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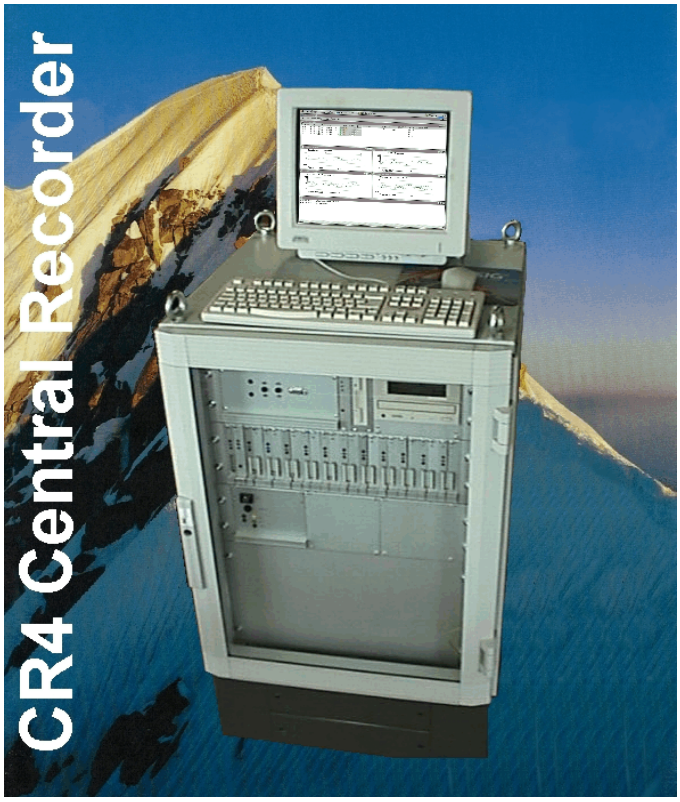
ISO 9001 certified

CR-4 PC Based Structural Monitoring System

Features

- PC based central recording system
- Upto 120 Dynamic & > 500 static channels
- 16 bit resolution, one 24 bit Delta-Sigma converter per channel, with gain selection
- 20-1000 Hz sample rate
- Alarm Relays, 1 global, 5 individual
- Power autonomy >24 hours
- Rugged industrial packaged Std.
- Galvanic isolation & surge protected
- GPS synchronized recording available
- Real-time display of dynamic channels
- Large capacity data storage options
- On-Line Surveillance, Diagnostics, Self checking and Reporting system



Outline

The CR-4 was developed out of years of experience in monitoring Civil Engineered structures such as dams, nuclear power plants, pipelines, tunnels, bridges, tall buildings and unique structures all over the world. This modern multichannel central recording system provides engineers with a valuable tool to fully understand and analyse the dynamics of structures in the operating environment. With a CR-4 system the dynamics affecting the structure including but not limited to acceleration, velocity, displacement, temperature, current, wind speed, wind direction, stress and pressure may be monitored and recorded.

Dynamic channel sample rates of 50, 100, 200, 500 and 1000Hz provided standard. The system has Delta-Sigma A/D converters which provide automatic anti-aliasing filter following the sampling rate on each channel accomplishes antialiasing of all analog signals.

The heart of the CR-4 software is SeisLog a proven data logger developed by the University of Bergen and frequently used in large seismic networks. GeoSIG engineers have integrated SeisLog data logger into the CR-4 providing a richly configured set of user-friendly capabilities, displays and analytical tools running under Windows 95/98 and NT.

In addition to the near real-time display of the dynamic channels the system provides static data like mean, max, min, and peak values. The CR-4 monitors the real-time data generated by each of the sensors attached to the system and compares the measured data to five fully independent alarm trigger criteria. The ring buffer size, the post event time, trigger thresholds and relay alarm on/off times may be selected by the customer.

Specifications CR-4

Set-up and Configuration
All the necessary parameter and configuration settings are selectable using the CR-4 software interface. The configuration of the **CR-4** stored in non volatile system memory to allow automatic restart in case of a system failure, watchdog **5 minutes timeout** or manual hard reset.

Data Analysis
The **CR-4 software** program provides basic time history data evaluation. Once an event file has been opened the analysis menu is available for analysis functions like FFT is available for determination of mode and natural frequencies of structures. Any customary in trade evaluation software package can of course be used as well using the available ASCII files.

