MAK 3101
Taşıt Titreşimleri

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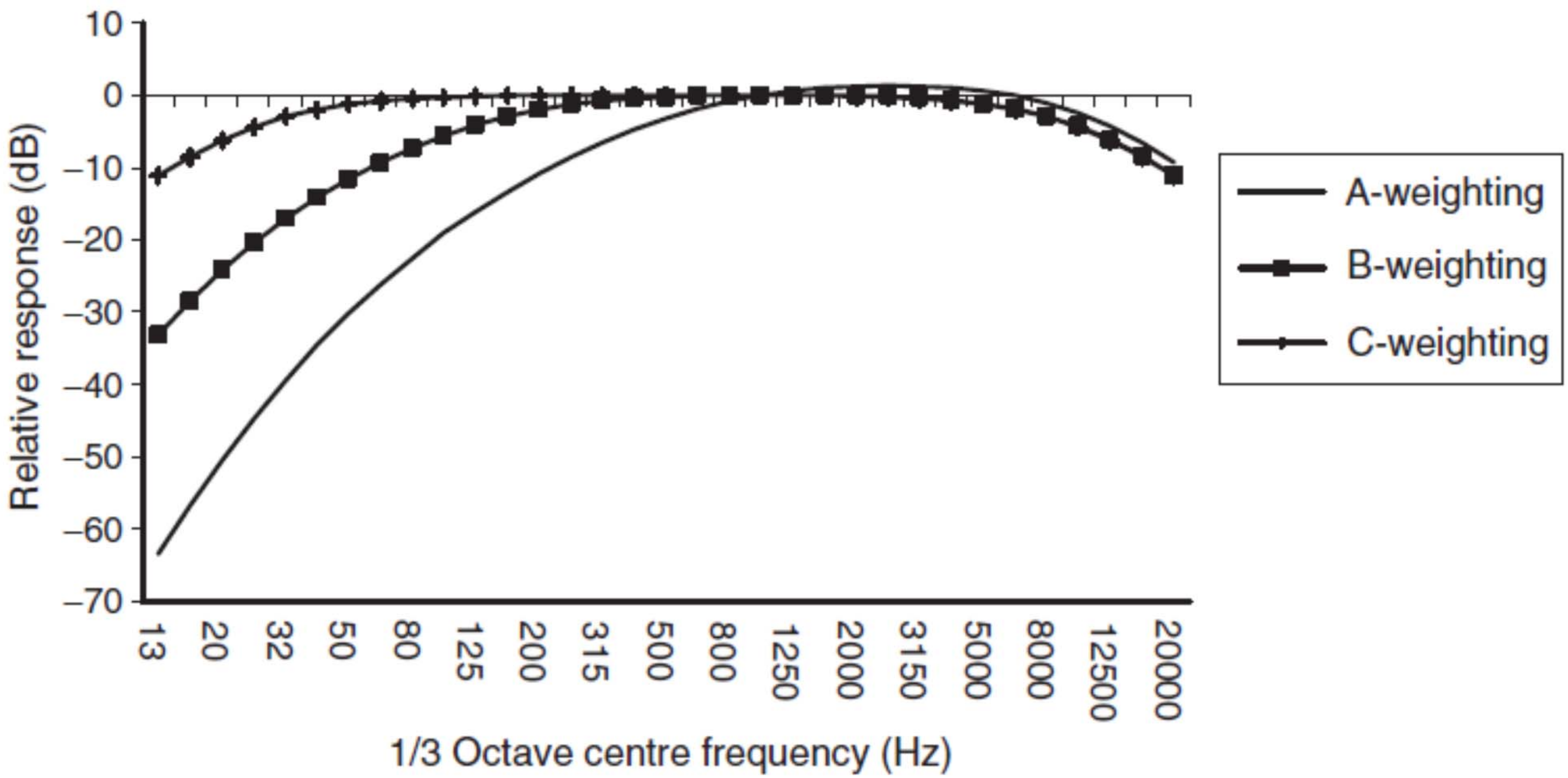
MAK 3101
VEHICLE VIBRATIONS

Asst. Prof. Dr. Levent YÜKSEK

Frequency weightings for sound levels

- A-weighting is the standard weighting for outdoor community noise measurements and is commonly used for noise measurements within architectural spaces and within vehicles.
- The A-weighting reduces the sensitivity of the measuring instrument to both low and very high frequency sounds. It approximately follows the inverted shape of the equal loudness contour passing through 40 dB at 1 kHz.

Frequency weightings for sound levels



- The ‘B’-weighting which approximately follows the inverted shape of the equal loudness contour passing through 70 dB at 1 kHz.
- The ‘C’-weighting which approximately follows the inverted shape of the equal loudness contour passing through 100 dB at 1 kHz.

