpose 9574 input cables for connection to the 8907 analog units.

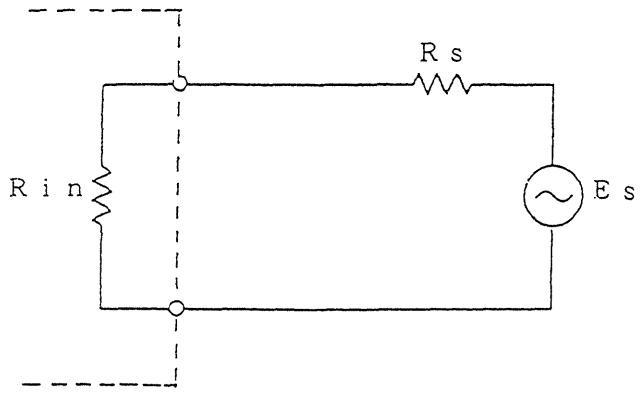
The cables are approximately 1.6 m long, and the portion which plugs into the 8907 has a plastic cover for added safety.



9574 input cable

16-2-6 Measurement Errors Caused by Signal Source Internal Resistance

- This problem only arises if the internal resistance of the signal source is not sufficiently low compared to the internal resistance of the 8825 unit. If it is high, it can lead to measurement errors.



Es : signal voltage
Rs : signal source resistance
Rin : input resistance

$$\text{Measurement error} = Es\left(1 - \frac{Rin}{Rs + Rin}\right)$$

Example: The internal resistance of the 8825 is approximately 1 MΩ, and therefore if the signal source resistance is 1 kΩ the error is increased by approximately 0.1%.

Section 17

Maintenance and Service

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17-1 Changing the Fuse 17-2
17-2 Cleaning the Printer Head 17-3
17-3 Troubleshooting 17-4

17-1 Changing the Fuse

⚠ Danger

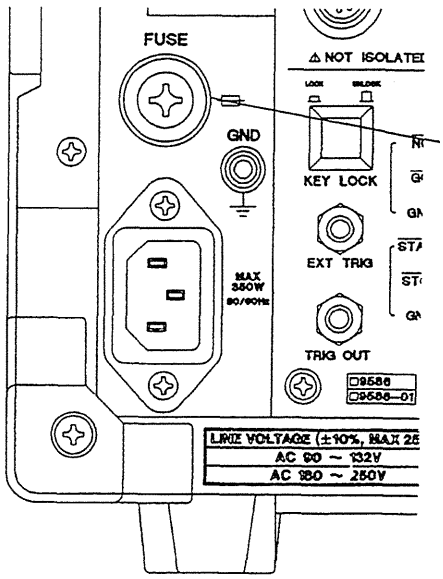
To avoid the danger of electric shock, always disconnect the power cord and input cables from the 8825 before removing or replacing input units or changing the fuse. To ensure safe operation, use only a fuse with the correct voltage and current rating as shown on the rear panel.

⚠ Danger

- If the fuse has blown, there is a possibility of an internal 8825 failure. Check the cause of the fault carefully before replacing the fuse.
- To avoid the danger of electric shock, always remove the power cord from the connector and disconnect the input cables from the 8825 before replacing the fuse.
- To ensure safe operation, use only a fuse of the correct rating.

Ordinary fuse	: For 90 - 132 V AC:	4.0 A / V, size ϕ6.4 × 30 mm
	For 180 - 250 V AC:	2.5 A / V, size ϕ6.4 × 30 mm

① Turn off the power switch on the 8825.
② Remove the 8825 power cord.
③ Remove the fuse from the fuseholder.
④ Replace with the specified fuse.
⑤ Reconnect the power cord.



17-2 Cleaning the Printer Head

However, depending upon the conditions of use, and especially if the printer has been used over a long period of time, it is possible for dirt or paper dust to adhere to the printer thermal head, causing the printing to be faint or otherwise indistinct. If this occurs, use one of the following procedures to clean the printer head.

Method 1: Try recording in the recorder function mode in the high speed range of 500 ms/DIV. Increase the input noise, so as to print for at least 5 seconds in solid black (100% black). If this does not effect enough improvement, then try method 2.

