

200mm wide recording/Channels to spare

Max.13 Channel Waveform Recorder

MEMORY Hi CORDER

8821

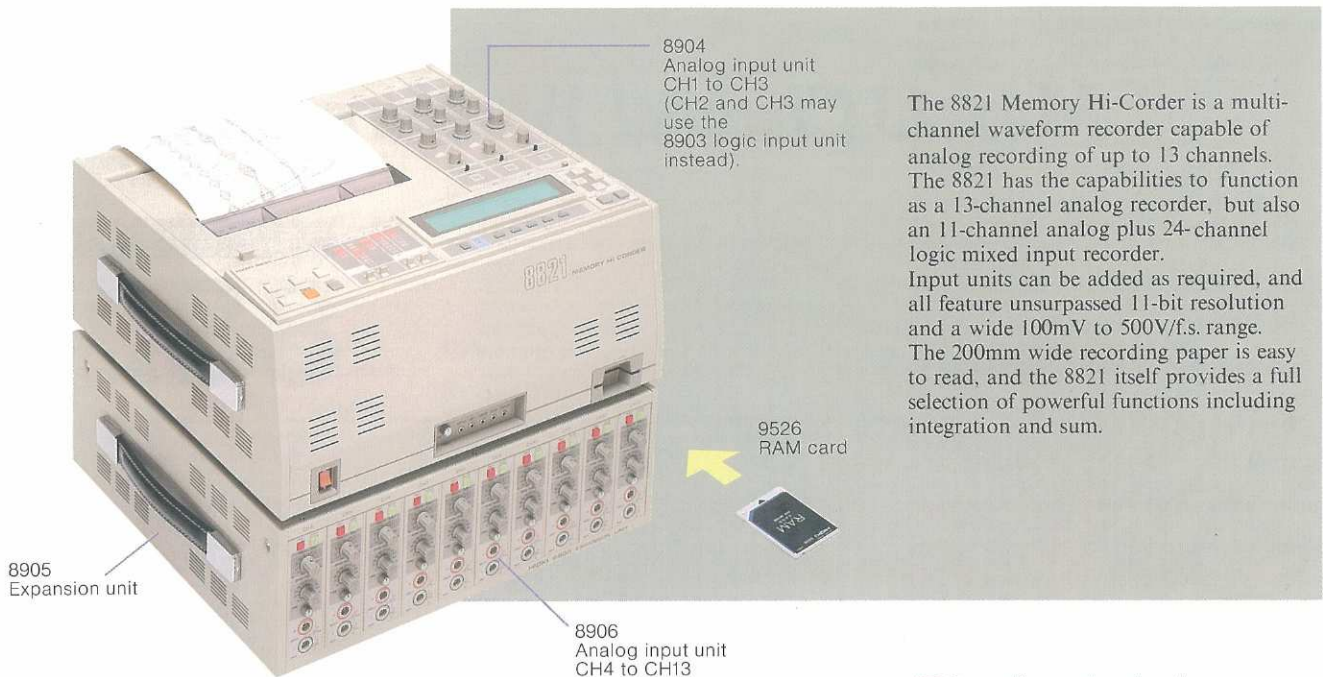


WAVEFORM RECORDER

GP-IB

High-precision, high-resolution. . . and free selection of channel count

Expandable up to a maximum of 13 channels, with 11-bit resolution on all.



The 8821 Memory Hi-Corder is a multi-channel waveform recorder capable of analog recording of up to 13 channels. The 8821 has the capabilities to function as a 13-channel analog recorder, but also an 11-channel analog plus 24-channel logic mixed input recorder. Input units can be added as required, and all feature unsurpassed 11-bit resolution and a wide 100mV to 500V/f.s. range. The 200mm wide recording paper is easy to read, and the 8821 itself provides a full selection of powerful functions including integration and sum.

Measurement items

Memory Recorder Function (MEM)

The input signal is first stored to memory, and then printed. This makes it possible to capture high-speed phenomena without wasting paper, and is invaluable in waveform analysis as well.

