OSIRIS XP - Manual / Reference

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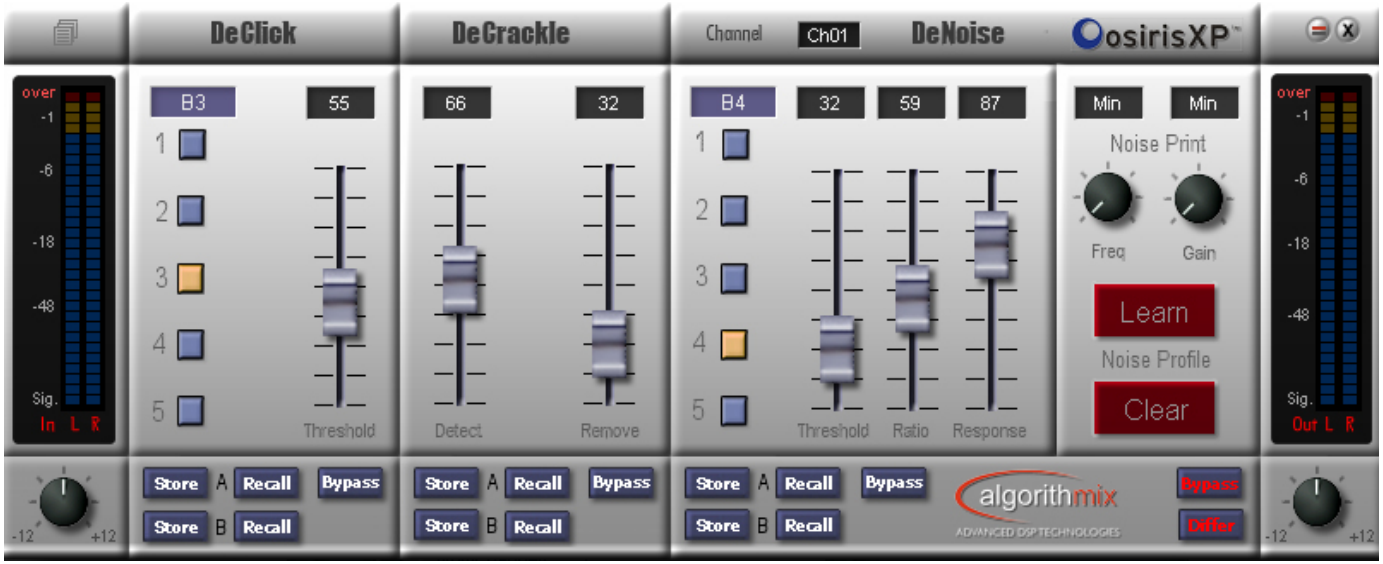


OSIRIS XP

Almost 10 years after CreamWare introduced their original “OSIRIS Sonic Restoration Package”, OSIRIS XP is a more than worthy successor to the classic restoration tool for CreamWare’s tripleDAT. OSIRIS XP is the result of a whole decade of further intense research and development in the restoration area by Algorithmix. As much as OSIRIS provided sensational quality at its time, the mid 90ies, the new OSIRIS XP sets another new benchmark for sonic restoration at its best. As you will easily hear for yourself…

Main Features

DeClick & DeCrackle Module

· effectively removes severe clicks from old shellac (78 rpm.) and vinyl records

· detects and removes switching noise, static discharge, digital cross-talk

· provides an excellent de-crackling algorithm

· diminishes distortion caused by signal clipping

· pre-defined processing profiles simplify restoration tasks in typical situations

· clickless real-time parameter adjustment during playback

· unique difference function for real-time audio monitoring the disturbances being removed

· short learning curve; good results within minutes with only three sliders

· extremely high internal calculation precision (double floating point - 80 bits)

DeNoise Module

· automatically removes or reduces any kind of constant background noise like hiss, hum, camera sound, and air-condition equipment

· removes residual and surface noise from old 78 rpm and vinyl records remaining after declicking and de-crackling process

· very effectively helps in cleaning up poor recorded dialogs or telephone cuts to be restored for forensic purposes

· allows recording of a noise profile for the de-noising of highquality recordings from noise-only part of the recording

· noise profiles can also be created from flat noise using noise print modifier

· pre-defined processing profiles simplify de-noising tasks in typical situations

· clickless real-time parameter adjustment during playback

· unique difference function for real-time audio monitoring the noise being removed

· short learning curve; good results within minutes with only three sliders

· extremely high internal calculation precision (double floating point - 80 bits)

