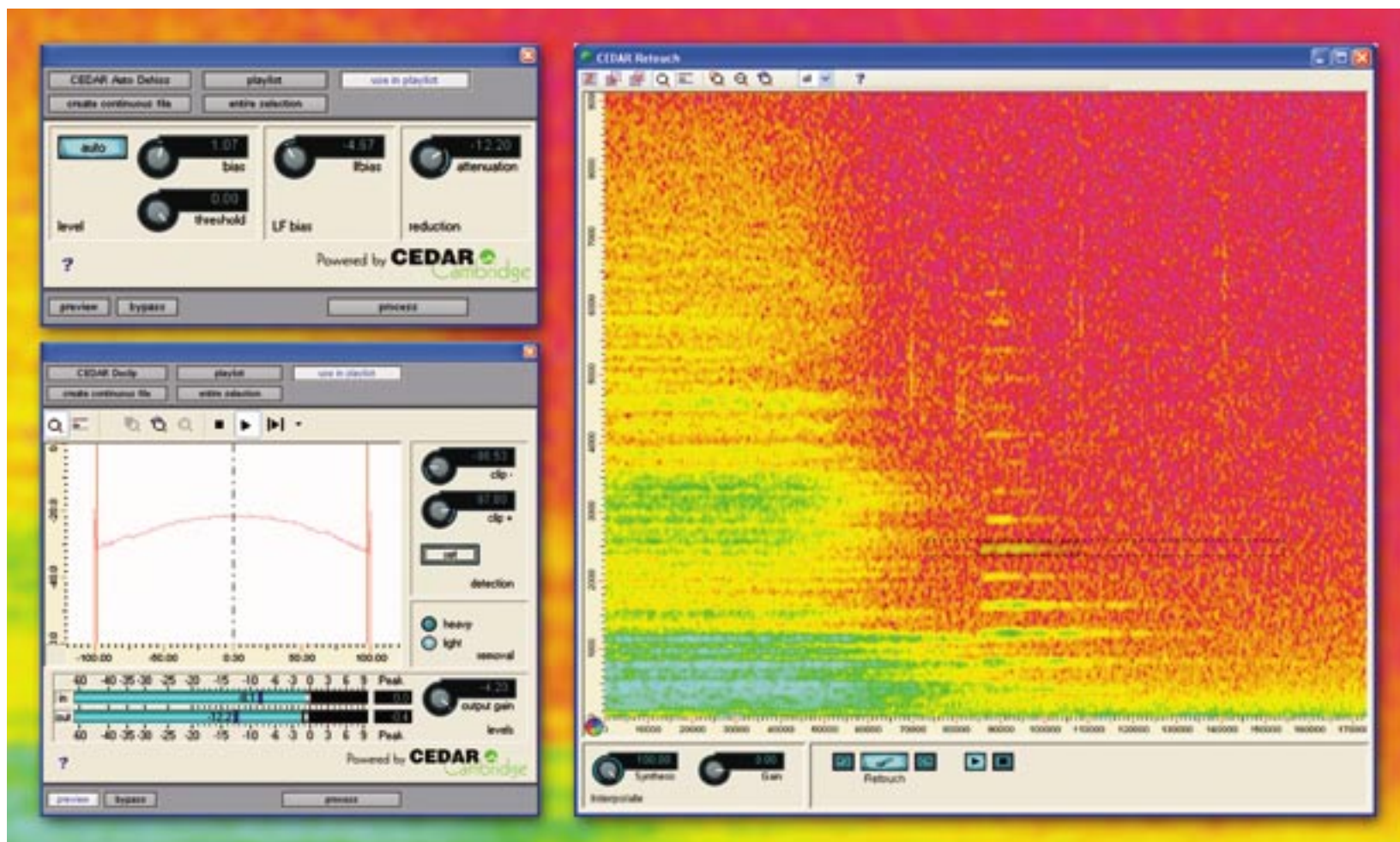


CEDAR Tools

CEDAR needs no introduction as the most pre-eminent company in the field of audio restoration. CEDAR Tools is the company's first venture into providing some of the functionality of its dedicated processors for Digidesign's Pro Tools platform, something that was previously only available to SADIE and Pyramix users.

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A VAILABLE AS A SET of RTAS plug-ins for Pro Tools LE and HD systems, CEDAR Tools is currently only available for Pro Tools on PC — something of a problem for facilities (like my own) that run Pro Tools exclusively on Mac. The nice folks at CEDAR were good enough, therefore, to supply me with a laptop running Pro Tools LE for the purposes of this review. Software authorisation is via a dedicated USB dongle (not iLok), and as this was pre-installed and authorised I can't comment on how straightforward this process is. This first release provides three restoration processes — Auto Dehiss, Declip and Retouch. We'll tackle each in turn, starting with the most straightforward — Auto Dehiss.

There are many approaches to removing unwanted broadband noise from signals, particularly reasonably consistent noise such as tape-hiss. In the past, this has ranged from simple low-pass filters, to dynamic filters to multiband expanders. More recent developments use subtractive processing based on having a 'fingerprint' of the noise signal — in other words a sample of the material that contains just noise and no signal. Auto Dehiss moves a step beyond many of these processes. Although still based largely on the principle of spectral subtraction, the process is automatic in the sense that you are not required to

identify a passage of noise without signal to act as the fingerprint. Instead, the process dynamically tracks and automatically updates the noise fingerprint, which in part makes the results more natural sounding.

