Sonnox Restore

Oxford Plugins

QUICK START GUIDE

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Introduction

The Sonnox Restore suite is a collection of three plug-ins designed to clean the sound of digital audio recordings that are damaged:

- by pops, clicks, or crackle;
- by hum, buzzes and whines;
- or by noise.

The tools are not just for restoring old material, but also for removing the clicks, pops, buzzes and background noises that can sometimes accidentally occur in new recordings.

A great deal of time has been put into making the Sonnox Restore suite as intuitive as possible in terms of providing excellent visual and graphical feedback. They also include some innovative solutions not seen before in the restoration field, the intention being to enable quick and accurate repair of a variety of spoiled recordings.

This quick-start guide contains a description of the most important controls and some initial guidelines to help the first-time user set up and use the plug-ins for the first time.

The user manual documents the plug-ins in full and should be consulted to get the best out of the plug-ins.

Restoration Processing Workflow

It is usual practice to use the DeClick process first, particularly if there are large disturbances present that require repair.

The optimal order for DeNoise and DeBuzz is probably dependent on the programme material. If a loud buzz is dominating low-level noise it would be sensible to remove the buzz first; on the other hand the presence of significant noise might make it more difficult for the DeBuzz detector to lock on to a low level buzz component.

The Oxford DeClicker

Description of Controls - DePop, DeClick and DeCrackle Sections

“**Threshold**” **–** This control is used to adjust a threshold level within the excitation profile to capture an event. If a peak on the excitation profile is below the threshold, it will not be registered as an event to be repaired. If a peak breaches the threshold line, then it is registered as a detected event and can be repaired.

“**Sensitivity**” **–** This control determines whether detected events are discarded, starting with the smallest. A low sensitivity means only the largest of the detected events go forwards to the repair section.

“**Enable**” **–**With the section disabled, the detectors are still monitoring the audio and any detected events are shown on the Events Graph as red bubbles. Setting the section IN will present the detected events to the repair processing.

Quick Start Guide for the Oxford DeClicker

1. Lower the DePop **Threshold** until it is sitting just above the floor of the Excitation Profile.
2. Lower the **Sensitivity** until only the Pops you want to remove are being removed, and nothing more.
3. Repeat 1 and 2 for DeClick section.
4. Repeat 1 and 2 for DeCrackle section.
5. Review the material all the way through to check if the settings are good for all the material. If not, consider snap shot automation of different passages, or for dialogue consider using the Dialogue Mode.
6. Remember that a useful tip is to automate the **Exclude Box Enable** button.

Quick Start Guide for Dialogue Mode

1. Click on **Dialogue Mode** button.
2. Adjust the **Voice Threshold** slider to make the threshold be just above the background level while the speaker pauses.
3. Click on the "**Below Set**" button, and adjust the **Threshold/Sensitivity** controls of all three sections to make repairs to the background.
4. Click on the "**Above Set**" button, and adjust the **Threshold/Sensitivity** controls of all three sections to make repairs to the speech.
5. Listen to the material to evaluate the repair work all the way through. If not, consider using the side-chain to make the Above/Below decision be based on a particular band of the frequency spectrum rather than the overall level.

To Set up the Side Chain

To set up the Side Chain, first click on the **Side Chain** button in the listen section of the output panel, so you hear the output of the Side Chain. Then adjust the **LF filter** and **HF filter** to isolate the band you want to use to feed the **Voice Threshold** control. What you are hearing is what is fed to the **Voice Threshold**, which determines whether the input signal is Above or Below the threshold. Then go back to listening to the audio output.
You will notice that when you touch the **LF** or **HF** controls, the graph shows you an FFT plot of the signal. You can drag the end stops in (which are the **LF** and **HF** controls), and drag the threshold level (which is the **Voice Threshold**) to set it all up according to what you are seeing.

The Oxford DeBuzzer

Description of Controls – Frequency Detect Section

"**Auto**" – Auto mode is the default tracking mode. In this mode the removal filters automatically follow the peak frequency found in the peak profile. It is suitable for tracking a weak, slowly wandering fundamental and operates over all three frequency bands.

"**Fast**" **–** Fast tracking mode allows the removal filters to automatically follow a quickly wandering fundamental. This mode operates on MF and HF frequency selections only.

"**Freeze**" **–** For a fundamental that is a fixed frequency, once the auto mode has found the best nominal frequency, you can freeze the nominal. In freeze mode, the removal filters follow the value of the nominal frequency set by the big rotary frequency control.

"**Sensitivity**" **–** Start at a high value and back off to the point at which the hum becomes audible again, then push it up a little to make the hum disappear. Doing this correctly ensures least damage to the signal.

