Hioki's traditional MEMORY HiCORDER functions are now condensed into a low-profile, turn-key device. The compact design includes a beautiful wide-screen QVGA-TFT LCD. Easy to use, with great functionality and performance, you will want to keep this extraordinarily compact MEMORY HiCORDER close to hand.

- Compact and easy to carry
- Easy, intuitive operation
- Simple PC connection
- Fast, 1MS/second performance despite the compact size
- Built-in, compact-yet-sharp QVGA-TFT wide LCD

Palm-size but Powerful
Easy recording anytime, anywhere!
High performance instrument that fits in your hand

Ultra compact, yet easy to use

When powered on, the Settings screen appears along with the waveform monitor, and the new Setup Wizard blinks. By activating the Setup Wizard, you can easily navigate by following the simple instructions. Soon you will be operating the device like a seasoned professional.

The “Setup Wizard” function guides operations

Activate the Setup Wizard

Real-Time waveform monitoring

The help text crawls along the bottom of the screen, describing the function of the setting at the blinking cursor. The enhanced “Waveform Monitor” window with level meter display facilitates changes to settings by simultaneously displaying real-time input waveforms.
Acquire and store data on a CompactFlash card for analysis on a personal computer

**Simple, intuitive operation**

The 8870-20 feels like a hand-held tester, yet takes waveform snapshots. It has no complicated functions - allowing you to observe waveforms quickly and increasing your work efficiency.

- Easily make settings while viewing levels on the Settings screen.
- Observe waveforms using only simple memory recorder functions.

**Isolated inputs for safe measurements**

Isolated analog channel inputs provide CAT II overvoltage protection safety for measurements of up to 300 V AC and DC (maximum terminal-to-ground rating). This capability enables safe simultaneous voltage measurements of inverter primary and secondary and stacked battery cells without damaging the instrument.

- 300 V isolation between measurement terminals and HiCORDER chassis
- 300 V isolation between measurement terminals

**Easy connection to a PC**

Connect to a PC with the supplied USB cable to easily download data that has been automatically saved to a CF card. Use the supplied dedicated application program to display and print waveforms on the PC.

- Easy USB 2.0 data transfer
- Dedicated application program for displaying and printing waveforms

**Compact, easy-to-carry design**

Volume and weight have both been reduced by 60% from HIOKI's previously most compact MEMORY HiCORDER, the 8807-01, to just 40% the volume and 55% the weight. Easily pack it in your briefcase to accompany you wherever you go.

- Only 176 mm wide, 101 mm high and 41 mm thick
- Weighs only 600 g even with the battery pack installed

**Waveform display and printing, and CSV conversion with PC**

Either off-line, or via USB 2.0, easily copy data to a PC.

Open a data file with the dedicated Wave Processor (PC application program) for the 8870-20, to import and print waveforms with your own arrow and figure annotations. Of course, screen data can be copied and pasted into common Word and Excel documents to easily create reports.
Portable size for on-site jobs

Catering to a multitude of applications

**Sequential control fault analysis**

Momentary supply dropouts and low AC voltage are often found to be causes of abnormal interruptions and warnings from sequentially controlled devices in factory production and testing lines. For optimal operational analysis, specify an abnormal power event as a trigger and simultaneously record waveforms of associated sequential relay signals, AC power and DC voltage systems.

**CB timing measurements**

Analyze the relationships of multi-point logic signals and analog waveforms to detect timing issues that can affect power supply circuit breakers. Use logic probes to record relay operations on up to four channels, or use Differential Probe 9322 for 440-volt power measurements and for support of CAT III and CAT IV overvoltage measurement categories.

**When facility troubles require waveforms right away!**

Battery operation is especially convenient in those situations where no power outlet is available. Just plug in the supplied AC adapter to recharge the battery, regardless of whether the HiCORDER is on or off. The battery pack is automatically quick charged (auto-recharging function) whenever its capacity is depleted. A full charge provides about two hours of operation.

**Synchronize two HiCORDERs together for four-channel recording!**

For those times when two channels are just not enough, synchronize two 8870-20’s using the external trigger I/O terminals (apply the trigger output from one to the external trigger input of the other). Then use synchronous start to automatically record four channels of measurement data to a CF card.
Have you ever had an experience like these?

“There's a problem with the facility, so you need to see waveforms without full measurement instrumentation…”

“You often have to visit worksites to set up plants and facilities, but typical measurement instruments are too bulky…”

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Unattended monitoring for unpredictably intermittent leakage phenomena

Record instantaneous waveforms of leakage current and line voltage. Use “Out-of-Window” triggering to detect leakage events only when the input is outside of specified upper and lower limits. Measurement data is saved to CF card whenever leakage phenomena occur. Later, reload the data into the 8870-20 and use the cursor functions to analyze peak current values or breaker tripping events.

