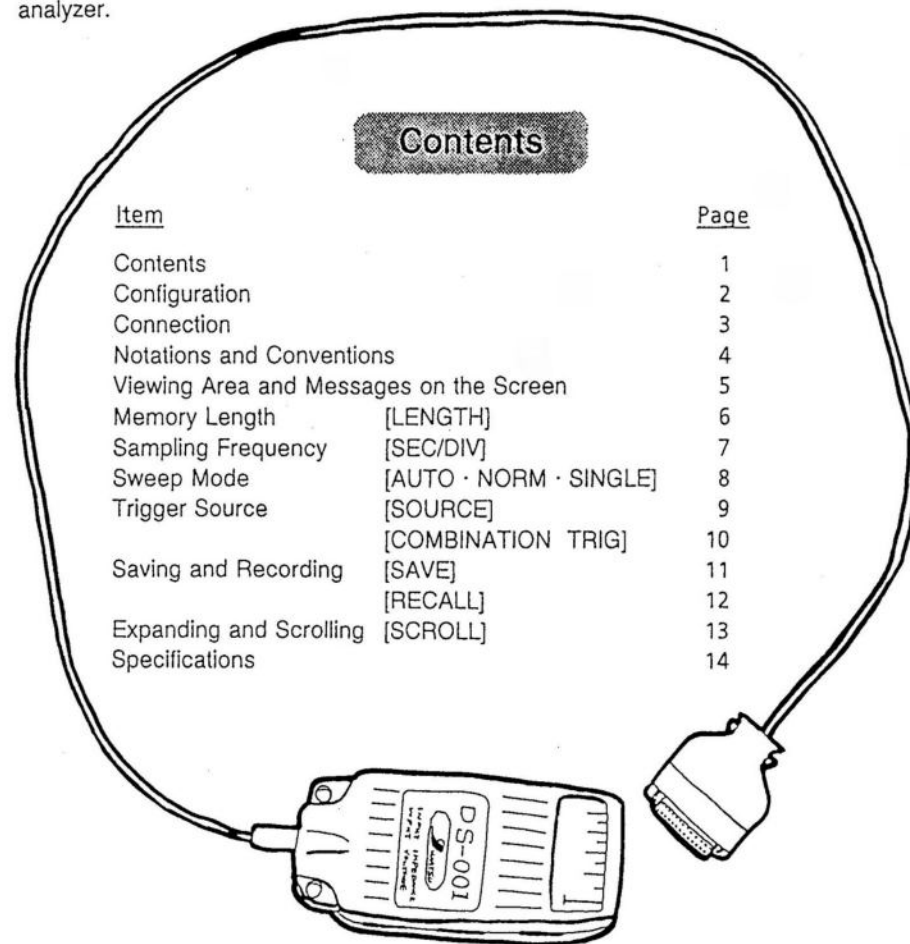Logic Probe for DS-8600

DS-001

INSTRUCTION MANUAL

Logic Probe DS-001 is a multi-channel input probe exclusively used for a digital storage scope DS-8600. With DS-001, DS-8600 can be used as a timing logic analyzer.
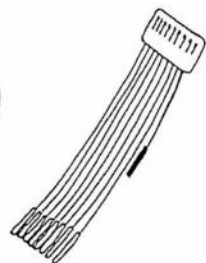
Contents

NOTE

※ This instruction manual mainly describes the specific functions as a logic analyzer. Refer to the instruction manual for DS-8600 proper for the details of usage common to the digital storage scope and precautions on handling.
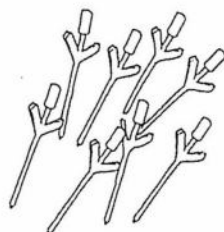
Configuration

- Logic probe   DS-001   1
- Lead set   DS-01K   1
  - Lead   (1)
  - Clips K   (8)
  - Clip G (for GND)   (1)
- Instruction manual   1
- Accessory bag   1
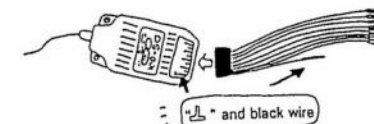
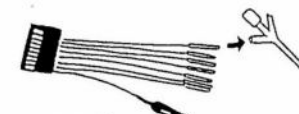[DS-001]   [Lead bundled wire]   [Clips K]   [Clip G]

Connection

- Connect DS-8600, the probe main unit and each clip by referring to the following illustrations.
- Be sure to turn off the power when connecting the probe main unit to DS-8600.
  The screen will automatically change to that of logic analyzer when the power is turned on after the probe is connected.
- The keys not described in this instruction manual will be disabled.

