

# EQ:UNCOVERED

Second Edition

By Eddie Bazil

## **EQ: Uncovered – Example Extract**

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### **EQ: Uncovered (Second Edition)**

By Eddie Bazil

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Second Edition Edited by: Andy Avgousti

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# How To Use This Book

## Audio Files

Throughout this book I will refer to certain audio files – the relevant file name will be **highlighted in red** and superseded with a 

The relevant file can be found in the corresponding chapter folder in the ebook download.

## Pictures

In this book you will see various screen shots from software applications – as these can sometimes be hard to read in a PDF file, I have also included larger copies of all images for closer inspection – you will find these images within the relevant chapter folders.

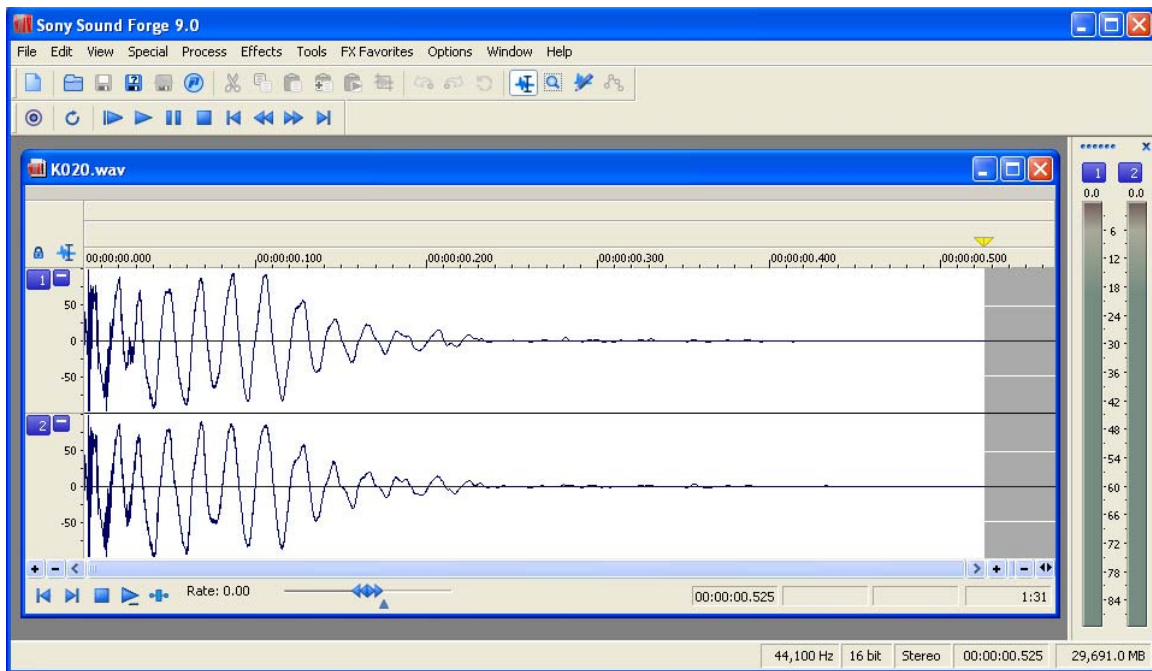
***Please Note*** – *Some chapters do not contains images or audio, hence no folder is present for these chapters!*

## 11. EQ & Drums: Kicks

We have covered EQ as a subject, so it is now time to begin with walk through examples. The following chapters will deal with instruments and vocals; this way we have a good variety of scenarios to deal with, and a good range of frequencies to cover and manipulate. First off; kick drums.

### Drum Sounds: Kick

Fig 11.1: K020.wav

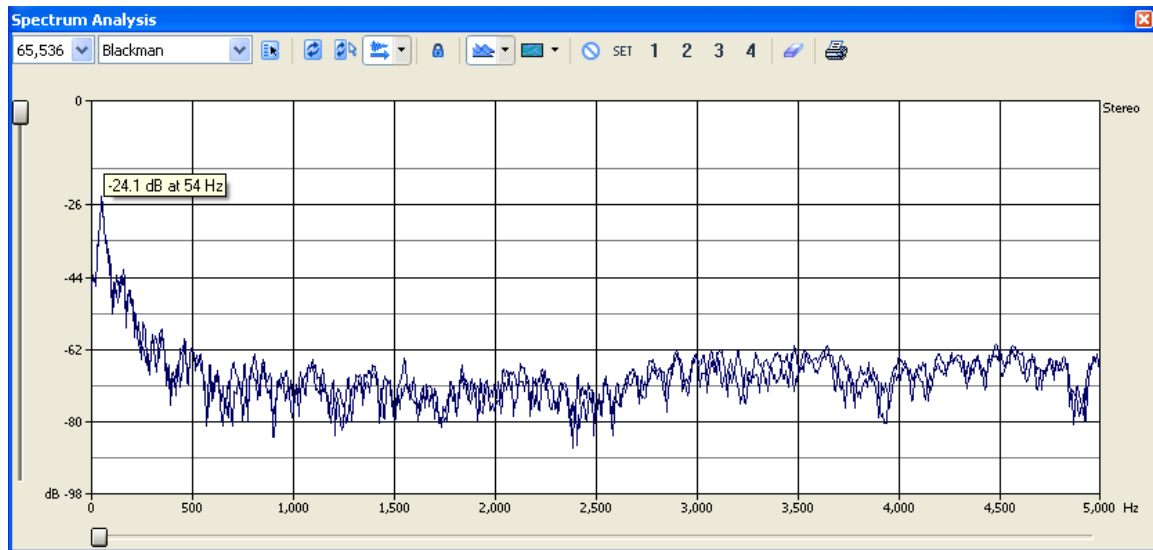


As you can see from the above image (**Fig 11.1**), I have opened up a kick file in Sound Forge. We are now going to manipulate this file and create new files by the simple use of EQ.

However, before we perform any type of manipulation I want to show you how to evaluate and see the frequency spectrum (range) of any selected audio file. For this, we use a piece of software (or hardware) called a Spectrum Analyser. Sound Forge has this tool under the menu option: *View - Spectrum Analyser*.

The image below (**Fig 11.2**), clearly displays the frequency spectrum of the kick when played.

**Fig 11.2: Spectrum Analysis of K020.wav**



By using the analyser we are able to fully see the frequency start, the frequency body and the frequency tail-off. This type of tool is invaluable in helping us to apply EQ, but do not rely on it solely as most Spectrum Analysers come into their own in determining low-end frequencies (although they do cover the whole spectrum as can be seen in **Fig 11.2**).

You will appreciate how useful this tool is when we come to removing unwanted frequencies, or when we come to using EQ to either correct flawed vocals, or thin out or thicken vocal lines.

