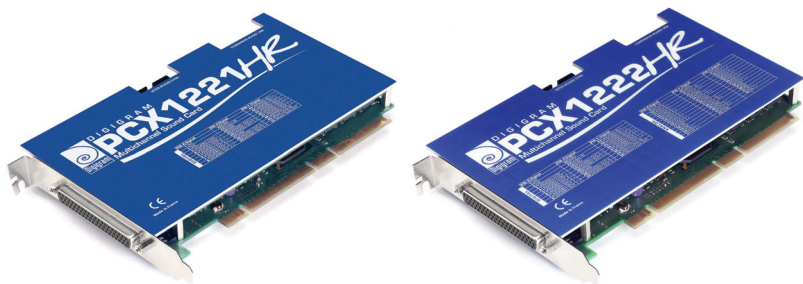


PCX1221HR

PCX1222HR

*Professional Multichannel
Sound Cards*



User's manual

**For technical support,
please contact your system supplier**



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PCX1221HR & PCX1222HR

User's Manual

Table of Contents

INFORMATION FOR THE USER	5
IMPORTANT NOTICE	5
CONTENTS OF THIS PACKAGE	6
FEATURES	6
PCX1221HR main hardware features	6
PCX1222HR main hardware features	7
Main software features	7
REQUIREMENTS	7
Hardware requirements	7
SOFTWARE REQUIREMENTS	8
Supported operating systems	8
HARDWARE INSTALLATION	8
Installing the card	8
Interrupt and memory address	8
SOFTWARE INSTALLATION	8
Installation under Windows 2000 and XP	9
Parameterizing the ASIO driver	9
Parameterizing the Wave driver	10
Removing the driver under Windows 2000 and XP	10
HOW TO CHECK THE INSTALLATION	11
DIRECTSOUND CONTROL PANEL	12
Playback controls	12
Recording controls	14
Clock selection	16
Digital outputs format selection	18
ASIO CONTROL PANEL	19
WAVE CONTROL PANEL	19
SPECIFICATIONS	20
Configuration	20
Inputs	20
Outputs	21
Connectors	21
Audio specifications	21
Audio Performance	22
Development environments	22
APPENDICES	23
PCX1221HR Schematic Diagram	23
PCX1222HR Schematic Diagram	23
Layout	24
PCX1221HR cable diagram	25
PCX1221HR wiring diagram	25
PCX1222HR cable diagram	26
PCX1222HR wiring diagram	27
PCX1221HR cable pinout	28
PCX1222HR cable pinout	28

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DU174300101 IS-01

INFORMATION FOR THE USER

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, and (2) This device must accept any interference received, including interference that may cause undesired operation.

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 equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions contained in this data sheet, may cause harmful interference to radio and television communications. 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 separation between the equipment and the receiver
- * connect the equipment into an outlet on a circuit different from that of the receiver
- * consult the dealer or an experienced audio television technician.

Note: *Connecting this device to peripheral devices that do not comply with CLASS B requirements or using an unshielded peripheral data cable could also result in harmful interference to radio or television reception. The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. To ensure that the use of this product does not contribute to interference, it is necessary to use shielded I/O cables.*

IMPORTANT NOTICE

This card has been tested and found to comply with the following standards:

- International: CISPR22 Class B
- Europe: EMC 89/336/CEE (1992) specifications
- United States: FCC Rules-Part 15-Class B (digital device)

In order to guarantee compliance with the above standards in an installation, the following must be done:

- the provided cable must not be modified
- additional cables used must have their respective shield connected to each extremity

PCX1221HR & PCX1222HR

User's Manual

CONTENTS OF THIS PACKAGE

Thank you for purchasing a Digigram PCX sound card.

The package consists of the following components:

- * a PCX1222HR or PCX1221HR sound card
- * the user's manual at hand

The breakout cables to connect the card's I/Os are not part of this package. They are delivered separately.

Also available (optional):

2U 19-inch breakout box allowing straightforward and secure connection to all the cards' I/Os

FEATURES

PCX1222HR and PCX1221HR are audio cards for PCI bus. They are 'Universal PCI 64-bit/66 MHz', which means they can be plugged in 32-bit/33 MHz 5 V PCI slots as well as in 64-bit/66 MHz 3.3 V keyed PCI slots. The cards are also compatible with PCI-X interfaces.

PCX1221HR main hardware features

- 1 digital AES/EBU* stereo input, with hardware sample rate converter (up to 96 kHz) and programmable digital gain
- 6 digital AES/EBU* stereo outputs (up to 192 kHz) with programmable digital gain
- 1 digital AES/EBU* stereo sync input (up to 192 kHz in play and record)
- 1 standard Word Clock input (up to 96 kHz)
- 1 standard Word Clock output (up to 96 kHz)
- 1 video sync input
- 1 SMPTE/LTC (Linear Time Code) sync input

* can be used as S/PDIF interface as well

PCX1222HR main hardware features

All features of the PCX1221HR, plus:

- 2 balanced** analog mono line inputs, with software programmable analog and digital gain
- 12 servo-balanced*** analog mono line outputs, with software programmable analog and digital gain
- 192 kHz / 24-bit converters
- Maximum level on analog inputs and outputs: +24 dBu

Note: *The digital outputs always play the digital version of the corresponding analog output.
The selection of the AES/EBU input excludes the selection of the analog inputs.*

Main software features

- Real-time, simultaneous record and playback in PCM (8, 16 and 24 bits) as well as in MPEG Audio Layer I, Layer II and Layer III[Ⓛ], Float IEEE754 conversion supported (with 24-bit fixed-point dynamic range)
- When using the np SDK, real-time mixing of several PCM and MPEG audio streams, direct monitoring, level adjustment, panning, cross-fades, punch-in/punch-out, scrubbing, time-stretching, pitch-shifting, 3-band parametric equalizer, maximizer, format and frequency conversions
- Low latency DirectSound, Wave, and ASIO drivers. Under DirectSound and ASIO, the cards operate in PCM mode only (nevertheless, an application can integrate coders/decoders on the host PC). Under Wave, HR boards can operate in both PCM and MPEG (layer 1 and layer 2).
[Ⓛ] MPEG Layer III play-only on DSP;
MPEG Layer III recording on the host computer is available through Digigram's PC Codec option using the np SDK

