User's Guide

RME

INTELLIGENT AUDIO SOLUTIONS

DIGI 96

DVD

24 Bit / 96 kHz ✓ *ready*

SyncAlign®   **ZLM**®   **adat**® OPTICAL

PCI Bus Audio Card
2 / 8 Channels Stereo Interface
24 Bit / 96 kHz Digital Audio
32-96 kHz Sample Rate

Contents

1. Introduction

Thank you for choosing the RME DIGI96. This card is capable of transferring digital and analog audio data directly from DAT, Sampler or other sources to your computer. Installation is simple, even for the inexperienced user, thanks to latest Plug & Play technology and full interrupt-sharing. Numerous unique features and a well thought-out configuration dialog have turned the DIGI96 series into a renowned and accepted industry standard.

Drivers for Windows (95/98, NT, 2000, XP) and MacOS (> 8.6) allow a problem-free, comfortable and powerful usage on computer systems with PCI bus technology. Drivers for Unix, Linux and Solaris are also available (see chapter 7.5). With this the DIGI96 series is supported by a variety of Operating Systems like no other digital audio card.

Our Hi-Performance philosophy guarantees full system performance in all possible functions not carried out by the driver (the computer´s CPU), but carried out by the DIGI96 series hardware.

2. Package Contents

Please ensure that all the following parts are included in DIGI96's packaging box:

- PCI card DIGI96
- Quick Info guide
- RME Driver CD
- Internal cable (2 core)

3. System Requirements

- Windows 95/98/NT/2000/XP, Linux or MacOS
- A free PCI bus slot

Additional system requirements such as CPU, memory etc. depend on the software being used for recording, playing and editing the audio data.

4. Brief Description and Characteristics

- All settings can be changed in real-time, all output options even in playback mode
- Separate record- and playback circuits; complete master mode
- Enhanced Full Duplex: Different sample rates at input and output possible
- Automatic and intelligent master/slave clock control
- Optional Word Clock Module (WCM) provides word clock input and output
- Track Marker Support: Supports CD/DAT Start-IDs and read out of CD subcode
- Comes with DIGICheck: the ultimate measurement, analysis and test tool
- Output format ADAT optical supported
- Enhanced Zero Latency Monitoring: hardware bypass per track, controlled by Punch-I/O
- SyncAlign guarantees sample aligned and never swapping channels
- Full interrupt-sharing
- Windows driver with Pentium optimization (quad times memory transfer)
- 32 bit memory transfer and fast 128 kB SRAM guarantee very low system load

5. Technical Specifications

5.1 Digital

- Ultra-low jitter SPDIF: < 1 ns in PLL mode (44.1 kHz, optical in)
- Input PLL ensures zero dropout, even at more than 40 ns jitter
- High-sensitivity input stage (< 0.2 Vss input level)
- Output voltage Consumer 0.8 V, Professional 1.6 V
- Supported sample rates: 32 / 44.1 / 48 / 64 / 88.2 / 96 kHz and variable (word clock)
- Supports all known formats mono/stereo from 16 to 24 bit

5.2 Digital Interface

- Inputs and outputs ground-free transformer coupled
- Connectors: optical (TOSLINK), coaxial (phono), internal (CD-ROM/Sync-In, Sync-Out)
- Formats: SPDIF, AES/EBU (Consumer/Professional), output ADAT optical

5.3 Transfer Modes: Resolution / Bits per Sample

- 16 bit 2 bytes   (stereo 4 bytes) (*)
- 20 bit 3 bytes   MSB (stereo 6 bytes)
- 20 bit 4 bytes   MSB (stereo 8 bytes) (*)
- 24 bit 3 bytes   (stereo 6 bytes)
- 24 bit 4 bytes MSB   (stereo 8 bytes) (*)
- 32 bit 4 bytes   (stereo 8 bytes) (*)

6. Hardware Installation

Important: Switch off the computer and remove the power cable from the power supply before fitting the DIGI96. Inserting and removing the card while the computer is in operation will more than likely lead to irreparable damage to the mainboard!

1. Disconnect the power cord and all other cables from the computer
2. Remove the computer's housing; further information on how to do this can be obtained from your computer´s instruction manual
3. Important: Before removing the DIGI96 from its protective bag, discharge any static in your body by touching the metal chassis of the PC.
4. Insert DIGI96 firmly into a free PCI slot, press and fasten the screw.
5. Replace the computer's housing and tighten the screws.
6. Reconnect the power cable and all other cables/connections.

7. Software Installation

7.1 Windows 95/98/SE/ME

After the hardware has been installed correctly (see 6. Hardware Installation), and the computer has been switched on, Windows will recognize the new hardware component and start its 'Add New Hardware Wizard'. Insert the RME Driver CD into your CD-ROM drive, and follow further instructions which appear on your computer screen. The driver files are located in the directory **\DIGI96 W9x** on the RME Driver CD.

Windows will install the DIGI driver, and will register the card in the system as a new audio device. The computer should now be re-booted.

Unfortunately, in seldom cases, the path to the CD-ROM (i.e. its drive-letter) has to be typed in again during the copy process.

All cards of the DIGI96 series are quickly and easily configured through the Settings dialog of the DIGI96 driver. The Settings dialog is started in three different ways:

- by clicking on the DIGI icon in the Taskbar's system tray
- by starting the 'Digi96' link from the Desktop
- via 'shortcut key' as defined in the 'Digi96' link (default: Ctrl-Num2)
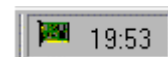
7.2 Windows NT

As automatic hardware recognition has not been implemented in Windows NT 4.0 the drivers have to be installed 'by hand'.

After the hardware has been installed correctly (see 6. Hardware Installation) and Windows NT has been booted, insert the RME Driver CD into your CD-ROM drive. Register the new device by starting >Control Panel /Multimedia /Devices /Audio Devices /Add<. Change to the CD's directory to **\NT** in the CD-ROM. Windows NT will now install the driver. The RME Settings dialog will open automatically.

A click on 'OK' finishes the installation. After a reboot the DIGI symbol will show up in the systray of the taskbar. The DIGITray tool will be loaded automatically each time when booting NT.

A left mouse click on the DIGI symbol starts the 'Settings' dialog. The NT driver supports any combination of up to three RME cards. The driver is installed only once for all cards in the system.

7.3 Windows 2000/XP

After the hardware has been installed correctly (see 6. Hardware Installation), and the computer has been switched on, Windows will recognize the new hardware component and start its 'Hardware Wizard'. Insert the RME Driver CD into your CD-ROM drive, and follow further instructions which appear on your computer screen. The driver files are located in the directory **\DIGI96 W2k** on the RME Driver CD.

