

DIGITAL SOUND FOR EXPERIENCED USERS CALLERLAB CONVENTION 2007 COLORADO SPRINGS, CO

Welcome to the Digital Sound Seminar. Today we are going to look at cleaning up the music waveform. We will look at the pop and hiss noise that is created when a vinyl record is recorded from a turntable into the computer. The software that will be used today is Cool Edit 2000. As many of you know there are many different selections of software available depending on how much money a person wants to spend.

The advantage of using the software available today is the quality of music that can be restored from used vinyl. Hearing music played through a laptop is no different than playing the vinyl record on the turntable if the music has not been cleaned. The only advantage would be more efficient storage. Tools to restore quality to our music are available to us and as professionals we should want to provide our audience with the best music quality possible. So why not make the music from our old worn vinyl sound like new vinyl?

Recording from the Hilton series 201, 205, or 501 are choices that one can decide to use. I believe the best choice is your home stereo turntable. The results are much better from a professional stereo due to better quality of needle, tone arm and components that make up the stereo turntable.

When you record the music from the turntable into the computer using the CoolEdit software, a music waveform is created. Figure 1 is an example of the music waveform.

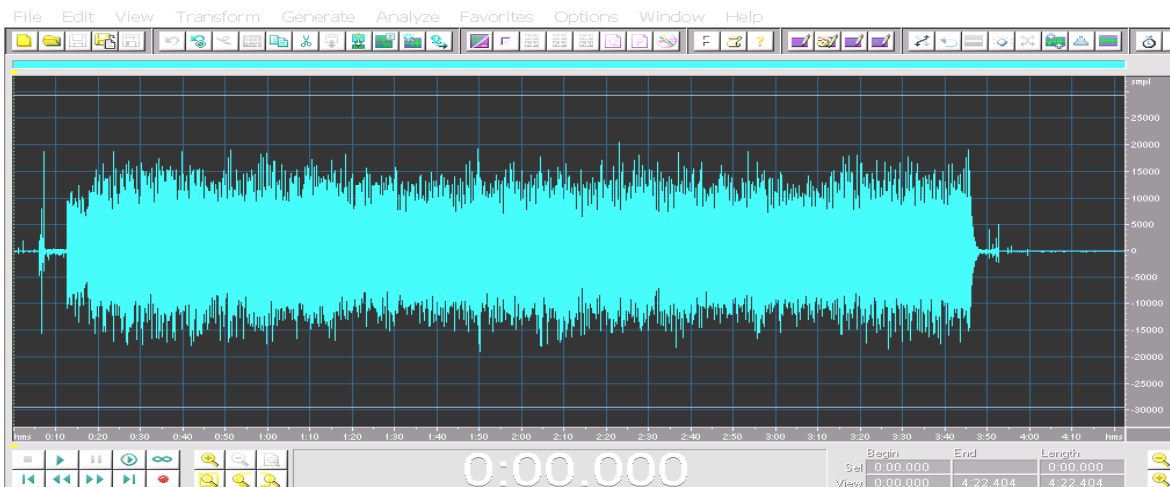


Figure 1

Once the recording is complete, save the recording by its original name. Figure 2 is the titled waveform.

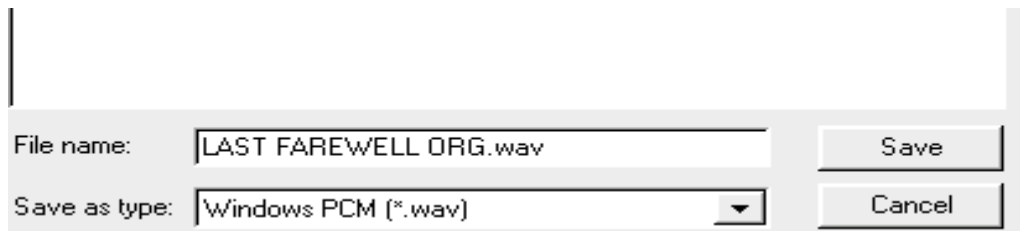


Figure 2

Notice this is saved as “LAST FARWELL ORG”. The ORG is for me to know it is the original recording from start to end with all the pops, clicks and noise. This is an exact copy of the vinyl record. Once the clean up process has been completed you will use the (Save As) to save the selection as “LAST FAREWELL”. Now you have two wave samples, the original waveform and the cleaned waveform.

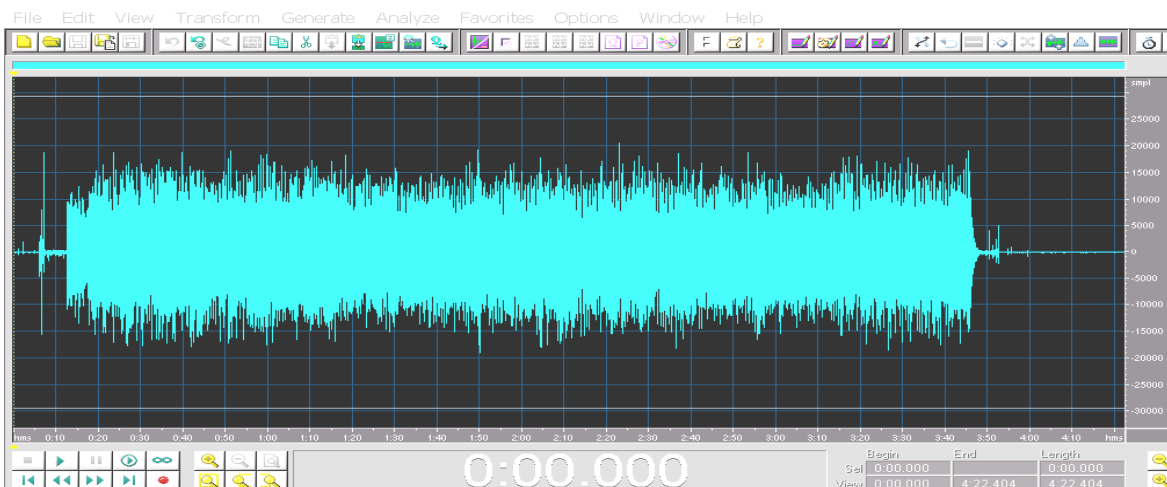


Figure 3

At the beginning of the music sample, there are spikes and a thickness before the music actually starts. These are pops and hiss noise picked up by the needle. The pops and hiss are on the vinyl and the more the vinyl is used the more enhanced the pops and hiss will become. The pops and hiss actually are throughout the body of the music waveform, which is all blue. When the music is playing you may hear some of the hiss and possibly some of the pops on occasion. The waveform that was just recorded into the computer has all of the sound components of the record, both music and noise. With a vinyl record you cannot take out the hiss, pops or crackle sounds. Figure 3 displays the complete copy of a vinyl record.