Typical Applications

DeClick & DeCrackle Module

· cleaning up vinyl and 78 rpm (shellac) records from clicks and crackles

· restoration of wax cylinder recordings

· re-mastering old recordings to CD, SACD, or DVD

· removing switching noise, static discharge, and digital crosstalk

· masking drop-outs

· real-time operation with a turntable

· archiving and restoration of historic audio material

DeNoise Module

· removing tape hiss and electronic noise from preamps and audio processors

· de-noising after de-clicking and de-crackling of old records

· re-mastering old recordings to CD, SACD, or DVD

· cleaning up live recording from environmental noise

· eliminating camera and air-condition noise from film and video soundtracks

· reducing noise in recordings coming from optical soundtracks

· cleaning up noisy dialogs and telephone cuts for forensic purposes

· reducing noise from AM, short-wave, and FM radio, as well as TV sound

· real-time operation with a turntable, tape deck, or radio receiver

· archiving and restoration of historic audio material

Introduction

DeClick & DeCrackle Modul

These two modules effectively remove clicks and crackles from old vinyl and 78 rpm.(shellac) records, and clean up audio recordings tainted by switching noise, digital cross-talk, or thyristor buzz. You can change and optimize all parameters while listening to the audio in real-time.

While the de-clicking module is used to remove severe clicks from old shellac and vinyl records or switching noise originating from improper setups of digital audio equipment, the decrackling module removes any remaining small clicks and crackles.

We recommend that you utilize the Differ feature to fine-tune the real-time parameter settings while critically listening to audio content that is eventually removed. The de-clicking module (also valid for the de-crackling

Module) provides pre-defined application profiles (Type 1-5). They preset the internal parameters to help you in typical restoration situations: digital spikes, shellac and vinyl. In addition to its main application, the removal of clicks and crackles, the de-clicking module effectively diminishes any kind of distortion caused by signal overloads (Clipping).

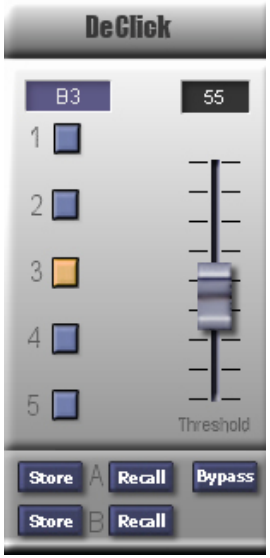
DeNoise Modul

Noise is one of the most common problems in the daily business of an audio engineer. The standard

methods of noise extraction with filters do not work if spectral components of noise overlap the desired signal. In such situations, the only solution is to use sophisticated signal processing algorithms suppressing unwanted noise in a more intelligent way. The DeNoise Module effectively removes broadband noise from any kind of audio material. It has been designed to perfectly cover a wide range of applications: from the high-quality de-noising of valuable music treasures, to the treatment of forensic material recorded at a very poor signal-to-noise ratio and/or in reverberate environment. Typical tasks for the DeNoise Module include removal of tapehiss, surface noise of old records and wax cylinders, broadcast noise, microphone and preamp noise, as well as enhancement of conversations and interviews that lack intelligibility.

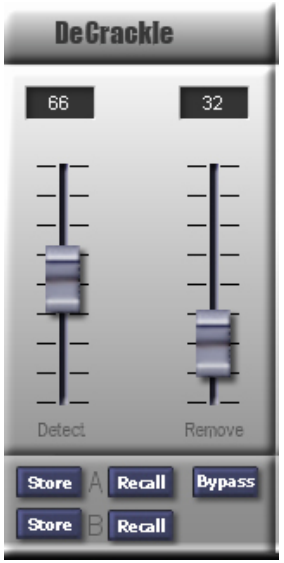
Working processes

Declicking Process



The de-clicking module of the OSIRIS XP™ Plug-In removes clicks from old records as well as any impulse-like noise originating from analog or digital audio equipment. The higher the Threshold parameter is set, the more clicks are removed. At a setting of zero, virtually all clicks pass through the module. For the removal of clicks from a typical vinyl record that was transferred to the digital domain, a Threshold level of approximately 50 to 70 works well in most cases. Higher values can cause artifacts and should be used carefully to achieve a good compromise between click removal performance and sound quality of the remaining original audio signal. To best concentrate on removing “clicks”, set the Detect and Remove parameters of the DeCrackler to 0. Dependent on the click shape and intensity, 5 different algorithms are provided. Especially for highly polluted material we recommend to spend some timelooking for the best working combination. The internal parameters of the de-clicking algorithm are well pre-defined for typical audio restoration situations. For additional help, we highly recommend using the Differ feature, allowing for intuitive and optimized setting of parameters: you can switch between the original input signal and the input/output difference, i.e., the part of signal taken out by the de-clicking algorithm. Normally, this differential signal should not contain any audible parts of the original audio material that you want to preserve.