Method 2: Moisten a piece of recording paper with a solvent such as anhydrous alcohol or freon or normal hexane, and insert it into the printer. After lowering the head up lever, move the recording paper to and fro manually, so as to clean the head.

(Because the recording paper will become discolored if alcohol or the like comes into contact with it, use it back to front.)

Notes

- After using alcohol, be sure that the printer is completely dry before operating it.
- Do not use thinners, or similar organic solvents.

17-3 Troubleshooting

If the unit is not functioning normally, check the following items before sending it for repair.

The screen and indicators do not light when powered on.	• Is the power cord correctly connected? • Has the fuse blown?
No waveform appears on the screen when the START key is pressed.	• Is the "pre-trig wait." message displayed? When recording before the trigger, until the corresponding time interval has elapsed, a trigger is not accepted. • Has the "wait for trig." message appeared? Check the trigger settings. • Are all of the channels switched off? • Has the timer trigger been set ?
There is absolutely no variation in the recorded waveform.	• Is the measurement range setting appropriate? • Has a low pass filter (5 Hz or 500 Hz) been set?
The printed recording is very faint or non-existent.	• Is the recording paper back to front? • Are you using the correct (thermal) recording paper?
During memory recorder operation, the apparent frequency of the recording is much lower than the expected frequency.	• This is likely to be an aliasing error. • Either switch to envelope mode, or make the TIME/DIV setting faster. For more details see the background information on aliasing distortion in Section 5-4-2 "Setting the Time Axis Range."
During operation in the recorder function mode, the recording line is very thick.	• A ripple component in the input signal may be the cause. Set the filter setting for the input unit to 5 Hz or 500 Hz.
The keys are dead and do not respond.	• Has the unit been put into the key lock condition (i.e., has the message "KEY LOCK" appeared) ? Press the KEY LOCK key to clear the key lock condition. • If the GP-IB interface is being used, is the unit being remotely controlled ?

If none of the above conditions apply, and the cause of the problem is not understood, try performing a SYSTEM RESET. All the settings will revert to the factory settings. Try the following operation, ① or ②.

System reset

① Execute the "SYSTEM RESET" (3) item on the system screen (INITIALIZE). (See Section 12-2-3. SYSTEM RESET)

② To perform a system reset, power on the unit while holding down the STOP key.

APPENDICES

Appendix 1 Error and Warning Messages

The unit produces two levels of message to indicate problems. These are distinguished as follows.

Error messages

(1) The "ERROR" indication appears at the lower right of the screen, followed by the message. This remains until the cause of the error is removed, or a key is pressed. (In some cases all keys other than the STOP key are disabled.)

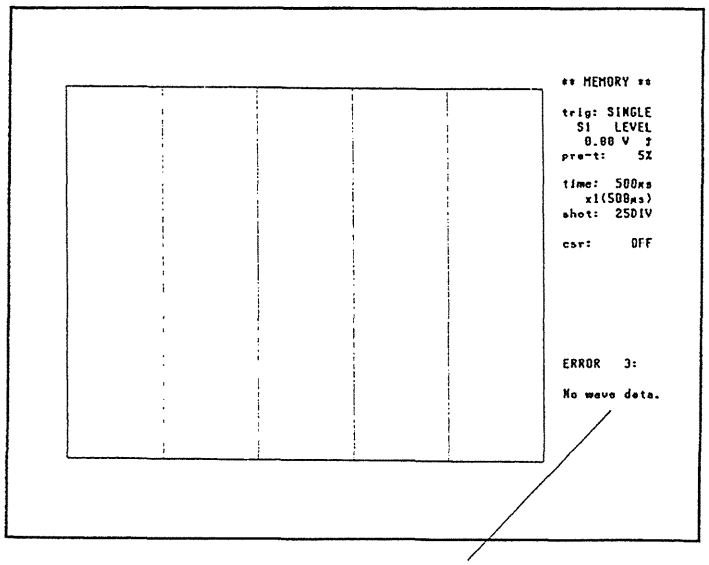
(2) If the "beep sound" item on the "system" screen is set to ON, then the beeper sounds intermittently while the message is displayed.