The beauty of editing software and the tools that are available in it allows us to clean the pops and hiss from the recorded worn vinyl record. Using this technology restores the music to the quality of a brand new vinyl recording. Below in Figure 4 is an enhancement of the beginning “Leader” of the recording so you can see what the pops and hiss look like.

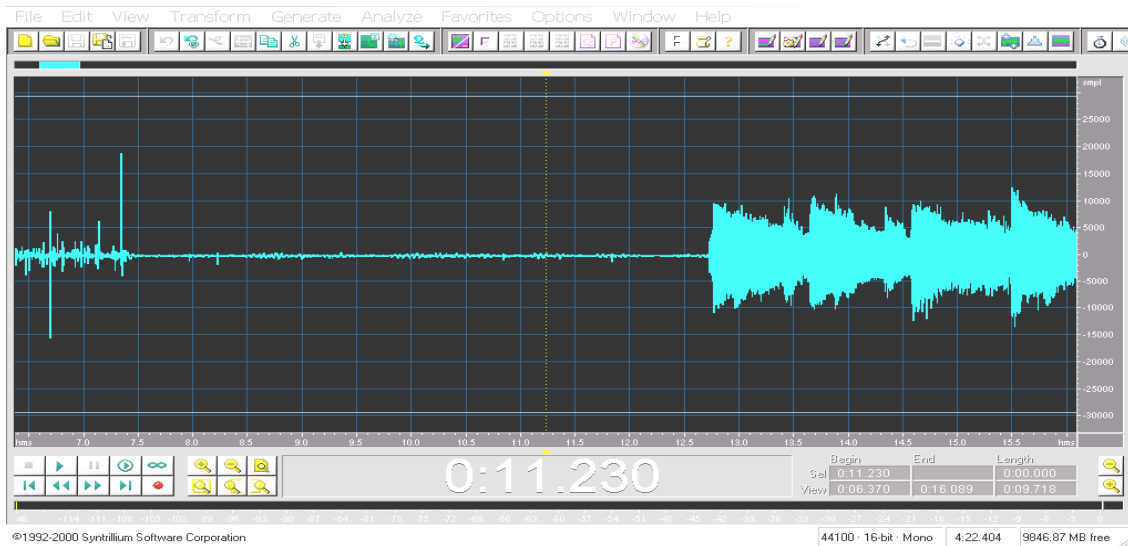


Figure 4

Notice at the very beginning of Figure 4, there are high and medium spikes. These are the pops from the vinyl that were picked up through the needle. Notice after the high and medium spikes there's a thin blue line with some small spikes and small wavy like noise before the actual music begins, which is the large solid blue mass called the music waveform (.wav). In the CoolEdit 2000 software, that we are using today, is an option called "Click Fix Pop Removal".

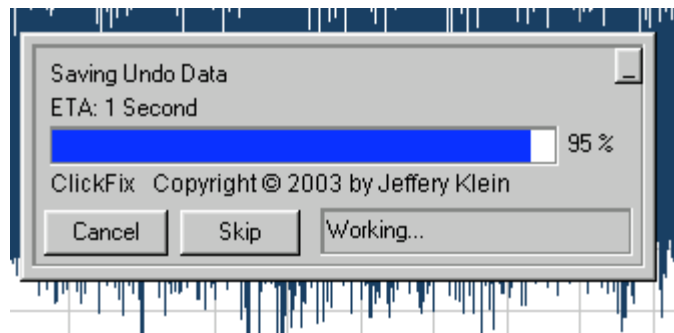


Figure 5

This option when selected will go from the beginning of the recording to the very end and take out all of the clicks and pops. Figure 5 shows the "Click Fix Pop Removal" beginning to process the waveform.

Within the Click and Pop removal program there's an option to view just the Clicks and Pops. Figure 5A shows where the Clicks and Pops are in the music waveform.

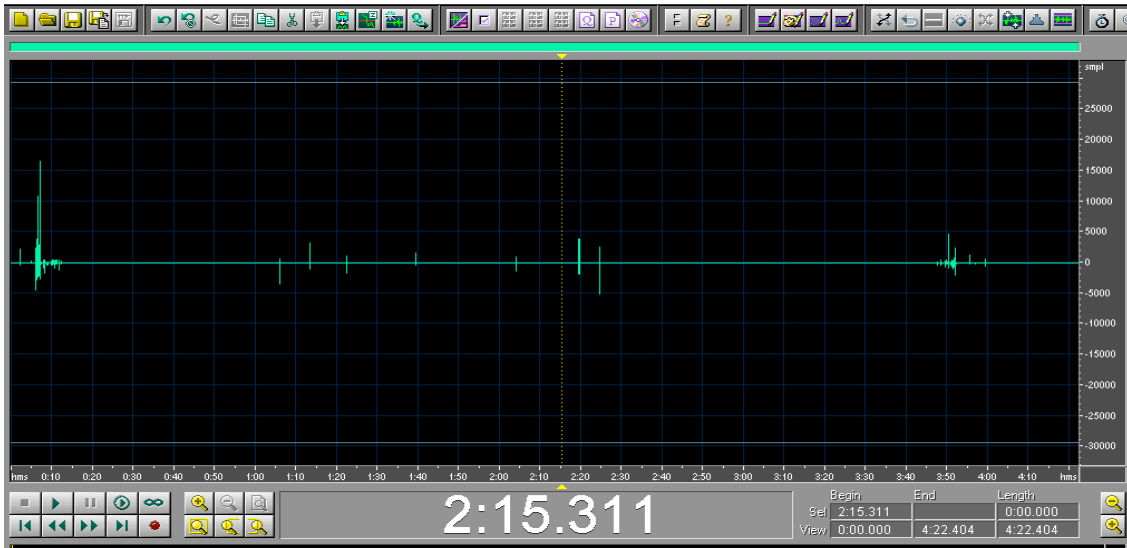


Figure 5A

There is also an option called “Noise Reduction”. This option, once a sample has been taken, will take the noise or hiss out of the entire music waveform. The result is like having a complete new vinyl recording no one has ever used.