Sensor
The CR-4 offers the most flexible adaptation of sensors to meet the needs of structural measuring. More than 120 dynamic and 500 static channels may be logically configured. Remote acquisition system allows analog signals to be digitised sensor and the dynamic and static signals concentrated for transmission to the central recorder over a single RS-422 cable. The sensors are housed in a rugged, compact cast aluminium case. Mounting fixtures and accessories are available for instrument installation. The sensors offered but not limited to are::

AC-53 Force Balance Accelerometer
Frequency Response: DC to 60 Hz, ± 2 g

AC-23 Geophone-based Accelerometer
Frequency Response: 0.2 Hz to 50 Hz, ± 1 g

Weather Station: Wind direction & speed, humidity, air pressure, temperature

Strain Gauge: ±1500 μStrain

Temperature: -40°C to +70°C

Digitizer
A/D Converter: (common time synch): 24 bit oversampling Delta Sigma per dynamic channel each with digital filter and antialiasing filter front-end

A/D Sampling rate: 64 ksps (over sampling)

Noise: <1 LSB (Peak) <0.4 LSB (RMS)

Effective Bits: 16

Sampling Rate: 50, 100, 200, 500, 1000 sps standard

Selectable Gain each Channel:: 1, 2, 4 ,8, 16, 32, 64 ,128x

Bandwidth: DC to 52 Hz (200 sps) or DC to 264Hz (1000 sps)

PC Based Recording
Computer (min. Performance): Pentium II 166Mz
64Mb RAM, 2GB Hard Drive
3.5 Floppy, 650MB writable CD
Com 1, 2 3, 4 & LPT 1, 2
PS/2 Mouse*, PS/2 Keyboard*
VGA display*
*not required for normal operation

Laptop (Optional): Pentium III, 466MHz, 64Kb RAM
6GB Hard Drive, Floppy, CD
COM1, PCMCIA, LPT1

Modem: US Robotics 56Kb External
fax (analog)

Data Logger Software: SeisLog

Recording Option: Recording without use of PC possible

Remote Acquisition System: Remote enclosure with A/D converter
Communications with CR: RS-422
Baud rate: 9600 bps (static),
19'200 bps dynamic 100 sps,
38'400 bps dynamic 200 sps

Data Recording
Pre-event-Time: 1 to 100 seconds
Post-event-Time: 1 to 100 seconds

Triggering
Level Triggering:
Lower band limit: 0.2 Hz (20 dB / decade)
Upper band limit: 100 Hz @200sps (20 dB / decade)
Range: 0.003 to 100 % of full scale
STA/LTA Triggering:
STA-Base: 0.1 to 5 seconds
LTA-Base: 5 to 100 seconds
STA/LTA-Ratio: 1 to 60 dB

Power Supply
AC Power: 230VAC/50Hz or 115VAC/60Hz std.
Solar Panels: Optional
Internal battery: 1 Rechargeable, 12 VDC, 115 Ah
Lead battery std. 2nd optional
Autonomy: 1 day
DC voltage: 12 VDC
Power consumption: 40 W with full rack without sensors

Time Base
External Code Compatible: NMEA
Standard clock accuracy: 100 ppm (50 min/year)
External time interfaces: GPS System accuracy 0.02 sec.
Power for GPS receiver: 12 VDC (power cycled every 15 min)
Surge Protected

Environment / Housing
Operational temperature: - 20 °C to + 60 °C
Storage temperature: - 40 °C to + 90 °C
Humidity: 0 % to 100 % (non condensing)
Type: Aluminium cabinet
Size up to: 15 channels 175X230X300 or 350 Portable ½ rack
33 Channels 175X530X300 or 350 Portable rack
33 channels 1000 X 600 X 620
120 channels 1600 X 600 X 620
all sizes in mm

Weight: Portable ½ rack 8 kg typical
Portable rack 12 kg typical
1000 X 600 X 620 110 kg typical as shown on page 1
1000 X 600 X 620 150 kg typical
Protection: IP65, EMI & Earthquake resistant

Self Test
Sensor test: Square pulse
GPS Signal lock
DSP: LED indicators of communication with PC
System Status: Checked every 6 hrs & reported to central
AC power, battery voltage & # of events

Seismic Switch / Warning Unit Option
The **CR-4** alarm/warning option provides 5 independent outputs (relay contacts) based on user selectable criteria & 1 global alarm

Alarms: 6 relay
Alarm levels: 0.003 to 100 % of full scale (User programmable per axis)
Relay Hold-On Typical 5s.
Time of writing event file to disk (User Programmable)

Consult factory for details

Specifications subject to change