

Audio Myths

Dispelling common misconceptions and misleading truths

Spring 2019 - Audio Tech Talk Series

February 19, 2019



Condenser microphones “pick up” more of the room than dynamic microphones



Neumann TLM 103

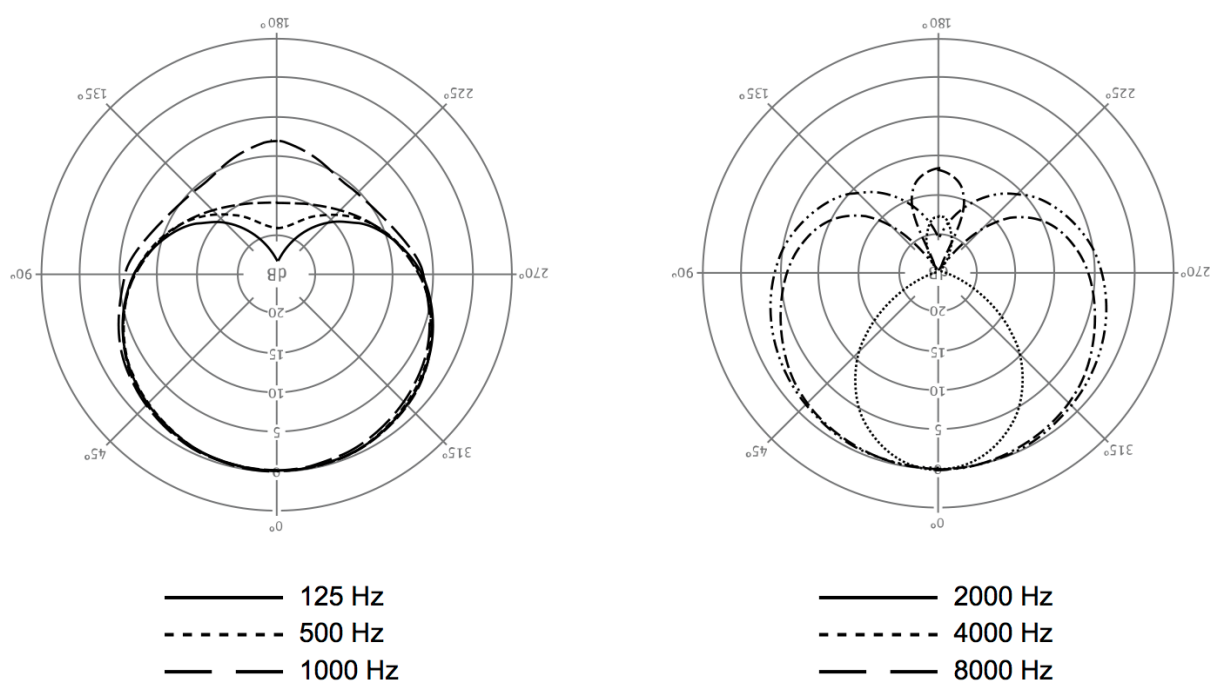
Condenser



Shure SM58