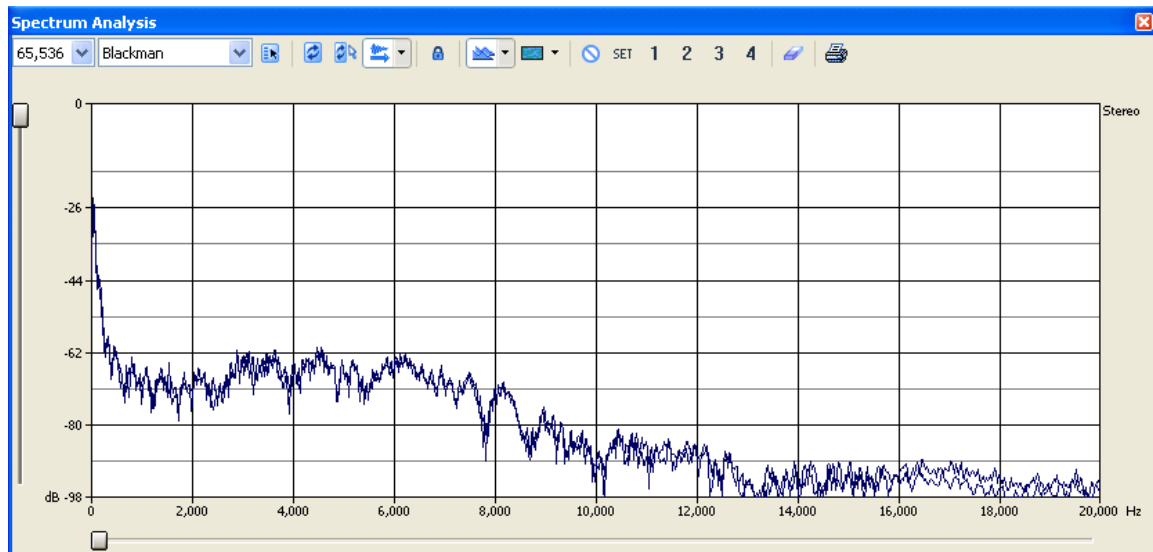
The Y axis (left hand side figures) denotes amplitude/level in dB.  
The X axis (bottom figures) denotes the frequency in Hz.

The analyser tells us that this kick starts on a frequency of 0 Hz at – 60 dB (attack), rises to 54 Hz at -24 dB (height of attack's decay), drops to around and levels off.

I have selected a range to be shown within the Spectrum Analyser's settings menu. In this instance I have selected a range not to exceed 5 kHz.

**Fig 11.3** shows us the full range from 20 Hz to 20 kHz.

**Fig 11.3: Full Range Spectrum Analysis of K020.wav**

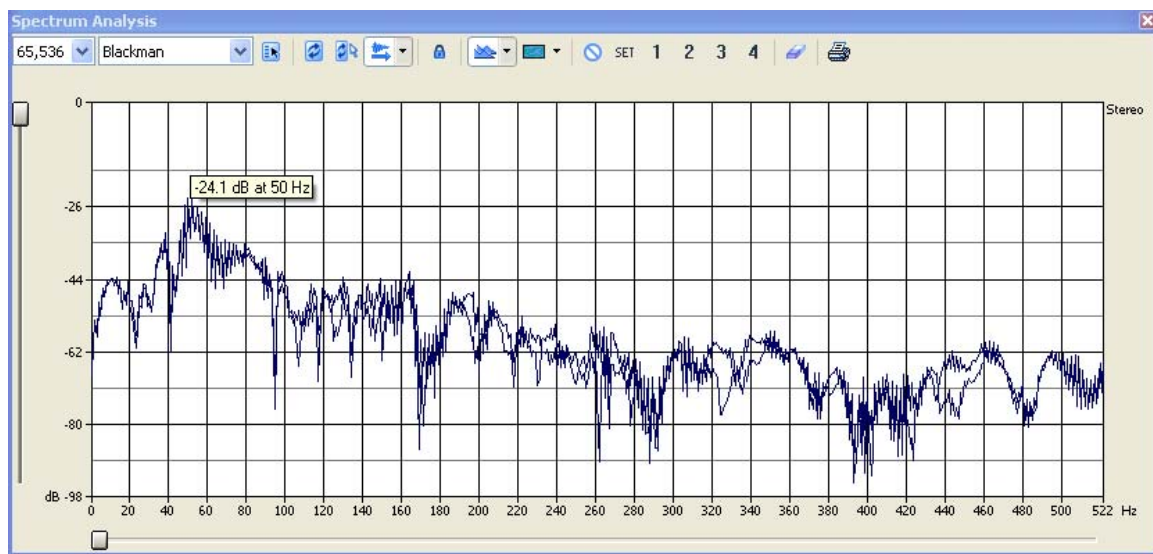


This helps us a great deal in understanding the characteristic and shape of the kick sound, and this in turn gives us a numerical and graphical reference for setting up our EQ parameters. However, as stated earlier, use the Spectrum Analyser purely as a guide.

What did I just say, in English?

Simple: check the same image but zoomed in (**Fig 11.4**). Sound Forge has a great tool for zooming in a range of frequencies by simply dragging the cursor from the start of the range to the end of the range. This allows us to view the frequencies in closer detail.

**Fig 11.4. Zoomed Spectrum Analysis of k020.wav**





I highlighted the peak of the kick file's waveform with the mouse and it gave me the figure above. I can move my mouse over any part of the waveform and it will highlight the data I need. With this example, I can now decide what type of EQ I want to apply and by how much.

The *punch component*, or attack, of most bass drums lies between about 40 and 110Hz. This is where you find the low-end energy of most kicks. Below this range you'll mostly feel rather than hear any boost. It's easy to either neglect this and be left with all sorts of low frequency imbalances in your mix, or to be confused by what is actually the 'bottom-end' of your mix.