Decrackling Process



The de-crackling module of the OSIRIS XP™ Plug-In removes crackles and small clicks left after the de-clicking process, or other crackle-like disturbances included in audio signals. The higher the parameters Detect and Remove are set, the more crackles are removed from the original signal. In most situations, the value of 50 for Detect and between 50 and 70 for Remove works well. Higher settings cause an unwanted flattening of the input signal, but they are sometimes useful for heavily damaged audio material. Before starting with the DeCrackler setup it is recommended to adjust the DeClicker first in order to remove heavy clicks. Sometimes, if the recording includes only small crackles the Threshold of the DeClicker can stay at 0. The easiest way to a proper DeCrackler parameter setup is to start first with Remove parameter at 100 and Detect at 0. While carefully increasing Detect you can hear more and more crackles disappearing.

However, with Remove at maximum, the sound becomes dull and somewhat funny. Therefore reduce the Remove as far as the sound becomes natural and crackles are still enough suppressed. If working with very heavy damaged material you may try recursively search for the best relation between Detect and Remove. Finally, it is up to you to find the proper compromise between the level of disturbances and the relative audio quality of the signal after processing.

Depending on the click and crackle shape as well as intensity, 5 different algorithms are provided. One of the 5 algorithms is always active. In the last case they are executed subsequently. Especially for highly polluted material we recommend to spend some time looking for the best combination.

As in the de-clicking process, the final setting of the parameters Threshold and Remove should be performed by critically listening to different parts of the audio file to be de-crackled. For additional help, we highly recommend using the Differ feature, allowing for intuitive and optimized parameter settings. You can switch between the original input signal and the input/output difference, i.e., the part of signal taken out by cleaning process. Normally, this differential signal should not contain any audible parts of the original audio material that you want to preserve. To achieve the highest possible performance when restoring and

mastering old mono vinyl or shellac records to CD, we recommend trying a stereo pick-up to record the signal in stereo mode. Applying the stereo recording mode to mono records and merging both channels back to mono, after de-clicking and de-crackling each channel individually, may improve the signal-to-noise ratio by at least 3dB

(which is actually a factor of two) compared to restoration procedures applied to mono files.

DeNoising Process

The DeNoise Module is a weapon against tape hiss, noise from telephone-call cuts, background noise in live recordings, and residual noise from old records after processing with the DeClick & DeCrackle Modules. The DeNoise Module is also very useful in forensic applications, especially for cleaning up pure recorded conversations. All the traditional methods for noise reduction starting with static filters (low-pass, notch, high-pass), over expander, noise gate, up to dynamic filters and multi-band expanders deliver only limited-quality

de-noising. The reason is that even the two last methods are unable to distinguish between noise and desired signal and thus they also remove parts of audio material that have to be recovered. The DeNoise Module works in frequency domain and intelligently treats the input signal split in many thousands well separated frequency bands. In general, the spectrum of the captured or manually crafted noise print is subtracted from the input signals. Such kind of de-noising is known as the spectral subtraction. In its basic form this solution is superior to all other traditional methods, but still not perfect for high-quality music restoration. It produces so called singing-birds artifacts and cannot distinguish between true noise and the ambience included in the original signal. Also the sharp transients are often smoothed, resulting in lack of high frequencies in restored signal. During the years of intensive research Algorithmix® had significantly enhanced the spectral subtraction technology by adding proprietary extensions based on psychoacoustic findings. It results in de-noising quality that virtually does not affect the original signal. In a single-ended noise reduction system, the user decides which noise characteristic (or noise profile) has to be applied for the de-noising process. To receive the highest system performance, it is recommended that you record your own noise profile from a portion of recording containing the background noise only.

When working with critical audio material, it is recommended that you record (or create) a few different noise profiles and save them. Since the entire process runs in real time, you can even load the profiles during playback and listen to the result. This helps you discover which noise profile is best suited to the audio material being processed. The noise reduction

process in the DeNoise Module is controlled basically by just two parameters: Threshold and Ratio allowing an easy search for optimal results for any given input signal.To get the best results, use your own ears in conjunction with the Difference button. It switches between the original input signal and the input/output difference, i.e., the portion of the signal removed by the de-noising algorithm. This differential signal normally should not contain any parts of the original signal you want to preserve.