REQUIREMENTS

Hardware requirements

- Pentium III minimum (or equivalent)
- 128 MB RAM
- One free PCI or PCI-X slot (5 V or 3.3 V)

** can be used with unbalanced signals

*** Electronically servo-balanced outputs provide automatic level adjustment to accommodate either balanced or unbalanced lines

PCX1221HR & PCX1222HR

User's Manual

Software requirements

To use your PCX1221HR or PCX1222HR, install the driver from the np Runtime HR package version 1.01 or higher. This package includes:

- a Digigram np driver enabling OEM applications to best capitalize on the HR boards
- a WDM DirectSound driver. Microsoft DirectX 9 or higher must be installed on your computer
- a Wave driver (installation optional).
- an ASIO driver (installation optional)

Supported operating systems

PCX1221HR and PCX1222HR cards run under Windows 2000 and Windows XP.

HARDWARE INSTALLATION

The card has to be installed in the computer prior to installing its driver.

Installing the card

Gently plug the card in a free PCI slot and press it down to position it firmly. Tighten the screw.

Interrupt and memory address

Hardware interrupt and addresses are automatically set up at start-up by the PCI PnP BIOS.

SOFTWARE INSTALLATION

Please visit the Digigram web site at www.digigram.com for the most recent driver.

In case you run a specific application developed or installed by a Digigram Partner, this application might require the use of a specific driver version. In this case, make sure that the updated driver has been approved by your supplier.

To update an HR driver, please uninstall the old version, then install the more recent one.

Installation under Windows 2000 and XP

If the driver has been downloaded from our web site, it has to be expanded prior to the driver's installation as follows: double-click on the downloaded file (self-expanding). You can use the default destination location (Windows temporary folder) or select another directory.

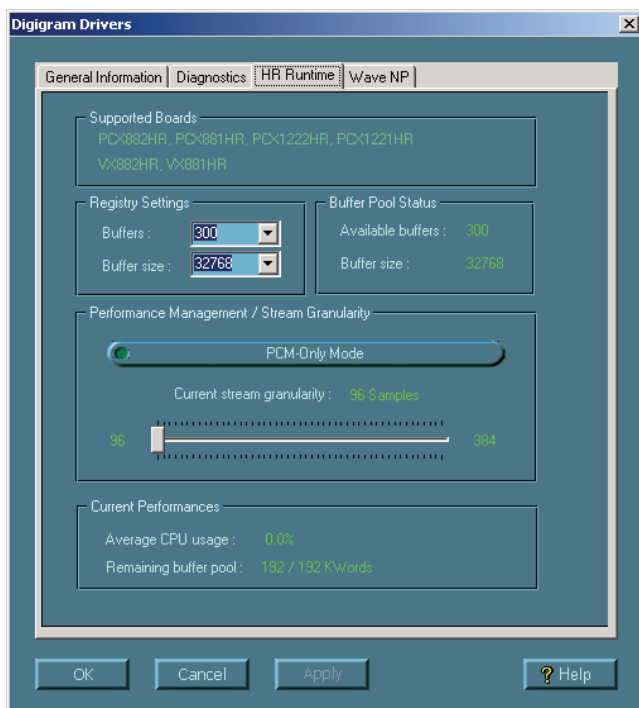
- Shut down your computer and insert your PCX card.
- Restart your computer.
- Click on **Cancel** if the **Found New Hardware Wizard** appears.
- Double-click on the **setup.exe** icon to launch the driver installation.
- A welcome message is displayed, click **Next** to continue.
- The **"License Agreement"** window appears: read it, and click on **Yes** to approve it. Do the same for the **"Read Me First"** window.
- Choose the destination folder where Setup will install the application files (..\pcxnp by default). Note that the driver files are installed in ..\windows\system32\Drivers\Digigram\PCXHR. Click **Next**.
- In the **"Select components"** window make sure that the **"Driver for the HR boards"** has been selected.
- Check the drivers to be installed in addition to DirectSound and Digigram np: Wave (MME), ASIO.
- Select the program folder where the program icons will be added (default: DIGIGRAM). Click **Next**.
- Click **Next** to start copying the files.
- Click on **Continue anyway** in the **"Hardware installation"** window (Windows XP).
- In the **"Digigram drivers"** window, select the number and the size of buffers required by your applications. Click on **Ok**.
- Click **Finish** to complete the driver installation.

Parameterizing the ASIO driver

- To use the ASIO driver on your on chart PCX HR sound card, the option **"PCM only"** has to be activated in the Digigram control panel (CPL). To access this control panel, go to **<Start>**, **<Programs>**, **<Digigram>**, **<Digigram Control Center>**.

PCX1221HR & PCX1222HR

User's Manual



Parameterizing the Wave driver

- In the case of an application managing exclusively PCM audio, the latency of the Wave driver can be optimized activating the option “**PCM only**” in the Digigram control panel (CPL). With this option enabled, the latency of the Wave driver is optimized (in this case the PCX HR on-board MPEG encoding/decoding is disabled). To access this control panel, go to <Start>, <Programs>, <Digigram>, <Digigram Control Center>.

Removing the driver under Windows 2000 and XP

- Open the **Windows Control Panel** and double-click on the **Add/Remove Software** icon.
- Select “**Digigram HR Runtime ...**”, and **Change/Remove**.
- Select **Remove** in the np Runtime window.
- Follow the instructions to finish driver removal.