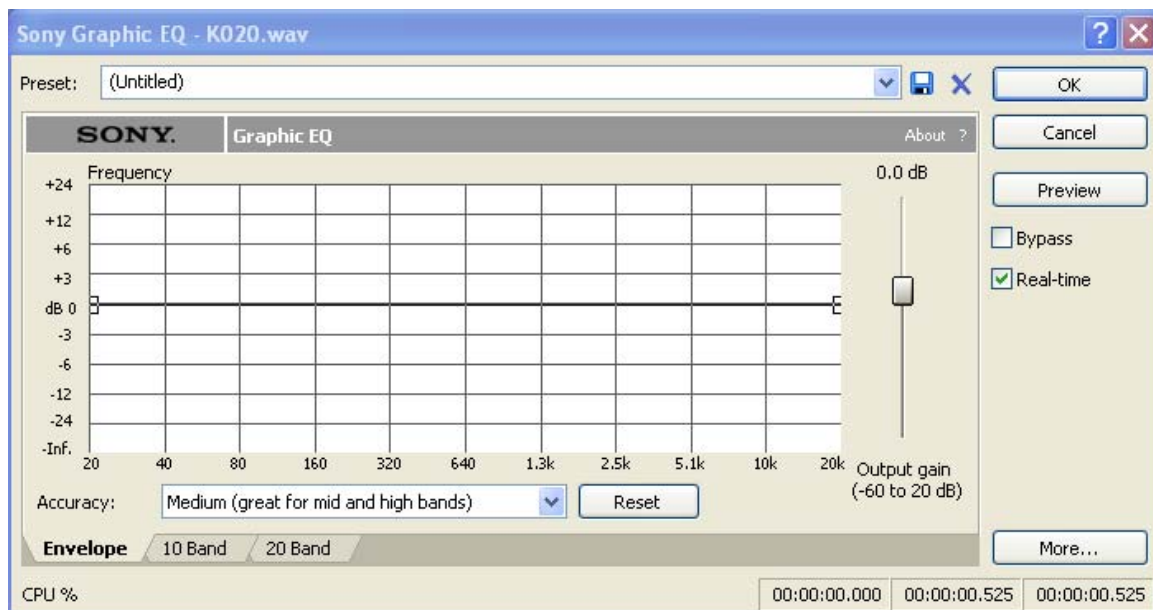
However, when using EQ to filter the lower end of, say, a kick drum in a mix context, it is imperative to analyse ALL the low-end energy which could be summed by using the kick, bass, low pads etc.

With sounds that tend to be '*warmer*', as opposed to '*cutting*', you will invariably find that the frequency area concentrated on is between 180 – 220 Hz.

Working on a kick that might need to be more prominent in the mix, or cut through on mid-range monitors, the 2 – 6 kHz range is where the manipulation takes place.

From the Soundforge menu option, I am going to choose a graphic EQ (*Process > EQ > Graphic*).

**Fig 11.5. Graphic EQ**



I have not input or drawn in the EQ curve. The Graphic EQ is currently at default with all the parameters at 0. Now, let us shape the EQ curve by using the nodes in the Graphic EQ window.

The default line (middle of screen) is at 0dB, across the whole frequency spectrum.

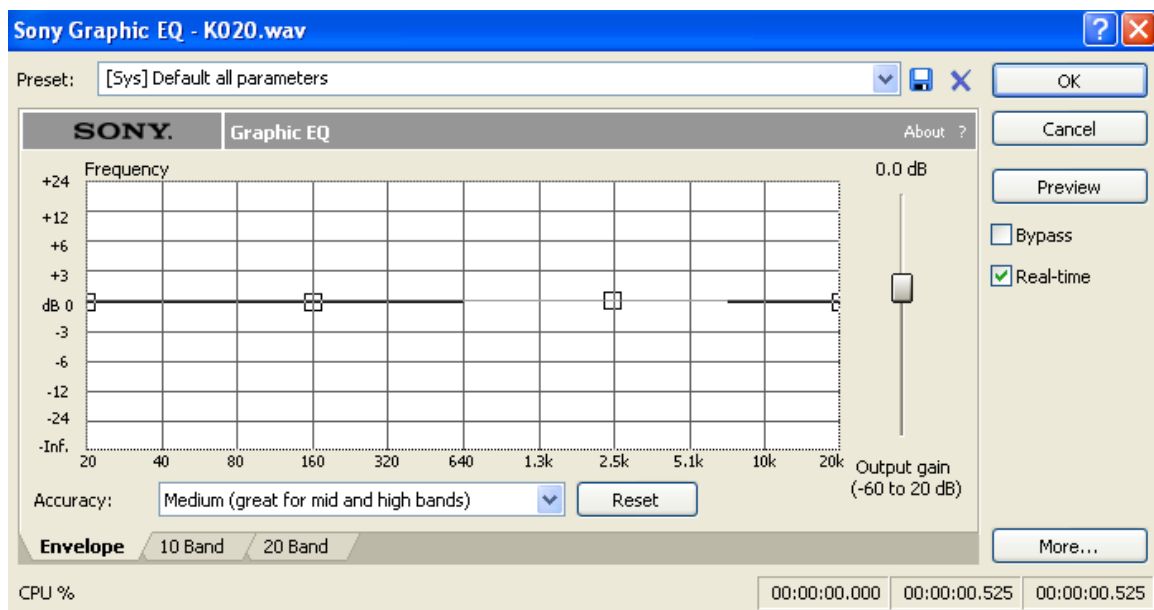


By placing the mouse over any part of the line, I can create a 'node' and then move this node. I can keep on creating nodes, so that I have control over the default line. The more nodes, the more detailed your control over the shape (response).

I have always preferred visual interfaces for these types of dynamic manipulations as opposed to inputting fields and numerical data into graphs. I can visually create the EQ curves here, instead of having to input numbers and hope for the best. There is also something very satisfying in having such instant and visual control.

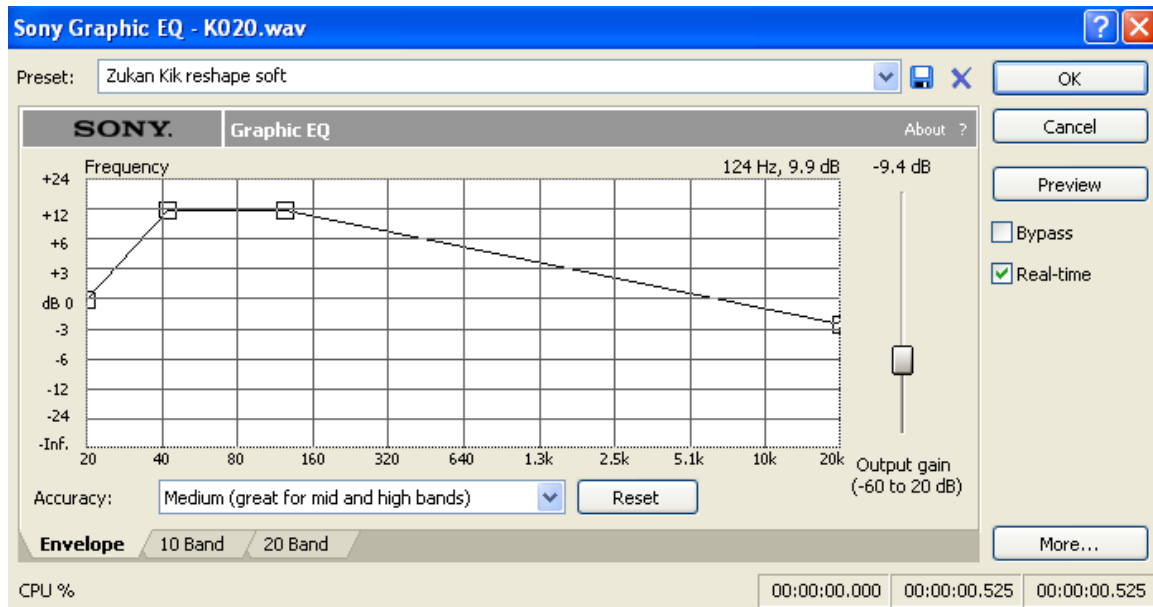
Earlier we talked about graphic EQs having fixed bands and that you could only apply boost or cut to these bands. But Sound Forge has given us variable and adjustable frequency bands and these are selected and determined via the nodes. **Fig 11.6** clearly shows what I mean by nodes.

