

D i g i g r a m

PCX924HR

PCX924HR-Mic

PCX22HR

Professional Stereo Sound Cards



User's manual

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



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PCX924HR & PCX924HR-Mic, PCX22HR

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Warning:



Electrostatic discharge (ESD) can damage several components on the board. To avoid such damage in handling the board, take the following precautions:

Bring the device and everything that contacts it to ground potential by providing a conductive surface and discharge paths. As a minimum, observe these precautions:

- Disconnect all power and signal sources.
- Place the device on a grounded conductive work surface.
- Ground yourself via a grounding wrist strap or by holding a grounded object.
- Ground any tool that will contact the device.



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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.

CONTENTS OF THIS PACKAGE

Thank you for purchasing a Digigram PCX924 or PCX22v2 card.
The package consists of the following components:

- a PCX924HR, PCX924HR-Mic, or PCX22HR sound card,
- the User's Manual at hand.

The cables (optional) are delivered separately.

FEATURES

PCX924HR-Mic, PCX924HR, and PCX22HR 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 keyed 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.

PCX924HR & PCX924HR-Mic

Main hardware features

- 2 balanced* analog mono line inputs, with software adjustable gain and a maximum Input level of +24 dBu
- 2 servo-balanced** analog mono line outputs, with software adjustable gain and a maximum output level of +24 dBu
- 1 digital AES/EBU*** stereo input

This input features a hardware sample rate converter (for details see chapter 'Specifications')

The selection of the digital input for recording excludes the selection of the analog inputs.

It is possible to use the signal on the digital input as reference clock.

- 1 AES/EBU Sync input
- These two AES/EBU inputs allow:
 - recording of a digital signal on the AES/EBU data input; this input is also used as source of synchronization with a digital clock
 - recording of a digital signal on the AES/EBU data inputs, synchronized on a digital clock connected to the AES/EBU synchronization input;

* can be used with unbalanced signals

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

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

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- the synchronization of analog recording and playback on an AES/EBU clock connected to the AES/EBU Sync input.
- 1 digital AES/EBU*** stereo output
Always transmits the digital version of the analog outputs 1 and 2.
- 1 LTC (Linear Time Code) input
- 1 mini jack stereo headphone output
This output is in parallel of the analog outputs 1 and 2.
- 2 General Purpose inputs and 2 outputs (GPIOs)
- Inter-card synchronization connector

PCX924HR-Mic

Additional hardware features

- 1 analog microphone input with
 - high-quality preamplifier
 - switchable 48 V phantom power
 - analog expander/compressor/limiterThis input is mixed with the two line inputs before A/D conversion.
- The AES/EBU input is AES42 compatible (for details see chapter 'Specifications')

***Note:** AES42 is an extension of the digital audio standard of interface AES3 providing for interfacing digital microphones.*

PCX22HR - Main hardware features

- 2 servo-balanced* analog mono line outputs, with software adjustable gain and a maximum output level of +24 dBu
- 1 digital AES/EBU ** stereo input, for synchronization on an external clock
- 1 digital AES/EBU** stereo output
(Always plays the digital version of the analog outputs 1 and 2)
- 1 LTC (Linear Time Code) input
- 1 mini jack stereo headphone output
(This output is in parallel of the analog outputs 1 and 2)
- 2 General Purpose inputs and 2 outputs (GPIOs)

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

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

PCX924HR, PCX924-Mic, and PCX22HR

Main software features

- Decoding and mixing of several PCM (8, 16 and 24 bits) and MPEG Audio streams (Layer I, II & III, *up to 48 kHz sampling frequency*)
- Real-time, simultaneous record and playback in PCM (8, 16 and 24 bits), Float IEEE754 conversion (with 24-bit fixed-point dynamic range), as well as in MPEG Audio Layer I, Layer II, and Layer III^①
- When using the np SDK, direct monitoring, level adjustment, panning, cross-fades, punch-in/punch-out, scrubbing, time-scaling, inter-board synchronization, synchronization on LTC (SMPTE)
- Possibility to control the parameters of the inputs and outputs (gains, mutes, 48 V switch, analog compressor-limiter-expander parameters), from the provided 'Digigram Hardware Settings' application, or from any application that addresses these controls
- 24-bit DSP effects in playback and recording: 3-band parametric equalizer plus Maximizer
- Low latency DirectSound, Wave, and ASIO drivers