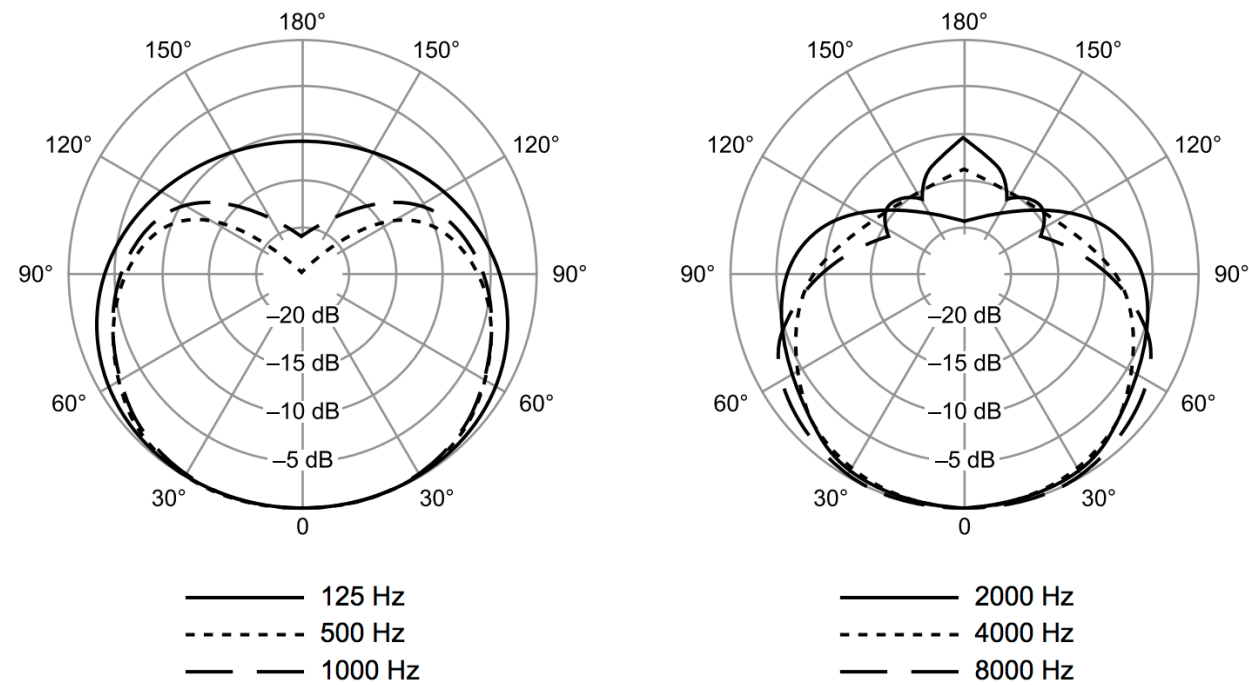
Dynamic

Polar Patterns



Neumann TLM 103

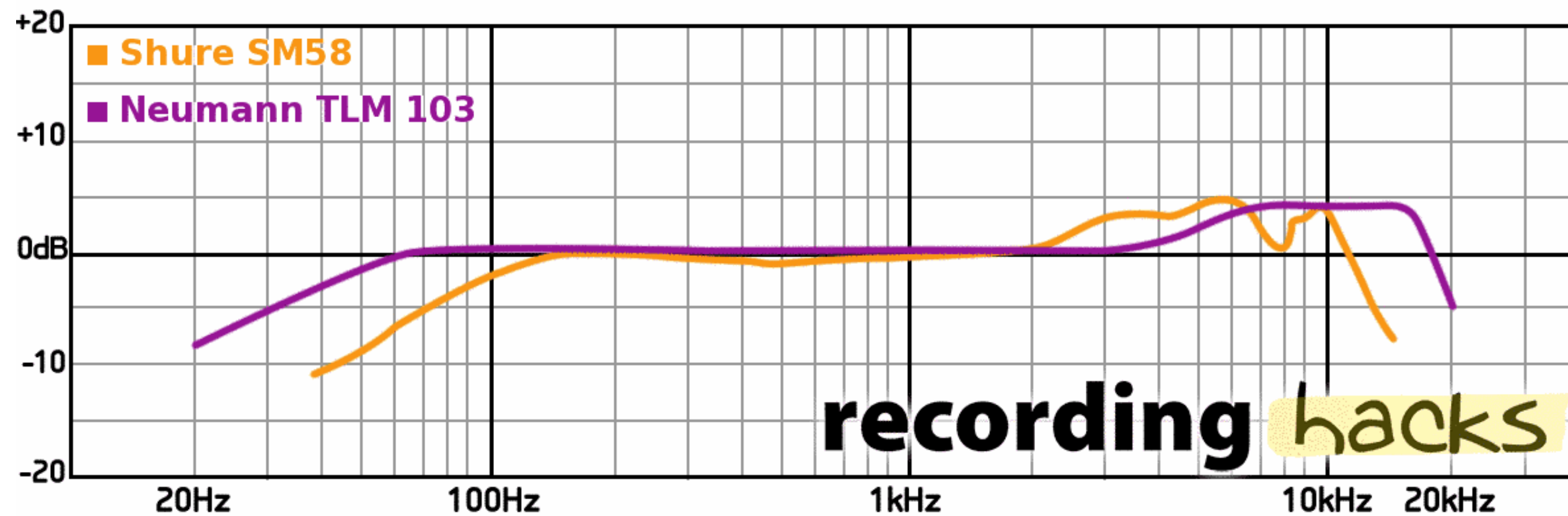
Condenser



Shure SM58

Dynamic

Frequency Response



Condensers “pick up” more of the room
than dynamics

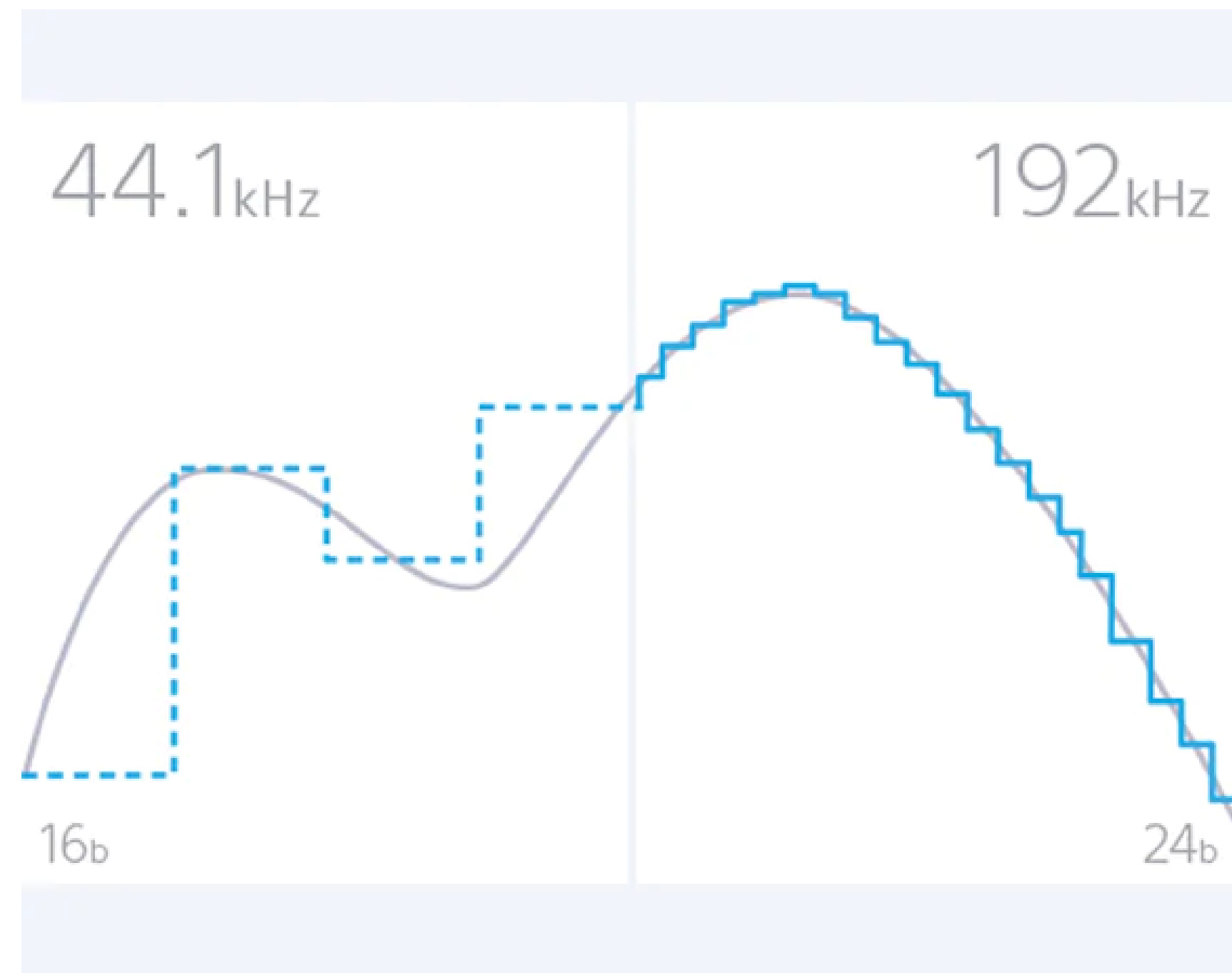
False



