KRAMER ELECTRONICS, Ltd.

USER MANUAL

Distribution Amplifiers

Models:

VM-5ARII, VM-10ARII, VM-20ARII, VM-1411

IMPORTANT: Before proceeding, please read paragraph entitled "Unpacking and Contents"

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1. INTRODUCTION

Congratulations on your purchase of this Kramer Electronics amplifier. Since 1981 Kramer has been dedicated to the development and manufacture of high quality video/audio equipment. The Kramer line has become an integral part of many of the best production and presentation facilities around the world. In recent years, Kramer has redesigned and upgraded most of the line, making the best even better. Kramer's line of professional video/audio electronics is one of the most versatile and complete available, and is a true leader in terms of quality, workmanship, price/performance ratio and innovation. In addition to the Kramer line of high quality amplifiers, such as the one you have just purchased, Kramer also offers a full line of high quality switchers, processors, interfaces, controllers and computer-related products. This manual includes configuration, operation and option information for the following products from the Kramer VM line of distribution amplifiers. All these VM amplifiers are similar in operation and features.

- **VM-5ARII** - 1:5 Video/Audio Distributor
- **VM-10ARII** - 1:10 Video/Audio Distributor
- **VM-20ARII** - 1:20 programmable Video/Audio Distributor
- **VM-1411** - 1:10 Video/Audio Distributor

1.1 A Word On Distribution Amplifiers

Distribution amplifiers are used to distribute one source to several acceptors for simultaneous recording or monitoring of one source, with no discernible signal degradation. They vary in the number of inputs, looping capability, programming capability, number of outputs, operating format, bandwidth and input/output coupling. A good quality distribution amplifier amplifies the incoming signal, pre-compensates the signal for potential losses (resulting from the use of long cables, noisy source, etc.) and generates several identical buffered and amplified outputs.

1.2 Factors Affecting Quality of Results

There are many factors affecting the quality of results when signals are transmitted from a source to an acceptor:

- **Connection cables** - Low quality cables are susceptible to interference, they degrade signal quality due to poor matching and cause elevated noise levels. They should therefore be of the best quality.
- **Sockets and connectors of the sources and acceptors** - So often ignored, they should be of highest quality, since "Zero Ohm" connection resistance is the target. Sockets and connectors also must match the required impedance (75ohms in video). Cheap, low quality connectors tend to rust, thus causing flaws in the signal path.
- **Amplifying circuitry** - Must have quality performance when the desired end result is high linearity, low distortion and low noise operation.
- **Distance between sources and acceptors** - Plays a major role in the final result. For long distances (over 15 meters) between sources and acceptors, special measures should be taken in order to avoid cable losses. These include using higher quality cables or adding line amplifiers.
- **Interference from neighboring electrical appliances** - These can have an adverse effect on signal quality. Balanced audio lines are less prone to interference, but unbalanced audio should be installed far from any mains power cables, electric motors, transmitters, etc. even when the cables are shielded.

2. SPECIFICATIONS

	VM-5ARII	VM-10ARII	VM-20ARII	VM-1411
Configuration	1:5	1:10	1:20 (Programmable)	1:10 (Programmable)
Input Type	1 video, composite or single component, looping with termination switch 1 stereo audio looping	1 composite/component video, looping with termination switch 2 audio, stereo or balanced mono looping	4 video looping with termination switches 4 stereo audio (or balanced mono)	2 composite/component video, looping with termination switch 1 balanced stereo audio looping
Input Connections	Video: BNC connector Audio: RCA	Video: BNC connector Audio: RCA	Video: BNC connectors Audio: RCA	Video: BNC connectors Audio: terminal blocks
Input Level	Video looping: 1Vpp/75ohm Audio looping: +4dBm /50Kohm	Video looping: 1Vpp/75ohm Audio looping: +4dBm, 50kohm.	Video looping: 1Vpp/75ohm Audio looping: +4dBm/50kohm	Video: 1Vpp/75ohm Audio: up to +24dBm /50kohm,
Output Type	5 video, composite or single component 5 stereo audio	2x5 composite/component video 10 stereo audio or balanced mono	Video: 20 (1:20, 2x1:10, 4x1:5, 1:10+2x1:5) Audio: 20 (1:20, 2x1:10, 4x1:5, 1:10+2x1:5) stereo audio (or balanced mono)	2x5 composite/component video 2x5 balanced stereo audio
Output Connector	Video: BNC connectors Audio: RCA connectors	Video: BNC connectors Audio: RCA connectors	Video: BNC connectors Audio: RCA connectors	Video: BNC connectors Audio: terminal blocks
Output Level	Video: 1Vpp/75ohm Audio: +4dBm /50ohm 27Vpp max.	Video: 1Vpp/75ohm Audio:+4dBm/50ohm, 25Vpp max.	Video: 1Vpp/75ohm Audio: +4dBm/50ohm, 27Vpp max.	Video: 1Vpp/75ohm Audio: up to +24dBm 50ohm
Output Coupling	DC/AC selectable (video), AC (audio.)	DC or AC (video), AC audio	Video: DC/AC user selectable Audio: AC	DC or AC (video), AC audio
Video S/N Ratio	>76dB	>77dB	>76dB	>77dB
Audio S/N Ratio	>86dB, unweighted @ 1Vpp.	>81dB	>80dB	>87dB@ 1Vpp.
Video Bandwidth	360 MHz 3dB	224 MHz 1dB.	430 MHz 3dB	224 MHz 3dB
Audio Bandwidth	52 kHz 0.1dB	60 kHz	110 kHz 1dB	60 kHz 3dB.
Audio THD 2nd Harmonic	<0.02% 0.002%	<0.02% 0.06%	< 0.02% < 0.002%	<0.02% 0.002%
Differential Gain	0.03 %	0.1 %	0.06 %	0.2 %
Differential Phase	0.06Deg.	0.22Deg.	0.08Deg.	0.2Deg.
K Factor	<0.05%	<0.05%	<0.1%	0.05%
Max. video output	2.2Vpp	1.8Vpp	2Vpp	1.8Vpp
Video controls	1 to +1.8dB, EQ. : 0 to +2.5dB	Front accessible trimmers for video gain (1.2 to +1.6dB) and EQ. (0 to +2.5dB).	1.2 to +1.7dB video level, EQ. : 0 to +2.4dB	Front accessible trimmers for video gain (1 to 2.8dB Luma) and EQ. (0 to 2.5dB)
Audio controls	Rear accessible audio left and right control trimmers (0.2 to +6dB)	Audio left and right control trimmers (0 to +6dB), balanced/stereo selector switch and audio control enable switch.	Front accessible audio left and right control trimmers (+0.3 to +6.2dB)	Front accessible audio left and right control trimmers (0.3 to 9.5dB)
Dimensions (W, D, H)	19 " x 7 " x 1U 48.26 cm x 17.78 x 4.5cm	19 " x 7 " x 1U 48.26 cm x 17.78 x 4.5cm	19 " x 7 " x 2U 48.26 cm x 17.78 x 9cm	19 " x 7 " x 1U 48.26 cm x 17.78 x 4.5cm
Weight	1.94kg (4.3 lbs.) Approx.	2.1kg (4.7 lbs.) Approx.	3.6kg. (8 lbs.) Approx.	2.9kg (6.4 lbs.) Approx.
Power consumption	21 VA.	19.5VA.	18.5 VA	19.5 VA.
Power Source	230VAC, 50/60 Hz, (115V U.S.A.)	230V/115VAC 50/60Hz (115V U.S.A.)	230V/115VAC 50/60Hz (115V U.S.A.)	230VAC 50/60Hz (115V U.S.A.)