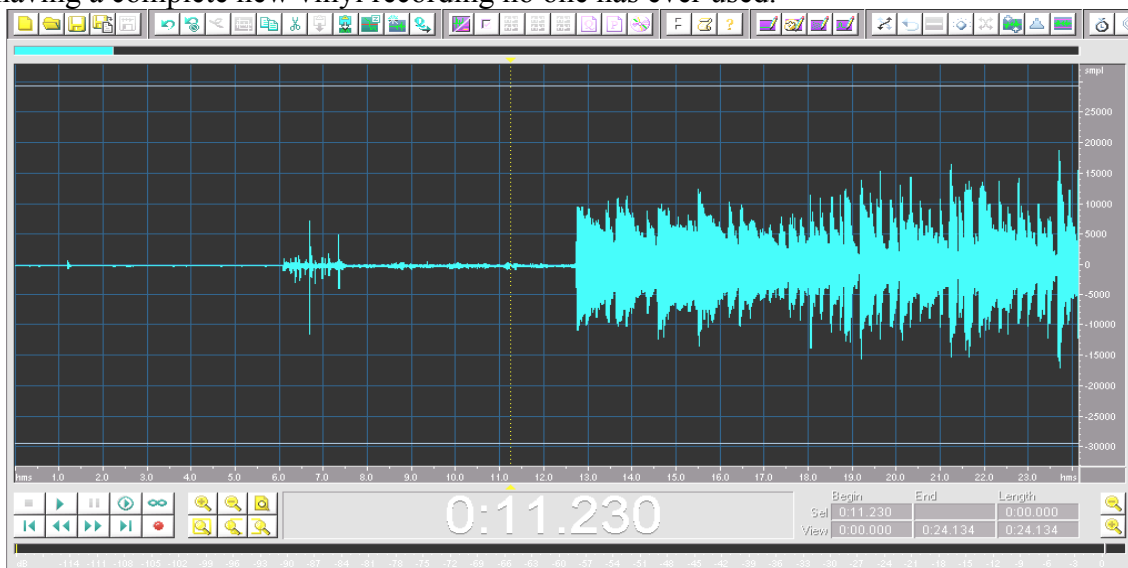


Figure 6

In Figure 6 the leader shows the complete process of the “Click Fix Pop Removal”. Let’s Compare the leaders between Figure 6 and Figure 4.

The next step is to use the “Noise Reduction” option. Below are the steps and results of what the “Noise Reduction” option will do. This option will remove the Hiss from the entire waveform. It will be most noticeable on the leader before the actual music waveform begins. When you record your music, be sure to try to get at least two seconds

of time recorded from the groove at the edge of the record so that you can get a good sample of Hiss to remove. Below (Fig 7) is a highlighted sample.

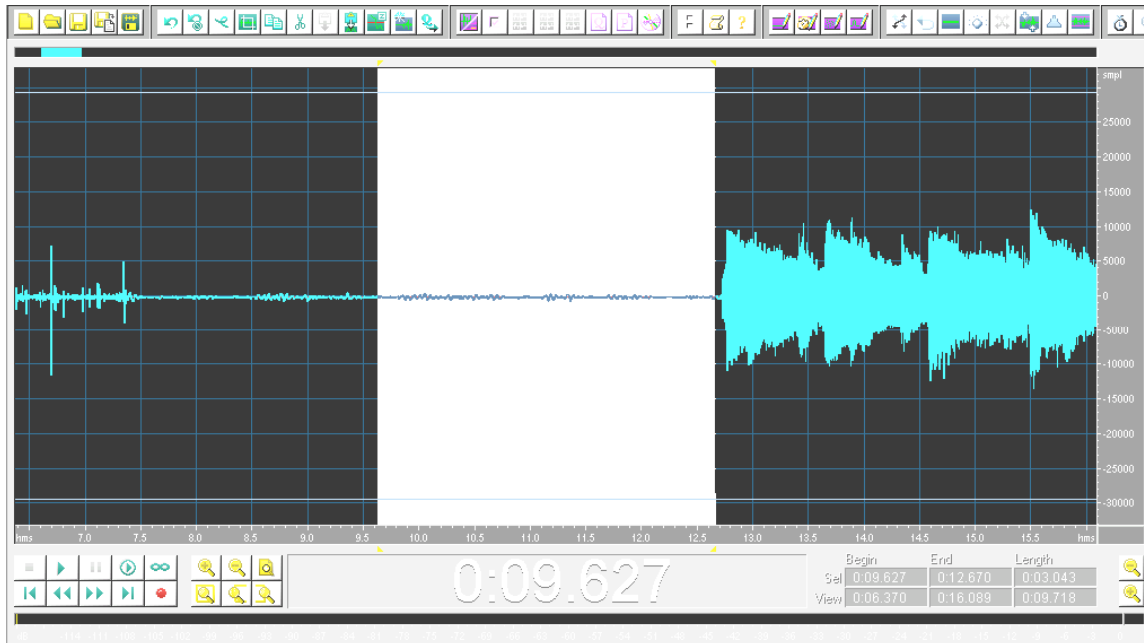


Figure 7

In Figure 7 above in the white area is a sample of the noise. First you must Zoom in on the leader and highlight approximately 3 seconds of noise. (Two seconds is the very minimum sample)

