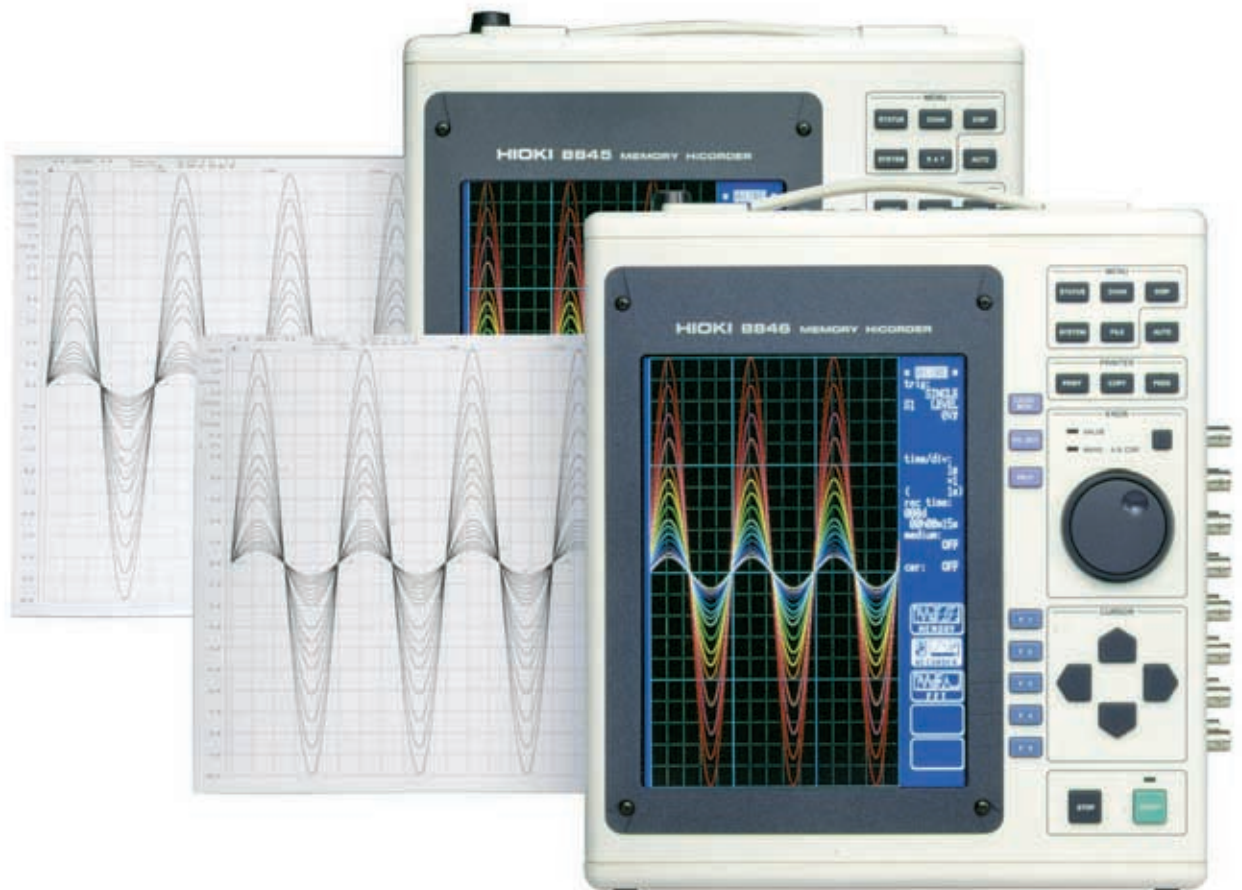# 8845, 8846 MEMORY HiCORDER

Recorders

New memory recorder with an MO/DAT drive providing extended recording time

Long memory recording time: 70 days of continuous recording on 16 channels*

The **MEMORY HiCORDER 8845** adds a DAT recorder function that enables direct data recording to DDS (Digital Data Storage) tape for extended recording.

The **MEMORY HiCORDER 8846** uses an MO (Magneto Optical) disk instead of a DDS tape. This revolutionizes recording times, breaking free of the internal memory capacity limit on a conventional unit. From a number of days of recording, you can search waveforms for the required data, displaying on the color screen or printing on the thermal printer as required. * Using DDS/90-m tape at 10 samples/s on **8845**

ISO 9001 JMI-0216
ISO14001 JQA-E-90091

CERTIFIED JQA MANAGEMENT SYSTEM QUALITY SYSTEM
CERTIFIED JQA MANAGEMENT SYSTEM ENVIRONMENTAL SYSTEM

INTERNET
HIOKI Website

http://www.hioki.co.jp/

HIOKI company overview, new products, environmental considerations and other information are available on our website.

Extended recording is now

1) MEMORY HiCORDER 8845 and 8846 features and specifications

● **Extended recording time**
With the same operational 'feel' as a conventional memory recorder, the 8845 allows sampled waveform data to be written directly to the DDS tape, and the 8846 allows the data to be written directly to the MO disk.

● **Transmission of data to a PC via an SCSI interface**
The MEMORY HiCORDER can accommodate an optional SCSI interface. The 8845's DAT drive and the 8846's MO drive can be controlled from a PC via the SCSI interface, enabling data processing to be performed on the PC.

● **Large-capacity-media MO/DAT***
The 8845 can use 90-m DDS tapes with a recording capacity of up to 2 GB, and the 8846 can use MO disks (OW type) with a recording capacity of up to 640 MB. Both media can accommodate a large amount of data.
                    * Only DDS tapes are available for the 8845's DAT drive.

● **9.5-inch color TFT liquid crystal display for better waveform discrimination**
The color display enables the user to see the measurement waveforms and device settings. This increased visibility improves operability.

● **Built-in large (A4-size) printer**
The built-in printer uses thermal recording paper with a width of 216 mm, so that data can be printed out whenever necessary. This printer eliminates the need for an additional recording device or oscilloscope to output data. The low-priced thermosensitive paper reduces running costs.

● **Plug-in input units capable of changing measurement channels**
The number of channels of the plug-in units can be varied depending on the application. Up to 16 non-insulated channel inputs and up to eight insulated channel inputs are available.

