TerraTec

phono *PreAmp*

Record Player PC Interface

Manual (English)

03.08.01

CE declaration

We:

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

hereby declare that the product:

phono PreAmp

to which this declaration refers complies with the following standards or standardizing documents:

EN 55013

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

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

This declaration is based on:

test report (s) of the EMC testing laboratory

Welcome.

And thank you for choosing phono PreAmp. So far, phono PreAmp is a unique product for the connecting between a record player and PC sound card in the best of hi-fi quality. Connection couldn't be easier. However, please read the following information, so that you will quickly be able to make use of all the possibilities this device offers.

In the chapter "Tips and Tools" you will get some background information on the record medium as well as learn what there is to know about "digital restoration on the PC".

We hope you will enjoy your phono PreAmp

... Your TerraTec Team!

Connection and Operation.

❶ *D- Plug for connecting to the sound card's gameport.*

Through this phono PreAmp receives its power. The gameport is channeled through and can still be used, for example, to connect a joystick.

❷ *Stereo Line Out.*

The line output is connected to the line in (input) of the sound card.

The output level of phono PreAmp can be adapted to the needed input sensitivity of almost all sound cards. Please do not use a microphone input (if applicable) for this, as they are designed for a far lower and usually mono input level.

❸ *Phono In.*

(cinch / red=right channel, white=left channel)

Connect your record player's output here. Please make sure your phono PreAmp is designed for a moving-magnet (MM) pickup system. Standard moving-coil (MC) systems cannot be used. A high-output MC system can be used, however, if you own one. The output level, however, should carry at least 2-3mVolt.

❹ *Gameport.*

Your sound card's gameport is still available for you to use.

We don't advise you operate the phono PreAmp at the same time a joystick is connected here – and you probably won't find it necessary to do so anyway. You can leave the joystick connected while the phono PreAmp is recording, but you should refrain from playing with it.

❺ *Input Capacity - Selection Switch.*

Please refer to your phono pickup system's technical data for what the recommended range of the preamplifier's input capacity is. Move the selection switch to the value that comes most closely to that area. If you are unfamiliar with your pickup's technical specifications, set the selection switch to the middle position.

❻ *Output Level - Selection Switch.*

Usually with sound cards the line-in input level lies at a music-friendly 1 to 2 Vrms. So that phono PreAmp's output level can be adapted to different cards, it can be set to three levels. Read more about this in the chapter *Attention! Recording.*

Grounding Wire.

If applicable, connect the grounding wire of your record player to your computer's case. It's best if you can use one of the fastening screws from your computer's housing cover to do this.

Technical Specifications.

- Stereo input for the record player (RCA/cinch)
- Stereo output with line meter (3.5 mm stereo mini-jack)
- Power supply through the PC sound card's gameport (5 VDC $\pm$ 10%)
- The gameport is looped to phono PreAmp
- For moving-magnet (MM) pick ups or high-output moving-coil (MC) systems
- Not suitable for standard MC systems
- Input sensitivity 5 mV / 47 kOhm / 1 kHz
- Input capacity adjustable to three levels (100 pF, 250 pF and 425 pF)
- Output level amplification adjustable to three levels (300 mV, 550 mV, 1100 mV (5mV/1kHz))
- Filter function with highly-accurate RIAA equalizer curve (20 Hz-20 kHz / $\pm$ 0.3 dB)
- Distortion factor < 0.002 % (5 mV)
- Signal-to-noise ratio: >86 dB (A)
- Shielded case

Tips and Tools.

Unfortunately for many record fans, this once favorite playback medium has become more and more obsolete under the present reign of CDs. Nowadays, even making your own CDs is no longer a problem with the help of a computer and a CD recorder (burner). Maybe now the topic might be of interest once more to all of those who would like to preserve their old vinyl treasures for eternity (or at least for the "half-life" of a blank CD). Even the restoration software that goes with it is becoming more and more affordable and easier to operate.

How do you get your LP recordings into the computer?

The record player's output signal cannot be directly used by sound cards (or other line devices). In this instance even a common hi-fi amp would need a special preamplifier, which doesn't even come standard anymore on the newer devices.

Now, you could help yourself by setting the (phono-friendly) hi-fi amp next to your PC, that is, if you aren't afraid of having to constantly move this highly-cabled unit. Here's where the concept of TerraTec's phono PreAmp comes in. The phono PreAmp strengthens the record player's signal, and converts it into a high-quality signal the sound card can use. To help keep down the number of unnecessary cables you need lying around, the phono PreAmp draws its power directly from the gameport of the attached sound card.

For all of you who now want to delve a little deeper into the good, old phono technology, here is some information on the vinyl.

How did it work again?

The audio signal is saved in a particular pattern to a groove on the record. The mechanical "reading" is done through the record player's pickup system, which then converts the pressed-vinyl "audio data" into a weak electrical signal. There is a distinction made here between two different pickup systems: moving coil (MC) and moving magnet (MM or MD for magnet-dynamic).