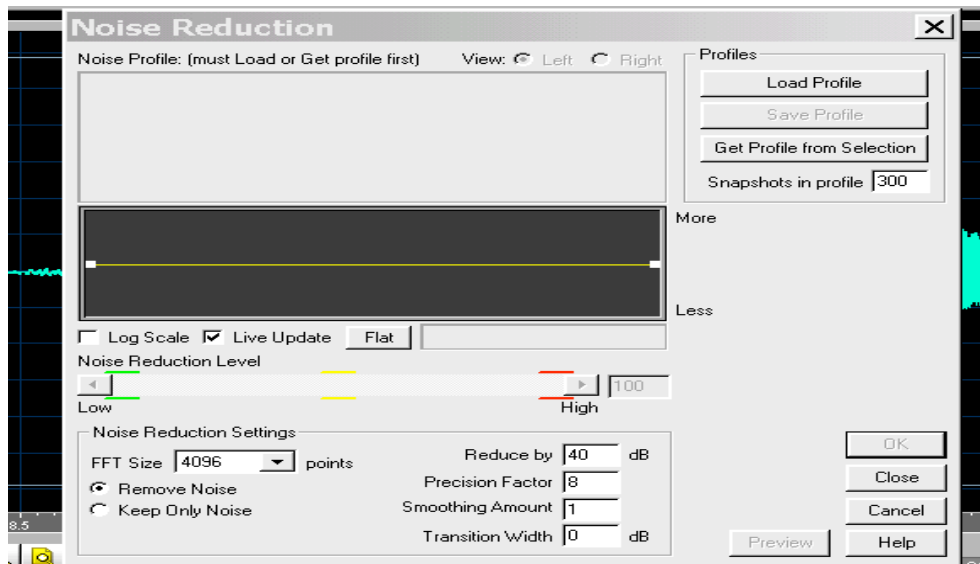


Figure 8

In Figure 8 the option of “Noise Reduction” is selected. Notice there is nothing present as a sample. There is an option in the upper right hand corner, “Load Profile.” This option is there if you have saved a sample of noise and want to use it on recordings that

may have the same thickness of noise on the leader of the recorded music. The examples today will be manually completed.

The next step is to click on the upper right hand corner, "Get Selection Profile".

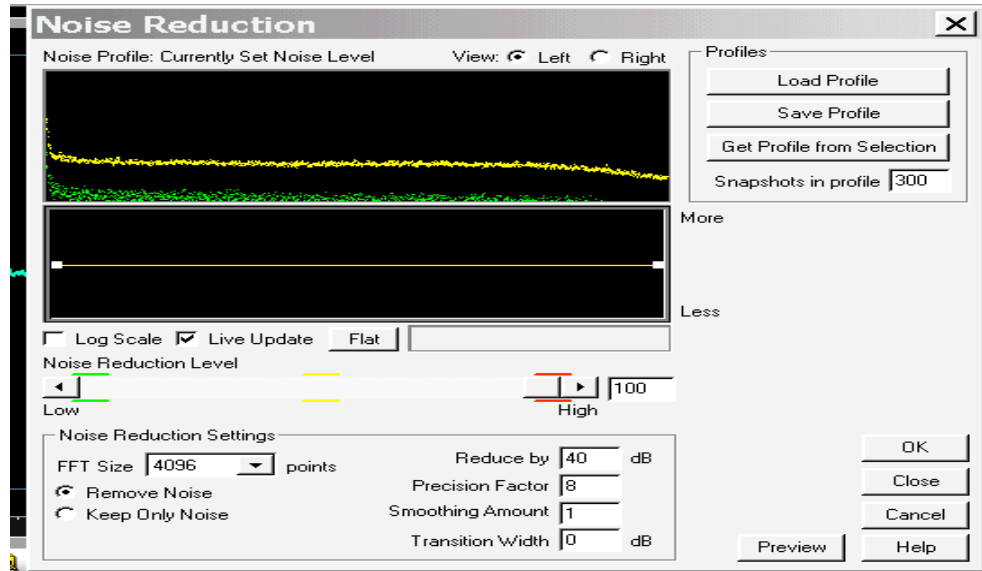


Figure 9

In Figure 9 you can see the Yellow and Green lines. These represent the frequency of the noise from the leader that was highlighted and the noise profile you want to remove. If the signal you are trying to keep gets too distorted at this level, use lower values until a balance is reached between noise reduction and allowable signal distortion. Just below is a slider bar. This allows you to adjust the Noise Reduction Level. Distortion effects may manifest themselves a "hollow" or "underwater/burbley" sounding signal, dull sounding impacts, "rolly" high end, or a "computerish" mechanical sound. These effects, if heard at all, will fall off if the noise reduction level is reduced.

Once the selection appears on the above screen, close out the Noise Reduction box. In the lower right hand corner there are buttons with OK, Close, Cancel, and Help (Fig 9). Click close. The reason is that if the OK button were clicked it would only clean the highlighted sample and would do nothing with the rest of the waveform. We want to take the noise out of the entire waveform.

Now that the Noise Reduction has been closed, zoom out full so the entire waveform is showing on the screen as seen below in Figure 10.