- **Samples all input channels on the same time axis**
superimposed writing is possible, making relationships between input signals obvious.
- **Time axis: 500μs/DIV to 10s/DIV**
Can be set in 14 steps (1-2-5 steps)
- **Maximum sampling speed 240kHz, 30k words/channel storage capacity.**
- **Waveform enlargement/reduction printing supported.**
Reduction: × 1/5 and × 1/10 and "small".
Enlargement: × 2. "Small" print compresses the entire waveform into the 200mm wide printout regardless of the shot length, letting you understand the overall flow at a glance.
- **High-quality print function**
A printout smoothing function makes the printout closer than ever to the real analog signal waveform.
- **Partial print**
You can print out any selection portion of the total stored waveform for a closer look.
- **Memory division**
Division of memory capacity permits continuous storage of most signals.

Recorder function (REC)

Continuous recording in realtime.

- **Samples all input channels on the same time axis.**
- **Paper feed speed: 1s/DIV to 100min/DIV**
- **Can be set in 13 steps (1-2-5 steps)**
- **High-speed sampling**
Maximum sampling speed about 3.43kHz, minimum 1kHz.

High-speed X-Y recorder function (XY_{MEM})

As with the operation of the memory recorder, X-Y synthesis between the input channels of the main unit is possible. Input channels corresponding to the X and Y axes can be set freely, with a maximum of three syntheses printed out superimposed.

- **Changeable output format**
Output can be made to the memory recorder (time axis waveform), or the reverse.

Continuous X-Y recorder function (XY_{CONT})

As with the operation of the normal X-Y recorder, X-Y synthesis between input channels is possible.

- **High-speed sampling**
Maximum of about 6kHz recording.
- **Infinite recording time**
- **Superimposed printout**
Superimposed printing continued through pen up/pen down until the memory clear received.

Sampling rate chart

Memory recorder, high-speed XY recorder

TIME / DIV	Sampling rate	Max. recording time	Time axis resolution (per DIV)
500μs/DIV	240kHz	125ms	1/120
1ms/DIV	120	250	
2	60	500	
5	24	1.25s	
10	12	2.5	
20	6	5.0	
50	2.4	12.5	
100	1.2	25	
200	600Hz	50	
500	240	125	
1s / DIV	120	250	
2	60	500	
5	24	1250	
10	12	2500	

* Sampling cycle = 1/sampling rate

Recorder

TIME / DIV	Chart speed	Time axis resolution (per DIV)
1s/DIV	20mm/s	1/120
2	10	
5	4	
10	120mm/min	
20	60	
50	24	
1min/DIV	20	
2	10	
5	4	
10	120mm/h	
20	60	
50	24	
100	12	

Recorder sampling rate Sampling rates shown in parens

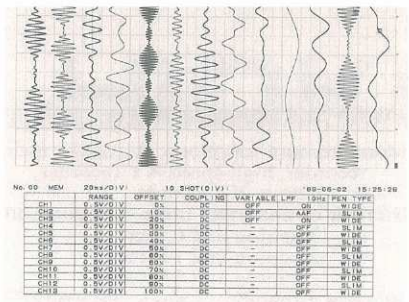
Channels used	Print type	
	Dot	Line
1	3.43 kHz (292μs)	1kHz (1ms)
2	3.00 (333)	1 (1)
3	2.67 (375)	1 (1)
4 ~ 13	1.60 (625)	1 (1)

Continuous X-Y recorder sampling rate

XY syntheses	Dot	Line
1	6.0 kHz (167μs)	90.9Hz (11ms)
2	4.8 (208)	45.5 (22)
3	4.0 (250)	30.3 (33)

Wide Selection of Recording Formats

200mm recording width at 6dots/mm promises you clear, wide printouts



Input unit



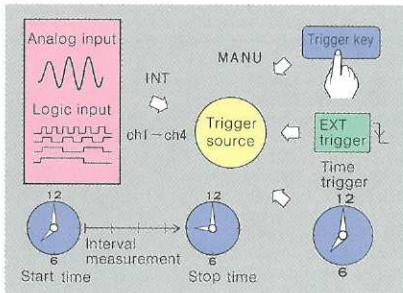
- **Wide input range**
Input range is wide, from 100mV/f.s. to 500V/f.s., making direct read of 100V commercial power possible.
- **All channels isolated**
Designed for measurement on mechanical and power distribution systems.