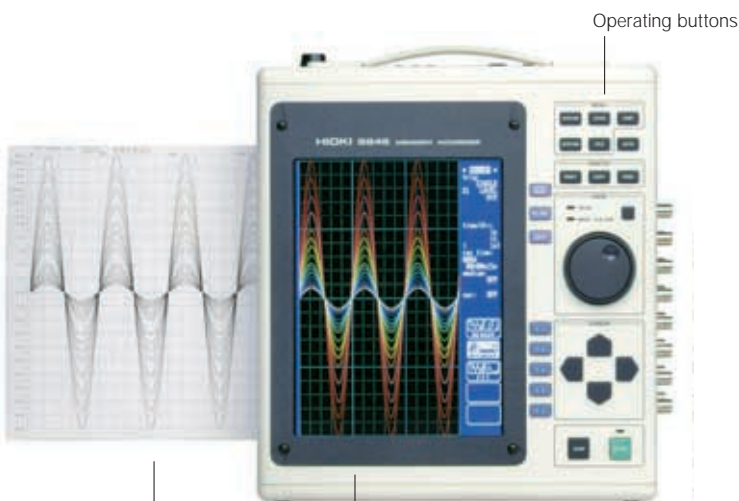● **Real-time recording by means of external sampling synchronization**
The signals digitized from measurement signals through A/D conversion can be sampled in synchronization with external signal timing, and the converted data can thereby be directly recorded onto a DDS tape or an MO disk.
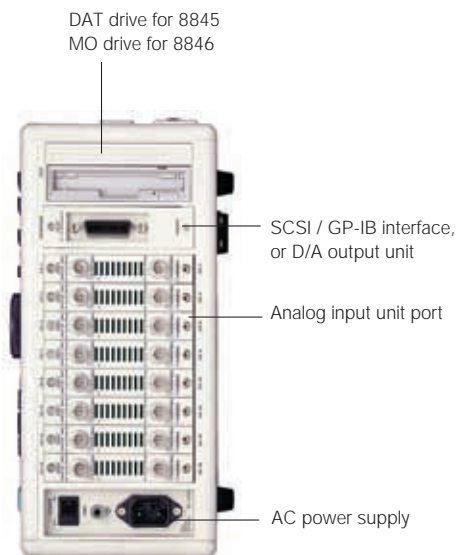
DC power supply
External control terminal
Used to record logic signals
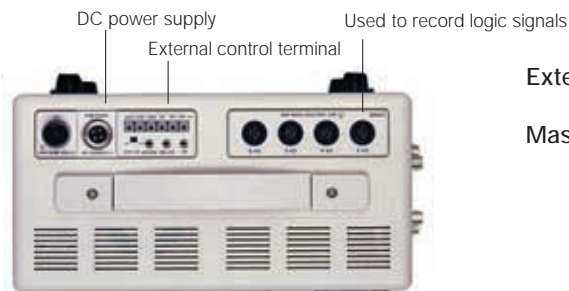
External dimensions:
        Approx. 280 (W) × 306 (H) × 140 (D) mm
Mass: Approx. 6.5 kg (main unit, excluding input units)

Operating buttons

DAT drive for 8845
MO drive for 8846

SCSI / GP-IB interface, or D/A output unit

Analog input unit port

AC power supply

Waveform monitor (color TFT LCD)

216 mm in width, 8-dot/mm thermal printer

possible

■ Specification 8845/8846 MEMORY HiCORDER

Basic specifications

Measurement functions	①Memory recorder, ② Recorder, ③ FFT
Input type	Plug-in analog input units * Using 8927 analog input units, inputs have a common ground; using 8916 to 8919 input units, all inputs are isolated.
Maximum number of channels	Using 8927: 16 analog channels, or 14 analog channels plus 16 logic channels Using 8916 to 8919: 8 analog channels, or 7 analog channels plus 16 logic channels * The 16 logic channels are fitted as standard, when the logic channels are used, one analog input unit cannot be used.
Memory capacity (Using 8927 input unit)	1M 14-bit words per channel (using 2 channels) to 100k 14-bit words per channel (using 16 channels)
File storage	8845: DAT drive × 1 (2GB, DDS format, binary, text file format) 8846: 3.5-inch Magneto-optical drive × 1 (640/540/230/128 MB, rewritable disks, over write corresponding, BMP, binary, text file format)
Battery back-up	Clock and settings ; battery life approx. 8 years (at 25°C)
External control terminals	**3.5-mm dia. mini-jacks :** trigger input / output, microphone **Terminal board :** external sampling, external start, stop and print inputs, waveform judgment output
Interface (option; one only)	**GP-IB:** for personal computer connection **SCSI:** direct personal computer connection for DAT/MO drive control **D/A output:** for connection to recorder or oscilloscope (2 channels)
Power supply	90 to 250 VAC (universal) 50/60 Hz, or 10 to 30 VDC
Power consumption (Using eight 8927 input unit)	Using 100 VAC : 350 VA max. (when printer off, 130 VA) Using 12 VDC : 130 VA max. (when printer off, approx. 70 VA)
Approx. dimensions and mass	280 (W) × 306 (H) × 140 (D) mm, 6.5 kg (main unit only)
Supplied accessories	AC power cord (1), DC power cord (1), power plug (1), recording paper (1 roll), dust cover (1), input cord labels, DDS tape (90 m × 1, Cleaning tape × 1, for 8845), MO disk (230 MB × 1, for 8846)

Recording and display section

Recording paper	216 mm × 30m , rolled thermosensitive paper
Recording width	20 divisions full scale, 1 division = 10 mm (80 dots)
Paper transfer density	10 rows/mm (20 rows/mm in memory recorder smooth printing mode)
Recording speed	25 mm/second maximum
Display screen	9.5-inch TFT color LCD

Trigger section

Trigger sources	CH 1 to CH 16 (analog), channel groups A to D (logic), external, and timer trigger sources set either on or off ; AND/OR of sources
Types of trigger (analog)	**Level trigger ;** Voltage value set digitally; triggering occurs on rising above, or falling below, the set level. **Window -in/ window -out trigger;** Upper and lower trigger levels are set; triggering on entering/exiting range
Trigger level resolution	1% f.s. (8-bit) equivalent (f.s. = 20 divisions)
Types of trigger (logic)	**Pattern trigger:** triggering occurs when the logic signals meet specified pattern of 1, 0, or × (don't care). Each group of four channels can be ANDed or ORed.

Auxiliary functions

Audio recording and playback	Any input unit can be switched to microphone input (Recorder function)
External sampling	Up to 180 kHz (restrictions depending on number of channels and input units)

Memory recorder function

Time axis	500 µs to 5 min /division; 18 ranges, 1 division=100 samples, Time axis expansion: × 2 to × 10; 3 settings Compression: 1/2 to 1/1000; 9 settings *Using 8927, 1 ms to 5 min/division
Sampling period	1/100 of the time axis range (min. 5µs)
Recording length	20 to 1000 divisions (using 9 to 16 channels), 2000 divisions (using 5 to 8 channels), 4000 divisions (using 3 or 4 channels), 10000 divisions (using 2 channels), 20000 divisions (using 1 channel and with units other than 8927)
Pre-trigger	Can record data from before the trigger; 0 to 100% or -95% of the recording duration, 15 settings
Other functions	Waveform processing calculations, waveform parameter calculations, waveform averaging, X-Y plot, memory segmentation (max. 63 divisions), voltage axis zoom functions (4 expansion settings; × 2 to × 20, 3 compression settings; 1/2 to 1/10), logging (numerical printout), waveform judgment against a bounding area or parameter value.

