

Kramer Electronics, Ltd.



USER MANUAL

Models:

VA-8xl, 8 Channel Balanced Stereo Audio Amplifier

VA-16xl, 16 Channel Balanced Stereo Audio Amplifier

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1 Introduction

Welcome to Kramer Electronics (since 1981): a world of unique, creative and affordable solutions to the infinite range of problems that confront the video, audio and presentation professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 350-plus different models now appear in 8 Groups¹, which are clearly defined by function.

Congratulations on purchasing your Kramer **VA-8xl 8 Channel Balanced Stereo Audio Amplifier** and/or **VA-16xl 16 Channel Balanced Stereo Audio Amplifier**, which are ideal for

- Duplication, production, or presentation systems requiring high quality audio signal distribution
- Audio production and broadcast studios

The package includes the following items:

- **VA-8xl 8 Channel Balanced Stereo Audio Amplifier** or **VA-16xl 16 Channel Balanced Stereo Audio Amplifier**
- Power cord
- Null-modem adapter
- Windows®-based software
- This user manual² and the Kramer concise product catalog/CD

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
- Use Kramer high performance high resolution cables³

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/manuals.html>

3 The complete list of Kramer cables is on our Web site at <http://www.kramerelectronics.com> (click "Cables and Connectors" in the Products section)

3 Overview

The high performance **VA-8xl** *8 Channel Balanced Stereo Audio Amplifier* and **VA-16xl** *16 Channel Balanced Stereo Audio Amplifier* are designed for professional and high-end consumer audio systems.

In particular, the **VA-8xl** and **VA-16xl**:

- Feature a digitally controlled volume control function, with gain from -95dB (attenuation) up to +31dB (amplification) - in increments of 0.5dB
- Provide a clean, noise-free transition during gain setting changes
- With their outstanding audio specifications, ensure transparent performance even in the most critical broadcast applications
- Have 8 and 16 channels respectively, each of which is independent
- Let you control the amplifier gain of the Left and Right channels— together or separately—via the front panel buttons, or remotely via RS-232 or RS-485
- Let you daisy-chain up to 15 machines in a single system using RS-485 or RS-232, allowing control of up to 240 stereo audio channels!
- Store and recall up to 15 configuration setups via the non-volatile memory, using the front panel buttons, or remotely via RS-232 or RS-485
- Include a bright 7-segment LED display on the front panel, showing the gain of the selected channel (that is, its left and right decibel status)
- Include easy-to-connect detachable terminal block connectors
- Are housed in a rugged, professional 1U rack mountable enclosure and ship with Windows®-based software

Achieving the best performance means:

- Connecting 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)
- Avoiding interference from neighboring electrical appliances that may adversely influence signal quality and positioning your **Kramer VA-8xl** or **VA-16xl** in a location free from moisture and away from excessive sunlight and dust

4 Your VA-8xl and VA-16xl

Figure 1 illustrates the **VA-8xl** *8 Channel Balanced Stereo Audio Amplifier* and Figure 2 illustrates the **VA-16xl** *16 Channel Balanced Stereo Audio Amplifier*. Table 1 defines the front panel of the **VA-8xl** and **VA-16xl**, and Table 2 defines the rear panel of the **VA-8xl** and **VA-16xl**.

Your VA-8xl and VA-16xl

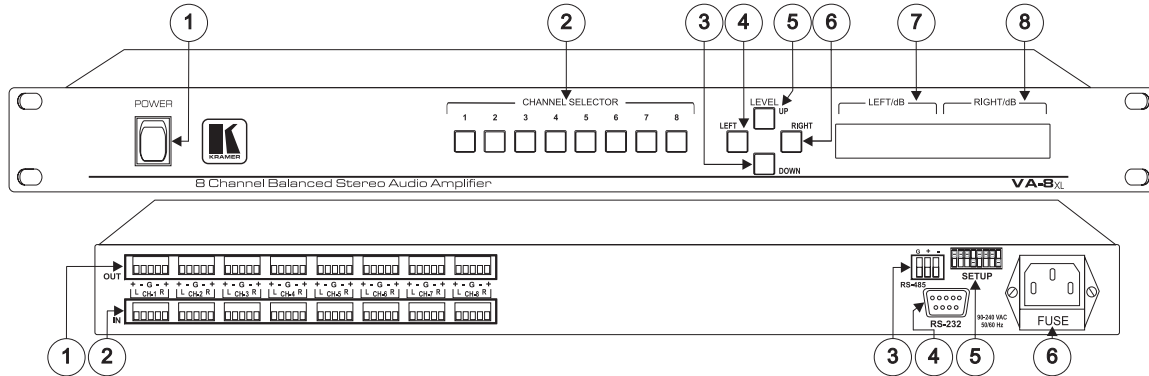


Figure 1: VA-8xl 8 Channel Balanced Stereo Audio Amplifier

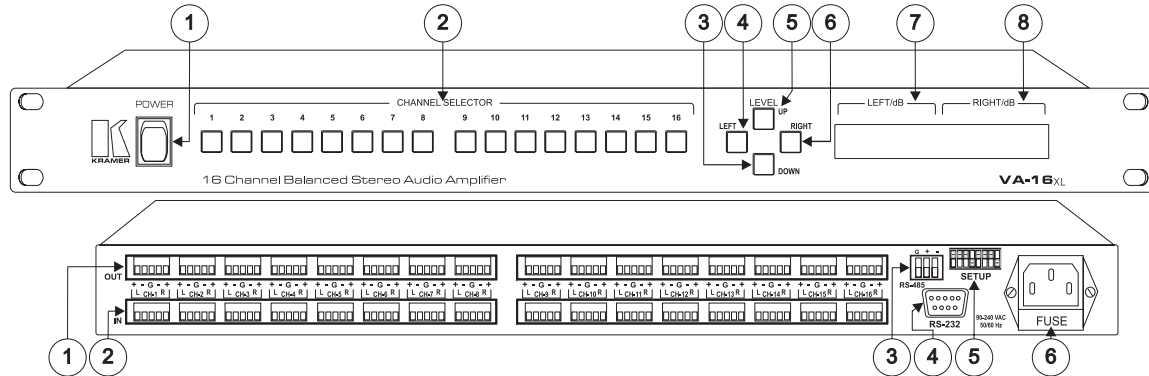


Figure 2: VA-16xl 16 Channel Balanced Stereo Audio Amplifier

Table 1: Front Panel VA-8xl / VA-16xl Features

#	Feature	Function(s)	
1	POWER Switch	Illuminated switch supplying power to the unit	
2	CHANNEL SELECTOR Buttons	(a). Select/deselect the stereo channel (from 1 to 8; or 1 to 16) (b). Select a setup number (from 1 to 15)	
3	LEVEL Control	DOWN Button	(a). Decreases the volume ¹ (b). Stores the current setting in the non-volatile memory
4		LEFT Button	Selects/deselects the left channel
5		UP Button	(a). Increases the volume ¹ (b). Recalls a setup from the non-volatile memory
6		RIGHT Button	Selects/deselects the right channel
7	LEFT/dB 7-segment LED Display	Shows the gain of the selected left channel ²	
8	RIGHT/dB 7-segment LED Display	Shows the gain of the selected right channel ²	