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Record motor inrush current waveforms

Reliably record waveforms of motor startup current. Measure current signals preferably using the 9018-10 Clamp-On Probe, or with the 3283 CLAMP ON LEAK HiTESTER. Models 3284 and 3285 CLAMP ON AC/DC HiTESTERs are also ideal for DC waveform measurements.

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Confirm inverter output waveforms

Inverter performance analysis requires simultaneous observation of the high frequency carrier signal and the low frequency fundamental waveform being switched. The combination of high-speed sampling capability and high-capacity memory make these observations possible. For current waveform observations, use HiOKI clamp sensors capable of high-frequency measurements without direct electrical contact.

---

In the automobile servicing industry

Analyze phenomena in ways that are just not possible with dedicated fault diagnostic instruments. The high-speed sampling capability of the 8870-20 as a compact hand-held oscilloscope provides mobility in situations that call for delicate testing, such as when performing high-level analysis or measuring specifiable phenomena.

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Capture momentary commercial power outages

Easily monitor the instantaneous waveform of 50/60 Hz commercial power. Use triggering to record unexpected waveform anomalies. Capture momentary commercial power outages and voltage dips.

---

Long-period recording like a pen recorder

Record dual-level DC voltage systems as you would with a pen recorder. Use the 10 ms sampling rate to record momentary voltage fluctuations. The internal two-Megaword memory offers about five hours of recording with a 10 ms sampling interval.

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### Main unit Specifications

**Basic specifications**

- **No. of channels**: 2 analog and 4 logic channels (standard configuration, logic grounds are common with instrument ground)
- **Measurement functions**: MEM (high-speed recording)
- **Fastest sampling rate**: 1 MS/s (1 ms, all channels simultaneously)
- **Memory capacity**: 12 bits × 2 MWords
- **Removable storage**: CF card Type I slot (standard equipment) × 1: Up to 1 GB (Flash ATA), supports FAT16 and FAT32 formats
- **Backup function**: Clock and settings: 5 years or more (25°C/77°F)
- **Waveform backup function**: available when BATTERY PACK 9780 is installed with charge remaining or AC adapter is connected (up to 100 hours with fully charged battery pack)
- **External interface**: USB: 1 port USB 2.0 High Speed mini-B receptacle, transfers files from the installed CF card to a PC when connected (mass storage class device) Note: The CF card installed in the RECORDER appears as a removable disk on the PC, but all communication functions such as the capability to change RECORDER setting from the PC are not provided.
- **External control terminals**: Terminal block: External trigger input, trigger output
- **Display type**: 4.3-inch WVQGA-TFT color LCD (480 × 272 dots)
- **Display resolution**: Waveform section: 20 × 10 divisions (time axis × voltage axis), each division is 20 × 20 dots
- **Environmental conditions**: Temperature and humidity range for use: -0°C (32°F) to 40°C (104°F), 80% or less
- **Temperature and humidity range for storage**: -10°C (14°F) to 70°C (158°F)
- **Compliance standard**: Safety: EN61010, EMC: EN61326, EN61000-3-2, EN61000-3-3
- **Power requirements**: AC ADAPTER 9786: 100 to 240 V AC (50/60 Hz)
- **Battery pack**: BATTERY PACK 9780: About 2 hours continuous operation (AC adapter has priority when both are used)
- **Charging functions**: The installed battery pack charges when the AC adapter is connected. Charging time is about 200 minutes at 25°C (77°F) Note: Charging time depends on battery condition. Charging is disabled to protect the battery at ambient temperatures less than 0°C (32°F) or over 40°C (104°F)
- **Power consumption**: 30 VA max. (charging with the AC adapter)
- **Dimensions and mass**: Approx. 176 mm (6.93 in) W × 101 mm (3.98 in) H × 41 mm (1.61 in) D, 3.5 lbs (1.6 kg) (with the BATTERY PACK 9780 installed)
- **Supplied accessories**: Instruction Manual × 1, Measurement Guide × 1, AC ADAPTER 9786 × 1, Strap × 1, USB cable × 1, Application Disk (dedicated program for the 8870-20) × 1, PROTECTION SHEET 8809 × 1