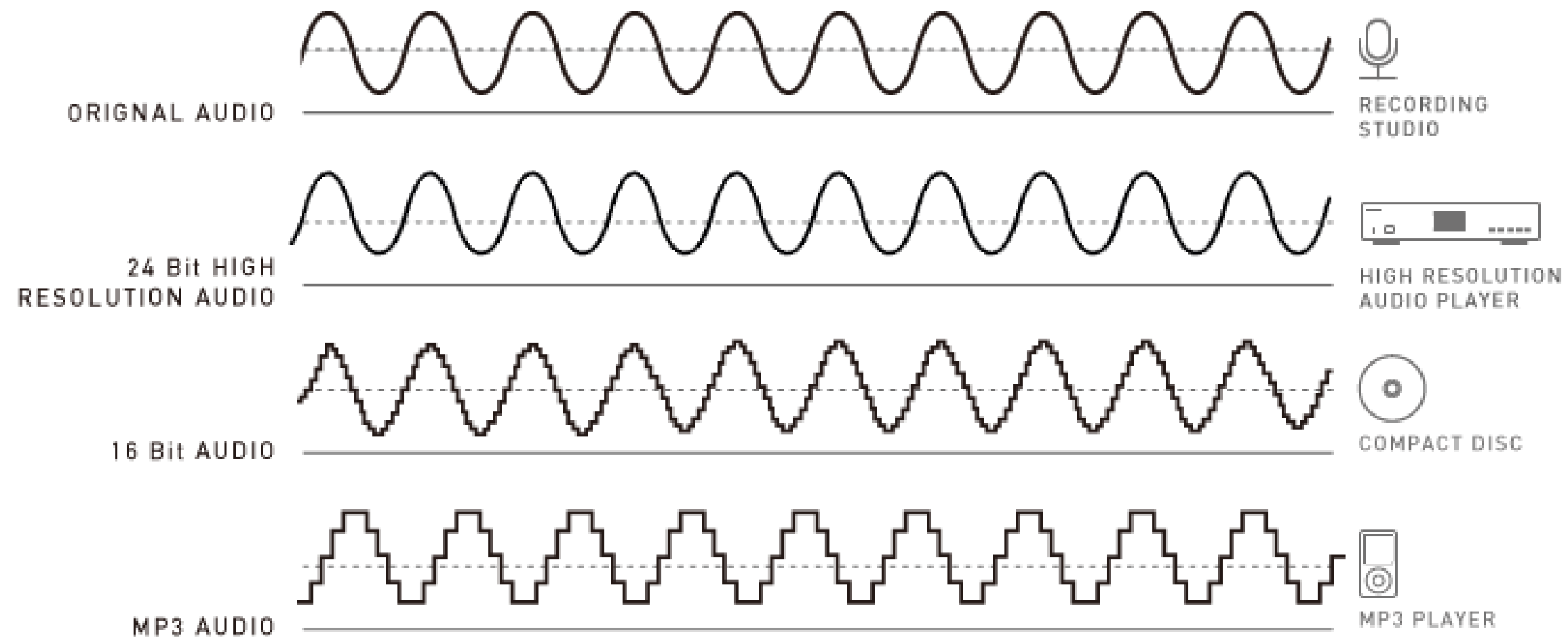
You can hear high-resolution audio

What is high-resolution audio?

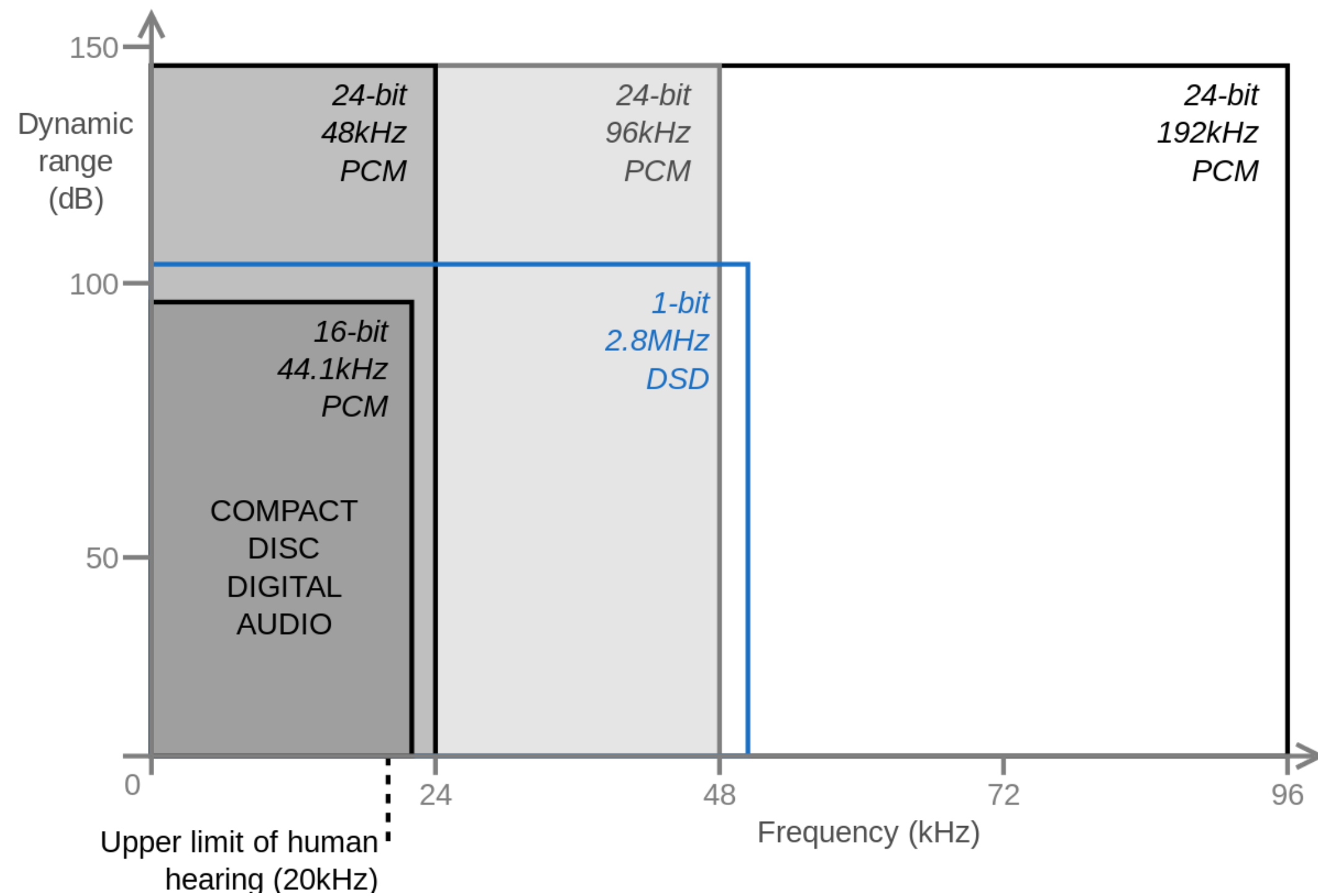
Music files that have a higher sampling frequency and/or bit depth than that of Compact Disc Digital Audio, which is specified at 16bit/44.1 kHz.