Table 2: Rear Panel VA-8xl / VA-16xl Features

#	Feature	Function
1	OUT Terminal Block Connectors	Connect to audio acceptors (from 1 to 8; or 1 to 16)
2	IN Terminal Block Connectors	Connect to audio sources (from 1 to 8; or 1 to 16)
3	RS-485 Detachable Terminal Block Port	Pin # 1 is for Ground; Pin # 2 is for +; Pin # 3 is for -
4	RS-232 DB 9F Port	Connects to the PC or the Remote Controller
5	SETUP Dipswitches	Dipswitches for setup of the unit
6	Power Connector with FUSE	AC connector enabling power supply to the unit

5 Operating Your VA-8xl and VA-16xl

Section 5.1 describes how to connect a balanced/unbalanced stereo audio channel. For control via a serial port, see section 6.

5.1 Connecting a Balanced/Unbalanced Audio Input/Output Channel

Figure 3 illustrates how to connect a balanced audio input/output channel:

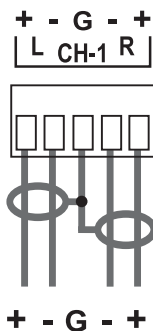


Figure 3: Balanced Audio Input/Output Channel

¹ In increments of 0.5dB from -95dB up to +31dB gain

² In decibels

Figure 4 illustrates how to connect an unbalanced audio input channel:

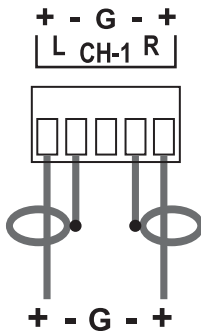


Figure 4: Unbalanced Audio Input Channel

Figure 5 illustrates how to connect an unbalanced audio output channel:

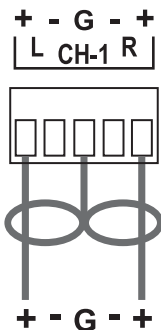


Figure 5: Unbalanced Audio Output Channel

When switching on the **VA-8xl** or **VA-16xl** (after a previous session), the **VA-8xl** or **VA-16xl** briefly scan each channel¹, showing the settings in the 7-segment LED Displays¹. After that, the **VA-8xl** or **VA-16xl** go to channel 1, and show its gain/attenuation level in dB.

During regular work, the **VA-8xl** or **VA-16xl** show the status of the last channel you observed and/or changed.

To observe the status of a Channel, do the following:

- Press a CHANNEL SELECTOR button.

That CHANNEL SELECTOR button illuminates² and the decibel values of the selected channel appear in the dimmed³ 7-segment LED Displays¹

¹ Stored in the non-volatile memory

² For about 20 seconds

³ When the LEDs are dimmed, you cannot change the gain or attenuation - the values are for observation only

You can control the amplifier gain of the Left and Right channels via the front panel buttons, or remotely via RS-232 or RS-485. You can increase or decrease the gain in increments of 0.5dB from -95dB up to +31dB.

You can control the amplifier gain of the Left and/or Right channels separately or together (see section 5.2).

5.2 Controlling the Gain/Attenuation of the Channels

To control the amplifier gain or the attenuation, do the following:

1. Press the appropriate CHANNEL SELECTOR button. That CHANNEL SELECTOR button illuminates and the decibel values of the selected channel appear in the dimmed¹ 7-segment LED Displays².
2. Press the LEFT LEVEL and/or the RIGHT LEVEL button. The decibel values of the selected channel appear in the bright LEFT/dB and/or RIGHT/dB 7-segment LED Display.
3. Press the UP or DOWN button **once** to increase or decrease, as appropriate, in increments of 0.5dB. Press and **hold** the UP or DOWN button, to increase or decrease the decibel level by a significant amount.
4. Press the LEFT LEVEL or the RIGHT LEVEL button again. The bright LEFT/dB and/or RIGHT/dB 7-segment LED Display becomes dim again, preventing unintentionally altering the settings.

5.3 Storing and Recalling Setups

You can store/recall up to 15 settings in the non-volatile memory, via the front panel buttons, or remotely via RS-232 or RS-485.

A setting refers to the gain/attenuation level of the selected channel that appears in the dimmed 7-segment LED Displays, and each setting includes all 8 or 16 channels, respectively.

To store a setting, via the front panel buttons, do the following:

1. When the 7-segment LED Displays are dimmed, press the DOWN button. The abbreviation “StO” (store) appears in the LEFT/dB 7-segment LED Display.
2. Choose a setup number (between 1 to 15), by pressing the appropriate CHANNEL SELECTOR button. The abbreviation “StO” (store) appears in the LEFT/dB 7-segment LED Display and the setup number appears in the RIGHT /dB 7-segment LED Display.

¹ When the LEDs are dimmed, you cannot change the gain or attenuation - the values are for observation only

² Stored in the non-volatile memory

3. Press the same CHANNEL SELECTOR button again.

The memory stores the chosen setup number. As confirmation, for a few seconds, “YES” appears in the LEFT/dB 7-segment LED Display and the setup number appears in the RIGHT /dB 7-segment LED Display.

Note:

- Saving a setup to an already allocated setup number, overwrites the previous setup
- To cancel, press the LEFT or RIGHT button

To recall a setting, via the front panel buttons, do the following:

1. When the 7-segment LED Displays are dimmed, press the UP button. The abbreviation “rCL” (recall) appears in the LEFT/dB 7-segment LED Display.

2. Press the appropriate CHANNEL SELECTOR button.

The abbreviation “rCL” (recall) appears in the LEFT/dB 7-segment LED Display and the number of that CHANNEL SELECTOR button appears in the RIGHT /dB 7-segment LED Display.

3. Press the same CHANNEL SELECTOR button again.

The memory recalls the setup. As confirmation, for a few seconds, “YES” appears in the LEFT/dB 7-segment LED Display and the setup number appears in the RIGHT /dB 7-segment LED Display.

If no setting is stored in the non-volatile memory with that setup #, “NO” appears in the LEFT/dB 7-segment LED Display and the setup number appears in the RIGHT /dB 7-segment LED Display.

