TerraTec

Audio Restoration Solution

English Manual

Version: 05.11.02

CE Declaration

We:

TerraTec Electronic GmbH, Herrenpfad 38, D-41334 Nettetal, Germany

hereby declare that the product:

Phono PreAmp Studio USB

to which this declaration refers is in compliance with the following standards or standardizing documents:

EN 55013

The following are the stipulated operating and environmental conditions for said compliance:

residential, business and commercial environments and small-company environments.

This declaration is based on:

Test report(s) of the EMC testing laboratory

Contents

Pre-amplified Congratulations

With the **TerraTec phono PreAmp Studio USB**, you have made a great choice. The **phono PreAmp Studio USB** is the complete solution for digitizing analog sound sources, like your beloved LP record collection, in top high-fidelity quality. The USB connection to the computer is almost too easy. Even so, please read the following information so that you can start using all of the benefits of your phono PreAmp Studio USB right away.

Furthermore, the chapter entitled, "All About Vinyl," provides useful background information on the LP recording medium as well as worthwhile information on the topic of "digital restoration on the PC."

We hope you find great satisfaction in using your **TerraTec phono PreAmp Studio USB.**

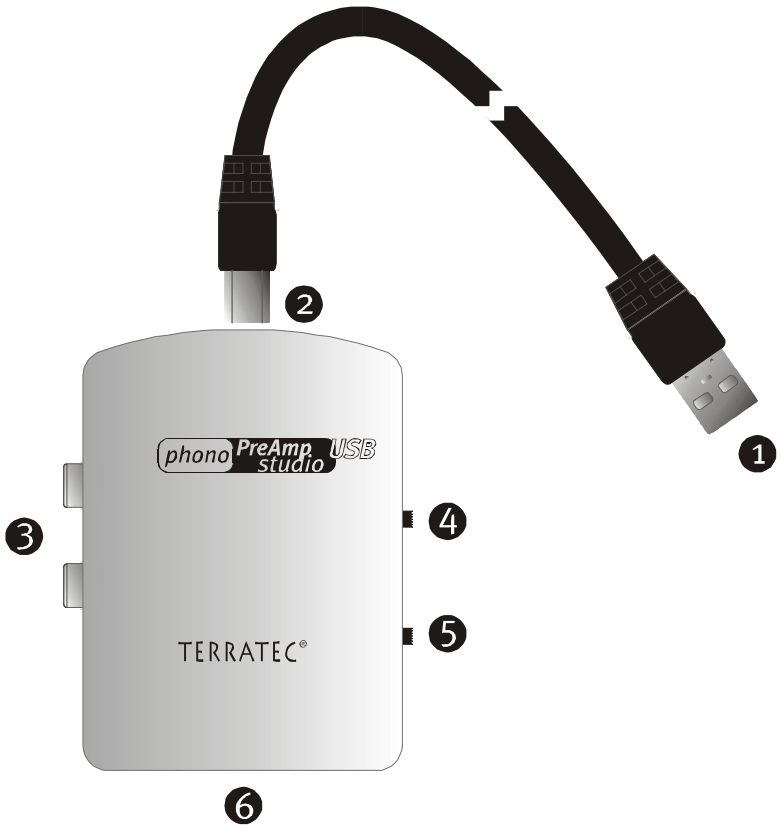
...your TerraTec Team

Ground Wire

To prevent so-called power-line hum, be sure to use the supplied adapter. Simply plug it into one of the audio cables (left or right) and connect your turntable's ground wire to the terminal screw.

Technical data

- Fast and easy USB computer connection
- NO special driver installation needed, direct compatibility with Win 98 SE/Win ME/Win 2000/Win XP
- Stereo input for turntables, switchable to line-in level (approx. 2 Volt/RMS - RCA/cinch)
- Power supply from the USB computer connection
- Input capacity adjustable in three stages (100 pF, 250 pF and 430 pF)
- Adjustable input level (Min -› 6mVRMS/1kHz, Max -› 12mVRMS/1kHz, Line-in -› 2VRMS/1kHz)
- Filter function with high-precision RIAA equalization (20 Hz-20 kHz / ± 0.4 dB)
- For moving magnet (MM) cartridges and high-output moving coil (MC) systems
- Not suited for standard MC systems
- Harmonic distortion ‹ 0.007 % (5 mV)
- Display LEDs for peak and signal
- Signal-to-noise ratio: › 86 dB (A)
- EMC-conforming shielded housing



❶ + ❷ *USB jack for connecting to the computer's USB port*

The USB port is how the audio data, digitized in the “phono PreAmp Studio USB”, is sent to your computer. It also acts as the power supply for your “phono PreAmp Studio USB”. Don't bother searching for an audio jack for your sound card: you don't need one! It all works digitally through USB.