◆ Connection between DS-8600 and the probe main unit

◆ Connection between the probe main unit and the lead bundled wire

"⏚" and black wire

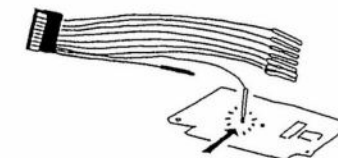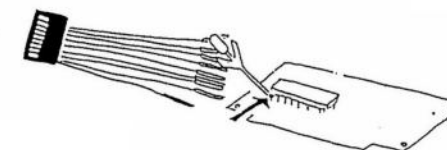◆ Connection between the lead bundled wire and the clip K

◆ Connection to the circuit to be measured

Caution !

Never apply excessive voltage over ±50V to the input terminal.

◇ Directly to the pin terminal
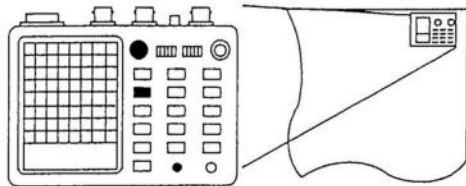
◇ By using a clip

A1-114300(L)

◆ **Style**

Each function and operation are described in the following order.

Purpose : is the outlines what you obtain from the operation.

Warning : decribes what may cause some hazard, accordingly prevents any accident.

Caution : describes what you must or must not do, accordingly prevents instrument damage.

Preliminary setup : describes necessary signal connections and the like.

Key operation : describes key operation sequence.

Operating procedure : describes the details of the operation.

One point advice : describes some useful tips to know.

◆ **Panel and Key**

◇ Panel illustration

The panel illustration in the top and right of the each page shows the locations of the keys used for the operation as the painted keys.
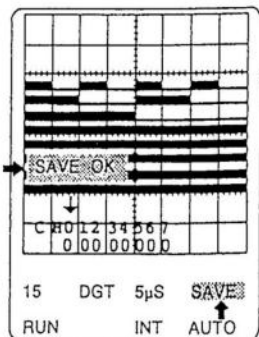
◇ **Key notations**

● SEC/DIV is used to indicate the actual key or switch.

● ← ↓ , ↑ → is used to indicate all the necessary keys for the operation. You can push the keys in any order and may need to push the key several times.

● SCROLL → ← ↓ is used to indicate the key operation sequence.