Recorder function

Time axis	1.25 ms to 1 hour /division; 21 ranges, 1 division=100 samples, Time axis expansion : × 2 to × 10; 3 settings Compression : 1/2 to 1/100,000 ; 17 settings * Data is directly recorded onto a DDS tape for 8845 or an MO disk for 8846.
Sampling period	1/100 of the time axis range (min. 12.5 µs using only one channel, 100 µs using 8 channels, 200 µs using 16 channels)
Recording time	1 second to 1 year, setting in 1-second steps
Medium recording capacity (Using an 8927 input unit) DDS : 90-m tape MO : 640MB	8845 : 1G 14-bit words/channel (using 1 channel) to 60 M 14-bit words/channel (using 16 channels) 8846 : 300 M 14-bit words/channel (using one channel) to 17.5 M 14-bit words/channel (using 16 channels)
Other functions	Logging (numerical printout), voltage axis zoom functions, transfer DDS data/MO data to memory recorder or FFT function, waveform retrieval function

FFT function

Single-signal analysis	Linear spectrum, RMS-value spectrum, power spectrum, auto-correlation function, histogram, and octave analysis
Two-signal analysis	Transfer function, cross-power spectrum, cross-correlation function, unit impulse response, and coherence function
Channels analyzed	Any one or two of the analog channels
Frequency range	133 mHz to 80 kHz; resolution 1/400 ; sampling 1000 points
Window types	Rectangular, Hanning and exponential
Other functions	Anti-aliasing filter ; 20 Hz to 40 kHz (linked to frequency range, when using 8919 FFT ANALOG UNIT), averaging function

Auxiliary function

Waveform judgment function	For a time axis waveform, X-Y plot, or FFT display, judgment against a bounding area, and also against reference values for a calculated waveform parameter **Judgment (pass/fail) output;** open collector 5 V voltage output, **Judgment time;** not more than 30 ms, **Judgment period;** about 200 ms *Above are reference values for minimum conditions
Calculation functions	*Maximum 200-division waveform; accurate to tolerance of input unit; eight simultaneous operations **Waveform processing calculations;** four arithmetic operations (+, -, ×, ÷), absolute value, exponentiation, common logarithm, square root, moving average, differentiation once and twice, integration once and twice, parallel displacement along the time axis, trigonometrical functions, and inverse trigonometrical functions **Waveform parameter calculations;** maximum value, minimum value, peak to peak value, average value, effective (rms) value, area value, period, frequency, time to maximum value, time to minimum value, rise time, fall time, X-Y area, and standard deviation

Input Units Freely Interchangeable

■ Option specifications (Accuracy at 23°C ± 5°C, after 60 minutes warming-up time; accuracy guaranteed for six months.)

8927 ANALOG UNIT

Input	**Number of channels :** Two (input/output common ground) **Terminal :** BNC
Measurement ranges	20 mV to 1 V/division, 6 ranges, full-scale (f.s.) is 20 divisions, maximum 50 V (DC+AC peak continuous), measurement resolution is 1/320 of range, low-pass filter 5 Hz, 50 Hz, 500Hz, or 5 kHz
Maximum sampling rate	100 kS/s (simultaneous sampling on both channels)
DC amplitude accuracy	± 0.25 % f.s.
Origin setting (zero position)	-15.6 to 35.6 divisions in 0.01 division steps, with zero adjust function
Zero position accuracy	± 0.2 % f.s. (after zero adjustment)
Frequency characteristics	DC to 50 kHz , -3dB
Input resistance and capacitance	1MΩ ± 1%, approximately 20pF at 50 kHz
Temperature characteristics	Gain ± 0.02 % f.s. / ˚C Zero ± 0.025 % f.s. / ˚C (after zero adjustment)
Dimensions and mass	Approx. 110 (W) × 20 (H) × 88 (D)mm , 125 g
Accessories	9437 INPUT CORD, 1.7 m (2)

8916 ANALOG UNIT

Input	**Number of channel :** One (input isolated from output) **Terminal :** Banana
Measurement ranges	5 mV to 20 V/division, 12 ranges, full-scale (f.s.) is 20 divisions, maximum 500 V (DC+AC peak), measurement resolution is 1/80 of range, low-pass filter 5 Hz, 50 Hz, 500Hz, or 5 kHz
Maximum sampling rate	200 kS/s
DC amplitude accuracy	± 0.25 % f.s.
Origin setting (zero position)	-15.6 to 35.6 divisions in 0.01 division steps, with zero adjust function
Zero position accuracy	± 0.1 % f.s. (after zero adjustment)
Frequency characteristics	DC to 100 kHz , -3dB
Input resistance and capacitance	1MΩ ± 1%, approx. 20pF at 100 kHz
Maximum floating voltage	450 VAC or DC (between input unit and frame, and between input units)
Temperature characteristics	Gain ± 0.02 % f.s. / ˚C Zero ± 0.015 % f.s. / ˚C (after zero adjustment)
Dimensions and mass	Approx. 110 (W) × 20 (H) × 88 (D)mm, 110 g
Accessories	9574 INPUT CORD, 1.7 m (1)

8917 DC/RMS UNIT

Input	**Number of channel :** One (input isolated from output) **Terminal :** Banana
Measurement ranges	5 mV to 20 V/division, 12 ranges, full-scale (f.s.) is 20 divisions, maximum 500 V (DC+AC peak), measurement resolution is 1/80 of range, low-pass filter 5 Hz, or 500 Hz
Maximum sampling rate	200 kS/s
DC amplitude accuracy	± 0.3 % f.s.
RMS accuracy	± 1% f.s. (DC, 40 Hz to 1kHz); ± 8% f.s. (1 kHz to 100kHz) * Valid input range: 10% to 128% of range setting; 1% steps; crest factor 2
Origin setting (zero position)	-15.6 to 35.6 divisions in 0.01 division steps, with zero adjust function
Zero position accuracy	± 0.1 % f.s. (after zero adjustment)
Frequency characteristics	DC to 100 kHz , -3dB
Response time Rise: 0 to 90% f.s. input Fall:100 to 10% f.s. input	Low-pass filter off: rise 100 ms, fall 200 ms (typical) Low-pass filter 500 Hz: 1 ms addition Low-pass filter 5 Hz: 100 ms addition
Input resistance and capacitance	1MΩ ± 1%, approx. 20pF at 50 kHz
Maximum floating voltage	450 VAC or DC (between input unit and frame, and between input units)
Temperature characteristics	Gain ± 0.02 % f.s. / ˚C Zero ± 0.05 % f.s. / ˚C (after zero adjustment)
Dimensions and mass	Approx. 110 (W) × 20 (H) × 88 (D)mm, 110 g
Accessories	9574 INPUT CORD, 1.7 m (1)

8919 FFT ANALOG UNIT

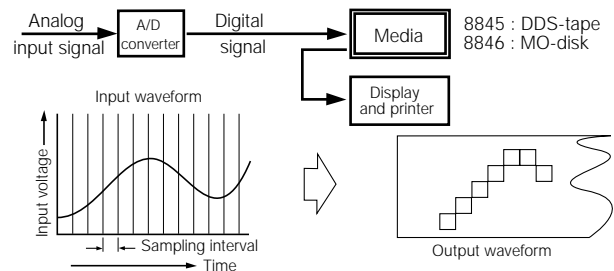|	
Anti-aliasing filter	Cut-off frequency 20 Hz, 40 Hz, 80 Hz, 200 Hz, 400 Hz, 800 Hz, 2 kHz, 4 kHz, 8 kHz, 20 kHz, 40 kHz, switched automatically with frequency range
Low-pass filter	5 Hz or 500 Hz
Input resistance and capacitance	1MΩ ± 1 %; approx. 27 pF at 100 kHz
Other specifications	Same as for the **8916** ANALOG UNIT

