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Astro-Med is system-certified to ISO 9001

MONITOR & RECORD 10, 20, or 30 CHANNELS

WITH ASTRO-MED'S ALL-NEW PORTABLE RECORDER

- True Portability: Internal Battery, AC and DC Power
- Big, Bright, High-Response Monitor for Viewing Data and Easy Setups
- Laser Quality Chart Resolution (300 dpi)
- 50 mV to 500 VDC Isolated Input — DC to 25 kHz Response
- Huge 512 kSample Memory per Channel for Data Capture and Analysis
- 1.44 MByte Floppy Drive for Quick Recorder Setups, Data Storage and Upgrades



Model
Dash 10

RECORD ALL YOUR DATA WITH THE DASH 10

When your job calls for recording 10 to 30 waveform channels, your only choice is Astro-Med's all-new Dash 10. Its internal battery power gives you true portability. Just pick it up and carry it anywhere. You get 11-inch wide, 300 dot per inch "laser quality" charts. You can view waveforms in real time on a bright, high response vacuum fluorescent (VF) monitor while recording or during setups.

The Dash 10 allows you to input full scale signals from 50 mV to 500 V peak (250 V RMS) at frequencies to 25 kHz without the need for external signal conditioners.

You can capture up to 512 kSamples of data per channel to the huge internal RAM memory for up to 30 channels simultaneously. Also, the 1.44 MByte DOS compatible floppy drive makes recorder setups, data storage and software upgrades quick and easy.



Up to 30 Input Channels

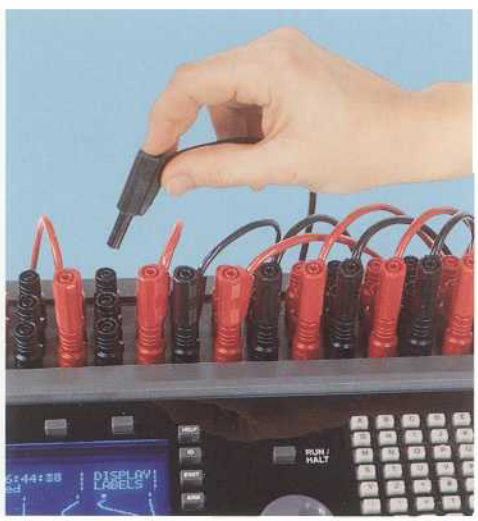
The Dash 10 comes with ten isolated analog waveform input channels and is expandable to 30 channels in increments of 10. Included are one event (logic) channel for each waveform plus a "system" event and two tri-level time markers. Built-in signal conditioners accept signals from 50 mV to 500 V peak (250 V RMS), with ±250 V of zero suppression and isolated inputs, eliminating the need for external amplifiers.

Real Time, Full-Size Waveform Monitor

The Dash 10 displays waveforms in real time on a bright, fast, vacuum fluorescent (VF) monitor. You can see waveform activity as it happens—even from across the room, eliminating any recorder viewing delay. Now the data is always visible — at any chart speed. And, since the VF display has a 100 Hz refresh rate, you can see high frequency signals clearly.

A Truly Portable Field and Lab Recorder

The Dash 10, a truly portable recorder, features a built-in battery, which allows it to be used at remote sites. In the lab, the battery also functions as a UPS (uninterruptible power supply). The battery is easily accessible by simply sliding off a cover plate, and it takes only



Guarded binding post type inputs (banana compatible), standard with the Dash 10, are available to accommodate 10, 20 or 30 channels.



Fast, brilliant vacuum fluorescent monitor with 100 Hz refresh rate displays high frequency signals clearly in real time. The monitor also displays recorder menus for paperless setups.

© Astro-Med, Inc.

an instant to snap in a fresh one. Battery replacement is so easy that it makes sense to bring extra batteries along on those long field trips. What's more, the battery *automatically* recharges whenever the Dash 10 is plugged in! The Dash 10, supplied with an integral shoulder strap and a soft-sided carrying case, is comfortable and easy to carry to a recording site.



Only Astro-Med's portable recorders offer internal batteries, making them at home in the field, lab, or on a factory floor.

Laser Sharp, 11-Inch Wide Charts

The Dash 10 and Astro-Med's Dash IV are the only portable recorders in the world with 300 dot-per-inch print engines, which provide laser-sharp, accurate charts.