Note:

- Recalling a setup implements the amplifier gain or the attenuation immediately

6 Serial Control of the VA-8xl or VA-16xl

You can control a single **VA-8xl** or **VA-16xl** unit (see section 6.1) or configure up to a 240 channel balanced stereo audio amplifier, using 15 **VA-16xl** units via RS-485 or RS-232 (see section 6.2).

6.1 Controlling a Single VA-8xl or VA-16xl Unit

To connect and control a single **VA-8xl** or **VA-16xl** unit, connect the following¹ to the rear panel:

- PC or other controller (see section 6.1.1: “Preparing the RS-232 Port on a Single Unit”)
- Set the dipswitches (see section 6.1.2)
- Power cord

6.1.1 Preparing the RS-232 Port on a Single Unit

Connect the RS-232 port to a PC or other controller, unless operating the **VA-8xl** or **VA-16xl** as a stand-alone unit without any control device².

To connect a PC to a stand-alone **VA-8xl** or **VA-16xl** unit, using the Null-modem adapter provided with the machine (recommended):

- Connect the RS-232 DB9 rear panel port on the **VA-8xl** or **VA-16xl** unit to the Null-modem adapter and connect the Null-modem adapter with a 9 wire flat cable to the RS-232 DB9 port on your PC

To connect a PC to a stand-alone **VA-8xl** or **VA-16xl** unit, without using a Null-modem adapter:

- Connect the RS-232 DB9 port on your PC to the RS-232 DB9 rear panel port on the **VA-8xl** or **VA-16xl** unit, as Figure 6 illustrates (depending on whether the PC has a 9-pin or 25-pin connector)

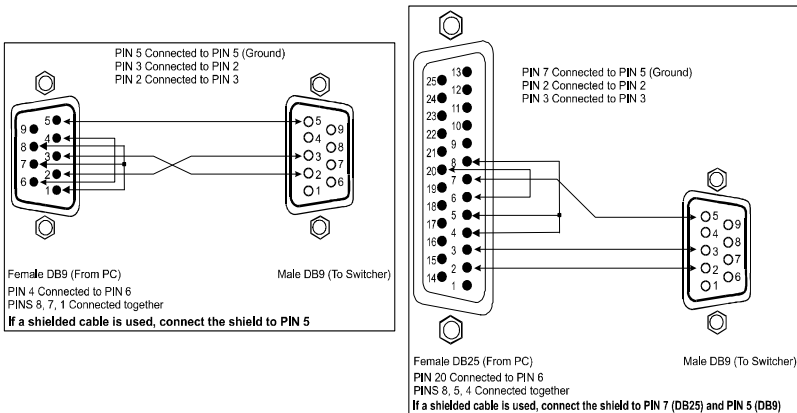


Figure 6: Connecting a VA-8xl or VA-16xl to a PC without using a Null-modem Adapter

1 Switch OFF the power on each device before connecting it to your VA-8xl or VA-16xl. After connecting your VA-8xl or VA-16xl, switch on its power and then switch on the power on each device. Switching on the VA-8xl or VA-16xl, recalls the previous setup of all the channels from the non-volatile memory. After changing a setting(s), it can take up to 30 seconds before these settings are saved

2 That is, with control from the front panel, and not via a remote controller or a PC

6.1.2 Dipswitch Settings

Configure the **VA-8xl** or **VA-16xl** by setting the dipswitches as Figure 7 and Table 3 define:

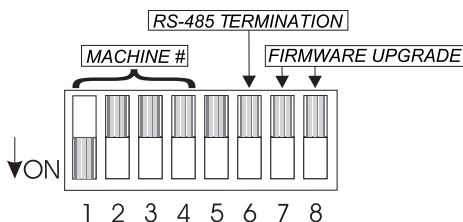


Figure 7: Rear Panel Dipswitches (Factory Default)

Table 3: Dipswitch Definitions

DIP #	Function:
1-4	Set the MACHINE # (see Table 4 in section 6.1.3)
5	Not used
6	RS-485 termination for first and last machine = ON (RS-485 line terminates with 110Ω); for others = OFF (RS-485 line is open)
7/8	Used for the firmware upgrade procedure (see section 7)

6.1.3 Setting the MACHINE

To control a unit via RS-232 or RS-485, each unit has to be identified via its unique MACHINE #. Set the MACHINE # on a **VA-8xl** or **VA-16xl** unit according to Table 4. A valid MACHINE # is from 1 to 15.

For a single, stand alone machine, set as MACHINE # 1.

Table 4: Machine # Dipswitch Settings

MACHINE #	DIPSWITCH			
	1	2	3	4
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

6.2 Configuring up to a 240 Channel Balanced Stereo Audio Amplifier

To connect up to 15 **VA-8xl** or **VA-16xl** units, do the following¹:

- Connect the balanced/unbalanced audio sources/acceptors to the rear panel on each unit (see section 5.1)
- Connect a PC or other controller (see section 6.2.1)
- Set the dipswitches on each unit (see section 6.1.2)
- Connect the power cord on each unit

Figure 8 illustrates how to configure up to 15 **VA-8xl** or **VA-16xl** units.

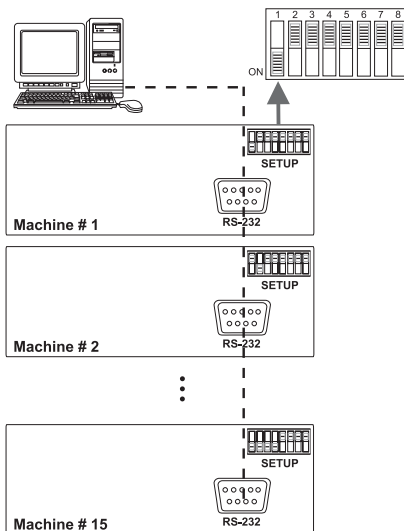


Figure 8: Configuring up to 15 VA-8xl or VA-16xl Units²

6.2.1 Connecting a Control Interface on a Set of Units

To connect the control interface on a set of units, do one of the following:

- Connect the RS-232 port on the first **VA-8xl** or **VA-16xl** unit to a PC or other controller, and then connect the RS-232 port on each of the **VA-8xl** or **VA-16xl** units, using the specially prepared RS-232 cable (see section 6.2.1.1); **or**
- Connect a PC or other controller to the “RS-232 in” DB9F port on a Kramer Tools **VP-43xl Interface Converter** and connect the RS-485 port on the **VP-43xl** to the RS-485 ports on each of the **VA-8xl** or **VA-16xl** units (see section 6.2.1.2)

¹ Switch OFF the power on each device before connecting it to a VA-8xl or VA-16xl unit. After connecting all the VA-8xl or VA-16xl units, switch on their power and then switch on the power on each device that connects to them. Switching on each VA-8xl or VA-16xl unit, recalls the previous setup of each channel from the non-volatile memory. After changing a setting(s), it can take up to 30 seconds before these settings are saved

