Kramer Electronics, Ltd.

USER MANUAL

Model:

908

40W Per Channel Stereo Audio Amplifier

Contents

Figures

Tables

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 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Thank you for purchasing the Kramer MegaTOOLS® **908** *40W Per Channel Stereo Audio Amplifier*, which is ideal for:

- Presentation rooms and multimedia applications for quick, local audio amplification
- Personal audio listening (for example, a PC and portable CD player)

The package includes the following items:

- **908** *40W Per Channel Stereo Audio Amplifier*
- Kramer **RC-IR3** Infrared Remote Control Transmitter (including the required battery and a separate user manual)
- Power supply (24V DC)
- This user manual[2]

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 cables[3]

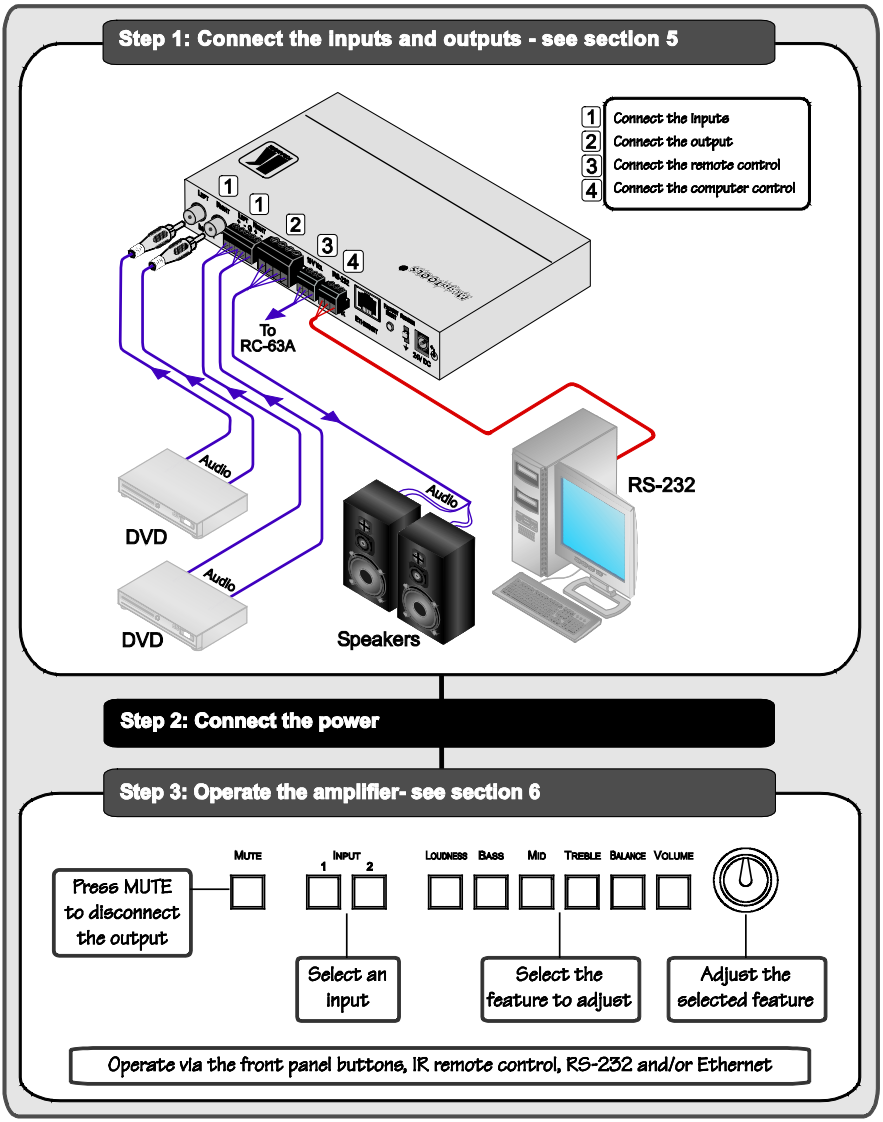
1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

2 Download up-to-date Kramer user manuals from our Web site at http://www.kramerelectronics.com

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

2.1 Quick Start

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



3 Overview

The Kramer **908** is a high-performance audio amplifier for line-level stereo audio signals. It accepts either a stereo audio signal on RCA connectors or a balanced stereo audio signal on a terminal block connector. It delivers a speaker output of 2x40 watts RMS per channel into an 8Ω load on a 10A 4-pin terminal block connector. The **908** features:

