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D I G I T A L   A U D I O   E L E C T R O N I C S

TRACE PRO AE

User's Guide

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Welcome

Congratulations and thank you very much that you decided in favour of a MARIAN product. You have chosen an innovative and powerful sound system, created according to your needs, the needs of our faithful customers. We are proud to present to you: the TRACE PRO AE.

With this fine piece of high technology you are well equipped for the future of digital audio signal processing. That is because the TRACE PRO AE is not just simply a recording system with professional connections in crystal-clear audio quality of 24 bit and 192 kHz – once installed it will upgrade your computer to a most flexible digital audio workstation. It offers you possibilities realized yet with expensive additional equipment only and hardly ever within a computer. You can, e.g. mix input signals and playback signals of a software without any delay on a comfortable mixer surface.

Due to the high quality input sample rate converter of digital input of the TRACE PRO AE you achieve a flexibility in handling different digital audio data format unheard-of so far. Thanks to the unique Output Control extensive routings of all digital and analog single- and mix-signals are set up, saved and recalled in a jiffy – just like at a patchbay.

As the special feature, the TRACE PRO AE includes the all-new TDM SyncBus. This amazing and mighty tool of digital signal processing is integrated directly within the powerful DSP mixer. With the help of the TDM SyncBus all available signals can easily be directed to the input of a TRACE PRO AE or other Marian Soundcards with TDM SyncBus option, and are available there like "real" physical input signals. The resulting routing- and mix-capabilities are almost unlimited.

Please take your time to go through the next pages of this manual also. Besides helpful explanations for the installation, it offers many valuable hints on how to use the Mixer and the Output Control effectively and profitably. If you run in on technical terms while reading, which are unknown to you, the glossary at the end of this manual will helpfully serve you for their clearance.

Now, we do wish you lots of success in working with the TRACE PRO AE. We hope it will bring you just as much fun, as we had developing it.

Your MARIAN Team

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Features

Your TRACE PRO AE comes with a lot of great functions. Here you can find a small list of properties and capabilities.

- ✓ PCI Busmaster card
- ✓ Full duplex support and Multi-Client Support
- ✓ 2 analog, balanced in- and outputs with switchable reference level
- ✓ Digital Stereo in- and output in AES/EBU format
- ✓ Digital S/PDIF input for internal CD/DVD drives
- ✓ High-quality samplerate converter for the digital input
- ✓ 24 bit / 192 kHz resolution
- ✓ Complete balanced signal circuits for all connectors
- ✓ 20 channel DSP Mixer; FPGA based, 40 Bits Precision; latency-free
- ✓ Flexible and extensive mix-, monitor- and routing possibilities
- ✓ DAT-marker support
- ✓ MARIAN SyncBus compatible
- ✓ MARIAN TDM SyncBus compatible
- ✓ WordClock/SuperClock input with software switch able termination
- ✓ Synchronization as clock master (output of internal clock on AES/EBU outputs or SyncBus)
- ✓ Synchronization as clock slave (using external clock on WordClock or digital input or SyncBus)
- ✓ Highly-developed multi-client driver for Windows™ XP: MME, ASIO 2.0, GSIF 2.0, WDM-Audio, DirectSound

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Installation

On the quick start guide and in the interactive tutorial on the driver CD you will find all important installation steps explained graphically. If you have any further questions concerning the installation, please contact our support service. At the end of this manual you will find the different ways of contacting us.

Scope of supply

After opening the package of the TRACE PRO AE, please check if the following components are included and undamaged.

- ✓ 1 x TRACE PRO AE PCI slot card
- ✓ 1 x XLR breakout cable for analog
- ✓ 1 x XLR breakout cable for digital
- ✓ 1 x connector cable for internal S/PDIF input
- ✓ 1 x CD-ROM with driver software
- ✓ 1 x CD-ROM with bundle software
- ✓ this manual with quick installation guide

System requirements

For successful and orderly operation of the TRACE PRO AE, the following basic requirements have to be met.

- ✓ Intel Pentium-, or AMD CPU with at least 1 GHz clock and 256 MB RAM
- ✓ Operating system Windows™ 2000, Windows™ XP Home or Professional or Windows™ 2003 Server
- ✓ Direct X 9b
- ✓ One free PCI slot

Connectors on the TRACE PRO AE

S/PDIF input for
internal CD/DVD   TDM
drives   SyncBus

AES/EBU breakout
cable connector for
digital in- and output

WordClock/Superclock
input

Breakout cable
connector for analog
in- and output
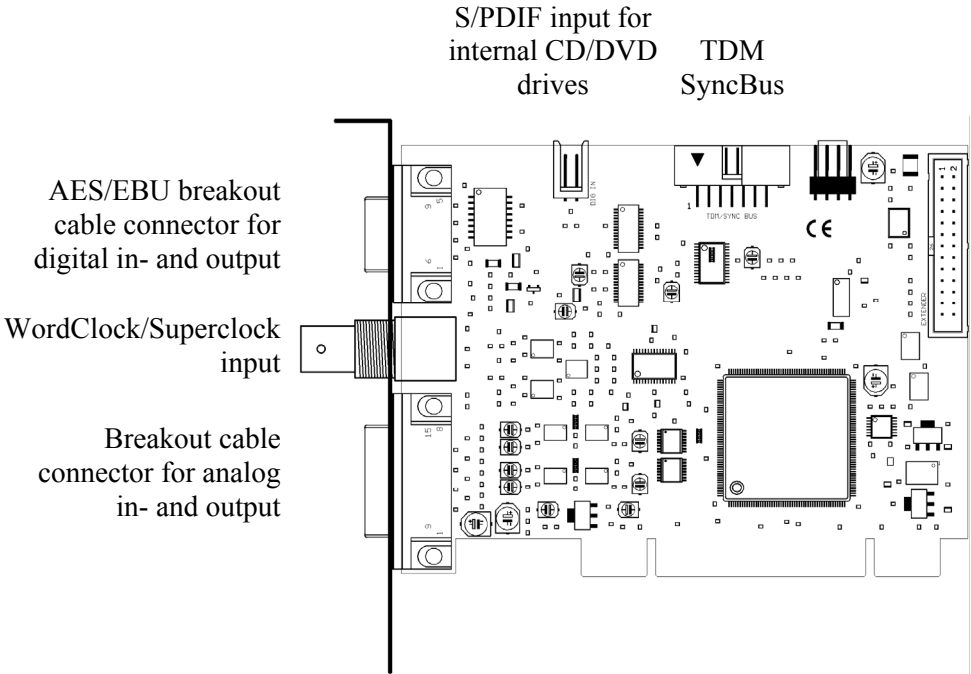
AES/EBU Inputs and Outputs

The stereo AES/EBU in- and output is connected to the TRACE PRO AE using a breakout cable.

Wordclock/SuperClock Input

Connect the Wordclock or SuperClock output of a digital clock device here, if the TRACE PRO AE is to be synchronized externally.

Analog Inputs and Outputs

The stereo analog in- and output is connected to the TRACE PRO AE using a breakout cable.

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S/PDIF Input

Connect the digital output of an internal CD or DVD drive. The signal is available in the "Digital" input channel of the Mixer if "CD" is choosen in the drop down list.

TDM SyncBus

If other MARIAN sound systems with TDM SyncBus option are installed, they can be connected here using a TDM SyncBus cable. Other MARIAN sound systems with SyncBus option only, can be connected using an adapter cable. Both cables can be ordered at the MARIAN web shop.

The TRACE PRO AE in Detail

The first contact

After the successful installation the symbol of the TRACE PRO AE manager appears in the Windows™ taskbar of your computer. It offers you direct access to important driver settings, the clock status display, the DSP-based 20 channel Mixer and the Output Control of the TRACE PRO AE. Furthermore, you can save and load the setups for Mixer and Output Control. Via "Visualizations" you may choose the different skins for Mixer and Output Control. "Info" shows the current driver version of the TRACE PRO AE. This is needed when consulting our support service with certain questions. The menu is opened with a single mouse click, with another on the corresponding entry the window of it is being opened. Via clicking the option "Always on Top" it is prevented that any other window can cover the Mixer or the Output Control. This option is helpful, when working simultaneous with other windows, while wanting constant direct access on Mixer and Output Control.