❸ ***Phono line input*** (cinch / red = right channel, white = left channel)

This is where you connect the output cable from your turntable. Note that the “phono PreAmp Studio USB” is designed for moving-magnet (MM) pick-up systems. Standard moving-coil (MC) systems are not supported. If you have a high-output MC system, you can use it with the “phono PreAmp Studio USB”. However, the output level must be at least 2-3 mV. Alternatively, you can also connect devices with line-level-output, such as tape decks.

❹ *Signal and peak display*

These two LED lamps conveniently let you know that the phono PreAmp hardware is working. If the unit is connected correctly and is receiving an audio signal, the signal LED is lit. Its brightness changes according to the strength of the input signal. The peak LED lights if the signal level is too high, causing overamplification. For adjusting input levels, see item ❻ regarding the "Input-level selector switch".

❺ *Input-range selector switch*

Please refer to the technical documentation of your phono pick-up system for the recommended input capacity range for the preamplifier. Then set this selector switch to a value that best matches this range. If you cannot find any technical documentation for your pick-up cartridge, set the selector switch to its middle position.

❻ *Input-level selector switch*

Use this to select the type of input signal and how it is to be preamplified. You can select between minimum (Min) and maximum (Max) preamplification. If you are recording a line-in signal, select the Line in option. In this case, also refer to the chapter entitled, ***Recording.***

All About Vinyl

Tips and Tools

When CD technology took hold of the music recording industry, it eventually replaced all production of vinyl records, to the regret of many collectors and enthusiasts. Today, it has become easy for just about anyone to create his own CDs using a computer and a CD burner. This is the time when the idea of eternalizing (or at least conserving them for the "half-life period" of a CD blank ...) your old vinyl treasures has become most interesting. Even the restoration software available on the market today has become more affordable and easier to use.

How, however, do you get the phono recordings into the computer?

First of all, turntables do not provide a signal that is directly usable with sound cards (and other line devices). Second, many of today's commercial HiFi amplifiers do not even come integrated with the special phono-input preamplifier required for use with turntables.

Of course, you can always set up your (turntable-compatible) HiFi amplifier directly next to your PC – that is, if you don't mind having to move all your nicely connected equipment all the time. That is precisely why Terratec came up with the concept of the **phono PreAmp Studio USB**. The **phono PreAmp Studio USB** amplifies the output signal of the turntable, turns it into a high-quality, usable signal, and then digitizes it – all within the device. The digital data are then "copied" straight to the computer through the USB port. Now you can even archive your records on a laptop in comfort – without having an unnecessary mess of cables lying around – because the **phono PreAmp Studio USB** takes its power supply directly from the computer's USB port.

For those interested in the details of the good old phonograph technology, the following is for you.

Just one Groove, but a Lot of Music

The audio signal is stored on a record as a pattern in the record's groove. This pattern is picked up mechanically by the turntable's stylus, which converts the "audio data" pressed into the vinyl into a weak electrical signal. There are two different pickup systems: Moving Coil (MC) and Moving Magnet (MM or MD for magnetodynamic).

In MM systems a permanent magnet is moved; in MC systems the coil follows the movement of the record's groove. The advantage of MC systems is their lower moving mass, but they have the disadvantage of an output signal which is lower than that of MM systems by a factor of 10, making it more difficult to achieve a good S/N ratio.

Both MM and MC systems are capable of outstanding musical reproduction, but in practice the first system is the more common one.

RIAA filtering.

Perhaps you've accidentally connected your turntable to the wrong input of your HiFi amplifier at one time or another. You probably noticed that the signal was not only very quiet, but also distorted. The reason: as the deflection of the needle is limited to specific range, high frequencies (= low amplitude) are amplified and low frequencies (= high amplitude) are weakened on the record. The signal from the pickup must therefore be processed (filtered) before it can be used.

The Recording Industry Association of America (RIAA) has defined a standard for the changes to the frequency ranges to ensure that all records can be played using the same filtering. The quality of the equalization process is thus an important factor in the overall quality of a phono preamplifier.

Shielding

Due to the relatively low output levels that even moving-magnet systems achieve (MM approx. 2-5 mV, MC approx. 0.1-0.4 mV), a certain amount of protection has to be provided against external sources of noise. For example, using an overly simple power supply design can result in unpleasant AC hum.

Unfortunately, the mounting number of electronic devices in an average household means an increasing amount of electromagnetic interference. While these waves are very weak, they can still interfere with the signal from the pickup, which is also very weak, as mentioned above. This problem can be dealt with by carefully shielding the amplifier, as is the case with the **phono PreAmp Studio USB**.

The ground wire of your turntable, if present, also fits in with this topic. This wire establishes an electrical connection between the turntable and the shielding to help prevent AC hum.

Recording

Included with the **phono PreAmp Studio USB** is **Sound Rescue *TerraTec Edition 2.0***, a professional software application for restoring your audio recordings. For more information, refer to the *Recording* chapter of the program manual. Start **Sound Rescue *TerraTec Edition 2.0*** as described in the manual and begin recording.