² See Figure 9 for details of how to interconnect the RS-232 ports

6.2.1.1 Preparing the RS-232 Port¹ on a Set of Units

To connect a PC to a set of **VA-8xl** or **VA-16xl** units, **do not use a null-modem adapter**. Do the following²:

1. Prepare the RS-232 DB9F connector (A), by connecting PIN 4 to PIN 6 and connecting PINS 8, 7, and 1 together.
2. Attach the RS-232 DB9F connector (A) to another RS-232 DB9M connector (B) by connecting PIN 5 to PIN 5, PIN 3 to PIN 2, and PIN 2 to PIN 3.
3. Connect the RS-232 DB9F connector (A) to your PC's RS-232 DB9M port.
4. Attach the RS-232 DB9M connector (B) to another RS-232 DB9M connector (C), by connecting PIN 5 to PIN 5, PIN 8 to PIN 3, PIN 9 to PIN 2.
5. Connect the RS-232 DB9M connector (B) to the RS-232 DB9F port on the first **VA-8xl** or **VA-16xl** unit.
6. Attach the RS-232 DB9M connector (C) to another RS-232 DB9M connector, if required, by connecting PIN 5 to PIN 5, PIN 8 to PIN 3, PIN 9 to PIN 2.
7. Connect the RS-232 DB9M connector (C) to the RS-232 DB9F port on the next **VA-8xl** or **VA-16xl** unit.

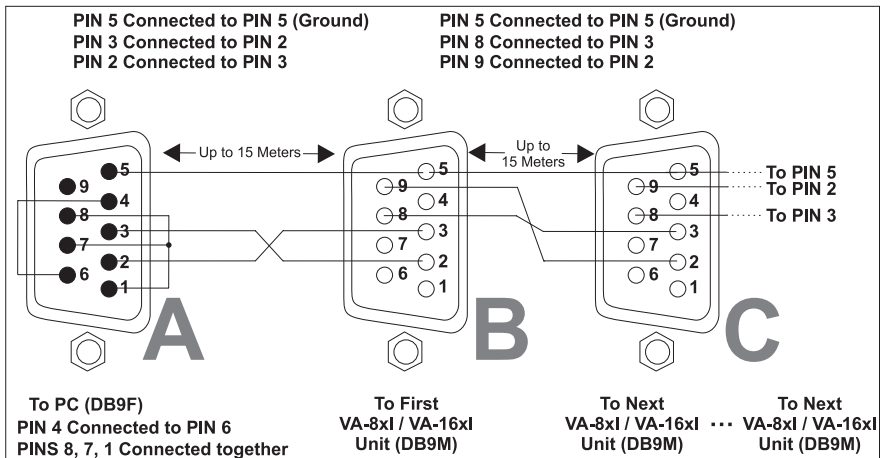


Figure 9: Preparing the RS-232 Connectors

¹ Choose the RS-232 control interface, for a range of about 25 meters used for a point-to-point connection

² By preparing a special RS-232 cable (not required when connecting a stand-alone VA-8xl or VA-16xl unit (see section 6.1.1)), as illustrated in Figure 8 and Figure 9

6.2.1.2 Connecting the RS-485 Control Interface¹

To connect an RS-485 connector on one **VA-8xl** or **VA-16xl** unit to an RS-485 connector on another unit:

1. Connect the “+” PIN on the first **VA-8xl** or **VA-16xl** unit to the “+” PIN on the second **VA-8xl** or **VA-16xl** unit
2. Connect the “-” PIN on the first **VA-8xl** or **VA-16xl** unit to the “-” PIN on the second **VA-8xl** or **VA-16xl** unit
3. If shielded cable is used for an RS-485 connection, connect the shield to the Ground PIN.

Figure 10 illustrates the RS-485 line that connects:

- Between each **VA-8xl** / **VA-16xl** unit
- To the PC via a Kramer Tools **VP-43xl Interface Converter** (connect the PC’s DB 9 COM port to the “RS-232 in” DB9F port on the **VP-43xl**. Next, connect the RS-485 port on the **VP-43xl** to the RS-485 ports on the **VA-8xl** or **VA-16xl** units)

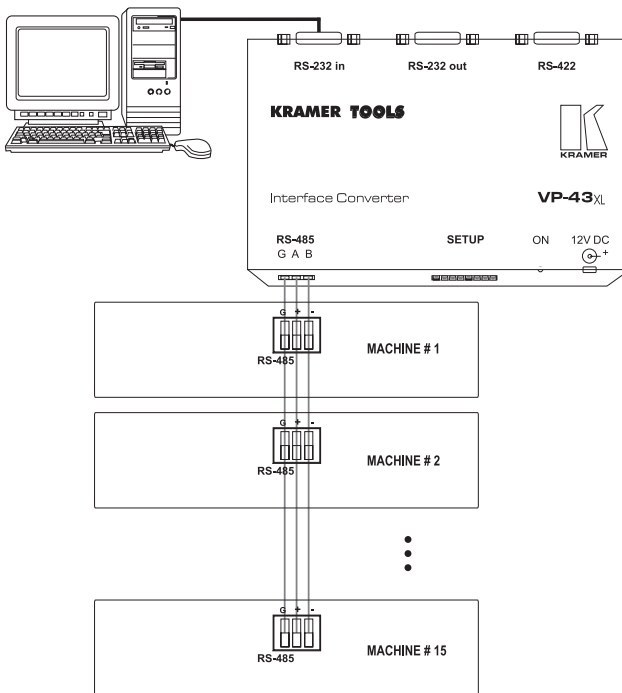


Figure 10: An RS-485 Control Interface Setup

¹ Choose the RS-485 control interface, to operate the VA-8xl or VA-16xl from an extended distance of up to 1200 meters

7 Flash Memory Upgrade

The **VA-8xl** or **VA-16xl** firmware is located in FLASH memory, which lets you upgrade to the latest Kramer firmware version in minutes! The process involves:

- Downloading from the Internet (see section 7.1)
- Connecting the PC to the RS-232 port (see section 7.2)
- Upgrading Firmware (see section 7.3)

7.1 Downloading from the Internet

You can download the up-to-date file from the Internet. To do so:

1. Go to our Web site at <http://www.kramerelectronics.com> and download the file: “*FLIP_VA16xl.zip*” from the Technical Support section.
2. Extract the file: “*FLIP_VA16xl.zip*” to a folder (for example, C:\Program Files\Kramer Flash).

