SPECTACOLO SOUND DESIGN COURSE

HOSTED BY MASHIRIKA PERFORMING ARTS &MEDIA COMPANY

TRAINING

BY

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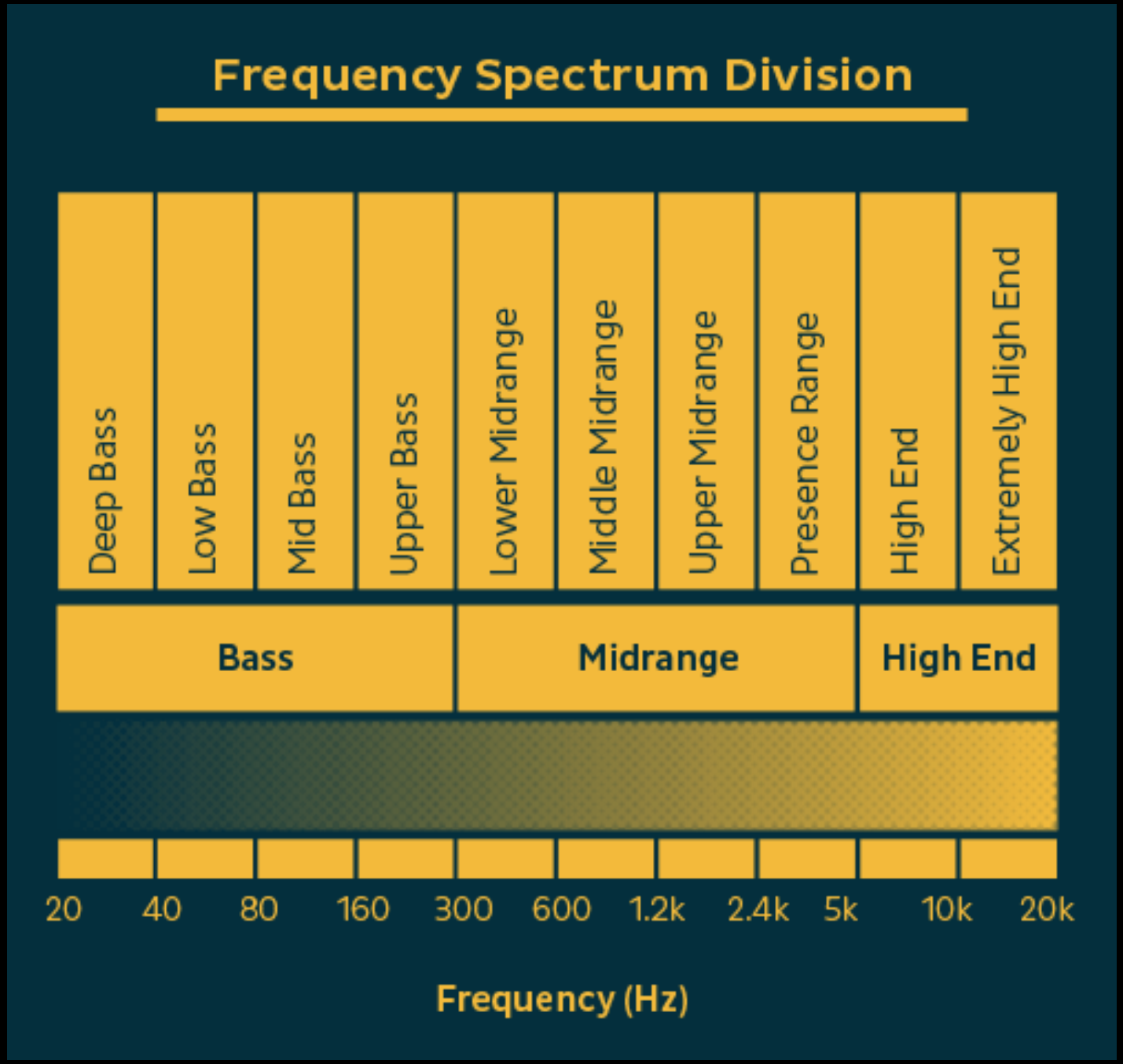
MASHIRIKA
PERFORMING ARTS AND MEDIA COMPANY