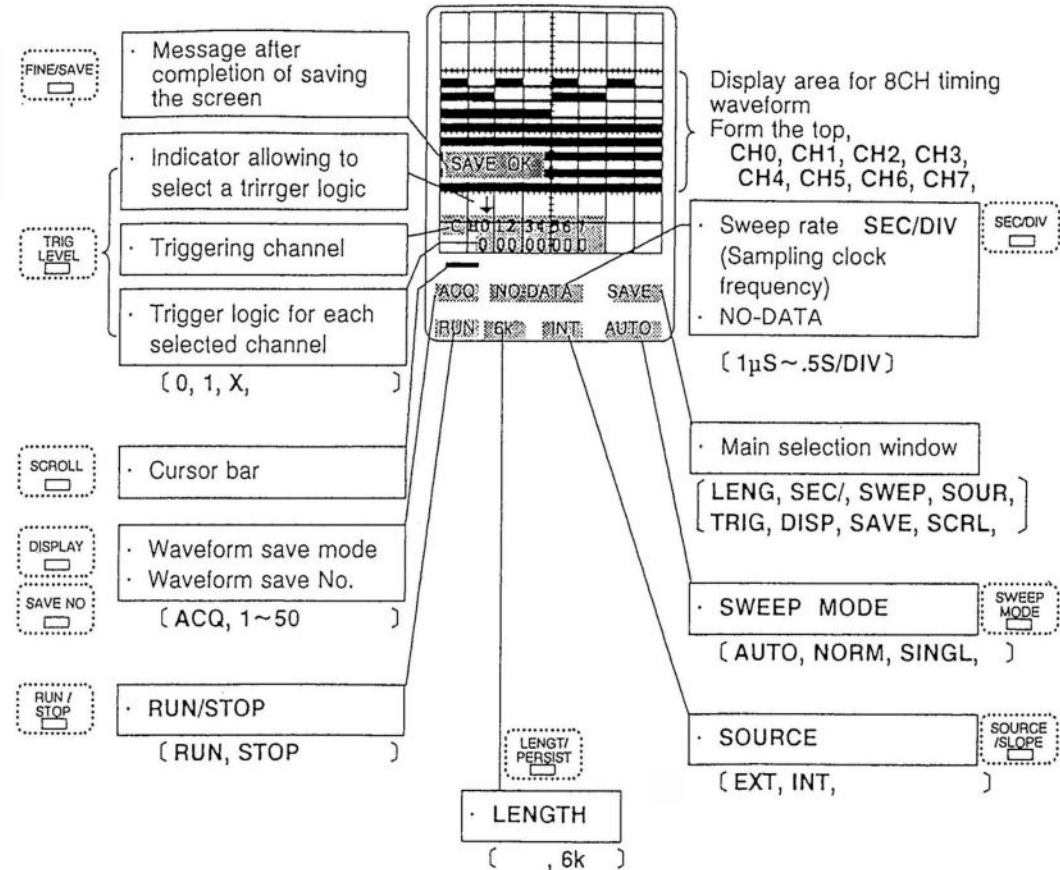◆ Notation in the Operating procedure

● ①, ②, ③ · · · is used to indicate the operation order.

● SCROLL is used to indicate the function to be selected.

● ⇐ connects between the procedure and the illustration.

◆ Marks in the screen display illustration

● The ← and ▨ marks are used to indicate the functions or operations selected. Certainly these marks are not shown on the actual screen.

FINE/SAVE · Message after completion of saving the screen

· Indicator allowing to select a trirrger logic

TRIG LEVEL · Triggering channel

· Trigger logic for each selected channel

〔 0, 1, X, 〕

SCROLL · Cursor bar

DISPLAY · Waveform save mode

SAVE NO · Waveform save No.

〔ACQ, 1~50 〕

RUN / STOP · RUN/STOP

〔 RUN, STOP 〕

Display area for 8CH timing waveform
Form the top,
CH0, CH1, CH2, CH3,
CH4, CH5, CH6, CH7,

SEC/DIV · Sweep rate SEC/DIV (Sampling clock frequency)
· NO-DATA

〔 1µS ~ .5S/DIV 〕

· Main selection window

〔 LENG, SEC/, SWEP, SOUR,
TRIG, DISP, SAVE, SCRL, 〕

SWEEP MODE · SWEEP MODE

〔 AUTO, NORM, SINGL, 〕

SOURCE /SLOPE · SOURCE

〔 EXT, INT, 〕

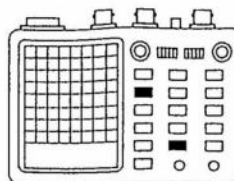LENGT/ PERSIST

· LENGTH

〔 , 6k 〕

◆ The display amplitude for the timing waveform is fixed as follows :

━ : 0 (1 dot)

▮ : 1 (6 dots)

▄ : Mixed data of 0 and 1 at the display compression rate over 2 (4 dots)

SAVE OK

CH0 1 2 3 4 5 6 7
0 00 00 00 0

15 DGT 5µS SAVE

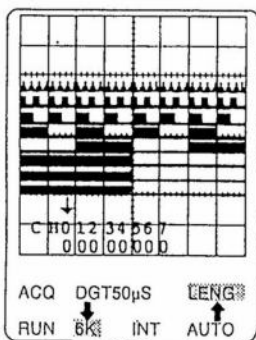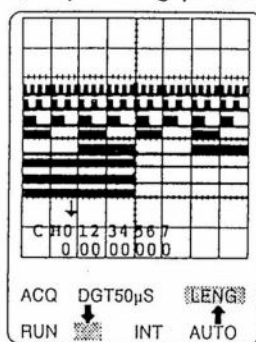RUN INT AUTO

Memory Length

LENGTH

[LENGT/PERSIST key]

In order to utilize the memory in the analyzer, the length of the data to be saved is selected in conjunction with the sampling frequency. If the length is long or the sampling frequency is slow, it takes long to complete saving the waveform. Change over according to the purpose of analysis.

◆ Key operation

[LENGT/PERSIST] → [←↓] /

Setting LENGTH   Selecting 128/6k

◆ Operating procedure

① Press the [LENGT/PERSIST] key and set the **LENGTH**.

