DC LIVE/Forensics 6
Getting The Most Out Of Your Demo

Welcome To DC LIVE/Forensics 6.0.

You will be sampling one of the most powerful Audio Forensics packages available on the market today. This powerful audio editor is ideal for removing noise from any recording, it is also ideal as a live surveillance tool and is flexible enough to work in any situation you put it in. We have also built in several important safeguards so that your chain of evidence never comes into question.

We realize that you may not be an audio expert today, so we've designed these tutorials for an entry level beginner, but don't worry, the results you'll hear will impress even the most seasoned professional.

We're going to take you by the hand and lead you through several examples of Forensics audio restoration and enhancement. Because this demo is somewhat crippled you really have no time limit to use the product, so feel free to do a little experimentation on your own (albeit 1 minute at a time). When you are done, you'll be licensed to drive the product yourself without training wheels.

Before we start the product, let's just make a few quick assumptions:
1. You have the Line output on your sound card plugged into powered speakers. If you hear sound whenever Windows wakes up, chances are, you're ready to go.
2. You have Windows 98SE, Windows 2000, Windows ME or Windows XP, a reasonably fast computer (400 mhz or faster), a mouse and a sound card.

Let's install the software. Everything that requires action on your part will be in *bold*.

Just download the DC6LiveDemo.exe and either double click on it or click once on it and hit your Enter button.
- It will ask you if you want to install, **just click on "Next".**
- It will then ask you to agree to the license agreement. **Again, click "Yes".**
- It will then ask for your Name and Company Name. **These spaces can't be left blank, so fill something in and then click "Next".**
- It will then ask if you want a typical installation. **You will click on "Next" again.**
- It will ask if you want to use the Classic or Fast editing modes. **Choose the default "Classic" and hit "Next again.**
- Now, it's off to the races. It will install in about 20 seconds, thank you and copy the Diamond Cut Live6 Forensics Demo Icon to your desktop.

Figure 1- The DC LIVE/Forensics Icon

Still with us? Good. Let's do something.

This entire training process should take you about 10 minutes and will give you all the basics you need to know to use the program.

In these Guides, we'll tell you exactly what to do and even explain why it is you are doing these things. It's important that you follow along exactly as one step builds upon the next.

Easy Forensics Step By Step Guide

First, we need to run the program. If it's not already up, just *double click the icon on your desktop or click once and hit the Enter button* to start it. DC LIVE/Forensics starts with a tip screen, which offers quick suggestions as to how to use the program.
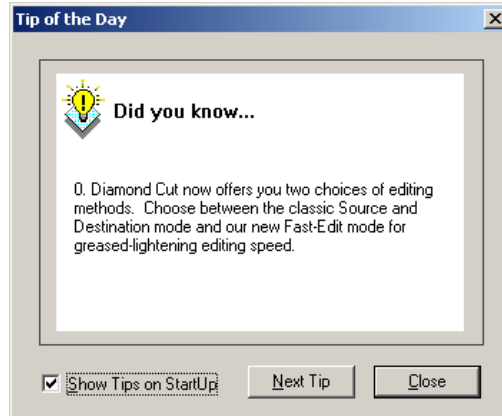

Figure 2- Useful Tips

You can disable this by clicking on the check box in this screen.

If you are new to audio restoration and feel a bit intimidated with the large number of filters and tools in DC LIVE/Forensics, then the AFDF Mode of the Continuous Noise Filter is for you. Our first guide is designed to get you going almost instantly. The AFDF Mode of the Continuous Noise filter is a powerful "Adaptive" filter. Put simply, that means that it adapts to the noise it hears and constantly changes as the noise changes. You can hear this filter getting smarter and smarter as it goes along. But let's not get ahead of ourselves here. First we need to load in an audio file to work with.

Now we want to open an audio file to start the demo. After DC LIVE/Forensics Opens, just **click on File, then click on Open Source**. You'll see a Window that looks like this:
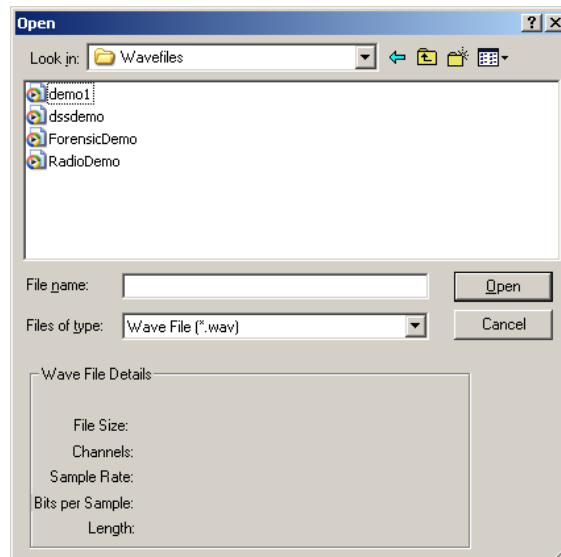

Figure 3- Open Your Wave File

Next, *open the ForensicsDemo wavefile.*

Note: If your computer doesn't automatically open to this "Wavefiles" subdirectory, no worries, several machines we've tested default to the "My Documents" directory. In that case, simply click on the arrow pointing down just under the Open menu bar beside the My Documents entry and navigate to C: (or whatever your main drive letter is) –Program Files-Diamond Cut Productions- DCLive6demo- Wavefiles and you'll now see a screen that looks just like the one above. It should have 4 wave files in it named "demo1", "RadioDemo", "DSS Demo", and "Forensicdemo".

