Noise Measurement

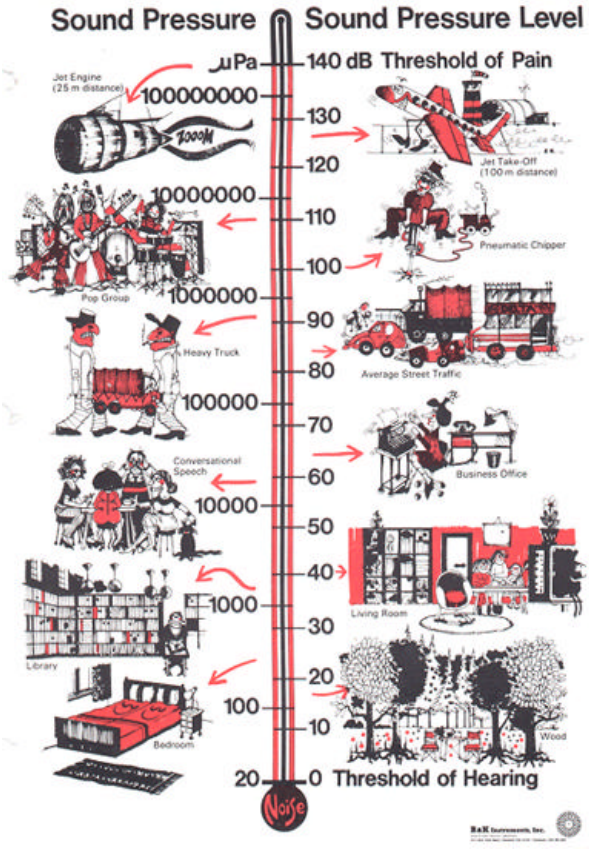
Mike Slater

Noise - Health Effects

- Temporary threshold shift
- Noise induced hearing loss
- Noise trauma
- Disturbance / interference

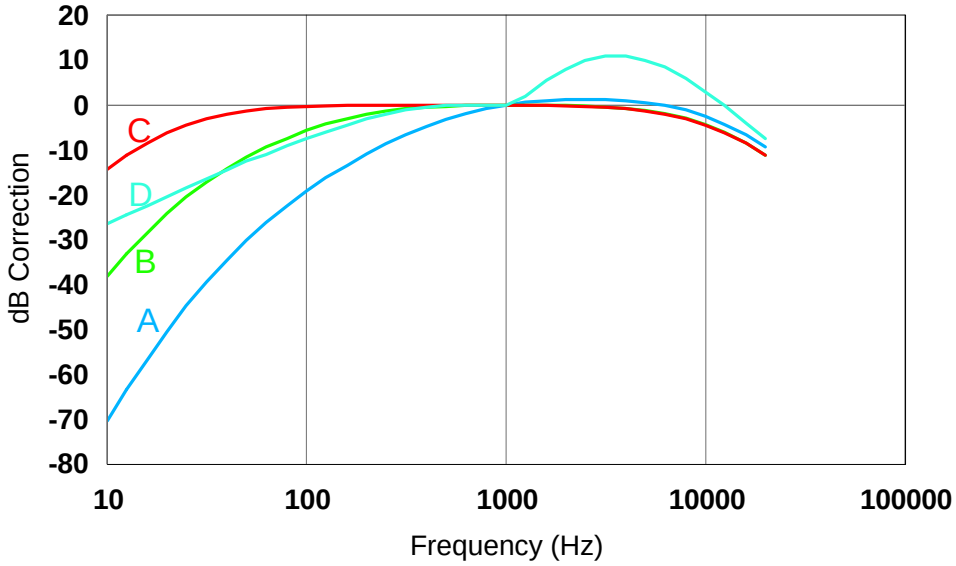
Noise Action Levels

- First Action Level
  - $L_{EP,d}$ of 85 dB(A)
- Second Action Level
  - $L_{EP,d}$ of 90 dB(A)
- Peak Action Level
  - 200 Pa
  - equivalent to 140 dB



