

**Kramer Electronics, Ltd.**



# **USER MANUAL**

**Models:**

**6410N, *Digital to Analog Audio Converter***

**6420N, *Analog to Digital Audio Converter***

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## 1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 500-plus different models now appear in eight groups<sup>1</sup> that are clearly defined by function.

Congratulations on purchasing your Kramer DigiTOOLS **6410N** *Digital to Analog Audio Converter* and/or **6420N** *Analog to Digital Audio Converter*. These products are ideal for:

- Audio broadcast and production studios
- Non-linear editing studios
- Multimedia and presentation format conversion
- Diagnostics of audio equipment during field operation

The package includes the following items:

- **6410N** *Digital to Analog Audio Converter* and/or **6420N** *Analog to Digital Audio Converter*
- Power adapter(s)
- This user manual

## 2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual<sup>2</sup>
- Use Kramer high performance high resolution cables<sup>3</sup>

### 2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.

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1 GROUP 1: Distribution Amplifiers; GROUP 2: Video and Audio Switchers, Matrix Switchers and Controllers; GROUP 3: Video, Audio, VGA/XGA Processors; GROUP 4: Interfaces and Sync Processors; GROUP 5: Twisted Pair Interfaces; GROUP 6: Accessories and Rack Adapters; GROUP 7: Scan Converters and Sealers; and GROUP 8: Cables and Connectors

2 Download up-to-date Kramer user manuals from the Internet at this URL: <http://www.kramerelectronics.com>

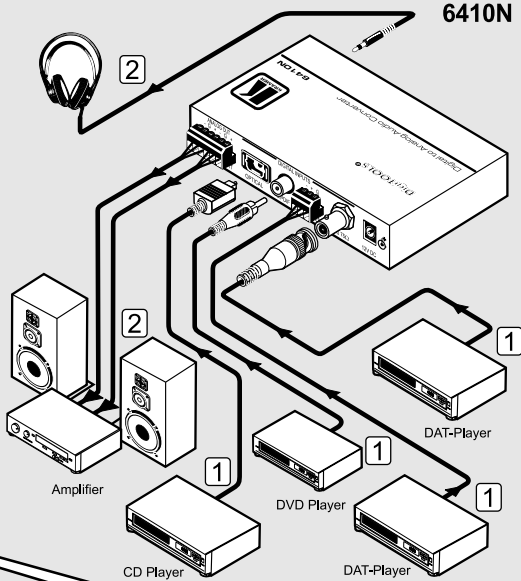
3 The complete list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>

**Step 1: Connect the Machines**

Quick Start: 6410N, 6420N

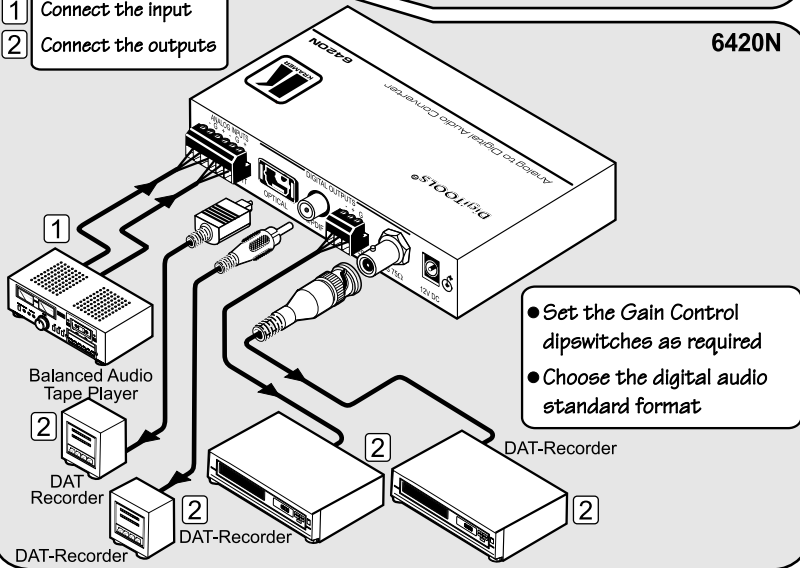
- 1 Connect the inputs
- 2 Connect the outputs

Set the Gain Control  
dipswitches as  
required



- 1 Connect the input
- 2 Connect the outputs

● Set the Gain Control  
dipswitches as required  
● Choose the digital audio  
standard format



**Step 2: Connect the power**

### 3 Overview

Both the **6410N** *Digital to Analog Audio Converter* and the **6420N** *Analog to Digital Audio Converter* use digital audio transmission standards, as section 3.1 describes.