MASTERING SOUND DESIGN FOR THEATER

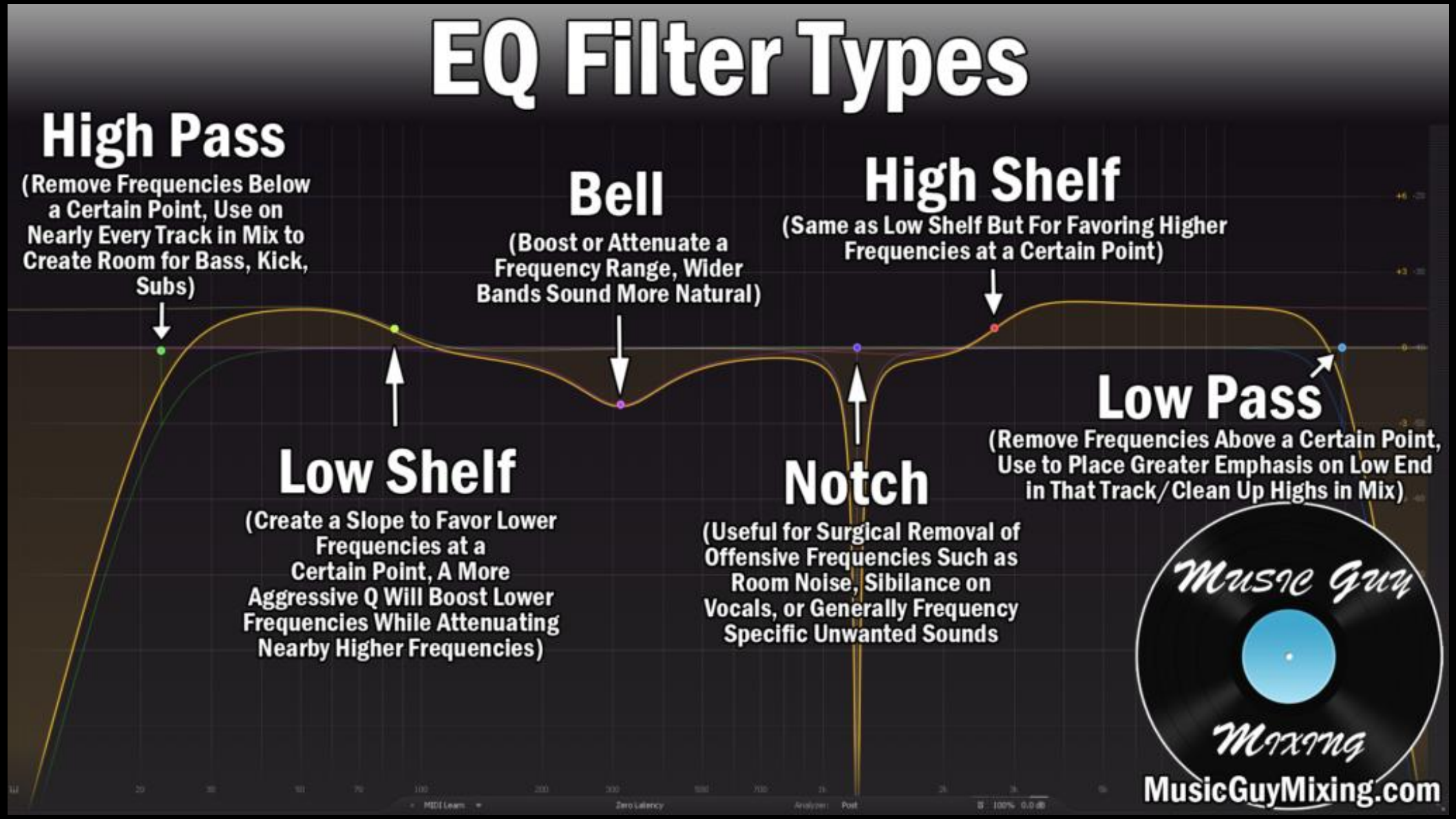
DAY 9

FREQUENCY MANAGEMENT

- **Frequency Spectrum**
- **Range of Frequencies**: The frequency spectrum spans from very low frequencies (20 Hz) to very high frequencies (20,000 Hz or 20 kHz). In sound design, we often focus on specific ranges:
  - **Sub-bass**: 20-60 Hz (Feel the vibrations more than hear them)
  - **Bass**: 60-250 Hz (Adds warmth and fullness)
  - **Low Midrange**: 250-500 Hz (Gives body to instruments)
  - **Midrange**: 500 Hz-2 kHz (Most of the fundamental frequencies of instruments and vocals)
  - **Upper Midrange**: 2-4 kHz (Clarity and presence)