**Fig 11.6 EQ Nodes in Soundforge**



As you can see from the above image, I have a total of four nodes (*little boxes*) across the default line which I have created. I am now going to move these nodes around and create an EQ shape for the kick drum file (**Fig 11.7**).

**Fig 11.7: Using nodes to create EQ shape**



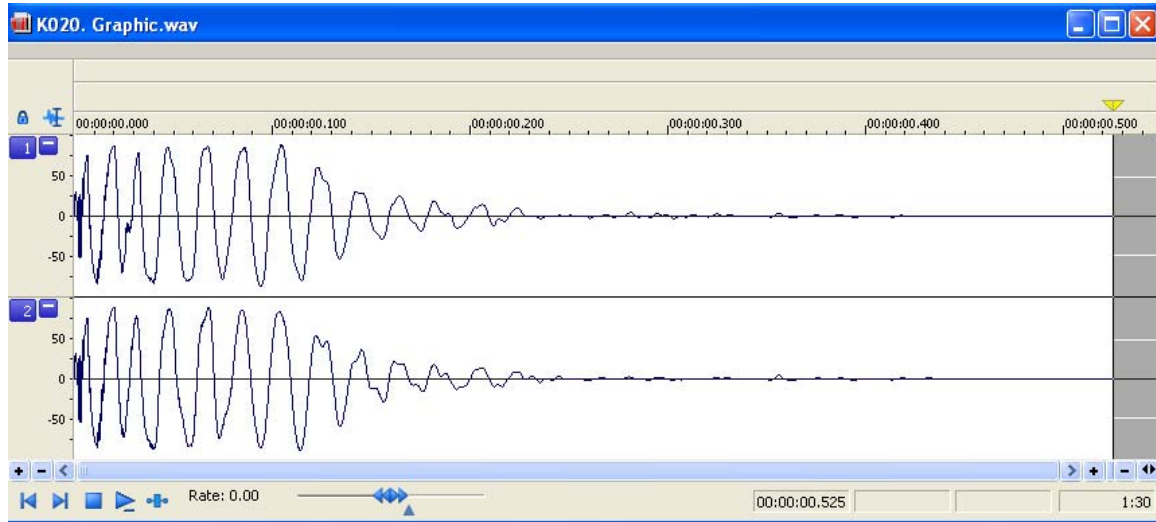
When boosting frequencies always make sure not to clip the file (i.e. don't go beyond 0 dBFS). Make sure to compensate for any boosts. I have adjusted the output gain to -9.4 dB so as to compensate the huge boost of 12 dB on the kick sample.

Usually, I would not generate such huge boost values, but for the purposes of this tutorial I chose to make sure the processes are clearly visible and audible. The 'shape' of the frequency curve shows that I have eaten into the attack of the kick sample by moving the second node away from 0. This can easily be heard when listening to the processed file.

By a simple four node process I have created a new sonic texture by using the same sample.

And once you press 'OK', that will render the new EQ shape over the audio file. The result is below (**Fig 11.8**).

Fig 11.8 K020 with graphic EQ applied

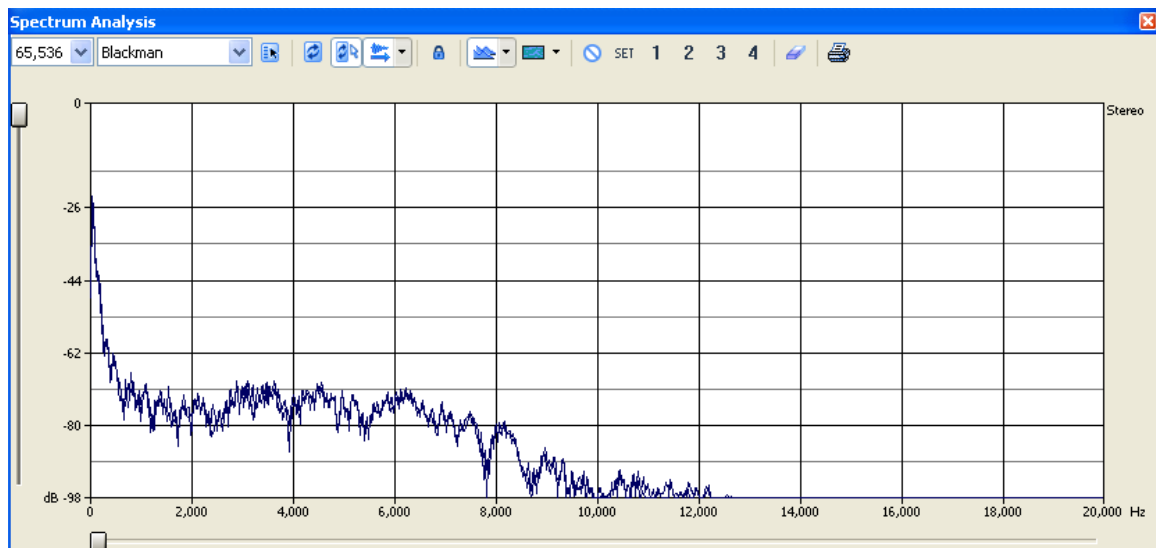


 **K020\_graphic.wav**

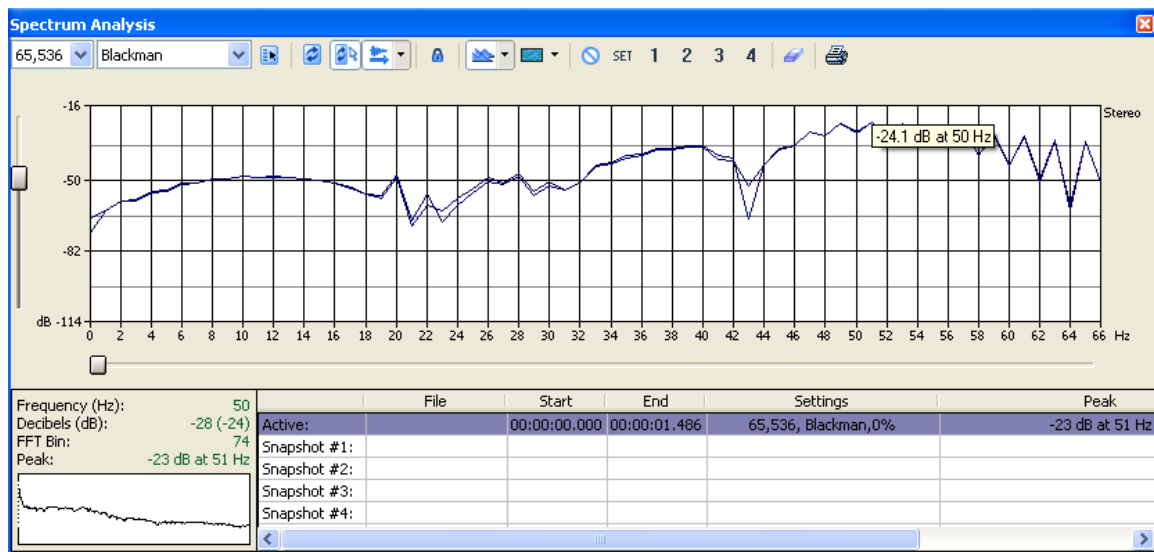
The kick file now sounds deeper, with less 'top-end'. The EQ shape accents the attack and decay of the attack, and drops rapidly from there, thus making the body and tail seem both quieter and as if the higher frequencies have been filtered (which they have).