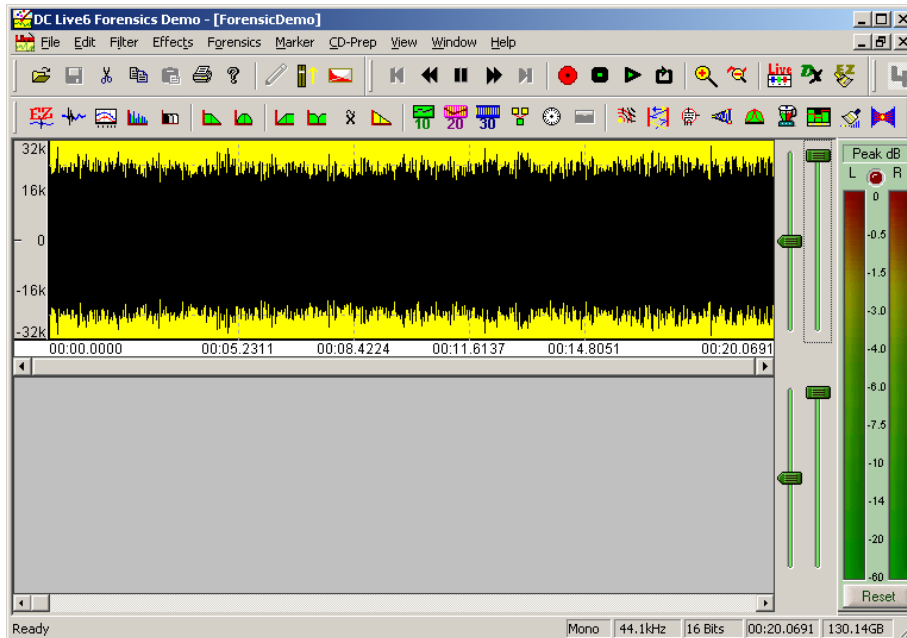After you've opened the ForensicDemo file, your DC LIVE/Forensics should look like this:

Figure 4- The Wave file is loaded into DC LIVE

Now we're going to activate the transport system within DC LIVE/Forensics so that you can hear this file.

     The transport system has 3 buttons that we'll worry about right now. If you've ever worked with a standard cassette tape recorder, these will all seem very familiar to you.

     This is the *Record* Button

     This is the *Stop* Button

     This is the *Play* Button

Listen to this file by either clicking the Play button or hitting the spacebar – Ouch, this file is full of noise. It's a mess**. *Stop the playback*** when you're done listening. You can do this by either hitting the space bar again or by using the Stop button.

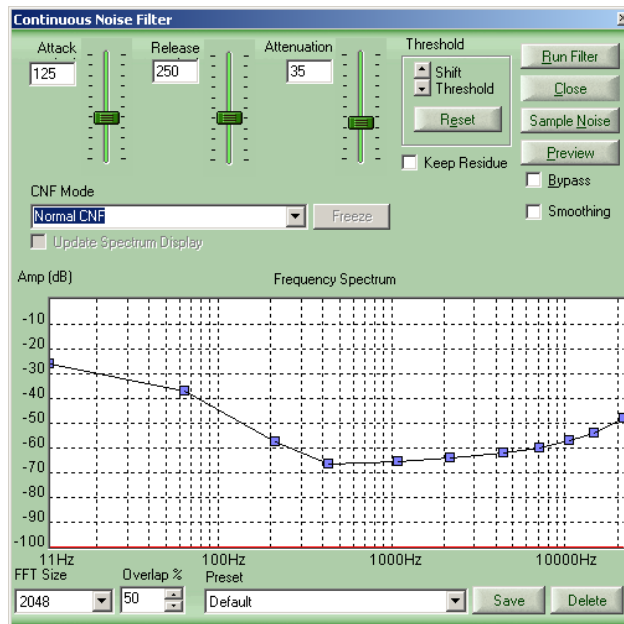Now for the fun part. *Click the Filter Menu and choose Continuous Noise filter*. The filter looks like this:

Figure 5- The Continuous Noise Filter

Though it is probably one of our most complex filters, it is also one of the most powerful. This time through though, we're going to choose an automatic filter. Just click on the CNF Mode Drop down arrow and select Forensic AFDF(Automatic Frequency Domain Filter).
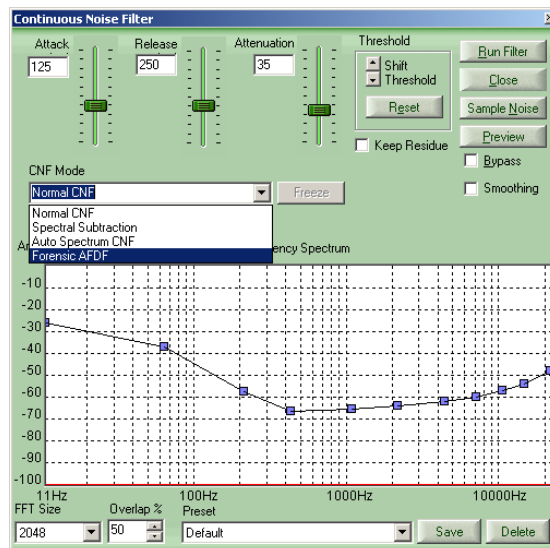

Figure 6- Selecting the Forensic AFDF Mode

We're also going to *change the FFT Size*, located at the bottom left of the filter from its default 2048 to 512. This FFT Size setting reduces artifacts with the AFDF filter. Larger FFT settings will likely work better in Normal CNF mode.
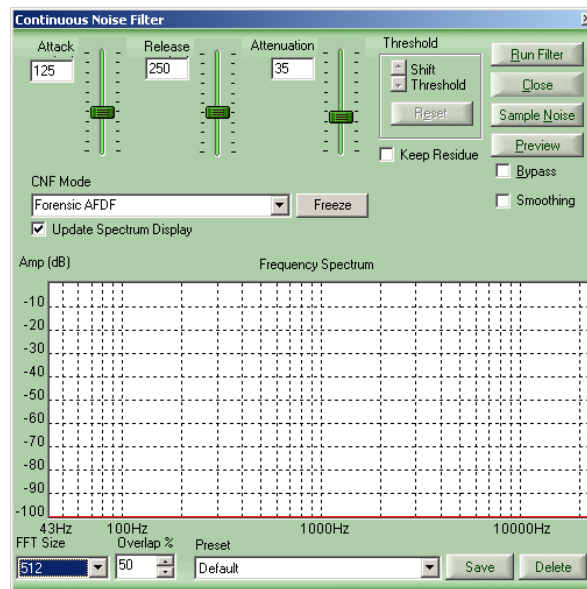

Figure 7- Changing FFT Size

Now we're ready to try our first restoration. Like all filters within DC LIVE/Forensics, you have several common features. You have a Preview button, which allows you to hear the filters' effects in realtime on your audio file. You have a Run Filter button, which actually permanently creates a wave file using the filter you've chosen, and you have a Bypass button, which lets you turn the filter on and off while playing so that you can easily hear the effects of your filter versus the original.