How to check the installation

Once the driver and the cards have been installed according to the procedure described in this manual, you can verify that the card is properly set up and works fine as follows:

- The card is visible under the DirectSound interface:
Menu **<Start>**, **<Settings>**, **<Control panel>**, **<Sound and Multimedia>**, tab **"Audio"**, **Default device** (Playback device, Recording device). Pull-down menus allow for the card's channel selection (e.g. "VPCX1222HR 1+2 (WDM)" for the card's first stereo channel). The card can be used with any DirectSound compliant application (see following pages).
- The card is also visible through the np interface: Go to **<Start>** **<Programs>** **<Digigram>** and select **<Digigram Control Center>**.
 - In the **"Digigram drivers"** window, select the **General Information** tab. In the Modules Information window you can see the HR Runtime modules that have been installed, and their versions.
 - In the **"Digigram drivers"** window, select the **Diagnostics** tab. You should see here the icons of the cards you have installed.

If the card you have installed is listed:

- Right click on the icon of the card.
- Select **Diagnostics**, and **Play sine**. This plays in loop a sine wave signal on the outputs of the card.
You can also select **Play file** to play in loop a file of your choice (PCM). If the playback is accurate, the card is correctly installed and works.
- To stop the playback, right click on the card icon, and select **Stop Activities**.
- If the "Wave (MME)..."option has been checked during installation, go to Menu **<Start>**, **<Settings>**, **<Control panel>**, **<Sound and Multimedia>**, tab **Audio**, **<Default device>** (Playback device, Recording device). The card's channels can be selected (e.g. PCX1222HR 1+2 for the card's first stereo channel). The card can be used with any Wave compliant application.
- If the ASIO option has been selected during installation, the card is visible through any ASIO compliant application.

If the card is not displayed:

- Make sure that during the HR Runtime installation the **"Driver for the HR boards"** has been selected in the **"Select components"** window.
- Make sure that the card is correctly inserted in the PCI slot, and screwed on the PC chassis.
- if necessary, uninstall HR Runtime package as described in this manual, and re-install it.

PCX1221HR & PCX1222HR

User's Manual

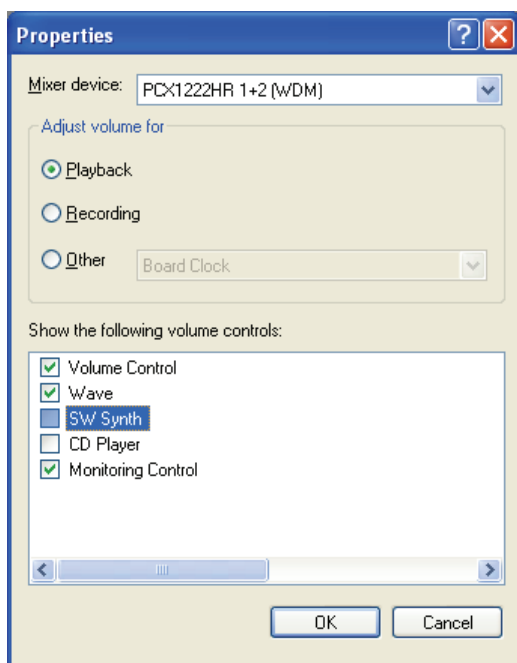
DIRECTSOUND CONTROL PANEL

Some parameters of the PCX1222/PCX1221HR cards (such as volume, balance, mute, clock selection, input selection...) can be adjusted from the Windows DirectSound volume control panel.

Note: *Keep in mind that there are no analog I/Os on PCX1221HR! Whenever reference is made to these inputs or outputs in the following chapters, it refers exclusively to the PCX1222HR.*

Playback controls

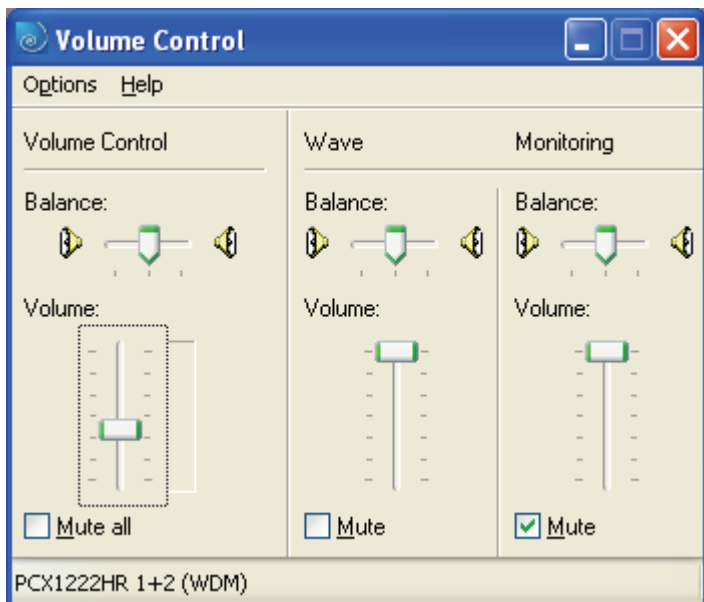
To adjust the playback parameters, open the Volume Control application, go to the **Options** menu, and select **Properties**.



Select the mixer device to be parameterized, and select **“Playback”** in the **“Adjust volume for”** area.

In the **“Show the following volume controls”** section, select the controls you'd like to adjust.

Click **Ok**.



Balance, **Mute**, and **Volume** can be adjusted for:

- The device output (**Volume control**):
Volume and **Balance** use the analog output gain; **Mute** is digital.
- The stream coming from the application (**Wave**):
Windows applies all controls to the digital stream coming from the application.
- The **Monitoring**:
the controls use the cards' digital output gains.