- **Minus offset supported through -100%.**
Even waveforms with DC components can be recorded accurately.

- **Low path filter (10Hz to 10kHz)**
Selectable cutoff frequency in 7 steps.

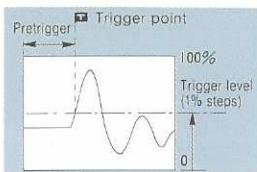
Trigger functions

Five trigger sources (OFF, EXT, MANU, INT and TIME) provided. INT trigger allows you to set trigger conditions such as AND and OR conditions between channels. Trigger filter and time trigger functions are also provided.



- **Trigger level**
Digital trigger level can be set for the entire recording region in 1% steps.

Pretrigger



In MEM and XYMEM, you can freely select recording before or after the trigger.

Trigger logic pattern set

For logic input, you can specify a pattern trigger for 8 of the 12 channels.

Time trigger

You can start recording at a preset time, and can also specify repeated recording at preset intervals.

Trigger filter

Prevents erroneous triggering due to signal chattering during logic input or noise during analog input.

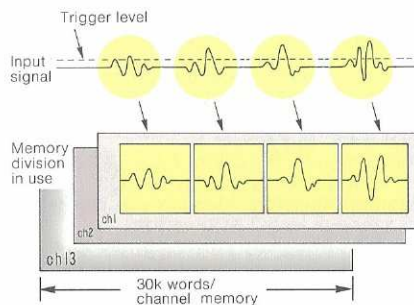
External trigger I/O terminal

Standard functions

Memory division function

The trigger cannot be detected during printout, and therefore the second and following spontaneous phenomena may not be captured in continuous recording. This is where memory division is handy. It lets you continuously store the input signal, and print it out later, minimizing dead time and giving you efficient measurement.

There are four settings depending on the shot length: 10DIV × 16, 20DIV × 8, 40DIV × 4 and 80DIV × 2.



Operation functions

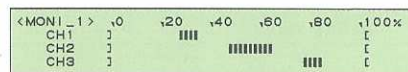
In memory recorder operation it is possible to determine the true rms, maximum, minimum, mean and area for any defined length. In XYMEM operation the area of the XY synthesis waveform can be determined easily. Differentials, integrals, moving averages and the four arithmetic functions are supported for the entire waveform length.

Low pass filter

Recording is possible after stripping off signal ripple components and unnecessary noise. The cutoff frequency can be set in 7 steps (10Hz, 50Hz, 100Hz, 500Hz, 1kHz, 5kHz and 10kHz).

Input level monitor

Input levels for all channels can be monitored on the LCD, three channels at a time.



GP-IB interface standard

Excluding operations on the analog input unit, all settings can be handled by remote control. Waveform data can also be transformed.

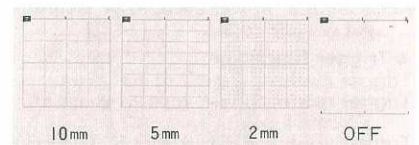
- Comment print function provided to print out titles and operation results directly on the recording paper.

- Level passage point operation function provided to determine waveform phase difference, cycle and rise time.

Variety of print formats

Print on/off and line width (MEM, REC) can be specified for each channel independently. And you can select between print dot/line. All such parameters can be printed out as your set list.

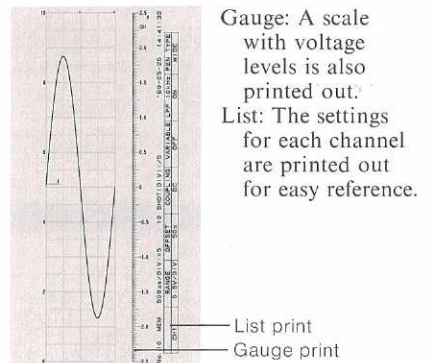
Four grids provided



Channel number print

The channel number can be printed out as well to make it easy to identify waveforms quickly.