Move the Attenuation slider to "0". *Now click the Preview button*. You'll start to hear the audio. As the file starts to play, *move the Attenuation slider slowly to around 60*. You'll hear most of the noise slowly disappear.

Listen for a second or two*. Now click the checkbox labeled Bypass*. This "bypasses" the filter and stops the filtering. You are now hearing the original music without the filters in place. Note the large amount of noise. *Uncheck the Bypass box to start filtering again*. What a relief! That's much better isn't it?

Remember that with this first tutorial, we want to show you how quickly you can clarify a nasty recording. This version is nowhere near perfect, but the point is, you can now hear the voice. This is but one approach in DC LIVE/Forensics.

Want to have some more fun? As the cleaned file plays, c*lick on the Keep Residue checkbox*. This filter lets you hear the noise that DC LIVE/Forensics is removing…sometimes it's useful to hear what's being removed. This can be a useful tool when you're close to finished and want to make sure you've removed only what you want to remove. You can hear that we've sliced a bit of the good voice out of this file, but remember the goal: to quickly get something that lets you dig a voice out of the muck. Your ears should tell you that the mission was accomplished.

Now, *stop the preview by clicking on the Cancel Button in the Preview box*. *Click on Run Filter* and you now have a destination file that is much more listenable! *Close the Continuous Noise Filter*. Could this possibly be any easier? Note how visually different the before and after files are. You begin to see what "noise" actually looks like.
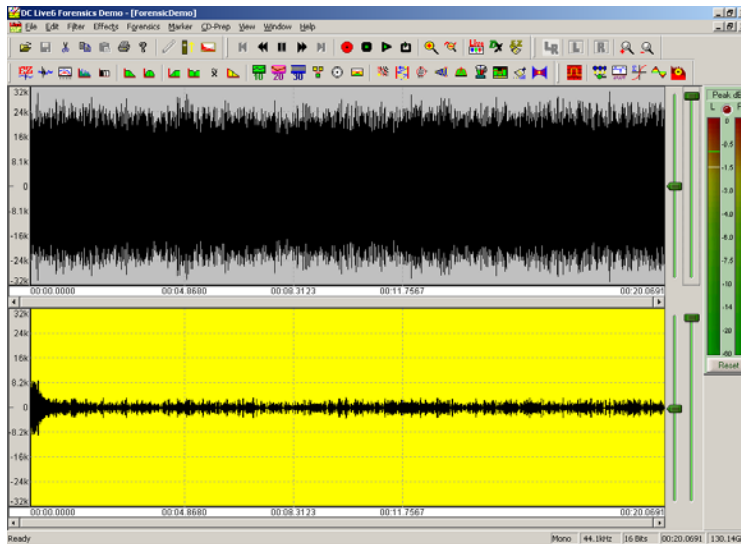

Figure 8- An Amazing Difference

Please continue on with the Advanced Forensic Restoration guide below. It starts your education on how to use individual tools and goes into more depth on the overall concept of DC LIVE/Forensics.

Advanced Forensic Step By Step Guide

Since the Forensic AFDF filter is so easy, you don't really get a feel for the overall program. This guide assumes you will use individual tools and will perform a similar restoration in a series of steps. One of the benefits of having over 25 different powerful filters in DC LIVE/Forensics is the different methods you can apply to the same problem. Our first guide showed you the down and dirty fast mode. Now lets make use of more of these filters and also explore more of what each filter does. We'll continue to work on Forensicdemo.wav, so you won't have to load a new file. *Go to File and then click on Close Destination.*

Because we'll need multiple filters in our new approach, let's use the MultiFilter. *Click on Filter/MultiFilter* and bring it up and *clear out any filters that are in the signal pat, by simply dragging them out of the main window*. Your Multi-filter should now look like this:
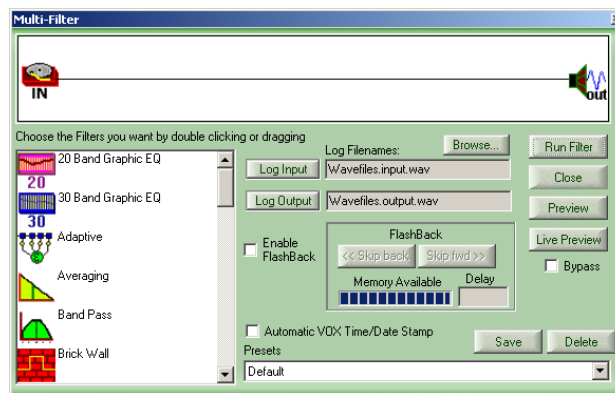

Figure 9- The Multi-Filter

The file contains a loud Buzz that almost overwhelms the good audio. To remove hum and buzz, we will use the Harmonic Reject Filter. It's called this since hum and buzz are rich in harmonics and this filter can remove them. We'll need one of these filters for sure but don't put it in the MultiFilter yet.