3. HOW DO I GET STARTED?

The fastest way to get started is to take your time and do everything right the first time. Taking 15 minutes to read the manual may save you a few hours later. You don't even have to read the whole manual. At the beginning of each section, you'll find an overview of the section. So if the section doesn't apply to you, you don't have to spend your time reading it.

4. UNPACKING and CONTENTS

The items contained in your Kramer VM Amplifier package are listed below. Please save the original box and packaging materials for possible future transportation and shipment of the Amplifier.

- Amplifier (rack-mountable)
- AC power cable
- User Manual
- Rubber feet
- Kramer concise product catalog

For additional information regarding optional cables and accessories, contact your Kramer dealer.

4.1 Optional Accessories

The following Kramer accessories can enhance implementation of your amplifier.

- **BNC "Y" Connector** - Used for looping purposes and splits the incoming signal to enable connection of an additional machine.

- **Termination Plug** - Used to terminate the line to 75ohm so that the video signal will be correctly transmitted without losses. Usually a 75ohm resistor is employed.

- **SP-40** - (Video/Audio Processor) can be serially connected between the video/audio source and the VM amplifier for video and audio processing. The machine is a high quality processor used for video control and correction in duplication and production studios, camera control, luminance and white balance correction. The SP-40 is capable of Composite to Y/C conversion and bi-directional transcoding. The machine allows video gain control down to full fade, definition control, contrast control, color saturation control, black level control, audio mix control for mixing between the selected source and an audio AUX source and a screen splitter control for "before-after" comparison. The unique limiter switch in the SP-40 allows true signal limiting and special effects.

- **SP-11** - (Video/Audio Processor) can be serially connected between the video/audio source and the VM amplifier for video and audio control/correction. The machine provides camera control and luminance/white balance correction. The SP-11 is also capable of performing composite to Y/C conversion and bi-directional transcoding. The machine allows full control over the video signal: video gain down to full fade, log or linear definition control, log or linear contrast control, color saturation control, black level control, red, green and blue controls and a screen splitter control for "before-after" comparison. The Input switch control is "audio-follow-video".

- **104L -** (Video Line Amplifier) Serially connected between the video source and the VM amplifier for video processing, the machine is used for video line amplification and cable compensation, video field work and SDI signal distribution. Signal loss and the resulting depreciation in picture quality is a real problem in any video setup requiring considerable distance between video source and acceptors. The KRAMER 104L video Line Amplifier, one of the KRAMER TOOLS, is a high quality amplifier, which prevents video signal losses over long cables. For best results the 104L amplifier is installed adjacent to the video source. The 104L is housed in the compact KRAMER TOOLS enclosure and is fed by a 12VDC source. High bandwidth and front accessible controls make it suitable for the most demanding analog and SDI studio applications.

- **VM-9YC -** (Video/Audio Line Amplifier) Serially connected between the video/audio source and the VM amplifier for video and audio processing, the machine is a high quality video/stereo amplifier which compensates for video and audio signal losses when long cables are used. In any video/audio setup requiring considerable distances between video/audio source and acceptors, signal loss and thus depreciation in the quality of both picture and sound is a real problem. To prevent this phenomenon, a VM-9S amplifier is installed adjacent to the video/audio source.
- **VM-4E -** (A Precision Mechanical 4x4 Video/Audio Switcher) Several video/audio sources may be connected to its inputs for switching. The machine may be used in every application where easy and fast video and audio source selection is needed and for high isolation between inputs. All unselected inputs are internally terminated with 75-Ohm resistors. The VM-4E switches video, SDI and any other high frequency signals. The VM-4E is housed in a small enclosure, occupying very little desk space.
- **VM-81AV -** (A Precision Mechanical 8x1 Video/Stereo Audio Switcher) Several video/audio sources may be connected to its inputs for switching. The machine offers fast and easy video/audio source and acceptor selection. The VM-81AV provides high isolation between inputs and outputs and all unselected video inputs are internally terminated with 75-Ohm resistors. The VM-81AV is housed in a professional 19" rack mountable enclosure.

- **TP-1** (Video Line Transmitter) If a DA output is sent over a long distance (100 meter or more), it is necessary to convert the signal to twisted pair type. The TP-1 sends a color video signal over long distances using telephone wire or any other twisted pair wire thus extending the range of operation of a DA. The TP-1 maintains the bandwidth of an industrial color video signal up to several hundred meters and of broadcast quality (up to 12 MHz) signals up to 100 meters. At shorter distances, as in a studio, bandwidth of 30MHz is easily achieved. By using the KRAMER TP-1 together with the TP-2 (video Line Receiver) coax wiring (in a studio, for example) can be completely eliminated. The TP-1 can also be used for simplification of security and CCTV installations, and for teleconferencing in offices and hospitals using existing intercom or telephone wiring.

- **VA-11AV** - (Video/Audio Combiner) Used to distribute video/audio signals. The machine can be inserted in front of a DA, allowing the DA to distribute a video signal and two audio signals simultaneously. It sends a color video signal and a stereo audio signal using only one standard coax cable in real time. The machine maintains the bandwidth of an industrial color video signal and the output signal may be viewed and recorded as a normal video signal. By using the VA-11AV together with the VA-12AV (video/audio Separator) the audio stereo signal may be recovered so audio signals may be sent in a hidden mode, to be recovered only by the VA-12AV. The VA-11AV can be used for simplification of security and CCTV installations, using existing video coax wiring for video and audio transmissions.

➢ **611T/611R** - (611T Fiber Optic Transmitter and 611R Fiber Optic Receiver) Part of the KRAMER TOOLS series, and designed for studio and other demanding applications, these machines, in combination, may be used to send one of the distributed channels to distances of 5-25Km. The full bandwidth 611T and matching 611R use state-of-the-art fiber optic circuitry and allow the user (via rear panel trimmers) to adjust input and output video levels and high frequency peaking to achieve best performance.