^① MPEG Layer III play-only on DSP;
MPEG Layer III recording on the host computer is available through Digigram's PC Codec using the np SDK

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HARDWARE REQUIREMENTS

Minimum requirements

- Pentium III 700 MHz (or equivalent) minimum
- One free PCI (3.3 V or 5 V keyed) or PCI-X slot

Software requirements

SOFTWARE REQUIREMENTS To use your PCX924HR or PCX924HR-Mic, install the driver from the np Runtime HR package version 1.40 or higher. This package includes a *WDM DirectSound* driver. Microsoft DirectX 9 or a later version must also be installed. The card can also be used with applications based on Digigram's np SDK

Supported operating systems

PCX924HR and PCX924HR-Mic cards run under Windows 2000, Windows XP¹, and Windows 2003 Server¹, are compatible np SDK, and come along with low-latency DirectSound, Wave, and ASIO drivers.

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, it might require the use of a specific driver version. In this case, make sure that the updated driver has been approved by your supplier.

¹ 3-bit version

Installation under Windows 2000, XP, and Windows Server 2003

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 **Next**.
- In the "Select components" window make sure that the "Driver for the HR boards" has been selected.
- Select the program folder where the program icons will be added (default: DIGIGRAM). **Next**.
- Click on **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 on the **Finish** button to complete the driver installation.

Removing the driver under Windows 2000, XP, and Windows Server 2003

- 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 "HR Runtime" window.
- Follow the instructions to finish the driver removal.

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How to check the installation

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

- Menu <Start> <Settings> <Control panel>, <Sound and Multimedia>, tab "Audio", Default device (Playback device, Recording device). The card's channels can be selected. the card can be used with any *DirectSound* application (see pages hereafter).
- The card is also visible via 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 signal on the outputs of the card. You can also select **Play file** to play in loop a file of your choice (PCM or MPEG).
If the playback is correct, the card is correctly installed and works.
- To stop the playback, right click on the card icon, and select **Stop Activities**.

The card is also visible via the DHS control panel (cf. dedicated chapter next page).

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.

The ‘Digigram Hardware Settings’ (‘DHS’) control panel

Digigram hardware settings (DHS) is an application allowing to configure the hardware resources of Digigram cards for all audio applications using them. A resource being managed by the DHS application can not be modified by any other applications. To enable an audio application to modify a Digigram card resource, this resource must not be managed by the DHS.

Note: As soon as a resource of a card is managed by the DHS, the clock selection of this card must obligatorily be defined in the DHS.

The DHS allows to define:

- Selection of the clock the card uses
- selection of the input source
- Analog and digital gain of an input
- Enable Sample Rate Converters of an input:
- Select the input monitored on an output
- Set the monitoring gains
- Set the analog and digital gains of an output
- Define the digital output format

For help on how to use this control panel, please refer to its on-line help.

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SPECIFICATIONS

Configuration

	PCX924HR	PCX924HR-Mic	PCX22HR
Bus/Format	PCI 2.2, "Universal PCI 32-bit/66 MHz" master mode, "short-length" PCI format compatible, PCI-X compatible		
Digital Signal Processor	Motorola 56303 at 100 MHz		
RAM	512 kWords		
Size	175 mm x 99 mm x 20 mm		
Power requirements (+3.3V/+5V / +12V / -12V)	0,35 A / 0,2 A / 0,2 A / 0,08 A	0,4 A / 0,3 A* / 0,22 A / 0,1 A	0,30 A / 0,18 A / 0,18 A / 0,08 A
Operating: temp / humidity (non-condensing)	0°C / +50°C • 5% / 90%		
Storage: temp / humidity (non-condensing)	-5°C / +70°C • 0% / 95%		

Inputs

	PCX924HR	PCX924HR-Mic	PCX22HR
Analog line inputs (mono)	2 balanced**		
Maximum input level/impedance	+24 dBu / >10 k(		
Digital inputs (stereo)	1 AES/EBU*** with hardware sample rate converter (SRC)		-
Other inputs	AES/EBU Sync (up to 200 kHz)		
Programmable input gain	analog: from -94 dB to +16 dB ☉ digital: from -110 dB to +18 dB		
Other inputs	2 GPI (dry contact), LTC		
AES11 synchronization	Yes		

* enabling phantom power (48 V) may increase this value by 50%
using the 10 V AES42 power to feed the microphone may increase this value by 150%

** can be used with unbalanced signals

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

☉ maximum sensitivity: 0 dBFs for -16 dBu input

Additional functionalities – PCX 924HR-Mic

Microphone input	1 professional mono with - high-quality preamplifier - switchable 48 V phantom power - analog expander/compressor/limiter <i>This input is mixed with the two line inputs before A/D conversion.</i>
Digital input (stereo)	The input AES/EBU IN* is AES42 compatible - supplying 10 V to feed a digital microphone - allowing remote microphone control.