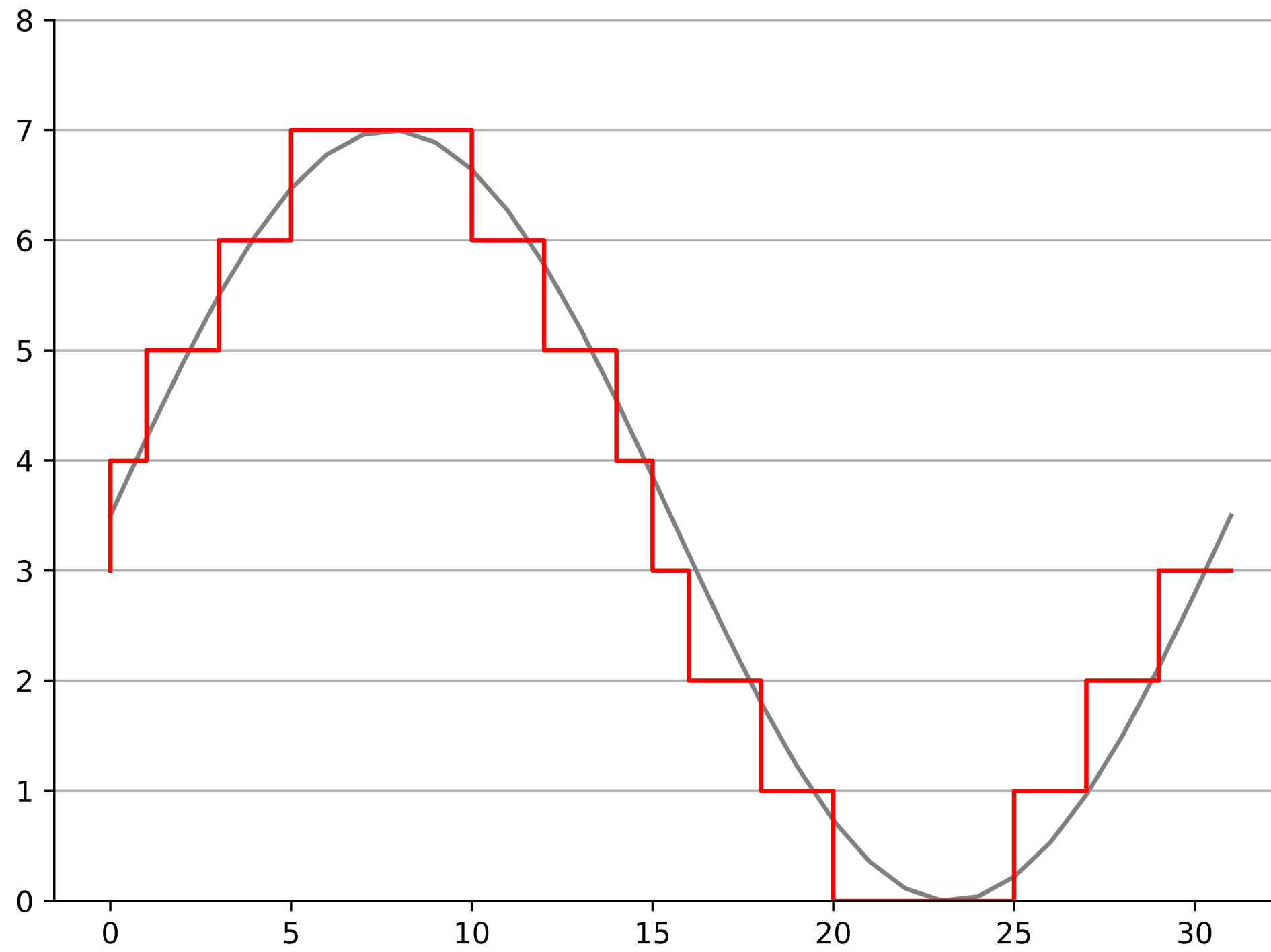
From the high resolution audio page on Sony.com

