EARTHQUAKES ON HI-FI

TOWNSHEND
Engineering Hi-Fi

There is an earthquake under our feet 24/7. The amplitude is very low, measuring between force -1 and force 2 on The Richter Scale, as shown (fig. 1) from the US Geological Survey.

These tremors are the result of myriad worldwide earthquakes shaking the ground at such low amplitude, they are not felt.

The amplitude of these earthquakes in built up areas, varies through the day due to man-made disturbances and natural phenomena, such as wind and tide. For example, The Houses of Parliament rise and fall 11" twice a day due to the rise and fall of the Thames.

The result of these vibrations is shown in the Seismograph read-out (fig. 2), which is from The British Geological Survey Seismograph, measured in Swindon, England, on the 27 January 2015.

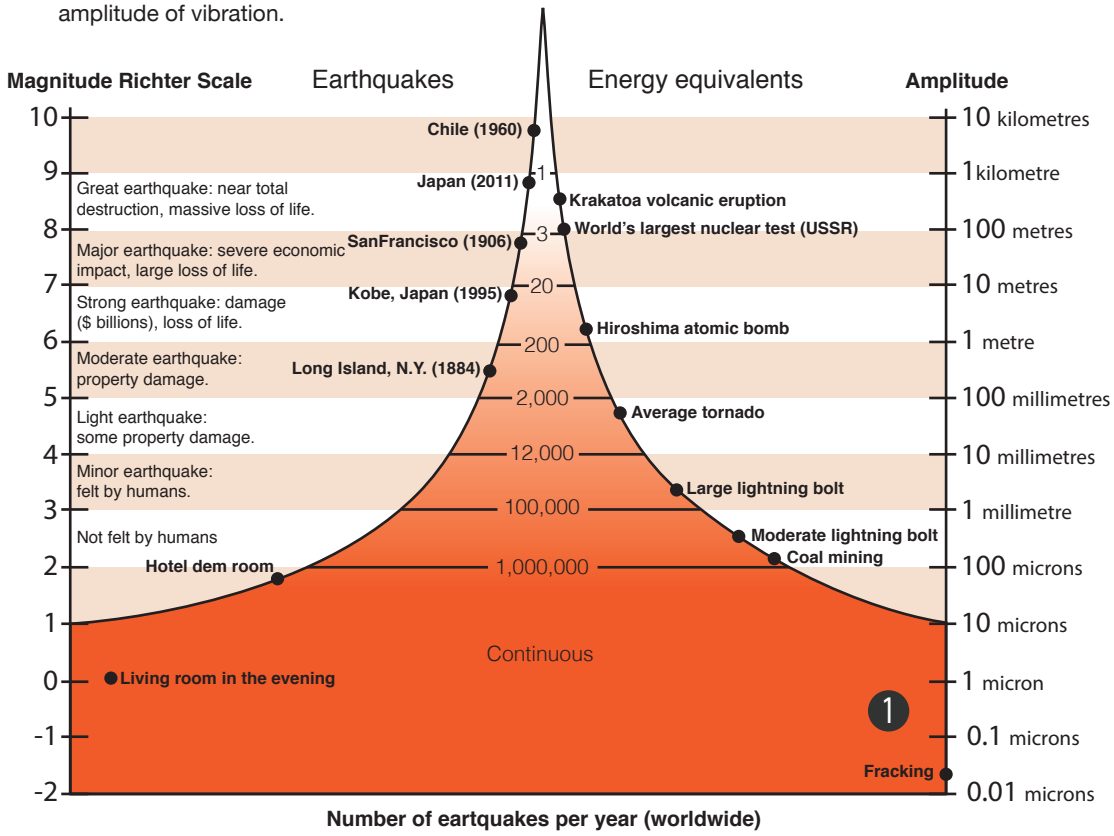
Notice how quiet things are between 8PM and 5AM. Then the increase in amplitude, commencing at around 5.30AM, caused by the build-up of traffic on the nearby M4 motorway.

As the traffic builds and human activity increases, the noise increases quite dramatically.
The range is from force 0 to force 2 and is typical of most built up areas throughout the world. Clock the force 3 natural earthquake at 6.30PM!