Windows will install the DIGI96 driver, and will register the card in the system as a new audio device. The card now ready for use.

All cards of the DIGI96 series can be easily configured using the RME DIGI Settings dialog. The panel 'Settings' can be opened

• by clicking on the DIGI icon in the Taskbar's system tray
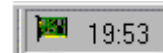
In case the warning messages 'Digital signature not found', 'Do not install driver', 'not certified driver' or similar come up: Don't listen to Microsoft, listen to us and continue with the installation.

7.4 Deinstalling the Drivers

A deinstallation of the DIGI96 series driver files is not necessary – and not supported by Windows anyway. Thanks to full Plug & Play support, the driver files will not be loaded after the hardware has been removed. If desired these files can then be deleted manually.

Unfortunately Windows Plug & Play methods do not cover the additional autorun entries of the Settings dialog, and the registering of the ASIO driver. Those entries can be removed from the registry through a software deinstallation request. This request can be found (like all deinstallation entries) in *Control Panel, Software*. Click on the entry 'DIGI96 Link and Tray Autostart', or 'RME DIGI32, DIGI96 and Hammerfall Series'.

7.5 Linux/Unix

Drivers for Linux, Unix and Solaris are available at 4Front Technology. Information:
http://www.opensound.com

Another source of (free) drivers is the ALSA project:
http://www.alsa-project.org

8. Operation and Usage

8.1 External Connectors

The DIGI96 has 2 external inputs and outputs. The current input is activated through 'Settings', available by a click on the DIGI symbol in the Taskbar's system tray. The card accepts all commonly used digital sources as well as SPDIF and AES/EBU. Channel status and copy protection are ignored.

All outputs are driven in parallel, therefore carrying identical signals. In the simplest situation, connect 2 devices at the outputs and use the card as a splitter (distribution 1 to 2).
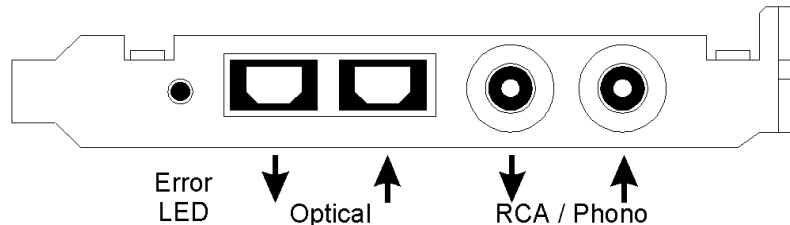
To receive signals in AES/EBU format, an adapter cable is required. Pins 2 and 3 of a female XLR plug are connected individually to the two pins of a phono plug. The cable shielding is only connected to pin 1 of the XLR - not to the phono plug. The ground-free design, with transformers for digital inputs and outputs, offers a trouble-free connection of all devices along with perfect hum rejection.
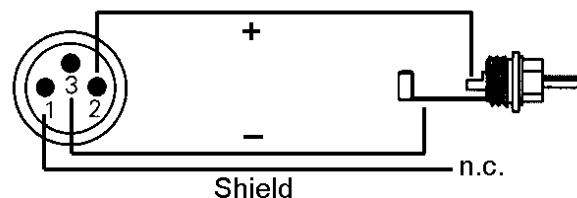
8.2 Internal Connectors

The DIGI96 has one internal digital input and output, provided by 2-pin connectors on the board. The internal input ST3, labelled **CD IN / Sync In**, can be connected to an internal CD-ROM drive having a digital audio output (advantage: the built in CD-ROM drive is sufficient for digital recording and the need for external cabling does not arise). Or it can be connected with the internal output of another DIGI96 series card (synchronizing multiple cards).

The internal output ST4, labelled **Sync Out**, provides a copy of the current external output signal, no matter if SPDIF or ADAT. An internal loopback proves to be a useful application. Use the supplied two pin cable to connect Sync In and Sync Out, set the card to Clock Mode 'Master' and selectal 'Internal' as input. Now the output signal shows up directly at the card's input. This allows you to record the playback signal, or to display the playback signals with our **DIGI-Check** software.

The two connectors ST6 and ST7 provide a connection to the optional Word Clock Module WCM. See the manual of the WCM for more information.

8.3 Playback (Windows MME)

DIGI96 can play back audio data only in supported formats (sample rate, bit resolution). Otherwise an error message appears (for example at 22 kHz and 8 bit).

In the audio application being used, DIGI96 must be selected as the output device. This can often be found in the *Options, Preferences* or *Settings* menus under *Playback Device, Audio Devices, Audio* etc. Only a few programs exclusively use Windows' *Preferred Playback Device*. This setting can be changed in >Control Panel /Multimedia /Audio<. We recommend using 24-bit resolution for playback to use the DIGI96 series fullest potential.

We strongly recommend switching all system sounds off (via >Control Panel /Sounds<). Also DIGI96 should not be the *Preferred Device* for playback, as this could cause loss of synchronization and unwanted noises. If you feel you cannot do without system sounds, you should consider buying a cheap Blaster clone and select this as *Preferred Device* in >Control Panel /Multimedia /Audio<.

The RME Driver CD includes step by step instructions for configuring many popular audio applications. Start setup.htm or setup2.htm (in the **\rmeaudio.web\techinfo** directory).

The screenshot to the right shows a typical configuration dialog as displayed by a (stereo) wave editor. In ADAT mode a playback is always using channels 1+2.

Increasing the number and/or size of audio buffers may prevent the audio signal from breaking up, but also increases latency i.e. output is delayed. For synchronized playback of audio and MIDI, be sure to activate the checkbox 'Get position from audio driver'. Even at higher buffer settings in a mixed Audio/MIDI environment, sync problems will not arise because the DIGI96 always reports the current play position correctly (even while recording - essential for chase lock synchronization).