Trace PRO
Mixer #1
Mixer #2
Output Control #1
Output Control #2
States #1
States #2
Settings
Visualizations ▶
Load Setup …
Save Setup …
Always on Top
About
Exit

▷ *If several TRACE PRO AE have been installed, the entries for Mixer and Output Control will appear accordingly with the extension „#2", „#3" and so on. The settings of the sound systems are managed via **one** window.*

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The Mixer

What is it all about?

This window shows all input channels and the master section of the TRACE PRO AE Mixer. You can see physical inputs (analog and digital), the channels of the TDM SyncBus (TDM In 1 to 4) and the playback channels of an audio application. (Play 1-2 to 7-8) The TRACE PRO AE offers an application with 16 playback channels as Play 1-2 to 15-16. Within the mixer though, only Play 1-2 up to 7-8 are shown as separate input channel strips. The Mixer treats all shown types of channel equally.

The channels

As an example for all types of channels, let's take a look at input channel "1-2" from top to bottom.

First we have the "GAIN"-knob. It is for adjusting the audio level. For the analog input the level adjustement takes place directly at the input stage of the TRACE PRO AE. This influences the level with which a software application is recording from this input. That is why the "GAIN" knob of the analog input is pictured in a different colour. Using the level switch a level adjustment of the input stage can be achived. This affects the range of the "GAIN"-knob.

Beneath "GAIN", "AUX 1", "AUX 2" and so on are placed. Pulling up knob "AUX 1" will result in a volume increase of the signal in the signal sum aux 1, pulling up knob "AUX 2" increases the volume of the signal in signal sum aux 2 and so forth. Hence the aux knobs have the same function like the fader at the end of the channel, except: not for the master sum, but for each aux signal sum.

Besides the aux knobs the "PRE"-button is located. If it is activated with a mouse click, the fader at the end of the channel looses its influence on the corresponding aux knob. Thus, the fader can, for example, be placed on position "-60" while still a signal reaches the Output Control of the TRACE PRO AE via the affected aux knob. Between "AUX 1" and "AUX 2" as well as "AUX 3" and "AUX 4" and so on a link-button is situated. If clicked on, aux volume and pre buttons for aux 1 and 2, aux 3 and 4 and so on are connected functionally. That means: when opening up "AUX 1", "AUX 2" is equally pulled up. Just like that, "PRE"-button of "AUX 2" is

▷ Instructions on how to monitor these aux sums on the TRACE PRO AE, you will find in section "The Output Control".

▷ Examples on how to use pre buttons and aux sums correctly please refer to the "hands on"-part.

▷ The number of shown aux controls depends on the operation mode of the TRACE PRO AE!

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activated when pushing "PRE"-button of "AUX 1".

Now the balance knob "BAL" follows. It regulates the volume relation between left and right channel of the signal, the way it shall appear in the master sum.

If the "Solo"-button is active in one or more channels, the mix out of the TRACE PRO AE provides the signal of these channels only.

If the "Mute"-button is active in one or more channels, the mix out of the TRACE PRO AE **and** the affected aux sums do not carry these signals. The aux busses of these channels are not muted if their "PRE"-button is active.

With the help of the fader at the end of the channel strip, the portion of volume of the channel on the master sum is regulated. Next to it, the level meter with clipping LED (up) and "PRE"-button (down) are located.

If "PRE" is active, the level of the signal is shown independently of the position or *before* the gain knob. If "PRE" is not active, it is measured and shown "post" – that means *after* the fader. This applies to all channel types.

Specialities of digital channel strips

At the top of the channel "Digital In" a drop down list ist placed. It allows choosing the signal for this channel. It offers "AES" for the digital AES/EBU input or "CD" for an internal CD/DVD drive.

This ends our little overview on the input channels of the TRACE PRO AE Mixer. Now, you know how to set up the volume of a channel on the master sum or the aux sums. The only thing that's missing is a possibility to control the level of all of these sum signals. That's what the master channel on the right side of the Mixer is all about.

The master channel

The upper knobs regulate the volume of the aux sums. Between "AUX 1" and "AUX 2" as well as "AUX 3" and "AUX 4" and so forth a link-button is situated. If clicked on, the concerning Aux-knobs are connected functionally. That means: when opening up "AUX 1", "AUX 2" is equally pulled up.

▷ If you set up different volumes for "AUX 1" and "AUX 2" or the right and the left fader without the link-button activated, this relation remains with the link-button pushed.

If the Solo-button has been switched on in any channel, the master channel will indicate this with a lit "Solo" LED. Using the "X"-button next to "Solo" you can deactivate all solo buttons of all channels simultaneously.

The master faders serve as regulators for the volume of the main sum. They are assigned either to the left or the right channel. As long as link-button is pushed, they are moved synchronously.

Adaptable – changing the view of the TRACE PRO AE Mixer

In the bottom left corner of the Mixer you can find four buttons for "Analog", "Digital", "TDM" and "PLAY". These allow, with a click on the button, to hide or show the affected channels.

In order to adjust the look of the Mixer according to your needs, single rows of control elements can be hid or shown with the help of "Parts". This applies to all gain-, aux- or bal knobs and the "Extra" row.

▷ *Note: Hidden channels are still active, just like they were shown.*

All these functions can be very handy for saving precious space on your computer screen. But they're also useful if you wish to secure certain setups of faders or knobs from accidentally being changed.

Of course, apart from all these functions, the window can be sized horizontally.

If multiple TRACE PRO AE have been installed, you can bring up the Mixer of every sound system using the drop-down list in the top bar of the window. The lock-symbol in the upper right corner of the window prevents coverage by other windows. This way the Mixer is always on top and accessible.

▷ *Snapshots are independent of setups (see chapter "Saving and loading Setups"). Thus, they will not be overwritten by a setup.*

You may save certain visual configurations along with the current mixer settings in a "snapshot". For this, click on one of the three buttons beneath "snaps" on the row "save". If you wish to recall a snapshot, click on the "load"-button situated beneath the previously saved snapshot.

The number of aux sums

The TRACE PRO AE can be operated in 3 different modes. Depending on the mode, only a limited number of aux-sums will be available. On samplerates up to 48 kHz 6 aux-sums will be available. On 96 kHz there will be 2 aux-sums. On 192 kHz, no aux-sum will be available.

That's why the drop-down list of Mixer and Output Control will be automatically adjusted accordingly.

Further functions

In the lower left corner of the Mixer 2 function buttons can be found. Via "Setup" the same context menu is opened as when clicking on the TRACE PRO AE symbol in the task bar. Here you will find fast access to important functions and windows of the TRACE PRO AE sound system.

"Outputs" opens the Output Control. There again you can quickly switch to the mixer surface using the "Mixer" button.

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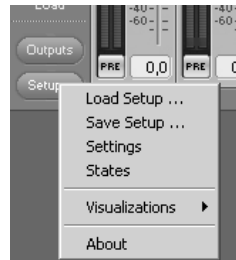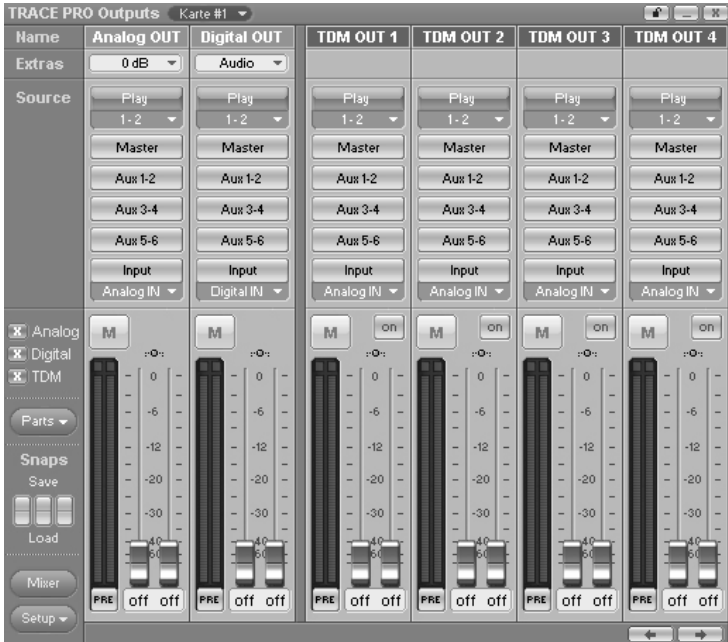
The Output Control

So far, we have taken a look at signals, which either entered the TRACE PRO AE via a physical input or as a playback signal of a software.

