

FEATURES

- **24-bit delta sigma A/D converters, 4th generation strong motion recorder**
- **3 or 6 channels**
- **Events only telemetry capable**
- **Earthworm exporter**

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® is a SMART-24R® with 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. The unit is telemetry ready using **CD1.1** and/or **Earthworm** protocols.

Very low power consumption is supplemented by a complete set of communication ports: serial, Ethernet, and USB2.0. **The removable and hot-swappable enclosure** has a **USB2.0** port for very fast data download. A **SEEDLink** plug-in is also available.

MODEL SMART-24A® Strong Motion Recorder



SMART-24A® SPECIFICATIONS

DATA ACQUISITION

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

ACQUISITION MODES

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

DATA STORAGE

On board memory	192 MB
Type	Up to <u>64GB</u> industrial grade Compact Flash memory in removable enclosure with USB2.0 port; 1 or 2 partitions
Recording format	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 ASCII headers with important information (PGA, LSB, GPS, trigger time)

TIMING

Accuracy	<±10 microseconds of UTC with GPS lock
Stability	0.5 PPM (when unlocked)
GPS duty cycle	User programmable GPS power on/off cycle times

INTERFACES

Indicators	Large graphic LCD display
Communications	RS232, Ethernet, USB2.0 for the removable enclosure
GPS	Dedicated RS-422 serial port
Power	Main power and external battery
Other I/O	5 or 8 12-bit analog inputs, external trigger in/out, 1 PPS in/out
Calibration	Pulse, sine wave, white noise, random binary, step functions, and shorted input
Telemetry	- <u>CD1.1</u> protocol, 4 independent profiles to 4 different IP servers; - <u>Earthworm</u> protocol on 1 profile; - 64 MB internal buffer for backfill; - continuous, events only or both

INTERNAL SENSORS

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

POWER

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

PHYSICAL

Construction	Rugged molded case, IP67
Size	5.9 in (150 mm) w x 11.8 in (300 mm) l x 14.17 in (360 mm)
Weight	18.8 lbs (8.5 kg)
Operating temperature	-20°C to +70°C
Humidity	0 to 100% (IP67)