8918 TEMPERATURE UNIT

Input	**Number of channel :** One (input isolated from output) **Terminal :** Screw
Measurement ranges	10 ˚C/division (0.125˚C resolution), 20˚C/division (0.25˚C resolution), 50˚C/division (0.625˚C resolution), full-scale (f.s.) is 20 divisions, low-pass filter 1.5 Hz or 5 Hz
Thermocouple ranges	K(CA) thermocouple : -90 to 1200˚C, J (IC) thermocouple : -90 to 800˚C, T (CC) thermocouple : -90 to 400˚C, Automatic reference junction compensation
Maximum sampling rate	50 kS/s
Accuracy	± 0.25 % f.s. ± 2 ˚C (including reference junction compensation accuracy)
Origin setting (zero position)	-15.6 to 35.6 divisions in 0.01 division steps, with zero adjust function
Frequency characteristics	DC to 500 Hz , -3dB
Response time Rise: 0 to 90% f.s. input Fall:100 to 10% f.s. input	Low-pass filter off: rise and fall 1 ms (typical) Low-pass filter 5 Hz: rise and fall 100 ms (typical) Low-pass filter 1.5 Hz: rise and fall 300 ms (typical)
Maximum floating voltage	250 VAC or DC (between input unit and frame, and between input units)
Temperature characteristics	± 0.05 % f.s. / ˚C
Dimensions and mass	Approx. 110 (W) × 20 (H) × 88 (D)mm , 110 g
Accessories	None

8928 STRAIN UNIT

Input	**Number of channels :**Two (input isolated from output) **Terminal :** TAJIMI PRC03-23A10-7F
Adaptive converter	Strain gage converter, **bridge impedance:** 120 to 1 kΩ; **gage factor:** 2.00, fixed; **bridge voltage:** 3 ± 0.05 V
Measurement ranges	20 to 1,000 με/division; full-scale (f.s.) is 20 divisions; the measurement resolution is 1/80 of the range; low-pass filter 10 Hz, 30 Hz, 300 Hz, 3 kHz, or 20 kHz
Maximum sampling rate	200 kS/s
DC amplitude accuracy	± 0.5 % f.s. ± 2 με (following auto balancing)
Balance	Electronic auto balance; balance adjustment range: ± 10,000 με, max.
Zero position accuracy	± 0.5 % f.s. (following auto balancing)
Frequency characteristics	DC to 16 kHz +1/-3 dB
Maximum floating voltage	40 V (DC + AC peak)
Temperature characteristics	Gain: ± 0.05% f.s. / °C Zero: ± 2 με/ °C (20 or 50 με/division) ± 0.1% f.s. / °C (other ranges)
Dimensions and mass	Approx. 110 (W) × 40 (H) × 88 (D)mm, 245g
Accessories	None

to Meet Signal Measurement Requirements

2 Recorder measurement functions

Outline of functions

The measurement signal is converted to a digital value, then written directly to the DDS tape for the MEMORY HiCORDER **8845** or to the MO disk for the MEMORY HiCORDER **8846**, as sampling data. The maximum sampling rate is 80 kS/s (using only one analog channel with a sampling period of 12.5 μs).

Analog input signal → A/D converter → Digital signal → Media

8845 : DDS-tape
8846 : MO-disk

Display and printer

Input waveform
Input voltage
Sampling interval
Time

Output waveform

Recorder recording time

8845: Only the standard tape speed is used. Binary data is recorded in DDS format.
8846: Binary data is recorded on the MO disk (128/230/540/640 MB) in MS-DOS format.

The table to the right shows the calculated maximum number of channels used and recording times for different time-axis settings when the medium with the largest recording capacity is used. In practice, because control information is also recorded, the recording times will be slightly shorter than those shown in the table. Reducing the number of channels used increases the recording time.

* Values in the table are calculated on the basis of 1 year = 365 days, and 4 years = 1461 days.
* The values in the table show simple calculations. For recording times of several years, continuous operation of the unit cannot be guaranteed, as the unit service life affects the operation.

Time/Division	Maximum channels used	8845 Recording time (DDS 90 m tape)	8846 Recording time (MO 640 MB disk)
1.25ms/DIV	1ch	3h 28m 20s	1h 6m 40s
2	1ch	5h 33m 20s	1h 46m 40s
2.5	2ch	3h 28m 20s	1h 6m 40s
5	4ch	3h 28m 20s	1h 6m 40s
10	8ch	3h 28m 20s	1h 6m 40s
20	16ch	3h 28m 20s	1h 6m 40s
50	16ch	8h 40m 50s	2h 46m 40s
100	16ch	17h 21m 40s	5h 33m 20s
200	16ch	1d 10h 43m 20s	11h 6m 40s
500	16ch	3d 14h 48m 20s	1d 3h 46m 40s
1s/DIV	16ch	7d 5h 36m 40s	2d 7h 33m 20s
2	16ch	14d 11h 13m 20s	4d 15h 6m 40s
5	16ch	36d 4h 3m 20s	11d 13h 46m 40s
10	16ch	72d 8h 6m 40s	23d 3h 33m 20s
20	16ch	144d 16h 13m 20s	46d 7h 6m 40s
1min/DIV	16ch	1y 69d 0h 40m *	138d 21h 20m
2	16ch	2y 138d 1h 20m *	277d 18h 40m
5	16ch	5y 344d 3h 20m *	1y 329d 10h 40m *
10	16ch	11y 323d 6h 40m *	3y 293d 21h 20m *
20	16ch	23y 280d 13h 20m *	7y 221d 18h 40m *
1hour/DIV	16ch	71y 109d 16h *	22y 298d 8h *

Recorder frequency characteristics

The frequency characteristics of the signal that can be recorded are determined by the sampling rate. The frequency limit varies according to whether it is the frequency so that the actual amplitude of the recorded signal is the same level as the original signal, or within the -3 dB attenuation level, or the limit frequency such that aliasing does not occur.
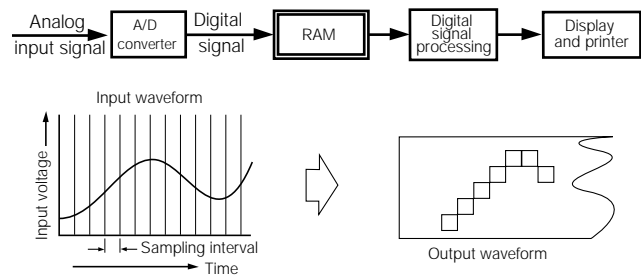The table on the right shows the limit frequencies in these cases.

* In the table on the right, the -3 dB level is based on the frequency such that one cycle is represented by 10 sampling points. The limit for aliasing to occur is calculated on the basis that one cycle is represented by 2.5 sampling points.

Time/division	Sampling interval	Within -3 dB of input amplitude	Limit for no aliasing
1.25ms/DIV	12.5 μs	8kHz(1ch)	30kHz(1ch)
2	20	5kHz(1ch)	20kHz(1ch)
2.5	25	4kHz(2ch)	17kHz(2ch)
5	50	2kHz(4ch)	8kHz(4ch)
10	100	1kHz(8ch)	4kHz(8ch)
20	200	500Hz(16ch)	2kHz(16ch)
50	500	200Hz(16ch)	800Hz(16ch)
100	1ms	100Hz(16ch)	400Hz(16ch)
200	2	50Hz(16ch)	200Hz(16ch)
500	5	20Hz(16ch)	80Hz(16ch)
1s/DIV	10	10Hz(16ch)	40Hz(16ch)
2	20	5Hz(16ch)	20Hz(16ch)
5	50	2Hz(16ch)	8Hz(16ch)
10	100	1Hz(16ch)	4Hz(16ch)
20	200	0.5Hz(16ch)	2Hz(16ch)
1min/DIV	0.6s	0.16Hz(16ch)	0.6Hz(16ch)
2	1.2s	83.3mHz(16ch)	0.3Hz(16ch)
5	3s	33.3mHz(16ch)	130mHz(16ch)
10	6s	16mHz(16ch)	60mHz(16ch)
20	12s	8.3mHz(16ch)	30mHz(16ch)
1hour/DIV	36s	2.7mHz(16ch)	10mHz(16ch)

The useful high-response memory recorder

3 Memory recorder function

Outline of functions

The input signal is first converted to digital form and stored in memory. The limit to the recording speed of the waveforms is determined by the sampling rate of the conversion, and the speed of writing to memory, thus allowing very brief transient events to be captured reliably. It is also possible to make X-Y plots for any pair of channels.