- Two input selector buttons and a mute button
- One gain knob for adjusting the audio output levels for loudness, bass, middle, treble, balance and the volume
- A USB connector for firmware upgrade
- RS-232 and Ethernet ports
- A 10V control port for adjusting the audio gain via an external connector[1]

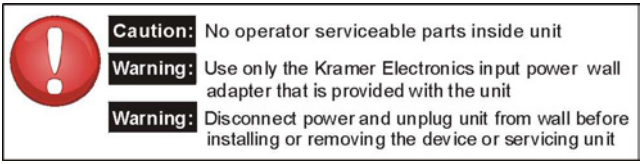
The **908** can be controlled:

- Directly, via the front panel push buttons and adjustment knob
- By RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- Via an external 10V controller (for volume)
- Via the Ethernet using the embedded Web server
- Remotely, from the infrared remote control transmitter

The **908** is housed in a Kramer MegaTOOLS™ enclosure and is fed by a 24V DC power supply.

To achieve the best performance:

- Use only good quality connection cables[2] to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality and position your Kramer **908** away from moisture, excessive sunlight and dust



1 For example, the Kramer RC-63A

2 Available from Kramer Electronics on our Web site at http://www.kramerelectronics.com

4 Your 908 Stereo Amplifier

Figure 1 and Table 1 define the **908**.

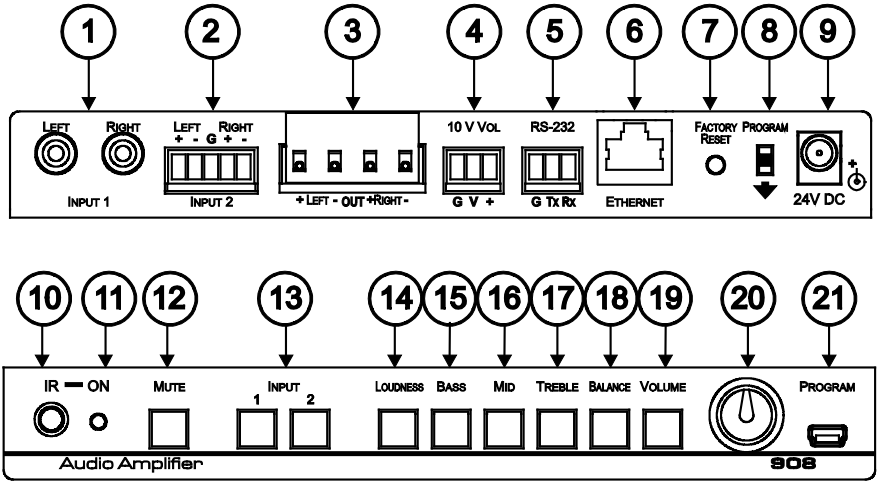


Figure 1: 908 40W Per Channel Stereo Audio Amplifier

Table 1: 908 40W Per Channel Stereo Audio Amplifier Functions

#	Feature	Function
1	*INPUT 1 L* and *R* RCA Connectors	Connect to the left and right unbalanced stereo analog audio acceptor
2	*INPUT 2* Terminal Block Connector	Connect to the balanced stereo audio source
3	*OUTPUT* Terminal Block Connector	Connect to a balanced stereo acceptor (speakers)
4	*10V VOL G, V, +* Terminal Block Connector	Connect to a controller[1] to adjust the volume via the controller
5	*RS-232 G Tx Rx* Terminal Block Connector	Control connector
6	*ETHERNET* Port	Connects to your LAN[2]
7	*FACTORY RESET* Button	Press to return the device to its factory default settings
8	*PROGRAM* Switch	Switch down before performing a firmware upgrade, leave up (the default) for normal operation
9	*24V DC Connector*	+24V DC for powering the unit
10	*IR IN* Receiver	Accepts IR remote commands
11	*ON* LED	Illuminates green when receiving power, flashes when receiving IR commands
12	*MUTE* Button	Press to disable/enable the audio output. The button illuminates when the audio output is disabled

1 For example, the Kramer RC-63A

2 Local Area Network (that is, computers sharing a common communications line or wireless link, which often share a server within a defined geographic area)

