GeoWatch

GeoSys

geophysical measuring solutions

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A Breakthrough in Strong Motion Technology

Scientists and Engineers are aware of the importance of accurate and reliable data acquisition of acceleration and velocity measurement. Market pressure for improved products and increasingly demanding legislation call for the highest levels of product performance.
To assist in meeting this commitment now and into the new century, GeoSys has developed the **GSR-12** Series of Strong Motion Recording instruments. This represents a significant breakthrough for scientists and engineers in the quest for increase accuracy and efficiency.

Total Digital Package
A proven range of sensors, the state-of-the-art microprocessor controller, menu-driven user friendly software, and the ability to network are the fundamental components of these powerful recording systems. To extend system capabilities, flexible configuration with ease of access enables permanent monitoring of the system. GeoSys with its affiliated partner **Terra Technology Corp**. who has extensive world-wide resources, now offers a unique solution for Strong Motion Monitoring, giving you absolute data reliability and maximum cost efficiency, coupled with simplicity of use and confidence in results.

The Future
GeoSys Motion Recorders have been designed from the outset with the future in mind. The open architecture, leading edge digital electronics, and the use of advanced engineering facilities, such as Computer Aided Engineering has resulted in a system design with the power and flexibility to perform not only today's but tomorrow's motion and vibration monitoring requirements.
The **GSR-12** series of Recorders are the most technically advanced, user friendly 12 Bit Strong Motion Recorders available today and with price/performance ratio and reliability hard to match by others.

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Project Watch

The need for strong-motion instrumentation of dams is identified and instrumentation schemes are proposed accordingly. The instruments used for dam monitoring have changed drastically in the last few years. Analog recording now belongs to the past. The new digital generation of accelerometers is more versatile and reliable. The stations of a seismic arrays can be easily interconnected so that all instruments record in a synchronised fashion. The aim of this article is to present a brief overview about the different techniques used in such arrays.

Hp. Boller, GeoSys AG

12 Bit Strong Motion Recorder GSR-12

The **GSR-12** is a 12 Bit acceleration data acquisition system that represents the state of the art technology in earthquake monitoring. The **GSR-12** comes in two versions: the **GSR-12FB** which uses the **Servo (Force Balance) Accelerometer SA-320** and the **GSR-12CS** with a **silicon solid state triaxial capacitive accelerometer**. Both versions are available with internal or external sensor. The sensor signals are captured by a 12 bit A/D converter and digitally filtered to increase accuracy and provide stable performance by reducing quantisation noise.

A variety of trigger conditions can be selected to start data capture into either a **Solid State Memory Bank** or into **Memory Cards** (Flash EEPROM or SRAM) for later analysis. Recorded data can be conveniently transferred to the central station using the serial interface (PC/RS-232 port or modem) or by removing the Memory Card. Sophisticated software provides the key to many features not possible in older instruments and includes a comprehensive built in test facility, which can be used on-line to monitor operations of the **GSR-12.**

Specs:
GSR-12FB: triaxial servo (force balance) acceleration sensor; measurement range DC to 50 (70) Hz, FS: ± 2, 1, 0.5, 0.25, 0.1 g; Dynamic range 72 dB; resolution ±50μg.
GSR-12FB: capacitive silicon triaxial acceleration sensor; measurement range DC to 50 (100) Hz; FS: ± 2, 1, 0.5, 0.25 g; Dynamic range 72 dB; resolution ± 125 μg; sampling rate 200 and 400 Hz (oversampling with digital signal processing); level-, LTA/STA-, hardware-, software and time table trigger; RS-232 interface; 280 x 180 x 100 mm, 6.9 kg, - 20° to 65°C;
Options: Internal modem, memory card, alarm functions, LC-Display.

Civil Engineering Recorder SR-12CE

The Civil Engineering recorder GSR-12CE is a compact vibration measurement equipment.

Permanent surveillance is supported by a statistical data reduction algorithm combined with selective event recording. The GSR-12CE can be used as portable equipment for temporary installation during ramming or blasting and as fix installed equipment for traffic vibration control or detection of human induced vibration during building civil engineering constructions.

Specs: Geophone based triaxial velocity sensor GSV-13 (internal or external); measurement range 4.5 Hz to 340Hz, FS: ± 100, 50, 10 mm/s; Dynamic range 72 dB; resolution ± 0.005 mm/s; sampling rate 1000 Hz; level-, LTA/STA-, hardware-, software and time table trigger; online vector calculation; RS-232 interface; Matrix Printer; 350 x 260 x 190, 15.4 kg, - 20° to 65°C

GPS-Receiver GSP-2

The Global Positioning System is a radio-navigation system that employs RF transmitters in 24 satellites. GPS receivers decode the satellites' signals to calculate the latitude, longitude and altitude of a position on earth. The UTC time is provided with optional accuracy of up to one microsecond.

Specs: Time Accuracy ± 1 μs; Position accuracy ± 25 m; RS-232 Interface; supply voltage 8 to 18 VDC; supply current 230 mA; 180 x 100 x 64 mm; 0.5 kg; - 30° to 50 °C.

Project Watch

Terra Technology specializes since 1973 in the design and manufacture of high-performance ground motion monitoring and recording instruments which operate in a wide range of earthquake- safety and engineering and in seismology research situations. Terra has chosen to develop its expertise into a quality product line for specific markets which require the superior value added performance offered.