Astro-Med's 300 dpi print engine permits 50% better resolution along the important amplitude axis compared to old style 200 dpi machines. It achieves 300 × 300 dpi laser printer resolution at up to 100 mm/sec, producing the clearest, sharpest, most accurate traces you've ever seen.

And the 11-inch wide chart provides plenty of space for waveforms, even when recording 30 channels!

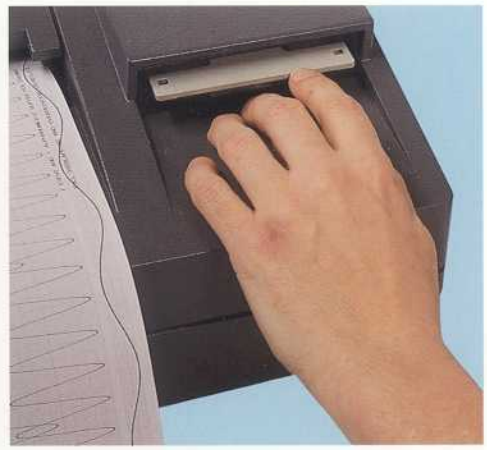
Completely Flexible Chart Layout

The Dash 10 gives you total control over chart layout and annotation, without rigid preformatted grids and annotation channels. You can set individual channel widths, channel locations, grid on/off and major and minor division sizing as well as annotation content and location.

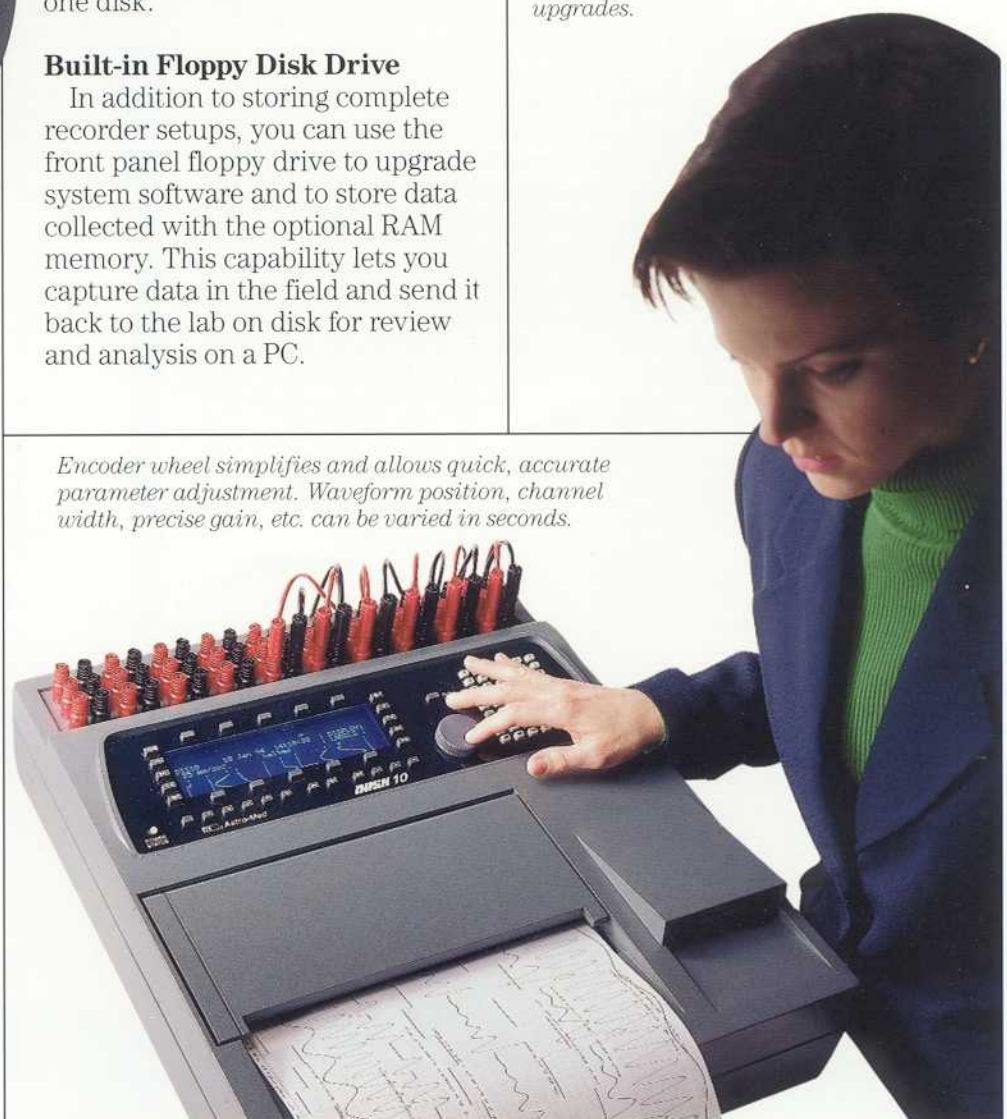
Every unique test setup can be saved to floppy disk using the 1.44 MB internal floppy disk drive standard with the Dash 10. Simply program the recorder once, then save the setup to disk. The next time you need that format, simply slip the disk into the drive, and you're ready to record. You can store up to 20 different setups on one disk.