Memory recording times

The table on the right shows the maximum recording times with the memory recorder function, calculated for different time axis settings and numbers of channels used.
Reducing the number of channels used increases the recording time.

* The values in the table apply when 8927 input units are used. When using 8916, 8917, and 8919 input units, the highest sampling rate is obtained using the 500 µs/division setting. Furthermore, the recording times are doubled (from 20,000 divisions for the 1-channel setting (2 MW/channel) to 2,000 divisions for the 8-channel setting (200 kW/channel)).

Time/division	Sampling interval	2-channel setting : 1 MW/channel 10000DIV	16-channel setting : 100 kW/channel 1000DIV
500µs /DIV	5µs	Cannot be set on 8927	Cannot be set on 8927
1ms/DIV	10	10s	1s
2	20	20s	2s
5	50	50s	5s
10	100	100s	10s
20	200	3m 20s	20s
50	500	8m 20s	50s
100	1ms	16m 40s	1m 40s
200	2	33m 20s	3m 20s
500	5	1h 23m 20s	8m 20s
1s/DIV	10	2h 46m 40s	16m 40s
2	20	5h 33m 20s	33m 20s
5	50	13h 53m 20s	1h 23m 20s
10	100	27h 46m 40s	2h 46m 40s
20	200	55h 33m 20s	5h 33m 20s
1min/DIV	0.6s	6d 22h 40m	16h 40m
2	1.2s	13d 21h 20m	33h 20m
5	3s	34d 17h 20m	3d 11h 20m

Memory segmentation function

In the memory recorder function, the memory can be divided into 3, 7, 15, 31, or 63 blocks (subject to some restrictions). The waveforms in the reference block and any other block can be superimposed and compared, and dead time during printing (time when signals cannot be captured) can be reduced.
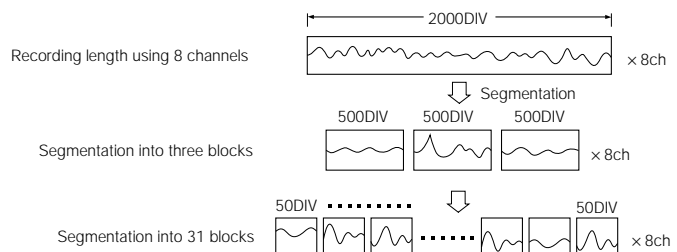
Cursor read-out functions

Using two cursors on the display screen, it is possible to read out time differences or voltage differences.
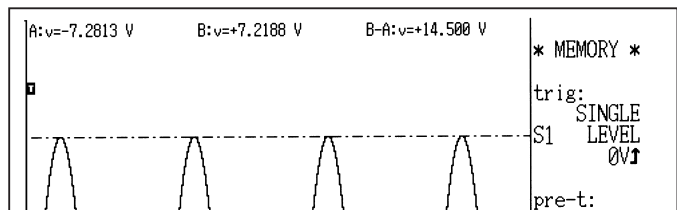
function captures transient phenomena.

4 Sophisticated analysis using digital signal processing

FFT analysis functions

There are single-signal FFT functions for analyzing frequency components, two-signal FFT functions for analyzing the transfer function and so forth, and octave analysis which can be used for investigating resonance. The source signals can be taken from either memory recorder or DAT/MO recorder waveform data, and just the required section of data can be specified. (Number of data points: 1000)
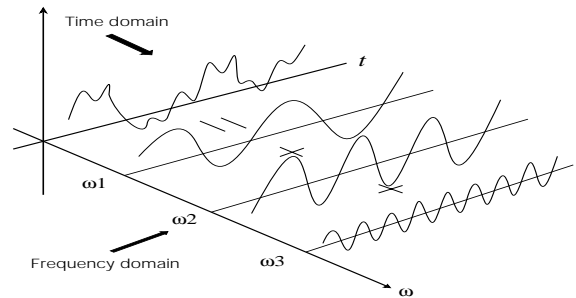
File storage on large-capacity media

Waveforms captured using the memory recorder can be stored on DDS (Digital Data Storage format) tapes for the MEMORY HiCORDER 8845 or MO (Magneto Optical) disks for the MEMORY HiCORDER 8846. A 90-m DDS tape holds approximately 2 GB of data, while the largest MO disk holds approximately 640 MB of data. A single tape or disk can hold several sets of memory recorder waveforms. Using the auto save function, just the necessary sections can be captured at high speeds and saved consecutively on the medium.

8845

Internal memory

Internal memory

Internal memory

8846
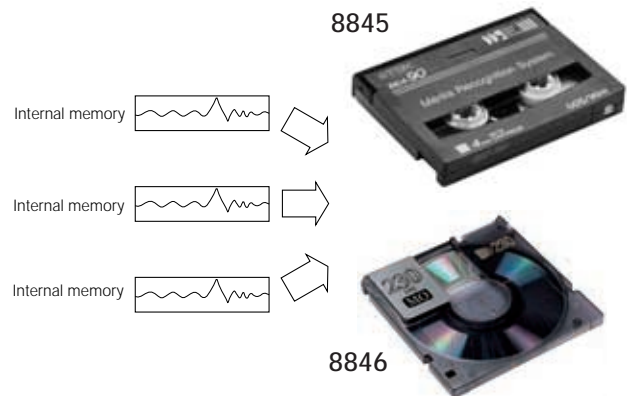
Complex calculations on 8 channels simultaneously

For the 16 channels of waveforms captured by the memory recorder function, eight calculations can be carried out simultaneously. The results of arithmetic, differentiation, and integration operations can be displayed as waveforms. Four parameter calculation functions, such as minimum and maximum, which produce a value from a waveform, can be executed simultaneously on the waveforms of the 16 channels. The FFT calculations can be carried out on any one or two of the channels.

Interface with PC (sold separately)*

If the 8845/8846 is connected to a PC by the 9538 SCSI INTERFACE, the internal DAT drive or MO drive can be operated as an external drive of the PC. If the data transfer utility supplied with the interface is used, the measurement data recorded on a DDS tape or MO disk can be processed on the PC.

* Any one of the GP-IB interface, D/A output unit, or SCSI interface is connected to the MEMORY HiCORDER

Data transfer utility supplied with the 9538 interface	
Function:	Copies the data saved on the DDS tape or MO disk to the PC. (in addition to changing the data format)
Data format:	Binary, text, CSV, or DADiSP
Environment :	Windows 95, Adaptec EZ-SCSI Ver 4.5 or later, or boards compatible with the Adaptec EZ-SCSI board

* This software is optionally available as a 9606-01 DATA CONVERSION UTILITY. Users can purchase it separately.

Complex waveforms are accurately captured

## 5 Ancillary functions aiding in signal measurement

Trigger functions capable of monitoring all 16 channels

For all of the measurement functions, including recorder and memory recorder, triggers can be set on all 16 channels.
In addition to a simple level trigger based on comparison with a single voltage value, there are:
• Window in/out triggers based on a window defined by two value
• Triggers based on on/off patterns of logic signals
By combining the window-in trigger with the trigger filter, supply line voltage drops can be monitored.