The Output Control allows controlling all signals, leaving the TRACE PRO AE. It is opened with single click on "Output Control" via e.g. the TRACE PRO AE symbol on the Windows™ taskbar.

You probably figure, that this window looks pretty much like the Mixer window. Sure it doesn't have gain-, aux and bal knobs but it has routing buttons instead.

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What is it all about?

This window shows the analog and digial output as well as the four TDM outputs of the TRACE PRO AE as stereo channel strips with the name "Analog OUT", "Digital OUT" or "TDM OUT".

In the Output Control the signals of the TRACE PRO AE can be routed completely free to an available output or a TDM Bus channel. This applies to any analog or digital input signal, any TDM input signal, any play signal and all stereo aux-sums.

▷ Just like aux- and master-sums the play channels 9-17 are audible on the output of the TRACE PRO AE, only when assigned in the Output Control!

This is how you do it: Example: you wish to monitor the sum "AUX 1-2" at the analog output of the TRACE PRO AE. Thus, push the "AUX 1-2" knob in the output channel with the title "Analog OUT". That's easy - isn't it?

▷ Aux 1 and aux 2, aux 3 and aux 4 and so on are grouped to stereo-couples.

The same works for input signals. Example: you wish to route the signal of the digital input of the TRACE PRO AE to the analog output? – No problem. Just push the "Input"-knob on the input channel strip "Analog OUT". In the drop-down menu below "Input" choose "Digital IN". – DONE!

▷ The routing of input signal of the TRACE PRO AE takes place directly within the hardware of the soundcard and is thereby latency-free.

For a playback signal of an audio application push "Play" in the appropriate output channel strip. After that, choose the desired channel in the drop-down menu.

If you choose a signal for an output channel under "SOURCE" you may adjust its volume with the fader at the bottom of that channel strip. The "Mute"-, "PRE"- and link-buttons as well as the level meter and clipping indicator work just the same way as you learned from the Mixer.

TDM channels become active with a click on the "ON"-button. If 2 or more TDM-capable cards have been installed in a computer system, an "ON"-button for a TDM channel can be activated in one Output Control, only. If a TDM channel is already active on one soundcard, and you try to activate the same channel on another soundcard, an error message will appear.

The row "Extras" allows changing the reference level for the analog output. This changes the level with which an output signal is played back. For the digital output you can define if an AES/EBU signal is to be played back, or if the digital signal is a "Non-Audio" signal like e.g. a DTS or AC3 stream.

Adaptable – changing the view of the Output Control

Similar to the Mixer, there are three buttons for "Analog", "Digital" and "TDM" in the bottom left corner of the Output Control. With click on the button the channels of this type can be either hid or shown.

▷ *Important on this one: Those channels are not deactivated but simply visually faded out!*

Furthermore, you may hide or display certain rows of the Output Control via "parts".

If multiple TRACE PRO AE have been installed, you can bring up the Output Control of every sound system using the drop-down list in the top bar of the window. The lock-symbol in the upper right corner of the window prevents coverage by other windows. This way the Output Control is always on top and accessible.
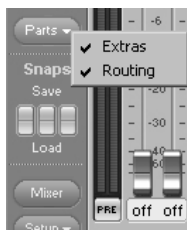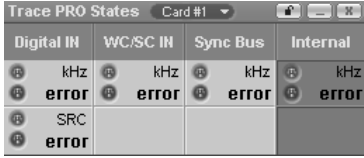
You may save certain visual configurations along with the current Output Control settings in a "snapshot". For this, click on one of the three buttons beneath "snaps" on the row "save". If you wish to recall a snapshot, click on the

▷ *Snapshots are independent of setups (see chapter "Saving and loading Setups"). Thus, they will not be overwritten by a setup.*

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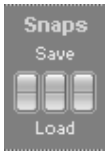
"load"-button situated beneath the previously saved snapshot.

Now you should have gained an extensive overview for your daily work with the two most important windows of the TRACE PRO AEmanager. For in-depth comprehension we recommend you to read the articles of the "hands on" part, which are of interest to you.

The clock status panel

What is it all about?

The TRACE PRO AE clock status panel quickly reports about sample rates, clock-sources, validity of a clock and the state of the sample rate-converter of every installed TRACE PRO AE. If multiple TRACE PRO AE have been installed, you can bring up the states panel of every sound system using the drop-down list in the top bar of the window.

The lock-symbol in the upper right corner of the window prevents coverage by other windows. This way the status panel is always on top and accessible.

Clock-status and sample rate

The first row of the panel tells you, which sample rate is captured on which connector or input (AES In; Wordclock; SyncBus) or is set up for the internal clock. The green LED on each left side, shows, whether or not the clock has been derived correctly from the corresponding input. If no clock source was detected on a connector, the red LED lights up. Additionally the hint "error" shows up. If this input has been chosen clock-source in the settings of the TRACE PRO AE, the corresponding column will appear red. The input actually used as clock-source will be marked whitely.

▷ *Settings for clock-source and samplerate-converters are handled in the settings window of the TRACE PRO AE manager. When using the ASIO interface they are done via the software application.*

▷ *If the option "Card is SyncBus master" is active, the column "SyncBus" will show an "M" for "Master".*

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Samplerate converter

The second row shows the status of the samplerate-converter of the digital input. If the green LED lights up in a column, the samplerate-converter of this input is active and functional. If the red LED lights up, the samplerate-converts is active, though either no clock can be captured from this input, or the samplerate of this input differs in ration more than 1:16/16:1 in reference to the clock currently set up and active. If neither of control LED is illuminated, the samplerate-converter of this input is deactivated.

The second row of the column "WC/SC IN" features information about the WordClock/Superclock input of the TRACE PRO AE, if a clock can be extracted on this input. It shows the frequency, which is coming in on this input and the current setting of the TRACE PRO AE manager as seen and set up in "Synchronisation" under "WC/SC input".

Saving and loading setups

Within the TRACE PRO AE manager the options "Save Setup…" and "Load Setup…" can be found. With those you can save all current settings (the setup) of the TRACE PRO AE Mixer and the Output Control into one single file and recall it when needed.

Clicking "Save Setup…" opens the Windows™ file browser where location and file name of a setup are to be assigned. You can save many, many different setups.

Clicking on "Load Setup…" opens Windows™ file browser, where the location of an already saved setup is to be assigned. If a file is chosen, clicking "open" will delete all current settings of Mixer and Output Control and overwrite them with the settings of the new setup file.

▷ *Choose very clear and direct names for your setups, e.g. the date of a session like "recording 2006-03-01". Also memorize this location well, so you will find this setup quickly next time you need it.*

▷ *For quick and seperate saving of certain settings of the Mixer or the Output Control, snapshots are a good tool!*

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The MARIAN TDM SyncBus

Principles of the TDM SyncBus

The TDM SyncBus is the collective transport of digital audio- and synchronization signals. With the help of the TDM SyncBus all signals of an audio system featuring the TDM SyncBus may be send out to other Marian sound cards with TDM SyncBus option or returned to an audio application again. The principle of operation of the TDM SyncBus can be compared quite well with the pneumatic dispatch or tube system within one or between several office buildings.

Imagine this: Ms. Smith, from the press department sends out a press report on channel 1 of the tube system. It arrives at the distribution central. If Mr. Mayer from the financial department wishes to read the report, he needs to call for it at the central. He will then receive it in the inbox of channel 1.

The same way as Ms. Smith uses a tube channel to send out a document within the building, you can use a TDM channel to send out a signal to the TDM SyncBus via the Output Control. The same way as Mr. Mayer receives the document in the inbox, the audio signal of the TDM SyncBus lands up in the input of the TRACE PRO AE Mixer.

This is also possible: Mr. Miller from the neighboring building may also request the message of Ms. Smith. For this, the distribution central simply copies the document and sends it out a second time to Mr. Miller.