Next, *listen again*. There are other noises in this piece that you probably can't easily identify by listening. However, we don't only have to listen to the audio, we can also see it. **Click on View and then choose the Spectrum Analyzer. Set the Spectrum Analyzer to a resolution of 43.07 Hz and 1024 FFT size**. Now **click on Play** and you'll see the audio as well as hear it. After listening for a few seconds**, hit the spacebar to stop the playback**. The Spectrum Analyzer continues to show you the frequency spectrum of the audio. Notice that there are some "spikes" of audio in here. One, for example, is at around 950 Hz. You can click on any spot in the display and the Spectrum Analyzer will show you the frequency and amplitude at that spot. It should look a lot like this:
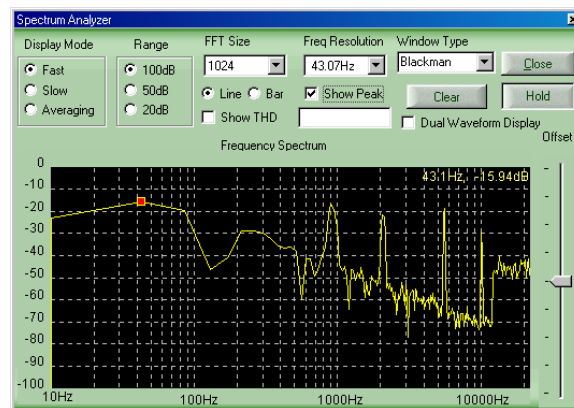

Figure 10- Using the Spectrum Analyzer

If you look closely, you can see that there are actually four spikes and some random noise above 12,000 Hz. We can remove specific frequency ranges with a Notch filter and we can remove that high frequency noise with our Continuous Noise filter or a Low Pass Filter. So now we know all the basics to attack this problem – we'll need a Harmonic Reject filter, 4 Notch filters and a Continuous Noise filter. You can see how we used the tools to come up with a general plan of attack. Now, *close the Spectrum Analyzer*.

We have already created a MultiFilter preset designed to clean this file**. *Select the MultiFilter preset called "Forensic Demo Clean Up Filter"*.** Notice that our basic filter is not quite the same as we had set-up in the earlier analysis. We know you want to hear this, so we will explain each component of this MultiFilter preset after we listen to it in action.

Note: This is a computationally challenging filter. Even a pretty fast computer might stutter or pause while trying to do all these calculations in real time. If this happens just stop the preview. *Hit the MultiFilter Preview button* and listen. *Click bypass in and out a few times* to get the full effect. *Cancel the Preview* when you're ready.

Now *click on Run Filter and listen to the resultant file* in the Destination window. Almost as impressive, check out the before and after Waveform display. It should look like this:
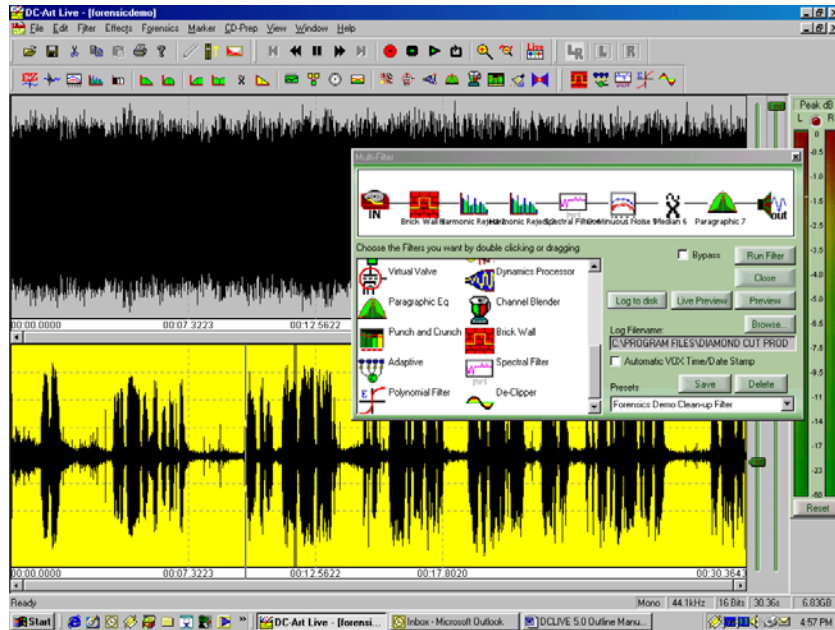
Figure 11- The power of the MultiFilter is obvious

Notice how the total jumble of noise in the source window has changed to a nice speech pattern in the destination window. You could even make this a bit more "HIFI" if you wanted, but the goal of most Forensic restoration and enhancement projects is to make speech understandable.

Now we will explain the filters we used in this preset. ***Double click each filter*** as we explain it and examine the settings. ***Close each filter*** when you finish looking at the settings.

Brick Wall Filter – This is set to reject all low frequency sound and all sound above 11 kHz. Remember the noise in the Spectrum Analyzer at 12 kHz and above? We took it out with this filter.

Harmonic Reject Filters – Both are set at 60 Hz, which is a common power line induced noise frequency (50 Hz in many countries outside the US). Why do we use two of them? Because multiple filters of this type will deepen the attenuation of hum and buzz noise. It's like one worker digging a hole 2 feet deep and then another also digging a hole 2 feet deep, but the second worker starts in the hole created by the first. You end up with approximately a 4-foot hole.

Spectral Filter – Remember we thought we might need 4 notch filters? We could have done that, but our Spectral Filter allows us to set up as many as 32,000 notch filters in one! Additionally, this filter allows us to either boost or cut any frequency range we want including ones like these that are not related to each other harmonically. This is just a more efficient way to handle several unrelated noises.

Continuous Noise Filter – This filter is set up to aggressively filter just about all frequencies outside the speech range. Remember, this doesn't take out all sound, but targets noise while leaving behind good audio. It's a good filter to add to the mix.

Median Filter – This was chosen to add intelligibility to the voice. It is good for enhancing muffled speech.

Paragraphic EQ – This is set to raise the volume of the speech frequencies.

So you see, we really did follow our initial path by using Harmonic filters, Notch filters and Continuous Noise filters. We ended up adding some additional tools that further enhanced our audio. You will likely

do the same thing as you perform your own restorations. This process of first planning a course of action and then making it better is a common one that you will use often.

Continuous Noise Tutorial

Though we've skimmed the Continuous Noise filter in our previous tutorial, this powerful filter deserves a second look. The AFDF is the automatic setting, but what about using this tool as it was intended? Taking a sample of the noise and removing it.