➢ **VIDEO TESTER -** A new, unique, patented, indispensable tool for the video professional, the Video Tester is used to test a video path leading to/from an amplifier. By pressing only one touch switch it can trace missing signals, distinguish between good and jittery (VCR sourced) signals, and identify the presence of good signals. Whenever a video signal is missing, because of bad connections, cable breaks or faulty sources, the Video Tester is all you need.

5. VM SERIES AMPLIFIERS

This section describes all the controls and connections of your amplifier. Understanding all of the controls and connections helps you realize its full power.

5.1 Getting to Know Your VM-5ARII Amplifier

The KRAMER **VM-5ARII** is an ultra-high bandwidth, video/audio distribution amplifier designed for studio and other demanding applications. The **VM-5ARII** splits a single input source into five identical outputs with no discernible signal degradation. The machine has looping inputs for system extension. The user can adjust video gain and EQ. control as well as audio L and R levels externally. The **VM-5ARII** allows AC/DC video input coupling selection and has a video termination switch simplifying looping. The machine operates in "Audio Follow Video" mode, and has fully buffered, Broadcast level, audio stereo outputs.
Front/rear panel features of the **VM-5ARII** are described in Figure 1, and Table 1.

NOTE

For operation instructions refer to section 9.

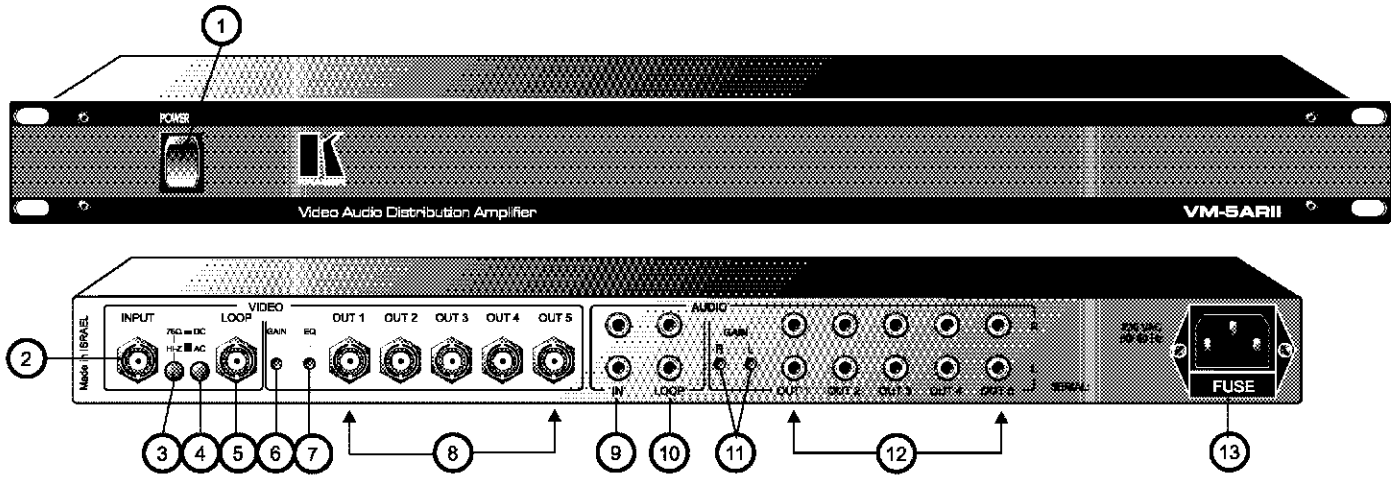


Figure 1: VM-5ARII Front/Rear Panel Features

Table 1: VM-5ARII Front/Rear Panel Features

No.	Feature	Function
1.	Illuminated power switch (on front panel)	Supplies power to the unit.
2.	BNC **INPUT** connector	Video input
3.	**75ohm/HI-z** switch	Selects "**75ohm**" or "**HI-z**" impedance (pressed=**75ohm**). For looping select "**Hi-z**".
4.	**AC/DC** switch	Selects **AC** or **DC** coupling (pressed=**DC**).
5.	BNC **LOOP** output connector	Provides video looping capability to increase number of outputs up to 500.
6.	Video **GAIN** trimmer	Controls video level of outputs.
7.	**EQ.** trimmer	Controls cable equalization of outputs.
8.	BNC **OUT (1-5)** connectors	5 amplified and buffered video outputs.
9.	**L, R** RCA **AUDIO IN** connector	Audio input
10.	**L, R** RCA **LOOP** connectors	Provide audio looping capability to increase number of outputs up to 500.
11.	**L, R** audio trimmers	Control audio output level.
12.	**L, R** RCA **OUT (1-5)** connectors	5 amplified and buffered audio outputs.
13.	A 3-prong power connector/fuse	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

5.2 Getting to Know Your VM-10ARII Amplifier

The KRAMER **VM-10ARII** is full broadcast, state-of-the-art, video/audio distribution amplifier designed for studio and other demanding applications. The **VM-10ARII** has looping video and audio stereo inputs, each splitting to 10 outputs. The user may choose unbalanced stereo or balanced mono audio via front panel switches. The output audio and video levels, as well as video cable EQ. may be adjusted via trimmers accessible from the front panel. The video outputs are in two blocks of 5 outputs each, where each block may be individually trimmed for level and cable EQ., thereby achieving different compensations for different cable lengths. Several **VM-10ARII** units may be chained through the looping inputs. Output video signals are DC/AC coupled (user selectable) for maximum flexibility. Front/rear panel features of the **VM-10ARII** are described in Figure 2, Table 2 and Table 3.

NOTE

For operation instructions refer to section 9.