Gauge/list functions



RAM card (9526, sold separately)

RAM cards can be used as external memory, making it easy to store waveform data and set-up parameters for later use.



Autostart function

By using a RAM card with set-up parameters stored in a specified file, auto-start is possible. Insert the RAM card and turn on the power, and the system will start automatically, with precision and efficiency that anyone can control easily.

Main unit specifications

Measurement functions: Recorder, memory recorder, high-speed XY recorder, continuous XY recorder

Number of channels (max: combinations):

- (1) 13 analog and 0 logic
- (2) 12 analog and 12 logic
- (3) 11 analog and 24 logic

Storage capacity: 11 bits \times 30k words per channel

Recording method: Thermal line printer on heat-sensitive paper

Recording paper: 216mm \times 50m roll heat-sensitive paper

Recording width: Effective width 200mm (1201 dots)

Units scale: 1DIV = 20mm (120 dots)

Print speed: 30mm/s (except in REC mode)

External control terminal: mini-jack (TRIG IN/OUT, START, STOP, PEN UP/DOWN)

Operating environment: 0 to 40°C, 80% RH max (no condensation)

Power supply: 100/120/220/240V AC \pm 10% (specify at order), 50/60Hz

Power consumption: Max. 300W (80W during normal recording)

Dimensions and weight: Approx. 190H \times 440W \times 405D (mm), 16.8kg (8821 main unit only)

Accessories: Power cord, 9224 recording paper (one roll)

● **Trigger functions**

Trigger method: digital comparison

Trigger mode: Single, repeat (except XYCONT)

Trigger source: OFF, EXT, INT (CH1 to CH4), MANU, TIME

Trigger slope: Analog input rise and fall; Logic input condition match and mismatch; EXT rise and fall

Trigger level: INT analog input 0 to 100% in 1% steps (digital set); EXT: TTL level (active low)

Trigger conditions (INT): (1) Channel selection (CH1 to CH4) (2) Inter-channel AND/OR (3) Pattern set for logic input (1, 0, \times [don't care]).

Trigger filter: 1, 2, 4, 8, 16, 32, 64 and 128 samples, OFF

Pretrigger (MEM, XYMEM): 0, 2, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 95, 100 and -100%

Trigger timing: START, STOP (REC XYCONT)

Trigger output: TTL level (active low), pulse width about 0.2s.

Measurement function specifications

● **Memory recorder (MEM)**

Time axis: 500 μ s/DIV to 10s/DIV.

Time axis resolution: 1/120 (per DIV)

*Sampling rate: Automatically set from time axis range

Recording length: 10, 20, 40, 80, 160, 250DIV

Complementary functions: dot/line (slim or wide)

Output format: $\times 2$, $\times 1$, $\times 1/5$, $\times 1/10$, small, smooth

Grid: OFF, 2mm, 5mm or 10mm widths selectable

Channel discrimination: Channel numbers may be printed for analog recording

● **Recorder (REC)**

Time axis: 1s/DIV to 50s/DIV, and 1min/DIV to 100min/DIV.

Time axis resolution: 1/120 (per DIV)

Sampling rate: Fixed regardless of time axis range

Recording length: 10, 20, 40, 80, 160, 250 DIV, CONT

Complementary functions: dot/line (slim or wide)

Grid: OFF, 2mm, 5mm or 10mm widths selectable

Channel discrimination: Channel numbers may be printed for analog recording

● **High-speed X-Y (X-YMEM)**

XY synthesis: X channel (CH1 to CH13) Y channel (CH1 to CH13)

Up to three syntheses between any channels supported.

Effective recording width: 200mm square (1200 dots square)

Time axis: 500 μ s/DIV to 10s/DIV.

Recording length: 10, 20, 40, 80, 160, 250DIV

Time axis resolution: 1/120 (per DIV)

Sampling rate: Automatically set from time axis range

Complementary functions: dot/line

Grid: OFF, 2mm, 5mm or 10mm widths selectable

● **Continuous X-Y recorder (XYCONT)**

XY synthesis: X channel (CH1 to CH13) Y channel (CH1 to CH13)

Up to three syntheses between any channels supported.