That means: If several Marian sound cards with TDM SyncBus are installed in a computer, the signals of the TDM channel are available to the other sound cards as well.

BUT: The capacities of the pneumatic dispatch are limited. E.g. if Mr. Miller from the neighboring building also wishes to send a document, he must not use channel 1, since Ms. Smith from the press department is already sending out her stuff here. All in all there are only 8 channels, that's why Mr. Miller must decide for channel 2 to 8.

For the TDM SyncBus this means: only one signal in one channel but eight channels at the maximum can be distributed simultaneously. That is to say that a certain TDM channel may only be active in once Output Control.

Using the TDM SyncBus

As already described, the TRACE PRO AE offers 8 stereo playback channels. These can be used with one or more software applications. Where these signals are actually played back or where they are send to, is completely up to you.

E.g. in order to send the playback signal of a software to the TDM SyncBus, all you need to do is to push "Play" of the desired TDM channel (1 to 4) in the Output Control and choose the playback signal from the drop down list. By activating the "ON" button, this input signal will be availabel in the TRACE PRO AE mixer in every connected MARIAN soundcard with TDM SyncBus option.

In order to record the signal of this TDM channel, you need to choose the input "TRACE PRO AE 9-10" in the software application, whereas "TRACE PRO AE 9-10" to "TRACE PRO AE 15-16" correspond to the TDM channels "1" to "4".

For using the TDM SyncBus please note the necessary settings as described in the section "The TRACE PRO AE as SyncBus master".

The settings
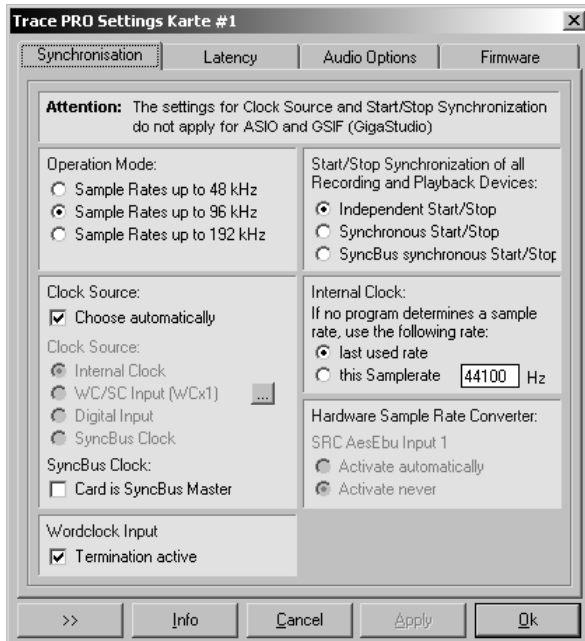
The following chapter is all about the system settings of the TRACE PRO AE. You open the corresponding window via the TRACE PRO AE symbol on the taskbar. Should questions remain, we recommend taking a look at the "hands on"-part of this manual. Especially the section "The TRACE PRO AE in connection with digital devices" contains simple examples for right handling of the clock settings.

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Synchronization

Operation modes

Operation Mode:
- ⦿ Sample Rate up to 48 kHz
- ○ Sample Rate up to 96 kHz
- ○ Sample Rate up to 192 kHz

The TRACE PRO AE can be operated in three modes. By choosing one of these options, you define which maximum sample rate the TRACE PRO AE can be operated with. This also affects the number of aux-sums available besides the master-sum. In 192 kHz Mode no additional mix sum besides the master sum is available. Therefore, in this mode, the mixer and the Output Control do not offer any aux knobs or buttons. When choosing the option "samplerates up to 48 kHz" there will be 6 aux-sums available. When choosing the option "samplerates up to 96 kHz" there will be 2 aux-sums available.

Start/Stop synchronization

Start/Stop Synchronization of all
Recording and Playback Devices:
- ⦿ Independent Start/Stop
- ○ Synchronous Start/Stop
- ○ SyncBus synchronous Start/Stop

The start/stop synchronization can be turned on or off for all audio devices. If this option is active, the audio data transfer of all audio devices is started and stopped simultaneously.

What effect does that have?

Let's suppose you wish to play back two stereo audio tracks from an audio application on different devices of the TRACE PRO AE ("TRACE PRO AE 1-2" to "TRACE PRO AE 3-4"). If all devices would be started and stopped asynchronously, it could happen, that track one (here: "TRACE PRO AE 1-2") starts first with playing back, and track two (here: "TRACE PRO AE 3-4") starts last with playing back. This offset can distinctively be hearable. But if you choose "synchronous start/stop" the playback of all tracks will start sample precise. There is no offset between ("TRACE PRO AE 1-2" to "TRACE PRO AE 3-4". The same applies for a recording situation.

▷ *You can activate the „classical" MME drivers in the system settings under "Audio Options".*

This option is only relevant, when working with "classical" MME drivers. In case of ASIO or GSIF, the synchronization is automatically ensured. For WDM/DirectSound the start/stop synchronization is, according to the specifications, not possible.

Clock source

Clock Source:
☑ Choose automatically
Clock Source:
◉ Internal Clock
○ WC/SC Input (WCx1)   [...]
○ Digital Input
○ SyncBus Clock
SyncBus Clock:
☐ Card is SyncBus Master
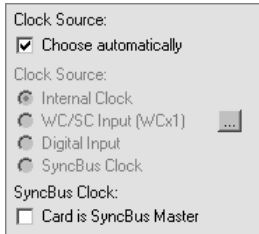
When working with digital audio signals, a clock is always required. The settings listed here, define where this clock comes from. If no clock is available or a wrong clock setting is made, playback errors or even system malfunction can be the result.

By selecting "choose automatically" the TRACE PRO AE driver will set up the valid clock source by itself depending on the recording- or playback-situation. In that case, please pay attention to the specialties dealt with in chapter "Important notes on TRACE PRO AE and digital clock".

Attention: If the connected device is not synchronized with the TRACE PRO AE and still you are recording from this digital input, the recording will suffer digital errors. These are possibly not instantly perceptible while quickly checking, but can ruin a recording by periodical "clicks" and "cracks" in the long run.

Important: The clock settings of the TRACE PRO AE manager will be ignored and overwritten if an audio application accesses the card via the ASIO driver. Thee settings will be done by this application. Commonly there is a drop down list showing all available clock sources of the TRACE PRO AE besides the field where the "ASIO TRACE PRO AE" driver is chosen. After quitting the ASIO application the clock settings of the TRACE PRO AE manager will be restored.
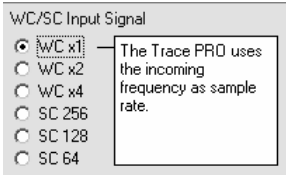
The TRACE PRO AE can be operated in 3 different clock modes. The following section will explain these and sort the different options of clock sources accordingly.

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The TRACE PRO AE as clock master

If "Internal Clock" is chosen, the TRACE PRO AE itself generates the clock. External devices can receive this clock signal via the digital output or the SyncBus of the TRACE PRO AE. This lifts the TRACE PRO AE to clock master status. If external devices are configured as clock slaves, they will work synchronously to the TRACE PRO AE.

The TRACE PRO AE as clock slave

If one of the following three options is chosen, the TRACE PRO AE will work synchronously to connected digital devices and therefore turn into a clock slave.

- When choosing "Digital Input" the clock is extracted out of the corresponding digital audio input signal. This may either be the AES/EBU input or the input of a internal CD/DVD drive.

- When choosing "WC/SC Input" the clock is caught from the WordClock input. Via the "…"-button different WordClock/SuperClock modes can be chosen. Each option will be a certain relation of the input frequency to the desired samplerate.

- When choosing "SyncBus Clock" the clock from the SyncBus connector on the TRACE PRO AE is used. For this to work, the option "Card is SyncBus Master" must not be chosen.

The TRACE PRO AE as SyncBus master

If you own two or more MARIAN PCI sound systems and have connected them all in your computer using a SyncBus cable, you can now define, which card supplies the digital clock in this setup using the option "Card is SyncBus Master". On the SyncBus Master card any clock source may be chosen. All other MARIAN PCI sound systems are running synchronously to this clock if their clock source has been set to "SyncBus".