16 Bit Strong Motion Recorder IDS-3602

The IDS-3602 16 Bit digital accelerograph provides a completely integrated Digital System for applications requiring high accuracy record over a broad range of acceleration levels. The IDS-3602 is available as 'S'-Type which includes built-in Terra SA series triaxial servo accelerometers well known in the market as the accelerometers with the most linear output without cross axis and hysteresis errors. The IDS-3602 converts the sensor output to 16 bit digital form at 1000 samples per second per channel. When the user selected triggering criteria have been met, the instrument records digitally filtered and decimated data and the synchronised internal time into battery backed CMOS RAM memory.

Terra's IDS Menu software operation on a PC provides a menu driven user interface for set-up, trigger definition, data transfer/analysis and system diagnostics. Direct or modem communications is via RS-232C port.

Specs: Servo (force balance) triaxial acceleration sensor (internal or external); measurement range DC - 50 (75) Hz, FS: ± 2, 1, 0.5, 0.25g; Dynamic range 96 dB; Pre amplification factor 1, 4, 16 or 64 (36 dB); resolution ± 0.24 μg; sampling rate 250, 200 and 100 Hz (oversampling with digital signal processing); level-, LTA/STA-, hardware-, software- and time table trigger; 304 x 355 x 203 mm, 21.6 kg, - 20° to 65°C.

Terra-Flex SA-102 Accelerometer

Terra-Flex SA Series Servo Accelerometers offer the unparalleled combination of excellent stability and raggedness. Designed for maximum user flexibility, standard features include field rangeability, choice of sensitive axis di-rection and a 1 g bias network which can be user connected.

A special alloy flexure system and stable differential electronic detector/amplifier are combined to provide high sensitivity, broad dynamic range, raggedness, long term stability and extremely low thermal drift. Essentially no hysteresis (<0.005%) and exceptional resolution ensures accurate data.

The flexure suspension, unlike pivot and jewel suspensions, is not subject to progressive deterioration in the presence of vibration and shock. High shock tolerance virtually eliminates breakage during handling.

The SA series accelerometers operate form a wide range of input voltages and can be used for a variety of acceleration measurement applications. These applications include seismic monitoring, control systems, vibration monitoring, structural response, vehicle testing and tilt sensing.

Specs: Servo (force-balance) accelerometer (US patent # 4'088'027); Signal to noise > 148 dB; Hysteresis < 0.005%; Cross axis sensitivity < 0.0005 g/g; Frequency response DC to 50 Hz; FS output ± 5 V; Input voltage ± 12 V; Shock 3000 g (0.1 msec); 76 x 51 x 47 mm; 0.2 kg; - 25° to 85°C.

Direct Digital Seismic Data Acquisition System

The Direct Digital family of seismic data acquisition products for applications which require multiple channels of accelerometer data recording. The Direct Digital system provides unparalleled system performance while minimising system costs through the utilisation of Pulse Width Modulated (PWM) signal trans-mission and advanced digitising architecture.

The Direct Digital family includes the DDA Direct Digital Accelerometer, the DDI Direct Digital Interface and the DDX the Direct Digital Acquisition System.

Direct Digital Accelerometer DDA-01, 02, 03

The DDA series servo accelerometer is part of the Direct Digital family of seismic data acquisition products utilising Pulse Width Modulated (PWM) signal transmission and digitising architecture. DDA accelerometers are based on Terra's patented SA series sensor which provides high dynamic range and low noise performance while maintaining exceptional linearity and extremely low hysteresis errors.

Advanced micro controller technology enables the analog signal to be digitised and converted to PWM data at the sensor. The amplitude tracking accelerometer controller provides 22 bits of signal dynamic range with 16 bit resolution at each of three gain steps. Step/Impulse test circuitry, offset trim and gain adjustments are all built-in and software controlled.

PWM data transmission form the DDA to a remote PC based data acquisition system (the DDX system) offers more than 78 dB (per 1000 feet of cable) of additional immunity form induced electrical/magnetic noise vs. analog transmission and DDA uses lower cost cable than analog systems.

The DDA connection to a standard PC computer printer port provides 12, 24, 36 or 48 channels of data acquisition (using the DDI interface/multiplexer).

Utilising surface mount components and advanced manufacturing techniques, a complete triaxial DDA system is housed in a very compact en-closure. The housing also incorporates a single bolt mount with tree point levelling screws and MS style connector or sealed cable entry.

Engdahl Enterprises have been supplying earthquake monitoring and warning instrumentation to nuclear power plants as well as other private and industrial complexes for over twenty years.

INTENSITRON EIC300

The INTENSITRON is a reliable precision earthquake computer designed to detect and analyse potentially damaging earthquakes. The unit provides two separate alarms. The first alarm alerts occupants, providing up to six seconds to take cover. The second alarm alerts occupants that structural damage may have taken place, and that building evacuation and utility shutoff may be required. The maximum intensity attained is indicated on three liquid crystal displays.

Specs: Capacitive mechanic force balance sensor (internal); DC to 12.5 Hz; ± 1g; dynamic range 60 dB; 126 x 144 x 86 mm; 1.0 kg; - 23˚ to 43˚C.

UTILITRON EIC300-R

The UTILITRON EIC300-R is an earthquake intensity computer with utility shutoff trigger.

Additional to the functions of the INTENSITRON, the UTILI-TRON automatically actuates utility shutoff devices and safety control systems to avert fire and water damage.

Specs: Capacitive mechanic force balance sensor (internal), DC to 12.5 Hz; ± 1g; dynamic range 60 dB; 126 x 144 x 86 mm; 1.0 kg; - 23˚ to 43˚C.