GeoWatch

Issue 5 **May 1995**

GeoSys provides Geophysical Measuring Solutions

GeoSys On-Line

After some busy months you will find here our 5th issue of GeoWatch. Busy, because GeoSys is fully concentrated in new developments to serve the customers needs. New developments which we will also present you in this issue. If you have not received GeoWatch so far, please fill in the attached form and return it to GeoSys. We will be glad to send you a personal copy periodically (or any other information of your interest).

We would like also to take this opportunity to welcome all the members of the SEE-2, 2nd International Conference on Seismology and Earthquake Engineering in Tehran, Iran to whom this issue is dedicated.

This GeoWatch:

In Europe, Africa, Middle East up to India, contact **GeoSys** or your local representative.

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In North- and South America and the Asia Pacific region, contact **Terra** or your local representative.

150 dB Accelerometer!!!
GeoSys/Terra introduces Super Low Noise Series

GeoSys / Terra expanded it's Terra Flex line of Servo Accelerometers with the Super Low Noise Series (SLN) providing 150 dB dynamic range with a noise floor of less than 0.25g. Models include the uniaxial SSA-120SLN, biaxial 220SLN, and triaxial 320SLN. The exceptional linearity (<0.05% error) with low cross axis error and virtually no hysteresis error make the SLN Series the ideal choice for high dynamic range seismic data acquisition (*including 24 bit applications*) where sensor accuracy is critical.

The sensing element contained in the SLN Series is Terra's patented SA series design with over 12,000 units installed. Terra's SA design is known world-wide for exceptional stability and performance including accurate displacement response (through double integration of data).

The SLN Series plug-in circuit cards utilize low noise surface mount technology and modular design to provide a 5 volt full scale output with low power consumption of 15 mA per axis. Sophisticated self test and calibration capabilities include a 1g "step test" for displacement response verification and a unique remote actuated "shorted cable" test. This test allows the noise of the sensor cable to be checked at the acquisition system with the accelerometer connected. An additional remote controller function provides selectable gain that switches between two full scale ranges specified by the user.

Typical SSA SLN Series applications include broadband microseismic networks, wide dynamic range arrays, ambient vibration measurements, and tilt sensing in both indoor and outdoor environments. The corrosion resistant aluminium package is NEMA 6P rated which provides submersion protection in up to six feet of water. A stainless steel borehole package is also available.

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GNC-CR Central Recorder

Extended Dynamic Range

The **GNC-CR** Multichannel Recorder is a Network Center containing several Recorder Module Cards. It can be extended to an almost unlimited amount of channels by adding further **12 Bit** *dynamic range* (72dB) Recorder Module Cards utilizing GeoSys's GSR-12 electronics. This unique features are based on a very compact and user friendly design.

16 bit Recording Module added to GNC-CR

The modular design of the GNC-CR make it possible today adding Recorder Module Cards with **16 Bit** *dynamic range* (96dB) based on the GSR-16 technology.

Each Recorder Module Card supports three sensor inputs and includes individually selectable trigger modes and threshold values. The data can be stored in battery-backed RAM on each Recorder Module Card or in removable PCMCIA memory cards (Flash or SRAM).

The GNC-CR system includes a Network Center that provides overall system communications, timing, and status indication. Communication is through a single serial port to the user's PC computer for all Recording Module setup and data retrieval. The Network Center also provides common sampling, triggering and time synchronization between recording modules. Time references for the system include options for Temperature Compensated Crystal Oscillator (TCXO) and external time reference including GPS.

GeoSys / Terra Case History

Blasting Surveillance of a Water Gallery

GeoSys installs 21 Channel GNC
Central Recording Network

In Autumn 1994 GeoSys has successfully installed a Central Recording Network with velocity sensors in boreholes of a water gallery in the eastern part of Switzerland (Sils i.D.). GeoSys has been chosen for this instrumentation system by the Department of Public Works of the County of Graubünden, Switzerland.

The purpose of this instrumentation is to control a water gallery which is crossing a tunnel construction of a new road being built during the following 3 years. During this construction period several blastings will take place and it will be needed to protect the water gallery by measuring the vibration and analysing every event.

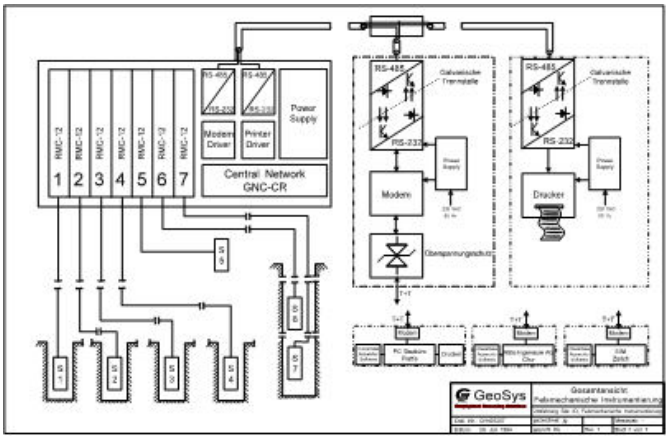
Four GSV-320 Velocity Sensors were installed with concrete in 1 meter deep boreholes at the base of the water gallery in distances of 50 to 100 meter away from the network center. They are located 30 meters below water surface. One sensor was mounted at the top of the compensation shaft and 2 sensors were placed in a borehole next to the water gallery in 25 and 35 meter depth. The sensor direction at the final position was taken by a newly designed electronic compass mounted to the torpedo with a release fixture for multiple use.