  - **Presence**: 4-6 kHz (Sharpness and definition)
  - **Brilliance**: 6-20 kHz (Air and sparkle)

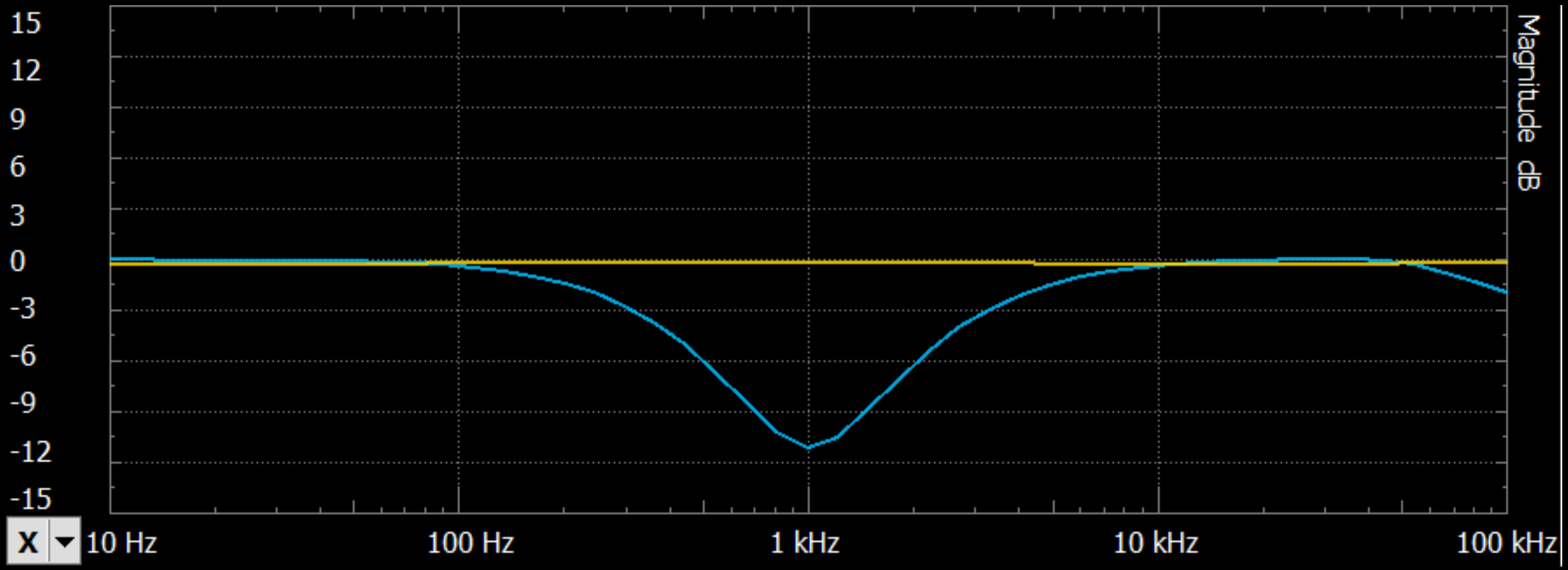

Frequency Spectrum Division
Deep Bass
Low Bass
Mid Bass
Upper Bass
Lower Midrange
Middle Midrange
Upper Midrange
Presence Range
High End
Extremely High End
Bass
Midrange
High End
20
40
80
160
300
600
1.2k
2.4k
5k
10k
20k
Frequency (Hz)

EQ Filter Types



FREQUENCY MANAGEMENT

- **Visual Representation**: Frequencies can be represented visually using tools like **spectrum analyzers**. These tools display a graph where:
- The x-axis represents frequency (from low to high).
- The y-axis represents amplitude (how loud each frequency is).