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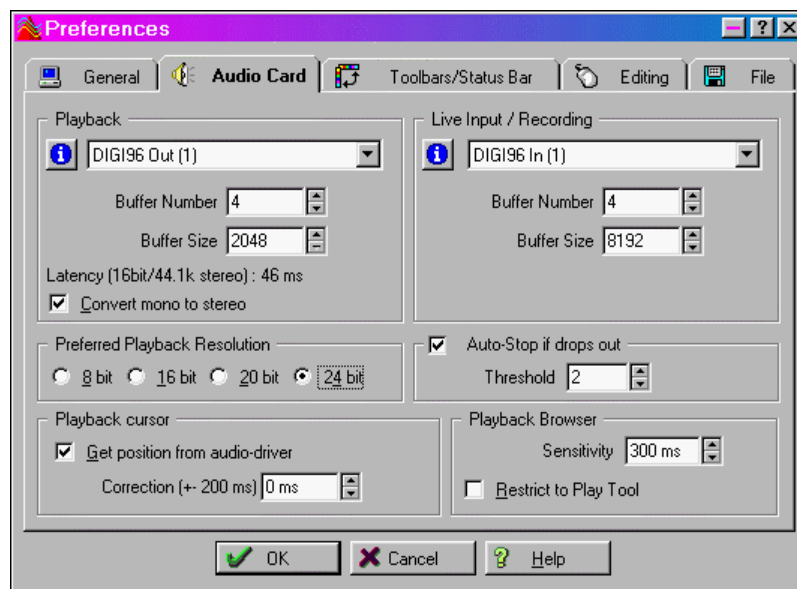
8.4 Recording Digital (Windows MME)

Unlike analog soundcards, which produce empty wave files (or noise) when no input signal is present, digital I/O cards always need a valid input signal to start recording (this includes the correct sample frequency as well).

To take this into account, RME has included three unique features in the DIGI96 series: an error LED for the active digital input in use, a comprehensive I/O signal status display (showing sample frequency, lock and format) in the Settings dialog, and the protective *Check Input* function.

The error LED indicates whether the card gets power and a valid digital input signal. Whenever an error occurs (wrong input, invalid data, signal transmitting device delivers nothing), the LED will light red. As soon as a valid input signal is present the LED will turn off. The display of the sample frequency (see chapter 9, picture Settings) in the Status display offers a similar function. If no sample frequency can be recognized 'Out Of Range' will be shown, in case of an error detection 'No Lock'.

If a 48 kHz signal is fed to the input and the application is set to 44.1 kHz, *Check Input* stops the system from recording. This prevents faulty takes, which often go unnoticed until later on in the production. Such tracks appear to have the wrong playback rate - the audio quality as such is not affected. 'Check Input' may be switched off for vari-speed purposes.

Therefore configuring the software to perform a digital recording is child´s play. After selecting the required input DIGI96 displays the current sample frequency. This parameter can then be changed in the application's audio attributes (or similar) dialog.

The screenshot to the right shows a typical dialog used for changing basic parameters such as sample frequency and resolution in an audio application.

Any bit resolution can be selected, providing it is supported by both the audio hardware and the software. Even if the input signal is 24 bit, the application can still be set to record at 16-bit resolution. The lower 8 bits (and therefore any signals about 96dB below maximum level) are lost entirely. On the other hand, there is nothing to gain from recording a 16-bit signal at 24-bit resolution - this would only waste precious space on the hard disk.
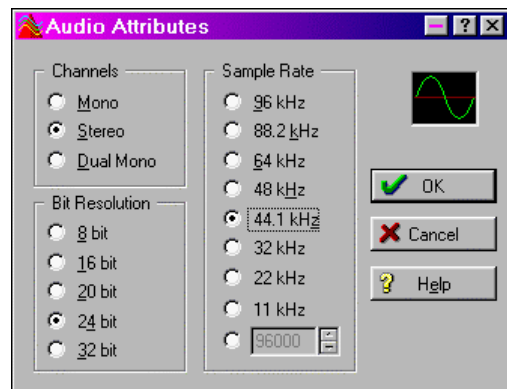
It often makes sense to monitor the input signal or send it directly to the output. The DIGI96 series includes a useful input monitor function, which can be set in the **RME DIGI Settings** (*Output/Automatic*). Activating Record or Pause in the application causes the input signal to be passed directly to the digital and analog output. However, some applications block monitoring by constantly activating playback, even if the played back track is empty. This is often required by programs to ensure that timing and punch I/O will work correctly.

Currently two solutions exist which enable real-time monitoring even when playback is active. Our ZLM (Zero Latency Monitoring) technology allows monitoring in Punch I/O mode - with this the card behaves like a tape machine. This method has been implemented in all versions of Samplitude (by SEK'D), and can be activated using the global track option 'Hardware monitoring during Punch'.

The other solution is to use our ASIO 2.0 drivers with a ASIO 2.0 compatible program. When 'ASIO Direct Monitoring' has been switched on, the input signal is routed in real-time to the output whenever record is started.

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8.5 Record while Play

DIGI96 allows the playback of audio data during the recording of further audio data, even at different sample frequencies. This feature, known as *Enhanced Full Duplex* or *Record while play*, is a must for multitrack harddisk recording, but it has to be supported by the recording software.

8.6 DVD-Playback (AC-3/DTS) under MME

When using popular DVD software player like WinDVD and PowerDVD, their audio data stream can be send to any AC-3/DTS capable receiver, using the DIGI96 series' SPDIF output. For this to work the DIGI96 output wave device has to be selected in 'Control Panel/Sounds and Multi-media/Audio'. Also check 'use preferred device only'.

You will notice that the DVD software's audio properties now allow to use 'SPDIF Out' or to 'activate SPDIF output'. When selecting these, the software will transfer the non-decoded digital multichannel data stream using the RME card.

This 'SPDIF' signal sounds like chopped noise at highest level. Therefore check 'Non-audio' in the card's Settings dialog, to prevent most SPDIF receivers from accepting the signal, and to prevent any attached equipment from being damaged.

Setting the card to be used as system playback device is against common sense, as professional cards are not specialized to play back system sounds, and shouldn't be disturbed by system events. To prevent this, be sure to re-assign this setting after usage, or to disable any system sounds (tab Sounds, scheme 'No audio').

Note: The DVD player will be synced backwards from the RME card. This means when using AutoSync and/or word clock, the playback speed and pitch follows the incoming clock signal.

8.7 Low Latency under MME (Buffer Size Adjustment)

Using Windows 95 or 98 the MME buffer size was nothing to worry about. Latencies below 46 ms were not possible. Meanwhile both computers and operating system have become much more powerful, and since Windows ME/2000/XP latencies far lower can be used. SAWStudio and Sonar allowed to use such low settings from the start. Sequoia was updated in version 5.91, WaveLab in version 3.04.

In the Settings dialog the MME buffersize (in fact the DMA buffer size) is set with the same buttons as the ASIO buffer size. Please note that this setting only defines the buffer size of the hardware. The true and effective latency is configured within the MME application!

Attention: the DMA buffers must not be larger than the application's buffers. This case can happen unnoticed when using ASIO and MME at the same time (multiclient) and setting MODE to 2048 (46 ms), while the buffers in the MME application are still set for a lower latency. Playback will be stuttering and audio will be distorted.