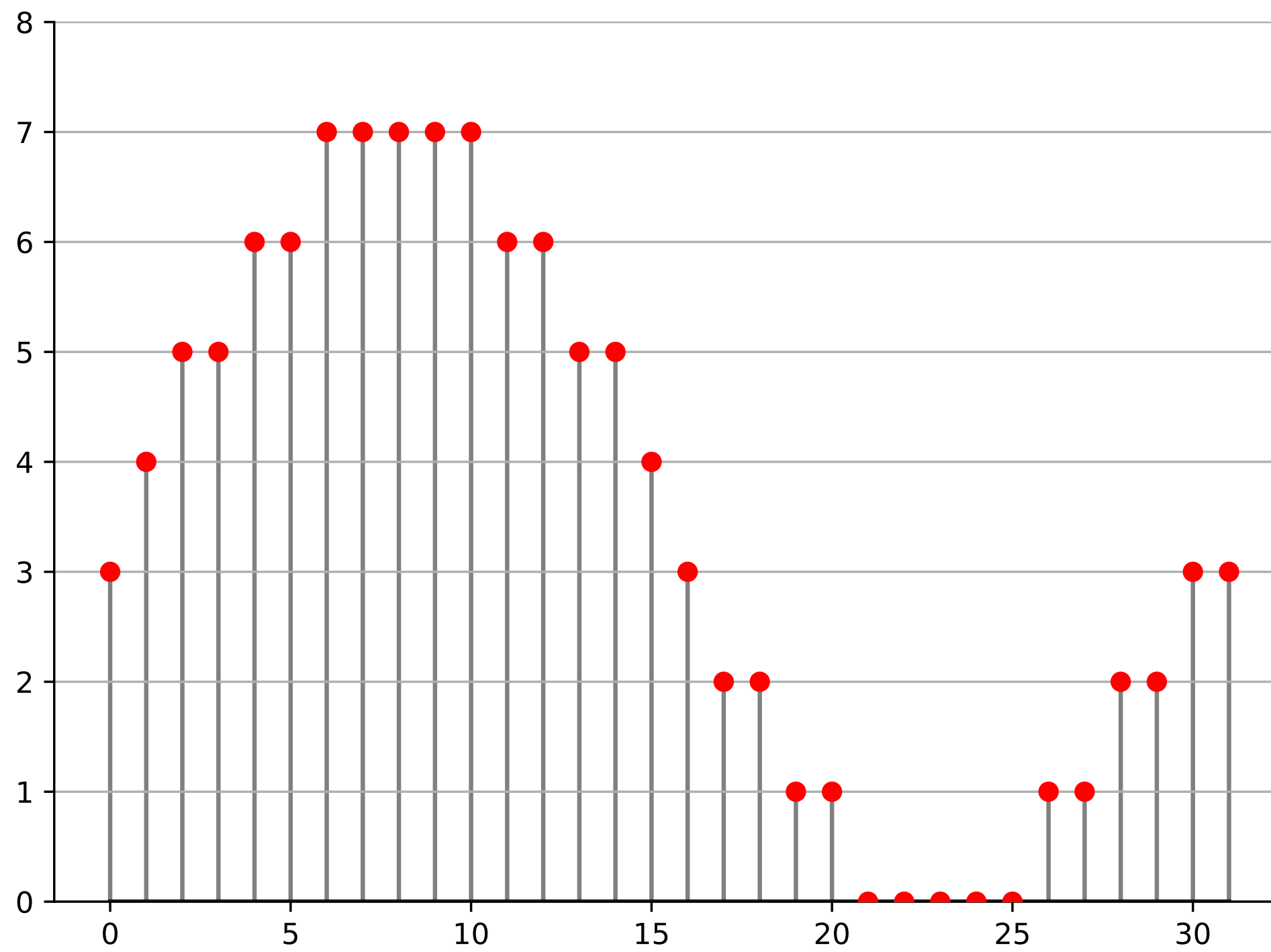


From the high resolution audio page on Technics.com



Digital audio does not contain stairsteps





Sampling rate only affects bandwidth
(highest frequencies)

Bit depth only affects dynamic range
(noise floor)

16 bit vs. 24 bit (96 dB vs. 144 dB)

44.1 kHz vs. 96 kHz (22.05 kHz vs. 48 kHz)

Support of high-resolution audio



Criticism

- "If they [the music business] cared about sound quality in the first place, they would make all of the releases sound great in every format they sell: MP3, FLAC, CD, iTunes, or LP." — cnet
- "Impractical overkill that nobody can afford" — Gizmodo
- "A solution to a problem that doesn't exist, a business model based on willful ignorance and scamming people." — Xiph.org

A Meta-Analysis of High Resolution Audio Perceptual Evaluation

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There is considerable debate over the benefits of recording and rendering high resolution audio, i.e., systems and formats that are capable of rendering beyond CD quality audio. We undertook a systematic review and meta-analysis to assess the ability of test subjects to perceive a difference between high resolution and standard, 16 bit, 44.1 or 48 kHz audio. All 18 published experiments for which sufficient data could be obtained were included, providing a meta-analysis involving over 400 participants in over 12,500 trials. Results showed a small but statistically significant ability of test subjects to discriminate high resolution content, and this effect increased dramatically when test subjects received extensive training. This result was verified by a sensitivity analysis exploring different choices for the chosen studies and different analysis approaches. Potential biases in studies, effect of test methodology, experimental design, and choice of stimuli were also investigated. The overall conclusion is that the perceived fidelity of an audio recording and playback chain can be affected by operating beyond conventional levels.

1 INTRODUCTION

High resolution audio may be loosely defined as those systems and formats that are capable of rendering beyond standard quality audio, i.e., more than 16 bits, and/or more than 44.1 or 48 kHz sample rate, as used in Compact Disc (CD) or “ordinary” Digital Video Disc (DVD) quality audio. Yet many believe that this standard quality audio is sufficient to capture all perceivable content from live sound. This question of perception of high resolution audio has

performance of audio feature extraction techniques within a general framework [4]. But to the best of our knowledge, this represents the first time that it has been applied to audio engineering research.