② Press the [←↓] key and select the **128** or **6k** memory length.

Top : Sample screen for the memory length of 128

Bottom : Sample screen for the memory length of 6k

where the input signals to each channel of the probe are as follows :

    80kHz clock : CH0

    Binary counter's output : CH1 to CH7 for the binary counter IC operating at 80kHz clock.

- When the memory length is 6k (6.4kwords), 50 words are compressed to 1 word and total of **128words** are displayed on the screen. (Refer to "One Point Advice" below.)

- When the momory length is 6k, refer to the Operating procedure for **SCROLL** to expand the display of data.

ACQ DGT50μS LENG
RUN INT AUTO

ACQ DGT50μS LENG
RUN 6K INT AUTO

One point Advice

◇ To display the data with the memory length of 6k on the screen (128 words)

Input signal →

Sampling clock →

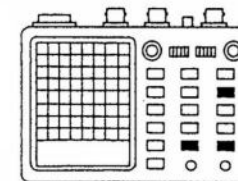Saving data with the memory length of 6k →

50words
1word

Screen display →

- The minimum compression rate is 2 and the maximum one is 50.
- Among the data to be displayed compresed to 1 word, if all is 1 or 0, the data is kept as it is. However, if 1 and 0 are mixed, the screen display will be the half the amplitude of the data 1.
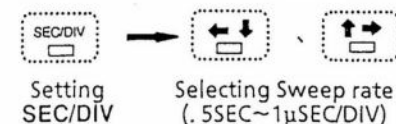

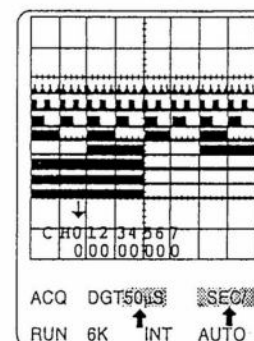## Sampling Frequency

SEC/DIV

[SEC/DIV key]

When you save a logic signal, you can change the sampling clock frequency according to the speed of the signal. The frequency may be changed when you want to grasp the overall image of the data or to observe a part in detail.

◆ Key operation

[SEC/DIV] → [←↓] 、 [↑→]

Setting SEC/DIV   Selecting Sweep rate (.5SEC~1μSEC/DIV)

◆ Operating procedure
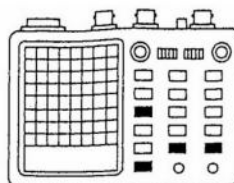
① Press the [SEC/DIV] key and set the **SEC/DIV**.

② Press the [←↓] key or [↑→] key and select the appropriate sweep rate (.5SEC~ 1μSEC/DIV).

The illustration is the screen at 50μS sweep rate.

ACQ DGT50μS SEC
RUN 6K INT AUTO

One point Advice

◇ Sweep Rate and Sampling Clock Frequency

Sweep Rate SEC/DIV	Sampling Frequency		
	Memory Length 128	Memory length 6k (substantial memory length)	
1 μs	16 MHz	16 MHz	(128)
2	8	16	(256)
5	3.2	16	(640)
10	1.6	16	(1.28 k)
20	0.8	16	(2.56 k)
50	0.32	16	(6.4 k)
.1 ms	0.16	8	(〃)
.2	80 kHz	4	(〃)
.5	32	1.6	(〃)
1	16	0.8	(〃)
2	8	0.4	(〃)
5	3.2	160 kHz	(〃)
10	1.6	80	(〃)
20	0.8	40	(〃)
50	0.32	16	(〃)
.1 s	0.16	8	(〃)
.2	80 Hz	4	(〃)
.5	32	1.6	(〃)

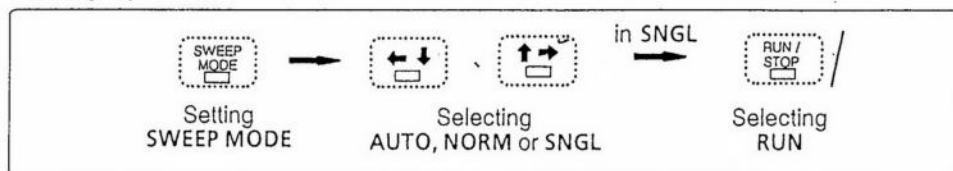# AUTO · NORM · SINGLE

SWEEP MODE

The following three modes are available for this unit.