This section summarizes:

- The **6410N** (see section 3.2)
- The **6420N** (see section 3.3)
- Recommendations for achieving the best performance (see section 3.4)

#### 3.1 Digital Audio Inputs/Outputs on the 6410N and 6420N

Figure 1 illustrates the transmission standards for professional and consumer formats, which can be translated via the **6410N/6420N**.

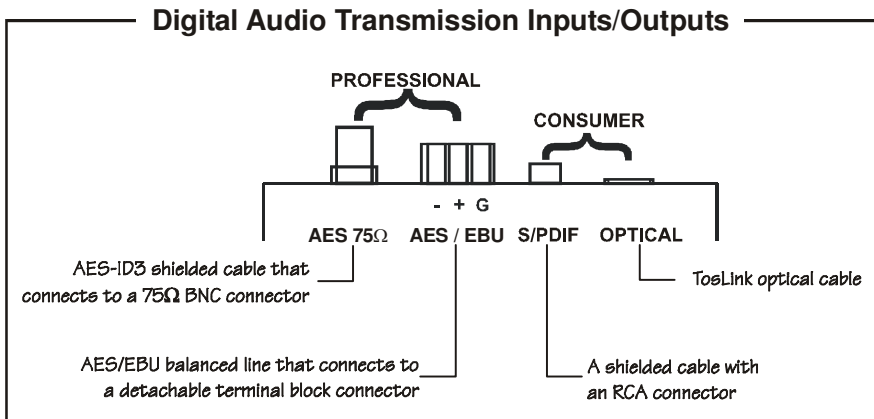


Figure 1: Professional and Consumer Inputs/Outputs on the 6410N / 6420N

### 3.2 About the 6410N

The **6410N** is a high performance format converter for digital audio signals. It converts AES/EBU, AES-ID3, S/PDIF or Toslink® optical digital audio signals simultaneously<sup>1</sup> to:

- Analog balanced stereo on detachable terminal block connectors
- Unbalanced stereo on a 3.5" jack, capable of driving a 32Ω load (headphones)

In particular, the **6410N**:

- Supports multi-standards - AES/EBU, IEC 958, S/PDIF and EIAJ CP340/1201 professional and consumer formats with sampling frequencies up to 96kHz
- Provides automatic equalization and reclocking of the digital audio stream coming from any digital input
- Automatically detects the sample rate of the digital input, ranging from 32kHz to 96kHz
- Features selectable conversion ratio (D/A) settings: 0dBFS to +12dB, +16dB, +20dB or +24dB
- Has an S/N Ratio of over 88dB
- Has AES/EBU and AES-ID3 transformer coupled inputs

The **6410N** is 12VDC fed and is housed in a DigiTOOLS enclosure.

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<sup>1</sup> As Figure 6 illustrates, the sound outputs from both the amplifier and the headphones simultaneously

### 3.3 About the 6420N

The **6420N** is a high performance format converter for balanced audio signals. It converts two channels of balanced audio signals to AES/EBU, AES-ID3, S/PDIF and Toslink® optical digital outputs simultaneously.

In particular, the **6420N**:

- Supports multi-standards - AES/EBU, IEC 958, S/PDIF and EIAJ CP340/1201 professional and consumer formats with sampling frequencies up to 96kHz
- With its analog balanced stereo audio input signal, splits to four digital audio output signals<sup>1</sup>, available in all the possible digital audio interfaces
- Features selectable sampling frequencies of 32k, 44.1k, 48k, or 96k
- Features selectable gain ratio (A/D) settings: -12dB, -16dB, -20dB or -24dB to 0dBFs
- Features selectable digital audio system bits (professional or consumer)
- Has AES/EBU and AES-ID3 transformer coupled outputs

The **6420N** is 12VDC fed and is housed in a DigiTOOLS enclosure.