7.2 Connecting the PC to the RS-232 Port

Before installing the latest Kramer firmware version on a **VA-8xl** or **VA-16xl** unit, do the following:

1. Connect the RS-232 DB9 rear panel port on the **VA-8xl** or **VA-16xl** unit to the Null-modem adapter and connect the Null-modem adapter with a 9 wire flat cable to the RS-232 DB9 COM port on your PC (see section 6.1.1). It is recommended that you use COM port¹ 2. However, if your computer has only one COM port, open the file: “*VA16xl.cfg*” (located at C:\Program Files\Kramer Flash\VA16xl.cfg) in **Notepad**, and change “*set port COM2*” to “*set port COM1*”.

2. Set the dipswitches as follows:

- **Set DIP 8 ON**
- **Set DIP 7 ON**

3. Connect the power cord and turn the *POWER* switch on the **VA-8xl** or **VA-16xl ON**.

The 7-segment LED Displays may show erratic data, which should be ignored.

7.3 Upgrading Firmware

Follow these steps to upgrade the firmware:

1. Double click the desktop icon: “*Shortcut to FLIP.EXE*”.
- The Splash screen appears as follows:

¹ The software is preset for use with COM port 2



Figure 11: Splash Screen

2. After a few seconds, the Splash screen is replaced by the “Atmel – Flip” window:

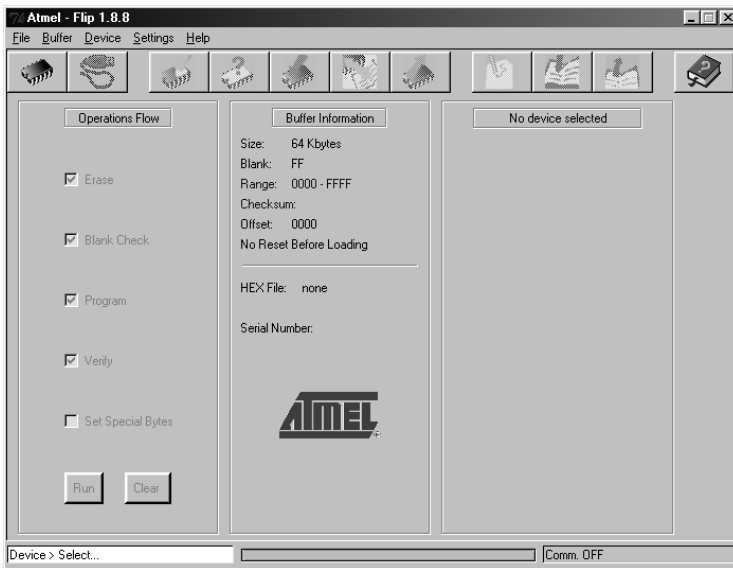


Figure 12: Atmel – Flip Window

3. Press the keyboard shortcut key *F4* (or select the “Read Configuration File” command from the *File* menu, or press the keys: *Alt FR*). The “Open Configuration File” window appears:

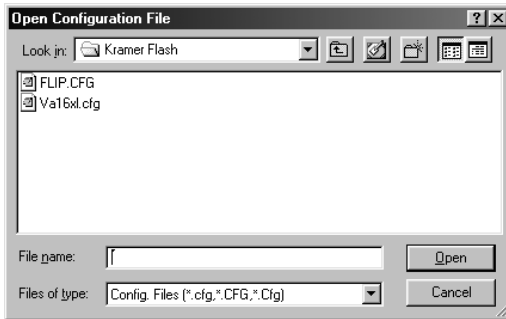


Figure 13: Open Configuration File Select Window

- Choose the file: “*Va16xl.cfg*” (by double-clicking it). If COM 2 was not selected (see section 7.2), an RS-232 error message appears. In the “*Atmel – Flip*” window, the *Operations Flow* column is disabled, and crosses appear in the third column.

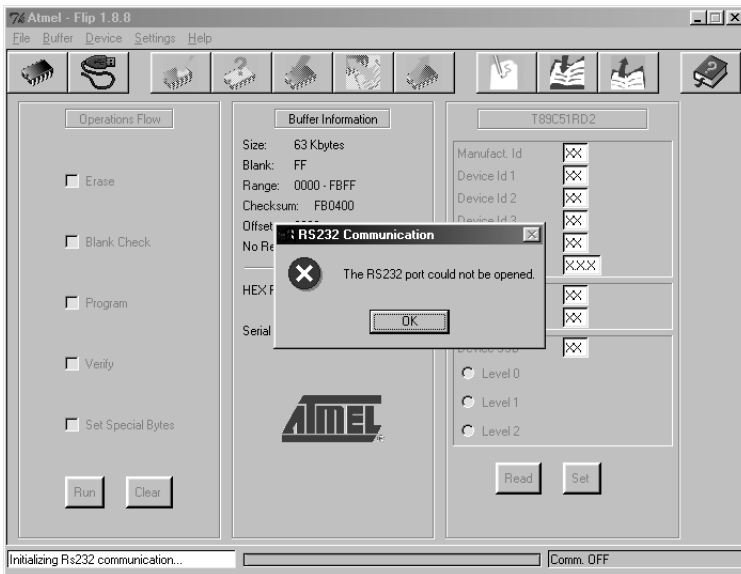


Figure 14: Atmel – Flip Window (RS-232 Communication)

- Click OK and press the keyboard shortcut key *F3* (or select the “*Communication / RS232*” command from the *Settings* menu, or press the keys: *Alt SCR*).

The “*RS232*” window appears. Change the COM port:

Flash Memory Upgrade

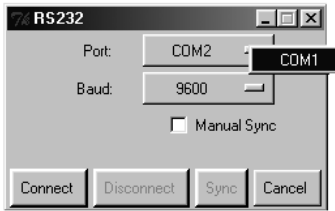


Figure 15: RS-232 Window

6. Click Connect.

In the “Atmel – Flip” window, in the *Operations Flow* column, the *Run* button is active, and the name of the chip appears as the name of the third column: *T89C51RD2*.

Verify that in the *Buffer Information* column, the “*HEX File: Va16xl.hex*” appears.

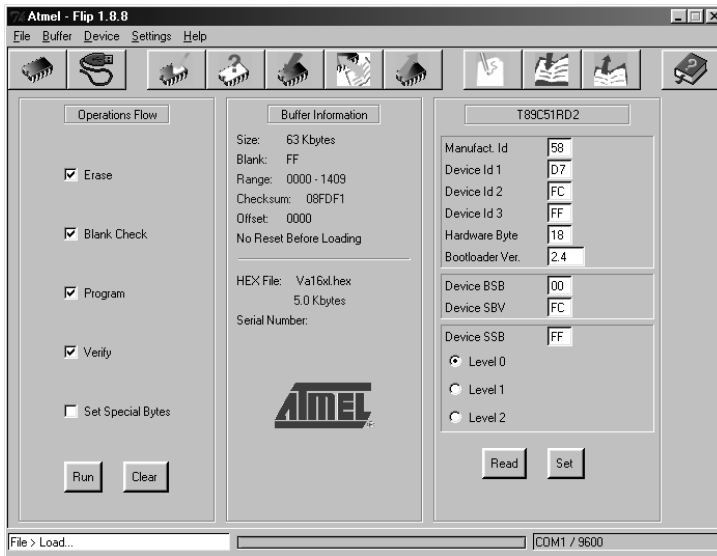


Figure 16: Atmel – Flip Window (Connected)

7. Click Run.

After each stage in the operation is completed, the check-box for that stage becomes colored green¹.