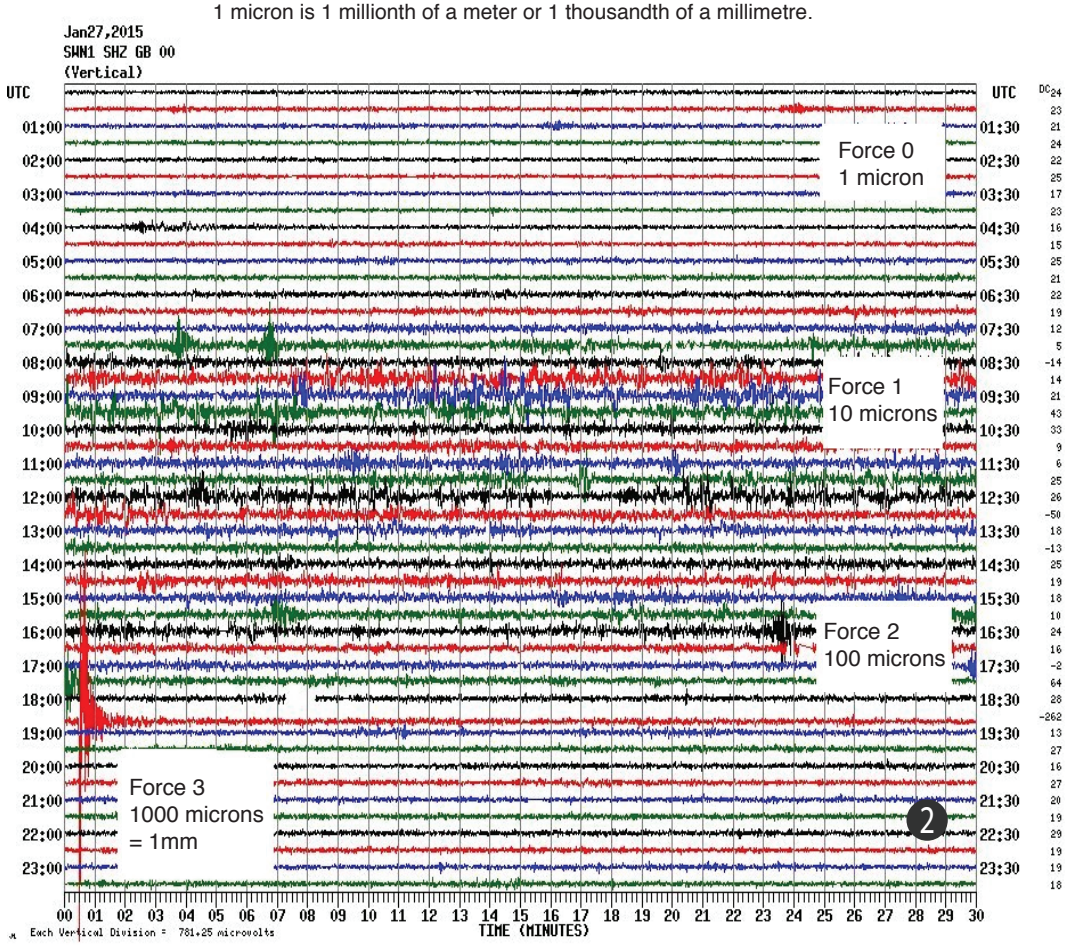
To see more of these read-outs, look up "live seismograph data".

Earthquake frequency and power

The left side of the chart shows the magnitude of the earthquake and the right side the amplitude of vibration.



Richter Scale Magnitude = Logarithm Base 10) of the maximum amplitude in microns.
1 micron is 1 millionth of a meter or 1 thousandth of a millimetre.



This means that most living room floors will be vibrating with an amplitude of about 10 microns (force 1) with a frequency range from 1—500 Hz. The closer noise sources result in higher frequency vibration.

The speaker (fig. 3) has an upper mid-band 5kHz signal, level 40dB at 1 metre applied. This is representative of the level of sound from a decaying cymbal note. The resultant cone movement of a 100mm diameter driver, is about 0.01 microns. If the speaker is coupled rigidly to the floor with spikes, the 10 micron earthquake floor vibration will travel up the spikes, into the cabinet, into the basket and onto the magnet plate. As the magnet plate is the "launch-pad" of your audio signal, this seismic movement will be superimposed onto your music (10/0.01=1000 times greater!) inevitably contaminating it.

Replacing spikes with Townshend Audio (TA) Seismic Isolation, dramatically reduces the ground borne vibration entering the speaker, so that only the music is heard (fig. 4)

Seismic Isolation will break the connection between your speaker and the floor with a subsequent increase in clarity, depth and soundstage.

When the cabinet is Seismically suspended, at the lower end of the spectrum, a bass note of 41Hz (E1) at 80dB level, at 1m is reproduced by a 300 mm (12") driver, the cone movement will be 4mm. If the mass of the cone is 40g and the mass of the cabinet is 40kg, the cabinet movement will be 4 microns. (fig. 5)

By Newton's Third Law, the 4 micron cabinet movement will be linearly related to the 4mm cone movement, causing no distortion. This will only decrease the bass output by a miniscule 0.01%.

If the speaker is rigidly spiked to the floor, then the 10 micron floor noise will be added to the 4 micron driver movement, causing more problems than it solves!

Further, the resultant bass noise (boom) will be transmitted into the floor, where it will re-radiates into the listening room and all adjacent rooms.
(fig. 6)

With Seismic Speaker Isolation this insidious path is blocked, so you can enjoy your much more musical system without disturbing the neighbours.

For the last 25 years, TA has promoted the radical concept of very low frequency vibration Isolation of all hi-fi components, including speakers. With the extensive experience gained and the in-depth understanding of real life situations, TA has engineered a comprehensive range of products to ensure the optimum performance and enjoyment of any hi-fi system. See the TA website for more info on how integrate Seismic Isolation in your system.

Impressive! Townshend Seismic Speaker Bars produce a result that goes way beyond what you might expect from 'speakers on springs'. To get an improvement in absolute resolution, precision of timing and solidity of stereo image from something so apparently simple is extraordinary. These things really do change the game, move the goalposts, and revolutionise the way we should think about speaker support. This is not an accessory… it's an essential.
Jason Kennedy. Hi Fi Plus Jan 15.