With MM systems a permanent magnet is moved, and with MC systems a spool. An MC system has the advantage over the MM system that it has less mass to move. The disadvantage to it, however, is that the output signal normally comes out lower by a factor of 10. This makes it harder to obtain a good signal-to-noise ratio.

Both MM and MC systems are able to reproduce excellent music, whereby the former is found to be used the most.

RIAA Equalizer.

Maybe you have accidentally connected your record player to the wrong input on your hi-fi amplifier before. You probably noticed that not only was the signal very quiet upon playback, but also the sound pattern appeared wrong. There is a reason for that: as the needle's control is limited to a certain extent, high frequencies (= low amplitude) are played back more strongly and deep frequencies (= high amplitude) more weakly. The pickup signal, therefore, has to be prepared (equalized) before it can be worked on further.

So that every record does not have to be equalized differently, a set of standards has been developed by the ´Recording Industry Association of America´ (RIAA) which exactly defines the frequency ranges to be defined. Therefore, the fidelity of the equalization process is an important mark of a phono preamplifier's quality.

Shielding.

Through the relatively low output level (even by a moving magnet system) - MM ca. 2-5 mVolt, MC ca. 0,1-0,4 mVolt - some waste of notes and disturbances are to be expected. For example, if you use a much too simply built network connector for your pre-amp's power source, then you have to be prepared for an unpleasant network hum.

Unfortunately, piling on more and more electronic devices in your household leads to an increase in electromagnetic waves being created. Even though these are low, they can lead to a disturbance of the pickup's audio signal, because, as mentioned, this is also quite low. The only thing that helps here is a careful shielding of the pre-amp as is of course the case with the phono PreAmp.

When talking about shielding it is also appropriate to mention the role of the record player's grounding wire (if applicable). This makes sure that the record player is connected to the shielding, so that such a disturbing hum is avoided.

Attention! Recording.

In order to fully take advantage of the dynamic range of your sound card's input converter, it is important to correctly set the output level of phono PreAmp.

Play through the record to be recorded.and keep an eye on the level indicator of your recording-software (e.g. CoolEdit 96™, to be found in the "share" area of **the phono PreAmp Studio** CD) Select the switch-position at which the signal is not overmodulated (clipping). An optimal setting would be one where the level indicator reaches just under the odb(zero decibel)-range. Unlike recording with a cassette recorder which you may have done earlier, a digital recording is *never* allowed to be overmodulated. What earlier may have passed for a desired "tape saturation-effect", only leads to clearly audible static on the digital level which can hardly be "repaired".

To fine tune the settings you can use the input control (input sensitivity) of your sound card. Please read more about this in your sound card's documentation.

If you can set the sampling rate and bit resolution on your sound card, select 16Bit and 44.1 kHz so that the data is directly recorded in a format compatible to an audio CD. Otherwise, before you can burn a CD, you will have to go through a so-called sample-rate conversion which can lead to a loss of sound.

Done recording: Now What ?

After you have made your recording using the phono PreAmp, sound card and software, you may decide you want to edit your work on a digital level. With the phono PreAmp Studio installed Software **"Sound Laundry TerraTec Edition"***. you have at your disposal a powerful tool for the restoration of old records, the operation of which is intuitive and easily understood. If you wish to work with other processing software, this should comprise at least the following functions: the elimination of short loud clicks (de- click); the elimination of low background crackle (de- crack) and noise suppression (de- noise).

In addition, some programs offer functions such as stereo editing (this is somewhat limited with records as opposed to CDs) and an equalizer. The latter lets you refresh the sound pattern a bit or arrange it more forcefully. But remember that quality is more important than quantity, and too much "paraphernalia" can destroy the authentic sound of the original recording.

Whenever you have recorded entire sides of records, you should divide them into individual tracks (titles) as required (e.g. CoolEdit 96™ or Feurio™), to be found in the "share" area of the phono PreAmp Studio CD). Depending on your software this function can proceed almost automatically. Last but not least you can burn the finished recording with your CD mastering software.

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* Registered phono PreAmp customers may also purchase "Sound Laundry TerraTec Edition" separately. Further information in this regard may be obtained from TerraTec Support (see chapter "Service from TerraTec.").

Links.

If you would like to find out more information on this topic, there are a few Internet-links we would recommend you look at. Have fun surfing.

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

Here you will find, among other things, quite a bit on the history of records.