#	Feature	Function
13	*INPUT SELECTOR* Buttons	Press to select the input audio source 1 or 2
14	*LOUDNESS* Button	Press to select the loudness adjustment, adjust with the level knob
15	*BASS* Button	Press to select the bass adjustment, adjust with the level knob
16	*MID* Button	Press to select the mid range adjustment, adjust with the level knob
17	*TREBLE* Button	Press to select the treble adjustment, adjust with the level knob
18	*BALANCE* Button	Press to select the balance between right and left speakers, adjust with the level knob
19	*VOLUME* Button	Press to select the volume adjustment, adjust with the level knob
20	Level Adjustment Knob	Increase and decrease the level of the previously selected function. Press and hold to disable local volume control and enable remote volume control. Press and hold again to activate local volume control (see section 6.1)
21	*PROGRAM (USB)* Connector	Connect to a computer to upgrade the firmware

5 Connecting the 908 Stereo Amplifier

To connect the **908**, as illustrated in the example in Figure 2, do the following:

1. Connect an unbalanced stereo audio source (for example, the unbalanced stereo audio output of a DVD player) to the L and R INPUT 1 RCA connectors.
2. Connect a balanced stereo audio source (for example, the balanced stereo audio output of a DVD player) to the INPUT 2 terminal block connector.
3. Connect the OUTPUT terminal block to a pair of loudspeakers:
   Connect the “L+” and the “L-” terminal block connectors to the left loudspeaker, and the “R+” and the “R-” terminal block connectors to the right loudspeaker. **Do not ground the loudspeakers**.
4. Connect the 24V DC power adapter to the power socket and connect the adapter to the mains electricity (not shown in Figure 2).
5. If required, connect:
   - The 10V CONTROL terminal block connector to an external controller[1] (see section 5.1)
   - The RS-232 port to a PC and/or serial controller (see section 5.2)
   - The Ethernet port to a PC or a network hub or router (see section 5.3

1 For example, the Kramer RC-63A

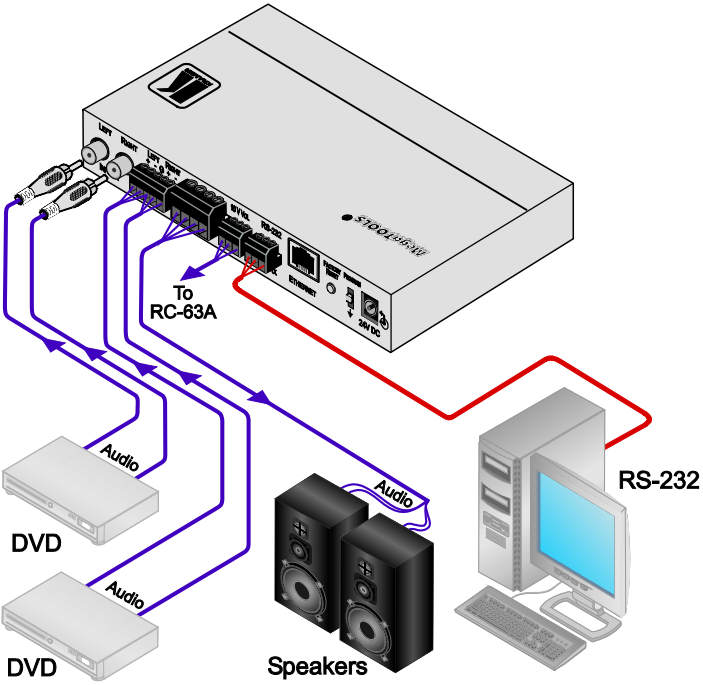


Figure 2: Connecting the 908 40W Per Channel Stereo Audio Amplifier

5.1 Connect the 10V CONTROL Port to an External Controller

You can connect the **908** 10V VOL terminal block connector to a controller (for example, the Kramer **RC-63A**) as illustrated in Figure 3:

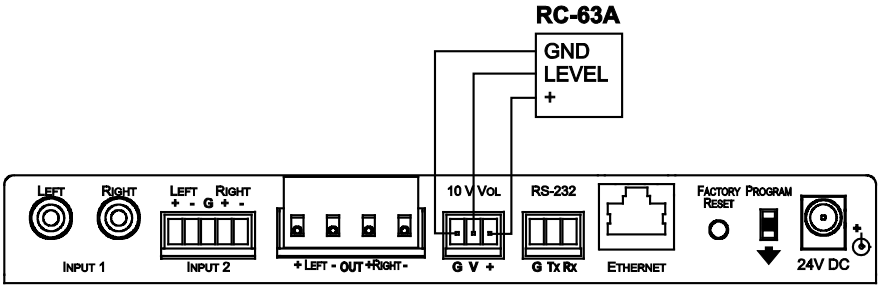


Figure 3: Connecting the 10V VOL Terminal Block Connector

5.2 Connecting a PC

You can connect a PC (or other controller) to the **908** via the RS-232 terminal block connector.

