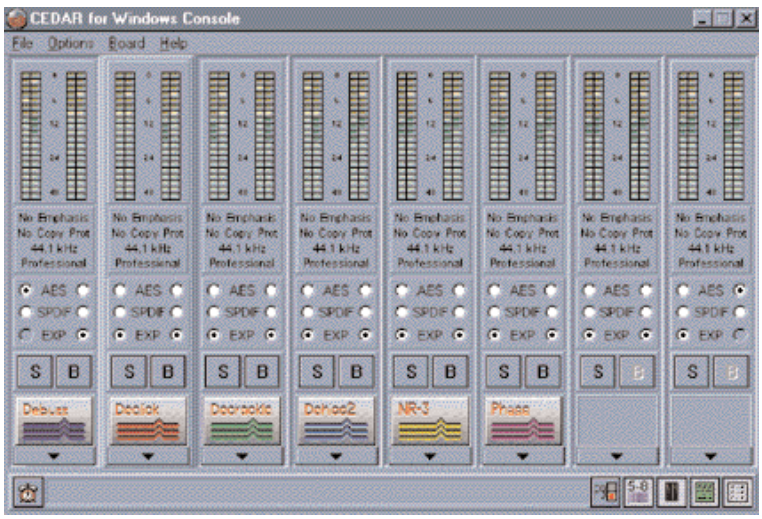
CEDAR for Windows

The first name in audio restoration now operates on the Windows platform. Michael Gissing assesses the improvements that this change has afforded.

CEDAR is well known in the professional audio community. It is the preferred restoration tool for the music and film sound industries and is the only real-time system. But if CEDAR had a fault it was the fact that it was a DOS-based system and did not allow for a multitasking environment which most of us now take for granted. To address that shortcoming, the latest version of CEDAR is designed to run on a Win 95 or Win 98 platform and is fully multitasking. The latest improvements make it possible to run multiple CEDAR modules. As if that were not a big enough improvement, CEDAR have also taken the opportunity to upgrade many of their existing software modules and also to include a new module – Debuzz.



System Overview

I had the latest CEDAR unit in the studio recently, partly for review purposes but also for some noise removal on two operas and a music documentary. The unit was supplied by David Wickert of Prodisc, the CEDAR agent. Housed in a rackmount PC, the unit had four DSP I/O cards. The number of I/O cards determines the number of modules that can be run simultaneously and is only limited by available ISA card slots (up to a maximum of eight card).

With supplied breakout cables to standard XLR or S/PDIF connectors, I had the option of connecting all four cards to enable independent eight-channel processing or alternatively allowing the system to be daisy-chained for two, four or six channel work. For my needs it was better to connect for two-channel processing and enable the CEDAR to then daisy-chain the cards. This allows four real-time processors to be selected, in any order and to simultaneously perform declicking, debuzzing, denoising, or any module that I cared to select. This is all facilitated via the new control panel software that lets you select the input and output for each card. If you select AES or S/PDIF, the card will look for and lock onto the digital signal going into the card. If however you select EXP, the card automatically daisy-chains the output from the previous card. The control panel also shows status information about the digital input and very accurate stereo peak metering. At the bottom of the control panel, the operator chooses the software module. So, working left to right, the input signal is routed through the choice of software, then daisy-chained into the next card for the next software module, which can in fact be the same software module. This for example may be required when declicking, to combat more than one different click types.

For the opera jobs I decided to run the signal through the Declick, Decrackle, Debuzz and the new NR-3 Noise Reduction. This meant using the stereo input on card one, and daisy-chaining the signal to cards two, three and four and then output from card four. For anyone experienced with CEDAR, the order in which processing is done is vitally important. In the past, separate passes, in that order, would have been required. But, by now being able to process in one pass, a vast amount of time is saved, and, most importantly, the relationship and interaction of the entire processing chain can be assessed. Anyone that has worked with non real-time systems will appreciate the advantage of a real-time alternative, but a multiple process real-time system is just awesome. The control panel also has some nice global features, like being able to switch the signal between process and bypass on all modules. Also, each module can be soloed or bypassed.