In use, you have the option of fully automatic or manual modes. Invoking the plug-in brings up the familiar Pro Tools plug-in wrapper, with a button for Auto mode On or Off, and up to four variable parameters. The key parameter here is attenuation, which sets the degree to which the presumed noise component is removed from the signal. Engaging Auto mode and simply changing this parameter produces quick and very good results on a variety of material. Hiss can be dramatically reduced, with very little in the way of artefacts to the signal, and plenty of transient detail left intact.

Although the intention of this automatic mode is that all its parameters are in their theoretically ideal positions, these can be tweaked if desired. For example, the degree to which noise is identified can be altered with a Bias parameter, which can make the process more or less aggressive in identifying noise for removal. In practice, reducing this parameter makes noise slightly more apparent, but this is countered by a little more openness to the high end with some programme material. There is also the capability to

force the process to target LF noise (below 5kHz) more aggressively than HF noise or vice versa. It's all very straightforward, and gives great results extremely quickly.

Disabling auto mode requires you to set an otherwise unavailable parameter to manually identify a threshold point for the noise component. Other than in extreme cases where the ratio of noise to signal is comparatively high, I don't really think many users will stray too far from the automatic setting.

Declip is designed to reconstruct in a single pass multiple instances of damaged audio caused by analogue or digital clipping. Selecting a passage of audio and invoking the plug-in brings up an analysis window that shows a graph depicting the average number of sample values either side of zero in a given period of time. With most audio that has not suffered from clipping, the shape of this curve will be roughly similar to a normal distribution curve — indicating that the proportion of high sample values either side of zero is relatively less than medium or low values. In the case of clipped audio, the graph shows very obvious spikes at the extremes of sample values, indicating that a higher than normal number of samples of these values is present. Digital clipping shows up as very defined spikes, analogue clipping

as more rounded but still pronounced peaks. Two controls then allow you to set the sample level at which clipping is deemed to have taken place, and this moves lines on the graph. Moving them just inside the spikes tells the Declip algorithm to reconstruct waveforms at any level exceeding these values.

Two algorithms are offered, one optimised for light clipping the other for heavy clipping. In practice, the plug-in is certainly able to improve the quality of the audio — and in the case of sporadic light clipping, does so very transparently. Severely damaged audio though, results in an output that, while less objectionable than the original, is still noticeably problematic (*Some things are just beyond redemption. Ed*). Interestingly, it seemed to perform better on material with a strong harmonic and transient content, such as piano, than it did on speech — although the speech example used was quite severely clipped.

The final process on offer, and in many ways the most impressive, is Retouch. The (excellent) help files describe this process as the audio equivalent of PhotoShop, and I can't think of a better way of putting it. If you imagine the process of retouching a digital photograph, removing a blemish by replacing it with pixels of similar luma and chroma values as those surrounding the blemish while making sure that there are no objectionable 'steps' between boundaries — all you have to do is apply the same concept to frequency and amplitude over a given time period.

In fact, the PhotoShop analogy is further strengthened by this plug-in's use of a spectrogram to indicate these characteristics. Selecting a region and invoking the plug-in pulls up this spectrogram, with sample values along the horizontal axis, frequency along the vertical axis, and colour variation indicating relative amplitude. Because the concept of Retouch is to use material surrounding the offending artefact to take its place, the original audio selection needs to include at least three times the length of the audio to be removed — preferably either side of the artefact.

A series of zoom tools allow easy navigation around the spectrogram, and identifying the offending artefact is reasonably easy given practice. Any noise event that has harmonic content is also clearly visible with individual harmonics rising up the vertical axis. Although Retouch has a few different modes of operation, the interpolation tool is by far the most powerful. Having identified an artefact (or part of an artefact, as harmonics are best treated individually), selecting the interpolation tool allows a marquee to be drawn around a given area. Once drawn, an outline appears that includes the area selected plus a 'handle' either side of this on the time axis. These handles are used to define the areas of signal that will be used to synthesise a replacement for the identified artefact. Although by default they are symmetrical, they can be changed afterwards — if, for example, an unwanted noise in a period of quiet is immediately followed by a louder, wanted signal, the user can change the post event handle to be zero, and set a larger pre-event handle.

Once this is done, parameters control to what degree the marked artefact will be replaced by interpolated signal, ranging from no replacement to full replacement — in other words an artefact can be reduced in intensity or removed. If necessary, the gain of the selected area can be increased or reduced to give the best match. Once these parameters are set, clicking the Retouch button performs the task, after which the result can be previewed from within the plug-in window. Each Retouch step can be undone and redone at will, and typically this does involve a little playing around. Once you are happy, the processed audio can be rewritten back to the Pro Tools time line.

Again, much like PhotoShop, the mechanics are easy enough, but there is a definite skill in identifying what to manipulate and how. A little practice, though, goes a long way and after half an hour or so I was able to remove an intrusive car horn in an otherwise quiet section of a choir recording with no detectable artefacts — very impressive stuff. There are other edit modes that allow you to 'patch' audio by identifying an area in the spectrogram, and then replacing it with another area that you identify, but this proved harder to get good results with.

Overall, this is an excellent package that prioritises the absolute quality of the restoration process over everything else, although I was much more impressed with the performance of Dehiss and Retouch than I was with Declip. I very much hope that CEDAR will continue with the development of these tools and start to include more of its processes in future. And please could we get them on a Mac too? ■

PROS

High quality and largely set and forget Dehissing; Retouch an extremely powerful tool; excellent documentation and help files.

CONS

Declip not as immediately impressive as the other processes (but then again, get it right to start with!); PC Pro Tools only.

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