**Trigger functions**

- **Trigger modes**: Single or continuous
- **Trigger types (analog)**: Level trigger: Triggering occurs when the signal rises or falls through a specified voltage level.
- **Trigger voltage drop**: Triggering is intended for 50/60 Hz commercial power, triggering occurs when the peak voltage is below the specified value.
- **Level setting**: Resolution: ± 0.5% of full scale (full scale = 10 divisions)
- **Logic Trigger**: 1, 0, or specified pattern
- **Trigger filter**: Set by the number of samples, from 0 to 100, in five steps
- **Other functions**: Pre-trigger recording to capture waveforms before and after triggering, trigger output (terminal block), 5-Volt open-collector active low with at least 1 ms pulse width

**Analog Input**

- **Number of channels**: 2, for voltage measurement
- **Isolated BNC connector (input impedance 1 MΩ, input capacitance 7 pF)**
- **Max. rated voltage to earth**: 300 V AC, DC, CAT II (with input isolated from the unit, the maximum voltage that can be applied between input channel and chassis and between input channels without damage)
- **Measurement range**: 10 mV to 50 Vdc, 12 ranges, full scale: 10 div, AC voltage for possible measurement/display using voltage axis × 1/2: 280 Vrms, Low-pass filter: 5 Hz/50 Hz/500 Hz/5 kHz
- **Measurement resolution**: 1/100 of measurement range (using 12-bit A/D conversion, measurement range is ± 0.05% of reading range value)
- **Highest sampling rate**: 1 MS/s (simultaneous sampling in 2 channels)

**Accuracy**

- **DC amplitude**: ± 0.5% of full scale (after zero-adjust, f.s. = 10 div of per-channel measurement range)
- **Frequency characteristics**: DC to 50kHz ±3dB
- **Input coupling**: DC/GND
- **Max. allowable input**: 400 V DC (the maximum voltage that can be applied across input pins without damage)

**Memory recorder functions**

- **Time axis**: 100 μs to 5 min/div, 20 ranges, time axis resolution 100 points/div, time axis zoom: X2 to X10 in 3 stages, compression: 1/2 to 1/1000 in 9 stages, Auto roll mode display at 50 ms/div or slowly range
- **Sampling speed**: 1/100th of time axis range, (1 μs per maximum, simultaneous sampling in all channels)
- **Recording length**: Ten settings from 20 to 20,000 div, or continuous (limited by timebase, the last 20,000 div are saved)
- **Pre-trigger**: Records waveforms prior to trigger events, from 0 to 100% of the specified recording length
- **Screen types**: Instantaneous value or RMS value display (only DC and 50/60 Hz) Refresh rate: 0.5 sec, Sampling speed: 10 kHz, 4 digits: the lowest digit displays as 0 if value is 0 to 4 and 5 for values 5 to 9
- **Voltage axis range**: 10 mV, 50 mV, 100 mV, 500 mV, 1 V, 5 V, 10 V, 50 V, Auto ranging
- **Accuracy**: ± 0.5% of reading ±5 digits
- **Numerical calculation**: Up to four simultaneous calculations (common to all channels), calculation results are saved to CF card, Calculation contents: average, peak, maximum and minimum values, RMS, period and frequency
- **Highlight**: Store calculated results
- **Screen capture**: The displayed screen is saved to CF card as a compressed bitmap
- **Cursor display**: Selectable by model (clamp or Differential Probe 9322), specified conversion ratio (output ratio, division ratio), 2-point setting method
- **Comment entry**: Title comments can be entered for each channel (including logic)
- **Screen contrast**: The displayed screen is saved to CF card as a compressed bitmap
- **Preserve starting conditions**: If power fails while measuring, measurement can be automatically resumed when power is restored
- **Auto save**: Included
- **Scroll bar**: To jump to a specific waveform location
- **Waveform monitor**: Setting is possible while monitoring waveforms on the waveform screen
- **Logic signal view**: In 4-bit units, four selectable display positions

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**Maximum Recording Time for the Memory Function**

- **Because data is not recorded directly to the CF card, maximum recording time is independent of CF card capacity.
- **Maximum recording time is determined only by internal memory capacity.
- **Operation cannot be guaranteed when recording continuously for more than one year (with a slow timebase).**
- **Maximum recording length is the same whether using one or two channels.**