Warning messages

(1) When the error occurs, the "WARNING" indication is displayed on the bottom line of the screen, followed by the message, but disappears after a few seconds.

(2) Warning messages also disappear if any key is pressed.

(3) If the "beep sound" item on the "system" screen is set to ON, then the beeper sounds once only, when the message is displayed.



Message display position

1-1 Error Messages

ERROR 1: Set printer paper. ·····	Printer paper has run out. Reload.
ERROR 2: Set printer lever. ·····	The head up/down lever has been left in the up position. Lower it.
ERROR 3: No waveform data. ·····	Printing is not possible, because there is no waveform data present. Start measurement operation to capture data.
ERROR 41: Bad A&B cursor position. ·····	The A and B cursors are not suitably positioned. Move the A and B cursors to appropriate positions for the current operation.
ERROR 70: Insert floppy disk. ·····	No disk is present in the floppy disk drive. Insert one.
ERROR 71: Can't load. (not 8825 data) ·····	A file cannot be loaded, because it is not a set of data created by an 8825 unit.
ERROR 72: Illegal format. ·····	The floppy disk is not a correctly formatted MS-DOS disk.
ERROR 73: Write protected. ·····	The floppy disk is write-protected. Change the write-protect setting or use a different disk.
ERROR 74: Disk full. ·····	The save cannot be performed, because there is insufficient space remaining on the disk.
ERROR 75: File is read only. ·····	The file cannot be written or deleted, because it is read-only.
ERROR 76: General failure. ·····	Access to the file has failed because of some low-level error, such as in formatting or file saving.

1-2 Warning Messages

WARNING 201: Set printer paper. ·····	Printer paper has run out. Reload.
WARNING 202: Set printer lever. ·····	The head up/down lever has been left in the up position. Lower it.
WARNING 205: Invalid. (START) ·····	The key pressed is not valid, because measurement operation is in progress.
WARNING 207: AUTO RANGE failure. ·····	Automatic setting with the auto range function has failed. Check the input signal.
WARNING 208: Can't SAVE. (Write protect) ·····	The auto save function has failed, because the floppy disk in the drive is write-protected. Change the write-protect setting or use a different disk.
WARNING 209: Can't SAVE. (Disk full) ·····	The auto save function has failed, because there is insufficient space remaining on the disk.
WARNING 210: Can't SAVE. (FD not ready) ·····	The auto save function has failed, because there is no floppy disk in the floppy disk drive.
WARNING 211: Can't SAVE. (General failure) ···	The auto save function has failed for some other reason.
WARNING 212: Bad A&B cursor position ·····	The auto save function has failed because the A and B cursors are not suitably positioned.
WARNING 213: Invalid(MEASUREMENT) ·····	Because "measurement" is ON, the key which was pressed is not valid.
WARNING 300: Can't START. (SYSTEM) ·····	It is not possible to start operation when the "system" screen is being displayed.
WARNING 301: Invalid key. (SYSTEM) ·····	The key pressed is not valid when the "system" screen is being displayed.
WARNING 327: Invalid key. (FTT) ·····	In the FFT function mode, the key pressed is not valid.
WARNING 328: Invalid. (Over write) ·····	This operation is not possible, since the superimposition function ("over-write") is enabled (ON).

WARNING 329: Wrong format. (set single or XYsingle) ··· Since the format is some format other than single or XYsingle, a waveform decision is not possible.

WARNING 330: Invalid. (SHOT too long) ····· The recording length is too long for the memory segmentation function or a waveform processing calculation to be carried out.

WARNING 332: Wrong FFT format. (set single) ··· Since the format is not either SINGLE or NYQUIST, waveform decision is not enabled.

WARNING 337: Invalid. (ROLL MODE) ····· Since the roll mode function is enabled (ON), superimposition is not possible.

WARNING 338: Invalid. (COMPARISON) ····· Since the waveform decision function is enabled (ON), superimposition is not possible.

WARNING 339: Invalid key. (STATUS) ····· The key pressed is invalid when the "status" screen is being displayed.