To achieve optimal level control when recording, it is important to adjust the input level of the **phono PreAmp Studio USB** correctly. Play the record you want to record and watch the peak LED on the **phono PreAmp Studio USB** while doing so. If possible, set the input level to MAX. If the LED lights up, it means the input signal is being over-amplified. In this case, set the input level back to MIN. With this setting, the LED should not indicate any more overamplification (peaks). Unlike recordings that you may have made in the past with a tape deck, digital recordings must *never* exceed the maximum level. In the analog world this might have passed for a desirable "tape saturation" effect, but with digital recording technology it leads to clearly audible distortion which is virtually impossible to "repair".

After you have recorded your music using the **phono PreAmp Studio USB** and the **Sound Rescue *TerraTec Edition 2.0*** software, you can also use the **Sound Rescue *TerraTec Edition 2.0*** to edit your recordings directly on a digital level. **Sound Rescue *TerraTec Edition 2.0*** is included in the software package of the sound card. It's a powerful tool for the restoration of old records, yet it is intuitive and easy to use. If you would prefer to use a different application to edit your recording, it should include at least the following functions: removing short, loud pops (de-click); removing quiet background crackling (de-crack), noise suppression (de-noise) and the automatic adjustment of the audio signal strength (normalization). The normalization function should always take place in a separate step after the audio material has been restored successfully.

Some programs offer additional functions such as the broadening of the stereo image (this is rather restricted on vinyl records in comparison to CDs) and equalizers with which you can freshen up the sound quality or add a bit of punch. However, please remember that less is generally better than too much, and that too much tinkering can destroy the authentic sound of the original recording.

If you generally record the entire sides of records at once, you can, as desired, cut the recording into individual tracks. To do so, you can use **Sound Rescue *TerraTec Edition 2.0*** or another audio editing tool. Depending on the software you are using, this function can be automated. Last but not least, you can use your CD mastering software to burn your recordings to CD (such as Feurio©, a shareware program that is included on the **phono PreAmp Studio USB** CD).

Links

If you are interested in more information, here are some of our recommended Internet links that you may want to check out.

http://fabdp.fh-potsdam.de/lehre/studpro/steffen/record/head/head.htm

This site provides a lot of information on the history of the LP record.

http://www.aaanalog.de/

Information on records, record players and analog technology. A first-class magazine with informative articles! Highly recommended.

http://ac.acusd.edu/History/recording/notes.html

recording technology history

Usenet

rec.music.collecting.vinyl

LP collectors use this site to share their experiences.

rec.music.marketplace.vinyl

And if you are looking for an LP that you cannot find anywhere else: try here!

Sound Rescue TerraTec Edition 2.0

1. Overview

Sound Rescue ***TerraTec Edition 2.0*** is a powerful tool that lets you clean up problematic material such as older recordings, directly on your PC. It lets you remove or significantly reduce unwanted noise while maintaining the authentic sound and quality of the original recording.

Sound Rescue ***TerraTec Edition 2.0*** is an ideal compliment to recording and CD programs, especially if you want to eternalize all of your tape cassettes and vinyl treasures – even your shellac phonograph records on CD. **Sound Rescue** ***TerraTec Edition 2.0*** offers a vast variety of functions and is specially developed for the multimedia user who does not want to spend hours learning complicated editing processes or use the multitude of parameter settings necessary for other professional software. For the two editing modules, *Descratcher* and *Denoiser*, only two parameters need to be set to achieve optimal sound, which normally takes only a few seconds to do. You can adjust these settings with no trouble during realtime playback. Likewise, you can adjust the volume and tone (bass and treble) of the "cleaned" output signal to remaster "dusty" recordings.

Features:

- Realtime operation with 233 MHz or better MMX Pentium and Windows® 95/98/Me/NT/2000/XP
- High stability using its own, separate drivers
- Recording at 44.1-kHz/16-bit "Red Book" WAV format
- Worldwide, the fastest off-line processing
- Fast, intuitive menu prompts
- Removes noises such as popping, crackling, static, scratches and surface noises
- Reduces constant background noises such as tape static, line hum and thyristor hum
- Softens digital distortions and covers signal drops
- Realtime operation during the fine tuning of parameters
- Unique *Difference* function for listening to the noises that are removed
- All measurements are precise to up to 80-bit decimal accuracy

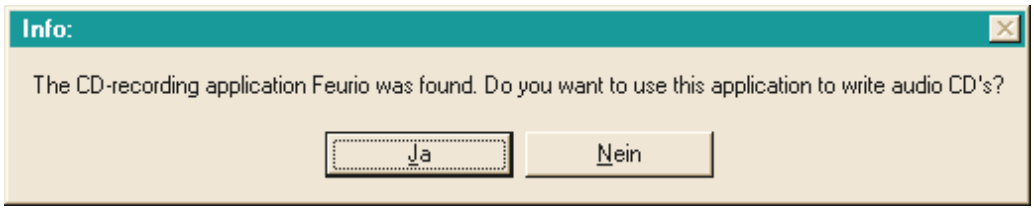
Typical Applications:

- Archives and restores old audio media
- Remasters old recordings on CD: from shellac, vinyl and tape
- Removes interference noises on cassette tape recordings
- Filters out and removes distortion in noisy dialogs and in recorded telephone clips
- Reduces distortion in radio broadcasts from medium wave, short wave and FM

2. First steps

Sound Rescue *TerraTec Edition 2.0* is located on the product CD, which is configured for automatic installation. If the autorun application on the CD does not launch automatically, start the application manually by double-clicking the "autorun.exe" file in the root directory of the CD. Then start the setup of **Sound Rescue *TerraTec Edition 2.0*** and follow the instructions as they appear on the monitor.

When **Sound Rescue *TerraTec Edition 2.0*** is started for the first time, it checks whether a CD burner and burner software are installed on your system. **Sound Rescue *TerraTec Edition 2.0*** has been tested with WinOnCD™ 3.6 to 5.0, EasyCDCreator™ 5.0, Nero 4.0 to 5.0 and Feurio 1.63. Feurio is also included on the TerraTec product CD. A dialog window asks you which burner program you want started directly from **Sound Rescue *TerraTec Edition 2.0***.



The dialog window for selecting burner software

Select the program that you prefer most for burning your audio CDs. Also refer to Chapter

8. Burning CDs.

To quickly verify that **Sound Rescue *TerraTec Edition 2.0*** was installed successfully, simply click the 

button and select the *democlic.wav* file for editing. **Sound Rescue *TerraTec Edition 2.0*** supports WAV files based on the Red Book standard: 16-bit/44.1 kHz.

User Interface

Sound Rescue *TerraTec Edition 2.0* has an intuitive interface. Its features are clearly arranged and truly easy to use and, at the same time, it offers powerful functionality. The upper half of the window contains the areas for the **DeScratcher**, **Analyzer** and **DeNoiser** features, and below these is a strip with other adjustment options for sound optimization. Below this is the **Playback area**, which displays the actual audio material in the **Waveform window** as well as control buttons for other program functions.

Quick Instructions

Follow the steps listed below to achieve – in very little time – a high-quality, remastered, recording of, for example, and old, scratched LP record. More detailed features are described in the chapters that follow.

1. Click the  button, enter a file name and start recording your new audio material.
2. Click the 

button to open the "*Select Input File*" menu. Select the WAV file that you want to process. The file you selected is loaded and its waveform is displayed in the *Waveform window*.
3. Start playback with the  button. You should now hear the audio material and be able to view the *level-control indicator*. In the **Analyzer** window, the frequency profiles of the input and output signals are dynamically displayed as is the *noise print*. You can pause playback with the  button and "rewind" back to the beginning of the clip by clicking  . During playback, you can restart playback at any position you like simply by clicking the position in the *Waveform window*.
4. If your recording contains sudden popping noises, use the *Declick* adjuster to try to filter them out.
5. If your recording has humming or buzzing noises or, in the case of a recording from an LP record, a constant background crackling, use the *Decrackle* adjuster to filter it out.
6. To reduce or remove noises such as tape static or constant LP surface noises, use the **Denoiser** feature by adjusting the *threshold* and *reduction* adjusters.
7. To compare the original sound with the filtered signal, click the 

button.
8. Use the 

function to listen to the noise that has been filtered out.
9. Adjust the volume slide so that the volume level never quite reaches the red range.