PCX1221HR & PCX1222HR

User's Manual

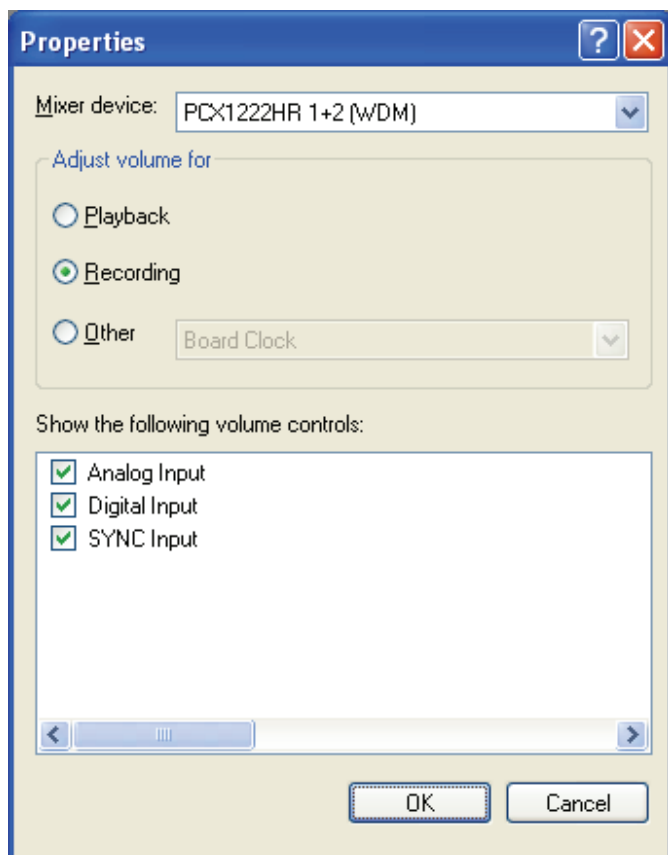
Recording controls

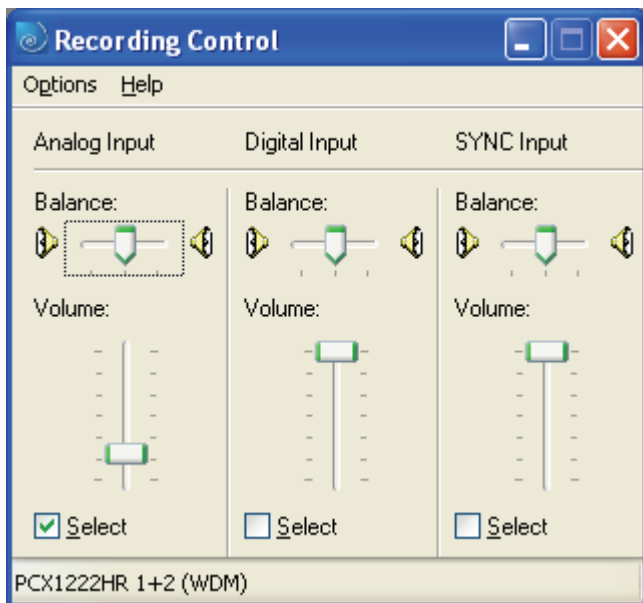
To adjust the recording parameters, open the Volume Control application, go to the **Options** menu, and select **Properties**.

Select the mixer device you want to control, and select **“Recording”** in the **“Adjust volume for”** area.

In the **“Show the following volume controls”** section, select the controls you'd like to adjust.

Click **Ok**.





From this Recording Control window, you can select the input the application will use by clicking on one of the “Select” check boxes: **Analog Input**, **Digital Input**, or digital **SYNC Input**.

- **Analog Input:**
Volume and **Balance** use the analog input gains.
Digital Input Volume and **Balance** can also be used when the **Analog Input** is selected.
- **Digital Input:**
Volume and **Balance** use the digital input gains.
- **SYNC Input**
 This input is available only with the **Mixer device 1/2** selected. On this device digital data can be recorded either from input AES/EBU IN 1 or from the AES/EBU SYNC input.
Volume and **Balance** use the digital input gains.

Note: *It is possible to select the analog input for one device, and the digital input for another device.*

PCX1221HR & PCX1222HR

User's Manual

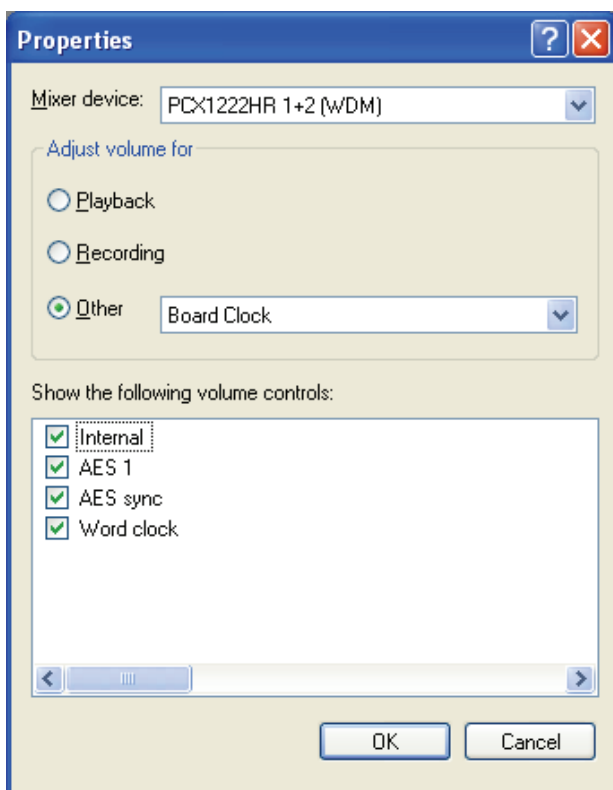
Clock selection

To select the clock, open the Volume Control application, go to the **Options** menu and select **Properties**.

Select the mixer device to be controlled, and select “**Other**” in the “**Adjust volume for**” section, then “**Board Clock**” from the pull-down menu.

In the “**Show the following volume controls**” section, select the controls you'd like to adjust.

Click **Ok**.