Now let us put this file into the Spectrum Analyser. This will clearly show if I am right or wrong (**Fig 11.9**).

Fig 11.9: Spectrum Analysis of K020 after graphic eq



**Fig 11.10: 11.9 Zoomed**



Yep, spot on. You can see that the attack and attack decay are peaked and smoothed between 50 Hz – 66 Hz. After that, the amplitude drops dramatically over the frequency spectrum.

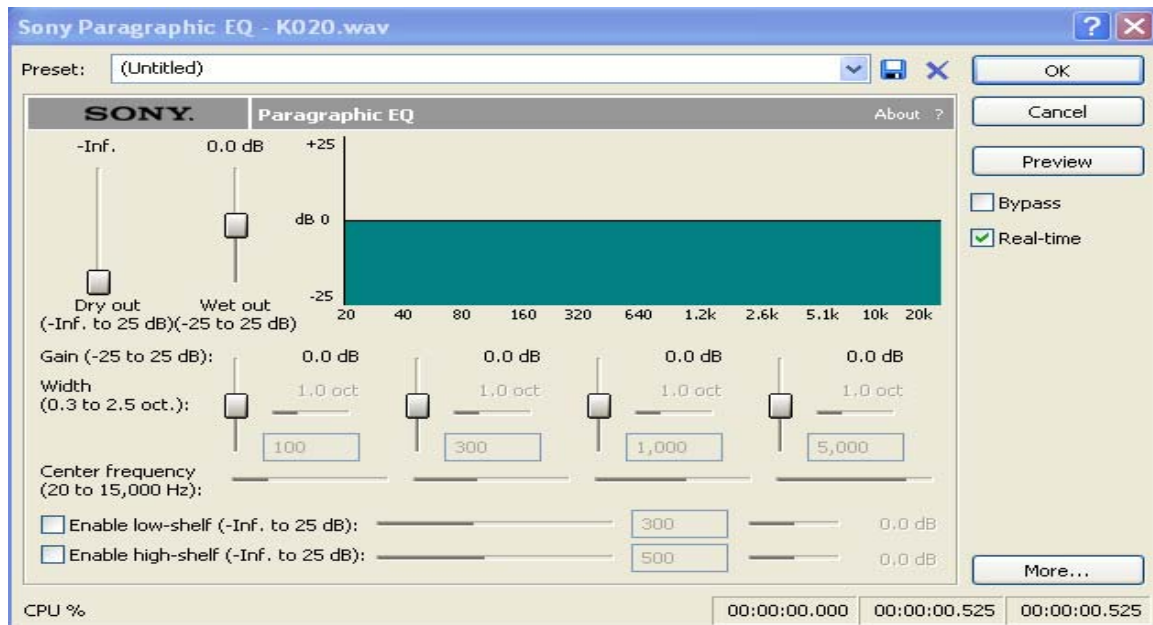
Have fun with the Spectrum Analyser feature in your audio editor - you will be amazed at how much you will learn, just by viewing frequency spectrums of different audio files.

Now let us use the same kick file, but with a different type of EQ, an EQ we discussed earlier - the Paragraphic EQ. So, to begin, we perform the exact same sequence as before. In fact, it is good practice to stick to a procedure and to keep practicing that. This helps you to perform tasks quicker and to fault find in the event that you have made a mistake in the process.

Load the Paragraphic EQ via the Soundforge menu option: *Process > EQ > Paragraphic*

Have a look at **Fig 11.11**. It shows the parameters of the Paragraphic EQ.

Fig 11.11: Paragraphic EQ



There are 4 bands and each bandwidth can be adjusted.

This Paragraphic EQ has a little more control than the usual Paragraphic EQs, in that you can not only shape the bands by adjusting the centre frequencies and their amounts, but also vary the position of each band. You also have the options of choosing low or hi-shelf filtering.

In **Fig 11.12**, I have chosen to create a much thinner and crisper sound. By removing the 'body' of the sample and boosting the higher frequencies, the sound is now far more pronounced and thinner sounding. Basically, I have left the attack portion of the sample intact but removed the fuller frequencies that follow. I have then boosted the upper mid to higher frequencies. This is a good way of explaining how to use this EQ and how it sounds.