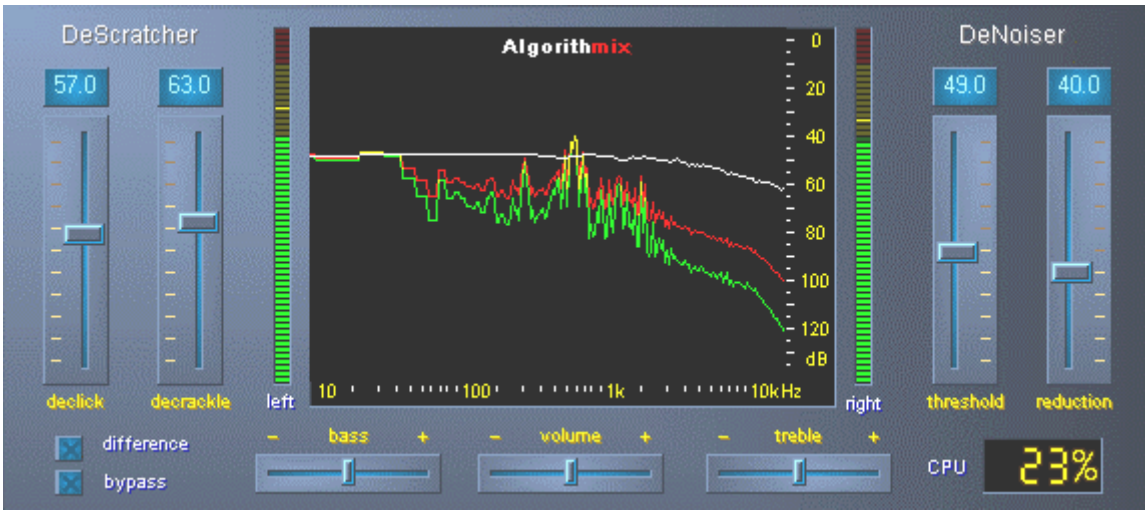
10. Use the Split button to clip off the extra audio material to the left of the current marker position.
11. Click Save to save the remastered audio material to a new file. Saved files are in 16-bit/44.1-kHz format.
12. Click Norm to optimize the loudness level of the audio material.
13. If you click the Cd button, the current audio material is sent to the associated burning software as a new track. Simply repeat this step to instantly put together an audio CD, which you can then burn.
14. The functions of the parameters for the Descratcher and Denoiser features are described in the chapters entitled, **Descratcher, Denoiser** and **Application Notes**.

3. User Interface

Editing Area

The editing area of **Sound Rescue *TerraTec Edition 2.0*** consists of four main components: **Descratcher** (on the left), **Denoiser** (on the right), **Analyzer** (in the center) and the adjustment sliders for *bass/treble/volume* (on the bottom). Two sound-level meters let you control the output level while, at the same time, you can adjust the volume and the bass and treble levels using the sliders mentioned above.

Because the processor requirements of **Sound Rescue *TerraTec Edition 2.0*** are quite low (about 30 % for a 300 MHz Pentium II for a WAV file with 16-bit, stereo and 44.1 kHz), you can optimize all of the parameters and simultaneously hear the results in realtime while editing your tracks.



The editing area of Sound Rescue TerraTec Edition 2.0

lets you listen separately to the noises that are being filtered out during processing in realtime.

lets you listen to the input signal by bypassing the DeScratcher and DeNoiser filters.

indicates the CPU usage of the computer, i.e. the percentage of CPU time being used by **Sound Rescue *TerraTec Edition 2.0***.

Analyzer graphically displays the volume and frequency curves, which is useful for visually verifying the filter levels.

DeScratcher effectively removes pops and crackling from the audio material.

DeNoiser removes noise and static from the audio material.

Playback Area

The **Playback area** is located in the lower section of the **Sound Rescue** ***TerraTec Edition 2.0*** interface. Using its features, you can record a WAV file, load a file for editing, start and stop playback, and jump to any position in the WAV file by moving the cursor within the *Waveform display*.

After loading a WAV file, its name and format are displayed in the *status window* below the **Analyzer** and its waveform is displayed in yellow in a normal view, meaning it is adapted to fit within the width of the Waveform window.

The playback area of Sound Rescue TerraTec Edition 2.0

You can save the processed audio material by opening the file dialog box using the Save button. The sampling frequency of the saved file is identical to the frequency of the output file (44.1 kHz). If the format of the output file is not 16-bit/44.1-kHz, it should be converted using any correspondingly high-quality tool in your editing or sound card software.

The Buttons and Controls in the Playback Area

File Functions

Load	opens the “load” file dialog box
Save	opens the “save” file dialog box

Audio Functions

Norm	normalizes the audio material to maximum loudness
Split	splits the audio material at the current marker position
Track	sets the marker at a position in the audio material at which a new track most likely begins
Peak	sets the marker at the position where the loudness is at its maximum
Cd	starts the associated CD burning software
Help	opens the help file

Control Functions

	asks for a file name and opens the recording window
	starts playback
	interrupts playback

 returns the playback cursor to the beginning of the clip

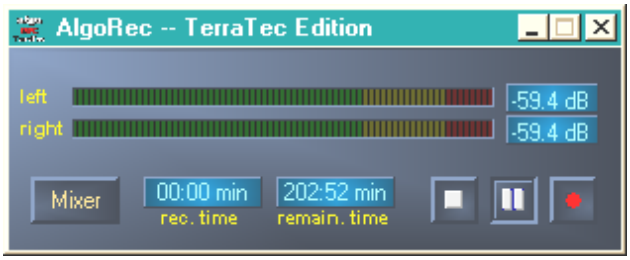
View Functions

 shows the entire audio material of the file

 zooms in on a length of about 20 seconds of the audio material

4. Recording

With **Sound Rescue *TerraTec Edition 2.0***, you can, of course, also make recordings. To do so, click the  button and specify a location and name for the resulting WAV file in the dialog box that opens. You will now see the **AlgoRec** window, which shows you the input level for the standard recording device as configured in Windows. Recording at first is paused  .