The noise profile marks the threshold border, above which no noise reduction is applied. The Threshold parameter moves this noise profile up and down and can help to exactly place the profile just above the background noise level. For a given Threshold, the second parameter, called Ratio, controls the amount of the reduction applied to spectral components being below the chosen noise profile.

A good starting value for Threshold is to set the noise profile just above the background noise level (approx. 10 dB). A subsequent increase of the Ratio parameter should significantly reduce the background noise. If noticeable artifacts in the form of so-called singing-birds or robot-like sounds appear (time aliasing phenomenon), decreasing the Ratio parameter and increasing the Threshold level (up to about 30 dB above the background noise) usually helps.

The overall performance of the DeNoise Module is significantly dependent on the proper preselection with the one of five buttons in the Type group. Especially in case of complex audio material, just try different pre-selections. The noise profile should ideally represent the frequency distribution of the noise to be removed from the noisy input signal. It is a kind of a spectral reference horizon used by the de-noising algorithm. As previously explained, the position of the noise profile relative to the input signal can be controlled with the Threshold parameter. The quality of the entire de-noising process is significantly dependent on the ‘quality’ of the applied profile, i.e., how exact the noise profile mirrors the characteristic of the noise you want to remove. Normally, the best results can be achieved by extracting the noise profile from a part of audio material containing only the noise components to be removed. It can be the beginning of a vinyl or tape recording. It can also be an intermediate recording part that does not contain the desired signal, only unwanted environmental noise. The recording of the noise profile from the noise-only signal should be done using Learn mode. Mark the proper noise-only part of the input signal in the host editor, start playback, and push immediately Learn button. Push the Learn button again to stop the noise print capturing. The noise only part should be at least 3 seconds long. If you cannot find a long enough noise-only portion try to set up a repetitive loop in your host editor. The loop can be played back several times to obtain an averaged noise profile. As already pointed out, the

loop should contain nothing but noise (or whatever has to be removed from the input signal). If a noise profile includes spectral components of the signal to be recovered, they will also be removed or at least lowered in the de-noising process. Therefore, much care and sensitivity is recommended when preparing noise profiles. It does not matter how you get your noise profile, but always remember that a proper noise profile can considerably enhance the entire de-noising process in terms of noise reduction, preserving the quality of the original signal, and avoiding artifacts. Better noise profile means also simpler and faster parameter adjustment.

Quick reference

DeClick & DeCrackle

· Type 1 -5 – predefines the internal parameters according to the typical applications:

- Vinyl 1 – recommended for vinyl records and general de-clicking tasks

- Vinyl 2 – recommended for vinyl records (different click characteristic as Vinyl 1)

- Shellac – recommended for restoration of 78rpm shellac records

- Digital – recommended for very narrow clicks and digital spikes

- Clip – recommended for signals distorted by overflow

· Threshold – sets the amount of clicks being removed

· Detect – adjusts the DeCrackler to act on narrower or wider frequency range

· Remove – sets the amount of crackles being removed

· Store/Recall A & B – allows fast comparison between two complete settings

· Bypass – switches the Plug-In on and off

· Differ – allows you to hear to the audio “garbage” being removed

DeNoise Modul

· Type – predefines the internal parameters according to the typical applications:

- Music 1 – recommended for classical music without fast transients

- Music 2 – recommended for “average” type of music

- Music 3 – recommended for percussive music with fast transients

- Speech 1 – recommended for normal and forensic speech processing

- Speech 2 – recommended for de-reverberation

· Threshold – sets the basic noise profile gain; higher values result in more de-noising

· Ratio – similar to an expander ratio; higher values result in more de-noising but cause more artifacts

· Response – sets the dynamic behaviour of the Denoising-Process ; lower values result in faster reaction but cause also more artifacts

· Learn – starts/stops the noise profile capturing from Noise only region

· Preset [A]&[B] – allows fast comparison between two complete settings

· Bypass – switches the PlugIn on and off

· Differ – allows you to hear to the audio “garbage” being removed

· and the following displays:

· Frequency – sets up the cut off for Noise

· Gain – boost or cut amount for / Noise (range ± 30 dB); the more boost, the more denoising

· Save – stores the actual loaded Noise Profile

· Clear – deletes the actual loaded and modified Noise Profile, reset to white noise

Application tips

The DeClick / DeCrackle Modules are an easy-to-use audio restoration tool based on extremely efficient signal processing algorithms. In most cases you will automatically achieve good results. To get the maximum, especially when working with heavily damaged audio material, there are some practical tips:

• You may use a stereo record player if you restore old mono vinyl or shellac records and process both channels individually before merging again to mono. This can improve the signal-to-noise ratio by at least 3dB (actually a factor of two) when compared to the one-channel procedure. It works only if the both mono signals are perfectly in-phase.