Internal clock

Internal Clock:
If no program determines a sample
rate, use the following rate:
- ⦿ last used rate
- ○ this Samplerate   `44100` Hz
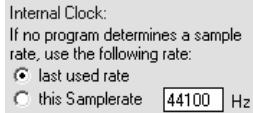
In the section "Use this sample rate", you can type in, which sample rate the TRACE PRO AE shall work with, if it is not busy with playing back or recording tasks of an audio application. For example, if you use the TRACE PRO AE purely as a digital mixer.

In choosing "last used rate", the sample rate, which was used last by a recording or a playback through a software, is kept by the TRACE PRO AE.

Sample rate conversion (SRC)

Hardware Sample Rate Converter:
SRC AesEbu Input 1
- ○ Activate automatically
- ⦿ Activate never
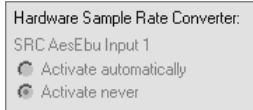
Here you can find the options of the sample rate converter for the digital input. Activating the option "activate automatically" will generally allow sample rate conversion on the input, except if the clock source of that input was chosen. On "Never active" the sample rate converter is deactivated permanently. Note: With this setting only, the transmission of DAT markers like from a DAT recorder will be possible.

Word clock input

Word Clock Eingang
- ☑ Terminierung aktiv
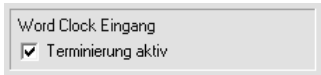
If you operate the TRACE PRO AE as last unit in a word clock chain, you can set the termination for the word clock input right here.

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Latency

DMA Buffer Size

DMA Buffer Size (Samples):
These settings apply to all installed Trace PRO.
Changes at these settings are used immediately. Thus, it is not necessary to click "Apply" or "Ok".

64   0

☐ Play Test Tone at "Trace PRO 1-2" (Samplerate: 44,1 kHz, -6 dBfs)

Resulting Latency (depends on samplerate):

kHz	22.05	32	44.1	48	64	88.2	96	176.4	192
ms	lbMs	lbMs	lbMs	lbMs	lbMs	lbMs	lbMs	lbMs	lbMs

The maximum latency by use of the Microsoft Mutilmedia
Drivers (Standard MME) is 18 ms.

▷ *The DMA buffer size is always simultaneously changing the latency for the GSIF interface.*

Via the upper slider you can adjust the minimal latency of the TRACE PRO AE. Here, the size of the buffer, shown in samples, is changed for the audio transport between PCI bridge and TRACE PRO AE. If you operate the soundcard with e.g. 44.1kHz, 88 samples will result in a latency of around 2ms. On 88,2kHz, this number of samples would mean a latency of 1ms. The cart "resulting latency" shows these connections for some important samplerates.

▷ *Important hints on how to set up the latency you will find in the „hands-on"-part and section "DMA bus master technology".*

By activating "Play test tone at TRACE PRO AE 1-2" a sine tone is played back at the analogoutput on the TRACE PRO AE with –6dbfs. Monitor this signal and adjust the value for the DMA buffer to be as small as possible, but without receiving distortions when playing back the sine wave.

Audio Options


```
Trace PRO Settings Karte #1                                    ×

 Synchronisation  |    Latency    |   Audio Options   |   Firmware

 ┌──────────────────────────────────────────────────────────┐
 │ Classic MME Drivers:                                       │
 │  □ Activate                                                │
 │  Before you change this setting, close all audio applications first. This setting │
 │  can be changed only by users with administrator rights.   │
 │                                                            │
 │  Clock/Samplerate/Device Conflicts:                        │
 │  ☑ Deactivate Warning Messages                             │
 ├──────────────────────────────────────────────────────────┤
 │ GigaStudio:                                                │
 │  Clock Source: [                        ▼]                 │
 ├──────────────────────────────────────────────────────────┤
 │ DAT Marker Support:                                        │
 │  □ on AES/EBU input 1                                      │
 │  Attention:                                                │
 │  Your audio application must support DAT Marker Recording in order to │
 │  use this function. (Application examples: Magix Samplitude or Sequoia, │
 │  Steinberg WaveLab)                                        │
 │  If you activate DAT Marker Support for an input then the SRC for that │
 │  input will be deactivated.                                │
 └──────────────────────────────────────────────────────────┘

   >>      |   Info   |   Cancel   |   Apply   |    Ok
```

Classical MME Drivers

On Windows™ XP, the MME drivers function via WDM. This may result in certain disadvantages. By activating this option, all in- and outputs of the TRACE PRO AE can be used via the "classical" MME interface. They appear with the suffix "(MME)" on recording and playback devices within an audio application. Please quit all audio applications prior to activating this option.

Clock/Sample rate/Device Conflicts

Clock/Samplerate/Device Conflicts:
☑ Deactivate Warning Messages

As you can see in chapter "Important notes on TRACE PRO AE and digital clock", situations can occur, where certain requirements to the TRACE PRO AE can not be met. For example:

Using the classical MME drivers, encountering a situation, which can not be established, the driver of the TRACE PRO AE can inform you about this with an appropriate error message or warning. Oftentimes, this can be insufficient since some applications test all available devices of the TRACE PRO AE on system startup. This test, would certainly lead to an accumulation of such messages. You'd be busy for quite a while confirming these by clicking "OK". By standard, error- and warning messages are therefore deactivated.

For diagnostic purposes it is recommended to deactivate this option, since it can provide a good hint on searching causes for problems in this field.

GigaStudio

GigaStudio:
Clock Source: Card 1 Word Clock ▾

This section is availably only if a Tascam GigaStudio application is installed. In the drop-down list, "clock-source" you can define, to which clock signal GigaStudio is to be synchronously operated to.

DAT marker support

DAT Marker Support:
☐ on AES/EBU input 1

DAT markers of e.g. a DAT device may be handed over to an application software via the TRACE PRO AE. Therefore this option has to be active. Please note, that in this case, the samplerate converter for the digital input will be deactive.

ASIO Device Setup
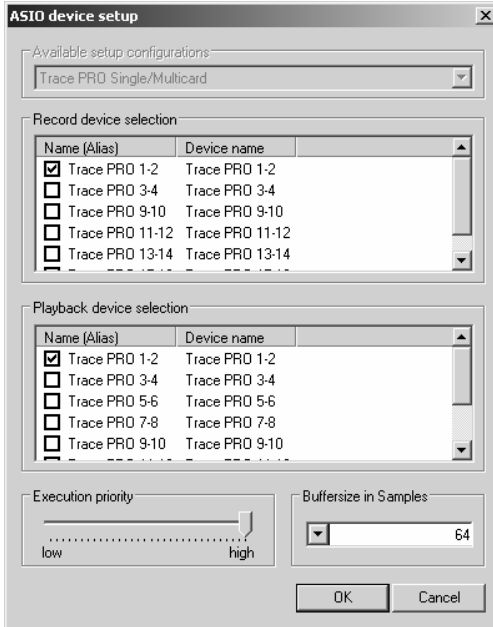
Due to small latency time, the ASIO interface has become a standard in professional music production. The ASIO device setup offers important settings for the TRACE PRO AE using the ASIO interface. It is opened from within the audio application, which supports the ASIO standard. Most times there is a button called "control panel" next to the field where the ASIO driver is selected – a click on it opens the ASIO device setup.

In this window you can see all in- and outputs the TRACE PRO AE offers. If one entry is checked, then the corresponding in- or output is activated and usable for the audio application.

With a click on an entry of an in- or output in the column "name (alias)", you can change its name. This name will also appear this way in the ASIO application. For example: You re-name

▷ *Please consult the manual of your audio application to get to know, where exactly the configuration of the ASIO driver is made.*

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"TRACE PRO AE AES/EBU In" to "From CD-Player". Now you can see in the audio program at first glance, which signal origins from the CD-player.

In the bottom left corner of the window, the "Execution priority"-slider is situated. It can be moved between "high" and "low" by dragging it. In position "high" the transfer of the audio data between ASIO audio application and TRACE PRO AE receives the highest priority. That means the CPU of the computer processes them preferably.

In position "low" the calculation of plug-in effects is given the highest priority, the audio data transfer is cared about secondarily.