To connect a PC to a **908** unit, connect the RS-232 terminal block connector on the **908** unit to the RS-232 9-pin D-sub port on your PC, see Figure 4:

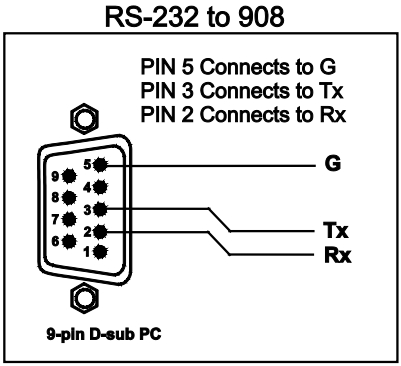


Figure 4: Connecting to a PC

5.3 Connecting the 908 via the Ethernet Port

To connect the **908** via the Ethernet port, do the following:

- When connecting to the Ethernet port on a network hub or network router, use a straight-through cable with RJ-45 connectors
- When connecting to the Ethernet port of a PC, use a crossover cable with RJ-45 connectors

If you are connecting the **908** directly to your computer (not through the network) you may need to reconfigure the PC network settings.

To reconfigure the PC network settings:

1. Navigate to *Start* > *Settings* > *Network Connections*.
2. Click on the appropriate *Local Area Connection*.
3. Right-click the *Local Area Connection* and click *Properties*.
   The Local Area Properties Window appears:

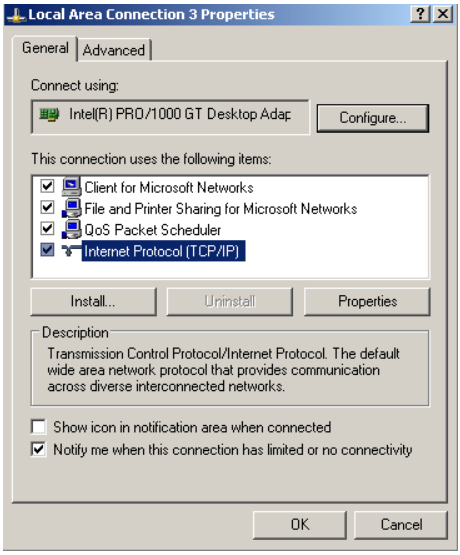


Figure 5: Local Area Properties Window

4. Select *Internet Protocol (TCP/IP)* and click *Properties*.
   The Internet Protocol (TCP/IP) Properties Window appears:

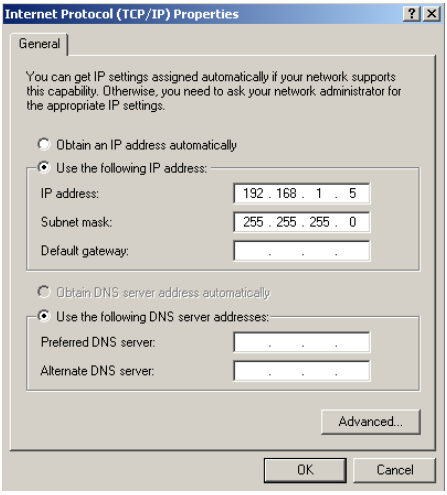


Figure 6: Internet Protocol (TCP/IP) Properties Window

5. Click *Use the following IP address* and enter the IP address and Subnet mask shown above. Click *OK* and *OK* to close both windows and save the settings.

6 Operating the 908

You can operate your **908** using:

- The front panel buttons (see section 6.1)
- PC, touch screen system, or other serial controller via RS-232 serial commands (see section 6.2)
- The Ethernet via the embedded Web server (see section 6.3)
- The included RC-IR3 Infrared Remote Controller (see section 6.4)

6.1 Using the Front Panel Buttons

The front panel buttons let you:

- Select an input, by pressing the INPUT 1 or the INPUT 2 button
- Adjust the sound
- Mute the sound by pressing the MUTE button

To adjust the sound of the output signal:

1. Press the sound component that you want to adjust (LOUD, BASS, MID, TREBLE, BAL or VOLUME). The button illuminates.
2. Turn the adjustment knob to adjust the setting.