When the operation is completed, all 4 check-boxes will be colored green and the status bar message: *Memory Verify Pass* appears²:

¹ See also the blue progress indicator on the status bar

² If an error message: “Not Finished” shows, click Run again

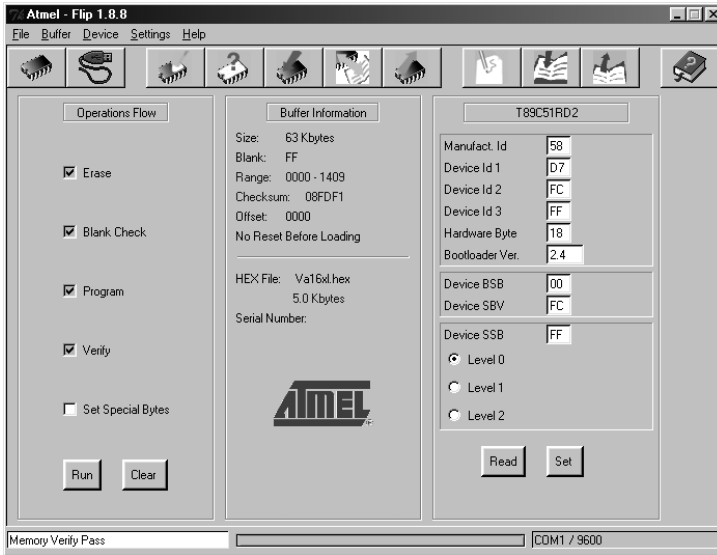


Figure 17: Atmel – Flip Window (Operation Completed)

8. Close the “Atmel – Flip” window.
 9. **Turn the POWER switch on the VA-8xl or VA-16xl OFF.**
 10. Disconnect the RS-232 DB9 rear panel port on the **VA-8xl** or **VA-16xl** unit from the Null-modem adapter.
 11. **Set DIP 7 OFF.**
 12. **Set DIP 8 OFF.**
 13. Turn the *POWER* switch on the **VA-8xl** or **VA-16xl** *ON*.
- Upon initialization, the new **VA-8xl** or **VA-16xl** software version shows in the RIGHT/dB 7-segment LED Display.

8 Technical Specifications

Table 5 includes the technical specifications:

Table 5: Technical Specifications¹ of the VA-8xl or VA-16xl

INPUTS:	VA-8xl: 8 balanced stereo audio +4dBm / 30kΩ on detachable terminal blocks VA-16xl: 16 balanced stereo audio +4dBm / 30kΩ on detachable terminal blocks
OUTPUTS:	VA-8xl: 8 balanced stereo audio +4dBm / 50Ω on detachable terminal blocks VA-16xl: 16 balanced stereo audio +4dBm / 50Ω on detachable terminal blocks
GAIN:	-95dB to +31dB
MAX. OUTPUT LEVEL:	>20dBu balanced (TND +N <0.01)
BANDWIDTH (-0.3dB):	20 Hz to 40 kHz
NOISE FLOOR:	<90dB (GAIN 0dB)
THD + NOISE:	0.006%, +4dBu 1kHz
CONTROLS:	Front pushbuttons, RS-232, and RS-485
INDICATORS:	Gain in dB for left and right channels
POWER SOURCE:	90 - 240V 13VA
DIMENSIONS:	19-inch (W), 7-inch (D) 1U (H) rack-mountable
WEIGHT:	3.5 kg (7.8 lbs.) approx.
ACCESSORIES:	Power cord, Null modem adapter, Windows®-based control software

¹ Specifications are subject to change without notice

9 Communication Protocol¹

The **VA-8xl** or **VA-16xl** is compatible with Kramer's Protocol 2000² (version 0.43). This RS-232 / RS-485 communication protocol uses four bytes of information as defined below.

1st BYTE: Bit 7 (MSB) - Defined as 0.
 Bit 6 0 - for sending information to the switchers (from the PC);
 1 - for sending to the PC (from the switcher).

Bits 5...0 – "INSTRUCTION"

The function that is to be performed by the switcher(s) is defined by the INSTRUCTION (see Table 6 below). Similarly, if a function is performed via the machine's front panel, then these bits are set according to the INSTRUCTION NO., which was performed.

2nd BYTE: Bit 7 (MSB) - Defined as 1.
 Bits 4...0 - Channel number
 Bit 5 - Left (set to 1 when referring to the left channel)
 Bit 6 - Right (set to 1 when referring to the right channel)

3rd BYTE: Bit 7 (MSB) - Defined as 1.
 Bits 6...0 – 7 least significant bits of data

4th BYTE: Bit 7 (MSB) - Defined as 1.
 Bit 5 - MSB of data (7 LSBs are in 3rd byte).
 Bits 4...0 - MACHINE NUMBER.

For RS-232, a null-modem connection between the machine and controller is used. For both RS-232/RS-485 interfaces the default data rate is 9600 baud, with no parity, 8 data bits and 1 stop bit.

Table 6: Instruction Codes

Note: All values in the table are **decimal**, unless otherwise stated.

#	DESCRIPTION	3rd BYTE
22dec (16hex)	SET AUDIO GAIN	Set 7 LSBs of gain value Gain (dB) = 31.5 – (0.5x(255-DATA))
24dec (18hex)	INCREASE / DECREASE AUDIO GAIN	0 - increase gain 1 - decrease gain
25dec (19hex)	REQUEST AUDIO GAIN	As in Instruction 22dec above. When requesting both channels, the reply is: <ul style="list-style-type: none"> • For equal left and right gain: bits 5 = bit 6 • For unequal left and right gain: bits 6 = 0; bit 5 = 1 for reply for left channel

In addition to the above, instructions 15, 18, 19, 20, 61, 62 (decimal) of Kramer's Protocol 2000 are also fully implemented in the unit. For instructions 18 and 19, setups 01 to 15 (decimal) are valid. See the examples in the Table 7 below:

Table 7: Examples

COMMAND	EXAMPLES (MACHINE # 1)
16h E7h 90h 81h	Set channel 7 both left and right gain -88dB
16h AAh FFh 81h	Set channel 10 left gain -32.5dB
16h CAh COh A1h	Set channel 10 right gain 0dB
16h FOh DOh A1h	Set channel 16 both left and right gain +8dB
18h EFh 80h 81h	Increment (increase) gain on 0.5dB on left and right of Channel 15
19h CFh 80h 81h	Request gain of Channel 15 right. If the gain is 0dB for both left and right channels, then the reply would be: 59h EFh COh A1h
19h EEh 80h 81h	Request gain of Channel 14 both left and right. If the gain is different for the left and right channels, then, for +3dB gain in the left channel the reply would be: 59h AEh C6h A1h

Table 8 on page 20 defines the VA-16xl Hex Codes for Gain Control (Attenuation), Table 9 on page 21 defines the VA-16xl Hex Codes for Gain Control (Amplification), and Table 10 on page 21 defines the Channel Number Codes.