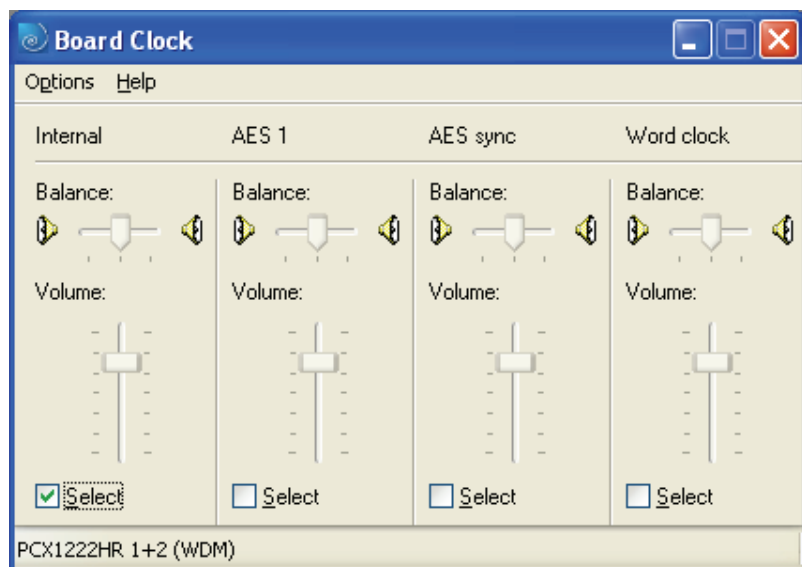


Note: If the selected digital source has a clock other than the clock selected in this “Properties” dialog, the on-board sample rate converter is used (except for AES/EBU Sync).

D i g i t a l

In the Board Clock window, you can then choose the clock that will be used for both recording and playback, by selecting the corresponding check boxes.

Note: *Checking the 'Select' boxes is only possible with a signal present on the corresponding I/O.*



PCX1221HR & PCX1222HR

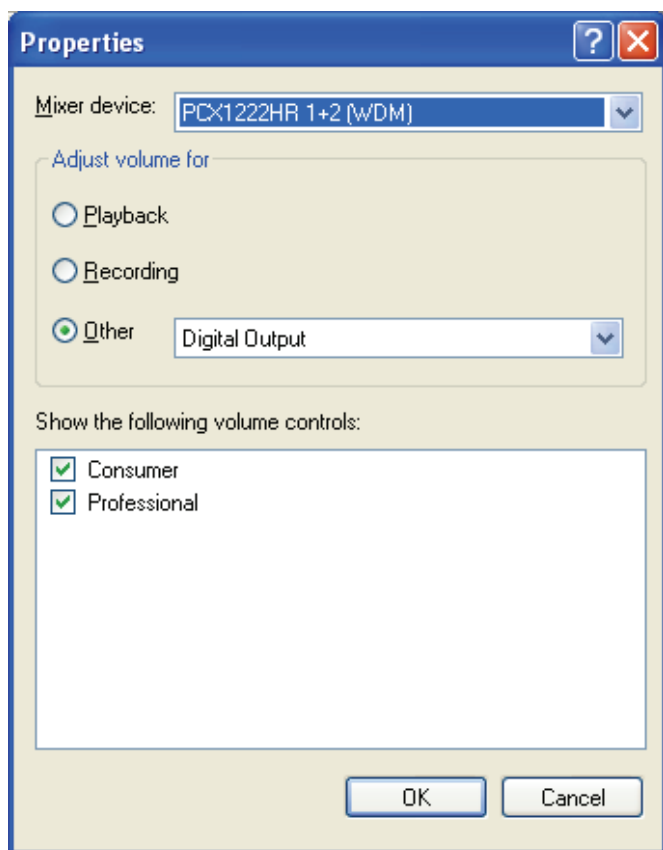
User's Manual

Digital outputs format selection

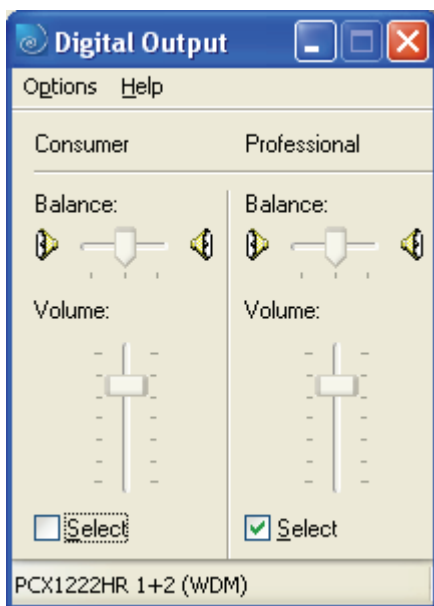
To select the digital outputs' format ("Consumer" or "Professional"), open the Volume Control application, go to the **Options** menu, and select **Properties**.

Select the mixer device you'd like to control, and select "**Other**" in the "**Adjust volume for**" section, then select "**Digital output**" from the pull-down menu.

In the "**Show the following volume controls**" area, select the controls you want to adjust ("Consumer" and "Professional").



Click **Ok**.



In the “**Digital Output**” window, click on one of the “**Select**” check boxes to select the required format.

ASIO CONTROL PANEL

With the ASIO driver installed, the card’s settings can be adjusted through the ASIO control panel. To launch this interface, go to **Start, Programs, Digigram, ASIO HR Settings**.

For details regarding its use, please refer to the on-line help of this interface.

WAVE CONTROL PANEL

When the card is used through the Wave interface, its parameters can be adjusted from the Digigram Wave mixer. This mixer can be found in the Windows task bar, or it can be started from **<Start>, <Programs>, <Digigram>**. For help on how to use this Wave control panel, please refer to its on-line help.

