GURALP SYSTEMS

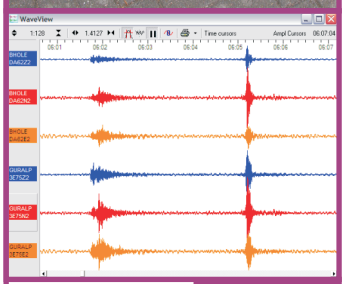
CMG-EDU-T

Triaxial broadband seismometer

The Güralp CMG-EDU-T is an ultra-lightweight digital seismometer designed for educational institutions, incorporating a triaxial broadband sensor and a compact digitizer with 24-bit resolution.

Using the CMG-EDU-T with Güralp Systems' free Scream! software for Windows, educators can demonstrate earth processes in a hands-on environment, and earth sciences students can investigate local and remote seismic events.

Lightweight and waterproof to IP67 standard, with "O"-ring seals throughout, the EDU-T is suitable for installation in a wide range of environments.



The EDU-T outputs digital data at up to 40 samples/s direct to a PC, or optionally over Ethernet or wireless networks, where it can be displayed or recorded in Scream!. This easy-to-use software package allows students to explore real-time and recorded seismic events, and investigate their characteristics using filters and spectrograms.

Features

- Research quality broadband force-feedback instrument
- Quick and easy, one-person installation
- No mass control required – plug in and go
- High sensitivity and dynamic range
- On-board 24-bit digitizer with configurable output
- Ultra low power (< 0.9 W at 40 samples/s)
- Ethernet and Wi-Fi options available

Distributed by:

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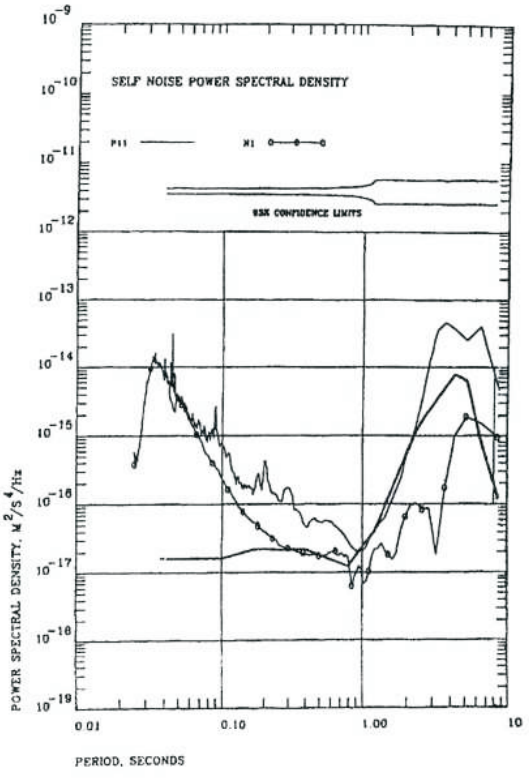
Response and noise levels

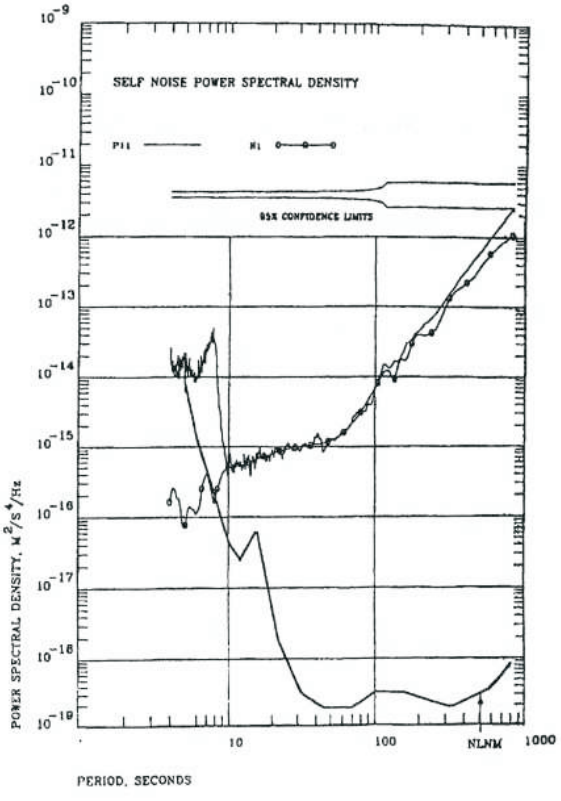
The CMG-EDU-T is a true broadband, force-feedback instrument based on the CMG-6T medium motion sensor, with a flat velocity response of 1200 V/m/s between 40 Hz and 30 s.

The lowest spurious vibration mode of the EDU-V is a barely measurable resonance at 440 Hz: a comparable 1 second geophone would have spurious resonances around 14 – 20 Hz.