The AlgoRec recording window of Sound Rescue TerraTec Edition 2.0

Adjust the level so that it never quite reaches odB, i.e. the red range. Going into the red range can cause digital crackling noises, which cannot be completely filtered out by the editing tools. Clicking the  button opens the Windows recording controls.

When you are ready to start recording, simply click the  button. You can also use  to pause and again continue recording.

Recording for the file you previously selected is stopped when you click  . If you like, you can now press  again to specify a new file and create a new recording.

5. Rescuing Audio Material

This section provides greater detail on how you can edit your recordings.

Restoration

After you have recorded the entire side of an LP, for example, you may want to rescue and restore the recorded audio material using **Sound Rescue *TerraTec Edition 2.0***. Start playback with the  button. If you enable the  button, the **DeScratcher** and **DeNoiser** filters are bypassed so that you can listen to the original recording. Disable the bypass option to listen to the effects of the restoration filters in realtime. You can adjust the settings of the **DeScratcher** and **DeNoiser** filters during playback and see the difference in the **Analyzer** while hearing it at the same time. To hear only the noises and crackling sounds that are being fil-

tered out of the audio material, click difference. Adjust the control slider to your liking and refer to the chapters on the **DeScratcher** and **DeNoiser** functions for more information. Adjust the volume slide so that the peak level never quite reaches the red range. Once you are satisfied with the results, stop playback by pressing and save the results by clicking the Save button. The new audio material is loaded and displayed automatically. To avoid mistakenly filtering a file that has already been filtered, the bypass option is enabled automatically.

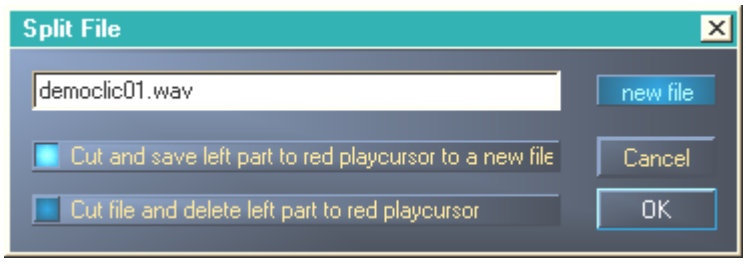
Optimization

Use Peak to find the positions having the highest peaks and check whether they are the result of pops or the normal audio material. When you are completely convinced that the quality of the material is good, you can raise its recorded volume without your recording being overamplified by clicking the Norm button. Now save your results again.

Creating Tracks

After successfully restoring your digital recording, you will probably want to pull out certain tracks from the length recording. If you click Track, **Sound Rescue *TerraTec Edition 2.0*** automatically finds for you a position that is likely a pause between two tracks. You can of course search for such pauses manually simply by listing to the audio material with , stopping the marker with . Then you can zoom in on the section of the recording using the Zoom+ button and reposition the marker more accurately.

Use Split to write the audio material to the left of the marker to a new file or to delete it altogether.



The Split window of Sound Rescue TerraTec Edition 2.0

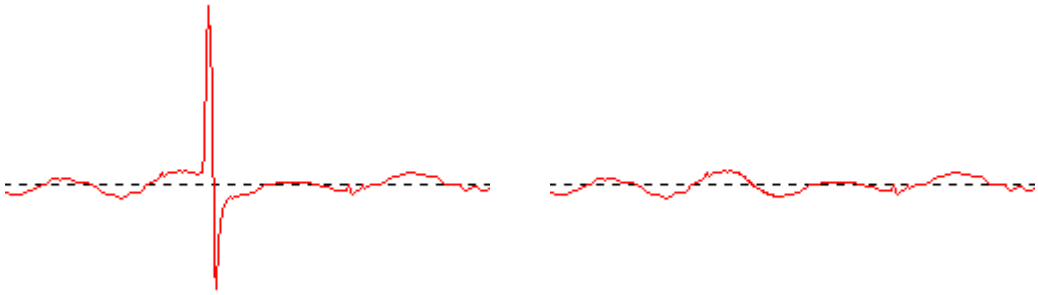
Select the option you want to execute, provide a name for a new file if necessary and then click OK. Save your individual tracks here and burn them onto a CD.

6. Descratcher

The **Descratcher** function effectively removes pops and crackling noises from old vinyl and shellac records as well as from audio files in which the tone quality has been decreased during recording because of switch noise, digital crosstalk or thyristor humming.

The *Descratching algorithm* consists of two components: the *Declicking filter* and the *Decrackling filter*. While the *Declicking filter* is running, usually to remove relatively loud clicks and pops from old vinyl records or switch noise from digital or analog audio devices, the *Decrackling filter* removes any remaining, usually quiet but dense crackling.