Outputs

	PCX924HR	PCX924HR-Mic	PCX22HR
Analog line outputs (mono)	2 servo-balanced**		
Maximum output level / impedance	+24 dBu / < 100Ω		
Digital outputs (stereo)	1 AES/EBU, up to 200 kHz		
Programmable output gain	analog: from -24 dB to +24 dB digital: from -110 dB to +18 dB		
Other outputs	1 stereo headphone output (600 Ω) 2 GPO (relay, 0,5 A, 48 VCC)		

Connectors

	PCX924HR	PCX924HR-Mic	PCX22HR
Internal connector	inter-board synchronization		
External connectors	15-pin Sub-D for analog I/Os 115-pin HD Sub-D for digital I/Os, Sync., and GPIO 1 mini jack headphone stereo output (3,5 mm TRS female jack)		

* can be used as S/PDIF interface as well

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

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Audio specifications

	PCX924HR	PCX924HR-Mic	PCX22HR
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, MPEG (Layer I, II, and III up to 48 kHz)		

Analog audio performance

Measurements done at $F_s=48$ kHz unless stated otherwise, with filter on the 22 Hz- 22 kHz range

	PCX924HR	PCX924HR-Mic	PCX22HR
Frequency response (record + play)	at 48 kHz: 20 Hz - 20 kHz: +0 /-0.3 dB at 96 kHz: 20 Hz - 40 kHz: +0 /-0.4 dB at 192 kHz: 20 Hz - 80 kHz: +0 /-1.1 dB		
Channel phase difference: 20/20kHz	<0.2°/2°		
Dynamic range (A-weighted)	Analog In: >104 dB* Analog out: > 106 dB		
THD + noise 1 kHz at -2 dBfs	Analog In: >-97 dB* Analog out: <-95 dB		
Crosstalk (Analog in or out)	1 kHz at 24 dBu: <-115 dB 15 kHz at 24 dBu: <-100 dB		

* PCX924HR & PCX924HR-Mic only

Sample rate converter performance

	PCX924HR	PCX924HR-Mic
Maximum frequency	192 kHz	
Frequency ratio	from 1:8 to 7.5:1	
THD + noise 1 kHz at -2 dBfs	<-130 dB	

Analog mono microphone input features - PC924HR-Mic

Power supply	switchable 48 V phantom power
Programmable mic gain	0 to 66 dB in 0.5 dB steps
Maximum input level/impedance	+10 dBu / < 10k Ω
Equivalent Input Noise, A/D-D/A at 48kHz, G=60 dB	<-125 dBu
Programmable noise-gate threshold	-52 dB, -42 dB, -32 dB
Programmable compressor/limiter threshold	from -26 dB to 0 dB
Programmable compressor ratio	1, 1.2, 1.5, 1.8, 2, 2.5, 3, 3.5, 4, 4.5
Programmable compressor/limiter gain	from 0 to 16 dB
Limiter ratio	15:1
Compressor/limiter release time	150 ms
Management of line and mic inputs	Mixed together before A/D, with independent level and mute controls
Programmable DSP effects on the output	3-band parametric equalizer plus Maximizer

AES42 microphone input features - PCX924HR-Mic

Power supply	10 V min / 250 mA max
Remote control	Yes
Supported synchronization	Operational mode 1 (the microphone generates its own clock)

Development environments

	PCX924HR	PCX924HR-Mic	PCX22HR
Digigram management	np SDK (HR Runtime, PCM and MPEG)		
Other management	Wave (PCM, MPEG), ASIO, and DirectSound (PCM)		
Supported operating systems	Windows 2000, XP ¹ , and Windows 2003 Server ¹		
Main on-board processing features (with np SDK)	PCM play, rec, Float IEEE754, direct monitoring, MPEG, direct monitoring, real-time mixing, level adjustment, <i>panning</i> , cross-fade, <i>punch-in/punch-out</i> , scrubbing, time-scaling		