1.1 Reviews

There are several overviews of the field of high resolution audio relevant to this work. A special issue of the

You can hear high-resolution audio

Mostly false

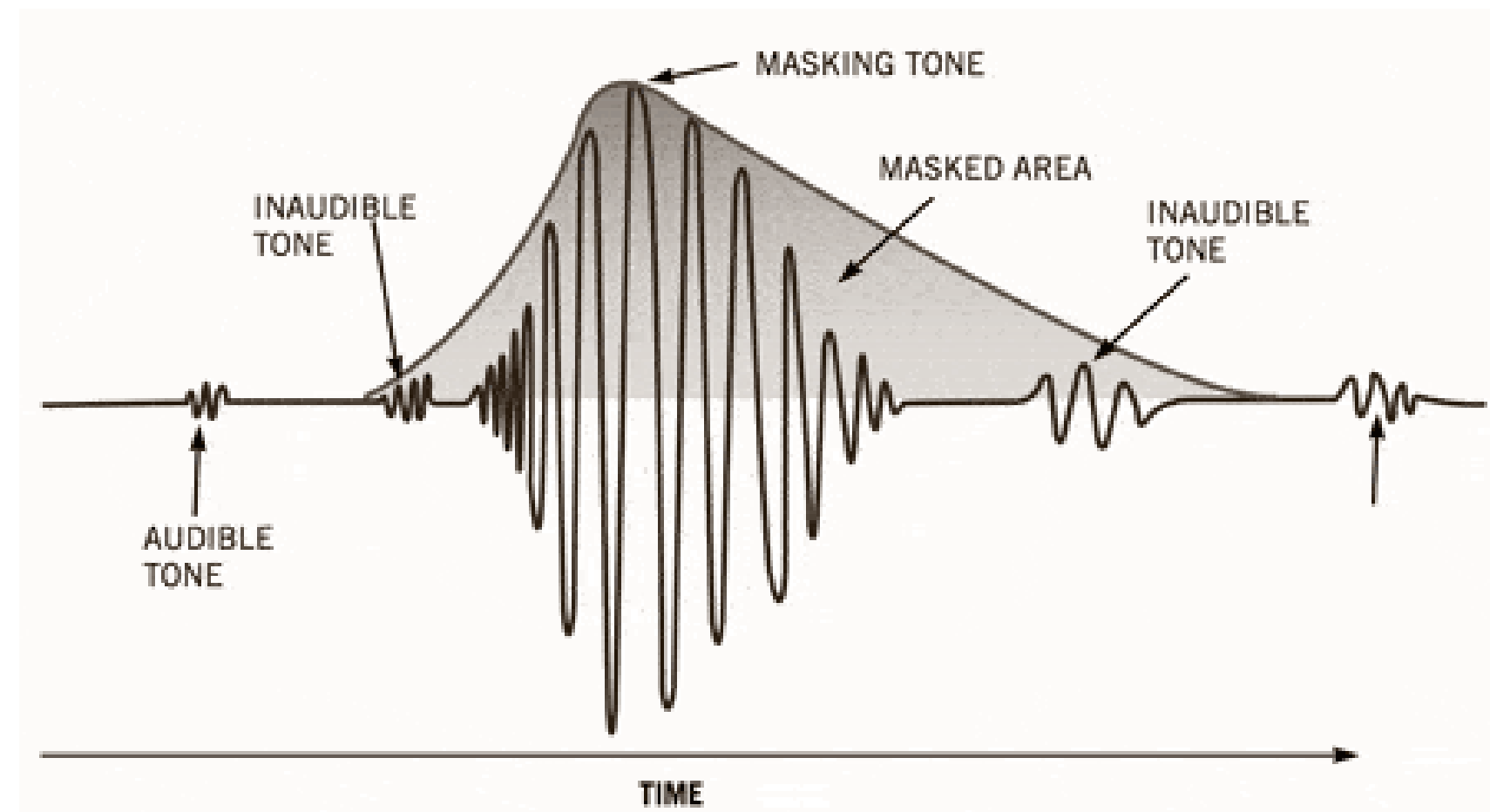


MP3 audio sounds bad

What is mp3 audio?

MP3 compression works by reducing (or approximating) the accuracy of certain components of sound that are considered to be beyond the hearing capabilities of most humans. This method is commonly referred to as perceptual coding or as psychoacoustic modeling.