### 3.4 Recommendations for Achieving the Best Performance

To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise-levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances and position your Kramer **6410N/6420N** away from moisture, excessive sunlight and dust



**Caution** – No operator-serviceable parts inside unit.

**Warning** – Use only the Kramer Electronics input power wall adapter that is provided with this unit<sup>2</sup>.

**Warning** – Disconnect power and unplug unit from wall before installing or removing device or servicing unit.

## 4 Your Audio Converters

Sections 4.1 and 4.2 define the **6410N** *Digital to Analog Audio Converter* and the **6420N** *Analog to Digital Audio Converter*, respectively.

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<sup>1</sup> Functioning as a 1:4 DA

<sup>2</sup> For example: model number AD2512C, part number 2535-000251

## 4.1 Your 6410N Digital to Analog Audio Converter

Figure 2 and Table 1 define the **6410N Digital to Analog Audio Converter**:

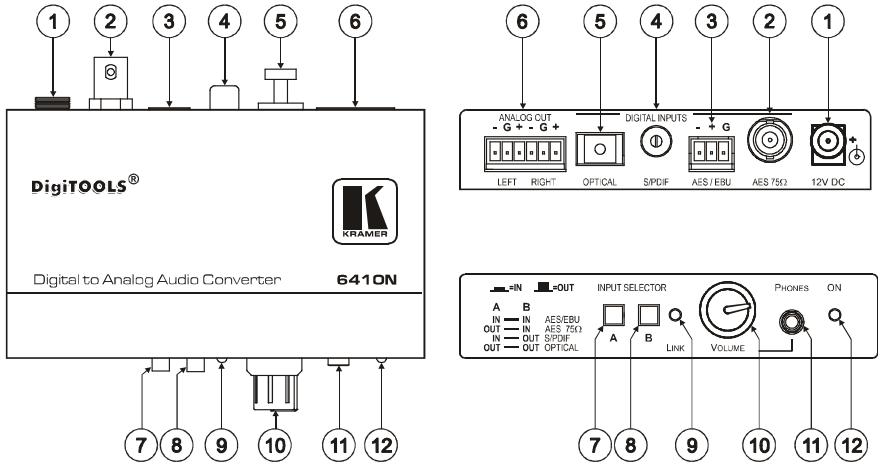


Figure 2: 6410N Digital to Analog Audio Converter

Table 1: 6410N Digital to Analog Audio Converter Features

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	DIGITAL INPUTS	AES 75Ω BNC Connector
3		AES / EBU Detachable Terminal Block Connector
4		S/PDIF RCA Connector
5		OPTICAL Toslink® Optical Connector
6	ANALOG OUT	LEFT and RIGHT Detachable Terminal Block Connectors
7	INPUT SELECTOR	A Push Button
8		B Push Button
9	LINK LED	Illuminates when receiving the appropriate input signal
10	VOLUME Control Knob	Rotate to adjust the headphones output signal level
11	PHONES Out Connector	Connects to a headphone set
12	ON LED	Illuminates when receiving power

Table 2: Selecting the Input on the 6410N

Press A	and press B	to select:
IN	IN	AES/EBU
OUT	IN	AES 75Ω
IN	OUT	S/PDIF
OUT	OUT	OPTICAL



### 4.1.1 The 6410N Underside

Figure 3 and Table 3 define the **6410N** underside:

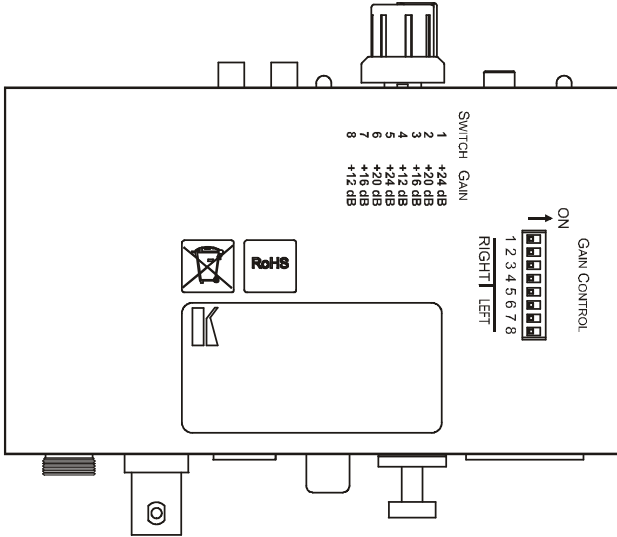


Figure 3: 6410N Digital to Analog Audio Converter Underside

Table 3: 6410N Digital to Analog Audio Converter Underside Features

Feature		Function				
GAIN CONTROL Dipswitches	RIGHT	Set the dipswitches as follows to determine the RIGHT channel conversion ratio <sup>1</sup> (GAIN CONTROL):				
		<b>Gain Control:</b>	<b>DIP 1</b>	<b>DIP 2</b>	<b>DIP 3</b>	<b>DIP 4</b>
		+24dB	ON	OFF	OFF	OFF
		+20dB	OFF	ON	OFF	OFF
		+16dB	OFF	OFF	ON	OFF
	+12dB	OFF	OFF	OFF	ON	
	LEFT	Set the dipswitches as follows to determine the LEFT channel conversion ratio <sup>1</sup> (GAIN CONTROL):				
		<b>Gain Control:</b>	<b>DIP 5</b>	<b>DIP 6</b>	<b>DIP 7</b>	<b>DIP 8</b>
		+24dB	ON	OFF	OFF	OFF
		+20dB	OFF	ON	OFF	OFF
+16dB		OFF	OFF	ON	OFF	
+12dB	OFF	OFF	OFF	ON		

<sup>1</sup> From digital to analog

Table 4 shows an example of the relation between the input signal, the selected gain and the THD + N.

Table 4: 6410N Input Signal and Gain

Vinput [vrms]	Gain [dB]	THD + N [dB] @1kHz
1	+12	-94
1	+16	-95
1	+20	-94
0.7	+24	-90

## 4.2 Your 6420N Analog to Digital Audio Converter

Figure 4 and Table 5 define the **6420N Analog to Digital Audio Converter**:

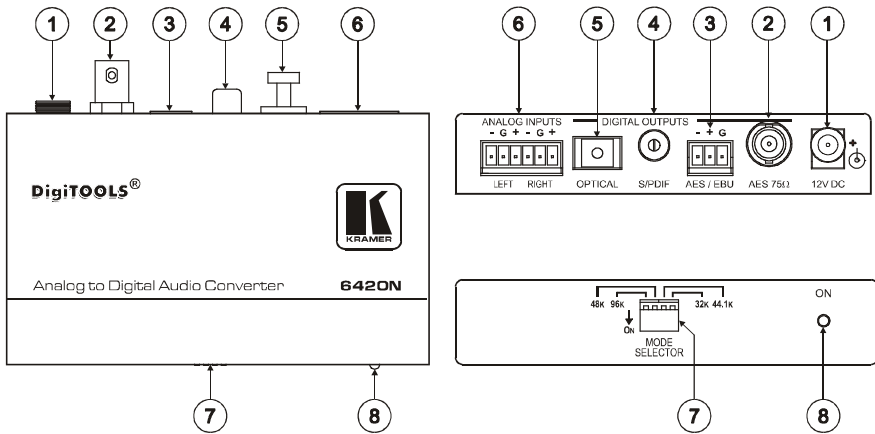


Figure 4: 6420N Analog to Digital Audio Converter

Table 5: 6420N Analog to Digital Audio Converter Features

#	Feature	Function	
1	12V DC	+12V DC connector for powering the unit	
2	DIGITAL OUTPUTS	AES 75Ω BNC connector	Connect to the digital audio acceptor
		AES / EBU Detachable Terminal Block Connector	Connect to the digital audio acceptor
		S/PDIF RCA Connector	Connect to the digital audio acceptor
3		OPTICAL Toslink® Optical Connector	Connect to the digital audio acceptor
4		LEFT and RIGHT Detachable Terminal Block Connectors	Connect to the analog audio source
7	MODE SELECTOR Dipswitches	Set a dipswitch to ON to choose the appropriate sample rate frequency	
8	ON LED	Illuminates when receiving power	