Let's *open the radiodemo wave fil*e by selecting File/Open Source/. This noisy radio recording will show us how quickly DC LIVE/Forensics and zero in on a continuous disturbance and eliminate it.

Click on View and make sure you have Time Display checked at this time. The Time Display box shows you various timing calculations with the program and will come in handy, as you will see.

The Continuous Noise filter is one of the coolest in the whole program so follow along carefully here. This filter will remove just about any continuous noise in a program, but it needs you to give it a sample of this noise. Once it is able to examine the noise, it will be able to seek it out and get rid of it. *Play the file now using the Play button at the top* and listen carefully. We're going to find a spot of noise only so that we can show DC LIVE/Forensics. There is some noise only at the beginning, but let's venture into the song and make use of the Timer window you've activated.

Using the Timer Window as your guide, click at about 00:5.15 seconds and drag until you've highlighted to about 5.77 using your left mouse button and holding down. Your Timer window should look like this:

Figure 12- The Timer Window

The area highlighted in yellow is the selection of noise that we're going to show the Continuous Noise filter. Your screen should look like this:
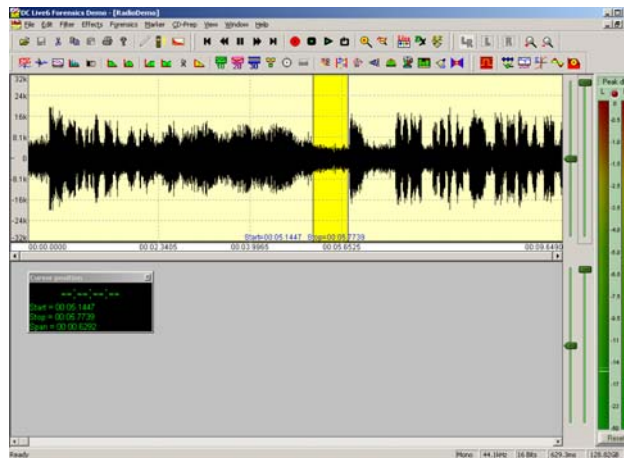

Figure 13- Selecting The Noise

Now hit the spacebar. You'll play only the selected area. It'll be quick. This allows you to audition a selected area to make sure you are really working on the correct area (does not contain silence or desired signal). You should only hear the hissing noise. Again, your selected area should look like the one shown above.

Now let's launch the Continuous Noise Filter by hitting Filter/Continuous Noise filter.

It's time for the fun part. You will like this. *Hit the Sample Noise button in the Filter window*. The filter will analyze the noise sample and will display the frequency characteristics of the noise in red. The blue line is the filter that has been designed to get rid of this noise. Notice how they track with each other. Yours should look like this:
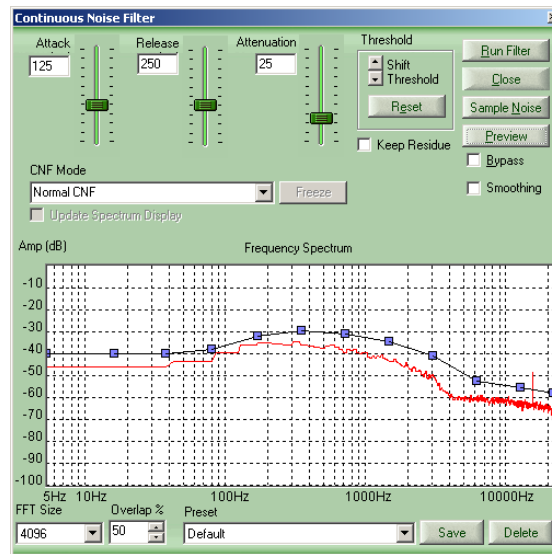

Figure 14- Continuous Noise Filter does its job

If you have jumped ahead again and clicked on Preview, there will be no lunch for you today. First, we've got to explain those little blue dots on the filter line. Notice how the blue line is above the red noise sample? The higher the blue filter line, the more filtering occurs at that frequency. The blue dots are called Control Points and allow you to adjust the amount of filtering for frequency components in the vicinity of the control point manually. We're going to do that in a second, but the Help file contains all the complete info on this filter.

Before we click on Preview, we need to again select the whole file so we'll hear the whole thing and not just our 1/3 second noise sample that is now selected. To select the whole file, just *double click anywhere in the waveform display*. Notice how the whole thing gets highlighted in yellow. *Now, go ahead and click on Preview*. You'll instantly hear that the hiss has been taken care of. Now your job becomes moving the blue control points to add back as much of the fidelity as you desire. If you start moving the blue box that is located at about 300 Hz up and down, you'll hear how it changes the sound of the preview. Move to blue control points to your right and you can quickly "dial in" the sound by either removing more or backing off on the filter. Because you can hear the filter while it's playing, this becomes a simple process of trial and elimination. You should also experiment with the use of the Attenuation control slider which increases the strength of the filter.

Live Mode Step by Step Guide

This guide will introduce you to another major feature of the program. We assume you have mastered the other concepts we introduced in the earlier Step by Step guides. Please make sure you have done these earlier guides before attempting this one.

Live mode is a powerful feature of DC LIVE/Forensics that allows you to remove noise and enhance audio as it happens. You do not have to record the audio to the hard disk before applying filters. This is useful for cleaning up radio reception for Hams, SWLs and Forensic users. It can also be used "on site" by Forensic users who may need to listen to (and record) surveillance audio as it happens.

To use Live mode, *make sure you have your speakers connected to the sound card output and an audio signal connected to the line level input*. This audio signal can be from a radio, tape deck or any other signal. For this Step-by-Step guide, we're going to assume you are using a radio to provide a signal to the program. In this case, you would *connect the headphone or other audio out of your radio to the line input of your sound card*.

Turn on the radio and you should hear audio from the speakers connected to your computer. This step depends somewhat on the brand and model of sound card you have, but the great majority of sound cards will simply take whatever audio appears on the input and send it directly to the output of the sound card. If you don't hear anything, just keep going in this Guide.