- **AUTO** When the condition trigger signal (TRIG) such as SOURCE, SLOPE, channel combination and logic is not satisfied for a certain period of time, the operations of data sampling, saving and displaying will be repeated automatically in the order described.
- **NORM** When the above condition is not satisfied, saving of new data will be waited until it is satisfied.
- **SINGLE** Saving will be performed only once at satisfaction of the trigger condition.

AUTO mode is used when observing variations while changing the signal. NORM mode is useful when only the events satisfying the condition are to be saved. SNGL mode is for effectively capturing once the event which rarely happens.
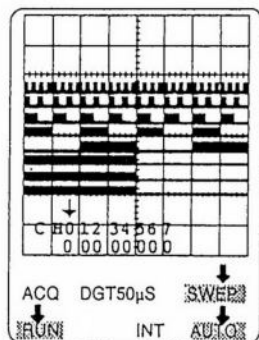
◆ **Preliminary setup**
- Arrange the triggering condition (selection of trigger source) in advance.
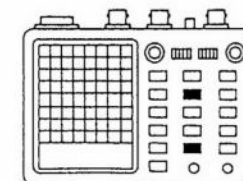
◆ **Key operation**

Setting SWEEP MODE → Selecting AUTO, NORM or SNGL → in SNGL → Selecting RUN

◆ **Operating procedure**

① Press the SWEEP MODE key and set the SWEEP MODE.

② Press the key or the and select the AUTO, NORM or SNGL sweep mode.
- The figure on the left shows the example when AUTO is selected.
- ◇ Perform the following steps when SNGL is selected.

③ Press the RUN/STOP key and select the RUN mode to set the oscilloscope ready.

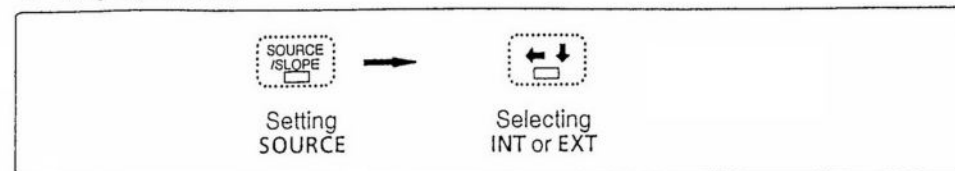④ Repeat the step 3 for performing SNGL again.

One point Advice
- If a trace (illuminated line) does not appear on the screen, press the RUN/STOP key and select the RUN mode.
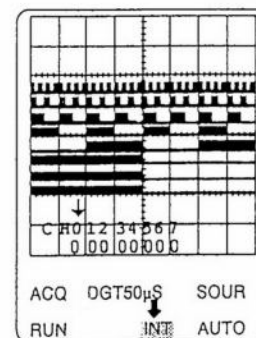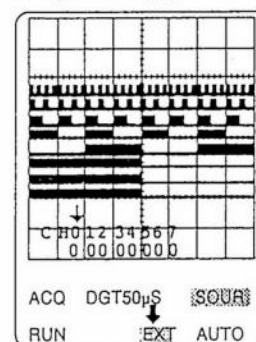

SOURCE

SOURCE /SLOPE

When observing the repeating signal by stabilizing on the screen or capturing a signal, which occurs very rarely (single shot signal), it is necessary to have a trigger signal (TRIG) in either case. Select a triggering method from the following two types : a method to utilize a signal of combination of 1 or 2 channels or more (combination trigger) from the signals CH0 to CH7 (INT : internal triggering) or a method to input another signal to EXT TRIG (EXT : external triggering).
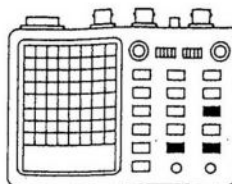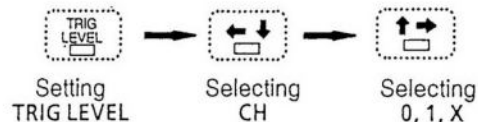
◆ **Key operation**

Setting SOURCE → Selecting INT or EXT

◆ **Operating procedure**

① Press the SOURCE /SLOPE key and set the SOURCE.

② Press the key and select the EXT or INT trigger signal.