### 4.2.1 The 6420N Underside

Figure 5 and Table 6 define the **6420N** underside:

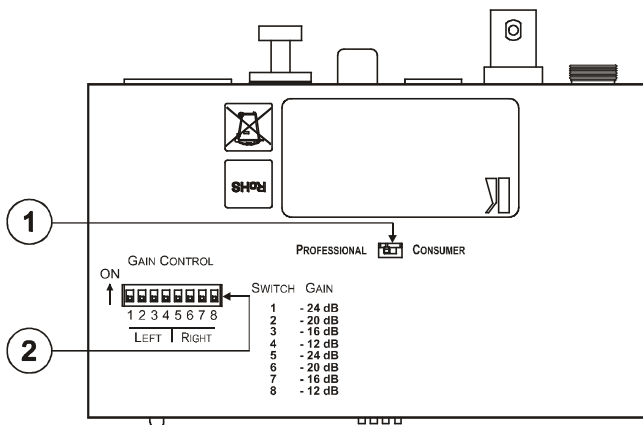


Figure 5: 6420N Analog to Digital Audio Converter Underside

Table 6: 6420N Analog to Digital Audio Converter Underside Features

#	Feature	Function	
1	PROFESSIONAL / CONSUMER Switch	Set to choose the digital audio system bit	
2	GAIN CONTROL Dipswitches	LEFT	Set the dipswitches as follows to determine the LEFT channel conversion ratio <sup>1</sup> (GAIN CONTROL):
		<b>Gain Control:</b>	<b>DIP 1</b> <b>DIP 2</b> <b>DIP 3</b> <b>DIP 4</b>
		-24dB	ON        OFF        OFF        OFF
		-20dB	OFF        ON        OFF        OFF
		-16dB	OFF        OFF        ON        OFF
		-12dB	OFF        OFF        OFF        ON
		RIGHT	Set the dipswitches as follows to determine the RIGHT channel conversion ratio <sup>1</sup> (GAIN CONTROL):
		<b>Gain Control:</b>	<b>DIP 5</b> <b>DIP 6</b> <b>DIP 7</b> <b>DIP 8</b>
		-24dB	ON        OFF        OFF        OFF
		-20dB	OFF        ON        OFF        OFF
-16dB	OFF        OFF        ON        OFF		
-12dB	OFF        OFF        OFF        ON		

<sup>1</sup> From analog to digital

## 5 Using the Audio Converters

Sections 5.1 and 5.2 describe how to connect the **6410N Digital to Analog Audio Converter** and the **6420N Analog to Digital Audio Converter**, respectively.

### 5.1 Connecting the 6410N Digital to Analog Audio Converter

To connect your **6410N Digital to Analog Audio Converter**, as illustrated in the example in Figure 6, do the following<sup>1</sup>:

1. Connect up to four sources to the four digital input connectors, as follows:
  - Connect an AES-75Ω source (for example, a DAT-Player) to the AES-75Ω BNC input connector
  - Connect an AES/EBU source (for example, a DAT-Player) to the AES/EBU detachable terminal block input connector using a shielded twisted pair cable
  - Connect an S/PDIF source (for example, a DVD Player) to the S/PDIF RCA input connector
  - Connect an optical source (for example, a CD Player) to the optical input connector
2. Connect up to two analog acceptors, as follows:
  - Connect the ANALOG OUT LEFT and RIGHT detachable terminal block connectors via shielded twisted pair cables to an analog balanced stereo acceptor (for example, an amplifier with a pair of loudspeakers)
  - If required, connect the PHONES 3.5mm output jack to a headphone set<sup>2</sup>
3. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity (not shown in Figure 6).
4. Set the conversion ratio on the underside of the unit<sup>3</sup>.