In the bottom right corner of the window, the "buffersize in samples"-field is situated. This value defines the delay time (latency) of the audio data transfer for ASIO.

Example: When working with a sample rate of 44.1 kHz, a buffer size of 176 samples will give you a delay time of 4ms. Working with a sample rate of 88.2 kHz, 176 samples will give 2ms delay.

The TRACE PRO AE in the connection with digital devices

Background

As you probably already know, there is one big difference between analog and digital audio signals: analog audio signals are continuous. That means at any given time you can measure this signal and retrieve a defined measuring value. As opposed to digital audio signals. They consist of many single values (samples), which follow each other in a certain frequency (sample rate). Here it is not possible to receive a measuring value at any time, but only as often as the sample rate defines. Example: having a sample rate returning one value a second, you can't measure a value at half a second.

What is a clock?

As you can see, there has to be something governing, at which moment of time a digital value is to be measured. This is exactly the task of the clock. It is the impulse- or rate generator. The rate, given by the clock, defines the sample rate.

Let's make this a little clearer with an example: Imagine an orchestra with a conductor. The maestro lifts and lowers the baton – he gives the beat. Depending on the beat, the musicians play either fast or slow. The conductor is thereby the clock and the speed the orchestra plays with, that is the sample rate.

What happens if an orchestra plays without a conductor? – complete chaos! Every musician plays just like he wants in a different speed. The same happens if you connect digital audio devices. Just like in the orchestra example, there has to be defined, who is maestro (the master) and who are the musicians (the slaves).

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The rules in the digital audio world

Connecting digital audio devices the following three simple rules have to be maintained.

1. All devices have to be synchronized with each other. (Using the clock)

2. There can only be one! That is the device (the master) governing the rate. All other devices have to lock in on this rate (the clock) of the master and are thereby slaves.

3. Digital audio connections mostly include a clock. (S/PDIF; ADAT or AES/EBU). Besides that, the synchronization can be ensured using Wordclock- or superclock connections. But within a compound of digital audio devices, the clock has to be the same – everywhere.

Important notes on TRACE PRO AE and digital clock.

Clock settings when using ASIO

If you work with an audio application using the ASIO interface of the TRACE PRO AE, all clock settings will be managed by that program and overwrite the current settings in the manager! Which clock source is used, can still be read in the clock settings within the TRACE PRO AE manager. The manual of the application should give you report about which clock source the audio application chooses under which circumstance. If the audio application is closed (communication with the ASIO driver is terminated), all previous clock settings are being reset.

Level metering in the TRACE PRO AE Mixer

In order for the TRACE PRO AE Mixer to show the levels of a digital input signal, it has to use the clock of this input. That means: If the clock source is not read from this input, no digital input signal can be used or shown, save you activate the sample rate converter for this digital input.

In that case, the sample rate on the input is adjusted to the currently active clock, in order to allow correct displaying. Now the level of that input port can also be shown. If the sample rate conversion is switched off, the affected input channel will have a small red square in the level meter.

Samplerate on record/playback

Please note, that a certain samplerate for the TRACE PRO AE can only be set, if the used clock-source is the internal clock. If synchronized externally (Clock is being read from an AES/EBU input or from the SyncBus), the samplerate will be defined by the connected devices.

Different sample rates on record/playback

You already work with certain in- or outputs of the TRACE PRO AE with a certain sample rate. Now you wish to use other in- or outputs simultaneously, but with another sample rate. Since the TRACE PRO AE can be operated with one sample rate, only, the driver will inhibit the usage of the additional in- or outputs. The simultaneous operation of the TRACE PRO AE with different sample rates in possible using the standard-MME or directSound driver, only.

Simultaneous playback on one channel

Example: You are playing back on a certain device (e.g. "TRACE PRO AE 1-2") of the TRACE PRO AE. Now you wish to playback another signal of another software application via the same device. The TRACE PRO AE driver will inhibit this, except if the simultaneous playback of several audio programs via the same device happens using the standard-MME or directSound drivers.

Parallel recording and playback

Example: A playback is running on the TRACE PRO AE, using the internal clock source. Now you wish to start a recording simultaneously. Without the sample rate converters for this a switching of the clock-source is required. But this would cause distortion signals on the running playback. The TRACE PRO AE manager and driver will always inhibit a switching of the clock-source, if a playback or recording is already going on.

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Overview

The following shows the recording and level capturing of one or more inputs in a chart. The input signal is not synchronized with the current clock of the TRACE PRO AE.

Current clock-source:	Recording/Level-metering of:	
	Analog input	Digital inputs
Internal clock	✓	✓
Any clock and SRC active	✓	X
Clock of input active	✓	✓

Note: A recording is generally possible, if the digital input signal is synchronized with the TRACE PRO AE.

The channel references

The following charts show you the different physical input and output channels of the TRACE PRO AE and how they are assigned to devices available to an audio application.

Playback line

Software Playback device	Mixer	Output Control
„TRACE PRO AE 1-2" to "TRACE PRO AE 7-8"	Available as „PLAY 1-2" to „PLAY 7-8"	Routable to any output via the „Play" button and the drop down list
„TRACE PRO AE 9-10" to "TRACE PRO AE 15-16"	Not available	Routable to any output via the „Play" button and the drop down list

Record line

Physical input on the TRACE PRO AE	Mixer	Software recording device
Analog input	„Analog IN"	„TRACE PRO AE 1-2"
Digital input (AES/EBU or CD)	„Digital IN"	„TRACE PRO AE 3-4"
TDM input 1 to 4	„TDM IN 1" to „TDM IN 4"	„TRACE PRO AE 9-10" to „TRACE PRO AE 15-16"

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PCI Bus Master Technology

As opposed to PCI cards with PCI target chip, the TRACE PRO AE is constructed as PCI bus master card. The PCI bus master technology offers some important advantages: It allows extremely small latencies while keeping the CPU load very small. Such qualities are fundamental key functions for a powerful digital audio workstation (DAW). Unfortunately, the PCI bus master technology also has a disadvantage.

Background: The principle of operation allows for a PCI card to independently initiate a data communication with the main board of the computer. The parameter for the time wise length of such data transfer is called "PCI Latency Timer".

Problem: If this time is very long, a PCI card may perfectly and effectively exchange data with the main board, but on the other hand, it may block other components, trying to do the same. That's why it could happen, that e.g. a network card or a hard drive controller might hinder the operation of the TRACE PRO AE, if the PCI Latency Timer for this component is set up very high.

Solution: If, even with correct driver- and DMA latency time, digital clicks or distortions appear on a recording or a playback when using the TRACE PRO AE with a lot of channels on high samplerates, it may appear necessary to perform changes at the PCI Latency Timer. Some BIOS allows changing the PCI Latency Timer for every PCI slot separately. That means, if you figure out, that e.g. the latency time for the network card of the computer is set up quite high (64 or more) and thereby hinders the TRACE PRO AE, the PCI Latency Timer for this component has to be reduced. Some other BIOS allows only global changes of the PCI Latency Timer parameter. In that case the time frame may only be changed for all components equally. But also on the Internet several programs are offered, that allow adjustments of the PCI Latency Timer for different components

Hands on the TRACE PRO AE

Sounding Good

Background

Surely at least once in your life you have recorded something with a cassette recorder. You also probably noticed that the signal can let the overload lamps flash in the bottom parts once in a while, without the music instantly sounding distorted and unpleasant. On digital audio systems, the level meter must never reach the overload status. In that case, distortions would appear instantly. On the other hand, you try to get the signal as loud as possible, in order to keep the noise floor, caused by an A/D converter on small levels, as low as possible. For every analog signal you'd like to record with the TRACE PRO AE, you have to start with adjusting the level! This happens within the TRACE PRO AE Mixer, with the help of the gain knob.

How to do it?

1. Turn on the "PRE"-button in the lower part of the concerning channel strip. Now the level meter is independent of the fader position. That means you hear the signal with the desired volume, without affecting or falsifying the level meter.

2. Carefully turn up or turn down the "GAIN"-knob of the channel strip, but only so far that the red overload indicator will never light up.

Hint:

If you are about to record a guitarist let him play a "real" song, while you do the leveling. This often comes a bit louder and with much more dynamic range. That really shows you how far you can go, pulling up the gain knob.