Fig 11.12: Paragraphic EQ on K020

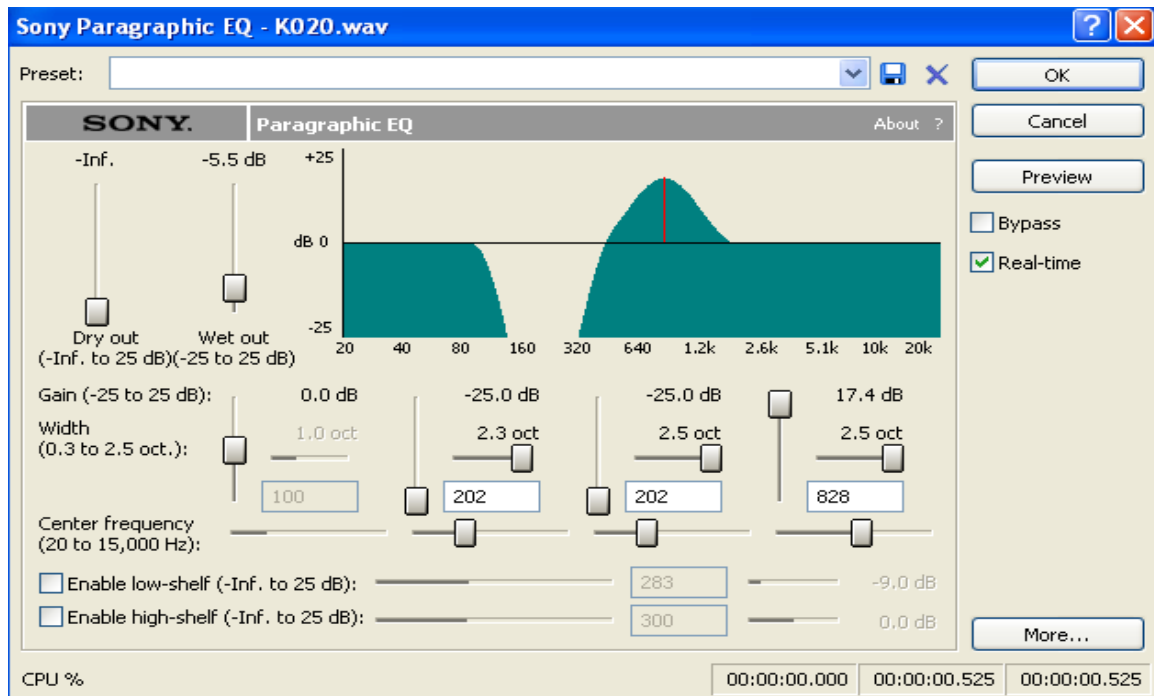
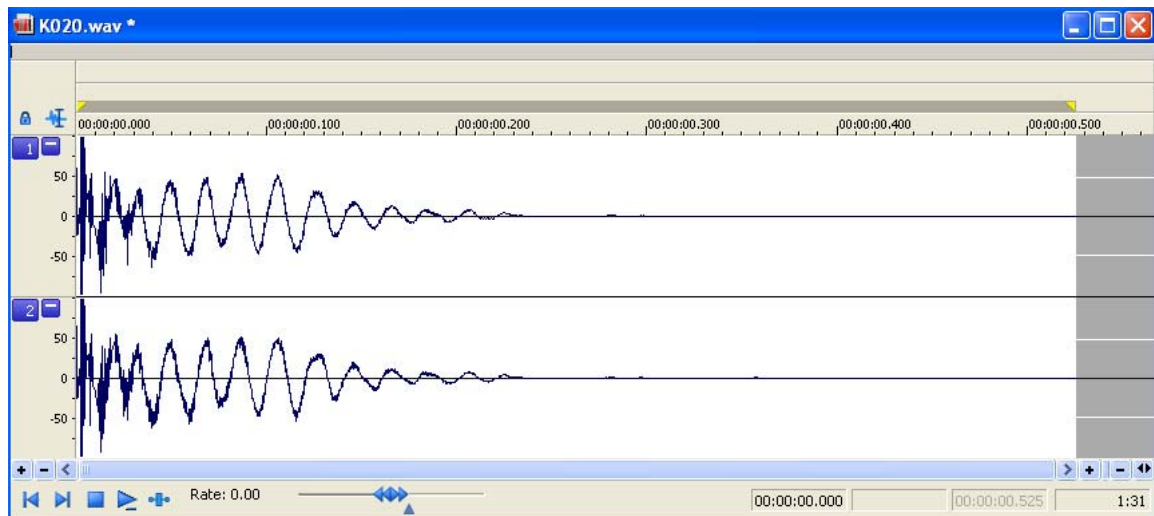


Fig 11.13 shows the new kick file after being rendered with the Paragraphic EQ.

Fig 11.13: K020 waveform after Paragraphic eq



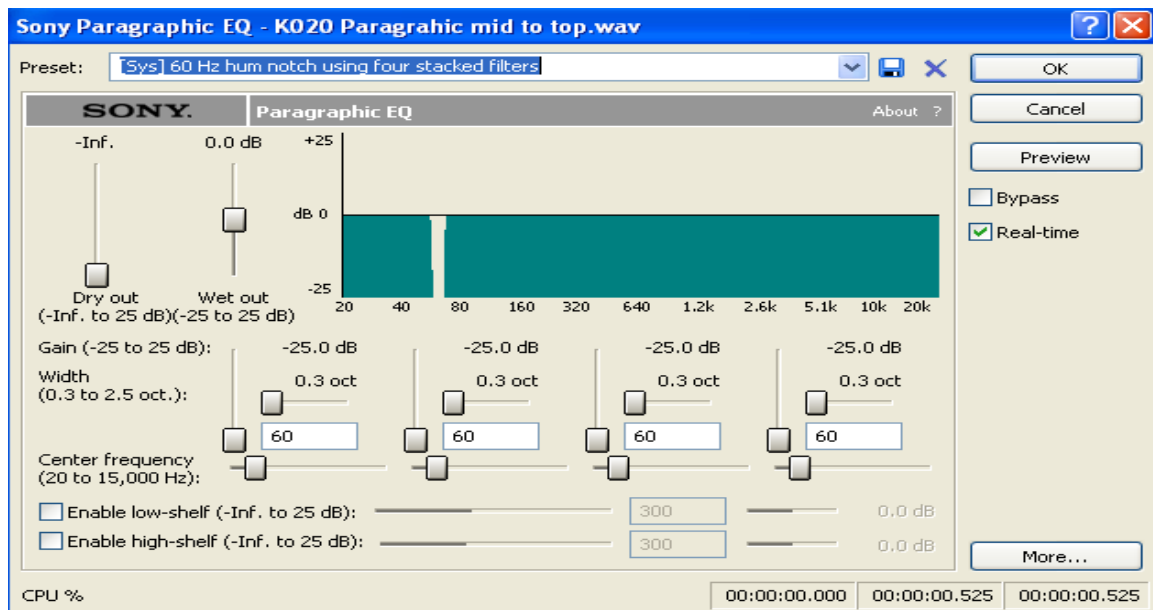
 K020 Paragraphic mid to top.wav

This new kick waveform clearly shows what the Paragraphic EQ has done to the frequency and amplitude of the waveform.

### Corrective Use Of Paragraphic EQ

The Paragraphic EQ can be used very effectively as a Notch Filter (**Fig 11.14**) and also to demonstrate the *Fletcher Munson Curve* (**Fig 11.16**).

**Fig 11.14 – Paragraphic as a Notch Filter**



The above shows how to use the Paragraphic EQ as a Notch Filter to isolate and remove 60 Hz cycle hum. This is a great tool to have as there are times when your audio file might exhibit mains hum at 60 Hz. This way you can isolate and remove the hum.

You can select to notch out any range of frequencies as displayed below in **Fig 11.15**. Here, all four bands have been selected for notch treatment. Of course, you would almost never use any more than a single band at a time, as multi-notched bands can alter a sound dramatically. Notch EQ is very useful for the removal of 'problem' frequencies as discussed earlier. But, as with most processes, experiment and have fun and gauge for yourself the impact of the process on the sound.