WARNING 351: Invalid. (Free run) ····· The pre-trigger setting cannot be made, since all trigger sources are switched off (free run).

WARNING 352: Invalid key. (CHAN) ····· The key pressed is invalid when the "channel" screen is being displayed.

WARNING 380: No reference data. ····· When using the memory segmentation function (multi-block), there is no data in the reference block.

WARNING 381: Ref. block = using block ····· When using the memory segmentation function (multi-block), the reference block and the block specified by the "using block" item are the same.

WARNING 382: No waveform data. ····· Because there is no waveform data present, it cannot be displayed on the screen. Start measurement operation to capture data.

WARNING 383: No FFT data. (ARRAY) ····· It is not possible to save array waveform data to the floppy disk.

WARNING 384: Different REF shot. ·····	The recording lengths are different for the reference block and the block specified by the "using block" item. Set the recording lengths to be the same and capture data.
WARNING 386: Invalid key. (RECORDER) ·····	In the recorder function mode, which is now operational, the key pressed is invalid.
WARNING 387: Invalid key. (X-Ycont) ·····	In the X-Y recorder function mode, which is now operational, the key pressed is invalid.
WARNING 388: No comparison AREA ·····	There is no waveform data. Creat the decision area.
WARNING 389: Can't use, PRINTER ·····	When setting the time axis range to 200 ms/DIV, the printer cannot be used.
WARNING 390: Can't set over up level ·····	The value over the upper level cannot be set.
WARNING 391: Can't set under low level ·····	The value under the lower level cannnot be set.
WARNING 392: Invalid. (Using unit 4 ch) ·····	In using channel 4, the recording length longer than the present one cannot be set. Make the using channel small.
WARNING 393: Invalid. (Using unit 8 ch) ·····	In using channel 8, the recording length longer than the present one connot be set. Make the using channel small.
WARNING 394: Invalid. (Using unit 16 ch) ·····	In using channel 16, the recording length longer than the present one connot be set. Make the using channel small.
WARNING 396: Out of range (variable) ·····	It is not possible to set the value exceeded the setting range in the variable function (up to 10 times of the captured voltage range full scale). When this message appears, the upper and lower limit values are automatically changed to within the settable range.
WARNING 397: Out of range (scaling) ·····	When setting to "POINT" in the scaling function, the setting value should be within the range shown on page 12-20. When this message appears, the value of v up is set to sc up and the value of v low is set to sc low.

Appendix 2 Glossary

Aliasing error	: The phenomenon of not obtaining an accurate signal waveform, due to aliasing distortion. (For a discussion of aliasing distortion, refer to Section 5-17.)
CH	: Used as an abbreviation for channel. "CH3" means channel 3; "4ch" means four channels.
Cutoff frequency	: The frequency for which the output of a filter falls below $1/\sqrt{2}$ (-3 dB) of the input.
Dark	: High intensity display or recording. This is "blackboard" terminology when the display is white on black.
DIV	: A unit corresponding to one division of the chart scale.
Full span voltage	: The voltage difference corresponding to 10 divisions.
GO	: Pass result for a waveform decision.
Light	: Low intensity display or recording. This is "blackboard" terminology when the display is white on black.
MS-DOS	: Personal computer operating system. MS-DOS is a registered trademark of Microsoft Corporation.
NG	: Fail result for a waveform decision.
PC-9801	: Series of personal computers manufactured by NEC and using a Japanese-language version of MS-DOS.
Position	: When referring to the position of the waveform along the voltage axis on the display, this refers more precisely to the origin, that is the position corresponding to 0 V.
Pre-trigger	: Refers to recording the waveform before the trigger. This value is represented as the percentage of the whole recording length coming before the trigger.
PT	: Voltage transformer
Scaling	: The conversion of an input voltage to some convenient external units.
Shot length	: The recording length, which is always expressed in terms of divisions.

Timer trigger	: Trigger function using the clock for fixed real time triggering.
Trigger timing	: Determines whether the trigger controls starting, stopping, or both.
Unbalanced input	: When one of two input terminals is used as the reference for the signal.
Word	: The amount of memory representing a single sampled value digitally.

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