Now *turn off your Radio.* We're going to continue to work with our "Radiodemo.wav" wave file.   Before we do this live, we're going to experiment a bit with a recorded bit of audio.

Once the file is loaded, *listen to it*. You can hear that there is A LOT of noise in this file. It is understandable, but would not be fun to listen to due to all the noise. Because our goal is to provide you with several approaches to each and every problem you encounter, we're going to tackle this noisy file in a more thorough way than earlier. Once the file has finished playing, *open the MultiFilter* (under the Filter Menu) *and choose the preset called "Live Mode Demo Cleanup – SW Radio"*. We have provided in this preset some tools that are useful for this demonstration file. This will also be a good starting point for your own efforts as you use the program in Live mode.

Double click the Continuous Noise Filter to open its adjustment window. You can look at the settings for all the tools in the MultiFilter preset and you should be able to understand what they are doing based on your learning so far. Remember, you can always open a specific filter and then hit F1 to find out about it. Your screen should look something like this:

Figure 15- Multiple Screens Working Together

We want to bring your attention specifically to the Continuous Noise filter here because we are dealing with a concept that you might not have considered – How do I use this filter in Live mode when I can't take a sample of the noise? Remember, the audio is happening in real time and is typically not recorded to the disk at all in Live mode. It'll therefore be impossible under these conditions to actually take a noise sample. Our preset setting here shows how you can deal with this. Notice that the filter is set to provide a

fairly large amount of attenuation to the low frequencies and the higher frequencies (remember, the higher the blue controls, the more noise is removed at that frequency). With radio signals, we will seldom care about very low or very high frequencies anyway, so this setting gets rid of a lot of noise without unduly bothering our good signal. The controls between 300 hz and 3,000 hz (which are speech frequencies) were then simply adjusted for good results. Go ahead and *hit the MultiFilter Preview button now*. *Click Bypass in and out* to hear the improvement.

Notice the slider labeled Attenuation. This control determines the overall amount of filtering that is going on for the entire filter. If you move this up, it will filter more overall. *While Previewing, adjust the Attenuation slider to find the point you like best*. You'll find that this very weak signal is now quite understandable – if you speak German. The other filters are also adjustable, of course. You'll quickly find that there is a tradeoff here. The more aggressive you make the Continuous Noise filter, the more digital artifacts you will induce. Just adjust it to please your ears.

Now *stop the Preview* and let's go into Live mode. *Turn on your radio* so that you can hear the signal in your computer speakers. **Note:** if you don't hear anything continue on anyway as some sound cards don't monitor incoming audio by default. *Double click the leftmost icon in the MultiFilter* so that you can adjust your audio settings. Do that and then *click on the button labeled "Live Preview"* and the program will immediately start providing filtered audio to your speakers. You should certainly be hearing audio now. Keep in mind that in this demo version, Live Preview will only be active for 60 seconds.

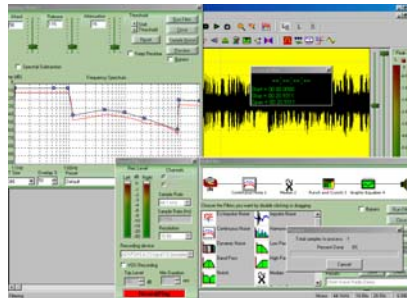Your screen should look like this in Live mode:

Figure 16- Live Mode is Engaged

Important -- Do you hear two versions of the audio – one a bit later in time that the other like an echo effect? If so, you need to turn down the input of your sound card. If you have a standard sound card, just double click the speaker icon in your tray and choose Options then Properties. Now click on Recording and then click "OK". Now move the slider labeled Line Input or Line down to the bottom. The echo should go away! If you have a more sophisticated sound card, refer to its documentation to find out how to turn off monitoring or turn down the Line Input control.

You cannot only process audio in real time, but you can record it as well. Just click the Log to Disk button.

Here's a tip. You can now add or change the filters as you please. A good one for radio work is the Dynamic Processor using the ALC mode. This can help a lot with fades in a signal as it will even out the audio in real time. *Close all of the filters as well as the Timer Window.*

What you have learned:
In this Step-by-Step Guide, you've learned how to use the MultiFilter in Live mode to process audio as it happens. You've learned how to adjust your sound card for Live mode – remember, however, that some low quality sound cards cannot record and play at the same time and therefore can't be used in Live mode. You also learned how some filters could be used to make radio reception much better.

DSS Demo
One of the more amazing new features of DC LIVE/Forensics is the Dynamic Spectral Subtraction filter.
One of the more common ways that criminals mask conversations is either turning up a stereo or television
during conversations, turning up the car stereo, or even having meetings in loud clubs to defeat hidden
microphones which may be in place. Now, with DSS, law enforcement officials have the capability to
remove the masking noise and still find the voices buried within.

Click on File/Open Source and select the DSSDemo wavefile. *Play the file by either hitting the space
bar or pressing the Play icon.* Can you hear the voice buried here? It is almost totally masked by the
music. In this case, 2 microphones were used: a body mic, which picked up the voice heard as well as a
good deal of the room noise (music) and a second mic which picked up mainly the room noise.

Click on the Forensics Menu and launch the DSS Filter. Your screen should look like this. We've
created a preset designed specifically for this file. Just click on the preset box and open the "dssdemo"
preset.

