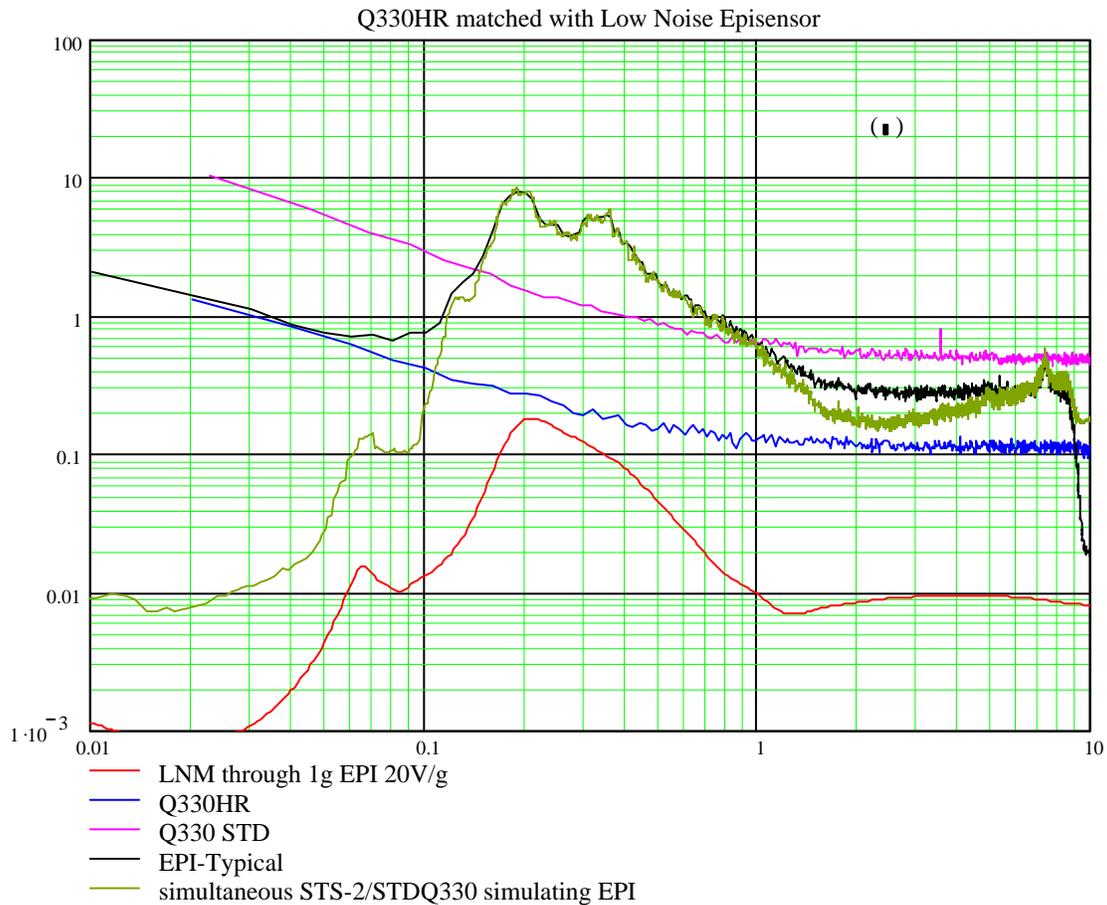


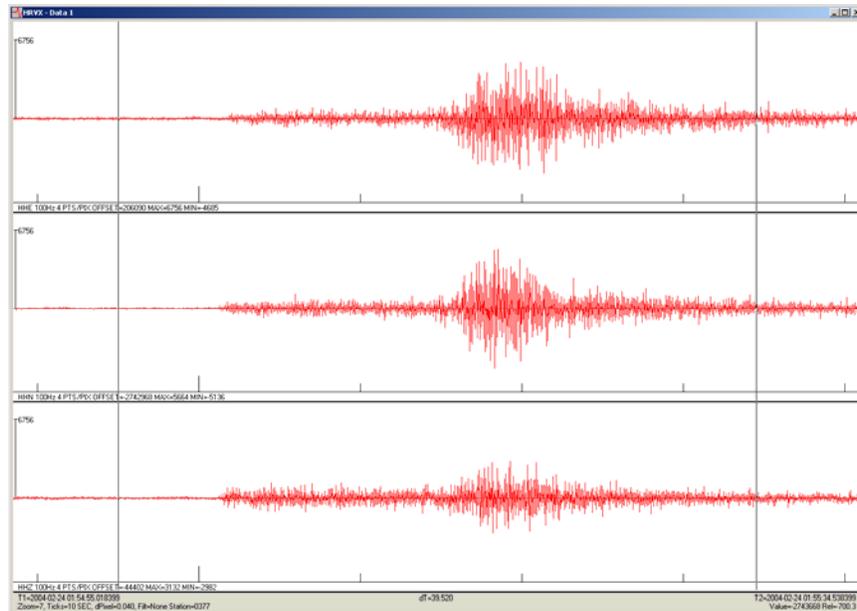
NEW ACQUISITION TECHNOLOGY FOR A NEW GENERATION OF HIGH DYNAMIC RANGE ACCELEROMETERS – Joseph Steim, Quanterra