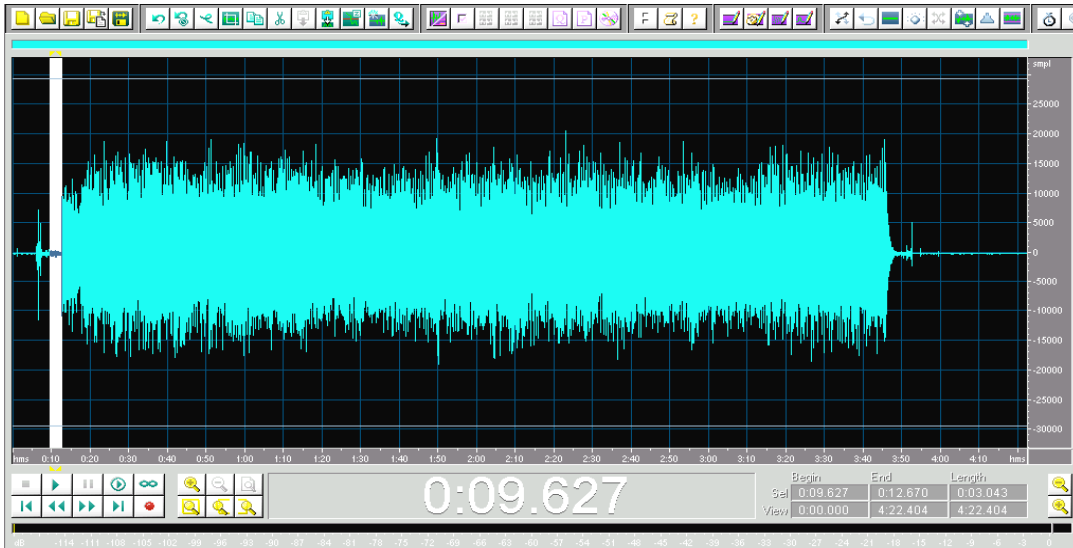


Figure 10

In Figure 10 notice the white highlighted area is still showing. Click anywhere on the waveform that is blue as shown in Figure 11.

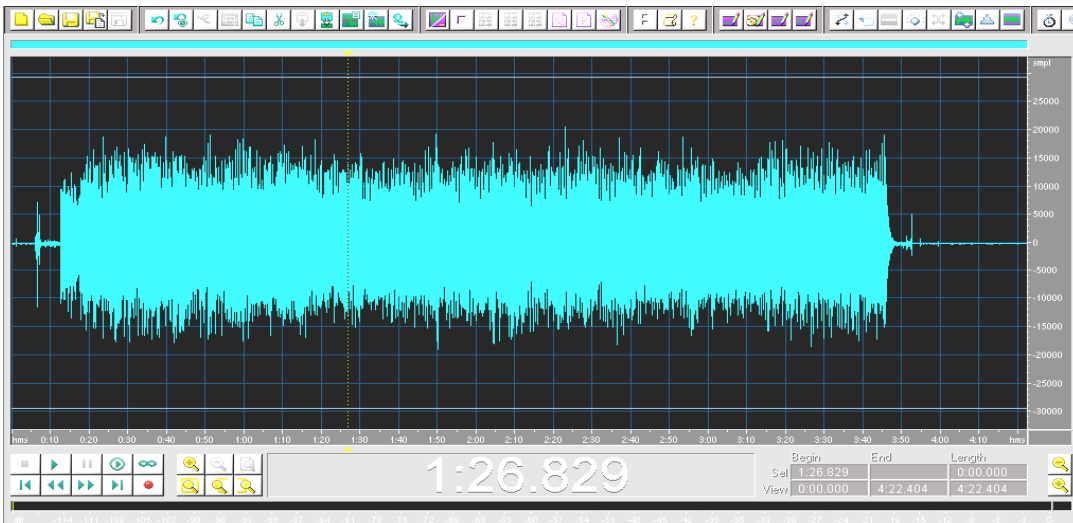


Figure 11

Figure 11 is the entire waveform and no area is highlighted. When the Noise Reduction is selected again it will automatically highlight the entire waveform as shown in Figure 12.

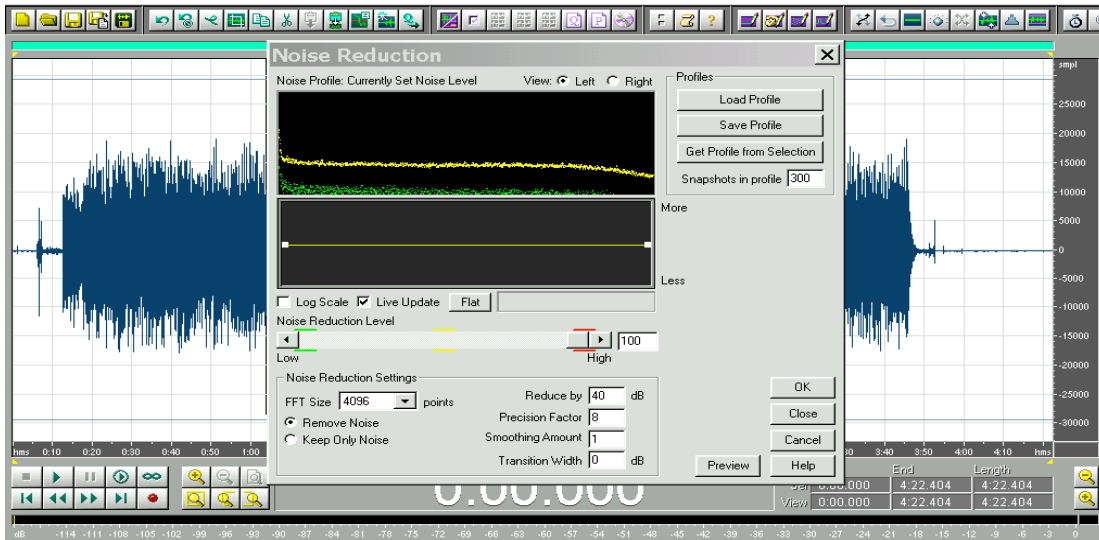


Figure 12

In Figure 12 the Noise Reduction has been selected and the waveform is behind the menu of the Noise Reduction option. The entire waveform is now highlighted white. Now when the “OK” button is selected (clicked), the filtering process will remove the sample profile from the entire waveform.