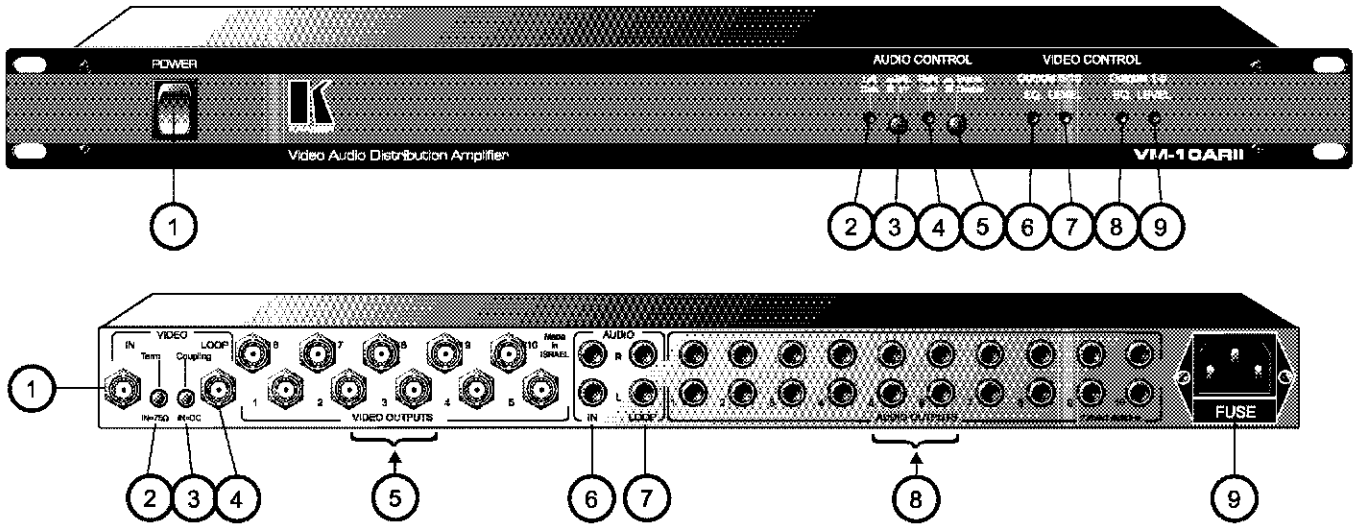


Figure 2: VM-10ARII Front/Rear Panel Features

Table 2: VM-10ARII Front Panel Features

No.	Feature	Function
1.	Illuminated power switch (on front panel)	Supplies power to the unit.
2.	Left **Gain** trimmer	Controls the left channel audio gain.
3.	**BAL/ST** pushbutton	Selects balanced/stereo operation of the audio channels (pressed=**BAL**).
4.	Right **Gain** trimmer	Controls the Right channel audio gain.
5.	**Enable/Disable** pushbutton	Enables the audio control by trimmers adjustments (pressed=**Enable**).
6.	**EQ.** trimmer (outputs 6-10)	Controls cable equalization of outputs 6-10.
7.	**LEVEL** trimmer (outputs 6-10)	Controls video level of outputs 6-10.
8.	**EQ.** trimmer (outputs 1-5)	Controls cable equalization of outputs 1-5.
9.	**LEVEL** trimmer (outputs 1-5)	Controls video level of outputs 1-5.

Table 3: VM-10ARII Rear Panel Features

No.	Feature	Function
1.	BNC **INPUT** connector	Video input
2.	**Term/75ohm** pushbutton	Selects "**75ohm**" or "**HI-z**" impedance (pressed=**75ohm**). For looping select "**Hi-z**".
3.	Coupling pushbutton	Selects **AC/DC** coupling (**DC** when pressed).
4.	BNC **LOOP** output connector	Provides video looping capability to increase number of outputs.
5.	BNC **VIDEO OUTPUTS (1-10)** connectors	10 amplified and buffered video outputs.
6.	**L, R** RCA **AUDIO IN** connector	Audio input
7.	**L, R** RCA **LOOP** connector	Provides audio looping capability to increase number of outputs.
8.	**L, R** RCA **OUT (1-10)** connectors	10 amplified and buffered audio outputs.
9.	A 3-prong power connector/fuse	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

5.3 Getting to Know Your VM-20ARII Amplifier

The KRAMER **VM-20ARII** is a full bandwidth, state-of-the-art, 1:20 Programmable video/audio distribution amplifier designed for studio and other demanding applications. The **VM-20ARII** splits a single video and audio input source into twenty identical outputs with no discernible signal degradation. The **VM-20ARII** has four looping video and audio (stereo) inputs and a user programmable mode of operation. The **VM-20ARII** can function as a 1:20, 2x1:10, 4x1:5 or 1:10+2x1:5 DA, and audio operation mode may be separated from video mode. Output signals are DC or AC coupled (user selectable) for highest signal fidelity. Due to the extended bandwidth of the machine it can be also used for video/graphics component distribution. The machine has video gain and EQ. controls for 4 sets of 5 outputs, as well as audio level controls. The audio section may be programmed to function as unbalanced stereo or balanced mono.
Front/rear panel features of the **VM-20ARII** are described in Figure 3, Table 4 and Table 5.

NOTE

For operation instructions refer to section 9.