Built-in Floppy Disk Drive

In addition to storing complete recorder setups, you can use the front panel floppy drive to upgrade system software and to store data collected with the optional RAM memory. This capability lets you capture data in the field and send it back to the lab on disk for review and analysis on a PC.



1.44 MByte DOS compatible floppy drive, standard with Dash 10, offers wealth of data management capabilities, including storage of up to 20 different chart setups; storage of data for archiving or for analysis; download of modified data for playback on monitor and hard copy output; and for installation of software upgrades.



Encoder wheel simplifies and allows quick, accurate parameter adjustment. Waveform position, channel width, precise gain, etc. can be varied in seconds.

CREATION OF THE PERFECT CHART

The true measure of a recorder is the quality of the chart it produces. The chart must be clear, crisp, easy to read, and accurate. The Dash 10 uses a print engine with laser resolution along with advanced electronics and software to give you charts that are as beautiful as they are accurate and complete with all the information needed for immediate analysis of test results.

Lay Out 10, 20 or Even 30 Channels Anywhere on the Chart

The Dash 10 gives you complete command of your data format. Up to 30 waveform channels can be placed at any location you select on the chart, and the grid for each waveform can be independently configured to suit your needs. Make the grids any size you want, and select the size and number of major and minor divisions.

The Dash 10 provides one event marker per channel plus the system event channel. You can position the event markers anywhere on the chart. For example, they can be grouped in a special section or placed alongside the corresponding waveform channel.

Calibrate the Chart in Engineering Units

The new Dash 10 can calibrate any grid in user-defined engineering units as well as the traditional voltage scale. You can overprint the chart directly with scale values such as °C or °F, psi, mmHg, ft-lb, or any scale that suits your application.

When you choose to annotate the chart in engineering units, you get more than just custom chart calibration. All chart annotations — all menus, grid minimum and maximum values, even the gain and zero suppression position — are displayed and printed in your own engineering units.

Five Types of Alphanumeric Annotation

The Dash 10 offers five different types of alphanumeric annotation to provide a complete description of your test results:

(1) The *System Log*, a single line containing the time, date, chart speed, time mark setting and operating mode, is located on the top margin of the chart.

(2) Up to 30 *Channel Annotation Buffers*, one per channel, provide a 128-character, alphanumeric, user-defined message that specifically describes the significant characteristics of each channel.

(3) *Gain Setting Conditions* are printed automatically for each waveform channel.

(4) One *On-Demand Printing Buffer* allows you to print one line of 128 characters anywhere on the chart.