Note: To enable remote volume control via the 10V VOL connector (using for example, the Kramer **RC-63A**), you must disable the local digital volume control by pressing and holding the VOLUME button on the front panel for several seconds. The LED flashes to indicate that remote control is enabled. In this mode, volume control via software ("Set simple audio volume" P3000 command, see section 10.6) is disabled. To disable remote control, press and hold the VOLUME button and the LED lights solid.

6.2 Using Serial Commands

To operate your device using serial commands, you need to install Kramer's control software[1].

For an explanation of all control commands, see section 10.

6.3 Using the Embedded Web Server

You can remotely operate the **908** using a Web browser via the Ethernet connection (see section 5.3). To be able to do so, you must use a supported

1 Download control software from our Web site at http://www.kramerelectronics.com

Web browser; Microsoft (V6.0 and higher), Chrome or Firefox (V3.0 and higher).

To check that Java is installed correctly and running, browse to: http://www.java.com/en/download/help/testvm.xml

This page runs a test and displays a Java success (see Figure 7) or failure message.

Figure 7: Java Test Page Success Message

If you do not see the success message, follow the instructions on the page to:

- Load and enable Java
- Enable Javascript in your browser

Make sure that your PC is connected via the Ethernet connection to the **908** (see section 5.3) and do the following:

1. Open your Internet browser.
2. Enter the unit's IP number[1] or name in the Address bar of your browser. If you are using DHCP, you must enter the name.

Figure 8: Entering the IP Number in the Address Bar

The following window appears:

1 The default IP number is 192.168.1.39, and may be changed by the system integrator

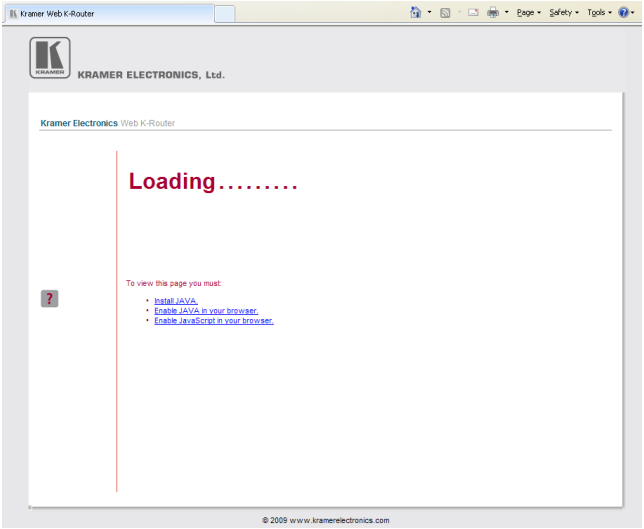


Figure 9: Loading the Embedded Web Server

3. Check that Java and JavaScript is enabled in your browser.
   The following window appears:

Figure 10: First Time Security Warning

4. Click Run.
   The **908** Control Window opens (see Figure 11):

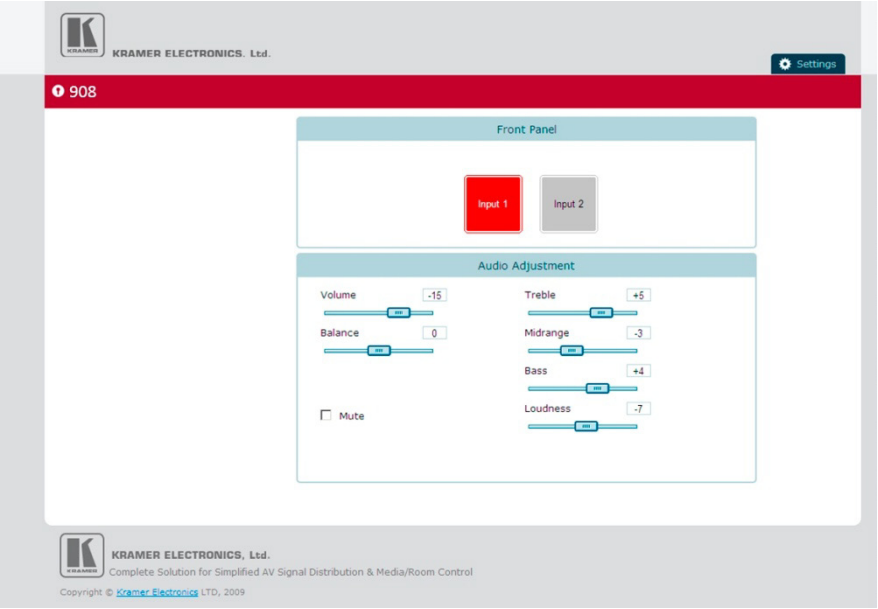


Figure 11: The 908 Control Window

5. To choose the desired input, click on *Input 1* or *Input 2* (see Figure 12). Each input has its own set of audio adjustments.
6. To adjust each function, click and hold each slider and drag to the right to increase or to the left to decrease the shown value.
7. To mute the output, check the Mute box.