- When EXT TRIG is selected, the trigger level of the external trigger is fixed. Be sure to input the signal which conforms to the specification (High level of +3.5V or higher and low level of +1.5V or lower).
- If INT is selected as SOURCE, refer to the Operating procedure for COMBINATION TRIG.
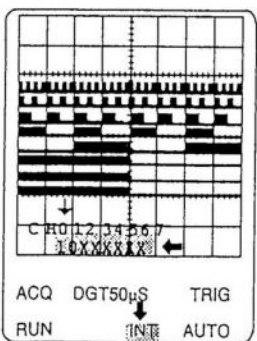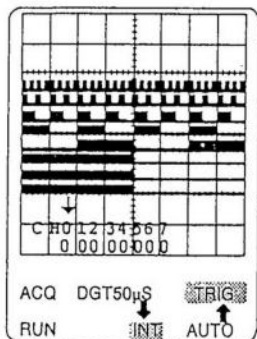
COMBINATION TRIG

[TRIG LEVEL]

When observing the repeating signal by stabilizing on the screen or capturing a signal which occurs very rarely (single shot signal), it is necessary to have a trigger signal (TRIG) in either case. If the internal triggering is selected, a signal of combination of 1 or 2 channels or more from the signals CH0~CH7 is used as a trigger signal (COMBINATION TRIG). The combination is determined by selecting a triggering logic combination (0, 1, X) for each channel.
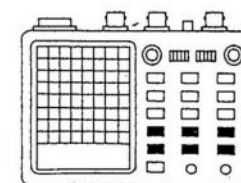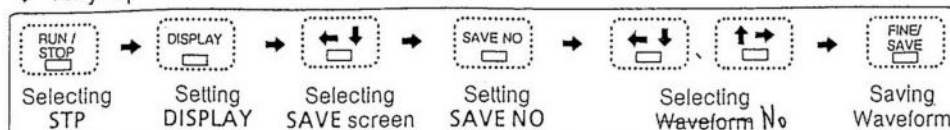
◆ Key operation

[TRIG LEVEL] → [←↓] → [↑→]

Setting TRIG LEVEL   Selecting CH   Selecting 0, 1, X

◆ Operating procedure

① Press the [TRIG LEVEL] key and set the TRIG LEVEL.

② Press the [←↓] key to move ↓ mark to the figures denoting a channel.

③ Press the [↑→] key to select the logic (0, 1, X). Triggering is performed when all the conditions for the selected channel are satisfied.
(Triggering point is at the center of the screen.)

1 : Conditions satisfied for +2.2V or more
0 : Conditions satisfied for +0.5V or less
X : Triggers unconditionally (Channels unrelated to triggering condition)

④ Repeat the steps ② and ③ for selecting logic of another channel.
• The figure on the left shows the example of trigger logic display with the conditions CH0 : 1, CH1 : 1 and CH2 to CH7 : X, and the waveform display at satisfaction of the conditions.

SAVE

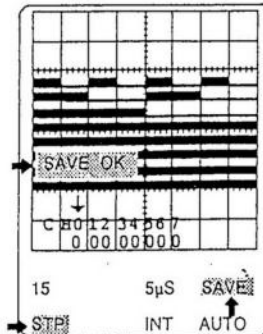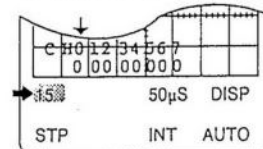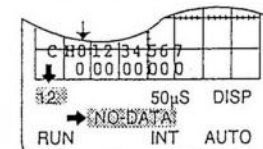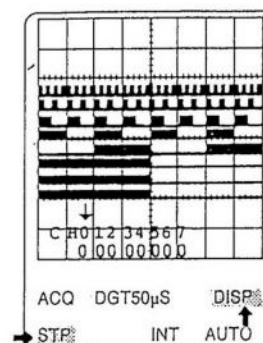[DISPLAY] [SAVE NO] [FINE/SAVE]

The display fix (STOP) waveforms can be saved up to 50 screens (128 words/No.) The waveforms saved can be used for comparison or analysis by recalling on to the screen or making a hard copy by a printer (option).
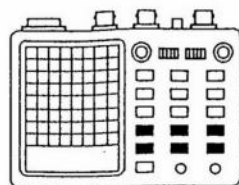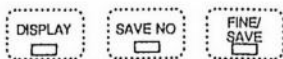
◆ Key operation

[RUN/STOP] → [DISPLAY] → [←↓] → [SAVE NO] → [←↓] [↑→] → [FINE/SAVE]

Selecting STP   Setting DISPLAY   Selecting SAVE screen   Setting SAVE NO   Selecting Waveform No   Saving Waveform

◆ Operating procedure

① Press the [RUN/STOP] key and select STOP.