1 VER-0.1

2 See the Technical Support section of our Web site: <http://www.kramerelectronics.com>

Table 8: VA-16xl Hex Codes for Gain Control (Attenuation)

Gain (dB)	LED	Hex Codes
Mute	--	16 XX 80 81
-95.5	-95.5	16 XX 81 81
-95	-95	16 XX 82 81
-94.5	-94.5	16 XX 83 81
-94	-94	16 XX 84 81
-93.5	-93.5	16 XX 85 81
-93	-93	16 XX 86 81
-92.5	-92.5	16 XX 87 81
-92	-92	16 XX 88 81
-91.5	-91.5	16 XX 89 81
-91	-91	16 XX 8A 81
-90.5	-90.5	16 XX 8B 81
-90	-90	16 XX 8C 81
-89.5	-89.5	16 XX 8D 81
-89	-89	16 XX 8E 81
-88.5	-88.5	16 XX 8F 81
-88	-88	16 XX 90 81
-87.5	-87.5	16 XX 91 81
-87	-87	16 XX 92 81
-86.5	-86.5	16 XX 93 81
-86	-86	16 XX 94 81
-85.5	-85.5	16 XX 95 81
-85	-85	16 XX 96 81
-84.5	-84.5	16 XX 97 81
-84	-84	16 XX 98 81
-83.5	-83.5	16 XX 99 81
-83	-83	16 XX 9A 81
-82.5	-82.5	16 XX 9B 81
-82	-82	16 XX 9C 81
-81.5	-81.5	16 XX 9D 81
-81	-81	16 XX 9E 81
-80.5	-80.5	16 XX 9F 81
-80	-80	16 XX A0 81
-79.5	-79.5	16 XX A1 81
-79	-79	16 XX A2 81
-78.5	-78.5	16 XX A3 81
-78	-78	16 XX A4 81
-77.5	-77.5	16 XX A5 81
-77	-77	16 XX A6 81
-76.5	-76.5	16 XX A7 81
-76	-76	16 XX A8 81
-75.5	-75.5	16 XX A9 81
-75	-75	16 XX AA 81
-74.5	-74.5	16 XX AB 81
-74	-74	16 XX AC 81
-73.5	-73.5	16 XX AD 81
-73	-73	16 XX AE 81
-72.5	-72.5	16 XX AF 81
-72	-72	16 XX B0 81
-71.5	-71.5	16 XX B1 81
-71	-71	16 XX B2 81
-70.5	-70.5	16 XX B3 81
-70	-70	16 XX B4 81
-69.5	-69.5	16 XX B5 81
-69	-69	16 XX B6 81
-68.5	-68.5	16 XX B7 81

Gain (dB)	LED	Hex Codes
-68	-68	16 XX B8 81
-67.5	-	16 XX B9 81
-67	-67	16 XX BA 81
-66.5	-	16 XX BB 81
-66	-66	16 XX BC 81
-65.5	-	16 XX BD 81
-65	-65	16 XX BE 81
-64.5	-	16 XX BF 81
-64	-64	16 XX C0 81
-63.5	-	16 XX C1 81
-63	-63	16 XX C2 81
-62.5	-	16 XX C3 81
-62	-62	16 XX C4 81
-61.5	-	16 XX C5 81
-61	-61	16 XX C6 81
-60.5	-	16 XX C7 81
-60	-60	16 XX C8 81
-59.5	-	16 XX C9 81
-59	-59	16 XX CA 81
-58.5	-	16 XX CB 81
-58	-58	16 XX CC 81
-57.5	-	16 XX CD 81
-57	-57	16 XX CE 81
-56.5	-	16 XX CF 81
-56	-56	16 XX D0 81
-55.5	-	16 XX D1 81
-55	-55	16 XX D2 81
-54.5	-	16 XX D3 81
-54	-54	16 XX D4 81
-53.5	-	16 XX D5 81
-53	-53	16 XX D6 81
-52.5	-	16 XX D7 81
-52	-52	16 XX D8 81
-51.5	-	16 XX D9 81
-51	-51	16 XX DA 81
-50.5	-	16 XX DB 81
-50	-50	16 XX DC 81
-49.5	-	16 XX DD 81
-49	-49	16 XX DE 81
-48.5	-	16 XX DF 81
-48	-48	16 XX E0 81
-47.5	-	16 XX E1 81
-47	-47	16 XX E2 81
-46.5	-	16 XX E3 81
-46	-46	16 XX E4 81
-45.5	-	16 XX E5 81
-45	-45	16 XX E6 81
-44.5	-	16 XX E7 81
-44	-44	16 XX E8 81
-43.5	-	16 XX E9 81
-43	-43	16 XX EA 81
-42.5	-	16 XX EB 81
-42	-42	16 XX EC 81
-41.5	-	16 XX ED 81
-41	-41	16 XX EE 81
-40.5	-	16 XX EF 81