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<sup>1</sup> Switch OFF the power on each device before connecting it to your 6410N. After connecting your 6410N, switch on its power and then switch on the power on each device

<sup>2</sup> The headphone output is usually used for diagnostics and setup of the audio system. It is recommended to disconnect the headphones (or to minimize the headphone volume level) when not in use

<sup>3</sup> It is essential that you choose the correct conversion ratio to prevent clipping, and to maintain the S/N ratio within the spec limits. The selection of the conversion rate greatly depends on the type of audio played, and also on the audio equipment that is connected to the 6410N

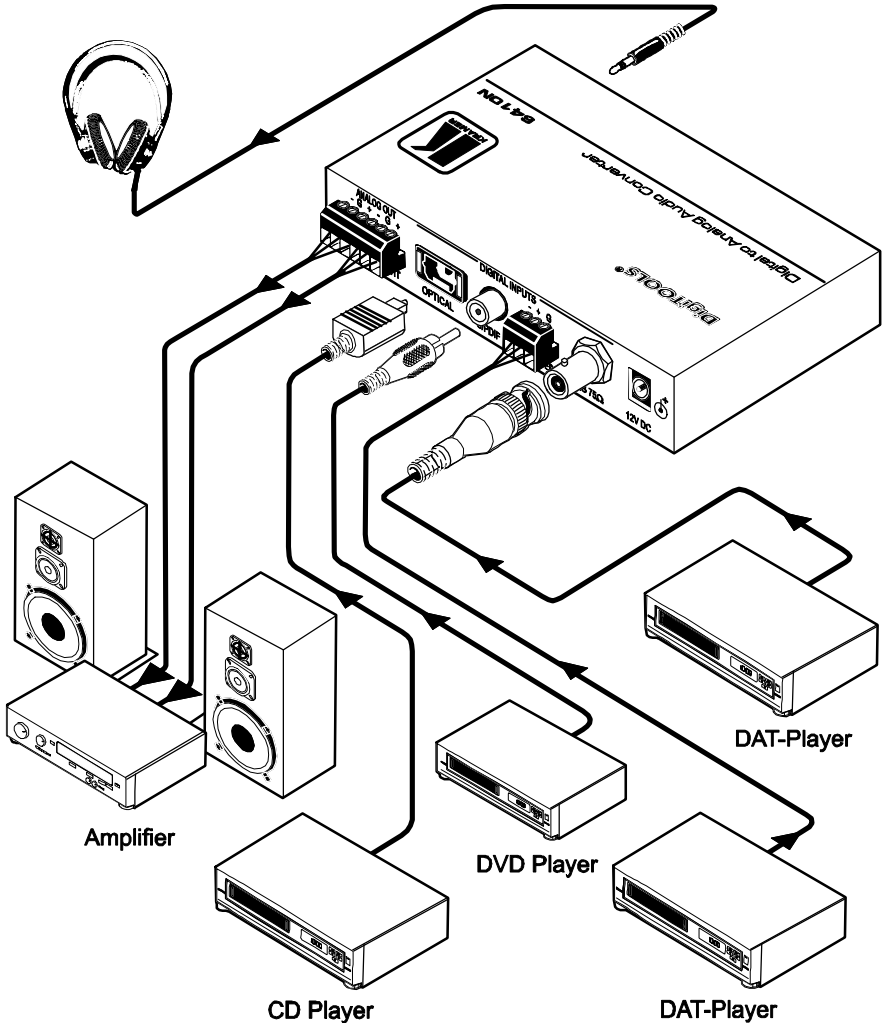


Figure 6: Connecting the 6410N Digital to Analog Audio Converter

### 5.1.1 Using the INPUT SELECTOR Switches

Set the digital input standard by pushing in and/or releasing one or both of the two INPUT SELECTOR switches<sup>1</sup> on the **6410N Digital to Analog Audio Converter**, as Table 1 defines.