15
12
9
6
3
0
-3
-6
-9
-12
-15
Magnitude dB
X
10 Hz
100 Hz
1 kHz
10 kHz
100 kHz

Tools for Visualizing Frequency Content

- **Spectrum Analyzers**: These display real-time visual representations of the frequency spectrum, helping you identify problem areas.
  - **Examples**: iZotope Insight, Voxengo Span, FabFilter Pro-Q.
- **FFT (Fast Fourier Transform)**: A mathematical method used to convert a signal from its original time domain into a frequency domain. This is the underlying technology in most spectrum analyzers.
  - **Applications**: FFT is used to visualize frequency content, identify peaks, and analyze the distribution of frequencies in a sound.

Frequency Bands

- **Low Frequencies (20-250 Hz)**:
  - Adds warmth, power, and fullness to the mix.
  - Too much can cause muddiness and rumble.
- **Mid Frequencies (250 Hz-2 kHz)**:
  - Contains the fundamental frequencies of most instruments and vocals.
  - Critical for clarity and presence. Too much can make the mix sound boxy or honky.
- **High Frequencies (2 kHz-20 kHz)**:
  - Adds clarity, sparkle, and air to the mix.
  - Excessive high frequencies can cause harshness and listener fatigue.
- Balancing these frequencies helps create a mix where each element has its own space and can be heard clearly. points

Vocal EQ

- Vocals are often the focal point of a performance, so clarity and presence are crucial.
- EQ can help remove unwanted frequencies, boost desirable ones, and ensure the vocals sit well in the mix.
- Techniques:
  - **High-pass Filter**: Remove low-end rumble and unwanted bass frequencies below 80-100 Hz.
  - **Presence Boost**: Boost frequencies around 2-5 kHz to enhance clarity and presence. This makes the vocals more intelligible and upfront.
  - **Cutting Muddy Frequencies**: Reduce frequencies around 200-400 Hz if the vocals sound boxy or muddy.
  - **De-essing**: Use EQ or a dedicated de-esser to reduce harsh sibilance (usually around 5-8 kHz).

Frequency Masking

- Frequency masking occurs when louder sounds in one frequency range make it difficult to hear softer sounds in the same or adjacent frequency ranges. This can result in a muddy mix where certain elements are lost.
- Managing Masking:
  - **EQ Cuts and Boosts**: Use equalization (EQ) to carve out space for each element. For example, if vocals are clashing with guitars, you might cut the mids in the guitar to give space to the vocals.
  - **Panning**: Spread elements across the stereo field to reduce masking.
  - **Dynamic EQ and Multiband Compression**: Tools that apply EQ or compression only to specific frequency ranges when they become problematic.

Sound Effects EQ

Shaping the Character of Sound Effects

- EQ can be used creatively to shape sound effects, making them more fitting for the scene or mix. Whether it's adding weight to a punch sound or making footsteps crisp and clear, EQ is essential.
- Techniques:
  - **Low-end Enhancement**: For effects like explosions or heavy impacts, boost the lower frequencies (60-120 Hz) to add power.
  - **Midrange Clarity**: Ensure sound effects are clear by adjusting the midrange (400 Hz-2 kHz). This is particularly important for effects that need to be heard over other elements.
  - **High-end Sparkle**: Add a touch of high-end (5-10 kHz) to give effects like glass breaking or gunshots a sharper, more realistic sound.
  - **Frequency Slotting**: Carve out frequencies in the effects that overlap with other elements to avoid masking and ensure everything can be heard distinctly.

Compression and When to Use It

- Dynamic range refers to the difference between the softest and loudest parts of an audio signal. In other words, it's the range of volumes that an audio signal can encompass.
- **Control with Compression**: Compression reduces the dynamic range by making the loud parts quieter and the quiet parts louder. This helps achieve a more consistent and controlled sound.


