

# Lesson 12

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## Signal Processing - A Frequency-Based Tone Control Q & A

1. There are two general types of analog equalizers, graphic and parametric. (page 478)
2. There are three common types of filters in today's EQ: these filters are called peaking, shelving, and high/low pass. (page 480 and 482).
3. The most common type of equalizer is the peaking curve. (page 478)
4. The width of the tone boosted or cut in a parametric EQ, the starting point, is commonly referred to as its quality factor or "Q". (page 478-479).
5. Left to right, horizontally the bandwidth determines how many frequencies are selected at one time. It is the number of hertz between the points that is -3db down from the center frequency of the parametric EQ. (page 479)
6. An EQ filter that carries a signal to a rise or dip and then levels off is called a shelving filter. (page 480)
7. A passband sharply reduces signals at extreme frequencies. (page 480)
8. When a high pass filter and a low pass filter are combined, we have what is known as a band pass filter. (page 481)
9. When a parametric equalizer is adjusted so that only a narrow bandwidth is chosen and the cut is set to full, it is called a notch. (page 483)
10. In digital hardware, signal processing is found in the form of plug-ins. (page 471)

# NOTES:

Equalizers boost or cut specific frequencies in a signal. The most common equalizers are tone controls. They tailor your sound to suit your music.

There are also 'mid' controls found on 3-band equalizers. This 'mid' is sometimes called a peaking or band-pass filter.

Graphic equalizers provide more flexibility and tone controls, and they're easy to use. A graphic equalizer is a set of filters that allow you to control the amount of boost or cut in each frequency band.

For instruments, stomp-box equalizers are great for delivering both a volume boost and changing tone for solo excursions.

Parametric equalizers give you the most flexibility, but are a bit more difficult to use. Parametric EQ allows you to set the amount of boost and cut and also allows you to set the center frequency and the bandwidth.

Parametric EQs can eliminate feedback by using a lot of cut (also called a notch filter) precisely right at the frequency that is feeding back.

Many amplifiers have a 'presence' knob that boosts the mid to high frequencies. This control is supposed to make your instrument sound like it is actually in the room. It also helps an instrument 'slice through' an unclear mix.

In the early 80s Rane developed the 1<sup>st</sup> constant Q - designs to preserve the same shape (bandwidth) over the entire boost/cut range.

\* Each enclosed space treats your sound differently \*

\* Keep your loud speakers out of corners \*

\* Maximize system gain before feedback - Minimize all reflected sound and try to get the best quality of direct sound \*

Equalizers give you that something extra, that edge. (For this reason, we all know where "radio voices" really come from)

Analog equalization may be accomplished through the use of passive or active filter circuits. Active ones require power for their components. There are 5 types of equalizer (filters) commonly used in the analog studio.

- 1) Shelving - This filter changes the signal's response by a constant amount of boost or cut and stops boosting or cutting at the frequency at which the filter is set, levels off and continues on to the end of the audio spectrum.
- 2) Pass filter - This filter cuts (reduces volume) and has a varying slope, usually of 18 dB per octave. A variation of this filter is known as a band pass filter, in which a high and a low-band pass filter are combined. A pass filter differs from a shelving filter because the reduction continues at a steep slope and does not level off. This frequency which is generally 3dB below the cut, is called the turnover frequency, also high or low-cut EQs.
- 3) Parametric (Peaking) - The parametric filter is more descriptively named in our text as the selectable frequency equalizer. (The engineer can move different control knobs, selecting the center of a fixed width of frequencies and boost or cut them. This type is frequently referred to as a semi-parametric EQ. The 'semi' is also named because it has a fixed bandwidth or "Q". A fully adjustable bandwidth parametric EQ is called a parametric equalizer.
- 4) The notch filter is a specialized version of the parametric EQ having a very small bandwidth fixed to 1 cut only. It is used to remove unwanted frequencies that are narrow in bandwidth.
- 5) \* Graphic equalizers are more frequently found in live sound applications \*
- 6) Composite - The console uses this equalizer group by including them in its I/O processing shelving and pass filters.