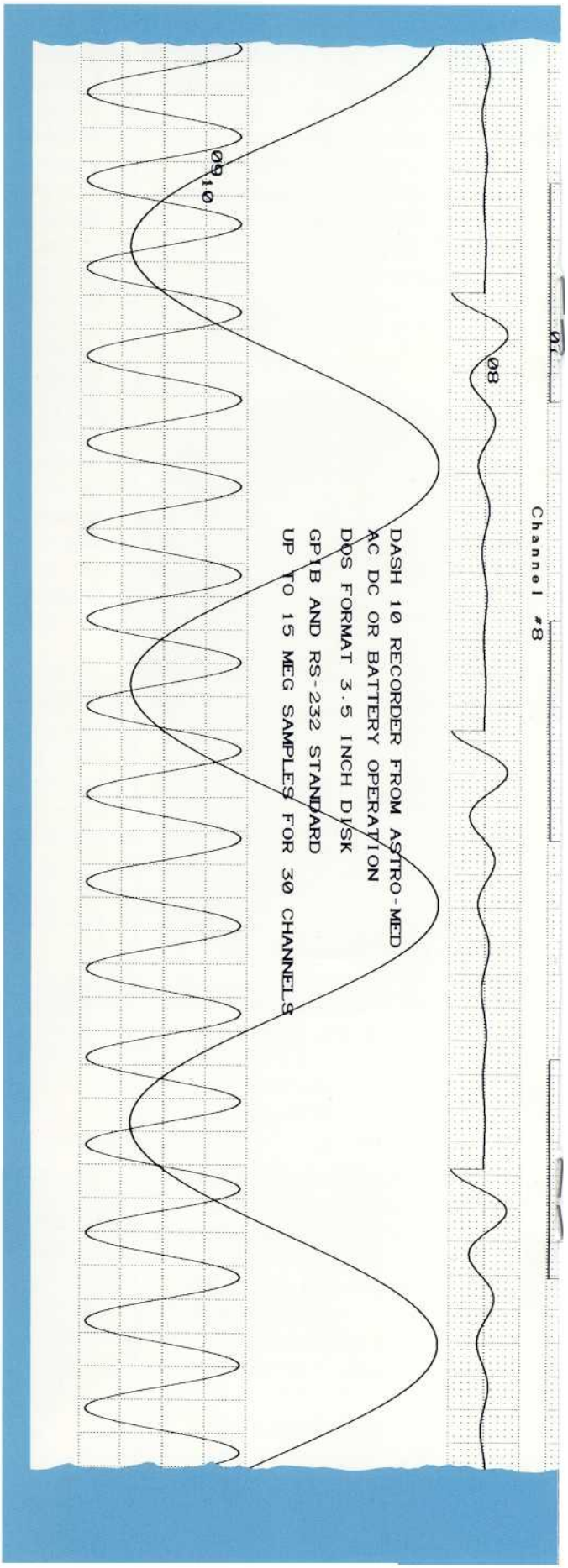
(5) *Channel ID* labels each waveform with its channel number and full scale top and bottom grid values in either voltage or your specified engineering units.