② Press the [DISPLAY] key and set the DISPLAY.

③ Press the [←↓] key and set the SAVE mode.

④ Press the [SAVE NO] key and set the SAVE NO. ACQ will change to SAVE NO (memory number) and the screen shows the waveform saved in that memory.
• When there is no data in the designated memory, the NO-DATA message will be displayed.
• The memory numbers are shared with the digital storage scope.

⑤ Press the [←↓] key or [↑→] key and select memory number for saving.
• The figure on the left shows the example of selecting No. 15.

⑥ Press the [FINE/SAVE] key and finish the saving on displaying SAVE OK on screen.
• To save into another memory, repeat the step ③ and ④.

One point Advice
• For exiting the RECALL screen, press the [DISPLAY] → [←↓] or the [AUTO RANGE] only.
• The saved data will not be erased when the power switch is turned off. (Battery Backup)
• Setup of measuring condition (SEC/DIV) on saving is displayed alongside the memory number.
• When the memory length is 6k, the data compressed to 128 words will be saved.
• Saving the new waveform erases the data saved previously.
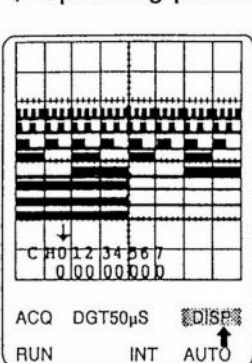
RECALL

DISPLAY SAVE NO FINE/SAVE

You can recall and display the saved signal from the memory, or send the saved signal to the optional dedicated printer. The waveforms saved can be used for comparison or analysis.
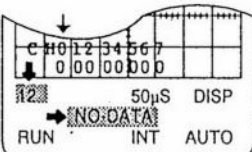
◆ Key operation

DISPLAY → ←↓ → SAVE NO → ←↓ , ↑→

Setting **DISPLAY** | Setting **SAVE** screen | Selecting **SAVE NO** | Selecting Memory number
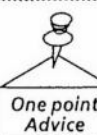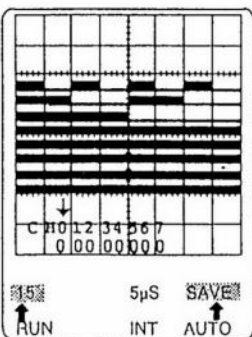
◆ Operating procedure

① Press the DISPLAY key and set the **DISPLAY**.

② Press the ←↓ key and set the **SAVE**.
ACQ will change to **SAVE NO** (memory number) and the screen shows the waveform saved in that memory.

③ Press the SAVE NO key and set the **SAVE NO**.
• When there is no data in the designated memory, the **NO DATA** will be displayed.
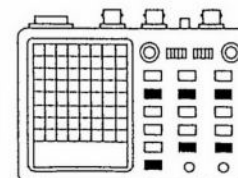• The memory numbers are shared with the digital storage scope.

④ Press the ←↓ key or the ↑→ key and select memory number in order to display the saved waveform.
• The figure on the left shows the example of selecting No. 15.

C H0 1 2 3 4 5 6 7
0 00 00 00 0

ACQ DGT50µS DISP
RUN   INT   AUTO

C H0 1 2 3 4 5 6 7
0 00 00 00 0
12   50µS   DISP
NO DATA
RUN   INT   AUTO

C H0 1 2 3 4 5 6 7
0 00 00 00 0
15   5µS   SAVE
RUN   INT   AUTO

One point Advice
• For exiting the **RECALL** screen, press the DISPLAY → ←↓ or the AUTO RANGE only.
• Setup of **SEC/DIV** is displayed alongside the memory number.
• When the memory length is 6k, the data comparessed to 128 words will be saved.

SCROLL
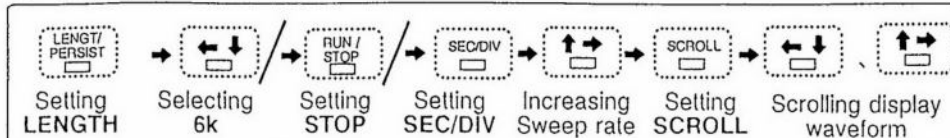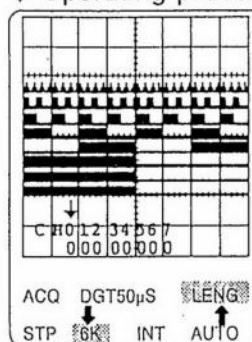
LENGT/PERSIST RUN/STOP SEC/DIV SCROLL