<sup>1</sup> Item 7 (button A) and item 8 (button B), in Figure 2

## 5.2 Connecting the 6420N Analog to Digital Audio Converter

To connect your **6420N Analog to Digital Audio Converter**, as illustrated in the example in Figure 7, do the following<sup>1</sup>:

1. Connect an analog balanced stereo source (for example, a balanced audio tape player) to the ANALOG INPUT LEFT and RIGHT detachable terminal block connector connectors via shielded twisted pair cables.
2. Connect the four different digital output connectors to up to four acceptors, as follows:
  - Connect the AES-75Ω BNC output connector to an AES-75Ω acceptor (for example, a DAT-Recorder)
  - Connect the AES/EBU detachable terminal block output connector<sup>2</sup> to an AES/EBU acceptor (for example, a DAT-Recorder)
  - Connect the S/PDIF RCA output connector to an S/PDIF acceptor (for example, a DAT-Recorder<sup>3</sup>)
  - Connect the OPTICAL output connector to an optical acceptor (for example, a DAT-Recorder<sup>3</sup>)
3. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity (not shown in Figure 7).
4. Set the MODE SELECTOR dipswitches on the **6420N Analog to Digital Audio Converter** to determine the appropriate digital sampling frequency.
5. On the machine underside:
  - If required, set the switch to PROFESSIONAL or CONSUMER to determine the digital audio standard format
  - Set the conversion ratio on the underside of the unit<sup>4</sup>

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1 Switch OFF the power on each device before connecting it to your 6420N. After connecting your 6420N, switch on its power and then switch on the power on each device

2 Using a shielded twisted pair cable (110Ω)

3 A small-sized consumer DAT-Recorder

4 It is essential that you choose the correct conversion rate to prevent clipping and to maintain the S/N ratio within the spec limits. The selection of the conversion rate greatly depends on the type of audio played, and also on the audio equipment that is connected to the 6420N

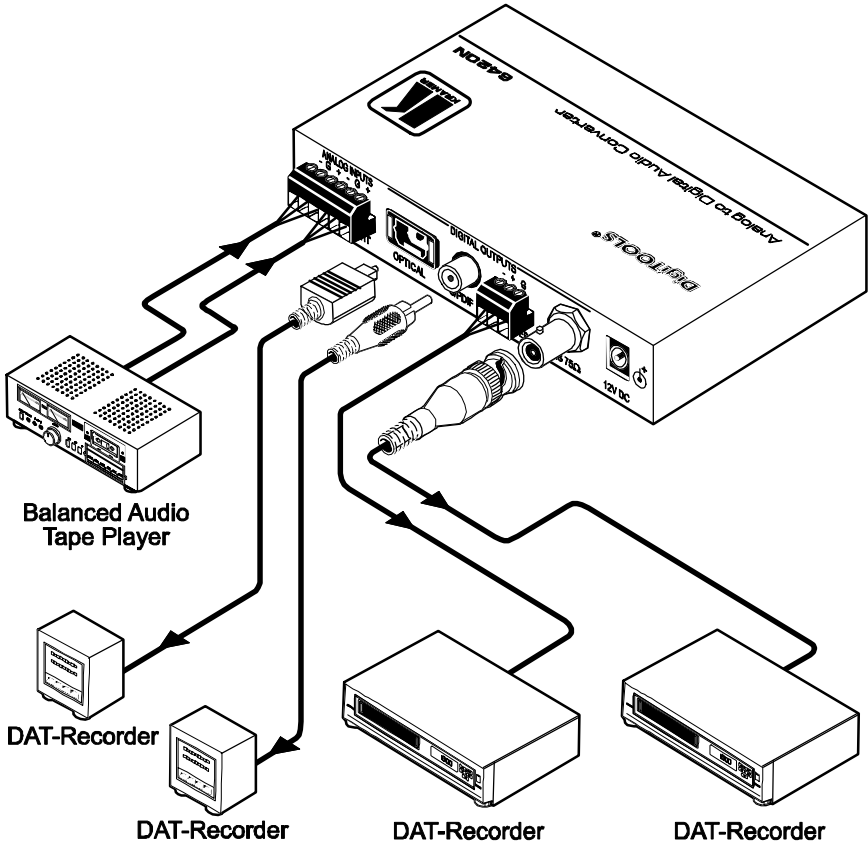


Figure 7: Connecting the 6420N Analog to Digital Audio Converter

## 6 Technical Specifications

Table 7 and Table 8 include the technical specifications for the **6410N** Digital to Analog Audio Converter and the **6420N** Analog to Digital Audio Converter, respectively.