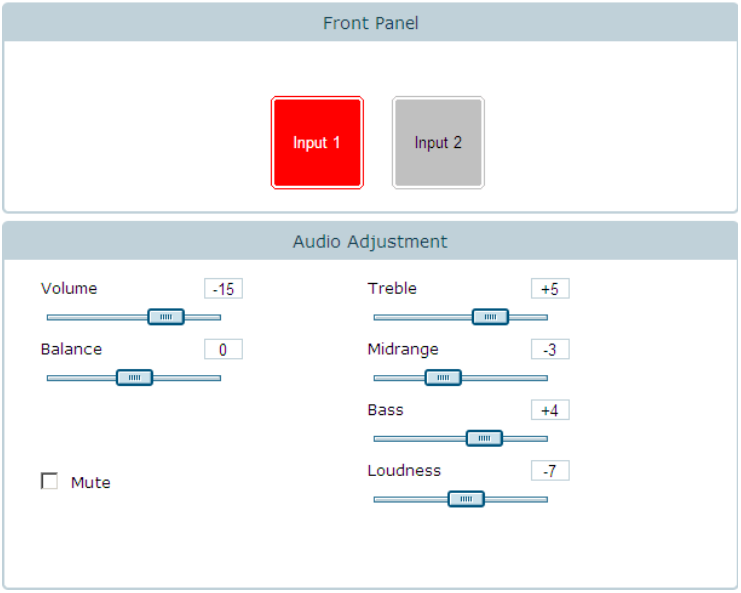


Figure 12: Control Settings

8. To change the Ethernet settings, click the *Settings* tab at the top of the Control Window. The Ethernet settings display (see Figure 13):

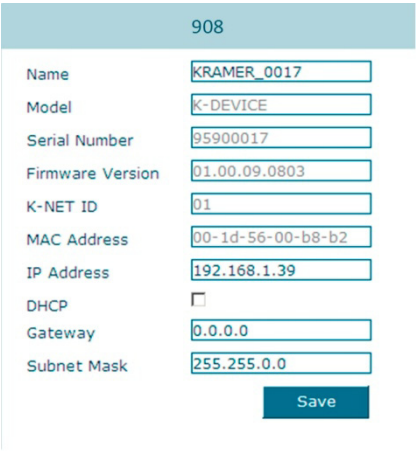


Figure 13: Ethernet Settings

9. Make any necessary changes and click *Save* to save the settings.
10. To return to the Control Window, click *908* under the Kramer logo.

6.4 Using the RC-IR3 Infrared Remote Controller

You can use the **RC-IR3** remote controller to make some[1] of the adjustments that are made using the front panel buttons:

- To choose an input, press button 1 or 2
- To toggle muting, press the OFF button
- To increase the volume, press + (►)
- To decrease the volume, press – (◄)

7 Updating the 908 Firmware

The **908** functions by means of a device microcontroller that runs firmware located in FLASH memory.

If required, you can download[2] and upgrade to the latest version of firmware[3].

8 Default Communication Parameters

Table 2 lists the communication parameters as used in Kramer Electronics products.

Table 2: Default Communication Parameters

RS-232	
Protocol 3000 (Default)	
Baud Rate:	115,200
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	ASCII
Ethernet Factory Default Values	
IP Address: 192.168.1.39 Mask: 255.255.255.0 Gateway: 192.168.1.1	Power cycle the unit while pressing the Factory Reset button, located on the rear panel of the unit.
TCP Port #: 5000	
UDP Port #: 50000	

1 Loudness, bass, mid, treble and balance adjustments are not adjustable using the IR remote

2 From the Kramer Web site www.kramerelectronics.com

3 The firmware is installed using the P3K software that is also available from the Kramer Web site

9 Technical Specifications

908 technical specifications are shown in Table 3:

Table 3: 908 Technical Specifications[1]