PCX1221HR & PCX1222HR

User's Manual

SPECIFICATIONS

Configuration

	PCX1221HR	PCX1222HR
Bus/Format	64-bit/66 Mhz Universal PCI master mode, PCI-X compatible	
Digital Signal Processor	Motorola 56321 at 240 MHz	
RAM	512 kWords	
Size	175 mm × 99 mm x 20 mm	
Power requirements (+3.3V / +5V / +12V / -12V)	0 A / 0.8 A / 0.1 A / 0 A	0 A / 1.8 A / 0.1 A / 0.1 A
Operating: temp / humidity (non-condensing)	0°C / +50°C • 5% / 90%	
Storage: temp / humidity (non-condensing)	-5°C / +70°C • 0% / 95%	

Inputs

	PCX1221HR	PCX1222HR
Analog line inputs (mono)	-	2 balanced*
Maximum input level/ impedance	-	+24 dBu/ >10 kΩ
Digital input (stereo)	1 AES/EBU** with hw Sample Rate Converter, 1:3 to 3:1, up to 96 kHz	
Programmable input gain	digital: from -110 dB to +18 dB	analog: from -94.5dB à +15.5 dB⊗ digital: from -110 dB à +18 dB
Other inputs	AES/EBU Sync (up to 192 kHz), Word clock (up to 96 kHz), LTC, Video	
AES11 synchronization	Yes	

* can be used with unbalanced signals

** can be used as S/PDIF interface as well

⊗ maximum sensitivity: 0 dBFS for -15.5 dBu input

D i g i t a l

Outputs

	PCX1221HR	PCX1222HR
Analog line outputs (mono)	-	12 servo-balanced ^{***}
Maximum output level / impedance	-	+24 dBu / <100 Ω
Digital outputs (stereo)	6 AES/EBU ^{**} , up to 192 kHz	
Programmable output gain	digital: from -110 dB to +18 dB	analog: from -86 dB to +24 dB digital: from -110 dB to +18 dB
Other outputs	Word clock (up to 96 kHz)	

Connectors

	PCX1221HR	PCX1222HR
Internal connectors	Inter-board Sync and Companion Board Link	
External connector	62-pin Sub-D	
Digigram accessories available	Breakout cable or 2U 19" Breakout Box	

Audio specifications

	PCX1221HR	PCX1222HR
Sampling frequencies available	Programmable from 8 to 192 kHz	
A/D and D/A converter resolution	-	24 bits
Supported audio formats	PCM (8, 16, 24 bits), Float IEEE754	

^{***} electronically servo-balanced outputs provide automatic level adjustment to accommodate either balanced or unbalanced lines

PCX1221HR & PCX1222HR

User's Manual

Audio Performance

measured at $F_s=48$ kHz

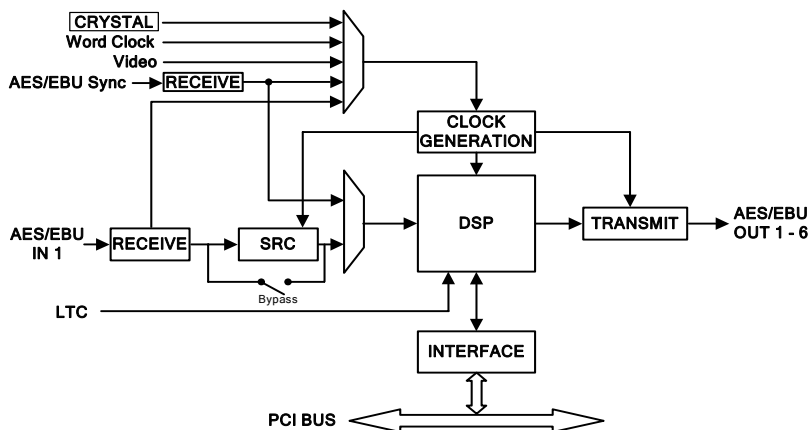
	PCX1221HR	PCX1222HR
Frequency response (record + play)	-	20 Hz–20 kHz: ± 0.3 dB
Channel phase difference: 20/20kHz	-	$< 0.2^\circ/2^\circ$
Dynamic range (A-weighted)	-	Analog In: > 104 dB Analog Out: > 110 dB
THD + noise 1 kHz at -1 dBfs	-	Analog In: < -96 dB Analog Out: < -98 dB
Crosstalk (Analog in or out)	-	1 kHz at 22 dBu: < -100 dB 15 kHz at 22 dBu: < -90 dB

Development environments

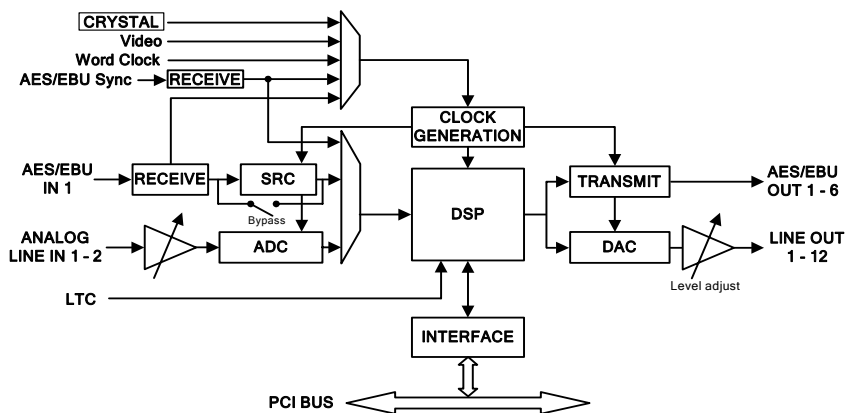
	PCX1221HR	PCX1222HR
Digigram management	np SDK (HR Runtime, PCM only)	
Other management	Wave (PCM, MPEG), ASIO, and DirectSound (PCM only)	
OS supported	Windows 2000 and XP	
Main on-board processing features (with np SDK)	PCM play, rec, Float IEEE754, and MPEG layer 1 et layer 2 (layer 3 in playback) direct monitoring, real- time mixing, level adjustment, panning, cross-fade, punch-in/punch-out, scrubbing	

