Sensors

Seismometers are instruments that measure and record motions of the ground, including those of seismic waves generated by earthquakes, nuclear explosions, and other seismic sources. Records of seismic waves allow seismologists to map the interior of the Earth, and locate and measure the size of these different sources.

Seismograph is another Greek term from Seism - “the shakes” and Grapho - “I draw”. It is often used to mean seismometer, though it is more applicable to the older instruments in which the measuring and recording of ground motion were combined than to modern systems, in which these functions are separated. Both types provide a continuous record of ground motion; this distinguishes them from seismoscopes, which merely indicate that motion has occurred, perhaps with some simple measure of how large it was.

The PASSCAL Instrument Center supports the following types of seismometers:

- **Broadband Sensors** - are three-component seismometers capable of sensing ground motions over a wide frequency band. These sensors are most-often used in passive experiments. The flat-to-velocity portion of the bandwidth is generally about 0.01 Hz (100 sec) to 25Hz. With sufficient signal, however, the 120-sec velocity transducers in the PASSCAL fleet can record signals with periods many thousands of seconds long, such as earth tides.

- **Intermediate Sensors** - are three component seismometers with corner periods in the 30- to 40-second range (distinct from the 120- to 240-second range of PASSCAL's truly broadband fleet). These sensors, like their broadband cousins, are capable of sensing ground motions of much longer period than their corner periods, if the long-period amplitudes are sufficient.

- **Short-Period Sensors** - are rugged three-component seismometers that cover higher-frequency bands (usually 1 Hz to 100+ Hz). These sensors are used in both passive and active-source experiments. The sensors, themselves, can be either feedback seismometers requiring power or conventional, passive seismometers requiring no external power.

- **High-Frequency Sensors** - are very rugged seismometers that cover even higher frequency bands (e.g. 4.5 Hz to 100+ Hz). These sensors are most-often used in active-source experiments and are often referred to as geophones.

- **Accelerometers** - also known as strong-motion sensors, are designed to measure the large amplitude, high frequency seismic waves typical of large local earthquakes, and operate in the frequency band 0 Hz to 100+ Hz.

To compare details of different sensors in the PASSCAL fleet, see the Sensor Comparison Chart.

Graph of example signal amplitudes and periods along with approximate sensor response amplitude/period space