• Transfer recordings directly to .WAV files without using any processing devices like limiter or

compressor prior to the DeClick / DeCrackle procedure.

• If the audio material to be restored contains very heavy clicks, you may allow for some clipping while transferring it to the digital domain. We recommend that you create a few versions, recorded with different input gains and compare the results after the DeClick /DeCrackle process.

• To get good results in a short time work systematically: first, concentrate on the DeClicker (setting up the Remove parameter at 0) and then subsequently activate the DeCrackler of the OSIRIS XP™ Plug-In. Start with the proper profile (Type 1-5), Threshold at 70. Depending on the intensity of the clicks you need to remove, look for a proper Threshold setup (good compromise between original material to be preserved and possible artifacts). In the next step, you should activate the Detect parameter starting with 50 and find the best setting for Remove.

• To avoid artifacts, do not exaggerate with the parameters Threshold, Detect and Remove. When working on heavily damaged audio material, use a good acoustical compromise between the level of the remaining disturbances and artifacts introduced to the output signal. Be forgiving if you have hopelessly damaged audio material; nobody can restore original data from nothing.

• To complete the restoration process of old records use the Denoising Module to remove

broadband residual noise and possibly other processing modules like FFT-Filter or PEQ.

• For the best results, use your own ears by utilizing the Differ feature. Switch between the original input signal and the input/output difference, i.e., the part of the signal taken out by the OSIRIS XP™ algorithms. This difference signal normally should not

contain any parts of the original signal you want to preserve. Use temporary Presets [A] and [B] for fast comparison between two complete settings.

The Denoising Module is also an easy-to-use and efficient audio cleaning tool based on sophisticated signal

processing algorithms. In the most cases, you will automatically achieve good results. To maximize success, especially when working with heavily noise-polluted audio material, there are some practical rules for you:

• For the best results, record your own noise profile for every piece you de-noise using method. Choose a portion of the recording that does not contain any material you want to recover, but noise you intend to remove. If the audio piece to be processed contains more noise only parts, try to record a few noise profiles and test them to determine the one that works best.

• If the part containing only noise is very short (under 3 seconds), we recommend setting up a loop for repetitive playback, before recording a noise profile.

• Do not exaggerate the parameters Threshold and Ratio to avoid artifacts occurring in the form of singing or robot-like sounds (time aliasing). Begin with a moderate adjustment by setting the noise profile to just above the background noise level (approx. 10 dB) and gradually increase the Ratio parameter. Finally try to recursively find the best relation between these two parameters.

• If you are working on heavily disturbed material, find a good acoustical compromise between the level of remaining noise and artifacts introduced to the output signal. Be indulgent if you have hopelessly noisy material. Nobody can restore the original signal without having enough original information.

• It helps sometimes to apply the de-noising process two or more times consecutively with a moderate parameter setting rather than one pass with an extreme aggressive setup.

• For the best results use your own ears in connection with the Difference feature. Switch between the original input signal and the input/output difference, i.e., the portion of signal removed by the de-noising algorithm. This differential signal normally should not contain any parts of the original signal you want to preserve. Use temporary Presets [A] and [B] for fast comparison between two complete settings.

Important remark

The OSIRIS XP™ Plug-In is a very fast and very effective tool. Unlike many other systems, the DeClick / DeCrackle Modules remove not only unwanted clicks and crackles, but also leaves the remaining audio material as natural as possible. You will be amazed by how dramatically the audio quality of old records can be improved. But please do not expect miracles if you process material with long gaps or jumps. The information theory says that once the information is lost and there is not enough redundancy in the remaining material, the restoration process for the original material is impossible. In such hopeless cases, experienced mastering engineers try to transfer similar recording parts into gaps using very precise audio editors (eg. tripleDAT oder CUTmaster).

The DeNoise Module is a very fast and effective tool, too. You will be here also amazed at how dramatic the audio quality of noisy recordings can be improved, but please, do not expect any miracles here as well if you process material containing so much noise that the original signal is no longer distinguishable. The information theory says that once the information is sunk in noise (bad signal-to-noise ratio) and there is not enough data about the properties of the original signal, or/and the original signal is non-linearly distorted, the de-noising process can deliver only limited-quality results.