As the CEDAR processing adds some signal delay, the accumulated delay can be displayed in a variety of formats – number of samples, milliseconds and timecode frames (for all code formats) including sub frames. This makes it easy to calculate offsets and quickly resync processed material. From the control panel the total system set-ups including the individual module settings can be saved as a single project file. This is on top of the ability to save settings on individual modules like the NR-3.

The Software Modules

Declick is the simplest CEDAR module to use and in

many respects the most amazing. You simply select the click type – Small, Medium or Large – then adjust the threshold to ensure click removal. Up to 2500 clicks per channel, per second, are removed without degrading the signal. Channel threshold can be ganged or separate levels can be set. Each channel, as in all the CEDAR modules, is processed independently. Post processing gain/ attenuation is provided.

Decrackle is similar to Declick but the software is optimised to detect surface noise, crackles and distortion. This makes it great for film optical soundtracks as well as old records. Again setting the controls is simply a matter of adjusting for two different crackle types, adjusting a threshold and also a 'split' level. When you select Detect, you hear the artefacts that the CEDAR has determined are crackles and distortions. By adjusting the split level, you tailor the degree of crackle detection. The threshold then determines the amount of removal.

Distortion is softened, and while some types of distortion can be fixed, (amplitude distortion) the "smarts" in CEDAR does a good job at softening the perception of the distortion in general.

Debuzz is a new module and comes in response to the request for a better tool for hum and buzz removal. While Decrackle is able to work on buzzes and the noise reduction would work on hum, the CEDAR developers realised that an optimised and simple to use module was needed. Like all CEDAR software, the strength of the system is the ability to detect and extract without the use of destructive filtering. Settings are simple. A choice of fundamental frequency tunes the software into the hum. Cleverly, a little pull down menu gives you choices of obvious frequency presets like 50 and 60Hz, and the module will then automate moderate frequency changes in the fundamental.

Attenuation controls are then split into low, medium and high frequencies. Like all CEDAR modules, which are stereo processors, different settings can be applied to left and right channels. On most of the modules they provide separate left/right controls plus a lock/unlock symbol. The Debuzz software deviates slightly from that methodology by providing a separate left, right or both selection button. As the debuzz has more control settings than most of the other modules, with the exception of NR-3 and EQ and Dynamics, this change of control interface makes sense.

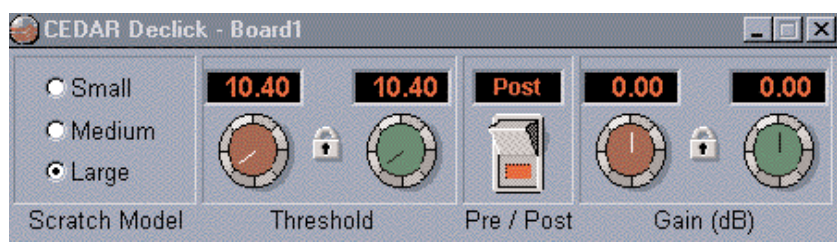
Phase Corrector & EQ

In the modern digital studio, phase inverting and sample accurate shifting is readily available. So some may ask why has CEDAR bothered to provide phase correction tools in a software module. The simple answer is that CEDAR will detect and auto track phase anomalies, and because it regenerates the signal, it can resolve and correct phase errors that are 0.25 of a sample. In fact, manual adjustments as short as 0.01 of a sample are possible. Improvements to the old phase corrector are the new fast and accurate Lissajous display and the speed and accuracy of the auto tracking correction.

EQ and Dynamics processors have been part of CEDAR software for a long time but the CEDAR for Windows version has a much improved interface. Within the software module, up to sixteen EQ or Dynamics sub modules can be daisy-chained. This means that a dynamics processor like a downwards expander can be combined with an EQ to trigger a frequency dependent dynamics response. The effect of this, for example, could be a customised de-esser. The EQ is amazingly powerful. In parametric modes, narrow Q settings of 100 are available. Cut and boost of 100dB and rolloffs of 100dB per octave in shelving modes are combined with frequency accuracy of 0.1Hz. And the dynamics processors are also extraordinary. As the proud owner of a Penny & Giles PP10, I can tell you that the CEDAR dynamics are in the same class. If there is anything to criticise, it is the fact that the signal delay in all the CEDAR modules also applies to the EQ and Dynamics. This means that they are not practical modules to use during mixing or recording, but then the intention is for the ultimate control during signal processing and restoration, post recording and pre mixing.