APPENDICES

PCXI221HR Schematic Diagram



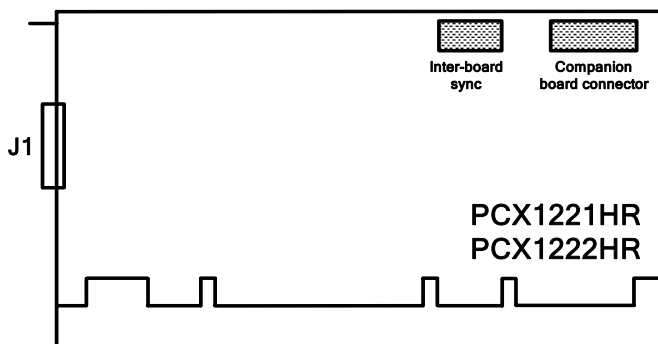
PCXI222HR Schematic Diagram



PCX1221HR & PCX1222HR

User's Manual

LAYOUT

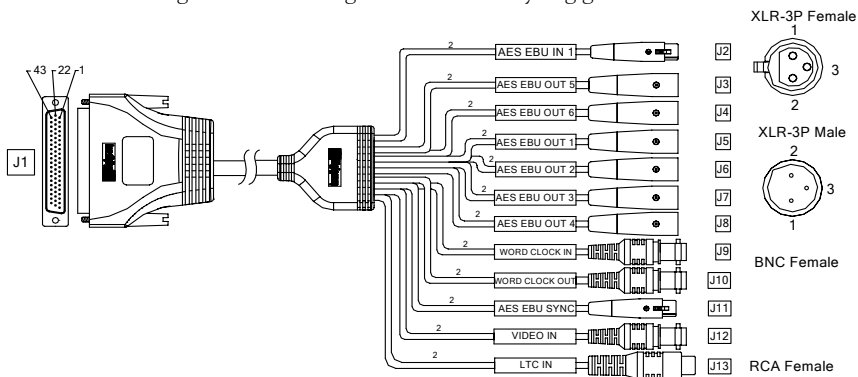


J1:

- Digital cable (PCX1221HR)
- Analog/digital cable (PCX1222HR)

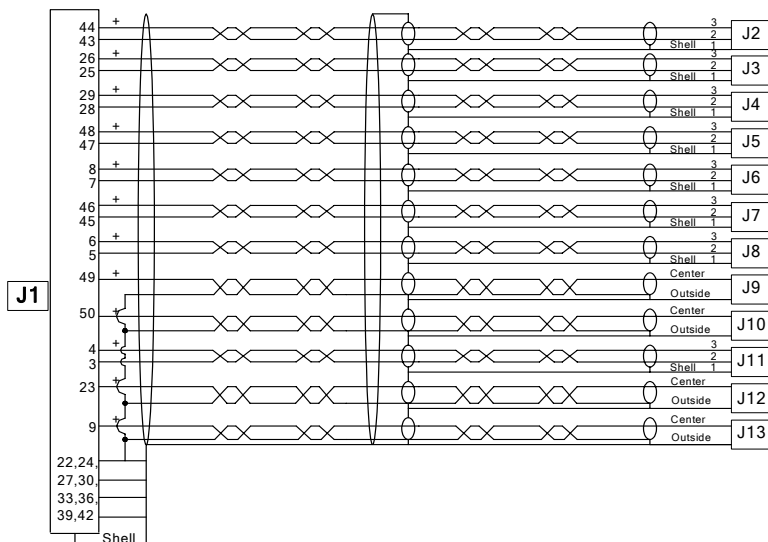
PCXI221HR cable diagram

Schematic diagram of the analog cable delivered by Digigram*:



* Your cable may look different if it is not a Digigram cable.