Mastering - Catch Peaks
cytomic
Utility
Attack
.3
1
3
.1
10
.01
30
Release
.4
.6
.8
.2
1.2
.1
A
Ratio
4
2
10
0
5
10
15
20
Threshold
-8.00 dB
Makeup
0.00 dB
Clip
Soft
Range
70.0 dB
Dry/Wet
100 %
Multiband Compression


SSL
G COMP
Solid State Logic


TELETRONIX


UNIVERSAL AUDIO


MANLEY
STEREO VARIABLE MU LIMITER COMPRESSOR


FabFilter Pro-C 2
fabfilter
Pro·C 2
A/B
Copy
Nice Pumping
Help
KNEE
DISPLAY
Pumping
THRESHOLD
RATIO
STYLE
ATTACK
RELEASE
AUTO GAIN
KNEE
RANGE
LOOKAHEAD
HOLD
DRY
SIDE CHAIN
In
Ext
Audition
SIDE CHAIN LEVEL
STEREO LINK
MIDI Learn
Oversampling
4x
Lookahead
On
100%
0.0 dB
0.0 dB

Compression Parameters

- **Threshold**: The level above which the compressor starts to work. If the signal exceeds this threshold, compression is applied.
- **Ratio**: The amount of compression applied once the signal exceeds the threshold. For example, a ratio of 4:1 means that for every 4 dB the signal exceeds the threshold, only 1 dB will pass through.
- **Attack**: The time it takes for the compressor to start reducing the signal after it exceeds the threshold. Fast attack times catch transients (short, loud bursts) quickly, while slow attack times allow more of the transients to come through.
- **Release**: The time it takes for the compressor to stop reducing the signal after it falls below the threshold. Fast release times let the signal recover quickly, while slow release times create a smoother sound.
- **Knee**: Defines how the compressor transitions between no compression and full compression. A "hard knee" applies compression immediately, while a "soft knee" gradually increases compression as the signal approaches the threshold, creating a more natural sound.

Applications

- **Leveling Vocals**: Compression can smooth out a vocal performance by evening out the volume variations. This ensures that quieter parts are audible without making louder parts overwhelming.
  - **Example**: Use a moderate threshold with a ratio of 3:1 to 4:1, fast attack, and medium release to maintain natural dynamics while keeping the vocals consistent.
- **Adding Punch to Drums**: Compressors can add impact to drums by controlling the dynamics and enhancing the transients.
  - **Example**: Set a low threshold with a higher ratio (e.g., 5:1 to 8:1), fast attack, and fast release to make drums punchy and lively.
- **Gluing Groups of Instruments Together**: Bus compression can make a mix sound more cohesive by subtly compressing groups of instruments together.
  - **Example**: Use a low ratio (e.g., 2:1), soft knee, slow attack, and slow release on the master bus or a group bus to create a cohesive and polished mix.
- Compression is a powerful tool in both live engineering and post-production, helping to control and shape the dynamics of your audio.

Navigating Radio Frequencies

- **Frequency Management**
- Managing radio frequencies effectively is crucial to avoid interference and ensure clear transmission. Here are some key strategies:
- **Frequency Planning**: Allocate frequencies carefully to avoid overlap and interference.
- **Coordination**: Work with other users to ensure harmonious use of the spectrum.
- **Monitoring**: Regularly monitor the spectrum to detect and address any interference

Radio Frequencies

Interference

Common sources of interference include:

- **Man-made sources**: Electrical appliances, wireless devices, and broadcasting stations.
- **Natural sources**: Lightning, solar flares, and other atmospheric phenomena.

Mitigation Techniques:

- Use filters
- shielding, and directional antennas to minimize interference.

Regulations

Relevant regulations and guidelines include:

- **ITU Radio Regulations**: Govern the global use of radio-frequency spectrum and satellite orbits.
- **FCC Guidelines**: In the United States, the Federal Communications Commission (FCC) sets rules for managing radio frequencies.
- **Best Practices**: Follow industry best practices, such as those outlined in the Radio Frequency Interference Best Practices Guidebook.

By understanding and applying these principles, you can effectively manage radio frequencies, minimize interference, and ensure clear and reliable communication.

Q&A

The floor is open for questions.

Have a blessed week

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Illuminating Sound