"**Alt Mode**" **–** This allows two different modes for hum removal. Try both modes with the sensitivity knob, and use the mode that allows the lowest setting of the sensitivity.
"**Tone On**" **–** Enables the onboard tone generator which can be useful for finding the frequency of unusual hums, whines or whistles.

"**Tone dB**" **–** Allows you to set the level of the tone generator.

"**Fine Adjust**" **–** Sets the **Frequency** control to have a much finer range so that it is easy to home into a precise frequency value. Holding down shift while moving the **Frequency** knob enables an extreme fine adjust, where the frequency can be accurately determined to 0.0001 Hz. If **Fine Adjus**t is selected while in **Auto** tracking mode, the detector is forced into **Freeze** mode and the **Freeze** mode button flashes. Exiting **Fine Adjust** returns to **Auto** mode.

"**LF**", "**MF**", "**HF**" **–** These three buttons set which frequency band the big rotary control will operate over. LF = 20Hz to 160Hz. MF = 160Hz to 1280Hz. HF = 1280Hz to 20kHz. The peak profile is not active for the HF range.

"**Hz**". The **Frequency** control in the centre is used to set the nominal frequency about which in **Auto** mode the detection algorithms hunt for a peak in the peak profile. In **Freeze** mode it determines the frequency of the removal filters. The frequency can be selected using the scribble tab in units of 1Hz (normal), 0.01Hz (Fine adjust) and 0.0001Hz (extreme fine adjust).

Description of Controls – Remove Section

"**Comb**" **–** Sets the removal filters to be a comb filter. Comb is best for auto mode, and for when there are many harmonics in a buzz.

"**Para-EQ**" **–** Sets the removal filters to be a narrow notching parametric EQ. You may prefer the sound of these filters when there are few harmonics.

"**+Even**" **–** When using the Para-EQ option, by default even harmonics are not notched out because frequently they are not present. Enabling this control will notch out even harmonics as well.

"**Range**" **–** This sets the frequency range above which there are no notches. This needs to be as low as possible to avoid loss of MF and HF information, but high enough to take out all the harmonics of a buzz.

"**Atten**" **–** Set this to the minimum attenuation that will make the hum or buzz inaudible.

"**Sharp/Q**" **–** Adjusts the width or sharpness of the notches. When too sharp, the filters tend to ring. When too wide, the filters take out too much of the audio around the harmonics. So adjusting this is a matter of finding a suitable compromise.

Quick Start Guide for the Oxford DeBuzzer

1. Find the nominal frequency. Start with the **Sensitivity** at maximum, **Range** and **Atten** controls at medium settings, and **Sharp/Q** relatively wide. **Alt Mode** off.

If it is a low frequency buzz you are looking to remove, then play the music through the plug-in for a while and look at the FFT plot. It will give you an idea of any persistent low frequencies. Then set the big central rotary control to that frequency, or click on the peak in the FFT plot to do the same thing. If that is the right frequency, you will hear the hum disappear. If not, look at the peak profile to see what is happening. If there is no discernable peak then you may be an octave too high, so try going to half that frequency.

If it is a higher frequency, set to **Freeze** mode, just look for it in the FFT plot, and click on the peak that is found.

2. Once the hum has disappeared, you then need to refine the removal process to make it remove only the minimum necessary. To do this, click on **Diff** so you can hear what is being removed.

3. Next, adjust the **Range** (either using the control, or by dragging the green drag handle on the graph) to bring it down to being just above the highest harmonic you want to remove.

4. Next, adjust the **Sharp/Q** control to be the best compromise between being too wide (too much audio is heard with the hum) or too narrow (the filters ring too much).

5. Next, switch back to listening to **Audio** mode, and reduce the **Atten** control clockwise so that the hum is just inaudible.

6. Next, adjust the **Sensitivity** control to be as low as possible (to cause least damage); simply reduce the sensitivity from 100 until the hum or buzz becomes just audible, then increase slightly until it disappears. Repeat this with **Alt Mode** on. Use the Mode which allows the **Sensitivity** to be least.

7. Decide if you want to try using the parametric EQ to remove the hum. If so, you may need to re-adjust the **Sharp/Q**, and set the **Slope**.

The Oxford DeNoiser

Description of Controls – DeHisser Section

"**Cutoff**" **–** This controls how far down the spectrum hiss removal is done. Can be set in the range 3kHz to 15kHz.

"**Reduction**" **–** This sets how many dBs of hiss reduction will be applied, up to -24dB.

"**Enable**" **–** If **Master Enable** is also **IN**, this makes the DeHisser active using glitchless switching.

Description of Controls – DeNoiser Detect Section

"**Thresh**" **–** This is the most critical control to get right. It sets the level of the threshold about which noise reduction takes place. Frequency components below the threshold get attenuated, whereas components above the threshold are left alone. If **Thresh** is set too high, signal will be attenuated; if set too low, not enough noise will be removed.