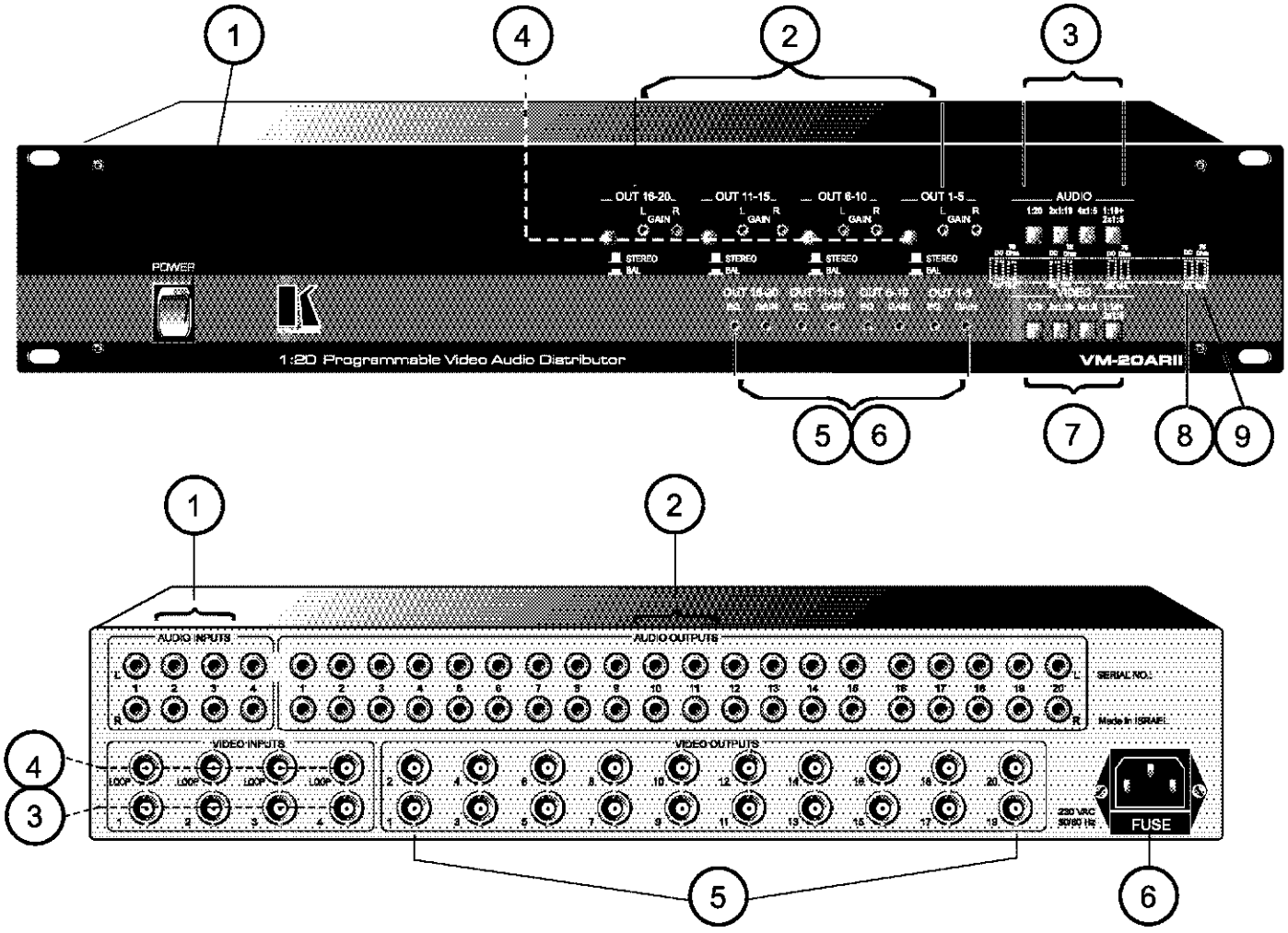


Figure 3: VM-20ARII Front/Rear Panel Features

Table 4: VM-20ARII Front Panel Features

No.	Feature	Function
1.	Illuminated power switch (on front panel)	Supplies power to the unit.
2.	**OUT 1-20 (L, R)** audio **GAIN** trimmers	Controls audio level of outputs 1-20.
3.	**1:20, 2x1:10, 4x1:5, 1:10+2x1:5 AUDIO** operating mode switches	Programming switches for audio mode of operation as follows: ➢ **1:20** - Splits input "**1**" to all 20 outputs. ➢ **2x1:10** - Splits input "**1**" to outputs "**1-10**" and input "**3**" to outputs "**11-20**". ➢ **4x1:5** - Splits four inputs to four consecutive sets of five outputs each. ➢ **1:10+2x1:5** - Splits input "**1**" to outputs "**1-10**", input "**3**" to outputs "**11-15**" and input "**4**" to outputs "**16-20**"
4.	**STEREO/BAL** pushbuttons	Select stereo or balanced mode of operation (pushed=balanced).
5.	**OUT (1-20) EQ.** trimmers	Control cable equalization of outputs 1-20.
6.	**OUT (1-20) GAIN** trimmers	Controls video level of outputs 1-20.
7.	**1:20, 2x1:10, 4x1:5, 1:10+2x1:5 VIDEO** operating mode switches	Programming switches for video mode of operation as follows: ➢ **1:20** - Splits input "**1**" to all 20 outputs. ➢ **2x1:10** - Splits input "**1**" to outputs "**1-10**" and input "**3**" to outputs "**11-20**". ➢ **4x1:5** - Splits four inputs to four consecutive sets of five outputs each. ➢ **1:10+2AAx1:5** - Splits input "**1**" to outputs "**1-10**", input "**3**" to outputs "**11-15**" and input "**4**" to outputs "**16-20**"
8.	4 **AC/DC** switches	Select **AC** or **DC** coupling (up=**DC**).
9.	4 **Term/75ohm** switches	Select "**75ohm**" or "**HI-z**" impedance (up=**75ohm**). For looping select "**Hi-z**".

Table 5: VM-20ARII Rear Panel Features

No.	Feature	Function
1.	**L, R RCA 1- 4 AUDIO INPUTS** connectors	Audio inputs that correspond to front panel operating mode touch switches.
2.	**L, R** RCA 1-20 **AUDIO OUTPUTS** connectors	20 amplified and buffered audio outputs.
3.	BNC **VIDEO INPUTS** connectors **1- 4**	Video input connectors that correspond to front panel operating mode touch switches.
4.	BNC **LOOP** connectors **1- 4**	Provide video looping capability to increase number of outputs.
5.	BNC **VIDEO OUTPUTS** connectors **1-20**	20 amplified and buffered video outputs.
6.	3-prong power connector/Fuse	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

5.4 Getting to Know Your VM-1411 Amplifier

The KRAMER **VM-1411** is full broadcast, state-of-the-art, video/balanced stereo audio distribution amplifier designed for studio and other applications. The **VM-1411** has two inputs, video and audio, each splitting to 5 outputs. The user may select 2 x 1:5 or 1:10 operation via front panel control switches. Several **VM-1411** units may be chained through the looping inputs. Output signals are (user selectable) DC or AC coupled for highest flexibility. Audio outputs are buffered and isolated from each other, allowing Hi-Fi Balanced audio distribution.
Front/rear panel features of the **VM-1411** are described in Figure 4, Table 6 and Table 7.

NOTE

For operation instructions refer to section 9.

