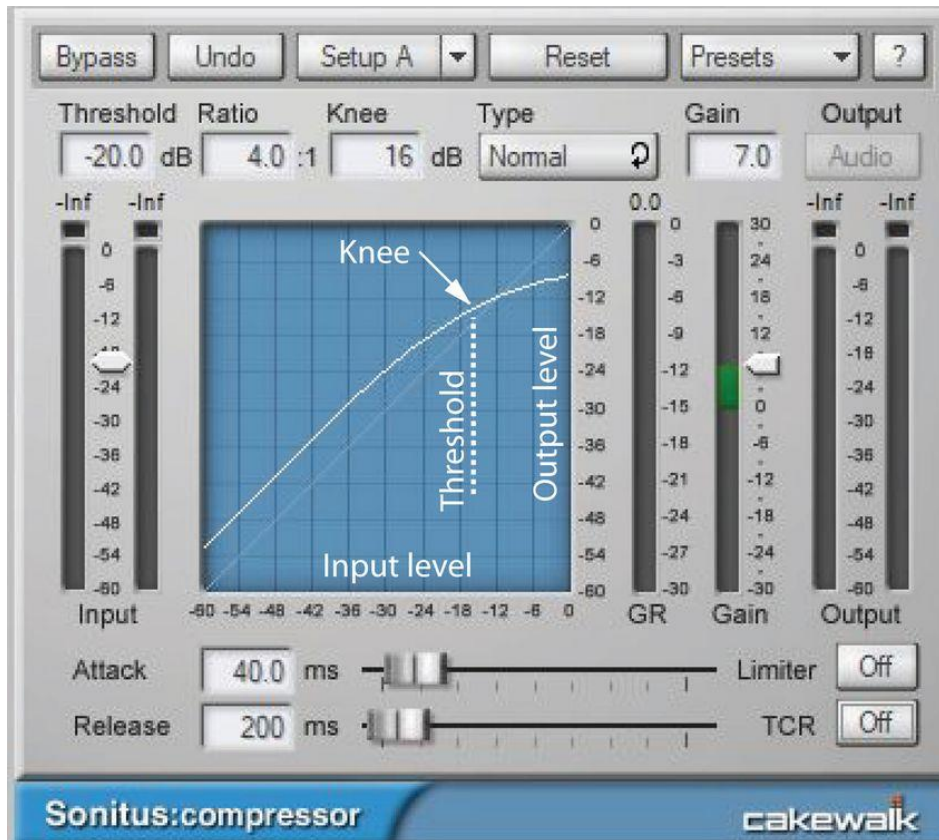**BEGINNER'S GUIDE TO HOME RECORDING ON A BUDGET**
Part 9: Compression

A compressor device or plugin acts like an automatic volume control, turning down the volume when the signal gets too loud. Here's why it's necessary.

Suppose you're recording a vocalist. Sometimes they sing too softly and get buried in the mix; other times they hit loud notes and blast the listener. Or they may move toward and away from the mic while singing, so that their average recording level changes.

Compression reduces the gain (amplification) when the input signal exceeds a preset level (called the threshold). The greater the input level, the less the gain. As a result, loud notes are made softer, so the dynamic range is reduced.

The compressor softens the highest peaks in the signal. To compensate, you add a few dB of "makeup gain" in the compressor. Then the average sound level is louder than it was going in.

Compression keeps the level of vocals or instruments more constant, so they are easier to hear throughout the mix. Also, it can be used for special effects—to make drums sound fatter, to increase the pluck attack in an upright bass, or to increase the sustain on a bass guitar. In pro studios, compression is used almost always on vocals; often on bass guitar, kick drum, and acoustic guitar; and sometimes on other instruments. You can make great mixes compressing nothing but the lead vocal.

Doesn't compression rob the music of its expressive dynamics? Yes, if overdone. But a vocal that gets too loud and soft is annoying. You need to tame it with a compressor. Even then, you can tell when the vocalist is singing loudly by the tone of the voice.

You can avoid vocal compression if the singer uses proper mic technique. They should back away from the mic on loud notes and come in close on soft notes. To tell whether you need a compressor on a vocal track, listen to your finished mix. If you can understand all the words, and no notes are too loud, omit the compressor.

Using a Compressor

Normally, you compress individual tracks or instruments, not the entire mix. You want to compress only the stuff that needs it. You can slightly compress the entire mix (a technique called bus compression) to "glue" the instruments together, but it's not always necessary.

There are five main controls in a compressor: ratio, threshold, attack, release, and makeup gain.

* Compression Ratio or Slope
This is the ratio of the change in input level to the change in output level. For example, a 2:1 ratio means that for every 2 dB change in input level, the output of the compressor changes 1 dB. A 20 dB change in input level results in a 10 dB change in the output, and so on. Common ratio settings are 2:1 to 4:1.

* Threshold
This is the input level above which compression occurs. Set the threshold high (about −5 dB) to compress only the loudest notes; set it low (−10 or −20 dB) to compress a broader range of notes. A setting of −10 is typical. Another method: while the music is playing, set the threshold high, then gradually bring it down until you get the amount of gain reduction you want on the gain-reduction meter (typically 3 to 10 dB).

* Attack Time
This is how fast the compressor reduces the gain when it's hit by a musical attack. Typical attack times range from 0.25 to 50 msec. The longer the attack time, the larger the peaks that are passed before gain reduction occurs. So, a long attack time sounds punchy; a short attack time reduces punch by softening the attack. Bass instruments require a fairly long attack time (>50 msec) to prevent distortion.

* Release Time
This is how fast the gain returns to normal after a loud passage ends. It's the time the compressor takes to reach 63% of its normal gain. You can set the release time from about 50 msec to several seconds; 0.2 second to 0.5 second is typical. For bass instruments, the release time must be longer than about 0.4 second to prevent harmonic distortion.

* Makeup Gain (Output Level)
This control is used to increase the output level of the compressor by the amount of gain reduction. For example, if a compressor is causing 6 dB of level reduction, set the makeup gain to 6 dB to achieve unity gain. This also brings up the quiet parts of the track by 6 dB. Some compressors keep the output level constant when other controls are varied.

Spend some time playing with all the settings so you learn how they affect the sound. Play various instruments and vocals through a compressor, vary the settings, and take notes on what you hear.

Many compressor plugins let you choose emulations of various hardware compressors, such as the vintage compressor dbx 160.

Here are "ballpark" compression settings for vocals: Ratio 2:1 to 3:1, soft knee, fast attack, 1/2 second release. Gradually turn down the threshold to get 3 to 6 dB of gain reduction on the loudest notes. Singers with extreme dynamic range might need 12 dB of gain reduction and a ratio of 4:1.

Instead of using compression, you might use volume envelopes. Draw a graph of the fader settings on your screen, setting them by ear. This method sounds more natural than compression.

# # #

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