Example: when you set the DIGI96 to 2048 you can't use 1024 in any program. But setting the card's MME buffer to 256 allows to use 512 and all higher values within the MME software.
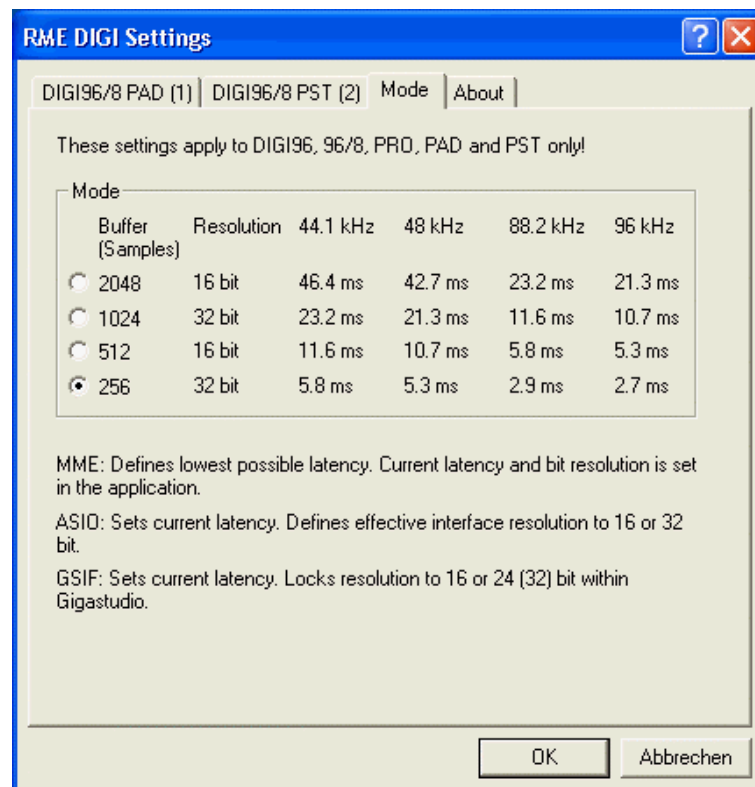
9. Configuring the DIGI96

9.1 General

The hardware of the DIGI96 series includes a number of helpful, well thought-of, practical functions and options, which allow you to configure the behaviour of the card to suit many different requirements. Through 'Settings' you will gain access to:

- Input selection
- Output operation
- Output Channel Status
- Synchronization behaviour
- Input and output status display

The display of the current input frequency and format is updated every 0.5 seconds. When choosing an input with a signal including errors or without any input signal the statement 'No Lock' appears, in vari-speed operation or with sample frequencies widely out of tune 'Out of Range' is shown. If the current signal has SPDIF or AES/EBU format then 'Stereo' is displayed, with ADAT format 'ADAT' is shown.

The three states of the output selected through the choicebox 'Output' control the monitoring behaviour of the card. 'Automatic' sets the normal mode where the input signal reaches the output only whilst recording. In this mode, when starting a recording, feedback occurs very often when using digital mixing desks. 'Play only' solves this problem by making sure that the input signal is never passed to the output.

After selecting 'Input', the input signal appears at the output whenever playback is not active. DIGI96 saves a continual record standby mode and can switch itself to monitoring without active software. As switching between the inputs is carried out in realtime, stepping through the inputs gives a fast check of the incoming signals.
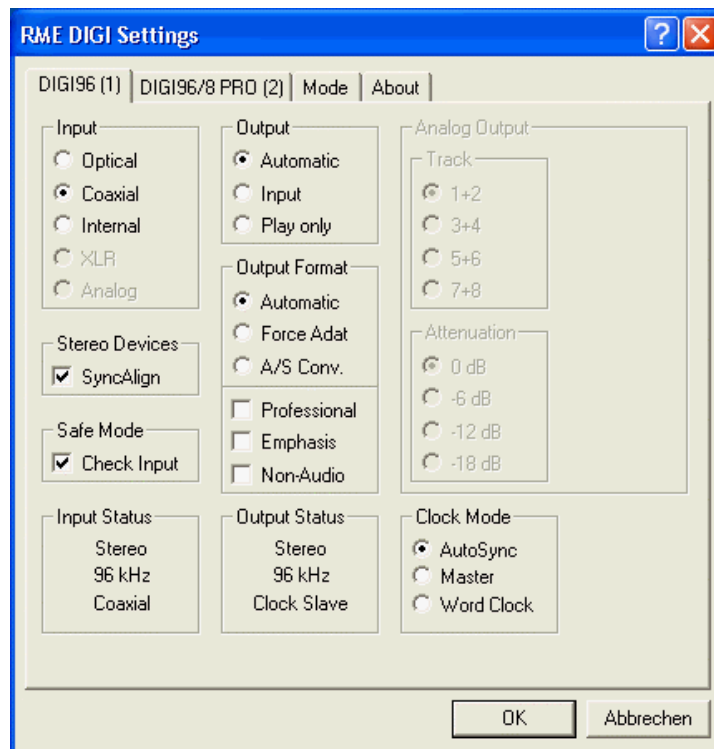
Settings should not be changed during playback or record if it can be avoided, as this can cause unwanted noises. Also, please note that even in 'Stop' mode, several programs keep the recording and playback devices open, which means that any new settings might not be applied immediately.

Specific information about the right choice of the output's Channel Status (output format Consumer / Professional) can be found in chapter 11.

Input
Defines the current input. Under W9x an additional option called *Autoselect* can be selected. When active, the digital inputs will be changed automatically until a valid input signal is detected.

Stereo Devices (W2k only)
SyncAlign operates fully automated and should be kept active all the time. Only in case the stereo devices must operate completetely independent, deactivating this setting may be necessary.

Safe Mode
Check Input verifies the current input signal against the settings in the record program. When de-activated a recording will always be allowed, even with non-valid input signals.

W9x only: 'Disable DS' deactivates the DirectSound support of the driver.

Output
With 'Automatic' active, the input signal reaches the output only whilst recording. 'Play only' prevents the input signal from being passed to the output. After selecting 'Input', the input signal appears at the output whenever playback is not active.

Output Format
'Automatic' sets the output to 2-channel SPDIF mode. Select 'Force Adat' to constantly have the output operating in ADAT mode. 'A/S Conv.' forces the card's output into 2-channel SPDIF mode.

Specific information about 'Professional', 'Emphasis' and 'Non-Audio' can be found in chapter 11.