Level trigger   Window-in trigger

Pattern trigger   Window-out trigger
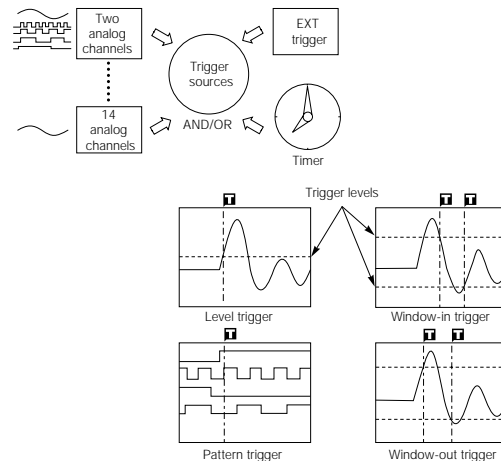
High-performance waveform retrieval function (for the recorder function only)

The waveform retrieval function picks up desired waveforms from enormous amounts of data recorded on a DDS tape or an MO disk for display on the screen. The level trigger conditions, event marks recorded together with waveforms, and elapsed time from the start of recording are used as a guideline for retrieval.

Wave form display (Result of the trigger search)
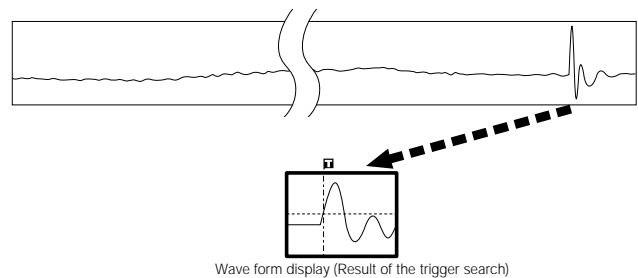
Amplitude adjustment to the recording-paper width

For recording signals varying from 1 V to 5 V or 4 mA to 20 mA and so forth, the variable memory recorder function* allows zero and full-scale points to be varied over the entire width of the recording paper. This function is useful for load shut-off tests in power generation plants.
A vernier function has been added. This function can be used to perform fine adjustment of the sensitivity of the input amplifier to vary the waveform amplitude.

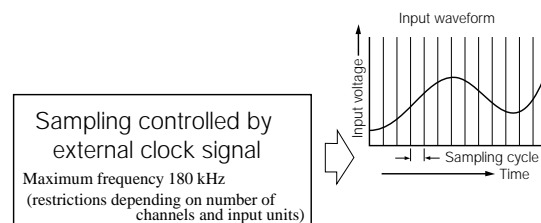Upper limit value $x.xxxx \times 10^{XX}$ (V)

100%

0%
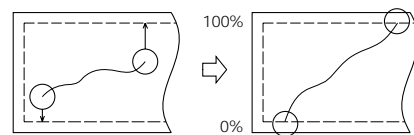
Lower limit value $x.xxxx \times 10^{XX}$ (V)   Variable function enabled

Clock input terminal for external sampling

The timing of the sampling of the input signal for the memory recorder or recorder function can be synchronized to an external clock signal. This is useful for data recordings synchronized to the running cycle of an engine, for example.

Sampling controlled by external clock signal
Maximum frequency 180 kHz
(restrictions depending on number of channels and input units)

Input waveform

Sampling cycle
Time

Waveform, or parameter judgment functions

After defining a reference bounding area for the waveform captured in memory recorder mode, it is possible to check whether waveforms go outside this reference area. Similarly, a number of parameter decisions, which operate by monitoring a calculated waveform parameter against preset reference values, can also be used.
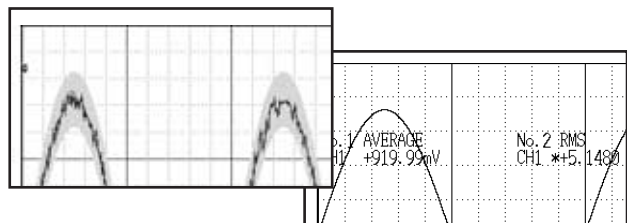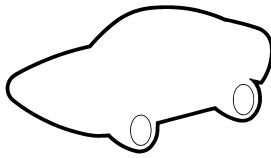
Example Printouts

(Actual size)
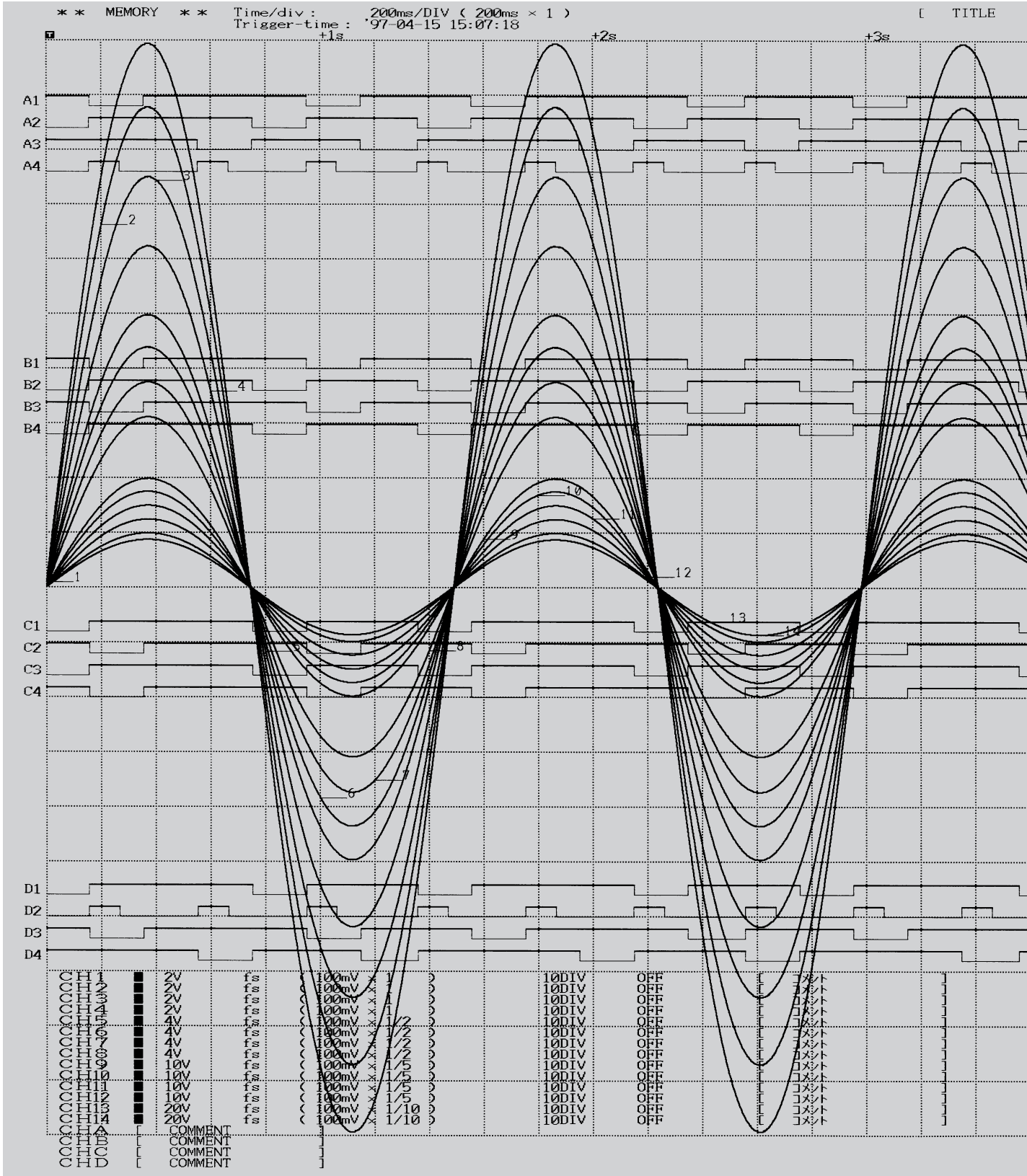
Example of memory recorder function recording (full-width)

Dual, quad, and octuple recordings, and X-Y plots are also possible.