Frequency weightings dB(A) example

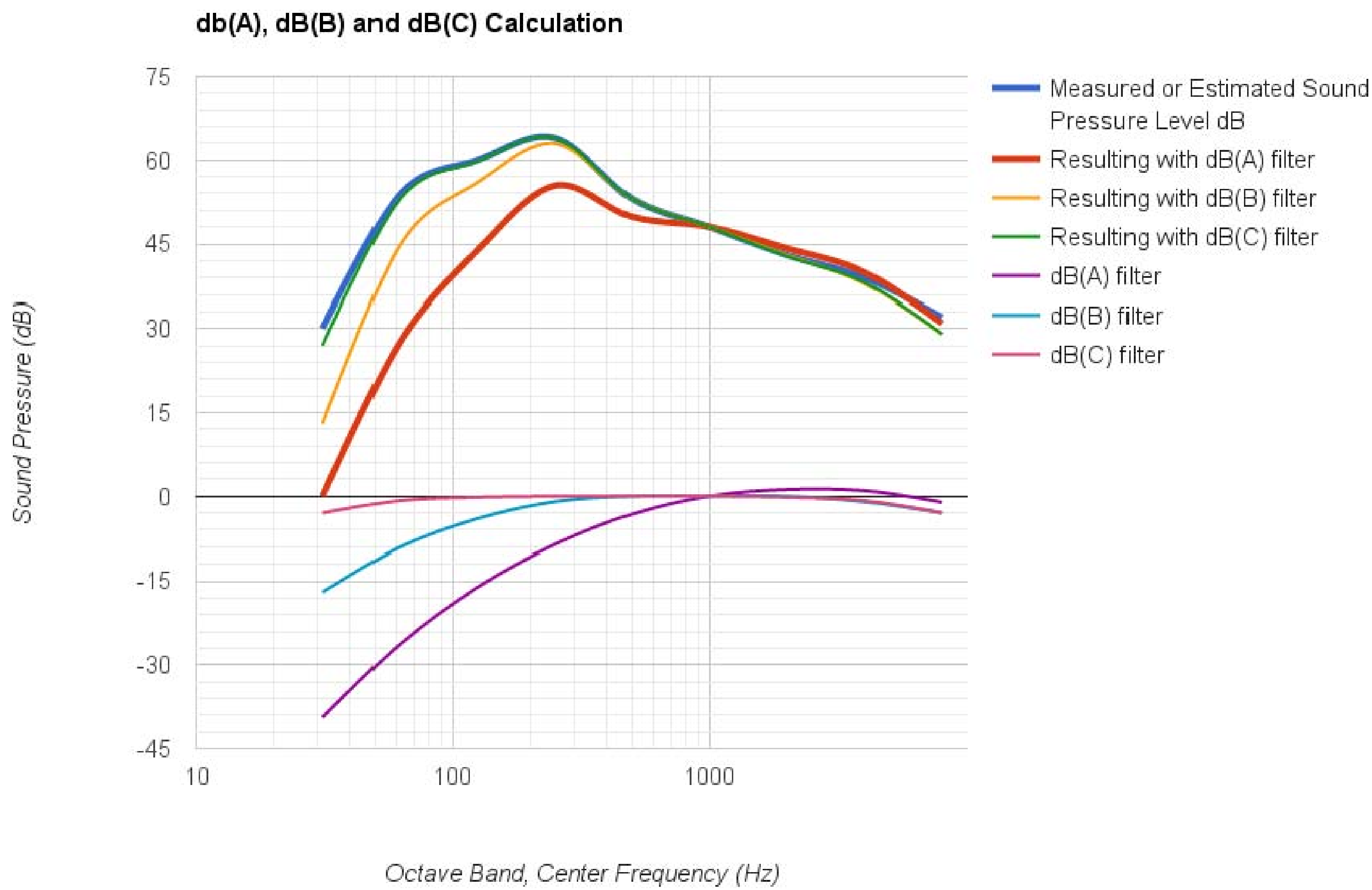
Relative Response (dB)	Frequency (Hz)								
	31.25	62.5	125	250	500	1000	2000	4000	8000
dB(A)	-39.4	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1
dB(B)	-17	-9	-4	-1	0	0	0	-1	-3
dB(C)	-3	-0.8	-0.2	0	0	0	-0.2	-0.8	-3

Octave band, Center Frequency (Hz)	62.5	125	250	500	1000	2000	4000	8000
Measured Sound Pressure Level (*dB*)	54	60	64	53	48	43	39	32
dB(A) filter (*dB*)	26	16	9	4	0	-1	-1	1
Resulting Sound Pressure Level (*dB*)	28	44	55	49	48	44	40	31