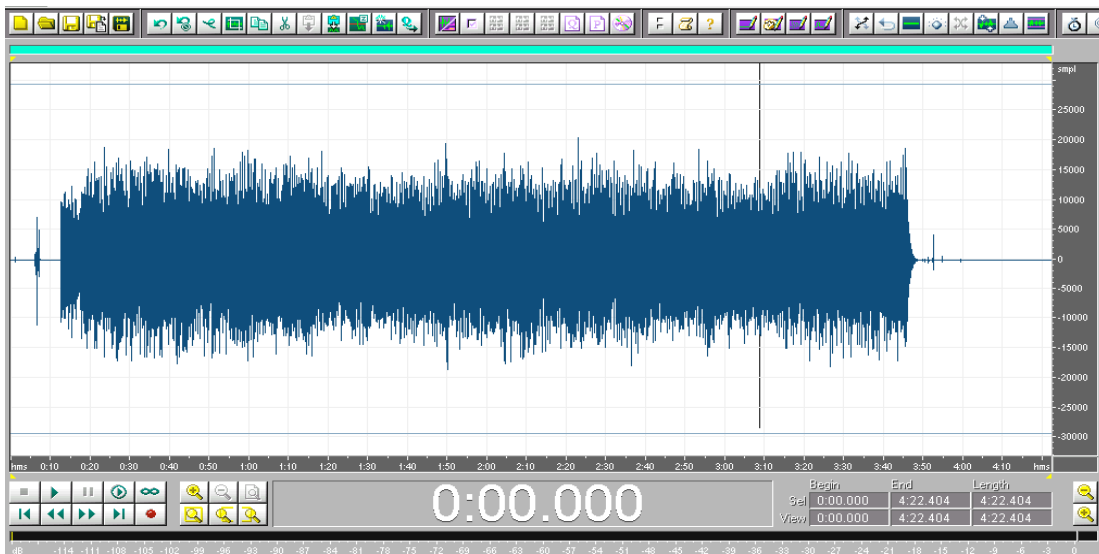


Figure 13

Figure 13 is the result after the Noise Reduction has completed. Look at the front of the waveform shown in Figure 14. Look at the leader that we have been focusing on and you can see how the Noise Reduction tool has cleaned the waveform.

Let’s Zoom in on the leader and see how it looks after the Click Pop removal and Noise Reductions options have been completed. Compare, Figure 4 and Figure 14.

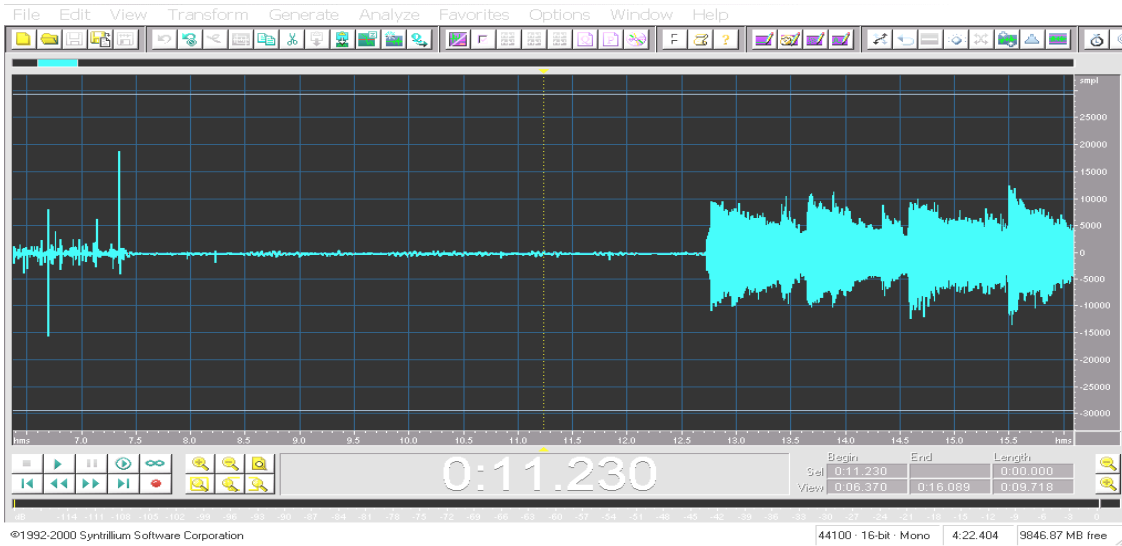


Figure 4

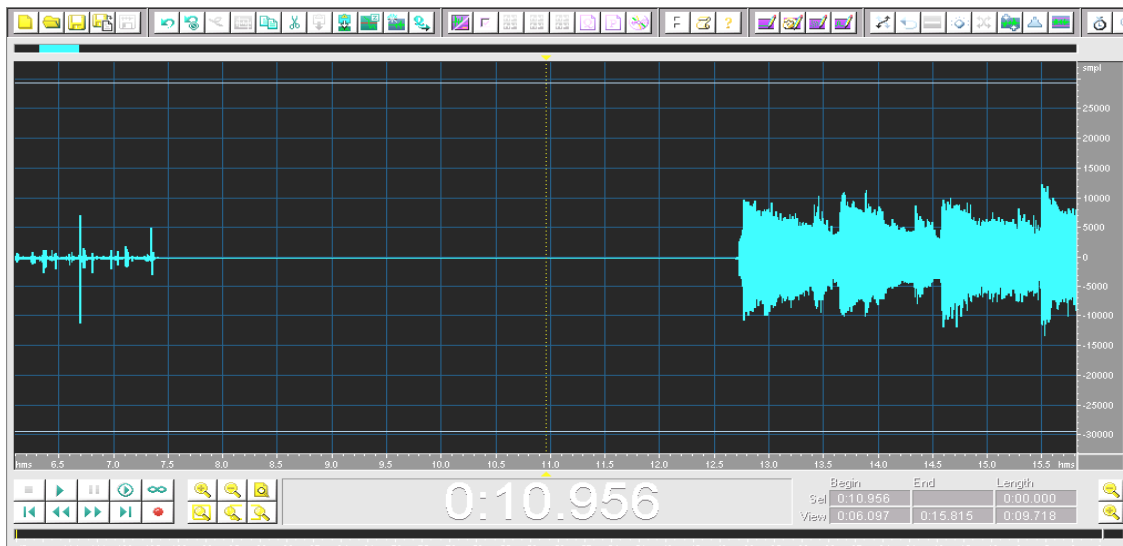


Figure 14

Above, to the far left, is where the needle first comes in contact with the vinyl record. In other words, “as the needle drops down onto the vinyl record.” The area after the spikes to where the actual music begins is perfectly flat with no spikes or wavy noise.