The higher you set the *Declick* parameter, the more cracking noise is removed. When it is set to 0, the filter lets through nearly all cracking noises. To remove cracking noises from soiled vinyl records, a *Declick* value of about 50 is good in most cases.



A typical popping noise in a signal from a vinyl record (left) and the reconstructed signal (right).

The higher you set the *Decrackle* parameter, the more crackling noise is removed from the original. The highest setting, nearly 100, dampens the actual input signal. In general, this parameter can be set to 80 without resulting in any audible depletion of the original sound. In some cases, an extremely high setting, even up to 100, can be used to improve the quality of the audio material.

To minimize the depletion of the original sound in the *Descratching* procedure, you should listen very carefully to the effects of the *Declick* and *Decrackle* parameters at various points of the recording before deciding on their final values. In doing so, the *Difference* function in the **Playback area** will certainly be a great aid. It allows you to set the parameters in a very intuitive manner. With it, you can switch between the original input signal and the input/output signal difference, i.e. the part that has been removed by the *Descratching* algorithm. Normally, you do not want the signal difference to contain any part of the original signal that you want to keep. For more notes on optimizing the settings of the *Declick* and *Decrackle* parameters, see to the Application Notes.

Note also that the *Difference* functions can be applied to the **Descratcher** and **Denoiser** functions simultaneously. If you want to run the **Descratcher** only, leave the sliders (*threshold* and *reduction*) for the **Denoiser** set to 0.

7. Denoiser

The **Denoiser** belongs to the noise reduction systems. It does not require any special coding method prior to recording, such as that required by the familiar tape noise reduction system by DOLBY™ Lab. The Denoiser efficiently removes all types of wideband noises from recorded audio tracks. The **Algorithmix**® **Denoiser** is used to remove tape hiss, static noise in telephone clips and residual noise on old records after they have been edited using the **Descratcher**.

This version of the **Denoiser** uses a typical wideband noise print that has been optimized for reducing surface noise on vinyl records and tape hiss.

The noise reduction process of the **Denoiser** is controlled by only two parameters, making it easy to optimize the results for various output material.

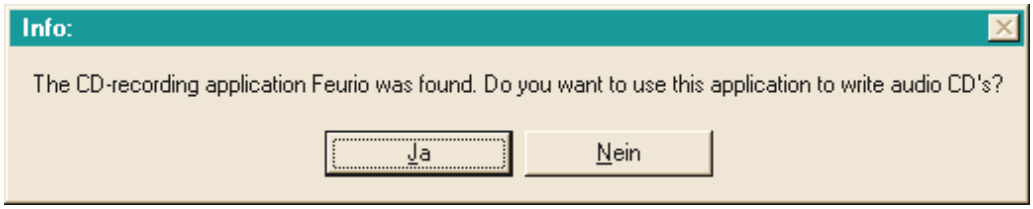
The frequency band of the input signal (red), the noise print used for processing the audio material (white) and the frequency band of the output signal after processing (green) can be viewed in the **Analyzer** window.

The noise print (white) indicates the threshold value beyond which no more noise reduction takes place. You can move this noise print up and down using the *threshold* parameter. You can also use this parameter to adjust the noise print so that it is just above the background-noise level. At a specific *threshold*, the *reduction* parameter then determines the range of removed noise within the selected noise print.

A good starting point for the *threshold* is to set the noise print just above the background-noise level (at about 10 dB). Increasing the *reduction* parameter would then reduce the background noise significantly. If distortions such as whistling sounds or robot-like noises (caused by the phenomenon called *time aliasing*) are clearly audible, decreasing the *reduction* parameter and increasing the *threshold* (to about 30 dB above the background-noise level) usually helps.

8. Burning CDs

When **Sound Rescue *TerraTec Edition 2.0*** is started for the first time, it checks whether a CD burner and burner software are installed on your system. **Sound Rescue *TerraTec Edition 2.0*** has been tested with WinOnCD™ 3.6 to 5.0, EasyCDCreator™ 5.0, Nero 4.0 to 5.0 and Feurio 1.63. Feurio is also included on the TerraTec product CD. A dialog window asks you which burner program you want started directly from **Sound Rescue *TerraTec Edition 2.0***.

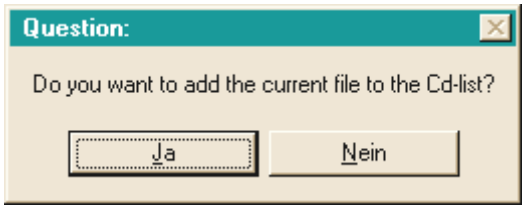


The dialog window for selecting burner software

Select the program that you prefer most for burning your audio CDs. If you want to change this program at a later time, simply click the small icon in the upper-left corner of the **Sound Rescue *TerraTec Edition 2.0*** window and select the *CD-Recording* item.