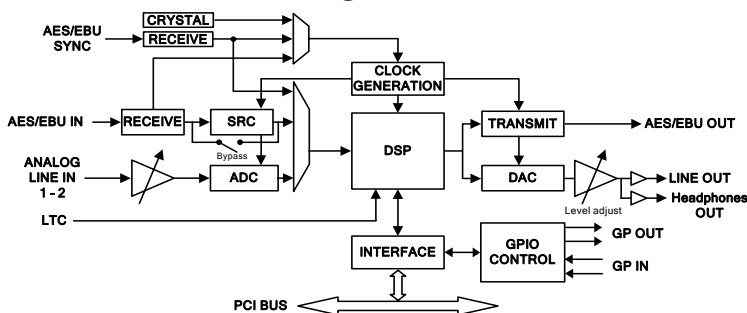
¹ 32-bit version

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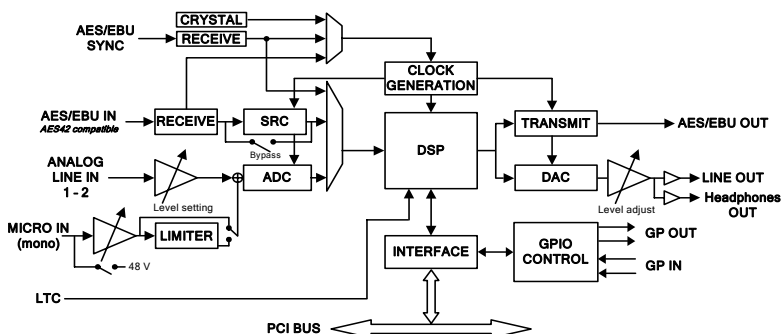
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APPENDICES

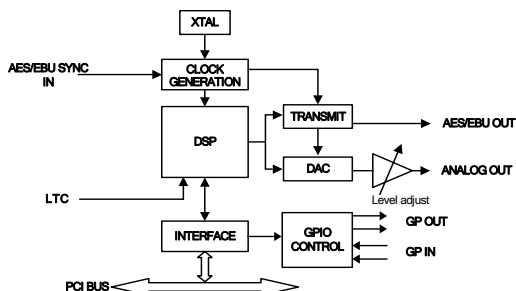
PCX924HR Schematic Diagram



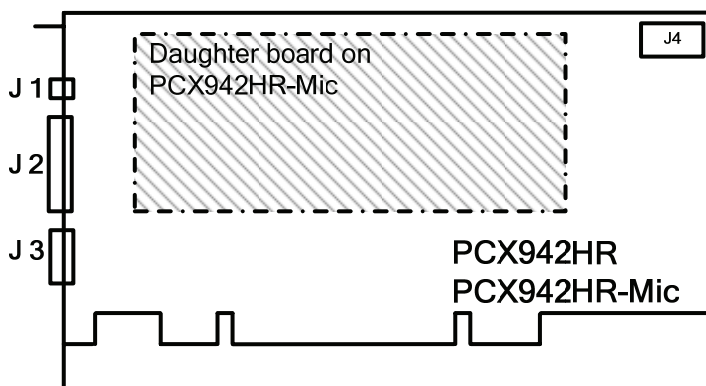
PCX924HR-Mic Schematic Diagram



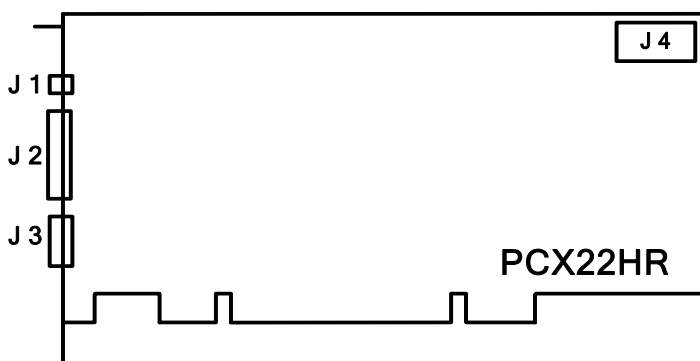
PCX22HR Schematic Diagram



PCX924HR & PCX924-Mic layout



PCX22HR layout



J1 : Headphone connector
(3.5 mm TRS female jack)