Full calibration information and measured system response data is provided with every instrument, including decimation filter coefficients for deriving true ground motion.

The graphs below show the power spectral density of the CMG-6T sensor's self noise at long (left) and short periods. The noise level at 1 Hz is below –147 dB (rel. $1 m^2 s^{-4} Hz^{-1}$). The Peterson New Low Noise Model (NLNM) is also shown.





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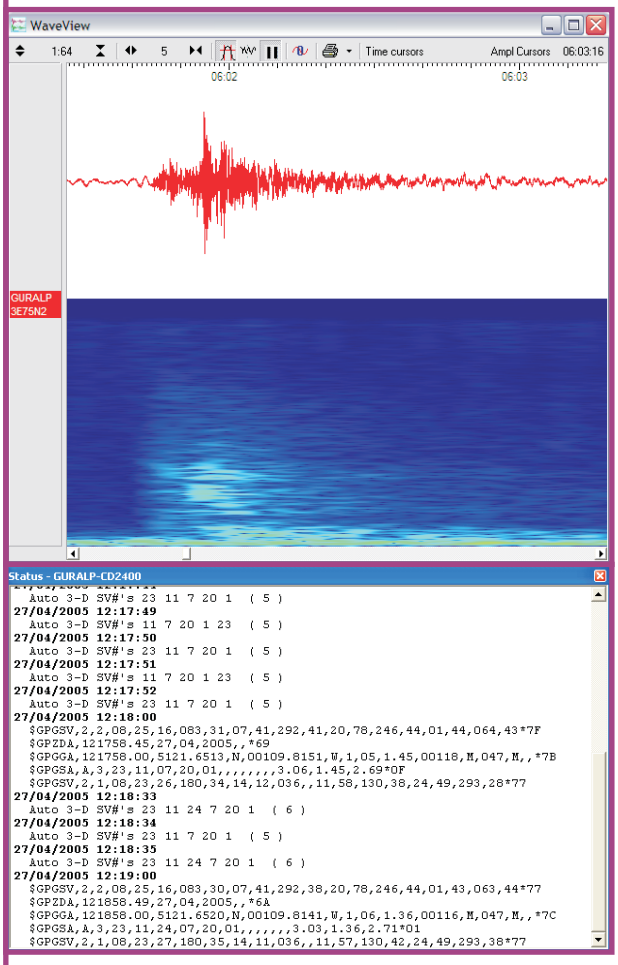
Digital output and networking



The CMG-EDU-T's built-in digitizer has three performance delta-sigma ADC converters for high-quality digital output.

Data is output in the compact GCF format, with a minimum effective resolution of 20 bits at 40 samples/s. Up to four concurrent sample rates (between 1 and 40 samples/s) may be configured for each component.

Data blocks are time-stamped within the digitizer using a real-time clock capable of synchronising to GPS time to better than 50 microseconds accuracy. Full GPS and state-of-health information is provided as a separate stream which can be inspected in Scream!.

The Güralp Systems GPS receiver provided with the CMG-EDU is a rugged and 100% waterproof unit capable of providing accurate GPS time to a resolution better than 100 microseconds.

Both the sensor and the GPS receiver are thoroughly tested in an environmental chamber and can operate at temperatures below –30 °.

Network options

The EDU-T is available with Ethernet and 802.11b (Wi-Fi) connectivity options. After assigning the instrument an IP address with easy-to-use PC software, real-time data can be retrieved over a TCP/IP connection and monitored in Scream!.

The Wi-Fi option is supplied with a small omni-directional antenna capable of connecting to an access point over distances up to 50 m. Using directional antennae, the maximum usable range can be increased as far as 500 m depending on conditions.

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Specifications

Velocity output bandwidth	30 s – 40 Hz
Velocity output sensitivity	2 × 1200 V/m/s
Lowest spurious resonance	450 Hz
Linearity	> 95 dB
Cross-axis rejection	> 60 dB
Electronics noise level	–147 dB (rel. $1m^2s^{-4}Hz^{-1}$)
Data output format	GCF over RS232, Firewire, Ethernet or Wi-Fi
Sample rates	4 – 1 samples/s
Digitizer resolution at 1 sample/s	21 bits
Operating temperature	–20 to +85 °C
Temperature sensitivity	< 0.6 V per 10 °C
Materials	Hard anodised aluminium case Gold plated contacts O-ring seals throughout
Case diameter	154 mm
Case height (excl. handle and feet)	153 mm
Weight	2.7 kg (entire system < 4.1 kg)
Power supply	10 – 28 V DC
Current at 12 V DC	65 mA
Calibration controls	Common signal & enable lines exposed on sensor connector
Offset zeroing	Not normally required
Levelling range	±3 ° from horizontal

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