Setting up the latency

In digital systems the processing of audio data always comes along with a certain delay time. Here is where you get to know, how to set up and optimize this delay time (latency) for the TRACE PRO AE.

Background

Within a computer, digital audio data is transported in small packages, the so called buffers. Thus, an audio signal is split up in little portions (data packages) and is send away piece by piece. Looking at the TRACE PRO AE, these buffers have to be send from audio application to the driver of the TRACE PRO AE. This one takes care, that the buffers find their way via the PCI socket (PCI Controller) to the TRACE PRO AE. If a recording is to be managed with the TRACE PRO AE, all of the mentioned happens in reverse.

Let's make this a little clearer with an example: A composer wants to write a little piece for a piano player. So in just five minutes he fills the first piece of paper with lots of notes. He then hands the paper to the musician who instantly starts to transform these notes into beautiful melodies. He, too, is now busy for five minutes. The composer could have written two pieces of paper in ten minutes, just as well, while the musician continues to play one piece of paper in five minutes. In order for the musician to continuously play, so the music won't stop, the composer must not write less then one score in five minutes.

In this example, the piece of paper is the audio buffer. Just like it contains notes, the buffer contains audio data. The composer is the audio application sending buffers via the audio driver. The musician is the TRACE PRO AE, which receives these buffers via the PCI Controller. The PCI Controller operates with the DMA latency defined by the DMA buffer. In order for the continuous data stream to not break up, the buffers of the audio application must not be smaller than the DMA latency (DMA buffer size)

Setting up the "DMA Latency"

1. Connect your monitor to the analog output on the TRACE PRO AE

2. Activate "Play Test Tone at "TRACE PRO AE 1-2"" in the settings window.

3. Wait approx. 2 to 4 seconds to check if distortions appear during the playback

4. If "clicks" and distortions appear continuously during the playback of the test tone, move the slider one position further to the right. If no distortions appear, move the slider one position to the left.

5. Repeat step 3 and 4 until an optimal playback without distorted playback is steadily ensured.

6. Depending on your computers performance, the resulting value should be around 2-8 ms.

▷ *Please note: the smaller the latency, the higher the system load to the CPU of your computer. For many purposes, e.g. audio editing, mixing, and mastering, small delay times are not relevant. In case of such application - field setting up a higher latency for smaller system load is recommended.*

▷ *For ASIO-applications the DMA-Latency is set up in the ASIO settings.*

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Setting up the audio driver latency

Possibly, this value has to be readjusted, when working with MME- or DirectSound applications.

1. Open the audio application

3. Start playing back a simple signal (e.g. a stereo track) and control it via the TRACE PRO AE.

4. Go to the audio setup of the audio application

5. For DirectSound- and MME applications, there is a setup field for the buffer size, defining the latency, mostly within the application.

6. Decrease the buffer size or latency as far as needed, but without causing the playback signal sound distorted

In a Project Studio

Situation

Let's imagine the following: Producing your brand-new chart hit you reach a critical phase: you want to record the vocals. For a singer to provide a perfect performance it is important, that the surrounding conditions are as well: most advantageous. The first step towards this, is a latency-free headphone mix in best possible quality. For that you use your studio reverb. For its latency-free integration – the TRACE PRO AE.

How to do it?

▷ *This article bases on section "Mixer" and "Output Control", as well as "Sounding Good" from the "Hands on"-part.*

Hardware routing

Plug the microphone cable into the analog input. Within the TRACE PRO AE Mixer, bring the signal up to perfect level using the "GAIN"-knob. Into the analog output, plug the headphone pre-amp for your musician. Now take care of the effect unit: the digital output of the TRACE PRO AE is plugged to the input of the effect unit. Its output goes to the digital input of the TRACE PRO AE.

▷ *Read section "Sounding good".*

Software routing

In the Output Control of the TRACE PRO AE assign under "SOURCE" "AUX 1-2" to "Analog OUT". On "Digital OUT" under "SOURCE" push "AUX 3-4".

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Volume settings

In order for your musician to hear him/herself on the headphones, you need to pull up "AUX 1" and "Aux 2" in his/her channel (analog input) in the TRACE PRO AE Mixer. For a portion of the signal going to the effect unit, "AUX 3" and "AUX 4" have to be pulled up. (Push the "LINK"-button between the knobs.)

The Output signal of the effect unit reaches the Mixer via analog input 5-6. In order for your musician to hear this reverb effect, you need to pull up "Aux 1-2" in this channel as well. (Push the "LINK"-button between the knobs.) The same can be done with a playback signal form an audio application e.g. a sequencing program. This will run into a channel in the Mixer on e.g. "Play 1-2". This is where you also pull up "AUX 1-2", so your musician can hear the playback.

Finalizing

Now you are able to regulate your monitor volume independently of the musician. You wish to hear the signal solo or want to let the musician be louder than the playback? – No problem, the headphone mix is not affected. Important for that: for all aux knobs the pre button has to be active!

Please take care: When pulling up aux3/aux4 in the digital input, you will get a feedback. Because: Aux 3-4, according to their assignment, go, via the digital output to the effect unit.

Best would be, you save this setup using a clear and direct name. This way it can always be recalled in a similar situation.

With this setup, you have complete control of what the musician hears. You can increase the vocals, completely and quickly mute the reverb if needed or even put reverb to the playback. Do everything possible, so your musician feels just fine – he/she will thank you with some sensational takes.

The TRACE PRO AE as hard-disk-recording-system

With the following example, we would like to show you, how to set up and optimize the TRACE PRO AE as a reliable hard disk recorder.

Situation

Let's recall the example of producing a chart hit. The setup has advanced so far that your musician is ready to produce the best takes ever. Now it is all about not letting him/her wait to long and guarantee the best possible recording quality.

What's there to care about?

Amount of data

Digital audio-data requires memory space – quite a lot…

It heavily depends on the used sample rate. That means: double the sample rate and you will need the double of memory space. Suppose the whole recording session produces one hour of audio material. You are recording the voice monophon and the reverb unit in stereo. Here we have a little example:

- 24 bit * 192 000Hz = 4608000 bit per second
- 4608000 bit/s = 562 Kbyte/second
- 60 seconds * 60 minutes * 3 tracks = 10800 seconds
- 562Kbyte * 10800 seconds = approx. 6 Gbyte

Depending on the audio software, there is mostly more data stored. Always plan about 1/3 more memory than calculated.

That means you need quite a modern hard drive with at least 10 Gbyte of memory and a high saving rate.

Needless to say, the affected computer should be of a newer date, to reliably process that amount of data in the given time.

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The software

You need a multitrack-capable software, which can reliably record the audio signals of the TRACE PRO AE. The software communicates with the TRACE PRO AE via the audio driver. In our example there are actually two that would apply: the "classical" MME drivers, or the ASIO drivers.

The setup

Since, when recording, the audio data has to be transported between the harddrive of the computer and the TRACE PRO AE distortion-free and error-less, the audio latency has to be adjusted perfectly. Check the corresponding settings! Choose bigger values (e.g. 10-20ms) to keep the system load small. Start your preferred audio application and choose the "ASIO TRACE PRO AE"-driver or the Multimedia driver, in "Audio Settings" or "Audio Options" from within the software. The in- and outputs of the TRACE PRO AE appear in the format "Analog IN (MME)" Using the ASIO driver, all wanted in- and outputs have to be activated via the ASIO device setup. Using the multimedia driver, all wanted in- and outputs are commonly activated via the audio software. Set up the latency for MME/ASIO. Again: rather enter bigger or more buffers, for a more relaxed system load.

Create the desired number of tracks in the software and assign them to the different inputs of the TRACE PRO AE. Put the tracks to record ready, push "record" and there you go…!

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The TDM SyncBus – Example 1

The situation

You have created a pretty large setup using Mixer and Output Control: via all physical outputs single signals are playing back – the outputs are all occupied. Additionally you created a stereo master sum and several aux-sums. The question arises: where and how could those mix-signals be monitored, even though all physical outputs of the card are already in use?