Fig 11.15 60Hz hum 4 way notch

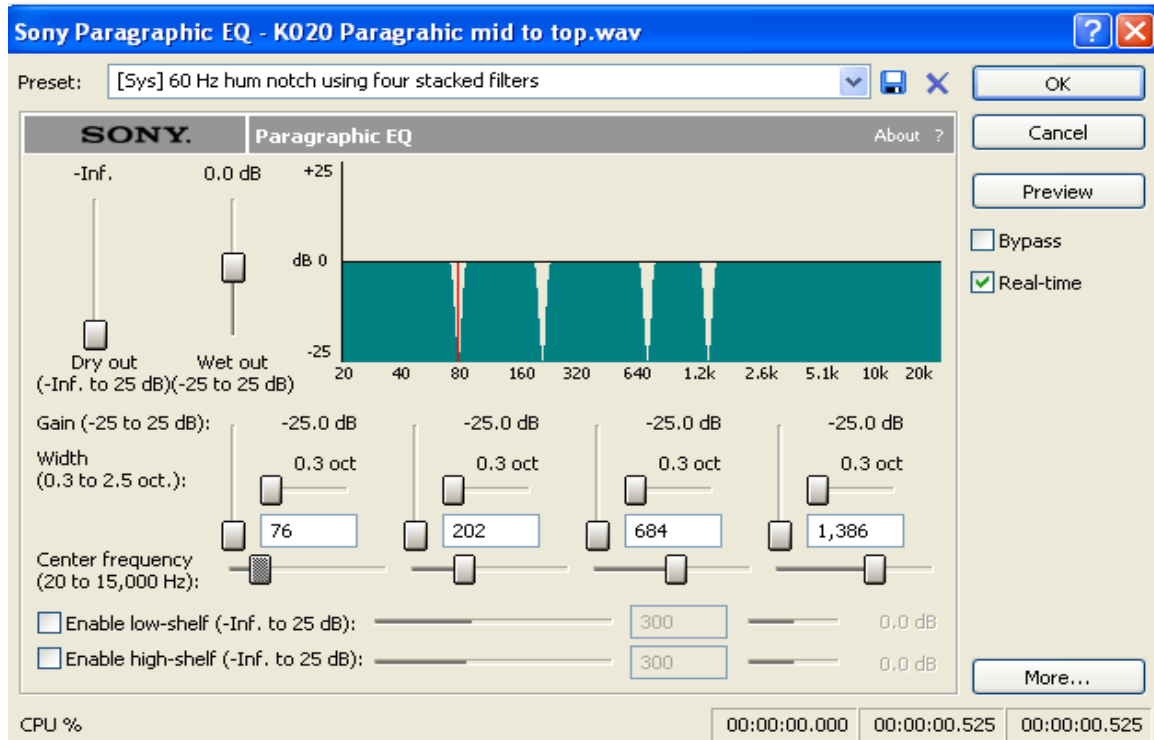
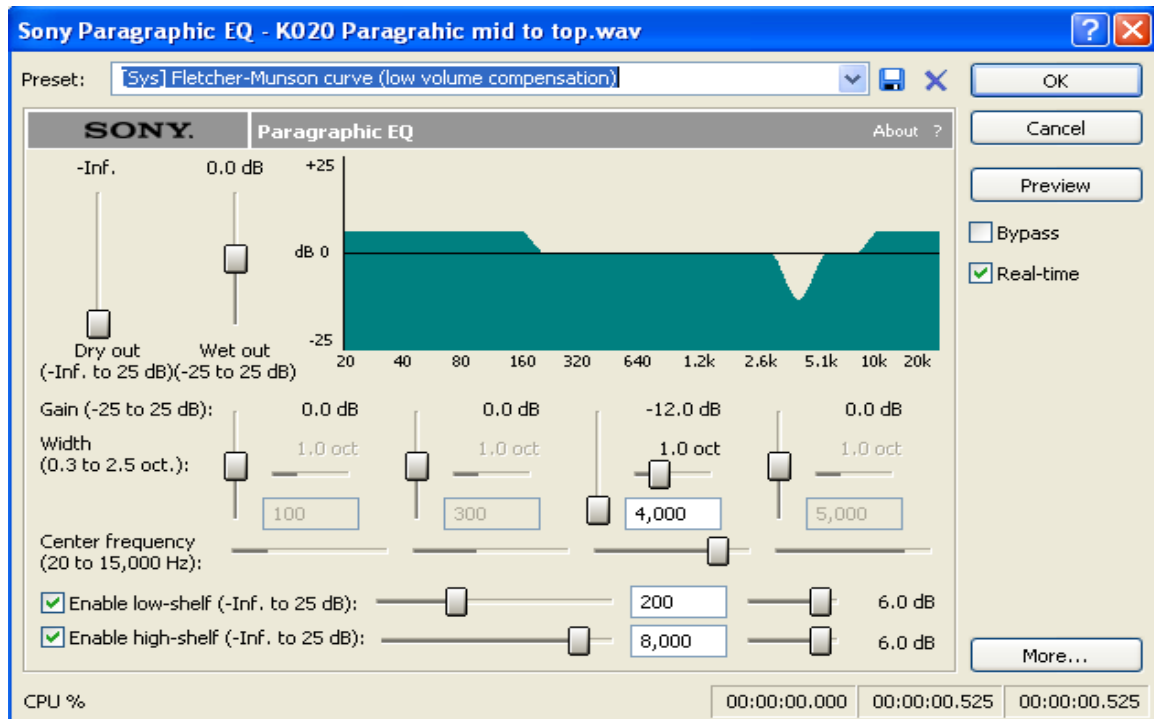