Frequency weightings

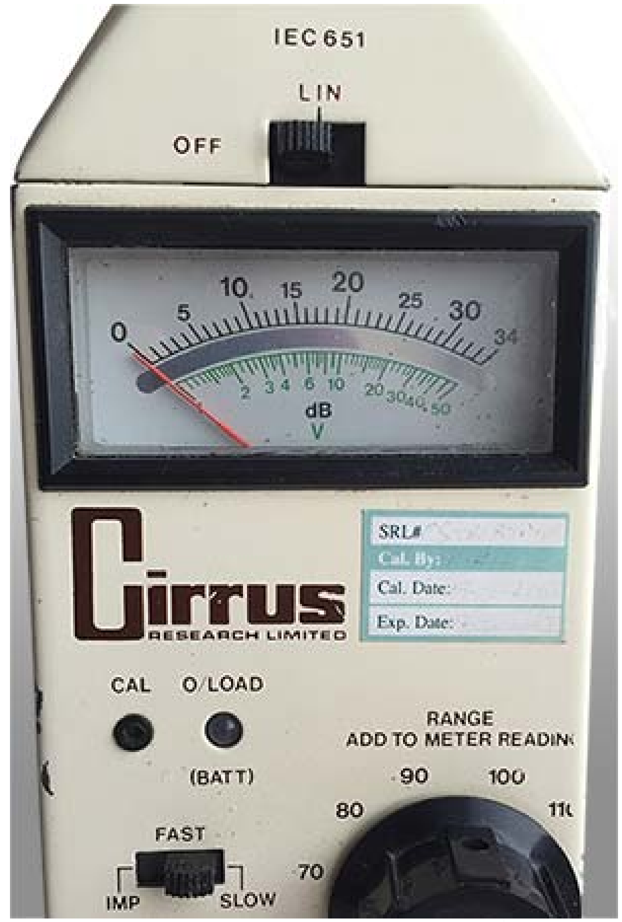
	Octave Band Center Frequency (Hz)								
	31.25	62.5	125	250	500	1000	2000	4000	8000
Measured or Estimated Sound Pressure Level dB	**30**	**54**	**60**	**64**	**53**	**48**	**43**	**39**	**32**
Resulting with dB(A) filter	0	27.8	43.9	55.4	49.8	48	44.2	40	30.9
Resulting with dB(B) filter	13	45	56	63	53	48	43	38	29
Resulting with dB(C) filter	27	53.2	59.8	64	53	48	42.8	38.2	29
dB(A) filter	-39.4	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1
dB(B) filter	-17	-9	-4	-1	0	0	0	-1	-3
dB(C) filter	-3	-0.8	-0.2	0	0	0	-0.2	-0.8	-3

Frequency weightings



Time Weightings

- Fast having an exponential time constant of 125 ms, corresponding approximately to the integration time of the ear (sounds of duration less than around 125 ms do not register their full loudness with the average human subject).
- Slow having an exponential time constant of 1 s to allow for the average level to be estimated by eye with greater precision.

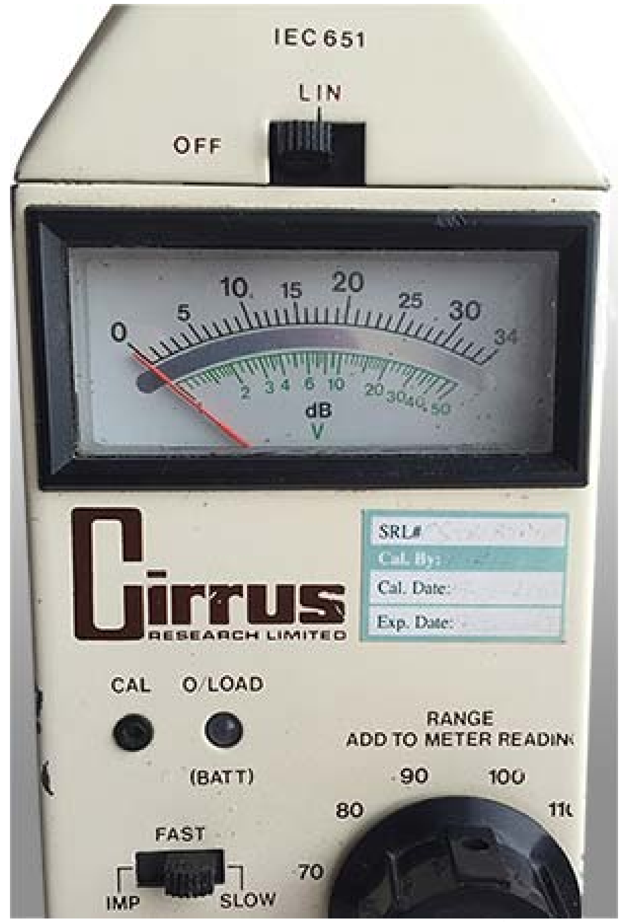


Time Weightings

- Peak Time Weighting having an exponential time constant of below 100s to respond as quickly as possible to the true peak level of transient sounds.