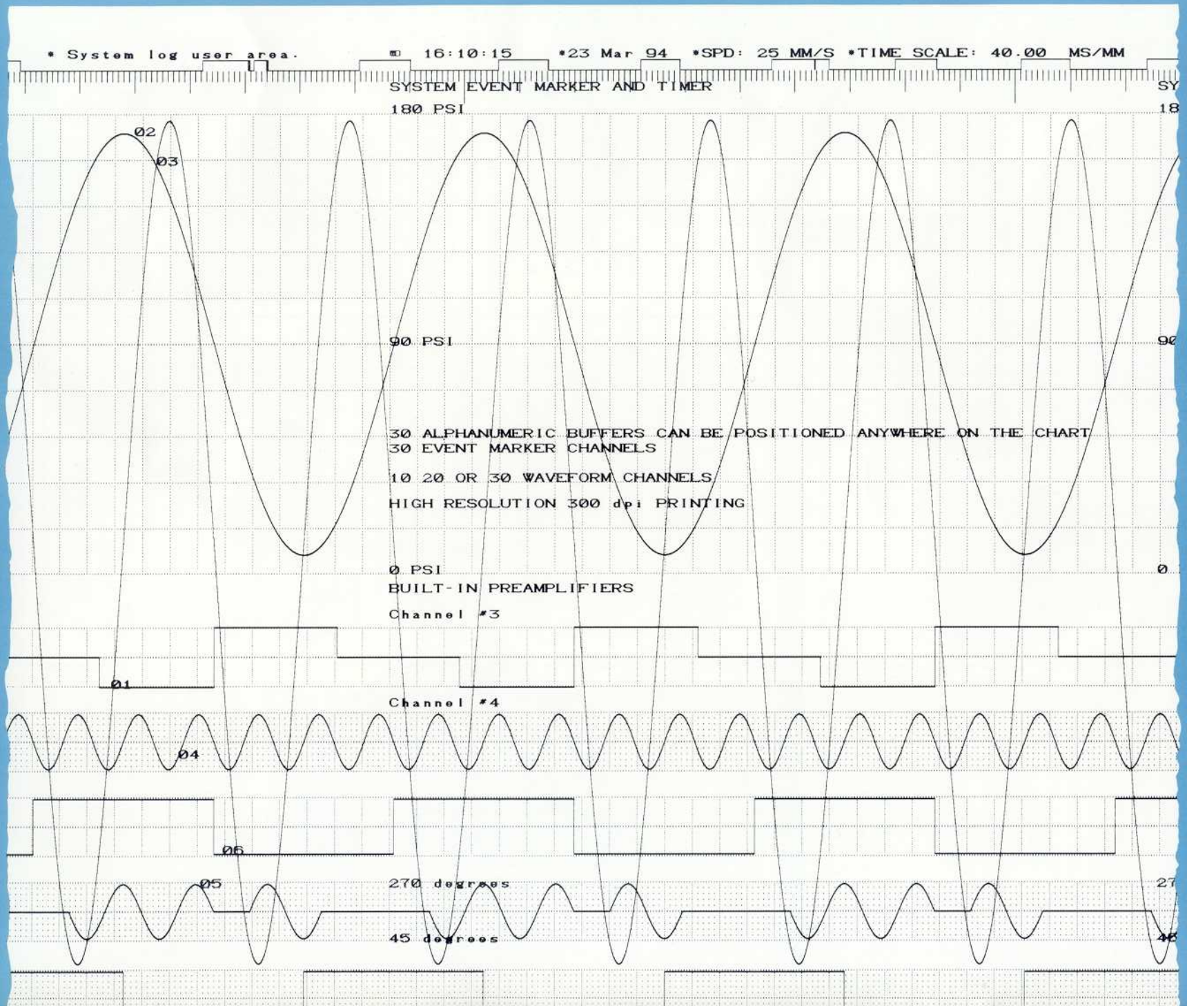
Multiple Recording Formats

In addition to the familiar waveform format, the Dash 10 gives you many different ways to view your data. For example, the Data Logger mode presents your data (10 channels at a time) in numeric values with your choice of engineering units. In this mode it prints each point as a signed, five-digit value with decimal and a four-character label to identify your units.

The Dash 10 can also operate as a line printer under host control, with data printed at up to 50 mm/second.

With optional data capture installed, data can be played back in X-Y plots or analyzed with the FFT utility program.





Typical chart illustrates the wide range of useful information recorded by the Dash 10. Includes interchannel annotation buffers, system annotation channel, system event channel, on-demand annotation buffer, channel ID and grid labeling. All printed with laser quality resolution.

DATA CAPTURE AND PLAYBACK

The Dash 10 offers a variety of powerful data capture and playback capabilities. It captures up to 5 Megasamples of data in one record; uses up to three different time bases for data capture; samples data at rates from 10 Hz to 250 kHz; and captures up to 512 kSamples per channel simultaneously for all thirty channels.

Data can be played back to the monitor or to the chart, or both. Moreover, captured data can be archived onto floppy disk for further analysis or permanent storage, or transferred to a host computer over GPIB or RS-232.

The Dash 10 with data capture also provides FFT analysis capability.

512 kSamples per Channel

The basic data capture format is 512 kSamples per channel, which only begins to describe the capabilities of the Dash 10. Since each bank of 10 channels is independent, up to three different sets of capture parameters may be used with 30-channel recording. The user can set different trigger conditions for each bank.

To achieve the best playback resolution, the user may vary the sample rate from 10 to 250 kSamples per second. Up to eight 64 kSample records per channel may be stacked or all the memory linked for one 5 Megasample capture. In 30-channel recording, three banks of 5 Megasamples of capture are available.

Triggering

The Dash 10 offers a variety of trigger types, including a manual trigger on the front panel. Triggering can be initiated from a host computer either by RS-232 or GPIB command. In addition, you can program the Dash 10 to trigger at a preset time interval. There are also a variety of waveform triggers — inside/outside window; above/below level; and a wide variety of AND/OR combinations of various waveform triggers — that may be employed. The level and window triggers can be set to 1% increments of the entire recording range.

You can even set the trigger to activate in your specified engineering units such as volts, mmHg, or psi. Use whatever measurement scale is meaningful in your application.

Background Capturing

The Dash 10 can capture data even during real time recording. This "Background Recording" feature allows uninterrupted real-time recording to continue while selected data is captured for playback.

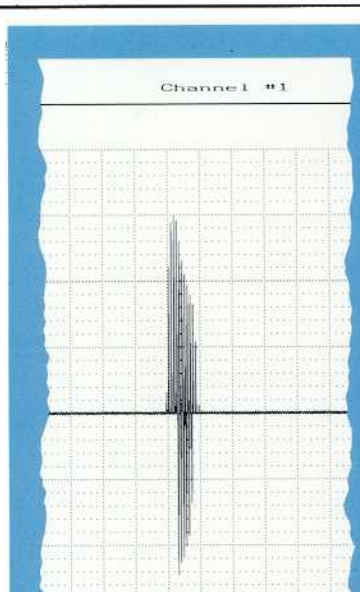
During all data captures, all event marker data is captured along with waveform data. The Dash 10 creates a header file for each capture, listing all analog recorder settings such as chart speed, zero/gain position and zero suppression.