*Table 7: 6410N Digital to Analog Audio Converter Technical Specifications*

INPUTS:	4 digital audio inputs: AES 75Ω; AES/EBU; S/PDIF; TosLink Optical
OUTPUTS:	2 analog outputs: balanced line out on detachable terminal blocks; 3.5mm headphone jack
SAMPLE RATE CONVERSION:	32kHz, 44.1kHz, 48kHz, 96kHz
CONVERSION GAIN:	+12dB, +16dB, +20dB,+24dB
BANDWIDTH (+4dBu/-3dBu):	20Hz to 22kHz
MAX. OUTPUT LEVEL:	11.2Vpp @1kHz
S/N RATIO:	88dB
AUDIO THD + NOISE:	-92dB
AUDIO 2nd HARMONIC:	0.003%
CONTROLS:	Input selector buttons, 8 gain switches, headphones level rotary control knob, 2 LEDs: ON and LINK
POWER SOURCE:	12V DC/1.25A, 150mA
DIMENSIONS:	12cm x 6.95cm x 2.44cm (4.72" x 2.74" x 0.96", W, D, H)
WEIGHT:	0.3kg (0.66lbs.) approx.
ACCESSORIES:	Power supply, mounting bracket
OPTIONS:	19" rack adapters

*Table 8: 6420N Analog to Digital Audio Converter Technical Specifications*

INPUTS:	1 analog input balanced line in (10k) on detachable terminal blocks
OUTPUTS:	4 digital audio outputs: AES 75Ω; AES/EBU; S/PDIF; TosLink Optical
SAMPLE RATE CONVERSION:	32kHz, 44.1kHz, 48kHz, 96kHz
MAX. INPUT LEVEL:	11.2Vpp @1kHz
CONVERSION GAIN:	-12dB, -16dB, -20dB,-24dB
CONTROLS:	4 sample rate selector switches, system bit selector switch, 8 gain switches, ON LED
COUPLING:	AC
POWER SOURCE:	12V DC/1.25A, 130mA
DIMENSIONS:	12cm x 6.95cm x 2.44cm (4.72" x 2.74" x 0.96", W, D, H)
WEIGHT:	0.3kg (0.66lbs.) approx.
ACCESSORIES:	Power supply, mounting bracket
OPTIONS:	19" rack adapters



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## LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

### HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

### WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

### WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site [www.kramerelectronics.com](http://www.kramerelectronics.com).
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
  - i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
  - ii) Product modification, or failure to follow instructions supplied with the product
  - iii) Repair or attempted repair by anyone not authorized by Kramer
  - iv) Any shipment of the product (claims must be presented to the carrier)
  - v) Removal or installation of the product
  - vi) Any other cause, which does not relate to a product defect
  - vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

### WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

### HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on your product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

### LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

### EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

**NOTE:** All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

- EN-50081: "Electromagnetic compatibility (EMC);  
generic emission standard.  
Part 1: Residential, commercial and light industry"
- EN-50082: "Electromagnetic compatibility (EMC) generic immunity standard.  
Part 1: Residential, commercial and light industry environment".
- CFR-47:  
FCC Rules and Regulations:  
Part 15: "Radio frequency devices  
Subpart B Unintentional radiators"

### CAUTION!

- ☒ Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- ☒ Use the supplied DC power supply to feed power to the machine.
- ☒ Please use recommended interconnection cables to connect the machine to other components.





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**For the latest information on our products and a list of Kramer distributors, visit our Web site: [www.kramerelectronics.com](http://www.kramerelectronics.com), where updates to this user manual may be found. We welcome your questions, comments and feedback.**



**Caution**

**Safety Warning:**

Disconnect the unit from the power supply before opening/servicing.



PN: 2900-000317



Rev: 2

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**Kramer Electronics, Ltd.**

Web site: [www.kramerelectronics.com](http://www.kramerelectronics.com)

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