### Memory recorder functions

<table>
<thead>
<tr>
<th>Time axis</th>
<th>Sampling speed</th>
<th>2M-Word (=4MB) 20MHz, div. Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 μs/div</td>
<td>1 μs</td>
<td>2 x</td>
</tr>
<tr>
<td>300 μs/div</td>
<td>2 μs</td>
<td>4 x</td>
</tr>
<tr>
<td>500 μs/div</td>
<td>5 μs</td>
<td>10 x</td>
</tr>
<tr>
<td>1 ms/div</td>
<td>10 μs</td>
<td>20 x</td>
</tr>
<tr>
<td>2 ms/div</td>
<td>20 ms</td>
<td>40 x</td>
</tr>
<tr>
<td>5 ms/div</td>
<td>50 ms</td>
<td>100 x</td>
</tr>
<tr>
<td>10 ms/div</td>
<td>100 ms</td>
<td>200 x</td>
</tr>
<tr>
<td>20 ms/div</td>
<td>200 ms</td>
<td>600 x</td>
</tr>
<tr>
<td>50 ms/div</td>
<td>500 ms</td>
<td>1600 x</td>
</tr>
<tr>
<td>100 ms/div</td>
<td>1 ms</td>
<td>3000 x</td>
</tr>
<tr>
<td>200 ms/div</td>
<td>2 ms</td>
<td>6000 x</td>
</tr>
<tr>
<td>500 ms/div</td>
<td>5 ms</td>
<td>20000 x</td>
</tr>
<tr>
<td>1 s/div</td>
<td>10 ms</td>
<td>30000 x</td>
</tr>
<tr>
<td>2 s/div</td>
<td>20 ms</td>
<td>60000 x</td>
</tr>
<tr>
<td>5 s/div</td>
<td>50 ms</td>
<td>120000 x</td>
</tr>
<tr>
<td>10 s/div</td>
<td>100 ms</td>
<td>600000 x</td>
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<tr>
<td>20 s/div</td>
<td>200 ms</td>
<td>1200000 x</td>
</tr>
<tr>
<td>50 s/div</td>
<td>500 ms</td>
<td>6000000 x</td>
</tr>
<tr>
<td>100 s/div</td>
<td>1 s</td>
<td>12000000 x</td>
</tr>
<tr>
<td>200 s/div</td>
<td>2 s</td>
<td>24000000 x</td>
</tr>
<tr>
<td>500 s/div</td>
<td>5 s</td>
<td>120000000 x</td>
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<tr>
<td>1000 s/div</td>
<td>10 s</td>
<td>240000000 x</td>
</tr>
<tr>
<td>5000 s/div</td>
<td>50 s</td>
<td>1200000000 x</td>
</tr>
<tr>
<td>10000 s/div</td>
<td>100 s</td>
<td>2400000000 x</td>
</tr>
<tr>
<td>20000 s/div</td>
<td>200 s</td>
<td>4800000000 x</td>
</tr>
<tr>
<td>50000 s/div</td>
<td>500 s</td>
<td>24000000000 x</td>
</tr>
<tr>
<td>100000 s/div</td>
<td>1000 s</td>
<td>48000000000 x</td>
</tr>
<tr>
<td>500000 s/div</td>
<td>5000 s</td>
<td>240000000000 x</td>
</tr>
</tbody>
</table>
Wave Processor Program for the 8870-20

**Supported measurement instruments**: MEMORY HI CORDER 8870-20 only

**Operating environment**: PC running Windows 2000, XP, or Vista (32-bit versions)

**File loading**: Loadable data format: Memory function data (MEMM extension).
Max. loadable file size: The maximum size that can be stored by the 8870-20 (subject to the capacity of the PC's operating environment)

**Overwriting save**: Overwrites saved scaling and title/channel comments

**Slideshow display**: Sequentially displays waveform files in the same folder

**Text conversion**: Data conversion format: Select from CSV, tab-separated or space-separated.
Object data range: Whole range, or between cursors
Data-thinning: Available by specifying interval
Conversion methods: Analog waveform data to voltage values.
Logic data is converted to ones and zeros
Conversion channels: selectable
Header contents: Title, trigger date, timebase, comments, per-channel setting conditions
Batch conversion: specify multiple files for batch conversion

Options specifications (sold separately)

**Cable length and mass**: Main unit cable: 1.5 m (4.92 ft), input section cable: 30 cm (0.98 ft), approx. 150 g (5.3 oz)

**LOGIC PROBE 9320-01**

| Function | 4 channels (common ground between unit and channels), digital/ | contact input, switchable (contact input can detect open-collector signals), input impedance: 1 MΩ (with digital input, 0 to ±5 V), 500 kΩ or more (with digital input, ±5 to ±50 V), pull-up resistance: 2 kΩ (contact input: internally pulled up to ±5 V) |
| --- | --- |
| Digital input threshold | 1.4 V/2.5 V/4.0 V |
| Contact input detection resistance | 1.5 kΩ or higher (open) and 500 Ω or lower (short), 3.5 kΩ or higher (open) and 1.5 kΩ or lower (short), 25 kΩ or higher (open) and 8 kΩ or lower (short) |
| Response speed | 500 ns or lower |
| Max. allowable input | 0 to ±50 V DC (the maximum voltage that can be applied across input pins without damage) |