Multiple Data Playback Options

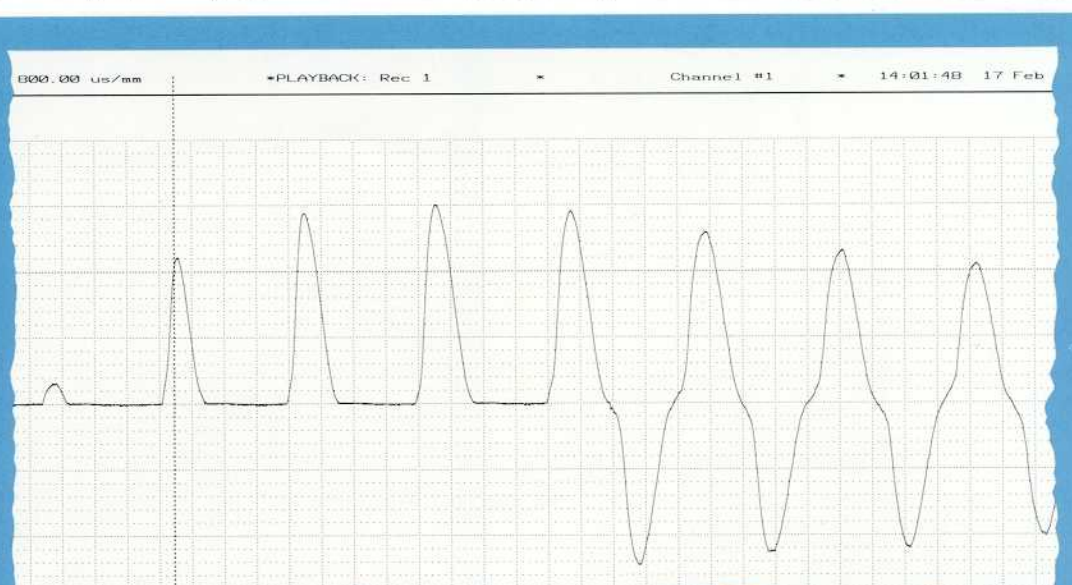
The Dash 10 can play back captured data repeatedly in any recording mode — any chart format, X-Y plot, data logger — to provide the desired perspective on the data. Play back the entire capture, or only a selected portion, in compressed or expanded formats. The recorder labels playback recordings with time, date, sample rate, time scale, and effective chart speed.

Unlimited Data Storage

The standard front-panel 1.44 MByte floppy disk drive on the Dash 10 enhances its data capture and playback capabilities. Now you can transfer your important test results onto floppy disk for permanent storage or analyze the data in more depth with a computer based analysis program. You can also transfer data directly to a host computer by GPIB or RS-232 interfaces.



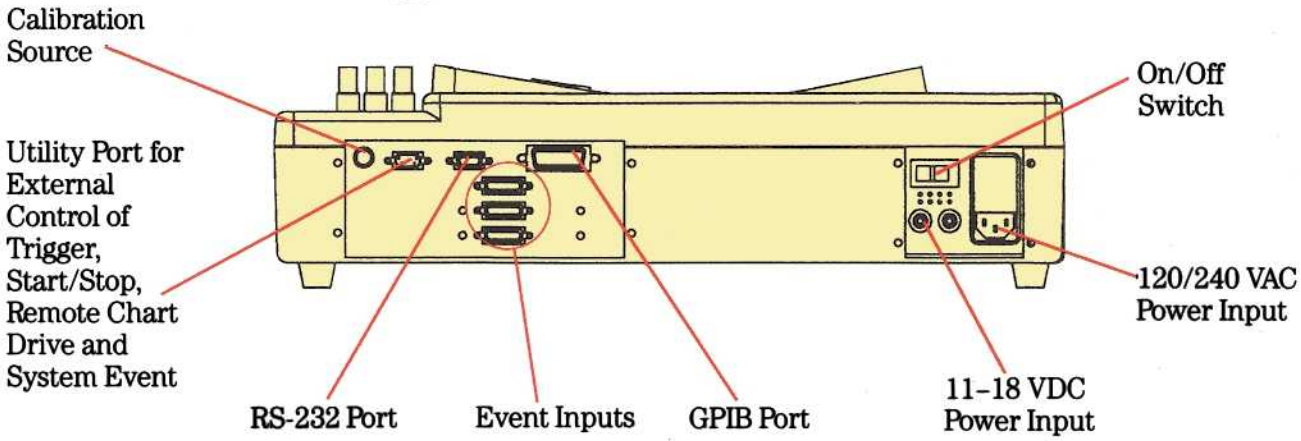
Waveform trace shows current draw of DC motor on startup recorded at 25 mm/sec.