Memory recorders are used in various industrial fields for the betterment of society.
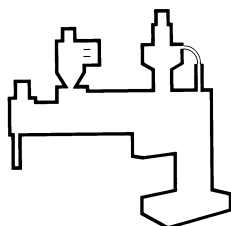
Research and development of automobiles

In the vehicle and engine running tests, the relationship among various parameters must be examined. Multichannel recorders are specifically necessary to do so.
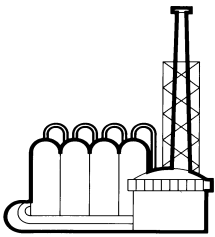
Failure monitoring of the hydraulic machine

Through the use of the MEMORY HiCORDER, pressure waveforms can be measured and recorded simultaneously at various points of hydraulic machines to determine whether such machines are operating normally. The scaling function allows the user to directly read pressures.
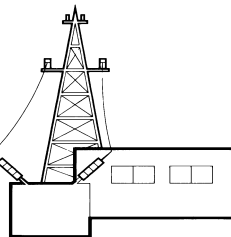
Plant maintenance

In plants, memory recorders are used to measure and record the operation of solenoid and control valves. Since the MEMORY HiCORDER 8845/8846 can simultaneously create X-Y plots for four channels, the relationship between flow and valve lift can also be observed.

Load shutdown tests in power generation plants

For load shutdown tests in power generation plants, the pre-trigger function can be used to measure and record waveforms before and after the test, enabling accurate analysis. The vernier function, which can be used to perform fine adjustment of amplitudes, is also a useful tool.
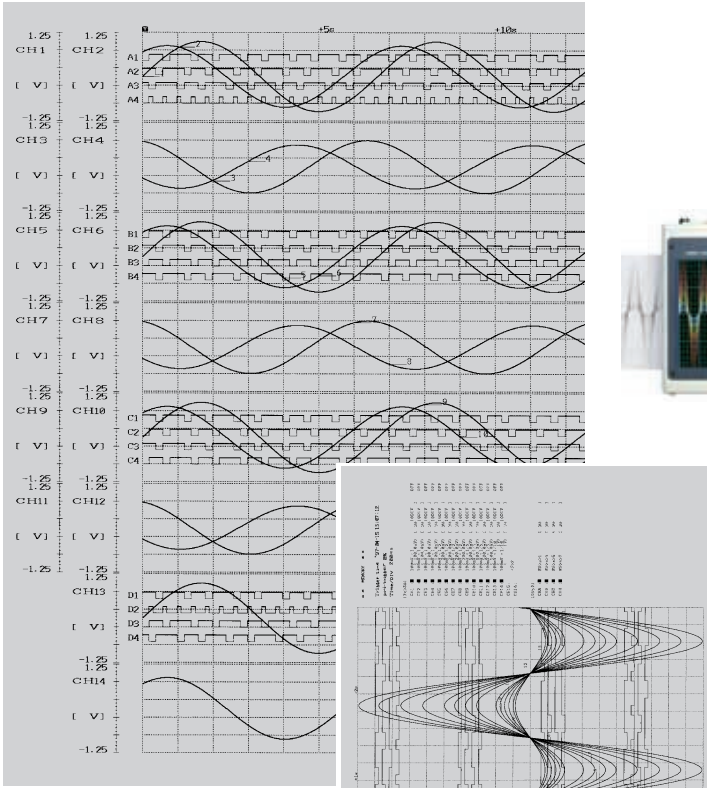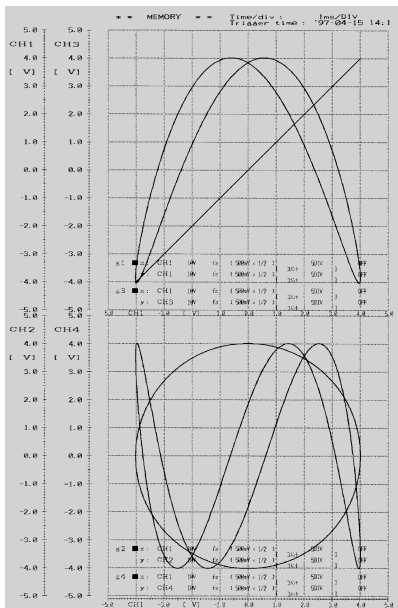
Example of recorder recording (octuple)

Full-width, dual, and quad recordings are also possible.
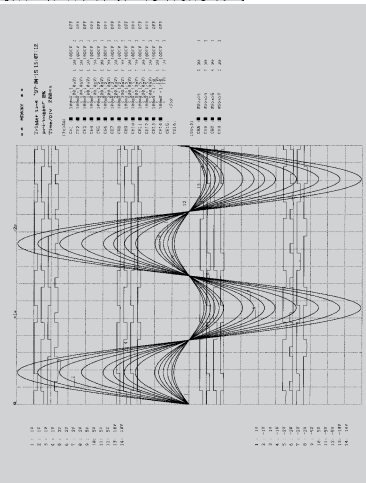
Example of A4 report output

Screen image output at high resolution, A4 size.

Example of X-Y plotting

Time-axis waveforms of each input channel can be defined on vertical and horizontal axes to create X-Y plots.

Example of Logging output

This prints the instantaneous numerical value for each sample.

■ Optional products specification (sold separately)

9320 LOGIC PROBE

Detector for high/low recording of 0/5 V signals or relay contacts.

Inputs : 4 channels (common ground), digital / contact signal detection.
Can detect open-collector signal at contact input.
Input resistance : 1MΩ (digital input, at 0 to +5V), at least 500kΩ (digital input, at +5V to +50V)
Pull up resistance : 2kΩ (contact input)
Threshold level (digital input)**:** +1.4 V, +2.5V, +4.0V
Detect resistance (contact input)**:** open at least 1.5kΩ /close at 500Ω or smaller, open at least 3.5kΩ /close at 1.5kΩ or smaller, open at least 25kΩ /close at 8kΩ or smaller
Response time : 500 ns maximum
Dimensions and mass: Approx. 62 (W) × 94 (H) × 20 (D)mm, 150 g
Max. allowable input: 0 to +50VDC

9320   9321

9321 LOGIC PROBE

Detector for high/low recording of relay drive signals. Can be used for detecting outages on a power line.