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

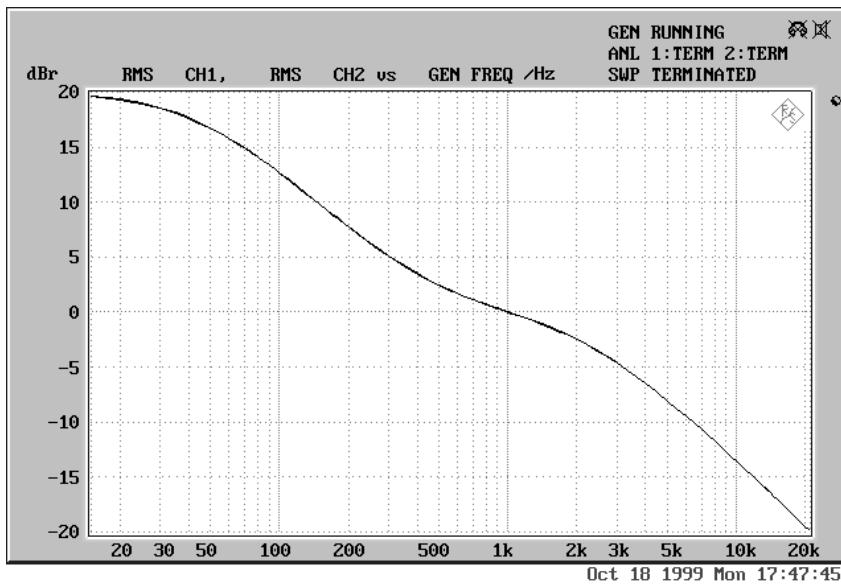**rec.music.collecting.vinyl**

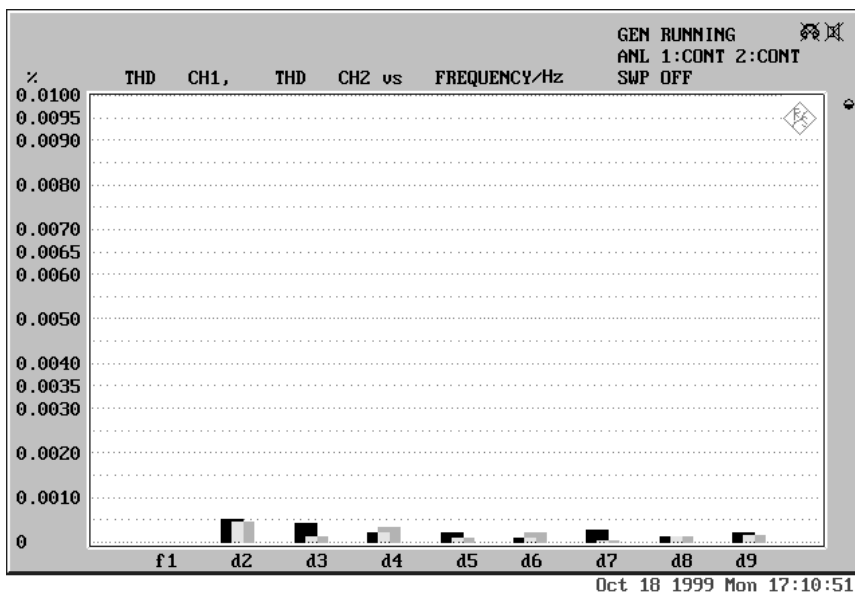Here record collectors can swap stories.

rec.music.marketplace.vinyl

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

Appendix.

RIAA-Equalization curve.


```
                                          GEN RUNNING        ⌧ ⌧
                                          ANL 1:TERM 2:TERM
dBr     RMS   CH1,    RMS   CH2 vs  GEN FREQ /Hz   SWP TERMINATED
 20
 15
 10
  5
  0
 -5
-10
-15
-20
      20  30  50   100    200    500    1k    2k 3k  5k   10k  20k
                                          Oct 18 1999 Mon 17:47:45
```

Distortion factor.


```
                                          GEN RUNNING        ⌧ ⌧
                                          ANL 1:CONT 2:CONT
 %      THD   CH1,    THD   CH2 vs   FREQUENCY/Hz   SWP OFF
0.0100
0.0095
0.0090
0.0080
0.0070
0.0065
0.0060
0.0050
0.0040
0.0035
0.0030
0.0020
0.0010
  0
        f1    d2    d3    d4    d5    d6    d7    d8    d9
                                          Oct 18 1999 Mon 17:10:51
```

Service from TerraTec.

It is no joy running into difficulties, but can occur in the best of systems once in a while. In such cases the TerraTec team is available for info and help.

Hotline, Mailbox, Internet.

In case of serious problems - which you alone can't handle even with the technical help in the manual, your neighbor or dealer - then please contact us directly.

The first method - if an option - is the internet: at **http://www.terratec.net/** you will find the answers to frequently asked questions (FAQ) as well as the newest drivers. All this is also reachable over our mailbox system. The mailbox numbers are: **+49-(0)2157-8179-24** (analog) and **+49-(0)2157-8179-42** (ISDN).

If the above mentioned options don't help you then contact our telephone support hotline. We can also be contacted online per email. Call up **http://www.terratec.net/support.htm**. In both cases you will need to have the following information at hand:

In both cases you will need to have the following information at hand:

- Your registration number
- This documentation

Furthermore, it helps our engineers if you are sitting in front of your unit when you call. That way you can directly try out some tricks and short-cuts. Please take note of the support team co-workers   name.
 You will need this in case there is a defect and you have to return the m3po.