Working with Responses to Get Units of Ground Motion

Necessary information:

Sensor: sensitivity and passband (velocity transducer) or scaling (accelerometer)

- For information on sensor sensitivity and passband, see the Sensor Comparison Chart along with the Sensor Response Plot.

Datalogger: Analog-to-Digital (A/D) conversion factor (aka bit weight) and Gain

- Quanterra model Q330: 419,430 counts/volt, or 2.384 uV/count at a Gain of 1
- RefTek model RT130: 629,327 counts/volt, or 1.58997 uV/count at a Gain of 1

Example: Counts to Ground Velocity Conversion within the Passband

The appropriate conversion within the passband would be:

\[
\text{ground velocity (m/s)} = \frac{\text{Amplitude(counts)} \times \text{A/D conversion factor(V/counts)}}{\text{Gain} \times \text{Sensitivity (V/m/s)}}
\]

Suppose your sensor is an STS-2 and your datalogger is an RT130 with its Gain set to 1.

\[
\begin{align*}
(1.58997E-06 \text{ V/counts})
\text{ground velocity} &= \text{Amplitude(counts)} \times \frac{1}{1 \times (1500 \text{ V/m/s})} \\
&\approx \text{Amplitude(counts)} \times \frac{1}{1500} \\
&\approx \text{Amplitude(counts)} \times 0.000667
\end{align*}
\]

For information on SENSOR sensitivity and passband, see the Sensor Comparison Chart along with the Sensor Response Plot.

Related categories: Convert Data from Counts to Motion, Deconvolving Instrument Responses, How To Sensors

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