Clock Mode
The card can be configured to use the selected input (AutoSync), a word clock signal (Word Clock), or its internal clock (Master) as clock source.

Status Displays
The displays at the bottom of the dialog box give precise information about the current status of the card like format of input and output signal, sample rate at input and output, or current clock mode.

9.2 Force Adat

The function 'Force Adat' changes the output's format from SPDIF to ADAT optical.

When using a 'normal' 2-track program to play a stereo file, you're not only able to send the data to any SPDIF device, but also to any other ADAT interface!

The option 'A/S Conv.' forces the card's output back into stereo operation.

9.3 Tab 'Mode'

The Buffer Size value can be set in the RME DIGI Settings dialog, tab 'Mode'. This setting determines the latency (the delay) between the audio application and the DIGI96 series, as well as general system stability. The higher the value, the more tracks can be recorded and played back simultaneously, and the longer the system takes to react.

In **RME DIGI Settings**, tab 'Mode', 4 different buffer sizes are available: 256 (6 ms), 512 (11 ms), 1024 (23 ms), 2048 (46 ms). As the real latency depends on the used sample rate, the values are different for different sample rates:

Choice	Buffer size	Resolution	44.1 kHz	48 kHz	88.2 kHz	96 kHz
46 ms/16 bit	2048 s	16 bit	46.4 ms	42.7 ms	23.2 ms	21.3 ms
23 ms/32 bit	1024 s	32 bit	23.2 ms	21.3 ms	11.6 ms	10.7 ms
11 ms/16 bit	512 s	16 bit	11.6 ms	10.7 ms	5.8 ms	5.3 ms
6 ms/32 bit	256 s	32 bit	5.8 ms	5.3 ms	2.9 ms	2.7 ms

The stated latency describes only one way. The complete path through the computer (record plus playback, monitoring) gives double values.

The setting of the buffer size affects all formats.

MME: Defines lowest possible latency. The current latency and bit resolution is set in the MME application.

ASIO: Sets current latency. Defines the effective interface resolution to 16 or 32 bit.

GSIF: Sets current latency and locks the current interface resolution to 16 or 32 bit. In Gigastudio's Hardware Settings the same (and only this) resolution will be displayed, either 24 (32) or 16 bit.

9.4 Clock Modes - Synchronization

In the digital world, all devices are either the 'Master' (clock source) or a 'Slave' synchronized to the master. Whenever several devices are linked within a system, there must always be a single master. The DIGI96 series includes a very user-friendly intelligent clock control, which handles the clock switching between master and slave on its own. Click on 'AutoSync' to activate this mode.

In AutoSync mode, the card constantly scans for a valid input signal at the active input. As soon as this matches the current playback sample rate, the card switches from the internal quartz (display 'Clock Master') to the clock generated from the input signal (display 'Clock Slave'). This allows on-the-fly recording, even during playback, without having to synchronize the card to the input signal first. It also allows immediate playback at any sample rate without having to reconfigure the card.

'AutoSync' guarantees a fault-free function of the modes Record, Record while Play and while using more than one card (see chapter 10). In certain cases however, e.g. when the inputs and outputs of a DAT machine are connected directly to the DIGI96, AutoSync causes feedback in the digital carrier, so synchronization breaks down. To remedy this, switch the card's clock mode over to 'Master'.

Due to the outstanding clock control and PLL a synchronization of the output signal to the input signal is not only possible at identical sample rates, but also at double/half sample rates.

AutoSync allows multiple cards to be easily synchronized by applying one input signal to all inputs simultaneously (see chapter 10).

Thanks to the described AutoSync technology and a lightning fast PLL the DIGI96 Series is not only capable of handling standard frequencies, but also any sample rate between 25 and 105 kHz. The digital input serves as synchronization source. Please note that at the start of a record or playback a valid sample frequency (32 kHz, 44.1 kHz, 48 kHz, 64 kHz, 88.2 kHz, 96 kHz) has to be fed. When started the sample frequency can be pitched to whatever is needed, DIGI96 will follow theses changes immediately.

When using the optional Word Clock Module (clock mode 'Word Clock') the word clock input can serve as synchronization source. In vari-speed operation any sample frequency between 25 kHz and 105 kHz is allowed.

☞ *Only one device can be master in a digital system! When DIGI96 operates in clock mode 'Master', all other devices have to be 'Slave'.*

More information on these subjects can be found in the HTML document 'sync96.htm', located in the directory **\rmeaudio.web\english\techinfo** on the RME Driver CD, or on our web site.

10. Using more than one DIGI96

All our drivers can communicate simultaneously with all the cards registered in the system. The driver marks them with different numbers after the device's name, like 'DIGI96 In (1)'.

Thanks to our AutoSync technology multiple cards can be synchronized easily by applying one input signal to all inputs simultaneously.

In order to connect more than one DIGI96 to a digital mixing desk they must all get the same clock(ed input signal). This is easy to achieve: just connect at least one input of each card to one output of the mixing desk.

Example 1: All DIGI's digital inputs are connected to other devices synced to the word clock net.

Activate the corresponding input of each card in its Settings dialog, and activate the mode AutoSync at all cards.

Example 2: Only the outputs of the DIGIs are connected to other devices.

Connect the internal Sync-Out of the master card to the Sync-In (CD-ROM) of the second card, activate its internal input and AutoSync mode. Next connect the third card in the same way, from the second's card Sync-Out to the third's card Sync-In. Configure this card like the second one. The necessary 2-wire cables are the ones supplied with the DIGI cards. Of course this method is also operational with the external connectors, like optical or coaxial, as long as the corresponding input is activated.

A convenient alternative is the test mode of the optional Word Clock Module WCM.

Please note when using more than one card plus the word clock output that only one card can be master!

Example 3: All DIGIs are correctly connected to the Word Clock Module.

Activate the test mode by pushing the test switch, so the red LED lights up. Next activate the mode 'Word Clock' in all card's settings dialogs. Now all cards should show 'Word Clock' in the third line of 'Output Status'.

After activating the test mode all internally connected cards are immediately synchronized, in case clock mode 'Word Clock' was activated in all settings dialogs.

More information on this subject can be found in the HTML document 'sync96.htm', located in the directory **\rmeaudio.web\english\techinfo** on the RME Driver CD, or on our web site.

11. Special Features of the Digital Output

Apart from the audio data itself, digital audio signals in SPDIF or AES/EBU format include a header containing Channel Status information. False Channel Status is a common cause of malfunction. The DIGI96 series ignores the received header and creates a totally new one for the output signal.