EPISENSOR – dynamic range capability realized

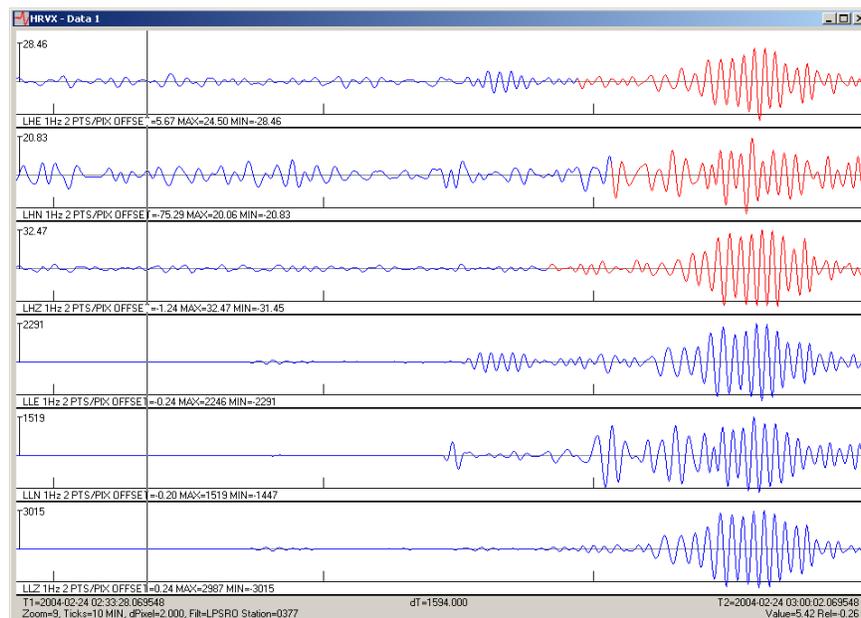
A new generation of high dynamic range accelerometer such as the Kinemetrics ES-T “Low-Noise” EpiSensor is capable of an operating range exceeding that of present A/D’s. The high dynamic range of 24+ bits of the Q330HR matches that of a high dynamic range EpiSensor accelerometer. Such a combination can provide not only useful high-frequency data and recording of strong ground shaking, but also a routine source of useful redundant data from frequent moderate-sized events, that is helpful to support long-term in-situ calibration of primary broad-band sensors. The high dynamic range of this combination provides much more, higher-quality data over a wider range of amplitudes for routine system quality management. For many urban sites, only such a high-dynamic range, inexpensive, and robust accelerometer would be required to capture all ground motion from ambient noise to 1G clip levels across a wide general-purpose band. The figure below shows ES-T data taken at the HRV (Harvard) GSN observatory compared with STS-2 data at the same site. The ES-T and Q330HR resolve 1G to essentially ambient noise at frequencies above 0.1Hz.



The data below were acquired at the HRV GSN site with an ES-T and a standard Q330, but with additional gain to simulate the approximate actual small-signal resolution of the Q330HR operating with unity gain. The first figure is a magnitude 2.0 event at 1°. This sort of data from a low-gain system is expected.



The same low-gain sensor with a Q330HR, however, is capable of resolving even low-level long-period signals. The following compares 3-axis LPSRO-filtered data from the ES-T with a side-by-side STS-2. The event is the 6.4, 2004/02/24 Morocco.



Today's ES-T is not shielded against magnetic, temperature, or pressure changes. Improvements in environmental isolation, combined with the Q330HR may yield a simple, very rugged, and extremely wide range technology for general application.