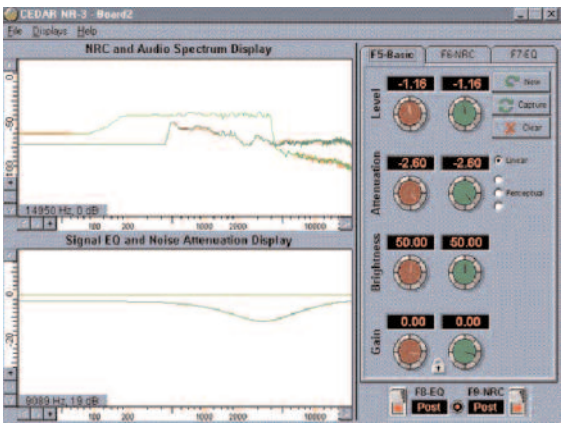
Dehiss2 & NR3

I have intentionally left the description of the two new denoising modules until last. Partly because, for my needs, they are the most important. But they are also the two modules that are most improved in the CEDAR for Windows version. Dehiss2 is an automatic noise reduction module that requires no 'spectral fingerprint'. Dehissing usually requires that a sample of the type of noise be used to optimise the removal processing. But so advanced is CEDAR's ability to discriminate between natural and unnatural sound, that the Dehiss2 will remove an amazing amount of noise without eating into the signal. Again we find the simple threshold and attenuation controls common to most modules. But a brightness control is also added. The dehissing software, when driven hard, has the tendency to take some brightness off the signal. This is partly a change in perception due to the removal of high frequency noise components that give a perceived brightness. Adjusting this control actually fine tunes CEDAR's noise modelling. The software is then better tuned and therefore avoids 'eating' into the high frequency components. It retains brightness, rather than needing post processing EQ.



NR3 is worth the upgrade to CEDAR for Windows alone. Anyone using the older CEDAR systems should check this baby out. Like the earlier NR versions this module generally works best with a sample, although you can work without a sample. But getting a sample is made

easier with a single mouse click. Different left and right samples can be used and libraries of samples can be easily gathered, stored and utilised. As well as the familiar spectrum display showing the signal with the NRC sample superimposed, the NR-3 includes a signal EQ and noise attenuation display. These displays are further enhanced by the new feature of being able to call up a freehand toolbar which allows the operator to erase or freehand draw modifications to the sample or the shape of the noise reduction curve. If that was not enough, CEDAR have added three new perceptual curves that automatically tailor the denoising to Fletcher Munson frequency perceptual curves. For the opera jobs, I found that a quick sample followed by a quick tweek of the noise attenuation control – to the point where I was just becoming aware of pushing the system – and then selecting one of the perceptual curves and 'hey presto', job done. The dehissing was the best result I have experienced and it was also the easiest. The important point about the NR-3 is that I barely scratched the surface (pardon the pun). Like the earlier NR module (known as Hiss-2), it also has the ability to apply noise-free EQ. After separating the signal that CEDAR determines to be genuine signal from noise, EQ boost is applied to the genuine component of the signal. This means that even residual noise is not given any EQ boost. Cleverly though, EQ cut is applied to both genuine and noise components.



The comprehensiveness of the EQ is staggering, from ultra tight notch filtering to broadband and roll off filtering. In the past, operators have been using the notch filtering to deal with hum, but with the new Debuzz software that technique is a thing of the past.

DeLighted

Having used the older single module CEDAR systems, I was expecting an improvement to the CEDAR functionality, but the big improvements to the NR-3 and Dehiss2 modules and the new Debuzz are very impressive. CEDAR is, in my opinion, the best restoration tool available and it seems that the team at Cambridge are determined to make sure that they out pace any opposition. The CEDAR system fully optioned and with all the modules is not cheap, although the entry level price for a single card and software module has come down over the years. The exciting news from CEDAR is that at the same time as the multi-module Windows systems are available, they have released a new range of stand-alone boxes featuring Declick, Decrackle, Debuzz, Azimuth Correction and Dehiss2 which are at very competitive prices.

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Price

• *Systems currently available from $19,500 (excluding host computer)*