BEGINNER'S GUIDE TO HOME RECORDING ON A BUDGET
Part 6: Equalization (EQ)

An equalizer is a sophisticated tone control in your mixer or recording software. It's something like the bass and treble controls in a stereo system. Equalization (EQ) lets you improve on reality: add crispness to dull cymbals or add bite to a wimpy electric guitar. EQ also can make a track sound more natural; for instance, it can remove tubbiness from a close-miked vocal.

Equalization can be hardware, as in a mixing console; or software, as a plug-in in a DAW. A plug-in is software that runs a particular function within a larger recording program called the host.

To understand how EQ works, we need to know the meaning of a spectrum. Each instrument or voice produces a wide range of frequencies called its spectrum—the relative levels of its fundamentals and harmonics. A graph of the spectrum shows level vs. frequency. The spectrum gives each instrument its distinctive tone quality or timbre.

If you boost or cut certain frequencies in the spectrum, you change the tone quality of the recorded instrument. EQ adjusts the bass, treble, and midrange of a sound by turning up or down certain frequency ranges. That is, it alters the frequency response. For example, a boost (a level increase) in the range centered at 10 kHz makes percussion sound bright and crisp. A cut at the same frequency dulls the sound.

TYPES OF EQ

Equalizers range from simple to complex. The most basic type is a bass and treble control (labeled LF EQ and HF EQ). Typically, this type has up to 15 dB of boost or cut at 100 Hz (for the low-frequency EQ knob) and at 10 kHz (for the high-frequency EQ knob).

With 3-band EQ you can boost or cut the lows, mids, and highs at fixed frequencies. Sweepable EQ is more flexible because you can “tune in” the exact frequency range needing adjustment.

Parametric EQ lets you set the frequency, amount of boost/cut, and bandwidth—the range of frequencies affected. A boost or cut with a low-Q setting (such as 1.5) affects a wide range of

frequencies; a high-Q setting (such as 10) makes a narrow peak or dip. Generally, use narrow-band (high-Q) EQ to remove hum and resonances; use wide-band (low-Q) EQ for tonal changes.

Audio clip 27 at www.taylorandfrancis.com/cw/bartlett-9780240821535/ demonstrates various types of EQ.

A filter causes a rolloff at the frequency extremes. It sharply rejects (attenuates) frequencies above or below a certain frequency. For example, a 100-Hz highpass filter (low-cut filter) attenuates frequencies below 100 Hz. This removes low-pitched noises such as air-handler rumble or breath pops. A 1-kHz bandpass filter cuts frequencies above and below a frequency band centered at 1 kHz.

HOW TO USE EQ

If your mixer has bass and treble controls, their frequencies are preset (usually at 100 Hz and 10 kHz). Set the EQ knob at 0 to have no effect (flat setting). Turn the knob to create a boost or cut. If your mixer has multiple-frequency EQ or sweepable EQ, one knob sets the frequency range and another sets the amount of boost or cut.

For each instrument, turn up the lower end of the fundamentals to get warmth and fullness. Turn down the fundamentals if the tone is too bassy or tubby. Turn up the harmonics for presence and definition; turn down the harmonics if the tone is too harsh or sizzly.

Suppose you want to EQ a fiddle. Its lowest note is 196 Hz. So if you boost or cut 100 Hz, that won't have much effect. Apply EQ at 200 Hz instead to vary the warmth of the fiddle sound.

Suppose a vocal track sounds too full or bassy. Reach for the LF EQ knob (say, 100 Hz) and turn it down until the voice sounds natural. Or suppose a snare drum sounds dull or muffled. Grab the mid-frequency EQ knob, set it to 5 kHz to 10 kHz, and turn it up until the snare sounds clear and crisp.

What if an instrument sounds honky, tubby, or harsh, and you don’t know what frequency to tweak? Set a sweepable equalizer for extreme boost and high Q (5 to 10). Then sweep the frequencies until you find the frequency range matching the coloration. Cut that range by the amount that sounds right. For example, a piano miked with the lid closed might have a tubby coloration—maybe too much output around 300 Hz. Set your low-frequency EQ for boost, and vary the center frequency until the tubbiness is exaggerated. Then cut at that frequency until the piano sounds natural.

Usually it's best to apply EQ to tracks when all the tracks are playing in a mix. The EQ that sounds good on a soloed track may not work well when all the tracks are heard together because the tracks mask each other.

Use a highpass filter (low-cut filter) on all tracks to remove low frequencies below each instrument’s lowest fundamental frequency. In each track, enable a highpass filter. Slowliy turn up the filter's frequency until the sound starts to thin out, then back off a little.

To train your hearing, boost and cut various frequencies on an instrument's track. Take notes on what you hear. For example, you might start with an acoustic guitar track, boost at 500 Hz, and describe the resulting sound as "puffy". Or boost at 80 Hz and call the result "thumpy." Whatever makes sense to you.

WHEN TO USE EQ

Before using EQ, try to get the desired tone quality by changing the mic or its placement. This gives a more natural effect than EQ. Many purists shun the use of EQ, complaining of excessive phase shift or ringing caused by the equalizer—a “strained” sound. Instead, they use carefully placed, high-quality microphones to get a natural tonal balance without EQ.

The usual practice is to record flat and dry (without EQ or effects) and then add EQ and effects during mixdown.

If two instruments occupy the same frequency range, they might mask or cover up each other's sound. They blur together instead of sounding distinct. To prevent that, apply different EQ to each. For example, you might reduce the lows in the kick so it doesn't compete with the bass. Or do the opposite.

###

Bruce Bartlett is a recording engineer, audio journalist and microphone engineer (www.bartlettaudio.com). His latest books are "Practical Recording Techniques 7th edition" and "Recording Music On Location 2nd edition".