Effective recording dimensions: 200mm square (1200 dots square)

XY axis resolution: 1/120 (per DIV)

*Sampling rate: Automatically set from number of syntheses and print type

Complementary functions: dot/line

Grid: OFF, 2mm or 10mm widths selectable

Superimposition: Supported (until memory clear)

External pen up/down: Supported (through special external control terminal)

*Note: See sampling rate chart inside

● **Accessory functions**

List print: Supported

Input monitor function: Level meter with simultaneous display of three channels

Memory division: Memory can be divided for use in MEM function

Partial print: Any portion of the total waveform can be specified in 1% units in the MEM function

Elapsed time print: Marking every hour in REC function

Auto TIME/DIV: Supported (REC, MEM, XYMEM)

Print format: Gauge and list on/off supported (GP-IB control of waveform on/off)

Clock function: Auto-calendar, automatic leap year calculation, 24-hour clock

Backup (at full charge):

- Clock and settings-one month
- Waveform data- one week

Operation functions: MEM -True RMS, max. min., mean, area, differential, integral, moving average, and four arithmetic functions. XYMEM- XY area

RAM card: Set-up parameters and waveform data may be stored. Auto-start function supported.

GP-IB: Mechanically and electrically compatible with IEEE standard 488-1978.

Option specifications (input unit)

● **8904 analog input unit (mounted in main unit)**

Measurement range -10mV/DIV to 50V/DIV, 12 ranges in 1, 2 and 5-unit steps

Gain adjustment -Continuously variable from about 50% to 100%.

Zero adjust -Settable to 21 points in 10% steps from -100% to +100% (fine tuning supported)

Frequency characteristics: DC to 100kHz (\pm 3dB)

Low pass filter: Cut-off frequency off/on selection (7 steps: 10, 50, 100 and 500Hz and 1, 5 and 10kHz)

Input type: Unbalanced input (input and output isolated)

Max. sampling speed: 240kS/s

Max. floating voltage: 250VAC, 250VDC + AC peak

Accessory: 9177 input cord

Dimensions and weight: Approx. 150H \times 43W \times 280D (mm), 700g

● **8903 logic input unit (Logic probe option)**

Input channel count: 12

Input type: Logic probe (4-channel) connection, maximum three units.

Max. sampling speed: 240kS/s

Trigger channels: CH1 to CH4 (A terminal), CH5 to CH8 (B terminal)

Dimensions and weight: Approx. 150H \times 43W \times 280D (mm), 500g

● **8905 10-channel expansion unit**

Input channel count: 10 channels

Storage capacity: 11 bits \times 30k words/channel

Power supply: 100/120/220/240VAC \pm 10% (specify at order), 50/60Hz

Power consumption: Max. 90W (60W during normal recording)

Dimensions and weight: About 155H \times 440W \times 405D (mm), 8.5kg (not including input units)

● **8906 analog input unit (expansion)**

Measurement range -10mV/DIV to 50V/DIV

Zero adjust -Settable to 11 points in 10% steps from 0% to +100% (fine tuning supported)

Frequency characteristics -DC to 100kHz (\pm 3dB)

Low pass filter: (same as 8904)

Input type: Unbalanced input (input and output isolated)

Max. sampling speed: 240kS/s

Max. floating voltage: 250VAC, 250VDC + AC peak

Accessory: 9177 input cord

Dimensions and weight: Approx. 150H \times 42W \times 180D (mm), 500g

8821 (main unit only, input units sold separately)

8905 Expansion unit (input units sold separately)

Optional input units

(for 8821 main unit)

8904 Analog input unit

8903 Logic input unit (for 8905 expansion unit)

8906 Analog input unit

Optional accessories

9151-02 GP-IB cable (2m)

9151-04 GP-IB cable (4m)

9224 Recording paper (50 m, 6 rolls)

9303 PT (voltage ratio 40:1, 20:1)

9305 Trigger cord

9306 Logic probe

9307 Line logic probe

9308 Line dip detector

9526 RAM card (64kB)

220H Recording paper winder

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All specifications are subject to change without notice.