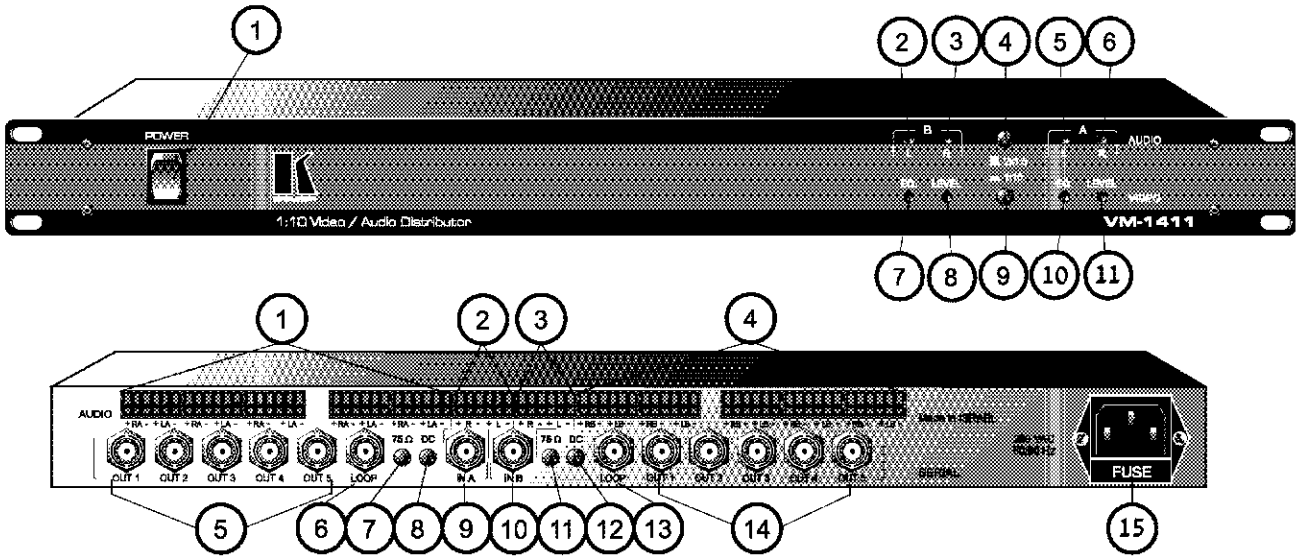


Figure 4: VM-1411 Front/Rear Panel Features

Table 6: VM-1411 Front Panel Features

No.	Feature	Function
1.	Illuminated power switch (on front panel)	Supplies power to the unit.
2.	**L AUDIO** trimmer (B)	Controls audio level of left channel B.
3.	**R AUDIO** trimmer (B)	Controls audio level of left channel B.
4.	**AUDIO MODE (2 x 1:5, 1:10)** pushbutton	Selects either 1:10 or 2 x 1:5 audio operation: **1:10** position (pressed)- splits input "A" to all 10 outputs. **2 x 1:5** position (released)- splits inputs "A" and "B" to outputs "A" (1-5) and "B" (1-5) respectively.
5.	**L AUDIO** trimmer (A)	Controls audio level of left channel A.
6.	**R AUDIO** trimmer (A)	Controls audio level of right channel A.
7.	**EQ** trimmer (B)	Controls cable equalization of channel B video outputs.
8.	**LEVEL** trimmer (B)	Controls video level of channel B video outputs.
9.	**VIDEO MODE (2 x 1:5, 1:10)** pushbutton	Selects either 1:10 or 2 x 1:5 video operation: **1:10** position (pressed)- splits input "A" to all 10 outputs. **2 x 1:5** position (released)- splits inputs "A" and "B" to outputs "A" (1-5) and "B" (1-5) respectively.
10.	**EQ** trimmer (A)	Controls cable equalization of channel A video outputs.
11.	**LEVEL** trimmer (A)	Controls video level of channel A video outputs.

Table 7: VM-1411 Rear Panel Features

No.	Feature	Function
1.	5 **AUDIO** outputs **RA, LA** terminal block connectors	5 amplified and buffered channel A audio outputs.
2.	**L, R** terminal block connectors	Channel A audio input.
3.	**L, R** terminal block connectors	Channel B audio input.
4.	5 **AUDIO** outputs **RB, LB** terminal block connectors	5 amplified and buffered channel B audio outputs.
5.	**OUT 1 –5** BNC connectors	5 amplified and buffered channel A video outputs.
6.	**LOOP** BNC connector	Provides video looping capability to increase number of outputs.
7.	Channel **A 75ohm** pushbutton	Selects "**75ohm**" or "**HI-z**" impedance (pressed=75ohm). For looping select "**Hi-z**".
8.	Channel **A DC** pushbutton	Selects DC coupling when pushed.
9.	**IN A** BNC connector	Video input.
10.	**IN B** BNC connector	Video input.
11.	Channel **B 75ohm** pushbutton	Selects "**75ohm**" or "**HI-z**" impedance (pressed=75ohm). For looping select "**Hi-z**".
12.	Channel **B DC** pushbutton	Selects DC coupling when pushed.
13.	**LOOP** BNC connector	Provides video looping capability to increase number of outputs.
14.	**OUT 1 –5** BNC connectors	5 amplified and buffered channel B video outputs.
15.	Power Connector	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

6. INSTALLATION

6.1 Rack Mounting

Each of the amplifiers included in this manual may be rackmounted in a standard 19" EIA rack assembly, and includes rack "ears" at the ends of the front panel. The **VM-5ARII, VM-10ARII** and the **VM-1411** use one unit (1U) of rack height and the **VM-20ARII** uses 2U rack height. They do not require any specific spacing above or below the unit for ventilation. To mount any of the amplifiers, simply place the unit rack ears against the rack rails of your rack, and fasten with standard screws through each of the four corner holes in the rack ears. It is recommended to use plastic washers to protect the panel from scratching.

7. CONNECTING to VIDEO DEVICES

Video sources and output devices (such as monitors, projectors or recorders) may be connected to the amplifiers through the BNC type connectors located on the back of the unit. Please keep in mind that the output signal format will match that of the input signal format. All signal connections that use more than one cable interconnecting between devices should be of equal length. Video sources connected to the **VM-5ARII, VM-10ARII, VM-1411, VM-20ARII** and output devices, may support CV/component video signal types with AC/DC coupling.

8. CONNECTING to AUDIO DEVICES

Audio sources and output devices (such as amplifiers or recorders) may be connected to the amplifier (VM-5ARII, VM-10ARI and VM-20ARII models) through the RCA type connectors located at the back of the unit, or through the terminal blocks (VM-1411 model).

9. USING the VM AMPLIFIERS

9.1 Powering on the Amplifier

NOTES

1. *Amplifier should only be powered on, after all connections are completed and all source devices have been powered on. Do not attempt to connect or disconnect any video, audio or control signals to the amplifier while it is powered on!*
2. *The socket-outlet should be near the equipment and should be easily accessible. To fully disconnect equipment, remove power cord from its socket.*

1) Press the toggle switch on the far-left front panel to the up position. In the up position, the toggle switch glows.
2) Operate the acceptors.

9.2 Looping

The looping function enables the operator to extend the number of outputs per input. The following example describes looping performed by using 3 amplifiers with one input and 5 outputs each: A video signal reaches input of amplifier No. 1. From looping connector of amplifier No. 1 a cable is connected to input socket of amplifier No. 2. The loop output of amplifier No. 2 is connected to the input socket of amplifier No. 3. In this way the input signal is divided into 15 separate output signals. The operator must always switch to "**Hi-z**" the termination switch of all the amplifiers but the last. The last amplifier's termination switch should always be at "**75ohm**" to maintain well-matched video line (of 75ohm impedance) from first to last amplifier. Note that if looping function is not used, the termination switch should be set to "**75 ohm**".

9.3 Coupling

The coupling function enables the operator to determine whether the incoming video signal is DC or AC coupled. When DC coupling is selected and proper standard video signal is applied to the amplifier's input, the output signal is equal to the input signal. When AC coupling is selected, DC components of the incoming signal are removed. DC coupling is always preferable since AC coupling might cause some linearity distortions in low and high frequencies (due to non-ideal behavior of capacitors). A problem may arise when the incoming signal is riding on a DC offset especially when the acceptors are highly effected by deviation of DC offsets (A to D converters for example), which in turn results in a distorted picture.

9.4 Level Control

Level Control function enables the operator to control video signal level or compensate for distortions such as those caused by cables that are too long. Using a non-standard, or an uncalibrated video source also affects the incoming signal. Picture darkness is usually caused by low video signal and on the other hand, excessive video level "burns" the picture. The sync signal (should be around -0.3v) may be used to check conformity of the whole video signal: If sync level is too low or too high, the incoming video signal is not within the standard level. To correct the incoming video signal, an oscilloscope should be connected to amplifier's output and the LEVEL trimmer adjusted until satisfactory sync level and hence proper picture are achieved.

WARNING!

