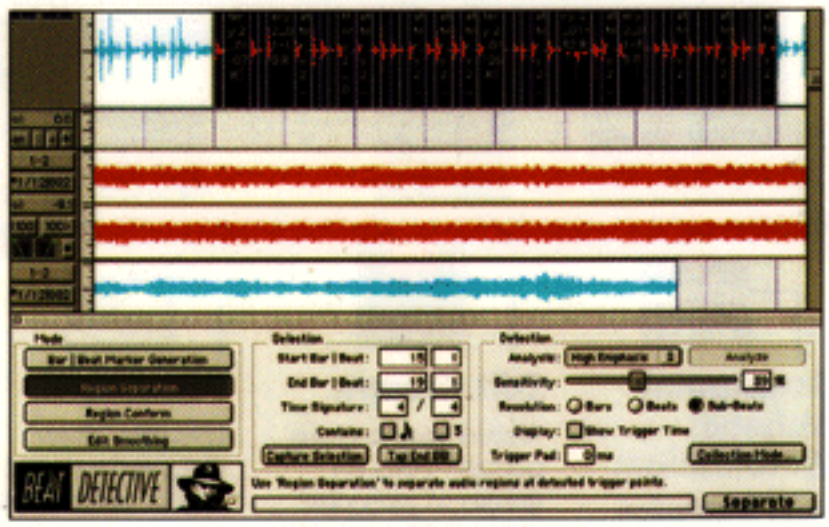
Mapping and quantizing audio and MIDI tracks

Time Is Of The Essence

By Tal Herzberg

Working with any type of sound always involves two main elements: pitch and time. Pitch elements define melodic and harmonic characteristics of musical compositions, set the mood of spoken segments, and enhance the intensity of different sounds. Presenting these elements over a timeline creates a linear listening experience — a series of pitched events spaced in pre-defined and measurable intervals.

While random time intervals between pitched events may apply to post-production situations (spotting effects to picture, dialog work), more restricted time-based considerations are involved in most music writing and producing. Using mathematically-based time divisions (whole, half, quarter, eighth notes, etc.), and a measured tempo in beats per minute (BPM), sets a predictable pace to any type of musical experience. Smaller sub-divisions of these time intervals, and the way they are spaced, create different rhythms and grooves — building blocks that are equally important as pitch-based events. Let's examine some of these elements and ways to manipulate them in our DAWs.



Digidesign's Beat Detective is an example of an automatic transient detection, region separation, variable quantization, and cross-fading program.

MAPPING THE GROUND

Since most of us are working on contemporary musical materials, it's safe to assume that almost every situation will involve a tempo (speed). Regardless of the song's tempo, it's good practice to set up a tempo map before recording anything.

Find the tempo control in the DAW software and set it to the desired speed. Sometimes the tempo will change among various sections of the song, such as speeding up a bit for a chorus (say from 90 to 91.5 BPM), and bringing it back down for the next verse, etc. To create the map, set the song's beginning tempo at bar 1, count the bars until the chorus occurs (often 16 bars), and at that point (bar 17), set a tempo change. The chorus section will now play slightly faster than the verse, making it a bit more exciting. When coming out of the chorus into the next verse (bar 25), set another tempo change, bringing the tempo back down to its initial setting.

Another part of the mapping procedure is setting up meter changes, if any. If the basic meter is 4/4, but isolated bars are 3/4 or 2/4 in meter, set up these changes similarly to the way you set the tempo changes. It will make navigating and editing much easier tasks.

Finally, with some programs that handle time/pitch stretched loops (*e.g.*, Cakewalk Sonar or Sonic Foundry Acid), you will also want to set up a map of key changes so that any pitched loops can follow along during the course of the song.

CLICK

Creating a tempo map makes it possible to generate a perfect click track (metronomic pulse), to which we reference new recorded parts. How close or far performances are to the click track will determine their tightness or looseness, respectively.

Sometimes we may choose not to constrain certain performances to a click track, and record them free of tempo reference (often the normal thing to do up until the era of drum machines started in the early '80s). Not following a click track may yield more lively performances that "breathe," but this makes it difficult to regulate the beat and groove to a fixed tempo, which seems to be the acceptable means of delivery nowadays. However, using a DAW, we can constrain any performance to fixed tempo and groove *after* it has been recorded, either with or without a click track. This process is called *quantization*.

QUANTIZE

The Merriam-Webster dictionary points to the Latin word *quantus* (how much) as the origin of "quantize," and translates it as, "to subdivide (as energy) into small but measurable increments." What this means to us is that there are further subdivisions than the basic bars and quarter notes, which we can use to regulate performances. In most of the music we deal with, the inner pulse will be either a division of two (straight) or three (shuffle, swing).

DAW software offers a special method of time mapping, called the PPQ system (Pulses-Per-Quarter Note). The maximum resolution offered by most DAWs is 960 PPQ,