PCXI221HR wiring diagram

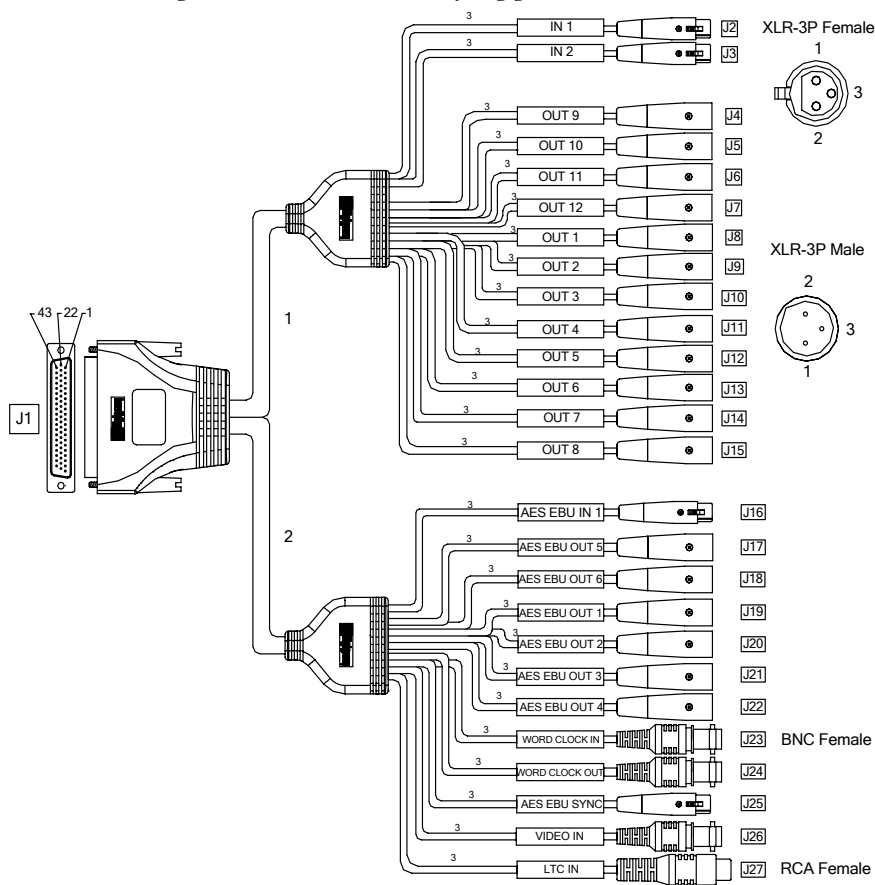


PCX1221HR & PCX1222HR

User's Manual

PCX1222HR cable diagram

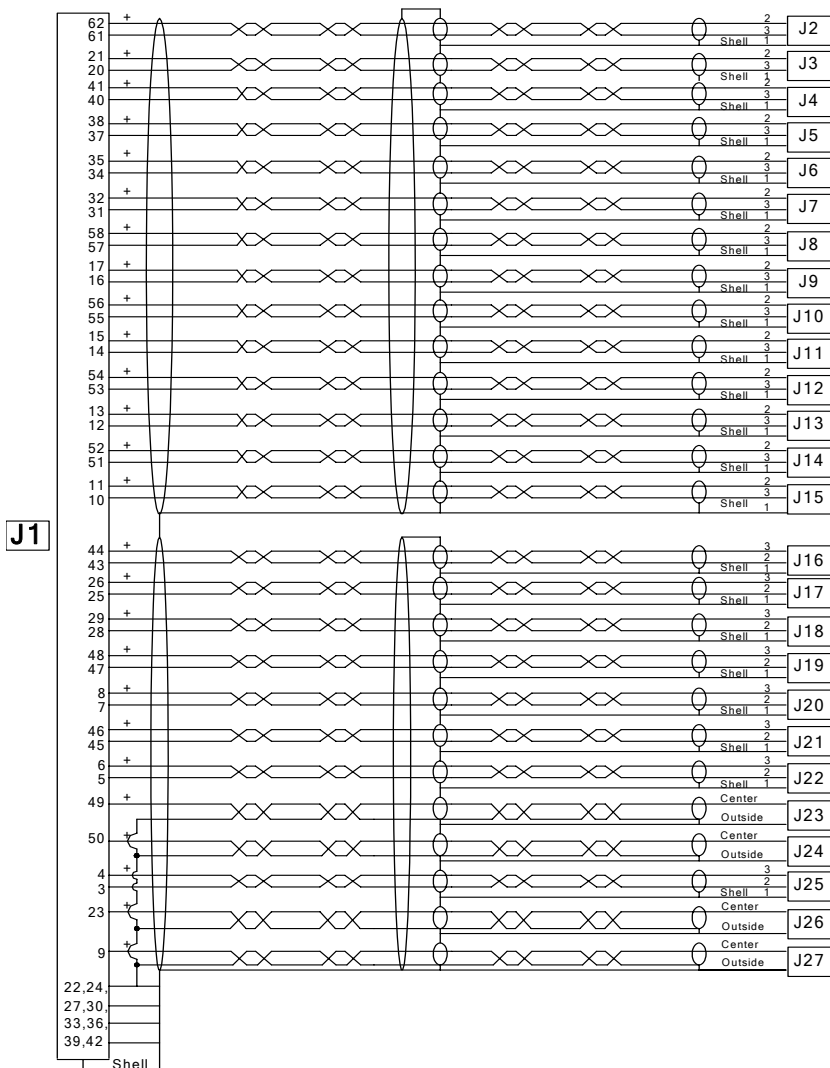
Schematic diagram of the cable delivered by Digigram*:



* Your cable may look different if it is not a Digigram cable.

D i g i t a l

PCXI222HR wiring diagram



PCX1221HR & PCX1222HR

User's Manual

PCX1221HR cable pinout

Digital	Pin	Signal	Pin	Signal	Pin	Signal
	1	NC	22	GND	43	AES/EBU IN 1 -
	2	NC	23	Vidéo IN	44	AES/EBU IN 1 +
	3	AES/EBU SYNC -	24	GND	45	AES/EBU OUT 3 -
	4	AES/EBU SYNC +	25	AES/EBU OUT 5 -	46	AES/EBU OUT 3 +
	5	AES/EBU OUT 4 -	26	AES/EBU OUT 5 +	47	AES/EBU OUT 1 -
	6	AES/EBU OUT 4 +	27	GND	48	AES/EBU OUT 1 +
	7	AES/EBU OUT 2 -	28	AES/EBU OUT 6 -	49	Word Clock IN
Analog	8	AES/EBU OUT 2 +	29	AES/EBU OUT 6 +	50	Word Clock OUT
	9	LTC IN	30	GND	51	NC
	10	NC	31	NC	52	NC
	11	NC	32	NC	53	NC
	12	NC	33	GND	54	NC
	13	NC	34	NC	55	NC
	14	NC	35	NC	56	NC
	15	NC	36	GND	57	NC
	16	NC	37	NC	58	NC
	17	NC	38	NC	59	NC
	18	NC	39	GND	60	NC
	19	NC	40	NC	61	NC
	20	NC	41	NC	62	NC
	21	NC	42	GND		

PCX1222HR cable pinout

Digital	Pin	Signal	Pin	Signal	Pin	Signal
	1	NC	22	GND	43	AES/EBU IN 1 -
	2	NC	23	Vidéo IN	44	AES/EBU IN 1 +
	3	AES/EBU SYNC -	24	GND	45	AES/EBU OUT 3 -
	4	AES/EBU SYNC +	25	AES/EBU OUT 5 -	46	AES/EBU OUT 3 +
	5	AES/EBU OUT 4 -	26	AES/EBU OUT 5 +	47	AES/EBU OUT 1 -
	6	AES/EBU OUT 4 +	27	GND	48	AES/EBU OUT 1 +
	7	AES/EBU OUT 2 -	28	AES/EBU OUT 6 -	49	Word Clock IN
Analog	8	AES/EBU OUT 2 +	29	AES/EBU OUT 6 +	50	Word Clock OUT
	9	LTC IN	30	GND	51	OUT 7 -
	10	OUT 8 -	31	OUT 12 -	52	OUT 7 +
	11	OUT 8 +	32	OUT 12 +	53	OUT 5 -
	12	OUT 6 -	33	GND	54	OUT 5 +
	13	OUT 6 +	34	OUT 11 -	55	OUT 3 -
	14	OUT 4 -	35	OUT 11 +	56	OUT 3 +
	15	OUT 4 +	36	GND	57	OUT 1 -
	16	OUT 2 -	37	OUT 10 -	58	OUT 1 +
	17	OUT 2 +	38	OUT 10 +	59	NC
	18	NC	39	GND	60	NC
	19	NC	40	OUT 9 -	61	IN 1 -
	20	IN 2 -	41	OUT 9 +	62	IN 1 +
	21	IN 2 +	42	GND		

D i g i t a l

Your notes:

[illegible]