Fig 11.16: Fletcher-Munson Curve

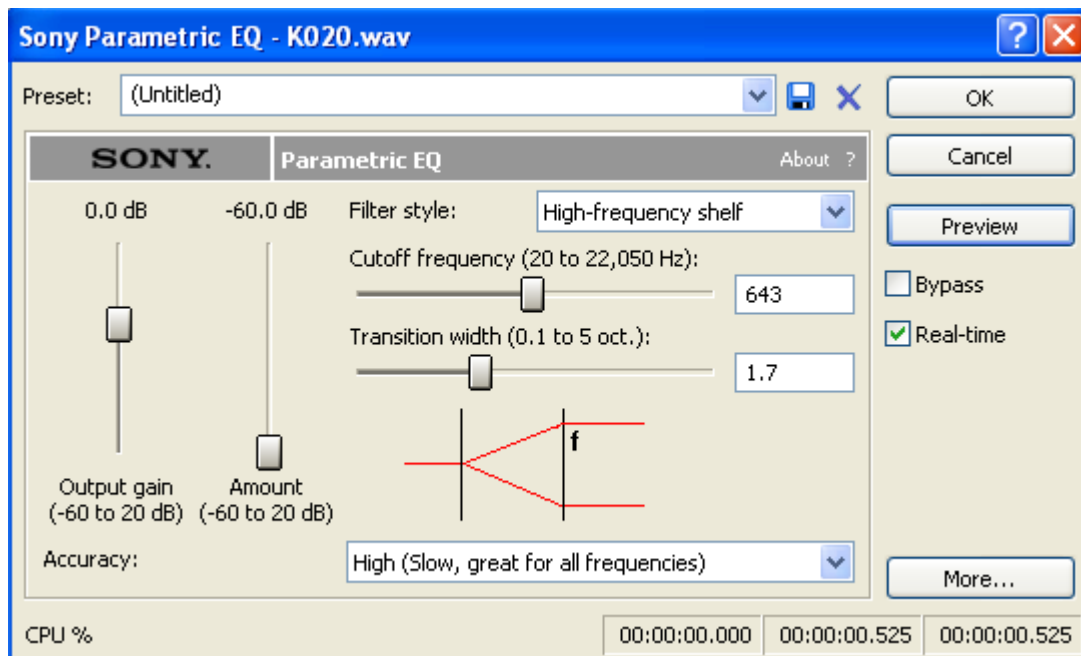


In this instance, EQ is used to cut and boost selected frequencies, so that a more balanced gain structure is kept right throughout the hearing spectrum at low listening levels. The *Fletcher Munson Curve* is far more apt on entire mixes than on single isolated sounds.

Now let us use the same kick file, but this time we will use a *Parametric EQ*. I like using this EQ, because not only is it simple to use, but it also has additional filter settings that make this EQ very versatile.

Look at the settings I am using in **Fig 11.17**. I have adjusted the parameters so that I am left with a high frequency shelf. I am actually *cutting* frequencies and not *boosting*. The kick file I am using for these examples is a good all round kick file that covers most of the frequencies I would expect to see in a file of this nature, and is not limited to any particular frequency. That is why it is such a good file to use. As we discussed earlier, cutting is always preferred to boosting, and this example reflects that thinking beautifully.

**Fig 11.17: Paragraphic EQ**

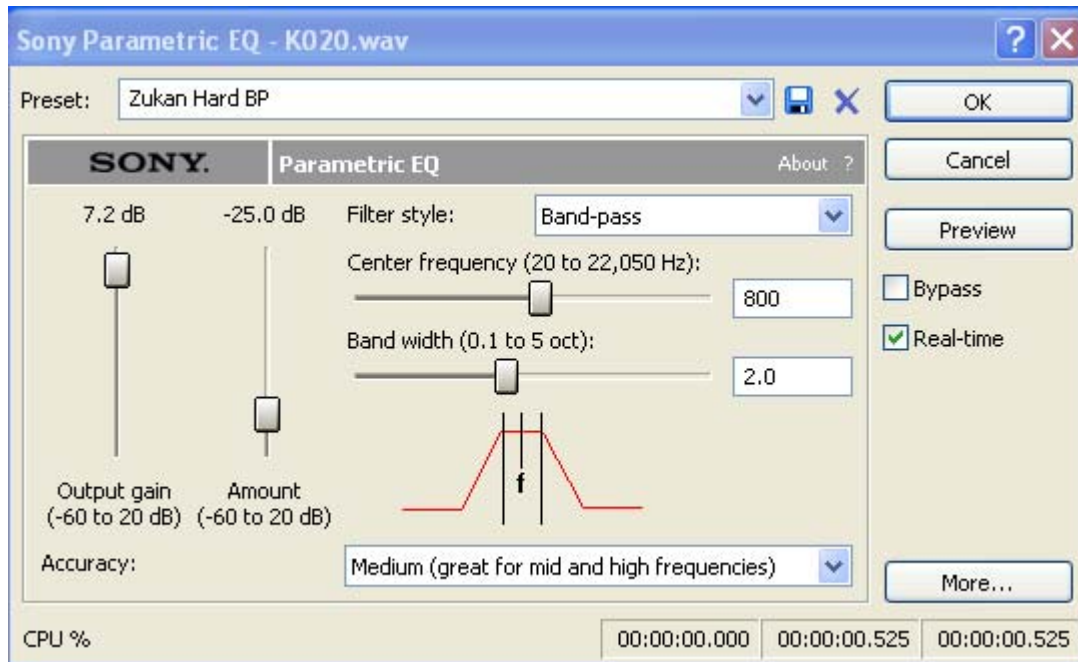


### K020 Parametric high shelf.wav

The sample now sounds far more rounded, deeper and 'woollen'. By removing hi-range frequencies we are left with the full attack and body. As mentioned earlier, cutting has a direct impact on unaltered frequencies. In this case cutting the higher frequencies pronounces the lower frequencies more.

And now I have used the *Band-pass Filter* on the Parametric, to give the kick sound a *boxy* feel (**Fig 11.18**).

Fig 11.18: Band Pass on Paragraphic



### K020 Parametric boxy.wav

By selecting the filter style (better to be named as type) as Band-Pass with a filter frequency of 800 Hz and a 2 octave bandwidth I am able to create a 'boxy' sounding effect. This filter type is also the one that is most commonly used when creating the 'telephone' effect on vocals (we will come to this later).

**Fig 11.19** is an image of a 2 *band* EQ, as discussed earlier and is probably the simplest of all EQs to use.

Fig 11.19: 2 Band EQ



### K020 2 band EQ.wav

As you can see, you have only two nodes to play with. This EQ is really self explanatory. For four bands of EQ, simply add another two bands to the above. The thinking is the same.

I have selected the Bell shape for filter response as I do not want to apply any hi or low shelving. The Bell shape also allows for a more gradual rise and drops for the peak, being asymmetrical in that it has symmetrical response characteristics irrespective of whether I cut or boost. In this instance the EQ process is more subtle and fluid.

Although I have used boosts as opposed to cuts you can hear that the effect is quite subtle but clear. By boosting at 38 Hz and shaping the ensuing frequencies, I am able to apply a smooth curve for the attack which is clearly evident when listening to the rendered file. The attack does not possess that harshness that was evident and the body sounds a little more rounded as I have applied another boost at 712 Hz.

**Fig 11.20** shows what happens when you alter the filter types to low shelf and low-pass.

Fig 11.20: 2 Band with low shelf and low pass



### K020 2 band EQ low-pass.wav

I have adjusted the two nodes at 58 Hz and 672 Hz and selected low shelf and low-pass from the drop down menus below the parameter settings. The drum sounds far more muffled and darker. It is vibrant in low frequencies with almost no high frequencies to balance out the sound. This is very useful when trying to attain the deeper and darker type of drum sounds.

Drums are probably the easiest instruments to EQ. The real art of kick drum EQ is to consider the bass line sound in the song that the drums reside in. As they invariably share similar frequency ranges, they must be processed with care and attention. Apply small amounts of EQ, as the process and result of applying any dynamics will result in some form of degradation. So, be sensible and wary of drastic changes. Keep things natural.

*Separation also comes into the equation; the whole 'drive' of modern Hip Hop and Dance songs are centred round the marriage between the kick drum and the bass line.*

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