1. ***Be aware that the amplifier was pre-calibrated for transparent operation at the factory and re-tuning it will upset signal transparency.***
2. ***Do not attempt to adjust the LEVEL trimmers without using accompanying standard calibrated oscilloscope or waveform monitor!***

9.5 Equalization Control

Equalization Control function enables the operator to compensate for degradation of the video signal due to too long or non-standard cables. Popular cables such as the RG-59, RG-11 or the RG-179 signal cause degradation/attenuation of the following values:

CABLE TYPE	LENGTH	FREQUENCY	ATTENUATION
RG-59	100 meter	10MHz	3.6dB
	100 meter	100MHz	11dB
RG-11	100 meter	10MHz	2.2dB
	100 meter	100MHz	7.5dB
RG-179	100 meter	10MHz	8dB
	100 meter	100MHz	30dB

Degradation and loss of video signal are mainly caused due to stray capacitance which occur in long cables. As longer cables or higher frequency are used, the problem becomes worse, resulting in fine detail loss as well as color degradation. When RGB signals are involved (200-300MHz), degradation is even greater, leading to a total loss of sharpness at high resolution. It is necessary to compensate for the problem by using the amplifier's EQ. Control trimmer. Equalization is performed as follows: A Color Bar Generator is connected to amplifier's input and a Waveform Monitor (or an Oscilloscope with 75ohm termination) is connected to the long cable output. A known color bar signal is applied to the amplifier's input and compared to the signal monitored at the far side. The operator adjusts the EQ. trimmer until the measured output chrominance signal matches that of the input signal.

WARNING!

1. ***The amplifier was calibrated at the factory for transparent operation at 1 meter. Any re-tuning will upset amplifier's transparency.***
2. ***Do not attempt to adjust the Equalization trimmers without using accompanying standard calibrated oscilloscope or waveform monitor!***

9.6 Balanced\Stereo Audio Control

Balanced audio is a signal that is divided into two antiphase signals, traveling on two wires (and sometimes with a third - a ground reference wire). Transmitting a balanced signal achieves a better signal to noise ratio, and the signal is more immune to noise and interference. On the receiving end there is a differential amplifier, which amplifies only the differences between the antiphase signals, thus canceling noise which is picked up on the way. The balanced system is used either when very low signals are to be transmitted over long distances (such as generated from high quality microphones) or at broadcast audio studios for highest quality signal recreation.

9.6.1 VM-10ARII Audio Control

To enable audio control trimmers adjustments, select "**Enable**" position using the **Enable/Disable** pushbutton. Then using a flat screwdriver, gently adjust the Left **Gain** trimmer to control the left channel audio gain, or the right **Gain** trimmer to control the right channel audio gain for satisfactory audio level. Select the desired balanced/stereo mode by pushing/releasing the **BAL/ST** pushbutton located at the front of the machine.

9.6.2 VM-5ARII, VM-20ARII and VM-1411 Audio Control

Using a flat screwdriver, gently adjust the Left **Gain** trimmer to control the left channel audio gain, or the right **Gain** trimmer to control the right channel audio gain for satisfactory audio level. Select the desired **balanced/stereo** position (VM-20ARII only) by pushing/releasing the **BAL/ST** pushbutton located at the front of the machine.

9.7 Programming the VM-20ARII

The VM-20ARII mode of operation is selected by pressing one of the operating mode control switches (one set for audio and one set for video) as described below:

- Pressing the **1:20** switch, splits input "**1**" to all 20 outputs.
- Pressing the **2x1:10** switch, splits input "**1**" to outputs "**1-10**" and input "**3**" to outputs "**11-20**".
- Pressing the **4x1:5** switch, splits four inputs to four consecutive sets of five outputs each.
- Pressing the **1:10+2x1:5** switch - Splits input "**1**" to outputs "**1-10**", input "**3**" to outputs "**11-15**" and input "**4**" to outputs "**16-20**".

9.8 Programming the VM-1411

The VM-1411 mode of operation is selected by pressing one of the operating mode control switches (one for audio and one for video) as described below:

- Pressing the **2x1:5/1:10** switch splits input "**A**" to all 10 outputs.
- Releasing the **2x1:5/1:10** switch splits inputs "**A**" and "**B**" to outputs sets "**A**" and "**B**" respectively.

9.9 Basic Video/Audio Distribution Setup

Figure 5 illustrates a typical usage of the VM amplifiers described in this manual: an incoming single input from source (VCR) is split into ten identical outputs, connected to acceptors. The VM-Amplifier is looped to a second VM-10ARII in order to extend the number of outputs.
Perform the following steps (if necessary):

1) Connect the output of the video/audio source to the video/audio inputs of a distribution amplifier (VM-10ARII for example).
2) Connect the output of the distribution amplifier to the inputs of 10 video & audio acceptors.
3) Use the looping option if needed (see section 9 for more details).
4) When looping option is used, connect a cable between looping connectors (video & audio) of the VM-10ARII to input connectors (video & audio) of a second VM-10ARII.