☞ *Note that in record or monitor modes, set emphasis bits will disappear. Recordings original-ly done with emphasis should always be played back with the emphasis bit set!*

This can be done by selecting the 'Emphasis' switch in the Settings dialogue. The changes in sound caused by this setting can be monitored in real-time at the analog output jack. At 64, 88.2 and 96 kHz sample rate the analog output does not support De-Emphasis, so no change in sound will be audible.

The DIGI96 series' new output header is optimized for largest compatibility with other digital devices:

- 32 kHz, 44.1 kHz, 48 kHz, 64 kHz, 88.2 kHz, 96 kHz, depending on the current sample rate
- Audio use, Non-Audio
- No copyright, copy permitted
- Format Consumer or Professional
- Category General, generation not indicated
- 2-Channel, No Emphasis or 50/15 µs
- Aux bits audio use

☞ *Note that most consumer-orientated equipment (with optical or phono SPDIF inputs) will only accept signals in 'Consumer' format!*

The status 'Professional' should always be activated when using AES/EBU format (when XLR connectors are used).

The audio bit in the header can be set to 'Non-Audio'. This is necessary when Dolby AC-3 en-coded data is sent to external decoders (surround-sound receivers, television sets etc. with AC-3 digital inputs), as these decoders would otherwise not recognize the data as AC-3.

When playing back in ADAT mode, the coaxial connectors will be turned off. This prevents sound disturbance by the ADAT signal fed to SPDIF or AES/EBU inputs.

12. Operation under ASIO 2.0

12.1 General

As Steinberg is the inventor of ASIO we have chosen Steinberg's Cubase VST as example on how to use and setup our cards in ASIO operation.

Our ASIO driver supports any combination of cards from the DIGI96 series. Important: Multiple cards MUST be synchronized among themselves! This may be done by using the input signal (having a common clock source, for example a digital mixing desk), or the RME Word Clock Module.

Start the ASIO application, go to ASIO/System and choose the device 'ASIO DIGI96 Series'. The button 'ASIO system control' directly starts the Settings dialog of the DIGI96 series (see chapter 9).
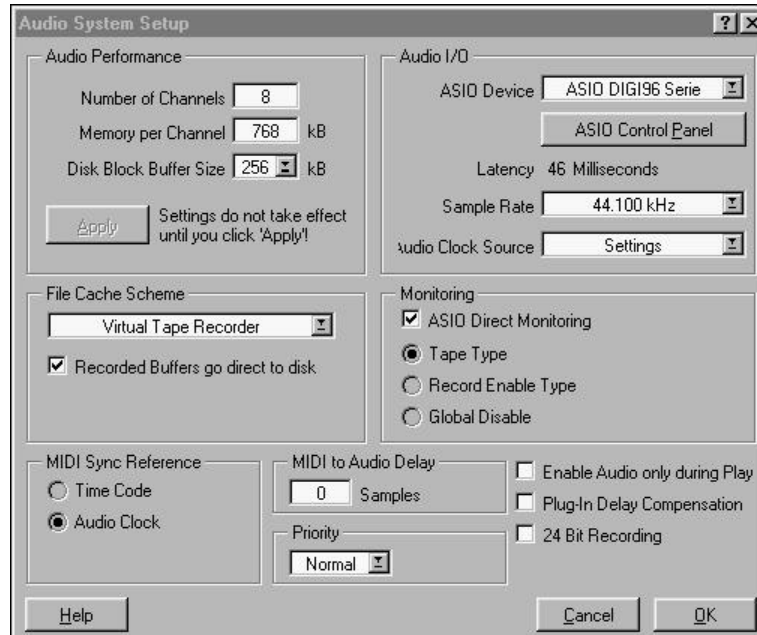
The Enhanced Zero Latency mode of the DIGI96 series enables the 'ASIO Direct Monitoring' feature of the ASIO 2.0 standard to be used. Please note that in this mode neither routing nor pan are supported so the input signals will only be routed to the same output channel. Other VST mixer settings have no effect.

12.2 Buffer Size - Latency

The Buffer Size value in the RME DIGI Settings dialog determines the latency (in this case the delay) between the audio application and the DIGI96 series as well as general system stability. The higher the value, the more tracks can be recorded and played back simultaneously, and the longer the system takes to react.

The indicated bit resolution is independent from the chosen bit resolution in Cubase. Selecting 16 bit in the driver and 24 bit in Cubase will cause Cubase to record 16 bit data and 8 bit zeroes. Selecting 24 bit in the driver and 16 bit in Cubase, the bits 17 to 24 get lost (which only matters if they included information at all).

Please note that the latency setting describes only one way. The complete path through the computer (record plus playback, monitoring) gives double values.

More information on how to set up the latency under ASIO can be found in chapter 9.4, *Tab 'Mode'*.

12.3 Known problems

In case the used computer has no sufficient CPU-power and/or sufficient PCI-bus transfer rates, then drop outs, crackling and noise will appear. We also recommend to deactivate all PlugIns to verify that these are not the reason for such effects.

Unfortunately some newer UltraATA66 and UltraATA100 hard disk controller (also Raid controller) seem to violate against the PCI specs. To achieve the highest throughput they hog the PCI bus, even in their default setting. Thus when working with low latencies heavy drop outs (clicks) are heard. Try to solve this problem by changing the default setting of the controller (for example by reducing the 'PCI Bus Utilization').

Another typical source of trouble is wrong synchronization. ASIO does not support asynchronous operation. This means input and output signal must not only have the same sample frequency, but must also be 'in sync' for error-free Full Duplex operation.

13. Operation under GSIF (Gigasampler Interface)

13.1 Windows 98/SE/ME

The GSIF interface of the DIGI96 series Windows 98/SE/ME driver allows direct operation with Gigasampler and Gigastudio, with up to 96kHz and 24bit. Additionally the driver supports multi-client operation. For example ASIO can use channels 1/2 and Gigastudio (with GSIF) channels 3/4 simultaneously, and so on.

Gigasampler/Studio requires a lot of the computer's calculation power. An optimum performance is achieved with a stand-alone GSIF PC. Else we recommend not to use the DIGI96 ASIO driver, but the ASIO Multimedia driver. It can be set to much higher latencies (i.e. 750 ms), thus providing a problem-free simultaneous operation of ASIO and Gigastudio. Gigastudio itself will still work at a very low latency.

The DIGI96 series requires identical formats when used in multi-client operation! All programs simultaneously accessing the hardware MUST use the same sample rate and bit resolution. Otherwise de-tuned sound or no sound at all will be heared.