**Cable length and mass**: Main unit cable: 1.3 m (4.27 ft), input section cable: 46 cm (1.51 ft), approx. 100 g (3.5 oz)

**LOGIC PROBE 9321-01**

<table>
<thead>
<tr>
<th>Function</th>
<th>Detection of AC or DC relay drive signal for High/Low state recording. Can also be used for power line interruption detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>4 channels (isolated between unit and channels), HIGH/LOW range switching, input impedance: 100 kΩ or higher (HIGH range), 30 kΩ or higher (LOW range)</td>
</tr>
<tr>
<td>Output (H) detection</td>
<td>170 to 250 V AC, ±DC (70 to 250 V) (HIGH range) 60 to 150 V AC, ±DC (20 to 150 V) (LOW range)</td>
</tr>
<tr>
<td>Output (L) detection</td>
<td>0 to 30 V AC, ±DC (0 to 43 V) (HIGH range) 0 to 10 V AC, ±DC (0 to 15 V) (LOW range)</td>
</tr>
<tr>
<td>Response time</td>
<td>Rising edge 1 ms max., falling edge 3 ms max. (with HIGH range at 200 V DC, LOW range at 100 V DC)</td>
</tr>
<tr>
<td>Maximum allowable input voltage</td>
<td>250 Vrms (HIGH range), 150 Vrms (LOW range) (the maximum voltage that can be applied across input pins without damage)</td>
</tr>
</tbody>
</table>

**Displaying**

- Display language: English or Japanese (select during installation)
- Waveform display: Scroll and magnify/reduce the time axis of the displayed waveform data image, move the zero position of each channel independently (variable gain)
- Numerical value display: included
- Cursor functions: Manipulate A and B cursors independently, and display time and voltage numerically.
- Max. displayable channels: two analog and four logic channels
- Gauge display: Time gauge (absolute or relative time, seconds, data points), voltage gauge (for each channel)
- Figure annotations: Text boxes, straight lines, arrows, circles and rectangles at any location
- Screen capture: Extended meta format, bitmap format
- Search functions: Date, maximum, minimum, level and window search
- Template function: Save and reload waveform file display configurations

**Printing**

- Printer support: Color and monochrome printing on printers supported by the operating system
- Printable ranges: All data, screen capture and selectable areas
- Print formats: Undivided, two divisions, 2, 4, 8 or 16 traces, single XY screen, gauges, channel comments, zero-position comments, and A/B cursor values
- Print preview and waveform screen hard copy/logging print functions are included

**Multiple files can be batch-converted to CSV data**
Voltage measurement (requiring power for probe)

DIFFERENTIAL PROBE 9322
2x24 V DC input regimen or ±15 V AC and CAT II 300V
Differential-probe types 9320-01 and 9321-01 are also available.

Logic probe measurement (One probe can be installed to provide four channels)

LOGIC PROBE 9320-01
4-channel types, for voltage/contact signal

LOGIC PROBE 9321-01
4 isolated channels, for voltage/contact signal

Current measurement

CLAMP ON LEAK HiTESTER 3233
10 A to 500 A

CLAMP ON A/C/DC HiTESTER 3234
20 A to 200 A A/C/DC

CLAMP ON A/C/DC HiTESTER 3285
200 A to 2000 A A/C/DC

AC ADAPTER 9094-02/03
For the 3233/3234/3235, 5V/1A

Removable storage

PC CARD 128M 9726
128MB capacity

PC CARD 256M 9727
256MB capacity

PC CARD 512M 9728
512MB capacity

PC CARD 1G 9729
1GB capacity

AC Adapter 9786 is the only supplied accessory.

AC Adapter 9445-02/-03
3.5-mm mini plug, and female banana terminals (output)

Not CE marked

PC Card Precaution

Use only PC cards sold by HIOKI! Compatibilities and performance are not guaranteed for PC cards made by other manufacturers. You may be unable to read from or save data in such cards.

Options for Voltage measurement (The supplied. Purchases together with attachment clips are required for your application.)

CONVERSION CABLE 9323
Female banana terminals to BNC plug (output)

Supplied Accessories

CONVERSION ADAPTER 9999
Female banana terminals to BNC plug (output)

MEMORY HiCORDER 8870-20
(English model, instrument only)

Note: Test leads are not included. Purchase the leads appropriate for your application separately. AC HiCORDER 8870 is the only supplied accessory.

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