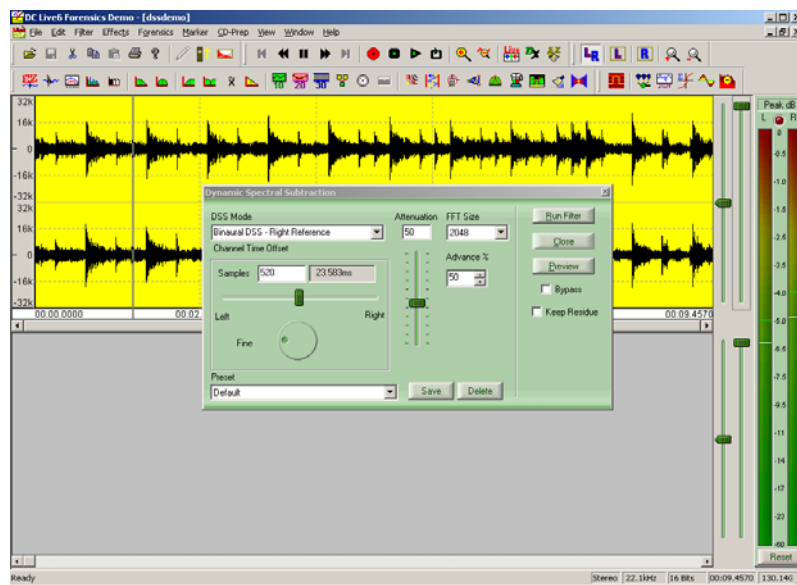**Figure 17- The DSS Filter Is Engaged**

DSS is designed to pull a voice from within incredibly loud background music. It works best when you
have an accurate recording of the background noise, but in several cases, where environmental mics failed
and only the voice file was preserved, copies of the recordings playing in the background were purchased
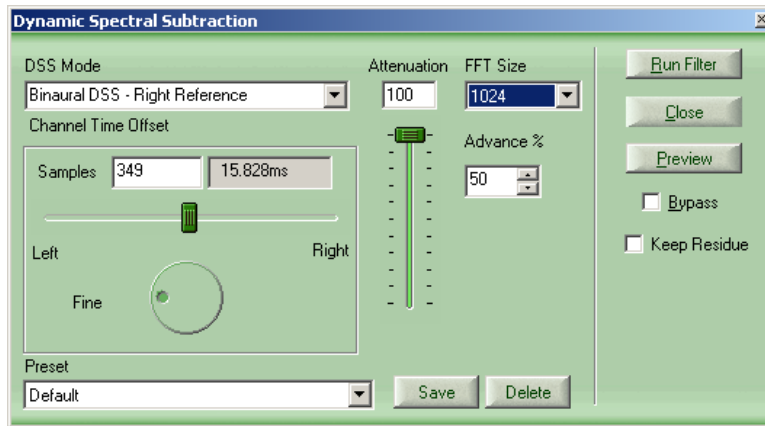on compact disk and subtracted later. *Hit the Preview button*.

Figure 18- A CloseUp of DSS

The most important aspect of achieving usable results from the DSS filter lies in making sure that the time alignment between the reference environment recording and the voice reference are as close as possible. You'll notice a "fine" adjustment wheel. ***While the file is previewing, move this wheel to the right. As you get above 2000 samples,*** you'll hear the music begin to come back in as the alignment fails. ***Run the filter.***
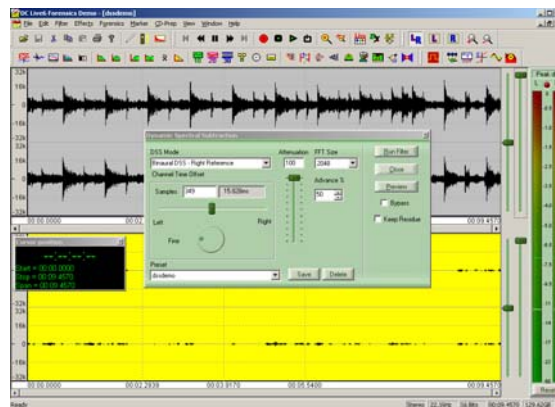
Figure 19- The voice remains

Now ***click on File/Make Destination the source***. The tiny waveform containing only the voice is now available for additional processing. It will be called dssdemo1.wav so that you know the file it originated from. From here, you can try several things…first you may want to raise the gain by either going to the Edit/Gain Change feature or by launching either of the 10, 20 or 30 band graphic EQs and boosting the frequencies or the overall gain. You could go to the CD Prep menu and do a Gain Normalize that brings the level of the loudest frequency to 0 dB. You could try to remove additional noise. That's the true beauty of a program like DC LIVE/Forensics. If you had any other package you may not have a prayer with a file like this, but with this, you always have a fighting chance.

Which Tool Do I Use?
Probably the most frequently asked question we get each day is "How do I get rid of a certain type of noise?" Certainly, the more you use this product, the more proficient you'll become at picking the right tool to match the noise you're trying to remove. But for now, if you're new to the game, we've included this handy chart that may help you get a jump on finding the tools that match your problem areas.

Filter Finder

Sound Restoration Category	Sound Defect or Task to be Performed	Filter Type
Magnetic Tape Recording	"Hiss"	Dynamic Noise Filter or Continuous Noise Filter
	"Highs Loss"	Time Offset (azimuth correction)
	"Smeared" Stereo Image	Time Offset (azimuth correction)
	Clipping Distortion	De-Clipper
	"Off Pitch"	Speed Change Filter
Radio or Short Wave Radio	"Hiss"	Dynamic Noise Filter or Continuous Noise Filter
	"Static"	Impulse Noise (Ez-Impulse or Expert Impulse Filter)
	Line Frequency Buzz	Harmonic Reject Filter
	Volume Fading	Dynamics Processor ALC
	Heterodyning "Whistle"	Notch Filter or Multiple Notch Filters
FM Stereo Broadcast	Multi-path Distortion	Dynamics Processor / De-Esser or Channel Blender
	Multiplex Noise	Channel Blender
	Ignition Noise / Static	Impulse Noise Filter
Live Recording	"Feedback"	Notch Filter
	"Hum"	Notch Filter
	"Mic 'P' Pop"	Highpass Filter
	"Dead"	Dynamic Noise Filter (spectral enhancement mode)
	'Digital Sound"	Virtual Valve Amplifier / Tube Warmth
	Street Noise	CNF Spectral Subtraction
	HVAC Noise	CNF Spectral Subtraction
	Hum	Notch Filter
	Buzz	Harmonic Reject Filter
	Sibilant "Ess"	De-Esser
	Digital Clipping	Limiter Preset in the Dynamics Processor
Telephone Conversation	"Intelligibility"	Bandpass Filter
	"Noisy - Random Out of Band"	Brick Wall Filter in Bandpass mode or Band Pass Filter in Chebyshev Mode
	"Noisy – In Band"	Continuous Noise Filter
	"Muffled or	Median Filter (large sample size)