Time Weightings

- Impulse Time Weighting
  - It’s about four times faster than **Fast** (35 milliseconds)
  - 35 ms while the signal level is increasing or 1,500 ms while the signal level is decreasing.
  - This is due to mirror the ear’s response to impulsive sound.

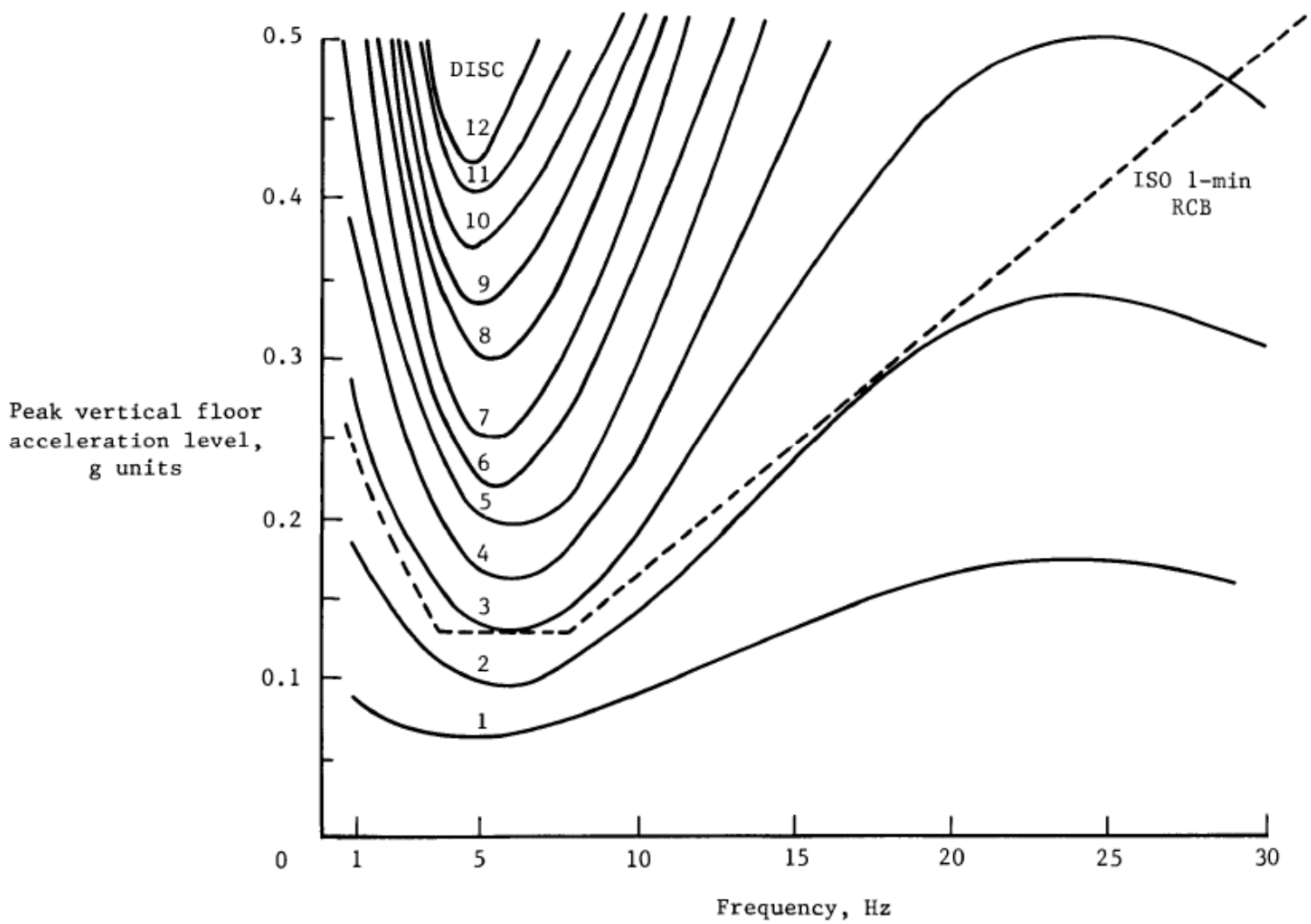


Ride perception inputs

- Seat location
- Seating position
- Influence of hand and foot vibration input
- Single- versus multiple-frequency input
- Multi-direction input
- Comfort scaling
- Duration of exposure
- Sound and visual vibration inputs

Vertical Frequency DISC

The NASA's study show a minimum tolerance (maximum sensitivity) of the human body to vertical vibration in the frequency range between 4 and 8 Hz.



Lateral Frequency DISC