Playback of captured data at effective rate of 1250 mm/sec reveals important details of current draw waveform.

SPECIAL FEATURES OF THE DASH 10





DASH 10 SPECIFICATIONS

General

Recording Method .....Direct thermal
Frequency Response ....DC to 25 kHz (−3 dB)
RMS Bandwidth .....50 kHz
Analog Waveform Channels .....10, 20 or 30
Amplitude Resolution ..12 dpm (300 dots per inch)
Time Base Resolution ..12 dots per mm (dpm) for 1 to 100 mm/sec, 6 dpm for 101–200 mm/sec
Event Channels .....1 per waveform channel, 1 system event, 2 timer events
Chart Width .....280 mm (11″)
Maximum Waveform Size .....256 mm
Grid Sizes .....30 independent grids up to 250 mm wide can be placed anywhere on the chart
Speeds .....1 mm/min to 200 mm/sec
Speed Accuracy .....±2%
Paper Capacity .....48 m roll

Input Specifications

Type .....Isolated, single ended voltage amplifier
User Input Connector ...Guarded binding posts
Input Coupling .....DC
Range .....50 mV to 500 V full scale
Max. Differential Input .....500 V peak or 250 V RMS
Max. CMV (IMV) .....500 VDC
Input Impedance .....1 Megohm
Zero Suppression .....±5 V (2.5 mV step) for ranges <5 V; ±250 V (.25 V step) for ranges >10 V
Zero Suppression Error .....±2%
Sample Rate .....250 kSamples/sec
RMS .....Handle crest factors to 8 with less than 1% error
CMRR at 60 Hz .....>80 dB
Low Pass Filter .....10 Hz
Max. Intrinsic Noise ....1 mm
Non-Linearity .....<0.1% of full scale
Baseline Drift with Time .....1% of full scale
Baseline Drift with Temperature .....<0.1% of full scale per °C

Waveform Monitor

Type .....Built-in vacuum fluorescent display for both text and real-time waveforms
Resolution .....256 dots (w) × 64 dots (h)
Waveform Format .....Waterfall scroll
Refresh Rate .....100 Hz

User Interface

Keypad .....Full alphanumeric keypad for annotation entry
Encoder Wheel .....Used for rapid entry of gain/zero position and chart layout
Chart Speed Keys .....Quick keys for 1, 5,25, 50, 100 and 200 mm/sec or mm/min plus 3 user defined speed keys
Indicators .....Battery Status, Arm, Trigger
Host Interfaces .....GPIB, RS-232 (DTR/DSR and XON/XOFF)
Disk Drive .....1.44 MByte, DOS compatible, 3.5″ floppy drive for saving setups and annotation, archiving data and upgrading software
Remote Start/Stop .....Standard via switch closure or TTL

Real-Time Recording Formats

Standard Recording ....10 to 30 channels with annotation buffers in overlap and separate channel modes
User Defined Formats ..User can design unique charts using standard menus. Up to 20 formats can be saved to floppy disk for quick chart setups
Data Logger .....Numeric reporting of waveform data in engineering units. Max. sample rate is 5 Hz
Timed Recording .....System can be programmed to start and stop recording at specific times
Line Print .....125 columns × 66 rows

Data Conversion and Signal Processing

General .....Each channel has own A/D converter
ADC Resolution .....12 bits

Annotation

Units .....All annotation can be selected in either voltage or in user-defined engineering units

System Log .....Single line containing the time, date, chart speed and time mark setting

Channel Annotation ....Each channel has a 128-character ASCII buffer

Signal Conditioner .....Uses last 32 characters of channel annotation if enabled

On-Demand Annotation .....128-character buffer printed anywhere on the chart

Channel ID .....Each channel is labeled with channel number on demand. Full scale top and bottom values of the grid can be printed in either voltage or engineering units