The selected burner software is now linked to the 

button. You can now send the current, restored track from **Sound Rescue *TerraTec Edition 2.0*** on the burner software with a single click. When you do so, you are asked whether you want to add the audio file to the burner program's CD list.



*Adding an audio track from **Sound Rescue** **TerraTec Edition 2.0***

Simply add individual audio tracks to the burner program's CD list after you have restored them to your liking. When you are finished, simply start the burning process.

Congratulations on your remastered, digital “record”!

9. Application Notes

The **Descratcher** and the **Denoiser** are user-friendly audio-restoration tools based on an extremely effective signal-processing algorithm. In most cases, they automatically produce good results. To get the most out of these tools, especially when working with badly damaged audio material, use the following, practical guidelines:

- Create your recordings using the WAV file format and do not use any editing devices, such as limiters or compressors, before applying the *Descratching* filter.
- If the audio material you are restoring contains loud crackling noises, you can limit them during the digital recording process. We recommend recording various versions with different input amplification levels and comparing the results after carrying out the *Descratching* process.
- To avoid digital distortion, do not set the *Declick* and *Decrackle* parameters too high. When working with badly damaged material, we recommend finding a good acoustic compromise between the remaining level of noise and the digital distortions that result within the signal. Make allowances when trying to improve hopelessly damaged audio sources, because not even the best tools can bring back the original sound where none is left.
- If the sound level and/or sound characteristic changes several times within a recording, you may want to split the original into separate segments, edit these individually using various *Denoising* settings and then normalize them.
- To avoid digital distortions such as whistling sounds and robot-like noises (*time aliasing*), do not set the *threshold* and *reduction* parameters too high. Start by using a moderate setting by adjusting the *noise print* to just above the background-noise level (about 10 dB), and then increase the *reduction* parameter gradually. Finally, try determine the optimal correlation between these two parameters.
- The **Analyzer** can be a great help when optimizing the setting of the **Denoiser** parameter. During the *Denoising* process, it makes visible the influence that the noise print and the parameter setting have on the audio signal.
- If you find the output signal too quiet, increase the *volume* while watching the left and right sound-level bars. If the red range lights up at all, the volume is set too high and you have reached the so-called *threshold range*, which can lead to audible distortions.
- Use the *bass* and *treble* sliders to increase (+) or decrease (-) the values of the bass and treble frequencies to achieve the tone that sounds best. Be aware, however, that setting the *bass* and *treble* levels too high increases the output signal volume level and in some cases can put it into the *threshold range*. In this case, lower the *volume* slider until the level no longer reaches the threshold range (so that the red LEDs at the top of the level bars no longer light up).
- If you do not use the **phono PreAmp Studio USB** to record your audio material, the type of the sound card and the type of analog/digital converter it uses have an important influ-

ence on the quality of the recorded signal. Be sure to use a high-quality sound card for recording your audio material, such as the ***TerraTec AudioSystem EWX 24/96***.

- If you save your audio files with a sampling frequency other than 44.1kHz (for example, 48 kHz), you will have to convert them to a sampling frequency of 44.1kHz. Here, too, be sure to use a high-quality software application for converting the frequency.
- Best results are achieved by evaluating the sound with your own ears using the *Difference* function during playback. This function plays only the sounds that have been filtered out by the *Descratching* and *Denoising algorithms*. In the best circumstances, you should only be able to hear noise with this function. If you can detect the presence of the original signal in the *Difference* signal, the amount of filtering should be decreased.

Important note:

Sound Rescue ***TerraTec Edition 2.0*** is a fast and effective tool. You will be amazed by how much you can improve the sound quality of old records and distorted audio files. However, please do not expect any miracles when trying to restore material that contains gaps or jumps. Once the signal has been lost to the point where there is insufficient redundancy in the remaining material, it becomes impossible to recover the original material. In cases as hopeless as these, experienced professional sound editors apply highly complex audio editors to try to copy similar sounding, already existing passages into the gaps. Likewise problematic is the attempt to rescue material that is so full of noise that the original signal can no longer be distinguished. If, for all practical purposes, the information consists almost entirely of noise (an extremely bad signal-to-noise ratio) and there is insufficient information available on the characteristics of the original signal, or even worse, if nonlinear distortions occur too, the quality of the *Denoising* results will be limited.

10. Contacting Us

For more information on extensions, updates and new products from Algorithmix® visit us on the Internet at:

http:// **www.algorithmix.com**

or send an e-mail:

to **support@algorithmix.com**

if you want information on the installation and features of this product,

or to **info@algorithmix.com**

if you have general comments or questions regarding the Algorithmix® product range.

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- your registration number
- this documentation.

In addition, it would be helpful to our technicians if you are at your device during the phone call to directly carry out tips and tricks. Please do not forget to write down the name of the respective support technician if you contact our Support Team. You will need this name if a defect is present and your device needs to be mailed to us.