The next step is to put silence on the front and back of the music waveform. Using a 2 second silence on the front and back of the waveform allows pure silence before the song begins playing. It also gives a couple of seconds for the caller to look up at the dancers before the song begins. Figure 15 shows the option selected “Generate Silence”.

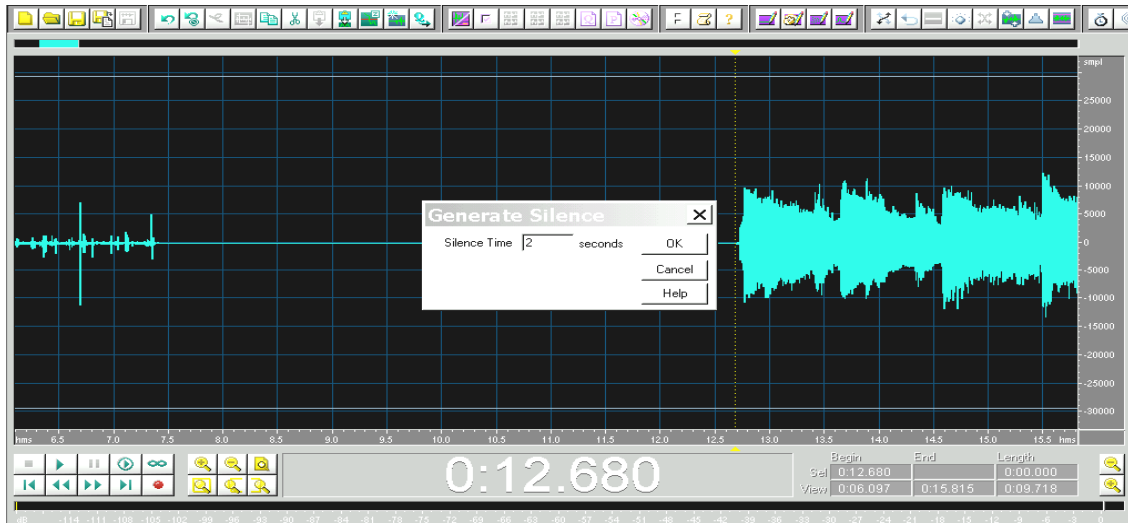


Figure 15

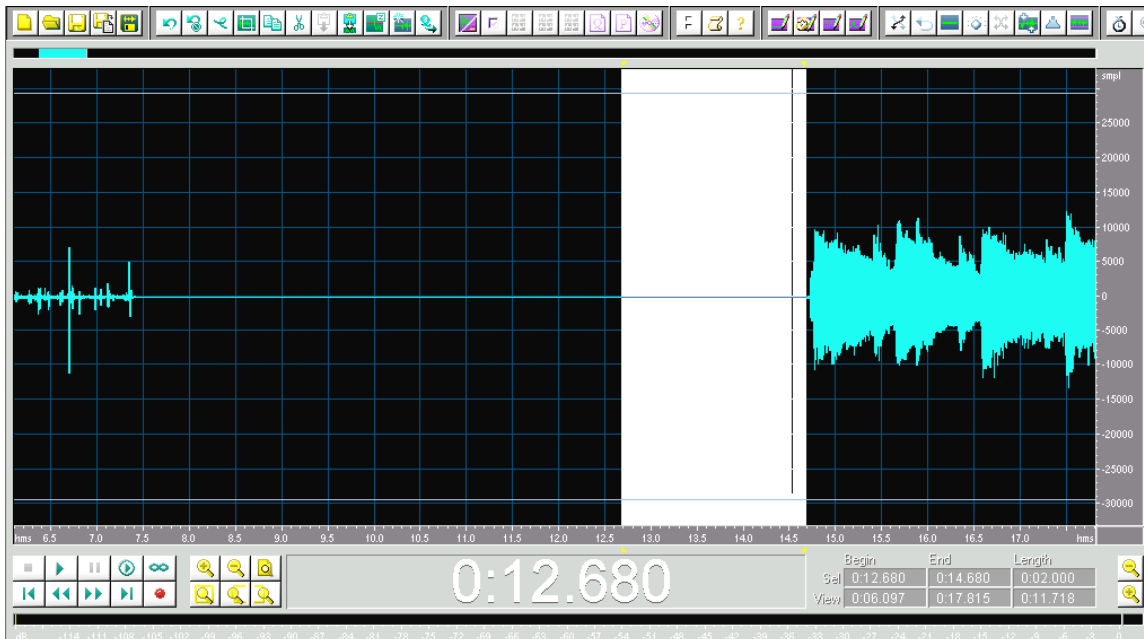


Figure 16

In Figure 16 the white highlighted area has been selected for 2 seconds of silence. At the beginning of the white highlighted area place your cursor and click/hold and drag to your far left. This will highlight the area prior to the 2 second of silence that you created. Shown in Figure 17.

