

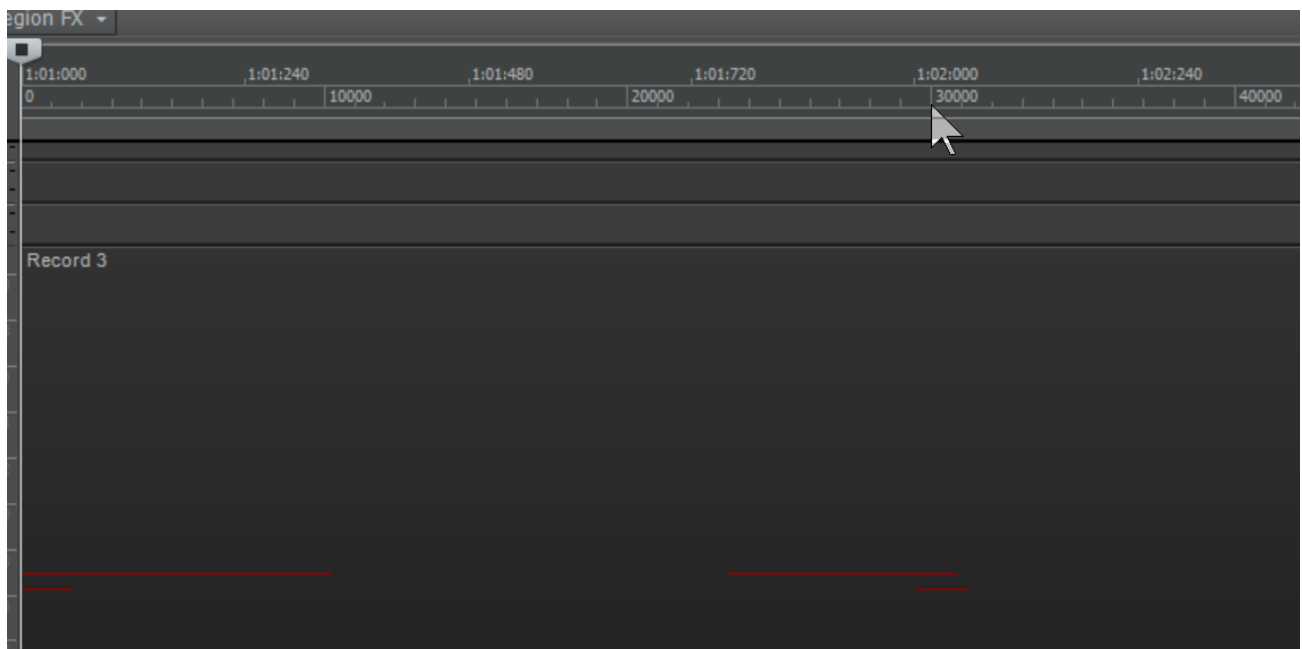
I decided to take some time to document how to use samples to get really accurate note placements. I've used Cakewalk for a long, long time - Bandlab offers it for free now in its latest format (Sonar).

One of the things you can see in Sonar is the timeline in several formats. One of these is 'Samples'. Samples indicates how many times that the track sound is captured each second. This is what converts your analog wave into a digital signal.

In this document, I will show how I set up the kick and snare, so that the kick plays a straight 4 beats to the measure, and the snare plays 5 beats over the 4. (5/4 time).

Try doing this with your hands. Left hand 4 beats and right hand 5 beats in the same time period. I can't, but I know someone who can. Doing this with triplets is a lot easier, and I think if you practice doing 5/4 you can get the feel for it as well, but it is super frustrating.

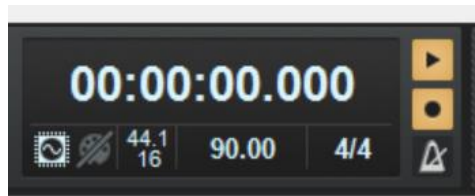
Here's a screenshot of the Sonar timeline ruler showing beats and samples.



Here, each beat is divided up into quarters, each quarter labeled 000, 240, 480, 720 and 000 for the next beat.

Underneath you see the samples going from 0 to 30,000. You can see that the second beat (1:02:000) is a little bit less than 30,000 samples. Actually it is 29,400 samples making up the one beat.

You can calculate these numbers based on two knowns. In Sonar you can see the beats per minute and the sample rate. In this case, I am at 90 beats per minute and a sample rate of 44.1K (44,100 samples per second, the CD standard).



I need to convert beats per minute to beats per second and then invert it to get seconds per beat. That way, I can multiply it times the sample rate to get how many samples per beat.

So, 90 beats per minute divided by 60 seconds per minute tells me that there are 90 beats every 60 seconds, or when reduced, 2 seconds for every 3 beats.

$$\frac{44,100 \text{ samples}}{1 \text{ second}} * \frac{2 \text{ seconds}}{3 \text{ beats}} = 29,400 \frac{\text{samples}}{\text{beat}}$$

Now you know how many samples per beat when you are set up at 90 bpm and 44.1K samples per second.

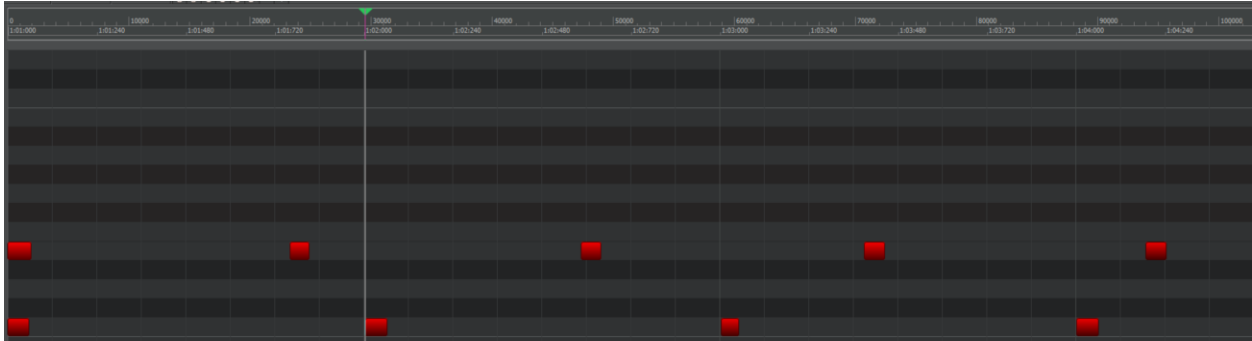
You can take it one step further and get the samples per measure by multiplying this number by 4. 117,600 samples per measure. This gives you an idea of how hard your computer is working!

So I want to use this information to place the notes as discussed, with the kick holding down a steady 1, 2,3,4 beat and the snare playing 5 evenly spaced beats over this.

To find out how many samples are in each of these 5 beats, you simply divide the samples per measure by 5 to get 23,520 samples per second.

Now, I should be able to use the timeline to place the 5 snare beats at the 0, 23521, 47041, 70561, 94081 sample points using the midi editor.

Here you see the four lower kick drum beats with the 5 higher snare beats above them.



All of this can be done using minutes and seconds to place the 5 beats as well, but I wanted to figure out samples as part of this exercise.

I am hoping to loop this and try to figure out how to do the two hands thing, but I probably will just drive myself crazy.