Inputs : 4 channels (isolate), HIGH/LOW range switching type
Input resistance : at least 100 kΩ (HIGH range), 30 kΩ (LOW range)
High detection levels : 170 to 250VAC, ±70 to 250VDC (HIGH range)
60 to 150VAC, ±20 to 150VDC (LOW range)
Low detection levels : 0 to 30VAC, 0 to ±43VDC (HIGH range)
0 to 10 VAC, 0 to ±15VDC (LOW range)
Response time : rising edge 1 ms max., falling edge 3 ms max.
(ON/OFF, with HIGH range at 200 V DC, LOW range at 100 V DC)
Max. allowable input: 250Vrms (HIGH range), 150Vrms (LOW range)
Dimensions and mass: Approx. 62(W) × 127 (H) × 20 (D)mm, 320 g

9308 LINE DIP DETECTOR

Detector for instantaneous drops on a 100/120 V AC line, sending a trigger signal. Connects to the logic inputs of the MEMORY HiCORDER.

Inputs : 100/120 VAC (50/60 Hz), with 1/100 waveform output
Detection level: Approx. 80/90 % of 100 or 120 V
Response time : Approx. 2 cycles of input AC signal
Input resistance: Approx. 12 kΩ
Dimensions and mass: Approx. 64 (W) × 137 (H) × 22 (D)mm, 300 g

9305 TRIGGER CORD

This connects the trigger inputs and outputs of a number of MEMORY HiCORDERs.

ø 3.5 mm dia. mini-plugs, length 1.5 m approx.

9303 PT

This voltage transformer converts 400 or 200 V AC to 10 V AC. (Input is insulated from output.)

Transformer ratio: 1/40 or 1/20 ± 1 %
Maximum permitted input: 440/220 VAC
Frequency characteristics: 40 Hz to 3 kHz, ± 1 %
Dimensions and mass: Approx. 56 (W) × 113 (H) × 93 (D)mm, 730 g

220H PAPER WINDER

Paper width: 70 to 220 mm
Power supply: (using special-purpose AC adapter)
Dimensions and mass: Approx. 240 (W) × 190 (H) × 160 (D)mm, 2.6 kg

9270-9272 CLAMP ON SENSORs and 9555 SENSOR UNIT

These current sensors are capable of reliable measurements of distorted current waveforms. Each clamp-on sensor operates together with the **9555** unit.

Input ranges : 20 A (**9270**), 200 A (**9271**), and 20/200 A (**9272**)
Output voltage : 2 V AC for full-range value
Frequency characteristics: 5 Hz to 50 kHz (**9270** and **9271**) ±2.5% f.s.
5 Hz to 10 kHz (**9272**) ±2.5% f.s.
Clamp aperture : 20 mm dia. (**9270** and **9271**)
46 mm dia. or 50 × 20 mm bus bar (**9272**)
Conductor voltage rating : 600 V AC (insulated) *Note*

9270   9271   9272

9277-9279 UNIVERSAL CLAMP ON CTs and 9555

These current sensors are capable of reliable measurement from DC to distorted current waveforms. Each clamp-on sensor operates together with the **9555** unit.

Input ranges : 20 A (**9277**), 200 A (**9278**), and 500 A (**9279**)
Output voltage: 2 V AC for full-range value
Frequency characteristics: DC to 100 kHz (**9277** and **9278**) ±5% f.s.
DC to 20 kHz (**9279**) ±5% f.s.
Clamp aperture: 20 mm dia. (**9277** and **9278**); 40 mm dia. (**9279**)
Conductor voltage rating: 600 V AC, 850 V peak (insulated) *Note*

9279
9278
9277   9555

Note : The core and shield casing are not insulated. to avoid the possibility of accidents, do not use on bare conductors.

■ Options

8916 ANALOG UNIT
* with one 9574 input cord

8917 DC/RMS UNIT
* with one 9574 input cord

8918 TEMPERATURE UNIT

8919 FFT ANALOG UNIT
* with one 9574 input cord

8927 ANALOG UNIT
* with two 9437 input cord

8928 STRAIN UNIT
* requires two channel slots on
the main unit

9537 GP-IB INTERFACE

9538 SCSI INTERFACE
* with a data transfer utility
50 pin bellows type connector

(Holds basic unit plus accessories)

9370 CARRYING CASE
Approx. dimensions and mass :
290 (W) × 340 (H) × 220 (D) mm ; 1.3 kg
Material: soft PVC leather

(Holds accessories only)

9084 CARRYING CASE
Approx. dimensions and mass :
260 (W) × 120 (H) × 300 (D) mm ; 750 g
Material: rigid PVC leather

9369 CARRYING CASE
Approx. dimensions and mass :
550 (W) × 192 (H) × 440 (D) mm ; 4.7 kg
Material: Rigid plastic

9539 D/A OUTPUT UNIT

(Recorder unit) + (8927 unit or other x required number) + (other options)

Maximum number of measurements	2 channels	4 channels	6 channels	8 channels	10 channels	12 channels	14 channels	16 channels
Number of 8927 units	1	2	3	4	5	6	7	8
Memory capacity per channel	1M words	500k words	200k words		100k words			

Ordering information

8845 MEMORY HiCORDER (basic unit only)
8846 MEMORY HiCORDER (basic unit only)

● Options Factory fitted or user-interchangeable

8927 ANALOG UNIT (2 channel unit)
8928 STRAIN UNIT (2 channel unit)
8916 ANALOG UNIT (1 channel unit)
8917 DC/RMS UNIT (1 channel unit)
8918 TEMPERATURE UNIT (1 channel unit)

◆ The MEMORY HiCORDER 8845/8846 cannot operate alone. To use the 8845/8846, mount an optional input unit or units on it.
◆ HIOKI does not supply thermocouples for use with the 8918 TEMPERATURE UNIT. Consult your specialist supplier.
◆ An input cord comes as standard equipment with the input unit. If an additional cord is required, the user can purchase it from HIOKI E.E. CORPORATION.

8919 FFT ANALOG UNIT (1 channel unit)
9537 GP-IB INTERFACE (one of 9537, 9538, and 9539)
9538 SCSI INTERFACE (one of 9537, 9538, and 9539)
9539 D/A OUTPUT UNIT (one of 9537, 9538, and 9539)

● Optional accessories

9231 RECORDING PAPER (30 m, 6 rolls)
9303 PT (insulating transformer)
9305 TRIGGER CORD: ø 3.5 mm dia. mini-plug, 1.5 m approx.
9308 LINE DIP DETECTOR:AC power supply instantaneous dip detector
9320 LOGIC PROBE: 4 channel digital / contact signal ON/OFF detection
9321 LOGIC PROBE: 4 isolated channels AC/DC voltage ON/OFF detection
9369 CARRYING CASE (rigid type)
9370 CARRYING CASE (soft type)
9084 CARRYING CASE (for accessories)
DDS tape (90 m, 2G-bytes, 1 roll / 1set)

9151-02 GP-IB CONNECTION CABLE (2 m)
9151-04 GP-IB CONNECTION CABLE (4 m)
220H PAPER WINDER (paper width of 70 to 220 mm)
9270 CLAMP ON SENSOR: 20 A, 5 Hz to 50 kHz
9271 CLAMP ON SENSOR: 200 A, 5 Hz to 50 kHz
9272 CLAMP ON SENSOR: 20/200 A, 5 Hz to 10 kHz
9277 UNIVERSAL CLAMP ON CT: 20 A, DC to 100 kHz
9278 UNIVERSAL CLAMP ON CT: 200 A, DC to 100 kHz
9279 UNIVERSAL CLAMP ON CT: 500 A, DC to 20 kHz
9555 SENSOR UNIT: used together with 9270 to 9272 and 9277 to 9279
9606-01 DATA CONVERSION UTILITY (from binary to ASCII)