Gain (dB)	LED	Hex Codes
-40	-40	16 XX F0 81
-39.5	-39.5	16 XX F1 81
-39	-39	16 XX F2 81
-38.5	-38.5	16 XX F3 81
-38	-38	16 XX F4 81
-37.5	-37.5	16 XX F5 81
-37	-37	16 XX F6 81
-36.5	-36.5	16 XX F7 81
-36	-36	16 XX F8 81
-35.5	-35.5	16 XX F9 81
-35	-35	16 XX FA 81
-34.5	-34.5	16 XX FB 81
-34	-34	16 XX FC 81
-33.5	-33.5	16 XX FD 81
-33	-33	16 XX FE 81
-32.5	-32.5	16 XX FF 81
-32	-32	16 XX 80 A1
-31.5	-31.5	16 XX 81 A1
-31	-31	16 XX 82 A1
-30.5	-30.5	16 XX 83 A1
-30	-30	16 XX 84 A1
-29.5	-29.5	16 XX 85 A1
-29	-29	16 XX 86 A1
-28.5	-28.5	16 XX 87 A1
-28	-28	16 XX 88 A1
-27.5	-27.5	16 XX 89 A1
-27	-27	16 XX 8A A1
-26.5	-26.5	16 XX 8B A1
-26	-26	16 XX 8C A1
-25.5	-25.5	16 XX 8D A1
-25	-25	16 XX 8E A1
-24.5	-24.5	16 XX 8F A1
-24	-24	16 XX 90 A1
-23.5	-23.5	16 XX 91 A1
-23	-23	16 XX 92 A1
-22.5	-22.5	16 XX 93 A1
-22	-22	16 XX 94 A1
-21.5	-21.5	16 XX 95 A1
-21	-21	16 XX 96 A1
-20.5	-20.5	16 XX 97 A1
-20	-20	16 XX 98 A1
-19.5	-19.5	16 XX 99 A1
-19	-19	16 XX 9A A1
-18.5	-18.5	16 XX 9B A1
-18	-18	16 XX 9C A1
-17.5	-17.5	16 XX 9D A1
-17	-17	16 XX 9E A1
-16.5	-16.5	16 XX 9F A1
-16	-16	16 XX A0 A1
-15.5	-15.5	16 XX A1 A1
-15	-15	16 XX A2 A1
-14.5	-14.5	16 XX A3 A1
-14	-14	16 XX A4 A1
-13.5	-13.5	16 XX A5 A1
-13	-13	16 XX A6 A1
-12.5	-12.5	16 XX A7 A1

Communication Protocol

Gain (dB)	LED	Hex Codes
-12	-12	16 XX A8 A1
-11.5	-11.5	16 XX A9 A1
-11	-11	16 XX AA A1
-10.5	-10.5	16 XX AB A1
-10	-10	16 XX AC A1
-9.5	-9.5	16 XX AD A1
-9	-9	16 XX AE A1
-8.5	-8.5	16 XX AF A1

Gain (dB)	LED	Hex Codes
-8	-8	16 XX B0 A1
-7.5	-7.5	16 XX B1 A1
-7	-7	16 XX B2 A1
-6.5	-6.5	16 XX B3 A1
-6	-6	16 XX B4 A1
-5.5	-5.5	16 XX B5 A1
-5	-5	16 XX B6 A1
-4.5	-4.5	16 XX B7 A1

Gain (dB)	LED	Hex Codes
-4	-4	16 XX B8 A1
-3.5	-3.5	16 XX B9 A1
-3	-3	16 XX BA A1
-2.5	-2.5	16 XX BB A1
-2	-2	16 XX BC A1
-1.5	-1.5	16 XX BD A1
-1	-1	16 XX BE A1
-0.5	-0.5	16 XX BF A1

Table 9: VA-16xl Hex Codes for Gain Control (Amplification)

Gain (dB)	LED	Hex Codes
0	0	16 XX C0 A1
+0.5	+0.5	16 XX C1 A1
+1	+1	16 XX C2 A1
+1.5	+1.5	16 XX C3 A1
+2	+2	16 XX C4 A1
+2.5	+2.5	16 XX C5 A1
+3	+3	16 XX C6 A1
+3.5	+3.5	16 XX C7 A1
+4	+4	16 XX C8 A1
+4.5	+4.5	16 XX C9 A1
+5	+5	16 XX CA A1
+5.5	+5.5	16 XX CB A1
+6	+6	16 XX CC A1
+6.5	+6.5	16 XX CD A1
+7	+7	16 XX CE A1
+7.5	+7.5	16 XX CF A1
+8	+8	16 XX D0 A1
+8.5	+8.5	16 XX D1 A1
+9	+9	16 XX D2 A1
+9.5	+9.5	16 XX D3 A1
+10	+10	16 XX D4 A1

Gain (dB)	LED	Hex Codes
+10.5	+10.5	16 XX D5 A1
+11	+11	16 XX D6 A1
+11.5	+11.5	16 XX D7 A1
+12	+12	16 XX D8 A1
+12.5	+12.5	16 XX D9 A1
+13	+13	16 XX DA A1
+13.5	+13.5	16 XX DB A1
+14	+14	16 XX DC A1
+14.5	+14.5	16 XX DD A1
+15	+15	16 XX DE A1
+15.5	+15.5	16 XX DF A1
+16	+16	16 XX E0 A1
+16.5	+16.5	16 XX E1 A1
+17	+17	16 XX E2 A1
+17.5	+17.5	16 XX E3 A1
+18	+18	16 XX E4 A1
+18.5	+18.5	16 XX E5 A1
+19	+19	16 XX E6 A1
+19.5	+19.5	16 XX E7 A1
+20	+20	16 XX E8 A1
+20.5	+20.5	16 XX E9 A1

Gain (dB)	LED	Hex Codes
+21	+21	16 XX EA A1
+21.5	+21.5	16 XX EB A1
+22	+22	16 XX EC A1
+22.5	+22.5	16 XX ED A1
+23	+23	16 XX EE A1
+23.5	+23.5	16 XX EF A1
+24	+24	16 XX F0 A1
+24.5	+24.5	16 XX F1 A1
+25	+25	16 XX F2 A1
+25.5	+25.5	16 XX F3 A1
+26	+26	16 XX F4 A1
+26.5	+26.5	16 XX F5 A1
+27	+27	16 XX F6 A1
+27.5	+27.5	16 XX F7 A1
+28	+28	16 XX F8 A1
+28.5	+28.5	16 XX F9 A1
+29	+29	16 XX FA A1
+29.5	+29.5	16 XX FB A1
+30	+30	16 XX FC A1
+30.5	+30.5	16 XX FD A1
+31	+31	16 XX FE A1
+31.5	+31.5	16 XX FF A1

Table 10: Channel Number Codes

Channel	Left	Right	Both (L and R)
1	A1	C1	E1
2	A2	C2	E2
3	A3	C3	E3
4	A4	C4	E4
5	A5	C5	E5
6	A6	C6	E6
7	A7	C7	E7
8	A8	C8	E8
9	A9	C9	E9
10	AA	CA	EA
11	AB	CB	EB
12	AC	CC	EC
13	AD	CD	ED
14	AE	CE	EE
15	AF	CF	EF
16	B0	D0	F0

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 three 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.
2. Any product, on which the serial number has been defaced, modified or removed.
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.



For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com.

Updates to this user manual may be found at <http://www.kramerelectronics.com/manuals.html>.

We welcome your questions, comments and feedback.



Kramer Electronics, Ltd.

Web site: www.kramerelectronics.com

E-mail: info@kramerelectronics.com

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