Additional simultaneous operation of GSIF and ASIO requires to use different channels. As Cubase VST always uses tracks 1/2 these tracks must not be activated in Gigastudio/Sampler. The tracks activated under GSIF have to be de-activated in ASIO.

Please note that the ASIO Multimedia driver will use the maximum bit resolution by default. If the bit resolution of Gigasampler/Studio and other programs do not match, audio output will be stopped, until the settings match and a reset is initiated ('Reset Devices' or software restart).

13.2 Windows 2000/XP

Basically as under Windows 9x. Differences: GSIF under W2k/XP uses a modified interface, which needs interrupts (similar to ASIO). Therefore the user can now set and change the latency (under W9x latency was fixed inside Gigastudio). However, when using the Hammerfall DSP, the latency is always the same as the one selected for ASIO operation. This can cause performance problems on slower machines when using GSIF and ASIO at the same time.

Please note that the W2k/XP driver fully supports multiclient operation, including the combination MME/ASIO. So for example Cubase, Gigastudio and Sonar can be used simultaneously, provided each of these programs uses its own audio channels exclusively. Please also note that Gigastudio is running unexpectedly in the background (thus blocking its assigned audio channels), as soon as the Gigastudio MIDI ports are used – even when Gigastudio itself hasn't been started.

14. Hotline - Troubleshooting

14.1 General

The newest information can always be found on our website www.rme-audio.com, section FAQ, Latest Additions.

Playback works but recording doesn´t:

- Check that a valid input signal is at hand. In this case the Error LED on the hardware turns off, and the current sample frequency is shown under 'Settings'.
- If you are sure that a valid signal is being sent but the LED is still red, then check the currently selected input in the Settings dialogue.
- Check whether the DIGI96 has been selected as recording device in the audio application.
- Check whether the sample frequency set in the audio application ('Recording properties' or similar) matches the input signal.
- Check that there is no loop cabling present. If so set 'Clock Mode' to 'Master'.

The input signal cannot be monitored in real-time

- Monitoring has not been enabled (for example 'Global disable' in Cubase).

Only the playback signal, but not the record (input) signal is present at the output

- The DIGI96 series has no hardware mixer. Therefore while playback is running only the playback signal is present at the output. The mixing of record and playback signal has to be done in the software (for example deactivate Cubase's 'ASIO Direct Monitoring').

The SPDIF output does not work

- The output operates in ADAT Mode, see *Output Status Display*. This is caused by Force Adat being activated. Select 'A/S Conv.' to set the output back to SPDIF mode.

Low Latency ASIO operation under Windows 2000/XP on single CPU systems:

- To use ASIO at lowest latencies under Windows 2000/XP even when only having one CPU, the system performance has to be optimized for background tasks. Go to Control Panel/System/Advanced/Performance Options. Change the default 'Applications' to 'Background tasks'. The lowest usable latency will drop from 23 ms to around 3 ms. This is no issue when using dual CPU systems.

The recording or the playback is disturbed by crackling:

- Increase the quantity and size of the buffers in the software being used.
- Use a different cable (coaxial or optical) to cross-check them for defects.
- Check that there is no loop cabling present. If so set 'Clock Mode' to 'Master'.
- Increase the buffer size of the hard disk cache (example: from 64 kB to 256 kB).
- Activate Busmaster mode for the hard disks. Windows: Device Manager, double-click on 'Disk drives', then on the required hard disk(s). Select 'DMA' in the Properties dialog.

Cubase seems to work, but no signal shows up at the output of the DIGI96

- This can also happen with Logic or other programs. Most propably Gigasampler/Gigastudio has been installed. Programs like Cubase then use the newly installed Gigastudio MIDI-Ports, thus activating GSIF on the audio channels which are set inside Gigastudio (default: 1/2). As a result ASIO (also 1/2) is blocked. This effect vanishes as soon as the Gigastudio ports are deactivated in Cubase' Setup MME.

14.2 Installation

More information on installation problems (which fortunately are very seldom, thanks to Plug and Play), can be found in the Tech Info 'Installation problems', located in the directory **\rmeaudio.web\techinfo** on the RME Driver CD**.**

The card is normally found in the Device Manager (>Settings/Control Panel/System<), in the category 'Sound-, Video- and Gamecontroller'. A double click on 'DIGI96' starts the properties dialog. Choosing 'Resources' shows Interrupt and Memory Range.

The newest information on hardware problems can always be found on our website www.rme-audio.com, section FAQ, Hardware Alert: about incompatible hardware.

The dialog 'New hardware component found' does not appear:

- Is the Error LED of the DIGI96 lit when no cable is connected to the optical input? If not, the card is either defect or not sitting properly in the slot.

When the card and the driver have been properly installed but no playback is possible:

- Check that the DIGI96 appears correctly in the Device Manager. If the device 'DIGI96' is marked with a yellow exclamation mark then either an address conflict or an IRQ conflict is present.
- If no yellow exclamation mark is present check the 'Resources' tab.
- Check that the DIGI96 has been set as 'transmitting device' in the software. Also check the settings under >Settings /Control Panel /Multimedia /Advanced<. Here the DIGI96 must appear as an audio device when it´s been correctly installed, and can be set as the *Preferred Device* under 'Audio'.

The computer crashes whenever the DIGI96 is accessed:

- If your graphics board is an older Matrox Mystique or uses a '968' S3 chip, there could be a memory allocation error. Change the memory area allocated to the DIGI96 to *below* the area used by the graphics board (e.g. D0000000 - D0FFFFFF). Detailed information on this subject can be found in **\rmeaudio.web\techinfo\install.htm** on the RME Driver CD.

15. DIGICheck: Analysis, Test and Measurements using the DIGI96 series

The DIGI96 series from RME is accompanied by a world wide unique software tool: DIGICheck, the incredible utility for test, measure and analysis of the digital audio data stream.

DIGICheck is based on functions of our well-known DAM-1, the **D**igital **A**udio **M**onitor. This device uses a built-in DSP for its calculations. Therefore DIGICheck is not able to realize all the functions of the DAM-1. Additionally, the DAM-1 works perfectly in the background while DIGI-Check will cause a certain CPU load.

DIGICheck also includes test routines from our research lab and our production site. Thus you are able for the first time to run a detailed function and performance test with your own audio card in your own computer, like it isn't possible with any other test tool.