	Garbled"	
	Variation in loudness between parties (near party/ far party gain compensation)	Dynamics processor / Compressor / ALC Punch and Crunch in ALC mode
	Warbling Tones	Adaptive Filter used in Keep Residue Mode
Surveillance Recording	Cancellation of Radio / or TV using a reference track	File Conversions (Left – Right Mode) Adaptive Filter in Reference Mode Continuous Filter in DSS Mode
	Automatic Voice Activated Recording	Multifilter operating in VOX mode
	Automatic Time Activated Recording	Timer Recording Function
	Noise isolation and identification Poor Speech Articulation	Slot Filter Median Filter w/ Weighting
	Varying Random Noise Profile	Adaptive Filter
	Varying Coherent Noise Profile like music playing behind speech	Continuous Noise Filter in DSS Mode with reference track
	DTMF Tone Amplification	DTMF Presets found in the Paragraphic EQ
	DTMF Tone Identification	Spectrum Analyzer
	Voice Masking	Speed Change + Stretch & Squish Filters
Forensics Audio Analysis & Enhancement	Gunshot Ballistic Timing	Markers and Time Display / Spectrum Analyzer
	Gunshot Ballistic Identification Matching	Time Display and Spectrogram
	Voice Identification	Spectrogram
	Analog Tape Deck Azimuth Correction	Time Offset Adjustment in the File Converter
	Person Talking too fast for Transcription	Stretch & Squish

	Voice Pitch too High	Speed Change Filter
	Tape Authenticity	Spectrum Analyzer
	Reference Channel Acoustical Compensation	Bandpass Filter plus 20 Band Equalizer plus Reverb
	Poor Intelligibility	20 Band Graphic EQ
	Adaptive Noise Rejection	AFDF in the Continuous Noise Filter
	Narrowband Noise Rejection	30 Band EQ
Optical Movie Soundtracks	"Pops"	Impulse Noise
	"Crackle"	Median
	"Thuds"	Highpass Filter
	"Hollow"	Graphic Equalizer
	"Film Flicker"	Harmonic Reject Filter
Television / Video	Vertical Sync Pulse Bleed-through buzz	Harmonic Reject Filter – 30 Hz United States 25 Hz Europe
	Horizontal Sync Pulse Bleed-through	Low Pass Filter
Any Sound Source	Mike "P" Pop	Highpass Filter selectively applied
	Low Gain or Volume	Gain Change (under Edit menu)
	Acoustical Feedback Clipping Distortion	Notch or Harmonic Reject Filter De-Clipping Filter or Manual De-Clipping Process or Lowpass Filter selectively applied or Impulse Filter
	De-Ess (excessive sibilance of the pronunciation of the letter "S."	Lowpass Filter selective applied, or use the Dynamic Processor/ De-esser
	Pitch incorrect	Change Speed Filter
	Line Frequency "Buzz"	Harmonic Reject Filter
	Excessive Dynamic Range	Dynamics Processor or Punch & Crunch
	Lacking Dynamic Range	Dynamics Processor or Punch & Crunch
	Top Octave missing	Virtual Valve Amplifier / Harmonic Exciter
	Top Octave	Dynamic Noise Filter Enhancer Mode

	Weak	
	Recording lacks "warmth"	Virtual Valve Amplifier
	Too much Reverb	Continuous noise filter
	Weak Vocal	Gain Change selectively applied
	No Ambience	Reverb
	Digital Clipping	De-Clipper
	Analog Clipping	De-Clipper
	Harmonic Distortion	Polynomial Filter / De-Esser
	Intermodulation Distortion	Polynomial Filter
	Multi-Tone Whistle	Spectral Filter or Multiple Notch Filters
	Signal Over modulates	Limiter Presets in Dynamic Processor
	Noise Between Tracks or Rides	Noise Gate Presets in Dynamics Processor
	Automatic Noise Reduction	EZ Clean Filter
	Sterile Bass Sound	VVA Fat Bass
	Medium Resolution Frequency Contouring	20-Band Graphic EQ
	High Resolution Frequency Contouring	30-Band Graphic EQ
	Normalize Loudness Between Multiple Wave files	Auto Leveling in the Batch File Processor

I Just Didn't Get It.
Don't worry, if you still feel intimidated by this system, help is just a phone call away. Simply call us at 717 764 9240 and we'll take the time to not only answer the phone, but help you better understand the product. We don't care if you haven't paid us any money yet. No question is too basic. Try us, you'll find out why our customer support has been called "legendary." Unlike competitors who may never actually answer the phone when you call, we do our best to have a human answer the phone each and every business day and try to respond to any emails we may get within 24 hours of the next business day. You may never need the excellent support we offer, but if you do, you'll notice a major difference with our company.

Training Is Available
We offer a 3-day training course on DC LIVE/Forensics in Northern Virginia several times as year as well as other participating training facilities all over the country. The class is open to Law Enforcement and forensic audio professionals. It will be useful for both the new user and someone who is already comfortable with the software. We will go over some audio theory, but only as is necessary for a complete

understanding our how our filters and enhancement tool operate. A full day of hands on training is included and each student will have their own PC provided for the training. We will cover everything from proper playback and recording techniques, to voice recovery and enhancement. A certificate of successful completion will be given out at the end of the course.   Call for more information.

How Do I Buy DC LIVE/Forensics?
We try to make that process as simple as possible. Simply go to the www.enhancedaudio.com web site and follow the signs to our secure store or call us toll free at 866 260 6376. The product is $1399. We also offer a 3 day extensive training course about 2 or 3 times a year that is $829 and gives you a full explanation in detail about Audio Forensics, DC LIVE/Forensics, gathering and storing audio evidence, and securing the evidentiary chain for later use at trial. Call us for more details.

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