Temporal Masking



Listening Examples

▶ 0:00 / 0:14 ●  🔊 ⋮

uncompressed WAVE - 2.5 MB

▶ 0:00 / 0:14 ● 🔊 ⋮

320 kbps MP3 - 563 KB [x4.4 factor] - $F_s = 44.1$ kHz

▶ 0:00 / 0:14 ● 🔊 ⋮

128 kbps MP3 - 225 KB [x11.1 factor] - $F_s = 44.1$ kHz

▶ 0:00 / 0:14 ● 🔊 ⋮

96 kbps MP3 - 169 KB [x14.8 factor] - $F_s = 44.1$ kHz

▶ 0:00 / 0:14 ● 🔊 ⋮

16 kbps MP3 - 29 KB [x86.2 factor] - $F_s = 8$ kHz

MP3 audio sounds bad

Mostly false



Power conditioners will
improve sound quality

Furman PL-8 Power Conditioner



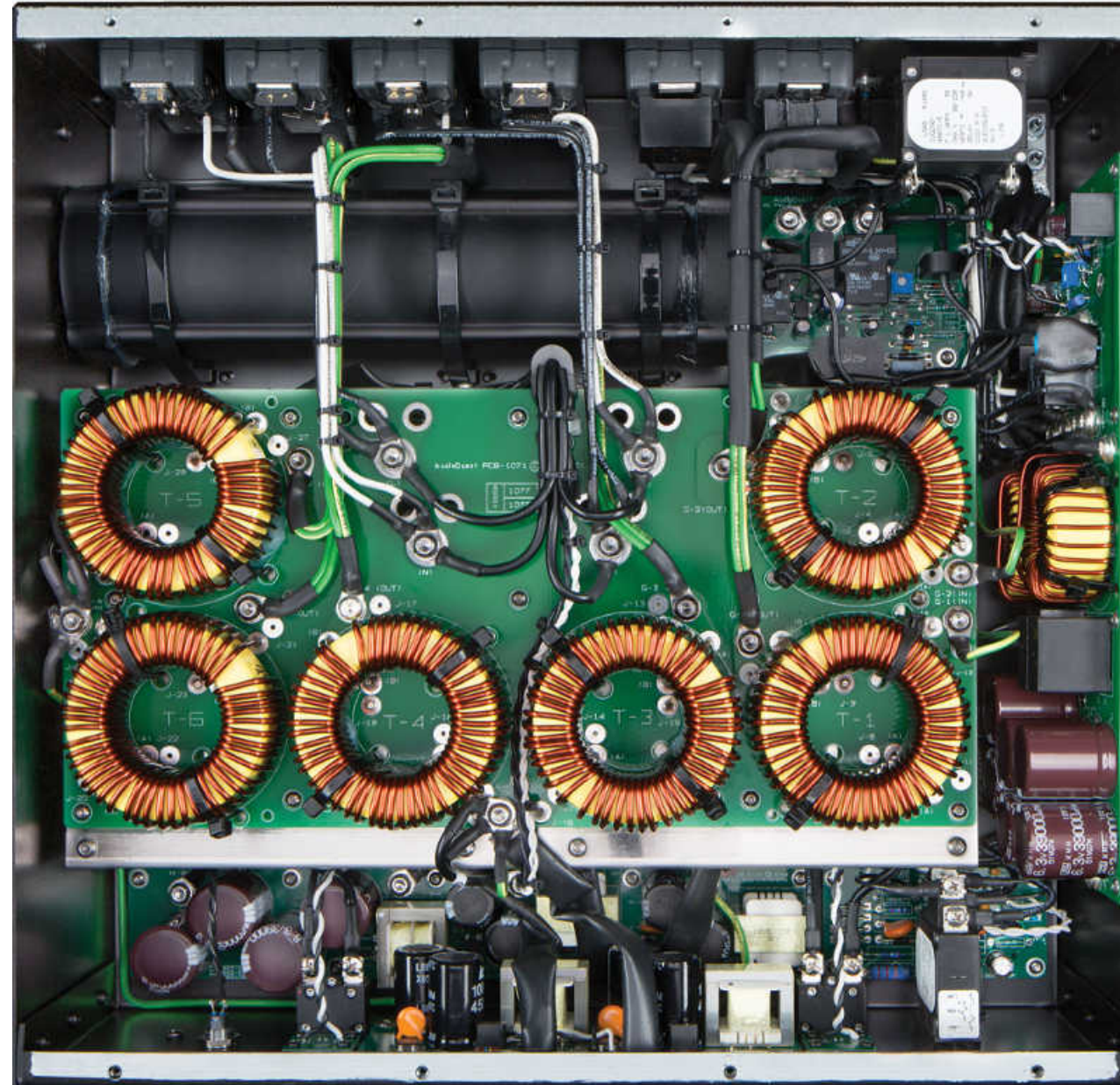
\$200.00

Furman M-8x2 Power Conditioner



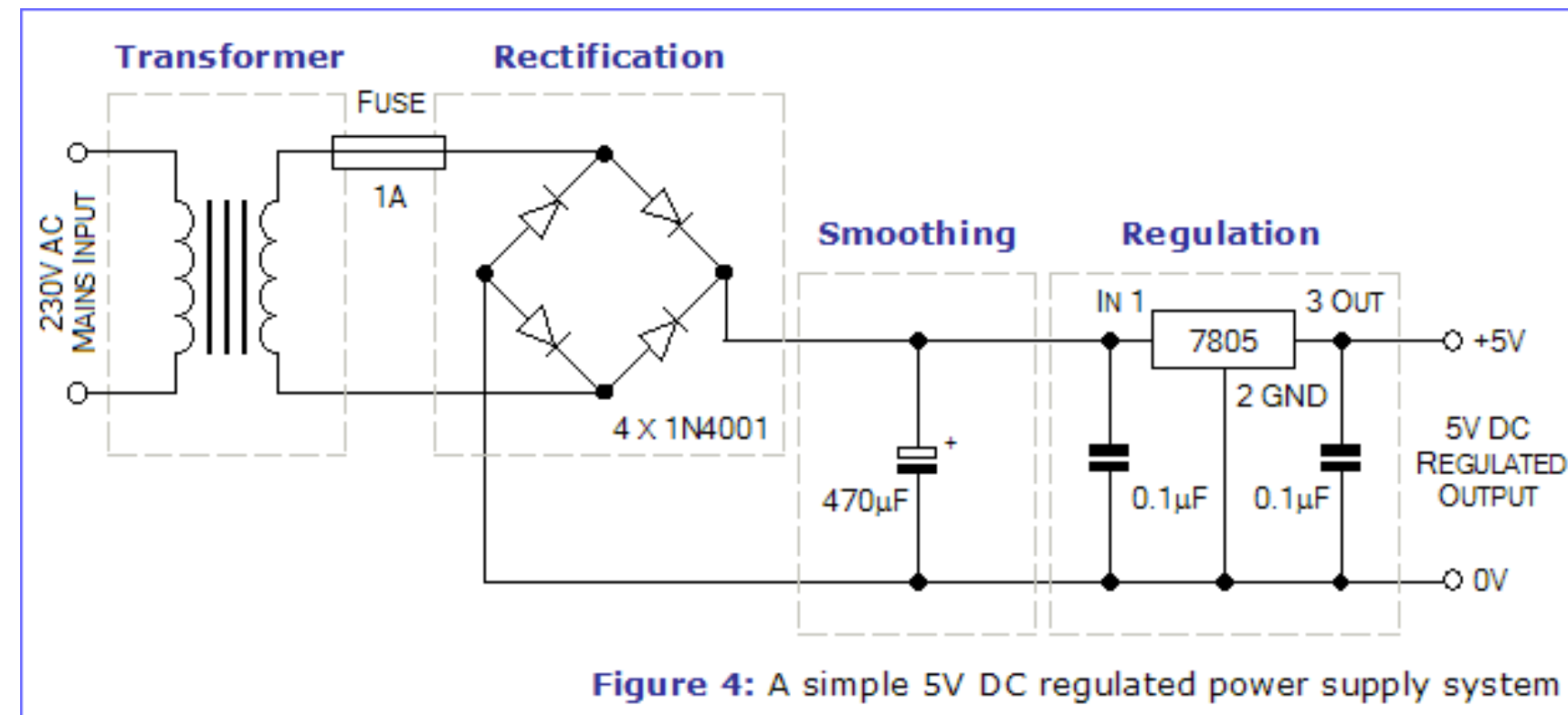
\$100.00

AudioQuest Niagara 7000



\$7999.50

AC-DC Power Supply



Power conditioners will
improve sound quality

Mostly false



Cables improve sound quality

How expensive could cables be?

Very