Although the DIGICheck software is fairly self-explanatory, it still includes a comprehensive online help. A detailed description of all functions and the technical background is also available in HTML format (digich.htm, in the **\techinfo** directory on the RME Drivers CD or from our website). The following is a short summary of the available functions:

- **Level Meter**. High precision 24-bit resolution, 2/8 channels. Application examples: Peak level measurement, RMS level measurement, Over detection, phase correlation measurement, dynamic range and signal-to-noise ratios, RMS to peak difference (loudness), long term peak measurement, input check
- **Channel Status Display**. Shows the channel status information contained in the digital audio data stream. Sample rate measurement
- **Bit Statistics**. Shows the true resolution of audio signals as well as errors and DC offset
- **Performance Test**. Measurement of the PCI-bus data transfer
- **Memory Test**. Tests the on board SRAM and the entire data path in the PC

To install DIGICheck, go to the **\DIGICheck** directory on the RME Drivers CD and run *setup.exe*. Follow the instructions prompted on the screen.

16. TECH INFO

RME provides more information on the TECH INFO pages in the web (http://www.rme-audio.com/techinfo/index.htm), and in the directory **\rmeaudio.web\techinfo** on the RME Driver CD. Here are some examples of available *Tech Infos*:

Synchronization II (DIGI96 series)
Digital audio synchronization: technical background, problems

Installation Problems
..and their solutions

List of Driver Updates
Lists all driver updates and the changes in them

Configuration of Samplitude, Cubase, Logic, Cakewalk 7.0, Sonar and SAWPlus32 using the DIGI96 series. Step by step instructions

DIGICheck: Analysis, tests and measurements with the DIGI96 series
A description of DIGICheck, including technical basics.

TMS (Track Marker Support)
Description of the TMS technology to transfer CD- and DAT information.

17. Warranty

Each individual DIGI96 undergoes comprehensive quality control and a complete test in a PC environment at RME before shipping. This may cause very slight signs of wear on the contacts (if the card looks like it was used one time before - it was). The usage of high grade components allows us to offer a full two year warranty. We accept a copy of the sales receipt as valid warranty legitimation.

RME's replacement service within this period is handled by the retailer. If you suspect that your card is faulty, please contact your local retailer. The warranty does not cover damage caused by improper installation or maltreatment - replacement or repair in such cases can only be carried out at the owner's expense.

RME does not accept claims for damages of any kind, especially consequential damage. Liability is limited to the value of the DIGI96. The general terms of business drawn up by Synthax OHG apply at all times.

18. Appendix

RME news, driver updates and further product information are available on our website:
http://www.rme-audio.com

If you prefer to read the information off-line, you can load a complete copy of the RME website from the RME Driver CD (in the **\rmeaudio.web** directory) into your browser.

Distributor in Germany:
Synthax Audio AG, Am Pfanderling 62, D-85778 Haimhausen, Tel.: (49) 08133 / 91810

Manufacturer:
IMM Elektronik, Leipziger Str. 32, D-09648 Mittweida
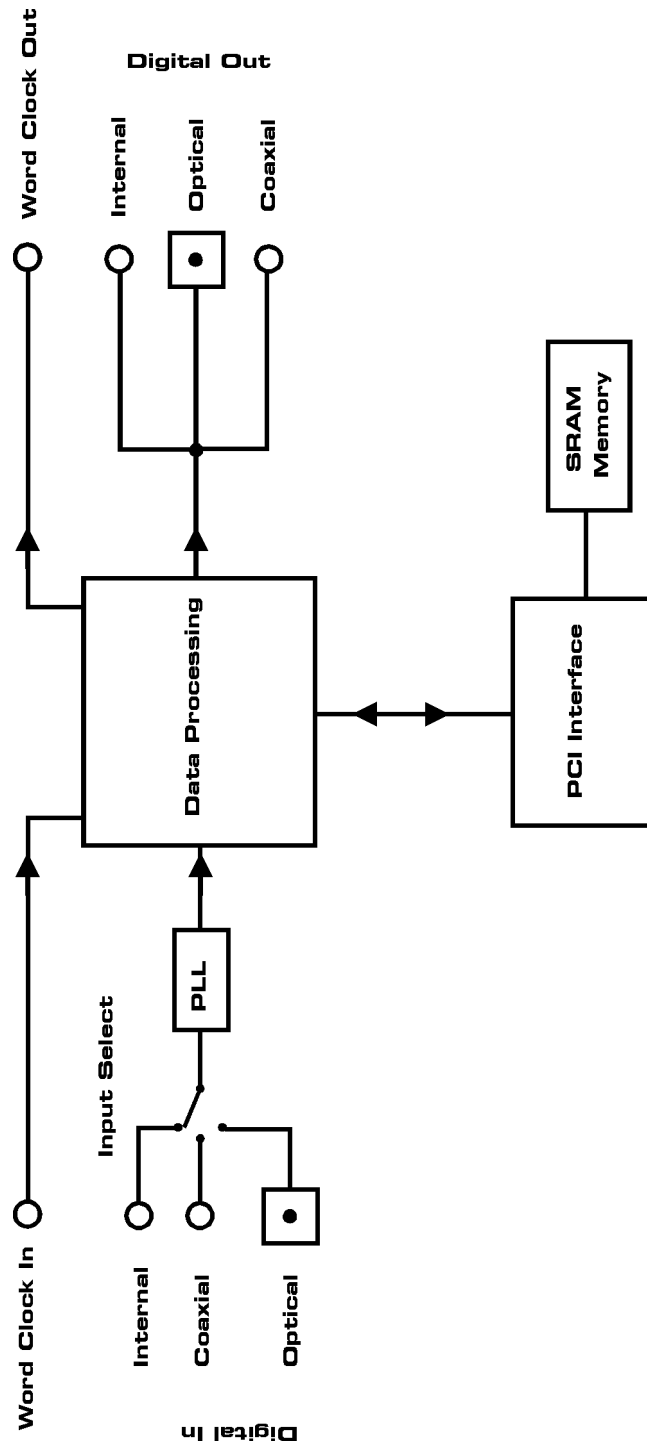
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Block diagram

CE

This device has been tested and found to comply with the limits of the European Council Directive on the approximation of the laws of the member states relating to electromagnetic compatibility (EMVG) according to EN 55022 class B and EN50082-1.

FCC Compliance Statement

Certified to comply with the limits for a Class B computing device according to subpart J or part 15 of FCC rules. See instructions if interference to radio reception is suspected.

FCC Warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This device complies with part 15 of FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna
• Increase the seperation between the equipment and receiver
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
• Consult the dealer or an experienced radio/TV technician for help.

In order for an installation of this product to maintain compliance with the limits for a Class B device, shielded cables must be used for the connection of any devices external to this product.