$$SPL = 20 \log\left[\frac{P}{P_{ref}}\right]$$

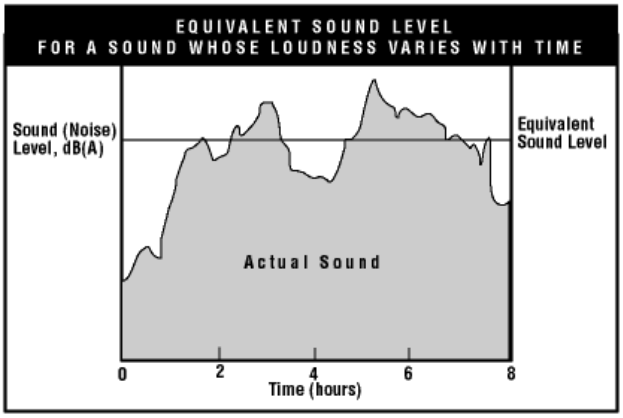
Noise Weighting Curves



Leq - Continuous Equivalent Sound Level

That continuous sound level over a given period of time which has the same energy content as the actual, varying, noise experienced

$$L_{Aeq,Te} = 10 \log_{10} \left\{ \frac{1}{T_e} \int_0^{T_e} \left[\frac{p_A(t)}{p_0} \right]^2 dt \right\}$$



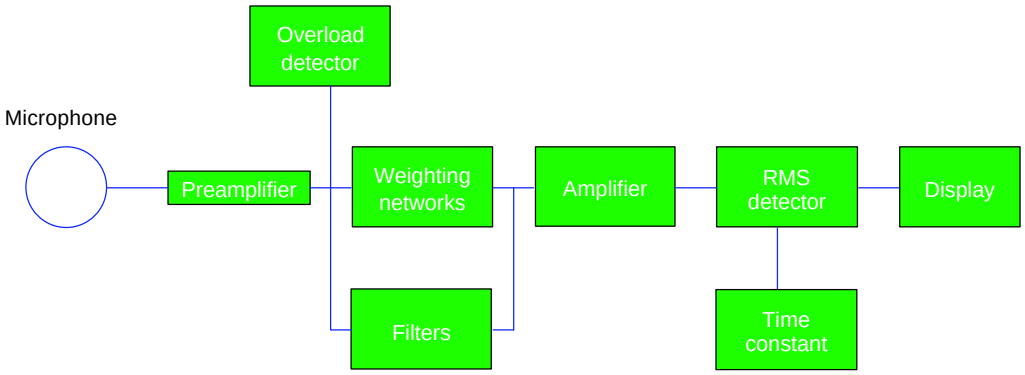
Daily Noise Dose

$$L_{EP,d} = L_{Aeq,T_e} + 10\log_{10}\frac{T_e}{T_0}$$

Noise Measurement

- Sound level meters
- Integrating sound level meters
- Octave filter sets
- Dosimeters
- Calibrators

Sound Level Meter

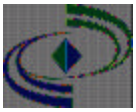


Sound Level Meters

Type	Application	Accuracy at reference conditions	Probable typical accuracy
0	Laboratory	± 0.4	± 0.5
1	Laboratory/Field	± 0.7	± 1.0
2	General Field	± 1.0	± 1.5
3	Field Survey	± 1.5	± 3.0

Frequency Analysis

- Octave band analysis
  - highest frequency double lowest
  - described by centre frequency (c)
  - range $c/\sqrt{2}$ to $c\sqrt{2}$
- Third octave filters
- Narrow band analysis



Dosimetry

- Measure personal exposures
- Affected by body reflections
- Accuracy -1 to +2 dB
- Mount on edge of shoulder
- Ensure 3dB exchange rate

Calibration

- Calibrator types
  - electronic
  - pistonphone
- Use calibrator before and after survey
- Full calibration every 2 years

Noise Surveys

- Walkthrough survey
- "Noise mapping"
- Leq measurements at workstations
- Octave band analysis
  - ear defender selection
- Dosimetry
  - where exposures variable

Impulse Noise

- Difficult to measure!
- Instrumentation
  - type 1 meter
  - C weighting
  - fast response
  - peak hold
- Accuracy ± 6 dB