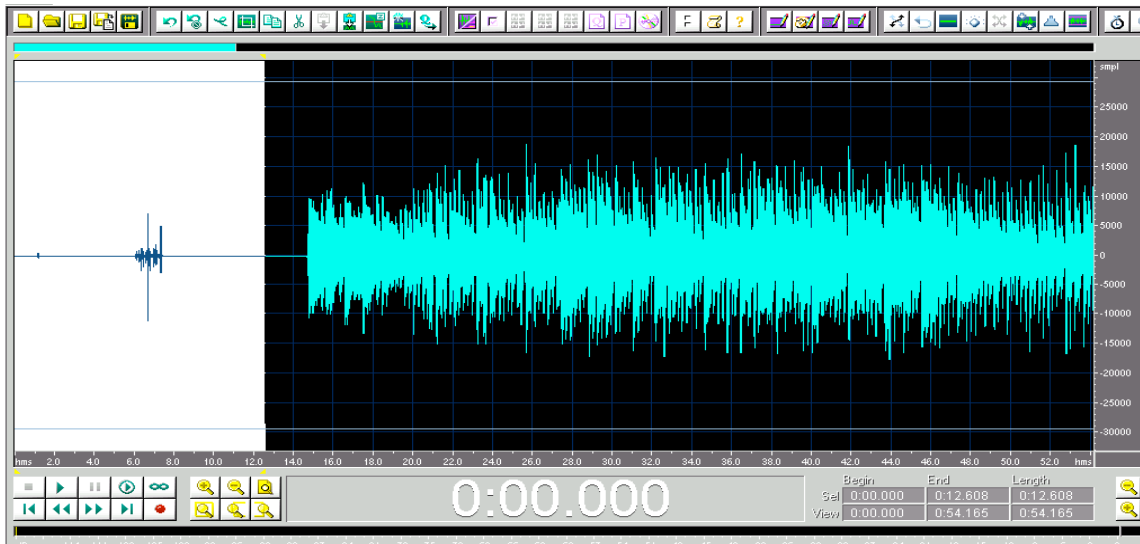


Figure 17

The white area highlighted is what you want to **delete** so that you will have the pure 2 seconds of silence in front of the music waveform. This is also completed on the very end of the music waveform and the process is the same except you drag the cursor right and **delete** it.

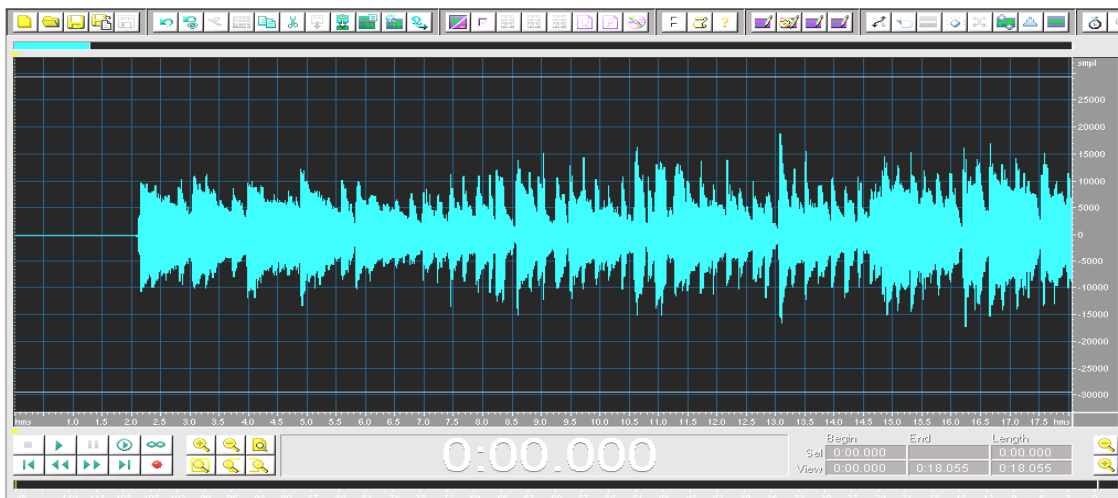


Figure 18

Figure 18 is the picture of what the front of the waveform called the leader should look like. It will take 2 seconds before the music will begin to play.

The next and final step is to Amplify the music waveform if needed. Personally recording music into the program around 2000 to 2500 smpl should be a good recording. The amplification process can increase the volume or decrease it depending on the amplification desired.

Amplitude represents the loudness of a signal. A waveform's amplitude is measured by its distance from the center-line (which represents a 0 amplitude value). There are different standards for measuring amplitude, with decibels (dB) being the most common.

Figure 19 shows the completed process and how the waveform will look after all the tools are used to clean the pops, clicks, noise, insert silence and amplify the waveform.

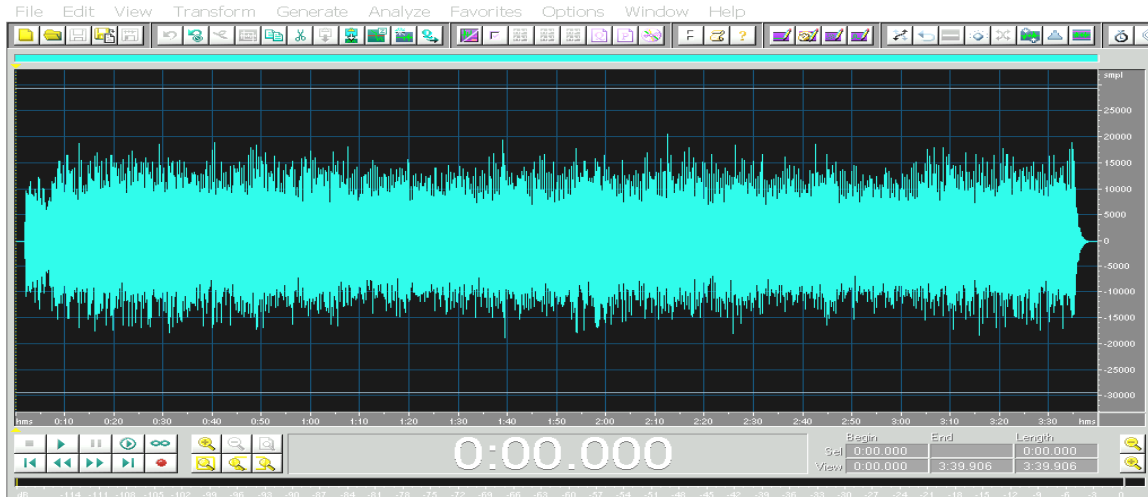


Figure 19

The last step is to convert the music Wave File into an MP3 File format. Basically the MP3 File is a smaller version of the music Wave File or the Wave File is compressed to save space. Example, a Wave File may be 20 Megs (4 minute mono music file) but when converted to an MP3 file the size would be approximately 4 meg.

We hope that we have provided you with a little better understanding of the process to move to the Digital Music format and a method to produce quality music for your dancers. We tried to show you that with a little practice you could restore or preserve the quality of the music on your records. Freeware and Shareware programs can keep your investment to a minimum. As you know you can keep hundreds or even thousand of pieces of music at your fingertips on the digital media players available today. Hopefully we have answered some of your questions and given you some direction in the process.