UNLV's SEISMOGRAPH STATION UPGRADE: Final Report 2000

UNLV's seismograph station was upgraded to increase and promote earthquake awareness and education in Clark County.

The station has a classic Lehman 15-second (long period), horizontal pendulum, low gain, single axis (horizontal, E -W component) seismometer located in the Lilly Fong Geoscience Building. The faithful Lehman seismometer has been operating in an analog mode recording on ink-chart paper for the last 20 years. Its primary use has been recording large natural teleseismic events (distant earthquakes) and underground nuclear explosive tests from the Nevada Test Site (NTS). The problem is that the relatively long period (low frequency response) Lehman does not have an adequate high frequency (short period) response to record local seismic activity which normally occurs at frequencies from 1.0 to 10 Hz and higher.
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The Lehman was converted to record in both the digital and analog mode while at the same time retaining the same viewing format as before. A new high gain amplifier and filter circuit board was installed to improve its noise level rejection capability and slightly enhance its frequency response. The data produced with this new configuration is readily available for computer analysis by converting a personal computer to a seismic digital recorder (SDR) with its analog-to-digital board synchronized to Station WWVB. Station WWVB broadcasts time signals accurate to 0.03 seconds from Boulder, Colorado at 60 khz by the National Institute of Standards for Technology (NIST), which are easily recorded in the Western US. Accurate time to 0.1 seconds is critical to a seismograph station for calculating travel time paths and analysis of the time series recorded on the seismogram. The data is archived very economically on a Compact Disc (CD) and easily retrieved when needed for analysis. These modifications (hardware & software) were obtained from the Public Seismic Network (PSN) which has developed hardware, software, and Internet formats to record and share seismic data via the Internet. The PSN Web site can be found at**:**
http://psn.quake.net
The analysis and data displays, on a routine basis, have been posted in the Lilly Fong Geoscience Building on an event by event basis.

Modifications and Costs – Hardware and Software

Lehman Seismometer suspension wires	$ 50.00
WWVB Receiver & Interface board	115.00
Amp/Filter board with ps, 3 analog inputs, 2-12k gain, filter BP (0.015-10hz)	35.00

A/D 16 bit board, 8 analog & 4 digital inputs with temp stable osc. (Clock) 320.00

DATAQ DI-700 16 bit digitizer with multiple gain settings 410.00

DATAQ break out board DI-705 110.00

PC 486 for seismic digital recorder (SDR) and monitor 450.00

PC Pent. III, with CD recorder for analysis and Internet interface 2,138.00

Software: License for SDR and WinQuake for analysis 50.00

Miscellaneous electronic parts amplifiers, filters, cables and connectors 230.00

Total Equipment $ 4,108.00

Modifications and Costs - Labor

- Replace Amp & Power Supply with new Amp/Filter & Power Supply; 20 Hours
  Convert to digital with A/D Board; Interface WWVB board to A/D board; Run Tests
- Install components and seismic digital recorder (software) 30 hours
- Install & use WinQuake (software) to analyze seismic data 30 hours
- Run system, debug and familiarization with programs 100 hours
- Set up procedures to use software and document systems 35 hours
- Procure seismic equipment and coordinate over all effort 25 hours

Total Hours 240

Project hours: Professionals' hours, 240 hours @ $50= 12,000

Total wages = 12,000

Equipment Costs = 4,108

Total Costs = $16,108

Total Funding Requested: $8,054

Contributions in kind of $8,054 was contributed by the work performed by the principals listed below and equipment provided:

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