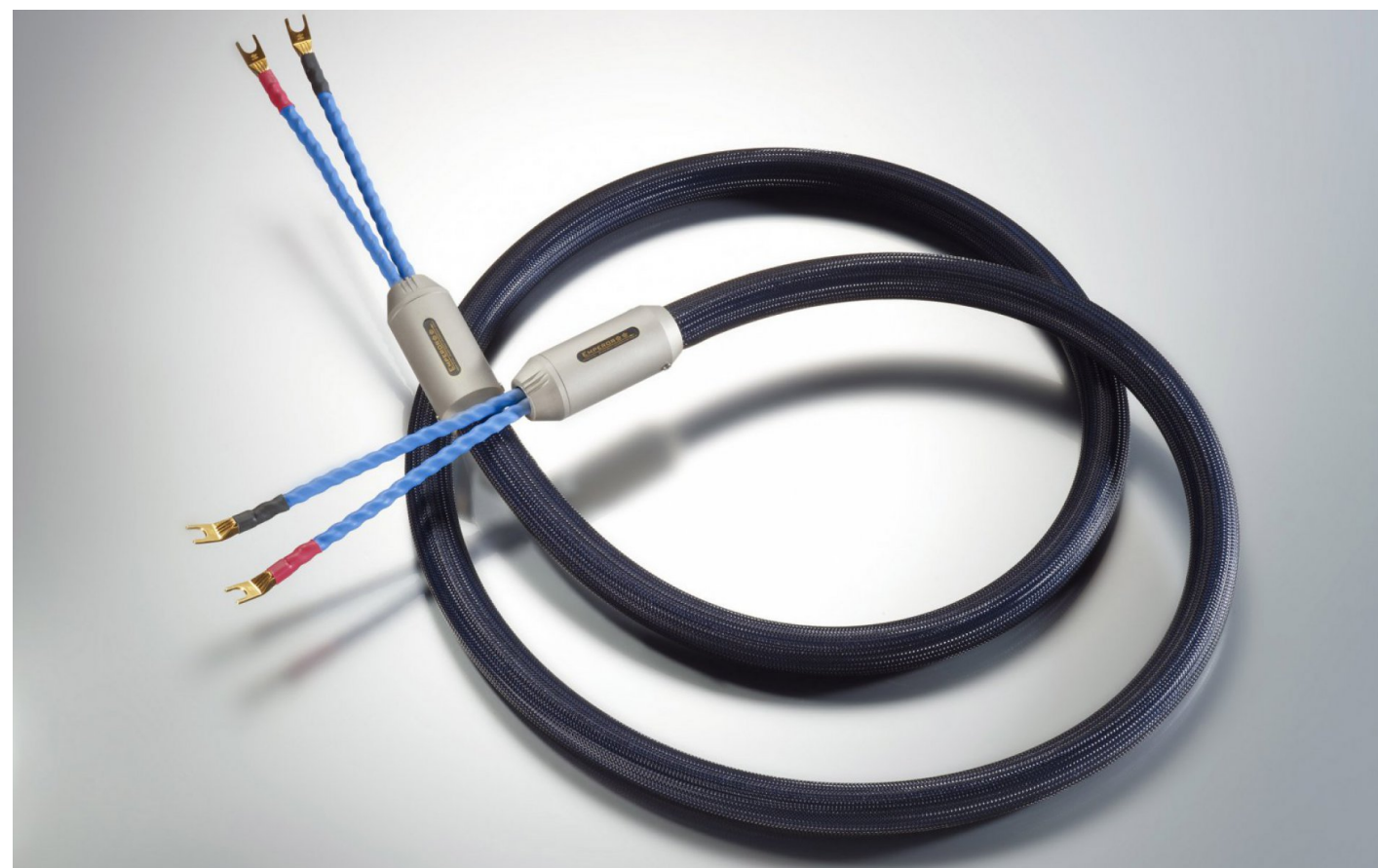
Moon Audio - Silver Dragon XLR interconnect

\$500



Cardas - Clear Beyond Speaker Cable

\$6,840



Siltech Cables - Emperor Double Crown Speaker Cable

\$45,000



Transmission Line Theory

'Short' vs. 'long' connections

Speed of light - 299,792,458 m/s

100 ft. (~30.5 m) audio cable - 101 ns propagation delay

20 kHz \rightarrow $T = 50 \mu\text{s}$ and $\sim 10,000$ m wavelength in copper

"Cables connecting an audio amplifier to speakers would have to be over **1.55 miles** in length before line reflections would significantly impact a 20 kHz audio signal"

What matters in a cable?

- Connectors - well made for good contacts
- Cable insulation - durable
- Correct gauge for application

Cables improve sound quality

Mostly false

Next Talk - March 5

AI in Audio

Part I: Automated music generation and production