Time Lines and Markers

Tri-State Markings .....(×1, ×10, ×100) mark on left, right or both edges

Horizontal Grid Lines ...May be synchronized to time mark

Time Mark Intervals ....0.02, 0.04, 0.1, 0.5 or 1 second (×1 setting)

Manual Event Mark .....Front panel key or external (TTL or switch closure), choice of bar on/off or binary level

External Time Marks .....Up to 30 event marks available (TTL or switch closure), non-isolated, glitch capture

Power/Environmental/Dimensional

General .....Standard AC, DC or optional internal battery

AC Requirement .....120/240 VAC nominal at 50 or 60 Hz

DC Requirement .....11–18 VDC

Operating Temperature .....0°C to 40°C

Storage Temperature ...–20°C to 80°C

Relative Humidity .....0% to 95%, non-condensing

Overall Dimensions .....5″ (127 mm) H × 20″ (508 mm) D × 18″ (457 mm) W

Weight .....36 lbs (16 kg) with battery; 32 lbs (15 kg) without (10 channel)

Options

Data Capture

General .....Each channel can capture up to 512 kSamples of data to RAM during one capture. Captures can be stacked in 64 kSample blocks or memory can be linked for a total of 5 Megasamples (per 10 channels). Events are also captured.

Background Capture ....Standard

Memory .....DRAM

Time Stamping .....All records are time stamped at time of trigger

Sample Rates .....10 to 250 kSamples per second per channel

Record Sizes .....64 kSamples/channel (stacked); 512 kSamples/channel (not stacked or linked); 5 Megasamples (linked, 1 channel capture per 10 channels)

Stacking .....Up to 8 records can be stacked. Stack up to eight 64 kSample blocks per channel

Header .....Each record contains complete capture information including analog settings

Trigger

Manual .....With front panel key

Host .....RS-232 or GPIB

Periodic .....User programmed, internal

Waveform .....Inside window, outside window, above level, below level, AND/OR combinations

Battery

General .....Fits inside the Dash 10 and charges automatically whenever unit is connected to external power. Ideal for field use and in the lab as a UPS.

Battery Life .....1 hour, nominal

Battery Charge Time ...15 hours

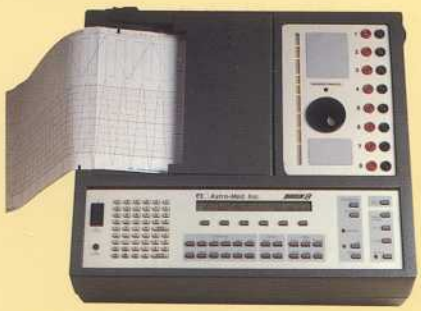
MORE WAYS TO FULFILL YOUR RECORDING REQUIREMENTS

At the Summit of Chart Recording



MT95K2, today's most powerful and versatile recorder, can perform range of tasks that previously required a battery of instruments. User can view up to 32 waveforms on bright built-in monitor while recording analog or digital waveform channels at real-time frequencies to 20 kHz. Features laser printer chart resolution of 300 dpi. Offers three on-board analysis functions and Windows analysis package for PC.

Truly Portable 8-Channel Recorder



Dash 8 is world's only truly portable 8-channel lab and field recorder. Records 8 channels of waveform data, 8 event, and 8 alphanumeric channels on 8½-inch chart. Frequency response DC to 25 kHz real time. Permits creation of custom chart formats "on the fly." Powered by internal rechargeable battery, AC and 12 VDC. Data capture and playback — 32 kSamples per channel. Weighs only 28 lbs including internal battery.

Portable 4-Channel Recorder with Laser Resolution



Dash IV true field recorder features laser printer chart resolution, bright high-response VF monitor, 140 mm chart, and 128 kSample memory per channel for data capture and analysis. Records from 50 mV to 350 VDC (isolated) at 20 kHz response. Internal rechargeable battery (and AC) provides true portability. Powerful software package permits data analysis with FFT, etc. Includes an on-board floppy drive for setups, updates and data archiving.

Rugged, Powerful 2-Channel Field Recorder



Dash II is world's toughest, most powerful 2-channel portable field recorder. Built for reliable operation under demanding physical and environmental conditions. Features frequency response to 500 Hz full scale and a wide range of signal conditioners for voltage, transducer, temperature, etc. Records separate or overlapping waveforms. Internal rechargeable battery, AC or 12 VDC operation.

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