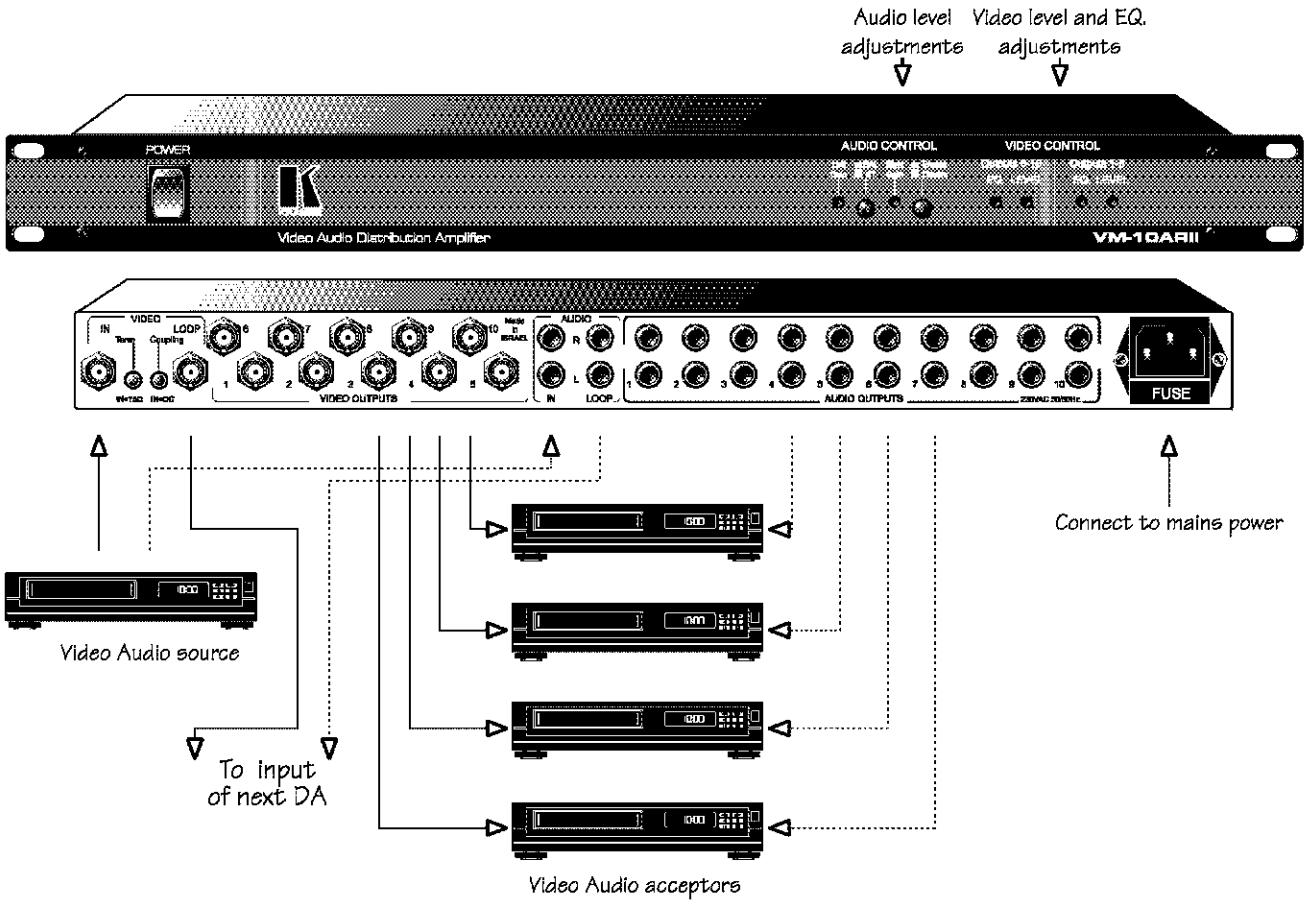


Figure 5: Basic Video/Audio Distribution Setup

10. TAKING CARE of YOUR VIDEO AMPLIFIER

Do not locate your amplifier in an environment where it is susceptible to dust or moisture. These may damage the electronics, and cause erratic operation or failure. Do not locate your amplifier where temperature and humidity may be excessive. Do not clean your amplifier with abrasives or strong cleaners. Doing so may remove or damage the finish, or may allow moisture to build up. Take care not to allow dust or particles to build up inside unused or open connectors.

11. TROUBLESHOOTING

NOTES

1. *Please note that if the output signal is disturbed or interrupted by very strong external electromagnetic interference, it should return and stabilize when such interference ends. If not, turn the power switch off and on again to reset the machine.*
2. *If the recommended actions still do not result in satisfactory operation, please consult your KRAMER Dealer.*

11.1 Power and Indicators

Problem	Remedy
No power	1. Confirm that the rocker switch is in the "ON" position, and that the LAMP/LED is illuminated. 2. Confirm that power connections are secured at the amplifier and at the receptacle. Make sure the receptacle is active, outputting the proper mains voltage. 3. If there is still no power, check the fuse. Remove power cord from the AC outlet and from the machine and then, using a flat head screwdriver, remove the fuse holder located directly below the power connector. Confirm that the fuse is good by looking at the wire connected to the ends of the fuse. If the wire is broken, replace the fuse with another, with the same value.

11.2 Video Signal

Problem	Remedy
No video at the output device, regardless of input selected.	1. Confirm that your sources and output device are powered on and connected properly. Video signals connected to the input of your amplifier should be of an identical signal format at the output of your source. Video signals at the output of your amplifier should be of an identical signal format as at the input of your display or recorder. 2. Confirm that any other amplifiers in the signal path have the proper input and/or output selected. 3. Use the Video Tester to test the video path leading to/from your amplifier (see section 4.1 " Video Tester")
Video level is too high or too low	1. The amplifiers in this manual (except for the VM-20ARII) have termination switches on each input. Verify that the video line is well interfaced through 75ohm impedance, otherwise it results in a video level that is too high or too low. Check if looping is used and if termination switch is in the proper position for this state. 2. Confirm that the connecting cables are of high quality, properly built and terminated with 75ohm BNC connectors. Check level controls located on your source input device or output device.

Problem	Remedy
Noise bars "roll" up or down in the output image or: Low frequency hum in the output signal	Hum bars (ground loop) are caused by a difference in the ground potential of any two or more devices connected to your signal path. This difference is compensated by passing that voltage difference through any available interconnection, including your video cables. WARNING! ***Do not disconnect the ground from any piece of video equipment in your signal path!*** Check the following to remove hum bars: 1. Confirm that all interconnected equipment is connected to the same phase of power. 2. Remove equipment connected to this phase that may be introducing noise, such as motors, generators, etc. 3. Disconnect all cables and reconnect them one at a time until ground loop reappears. Disconnect the affected cable and replace, or insert an isolation device (opto isolator or transformer) in the signal path.

11.3 Audio Signal

Problem	Remedy
No audio at the output device, regardless of input selected	1. Confirm that your sources and output device are powered on and connected properly. Audio signals connected to the input of your amplifier should be properly wired to the output of your source. Audio signals connected to the output of your amplifier should be properly wired to the input of your amplifier or recorder. 2. Confirm that any other amplifiers in the signal path have the proper input and/or output selected. Pay special attention to input amplifiers that may be built into your amplifier or recording device.
Audio level is too low	1. Confirm that the connecting cables are of high quality and properly built. Take special care in noting the wiring configuration of balanced to unbalanced cables. 2. Check level controls located on your source input device or output device.

LIMITED WARRANTY

Kramer Electronics (hereafter Kramer) warrants this product to be 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:
   a) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature, unauthorized product modification, or failure to follow instructions supplied with the product.
   b) Repair or attempted repair by anyone not authorized by Kramer.
   c) Any shipment of the product (claims must be presented to the carrier).
   d) Removal or installation of the product.
   e) Any other cause, which does not relate to a product defect.
   f) 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 you 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

Kramer's liability for any defective 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.

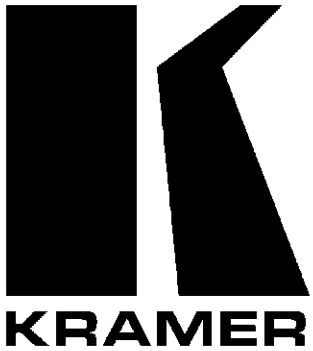
NOTICE

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

- Any user who makes changes or modifications to the unit without the express approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied AC power cord (when applicable) to supply power to the machine and controllers.
- Please use recommended interconnect cables to connect the machine to controllers and other components.



The list of Kramer distributors appears on our web site:
www.kramerelectronics.com
From the web site it is also possible to e-mail factory headquarters.
We welcome your questions, comments and feedback.

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