Contact	Signal
Sleeve	Ground
Tip	Left channel
Ring	Right channel

J2 : Analog cable

J3 : Digital cable

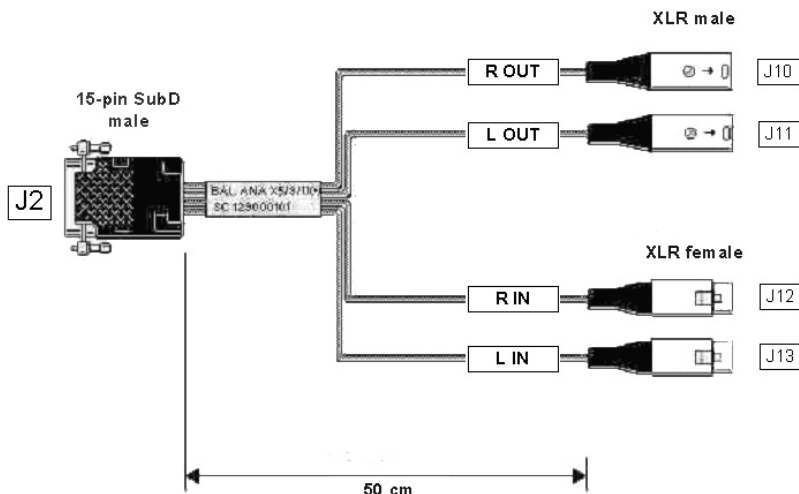
J4 : Inter-card synchronization connector

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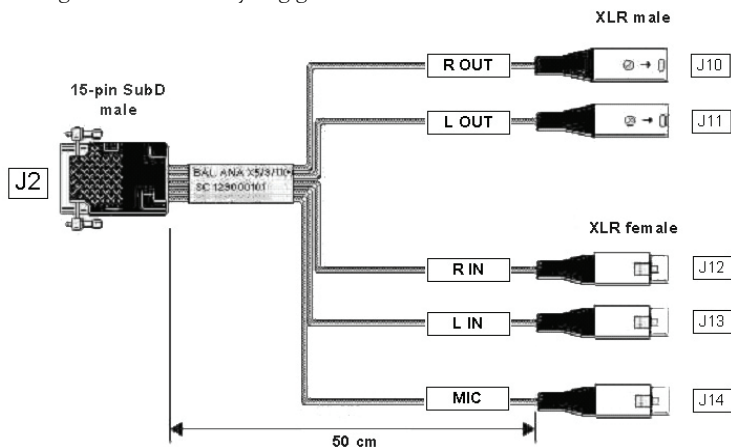
PCX924HR - analog cable diagram:

Analog cable delivered by Digigram:



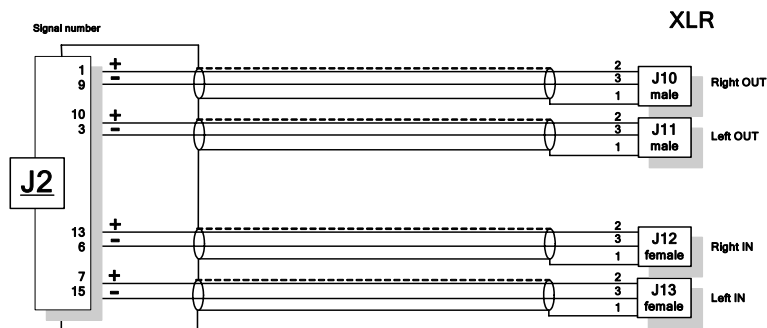
PCX924HR-Mic - analog cable diagram:

Analog cable delivered by Digigram:



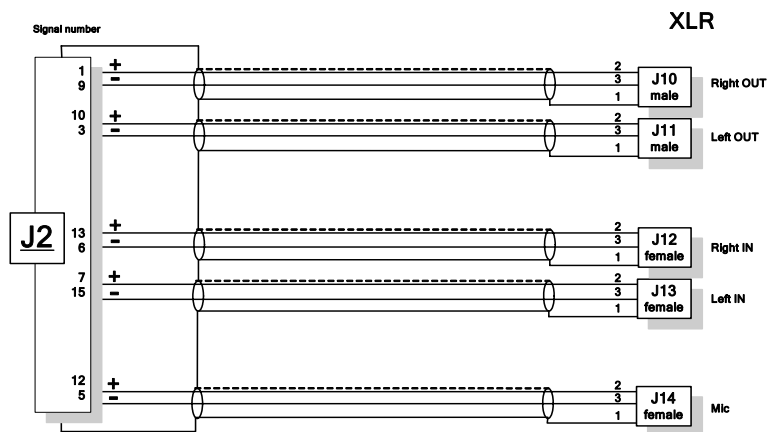
PCX924v2

Wiring Diagram – Analog Cable



PCX924HR-Mic

Wiring Diagram – Analog Cable



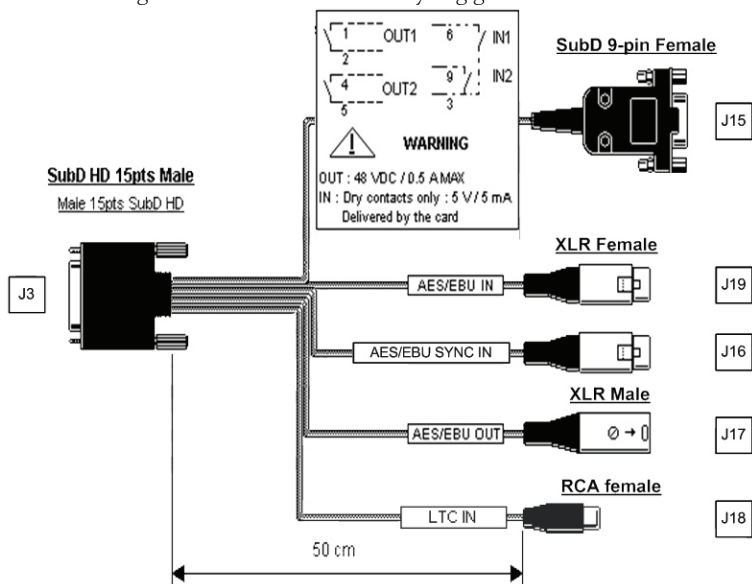
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PCX924HR & PCX924HR-Mic

Digital cable with GPIOs

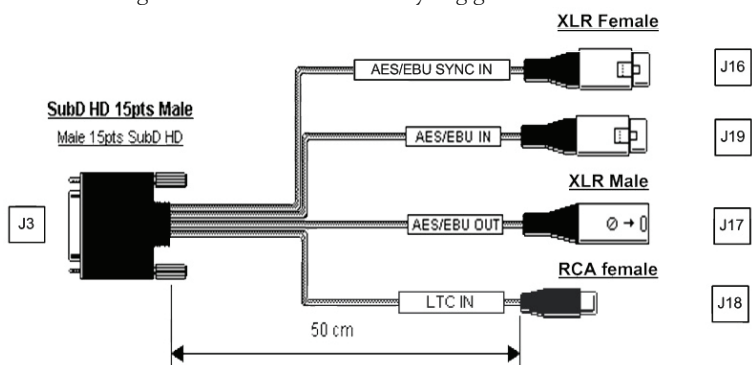
Schematic diagram of the cable delivered by Digigram*:



PCX924HR & PCX924-Mic

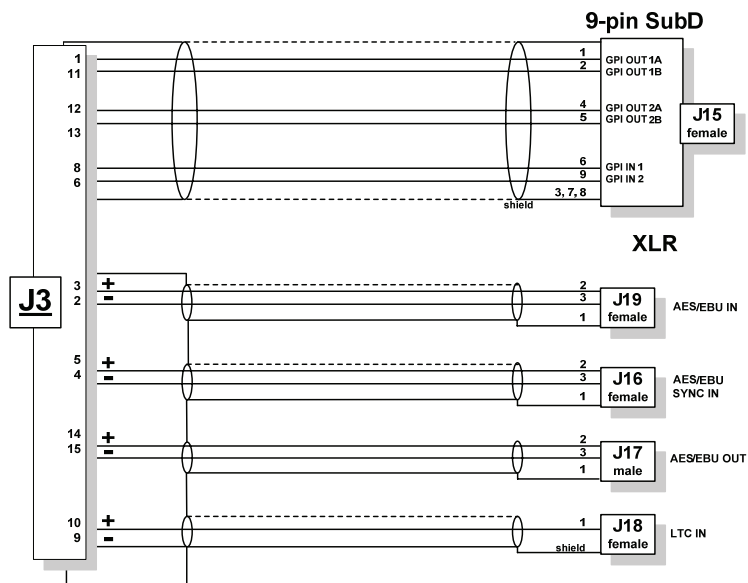
digital cable without GPIOs

Schematic diagram of the cable delivered by Digigram*:

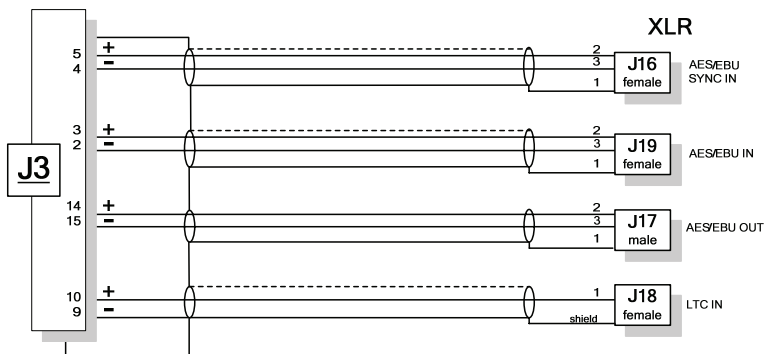


* Your cable may look different if it is not a Digigram cable.

PCX924HR & PCX924HR-Mic Wiring Diagram – digital cable with GPIOs



PCX924HR & PCX924HR-Mic Wiring Diagram – digital cable without GPIOs

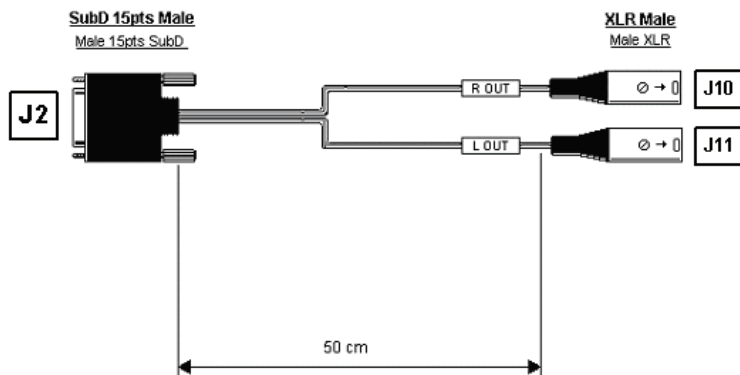


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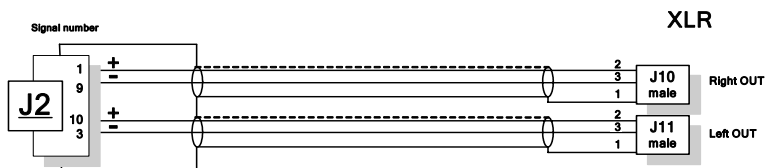
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PCX22 v2 : ANALOG CABLE DIAGRAM

Analog cable delivered by Digigram:

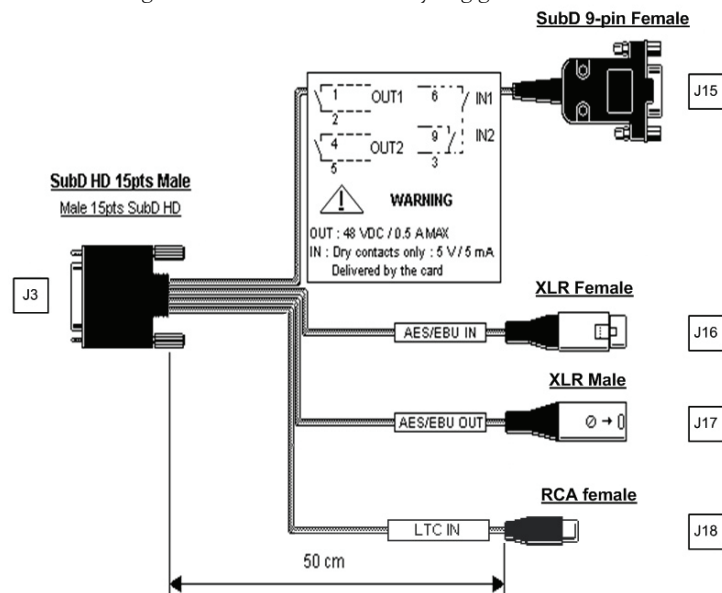


WIRING DIAGRAM – ANALOG CABLE - PCX22HR



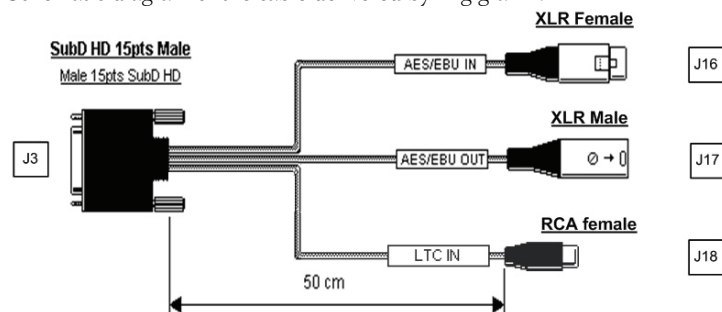
PCX22HR - digital cable with GPIOs

Schematic diagram of the cable delivered by Digigram*:



PCX22HR digital cable without GPIOs

Schematic diagram of the cable delivered by Digigram*:

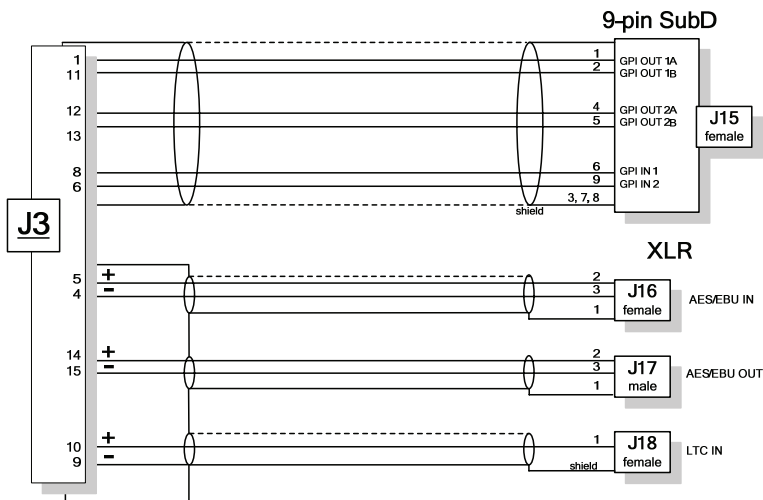


* Your cable may look different if it is not a Digigram cable.

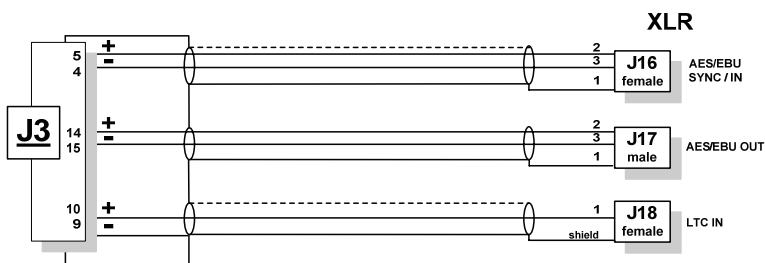
PCX924HR & PCX924HR-Mic, PCX22HR

User's Manual

Wiring Diagram – Digital Cable with GPIOs (PCX22HR)



Wiring Diagram – digital cable without GPIOs (PCX22HR)



PCX924HR cable pinout

Pin #	ANALOG	DIGITAL
1	R OUT +	GPIO OUT 1A
2	GND	NC
3	L OUT -	NC
4	GND	AES/EBU IN -
5	NC	AES/EBU IN +
6	R IN -	GPI INPUT 2
7	L IN +	GND/GPIO INPUT COMMON
8	GND	GPI INPUT 1
9	R OUT -	GND
10	L OUT +	LTC IN
11	GND	GPIO OUT 1B
12	NC	GPIO OUT 2A
13	R IN +	GPIO OUT 2B
14	GND	AES/EBU OUT +
15	L IN -	AES/EBU OUT -

PCX924HR-Mic cable pinout

Pin #	ANALOG	DIGITAL
1	R OUT +	GPIO OUT 1A
2	GND	AES/EBU IN -
3	L OUT -	AES/EBU IN +
4	GND	AES/EBU SYNC IN -
5	MIC IN -	AES/EBU SYNC IN +
6	R IN -	GPIO INPUT 2
7	L IN +	GND/GPI INPUT COMMON
8	GND	GPI INPUT 1
9	R OUT -	GND
10	L OUT +	LTC IN
11	GND	GPI OUT 1B
12	MIC IN +	GPI OUT 2A
13	R IN +	GPI OUT 2B
14	GND	AES/EBU OUT +
15	L IN -	AES/EBU OUT -