In order to utilize the memory in the analyzer, the length of the data to be saved is selected in conjunction with the sampling frequency. When the memory length is **6k**, 50 words are compressed to 1 word and total of 128 words are displayed on the screen. For the method of compressed display, refer to the description of "Memory Length **LENGTH**".
When observing the detailed data by magnifying, use the **SCROLL** Function. The display can be magnified up to 1 word.
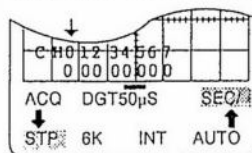
◆ Key operation

LENGT/PERSIST → ←↓ / RUN/STOP / SEC/DIV → ↑→ → SCROLL → ←↓ , ↑→

Setting **LENGTH** | Selecting **6k** | Setting **STOP** | Setting **SEC/DIV** | Increasing Sweep rate | Setting **SCROLL** | Scrolling display waveform

◆ Operating procedure

① Press the LENGT/PERSIST key and set the **LENGTH**.

② Press the ←↓ key and select the **6k** memory length.

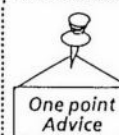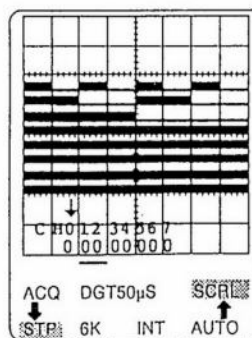③ Press the RUN/STOP key and set the **STP** to hold the display signal.

④ Press the SEC/DIV key and set the **SEC/DIV**.

⑤ Press the ↑→ key and expand the display waveform.
• A cursor bar appears on the message area to indicate the magnified position and the range of magnification.
The waveform on the screen will change according to the magnification.

⑥ Press the SCROLL key and set the **SCROLL**.

⑦ Press the ←↓ key or the ↑→ key and scroll the display waveform back and forth.

C H0 1 2 3 4 5 6 7
0 00 00 00 0
ACQ DGT50µS LENG
STP 6K INT AUTO

C H0 1 2 3 4 5 6 7
0 00 00 00 0
ACQ DGT50µS SEC/
STP 6K INT AUTO

C H0 1 2 3 4 5 6 7
0 00 00 00 0
ACQ DGT50µS SCRL
STP 6K INT AUTO

One point Advice
• To scroll slowly, press the SCROLL key, then the FINE/SAVE key (FINE). Press the SCROLL key again to release the **FINE**.

Specifications

Electrical Specifications
Vertical Deflection System (Input part)
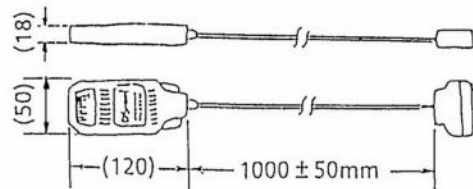
Analyzing function	Timing analyzer
Display method	Timing waveform display
Number of input channels	8 channels
Input level	H : 2.2V max, L : 0.5V min
	Hysterisis voltage : 0.3~1.2V
Input RC	Approx. 100kΩ//10pF or less
Maximum input voltage	±50V (DC + ACpeak)
Saving capacity (screen memory)	128 words×16 dots/DIV
Display size	128 words×16 dots/DIV
	when the saving capacity is 6.4k, compressed display of 128 words
Capacity of save memory	50 screens (128words×8CH×50 screens)
	(Shared with the digital storage scope)

Horizontal Deflection System (Time axis)

Sweep mode	AUTO, NORM, SINGLE
Sweep time (clock frequency)	1µS/DIV~0.5S/DIV 1-2-5 step
	(16MHz~32 samples/S)
Sampling method	Sampling by the internal clock
Waveform magnification	Max. 50 times (1µS/DIV), every 1 word in conjunction with SCROLL at the memory capacity of 6.4kwords
Trigger source	EXT : Positive (↑), with the signal over +3.5V of high level and under +1.5V of low level
	INT : 8CH combination trigger (0, 1, X)
Trigger frequency range	DC~2MHz
Trigger point	At the center of the screen (the signal after combination)

Weight and Size

Weight :	Approx. 150g
Size :	

Enviromental Characteristics
Same as DS-8600 proper.

Accessories
Refer to "Components".