

## FEATURES

- 24-bit delta sigma A/D converters, 4<sup>th</sup> generation strong motion recorder
- 3 or 6 channels
- Ultra low power, zero maintenance
- CD1.1 telemetry

The SMART Series of instruments represents the latest generation of seismological data acquisition systems developed by Geotech Instruments. It consists of the SMART-24D® digitizer, SMART-24R® recorder, and SMART-24A® accelerograph. SMART-24A® has internal battery and PA-23 force balance accelerometers, an improved version of those used in the well known A900 instruments that produced the largest strong motion data set ever recorder from a single earthquake, the Chi-Chi, Taiwan, event. Its electronics and firmware are significantly improved versions of those in the DR-24/DL-24 digitizers/recorders. Very low power consumption is supplemented by a complete set of communication ports: serial, Ethernet, and USB2.0.

## MODEL SMART-24A® Strong Motion Recorder

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# SMART-24A® SPECIFICATIONS

## DATA ACQUISITION

<b>Number of inputs</b>	3 or 6 channels
<b>Input type</b>	Balanced differential with transient protection suitable for both passive and active sensors
<b>Input range on additional three channels</b>	5Vp-p, 20Vp-p and 40Vp-p bipolar differential, 2x1 Mohm
<b>Gain</b>	Software selectable: x1, 2, 4, 8, 16, 32, 64
<b>Common mode rejection</b>	Greater than 90 dB
<b>Digitizer</b>	Over sampled 24-bit Delta Sigma ADC with digital signal processing, 1 per channel
<b>Anti-alias filter</b>	Brickwall digital FIR filter, cutoff at 80% of and 130 dB down at output Nyquist frequency. Causal filters optional.
<b>Dynamic range</b>	Up to 138 dB
<b>Intermodulation distortion</b>	Less than -110 dB
<b>Sample rates</b>	1, 5, 10, 20, 40, 50, 100, 125, 200, 250, 500, 1000, 2000 sps primary sample rates
<b>Noise</b>	~1 count RMS at up to 200 sps

## ACQUISITION MODES

<b>Continuous</b>	User selected start time, ring buffer or until storage full
<b>Timed</b>	16 user programmable recording windows
<b>Triggered</b>	Threshold, STA/LTA (updating or non-updating), and external
<b>Pre-event length</b>	Up to 32,768 data samples
<b>Post-event length</b>	Up to remaining data storage

## DATA STORAGE

<b>Type</b>	Solid state Flash memory removable cartridge
<b>Recording format</b>	Standard FAT32 file system, drives readable directly on a PC via a USB2.0 port; format converters available for 32-bit SUDS, SAC, SEG-Y, SEISAN, MatLab, miniSEED, and SEED. Separate short headers with important information (PGA, LSB, GPS, trigger time, etc.)

## TIMING

<b>Accuracy</b>	<±5 microseconds of UTC with GPS lock
<b>Stability</b>	0.5 PPM (when unlocked)
<b>GPS duty cycle</b>	User programmable GPS power on/off cycle times

## INTERFACES

<b>Indicators</b>	Large LCD display
<b>Communications</b>	RS232, Ethernet, USB2.0, IEEE1394 and IrDA ports optional
<b>GPS</b>	Dedicated RS-422 serial port
<b>Power</b>	Main power and external battery inputs
<b>Other I/O</b>	5 or 8 12-bit analog inputs, external trigger in/out, 1 PPS in/out
<b>Calibration</b>	Pulse, sine wave, white noise, random binary, step functions, and shorted input
<b>Telemetry</b>	CD1.1 protocol, 4 independent profiles (as 4 separate stations)

## INTERNAL SENSORS

<b>Type</b>	Geotech force balance PA-23
<b>Response</b>	DC to 100 Hz
<b>Full scale</b>	±4g (optional ±2g, ±1g)
<b>Dynamic range</b>	Total 142 dB

## POWER

<b>External</b>	10 to 16 VDC
<b>Internal</b>	12V sealed battery for 36 h continuous operation
<b>Power consumption</b>	Less than 2.5 watt average (3 channels @ 200 sps, GPS power and local recording cycling)

## PHYSICAL

<b>Construction</b>	Portable rugged molded case
<b>Size</b>	5.9 in (150 mm) w x 11.8 in (300 mm) l x 14.17 in (360 mm)
<b>Weight</b>	18.8 lbs (8.5 kg)
<b>Operating temperature</b>	-20°C to +70°C
<b>Humidity</b>	0 to 100%