A strong polyurethane cable was produced especially for this installation to resist in concrete and water. To ensure perfect performance at all times the already waterproof sensor housings with the enclosed geophones and its electronic were filled with a silicon resin.

The GNC-CR Network Center controls all sensor sites permanently and stores all events. Common timing, common sampling and common triggering is secured by the built-in controller card. Setting parameters, testing the sensors or collecting data from sensor sites is very simple through connection by either RS-232 or by the installed modem link. Additionally an external printer is connected at the building supervisors office, 300 meters away from the network center. It informs continuously the highest peaks, the vector sum and the frequency of any registered event.

All interfaces to the modem and to the printer are fully galvanic isolated and the connection is provided via RS-485. The entire analog data transmission within the instrumentation system is protected against overvoltage and lightning.

This network project was completed in less than 6 weeks. The intense effort of all the involved employees at GeoSys made it possible to fulfil this complex requirement with a number of specialities to the customers full satisfaction



NASA/JPL Goldstone Deep Space Antenna Complex

Terra 12 Channel GNC Central Recording Network

High in the California desert north of Barstow, the Jet Propulsion Laboratory in Pasadena operates several deep space dish antennas for NASA. The largest of these is the Mars Station. Standing 23 stories high and 70 meters across, the movable part of the structure weighs 8,000,000 pounds and rests on a thin hydraulic bearing. This precision instrument can track and communicate with space craft at the edges of the solar system.

During the Landers earthquake in 1992, the antennas subreflector attachments sustained some damage. In the discussions for repairing this damage, it was decided to install a seismograph to measure and record the forces present on the structure during seismic activity. Terra Technology's 16 bit IDS-CR 12 central recorder seismograph with SSA-320 triaxial accelerometers was chosen for this application.

The system configuration employs four (1g, 2g and two 4g) tri-axial accelerometers connected to the central recorder equipped with non-volatile memory storage and a high speed modem. The modem is connected to a dedicated phone line and allows remote status interrogation, configuration setup, and data downloads to JPL in Pasadena, CA. Additionally, the IDS-CR12 can be configured for unattended auto-download operation. When set for this mode of operation, the IDS-CR12 records the event data, calls the remote modem and automatically downloads the event record to a PC at JPL. Based on proven IDS-3602 technology the central recorder features 12 channels of synchronized sampling with no channel to channel skew. Event records are referenced to the antenna station's time by recording an IRIG time code with the data. Terra's IDS Menu for Multichannel Systems software provides a complete user interface to the instrument by remote modem, display and plotting of event records, and data conversion utilities (ASCII and SUDS). Additional data analyses such as FFT is provided by GeoSys' / Terra's CloseView software.

News

First Deliveries of GSR-16 to Turkey

The first 7 units of **GSR-16 16-bit** Strong Motion Recorders have been delivered to the Kandilli Observatory and Earthquake Research Institute in Istanbul, Turkey.

Further 12 units will be installed later in July this year.

GSR-12/FB for the Kuwait Antenna Tower

The Strong Motion Monitoring of the Kuwait Antenna Tower will be equipped with GSR-12 recorders connected with SSA-220 Force Balance Accelerometers. Interfels GmbH, a leading company for geotechnical instruments has been chosen for the installation of the entire monitoring system.

Training at GeoSys

We welcome Mr. Paul Vergote, Marketing Manager of our representative in Iran. He is presently undertaking a intensive training at GeoSys' facility. He will be back by the end of May and you will be able to reach him at Tel: +98 (0)21 888 5005, Fax: 802 9586.

Summer Vacation

GeoSys offices will be closed for summer vacation from *24th July until 6th August 1995*. After this date we will be back again with full energy and dynamism.

GeoSys Achievements

Assisi monitoring

Hereunder is a translation from a report published by the SSN Servizio Sismico Nationale in Rome, Italy

Presidency of the Minister council

HEAD OFFICE
DEPARTMENT OF THE NATIONAL TECHNICAL SERVICES

NATIONAL SEISMIC-SERVICE
SEISMIC EARTHQUAKE MONITORING OF
THE HOLY CONVENT OF ASSISI - GREAT PALACE WEST

REPORT OF THE EARTHQUAKE-EVENTS
ON 26TH APRIL 1994

Introduction

Due to the Earthquake-Events on 4th June 1994 and the arising damages on the Great Palace of the Holy Convent of Assisi, the National Seismic-Service has realized a project for dynamic monitoring, as to a request by the under-secretary's office of the civil defence.

In connection with contacts to manufacturers of earthquake instruments, the SSN has received a test-instrument GSR-12 GeoSys with a triaxial accelerometer SSA-320 Terra Technology and a communication system via modem, which was installed in cooperation with Mr. Christoph Kündig from GeoSys AG. (At the south-western corner of the Holy Convent).
The instrument has recorded a series of 9 events with the strongest one on 26th April 1994.

Thanks

We thank to Pater Giulio Berrettoni, administrator of the holy Convent of Assisi, and to the Franciscan Community for the friendly cooperation with the installation-work, and we thank also to the company GeoSys AG and Mr. Christoph Kündig from GeoSys AG who provided the instruments and supported us during the installation

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