"**Smooth**" - Adjusts the peakiness of the noise profile.

"**Tune**" – In some situations can help to remove musical noise.

"**Auto**" Mode - Enables automatic updating of noise profile and the noise profile level relative to the input signal.

"**Freeze**" Mode – Once you have obtained a good profile, this button will freeze the profile to prevent it updating.

"**Manual**" Mode – In this mode, the profile is forced flat to represent white noise. You can then use the "Colour", "Air" and bias controls to modify the shape of the profile.

"**Colour**" – Modifies the LF shape of the noise profile.

"**Air**" – Modifies the HF shape of the noise profile.

Description of Controls – DeNoiser Removal Section

"**Reduction**" – sets the amount of attenuation of broadband noise components below the threshold.

"**HF Cut"** – This is a simple low-pass filter with a fixed -18dB attenuation. It is active when the **DeNoiser Enable** and **Master Enable** are both active.

"**Makeup**" – Provides a way to adjust the level of the de-noised signal to compensate for any loss in level due to the de-noising process. This makes it easier to perform with and without de-noising comparisons using the master **IN** button.

"**Enable**" – If **Master Enable** is also **IN**, this makes the broadband DeNoiser active using glitchless switching.

Description of Controls – Display

"**Bias Select**" – This toggles between the red bias curve that modifies the shape of the noise threshold profile, and the yellow bias curve that modifies the shape of the noise reduction.

“**Reset Biases**” **–** When a bias handle is moved this button lights half-bright to indicate that the bias curve is non-null. A single press nulls the bias control handles for the currently active and visible bias curve; using shift-click will reset the bias handles for both the LF and HF sections of the currently active bias curve. A small red or yellow dot indicates that the non-selected bias curve is non-null.

“**Log / Lin Select**” **–** Switches the display between logarithmic (LF) and linear (HF) modes.

Quick Start Guide for the DeHisser Section

1. Click on the **IN** button of the DeHisser.

2. Set **Cutoff** to the desired frequency between 3kHz and 15kHz..

3. Set the **Reduction** to 0dB. Lower slowly to the point where hiss reduction is acceptable.

Quick Start Guide for the Oxford DeNoiser (Simple Broad-band Noise Removal)

1. Leave in **Auto** mode. For simple broad-band noise reduction, set the **Reduction** slider of the **Remove** section to around -12dB.

2. Adjust the **Thresh** slider to find the right balance between being too low (not enough noise is removed) and too high (too much audio is also removed). You may find it easier to listen to **Diff** mode, where you are listening to what has been removed. The idea is to have the maximum amount of noise and hiss in this signal, with the minimum amount of original signal.

3. See if adjusting the **Smooth** control gives a more pleasing result.

4. If necessary, adjust the **Tune** control to reduce “twinklies” (musical noise).

5. Set the **Reduction** to 0dB, and then very slowly lower the control until the amount of noise reduction is acceptable.

6. You can use the **Makeup** control in the removal section to do some critical comparison.. After noise reduction, the level of the signal may be significantly lower. If this is so, you can use the **Makeup** control to add gain to make it closer to the original. Then you can use the master **IN** button to do glitch-less comparison of with and without noise-reduction, comparing like-level with like-level.

7. Once you are happy that you have a sympathetic treatment of the noise, you can then consider adding some warmth back to the output using the **Warmth** control.

Quick Start Guide for the Oxford DeNoiser (Complex Noise Removal)

The DeNoiser provides significant ability to vary the shape of the noise threshold profile and the noise removal. For best results, here are some additional suggestions.

1. For surgical noise removal, set the **Reduction** slider of the **Remove** section to 0dB and activate the yellow **reduction bias curve** using **Bias Select** button. This allows the noise reduction to be modified in smaller frequency bands. Listen to the audio signal, and bring down the grab handles on the yellow curve. Listen to the removal of noise in that band, and carefully balance against the preservation of the audio signal.

2. Now listen to the critical frequencies of the material to evaluate whether you could adjust the red **threshold bias curve** to be more sympathetic to these parts. This would mean slightly lowering the threshold bias handles in the critical regions of the frequency spectrum to reduce noise reduction there and preserve more of the original audio, and perhaps to lift the bias controls in the HF area to remove more hiss.

3. If you have a constant noise floor, try to find a segment with no signal and use **Freeze** mode. All the threshold profile and noise reduction biasing controls will help you modify the curves.

4. Surprisingly good results can be obtained quickly using a manually-shaped fixed curve. Select **Manual** mode. Use the **Colour** control to modify the noise profile at LF, perhaps by mimicking a pink noise curve. Use the **Air** control to modify the noise profile at HF, which can help preserve HF signal frequencies. The noise profile can be further shaped in smaller frequency bands by using the bias curve handles.