The solution

Use another TRACE PRO AE and the TDM SyncBus! In the Output Control of card 1, click on "Master" in the TDM Out 1 and activate the bus with the "On" button. The master sum is now lead to TDM channel 1. In the Output Control of the card 2 click on "Input" and choose "TDM IN 1" in the channel where you wish the signal to appear – finished! Now the master sum is monitored on the second TRACE PRO AE.

You may proceed similar with the aux-sums using the remaining TDM channels.

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The TDM SyncBus – Example 2

The situation

You have created a nice mix down of input- and playback signal using the TRACE PRO AE. You wish to record this mix, but you don't own a second recording the system with the required AES/EBU inputs.

The solution

Again the solution is named: TDM SyncBus! TDM channel are available as input signals to any audio recording application. Just assign the input "TRACE PRO AE 9-10" to a stereo channel in you preferred recording software. This channel includes the signal of TDM channel 1. All you have to do then is to feed TDM channel 1 with the mix sum. For this, click on "Master" in the TDM Out 1 in the Output Control and activate the bus with the "On" button. Now the master sum is fed to the TDM channel 1.

Glossary

ASIO

ASIO stands for "Audio Streaming Input Output" and is a driver interface for soundcards developed by the company Steinberg. With ASIO very small latency times can be achieved. The ASIO driver is not multi-client capable. That means, different audio applications may not use the same audio device simultaneously.

Audio Device

In the field of digital audio processing, this mostly names an in- or output of an audio system, the way it appears in an audio application.

Aux

In the audio world "Aux" or "Auxiliary" names an additional in- or output. That means a physical in- or output or a mix signal besides the main mix signal.

Buffersize/Buffer

When transporting audio data within a computer (e.g. recording or playing back a signal), they are chopped in equal blocks called "buffer". That means, they are a certain time frame out of a complete signal. The number and size of the buffer defines the delay time (latency).

Direct Sound / Direct X

DirectX is a Windows™ system-software, which allows hardware manufacturers, to support different input-, graphic- or sound functions with their hardware and thereby accelerate it. DirectSound is a part of DirectX. A DirectSound driver creates less CPU load and enables faster latency times than a standard MME driver.

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Driver

A driver is a package of software, consisting of a couple of single programs or a part of a software, which ensures communication between a hardware device and other drivers or software applications on standardized level. Certain interfaces are used doing this.

DSP

DSP stands for "Digital Signal Processing". Most times this names an electrical component, processing audio signals digitally. It calculates, for example, the sum of two signals or an effect into an audio signal.

GSIF

GSIF stands for "GigaStudio InterFace" and is a driver interface for soundcards developed by the company TASCAM. GSIF is mainly used for the Tascam software "Giga Sampler" and "GigaStudio".

Interface

Interface names a part of a device or software, which other devices or software applications can communicate and possibly exchange data with.

Latency

Latency is, in the field of digital audio signal processing, another word for "delay time". Example: if you connect a microphone signal to the TRACE PRO AE, it takes some time until it comes from the TRACE PRO AEinput all the way to an audio application (e.g. your recording software). Similar, it needs some time, until a playback signal of an audio application actually can be heard at the TRACE PRO AE. This time is called latency and is specified in milliseconds.

Metering

Or level metering. Means the visualization of volume relations of an audio signal.

Pitch

In the field of audio techniques, this means the difference of a sample rate from a pre-defined one. If several digital audio devices are present, this fluctuation of sample rate has to be supported by all devices.

Routing

This word describes which paths on switches audio signals and clock signals take within a system.

Sample rate

In order to convert analog audio signals into digital audio data, they are chopped into a time grid. In this rate, the volume of the audio signal is measure, e.g. 44100 times a second. The smaller the grid, the better is the resulting audio quality.

S/PDIF

S/PDIF stands for "Sony Philips Digital Interface" and was developed by the companies Sony and Philips. With it a digital audio signal is transported either with a light conductor cable (TOSLINK) or a cinch coaxial cable.

WDM

WDM stands for "Windows™ Driver Model" and is an extensive driver model developed by the company Microsoft. Other drivers can build upon this. A derivation of it is used, to handle digital audio data within the computer – see Direct X.

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Wordclock

Is the name for a synchronization signal for digital audio systems. It ensures, for all devices connected, to work with the identical sample rate (e.g. 44.1 kHz). Most digital audio formats transmit a clock besides the audio information. E.g. S/PDIF, AES/EBU or ADAT. If no synchronization is possible via the audio connection (e.g. TDIF), digital audio devices have to be supplied with the Wordclock signal. Please don't confuse this with MIDI clock or time code synchronization (e.g. SMTPE).

Technical Facts

General		
Hardware type	PCI 2.3 card, 32 Bit, 3.3V / 5V	
Operation conditions	Ambient temperature	min. 0 … 45°C
	Ambient air humidity	max. 90% RH

Analog Inputs		
1x XLR via breakout cable	Max. input voltage	+22 dbu
	Input voltage for 0 dbFs	+22 dbu
	Impedance	10 kOhm
	AD input levelling	from -48 db to +18 db
	SNR AD @ 192kHz	105 db / 108 db(A)
	THD+N @ -3dbFS	< 0,002% / < -94 db
	Crosstalk	< -100 db
	Frequency response @ 48 kHz; -0,5 db	+/- 0,2 dB; 20 Hz to 22 kHz
	Frequency response @ 96 kHz; -0,5 db	+/- 0,2 dB; 20 Hz to 44 kHz
	Frequency response @ 192 kHz; -1 db	+/- 0,2 dB; 20 Hz to 61 kHz
	Channel Phase Difference	20 Hz – 20 kHz: 0°

Analog Outputs		
1x XLR via breakout cable	Balance	electronically
	Max. output voltage	+22 dbu
	Output voltage @ 0 dbFs	+22 dbu
	Output impedance	75 Ohm
	DA output levelling	from -78 db to 0 db

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	SNR DA @ 192 kHz	113db(A)
	THD+N @ -1dbFS	< 0,001% / < -100 db
	Crosstalk	< -108 db
	Frequency response @ 48 kHz; -0,5 db	+/- 0,2 dB; 20 Hz to 22 kHz
	Frequency response @ 96 kHz; -0,5 db	+/- 0,2 dB; 20 Hz to 44 kHz
	Frequency response @ 192 kHz; -1 db	+/- 0,2 dB; 20 Hz to 61 kHz
	Channel Phase Difference	20 Hz – 20 kHz: 0°

Digital Inputs

1x XLR AES/EBU via breakout cable	Balance	Galvanically separated
	Input voltage	From 0,2 Vss
1x CDROM digital (S/PDIF)	Lock range	32 kHz to 192 kHz
	SRC sample frequency ratio	1:16 / 16:1
	Dynamic range	140 db
	THD+N	140 db
	Channel Phase Difference	20 Hz – 20 kHz: 0°
1x BNC Word Clock Input	Balance	Galvanically separated
	Input impedance	10 kOhm; software controlled termination to 75 Ohm
	Input sensitivity	1 Vss - 5,6 Vss
		DC-Offset free
		Schmitt-Trigger input
		Overvoltage protection

Digital Outputs

1x XLR AES/EBU via	Balance	Galvanically separated

	Output voltage	3,5 Vss on 110 Ohm
	Sample frequency	28 kHz to 212 kHz in single wire mode
	Channel Phase Difference	20 Hz – 20 kHz: 0°

Service and Support

Warranty

Each TRACE PRO AE leaving us is put under extensive functionality checks. We allow full 24 month of warranty. A copy of the receipt or bill serves as proof of purchase. If there is a deficiency occurring during the time of warranty, you can exchange the unit at your dealer. Damages originating in inappropriate handling or false operation are excluded from warranty.

You can still send the unit in to us for repair after the warranty has expired. You can decide to have it repaired, after receiving a calculation of the approximate repair costs. For this, please get in contact with our support service.

Contact

If you have any questions or problems when installing or operating the TRACE PRO AE, please proceed as follows:

1. Make sure, the newest driver is installed. The current driver-files can be found on: *www.marian.de/en/downloads*

2. If still any questions remain, you can contact us via the internet using our support form at: *www.marian.de/en/support*

3. Or talk to us personally. Dial: *+49 341 589 32 22*

Interesting news, information as well as information about our products and authorized dealers can be found on *www.marian.de*.