INPUTS:	1 unbalanced stereo audio input on RCA connectors 1 balanced stereo audio input on a 5-pin terminal block connector 1 USB connector
OUTPUTS:	1 speaker stereo audio output on a 4-pin terminal block connector
INPUT SENSITIVITY:	Unbalanced: 360mVpp; balanced: 220mVpp
MAX. VOLTAGE GAIN:	Unbalanced: 35dB; balanced: 40.5dB
OUTPUT POWER:	40W per channel into 8Ω
BANDWIDTH (-3dB):	22kHz
CROSSTALK:	<-57dB @20kHz
CONTROLS:	Level: <-30dB to 35.5dB; balance: -30dB to 0dB; loudness: -14dB to 0dB @1kHz; bass: -15dB to 12dB @100Hz; mid: -15dB to 11dB @1kHz; treble: -14dB to 13dB @10kHz; input selector buttons, mute button, loudness, bass, mid, treble, balance, volume buttons, IR, RS-232, Ethernet, 10V volume control
COUPLING:	Input: AC, output: DC
AUDIO THD + NOISE:	0.15%
AUDIO 2nd HARMONIC:	0.06%
SIGNAL/NOISE RATIO:	63dB, 80dB @10% distortion
AMPLIFIER TYPE:	Class D
POWER SOURCE:	24V DC, 2A
DIMENSIONS	18.8cm x 11.4cm x 2.4cm (7.4" x 4.5" x 0.94") W, D, H
WEIGHT:	0.6kg (1.32lbs)
ACCESSORIES:	Power supply, RC-IR3 remote controller
OPTIONS:	RK-T2B 19” rack adapter

1 Specifications are subject to change without notice

10 908 Commands in Protocol 3000

This RS-232/RS-485 communication protocol lets you control the machine from any standard terminal software (for example, Windows® HyperTerminal Application) and uses a data rate of 115200 baud, with no parity, 8 data bits, and 1 stop bit.

This section describes all commands sent to the **908**. For an explanation of the syntax and use of Protocol 3000, see section 10.10.

10.1 Operating Commands

Following are the specific commands that the room controller (RC device) sends to the **908** to operate the external devices.

10.2 Help Commands

Command	Syntax	Response
Protocol handshaking	#CR	~OK CRLF

10.3 Device Initiated Messages

Command	Syntax
Start message	Kramer Electronics LTD. , Device Model Version Software Version
Switcher actions:	
Audio channel has switched (breakaway mode)	AUD IN>OUT

10.4 Result and Error Codes

	Syntax
Command ran successfully, no error.	COMMAND PARAMETERS OK
Protocol Errors:	
Syntax error	ERR001
Command not available for this device	ERR002
Parameter is out of range	ERR003
Unauthorized access (command run without the matching login).	ERR004

10.5 Basic Routing Commands

Command	Syntax	Response
Switch audio only	AUD IN>OUT, IN>OUT, … Short form: A IN>OUT, IN>OUT, …	AUD IN>OUT, IN>OUT, …RESULT
Switch audio only	AUD IN>OUT, IN>OUT, … Short form: A IN>OUT, IN>OUT, …	AUD IN>OUT, IN>OUT, …RESULT
Read audio connection	AUD? OUT Short form: A? OUT AUD? *	AUD IN>OUT AUD IN>1, IN>2, …

Parameter Description:

IN = Input number or '0' to disconnect output.

'>' = Connection character between in and out parameters.

OUT = Output number or '*' for all outputs.

10.6 Audio Parameters Commands

Command	Syntax	Response
Set simple audio volume	VOLUME VOLUME Short form: VOL VOLUME	VOLUME VOLUME RESULT
Increase/decrease simple audio volume	VOLUME +/- Short form: VOL +/-	VOLUME +/- RESULT
Read simple audio level	VOLUME? Short form: VOL?	VOLUME VOLUME
Set audio level in specific amplifier stage.	AUD-LVL STAGE, CHANNEL, VOLUME Short form: ADL STAGE, CHANNEL, VOLUME	AUD-LVL STAGE, CHANNEL, VOLUME RESULT
Read audio volume level	AUD-LVL? STAGE, CHANNEL Short form: ADL? STAGE	AUD-LVL STAGE, CHANNEL, VOLUME

Advanced commands for controlling each stage of audio amplification:

Set audio bass level	BASS CHANNEL, BASS Short form: ADB CHANNEL, BASS	BASS CHANNEL, BASS RESULT
Read audio bass level	BASS? CHANNEL Short form: ADB? CHANNEL	BASS CHANNEL, BASS
Set audio treble level	TREBLE CHANNEL,TREBLE Short form: ADT CHANNEL,TREBLE	TREBLE CHANNEL, TREBLE RESULT
Read audio treble	TREBLE? CHANNEL Short form: ADT? CHANNEL	TREBLE CHANNEL, TREBLE
Set audio midrange	MIDRANGE CHANNEL, MID_RANGE Short form: ADM CHANNEL, MID_RANGE	MIDRANGE CHANNEL, MID_RANGE RESULT
Read audio midrange	MIDRANGE? CHANNEL Short form: ADM? CHANNEL	MIDRANGE CHANNEL, MID_RANGE
Set audio loudness	LOUDNESS CHANNEL, LOUDNESS Short form: ADS CHANNEL, LOUDNESS	LOUDNESS CHANNEL, LOUDNESS RESULT
Read audio loudness	LOUDNESS? CHANNEL Short form: ADS? CHANNEL	LOUDNESS CHANNEL, LOUDNESS
Mute audio	MUTE MUTE-MODE	MUTE MUTE-MODE RESULT

Command	Syntax	Response
Read audio mute state	MUTE?	MUTE MUTE-MODE
Set stereo mode	STEREO STEREO-MODE	STEREO STEREO-MODE RESULT
Read stereo mode	STEREO?	STEREO STEREO-MODE
Set balance mode	BALANCE OUT-CHANNEL, BALANCE-LEVEL	BALANCE OUT-CHANNEL, BALANCE-LEVEL RESULT
Read balance mode	BALANCE? OUT-CHANNEL	BALANCE OUT-CHANNEL, BALANCE-LEVEL

Parameter Description:

STAGE = 'IN, 'OUT'

or

Numeric value of present audio processing stage. For example: '0' for input level, '1' for pre-amplifier, '2' for amplifier (OUT) etc.

CHANNEL = Input or Output #

VOLUME / BASS / TREBLE / MID_RANGE = Audio parameter in Kramer units, minus sign precedes negative values.

++ increase current value,

-- decrease current value.

10.7 Identification Commands

Command	Syntax	Response
Protocol handshaking	#CR	~OK CRLF
Read device model	MODEL?	MODEL MACHINE_MODEL
Read device serial number	SN?	SN SERIAL_NUMBER
Read device firmware version	VERSION?	VERSION MAJOR .MINOR .BUILD .REVISION
Set machine name	NAME MACHINE_NAME	NAME MACHINE_NAME RESULT
Read machine name	NAME?	NAME MACHINE_NAME
Reset machine name to factory default*	NAME-RST	NAME-RST MACHINE_FACTORY_NAME RESULT

***Note**: The machine name is not the same as the model name. The machine name is used to identify a specific machine or a network in use (with DNS feature on).

MACHINE_NAME = Up to 14 alphameric chars.

* **Machine factory name =** Model name + last 4 digits from serial number.

Set machine ID number	MACH-NUM MACHINE_NUMBER	MACH-NUM OLD_MACHINE_NUMBER ,NEW_MACHINE_NUMBER RESULT

* A response is sent after the machine number was changed. The response with the header is:

NEW_MACHINE_NUMBER @MACH-NUM OLD_MACHINE_NUMBER ,NEW_MACHINE_NUMBER OK

10.8 Network Setting Commands

Command	Syntax	Response
Set IP address	NET-IP IP_ADDRESS Short form: NTIP	NET-IP IP_ADDRESS RESULT
Read IP address	NET-IP? Short form: NTIP?	NET-IP IP_ADDRESS
Read MAC address	NET-MAC? Short form: NTMC	NET-MAC MAC_ADDRESS
Set subnet mask	NET-MASK SUBNET_MASK Short form: NTMSK	NET-MASK SUBNET_MASK RESULT
Read subnet mask	NET-MASK? Short form: NTMSK?	NET-MASK SUBNET_MASK
Set gateway address	NET-GATE GATEWAY_ADDRESS Short form: NTGT	NET-GATE GATEWAY_ADDRESS RESULT
Read subnet mask	NET-GATE? Short form: NTGT?	NET-GATE GATEWAY_ADDRESS
Set DHCP mode	NET-DHCP DHCP_MODE Short form: NTDH	NET-DHCP DHCP_MODE RESULT
Read subnet mask	NET-DHCP? Short form: NTDH?	NET-DHCP DHCP_MODE

DHCP_MODE =
'0' – Don't use DHCP (Use IP set by factory or IP set command).
'1' – Try to use DHCP, if unavailable use IP as above.

Change protocol Ethernet port	ETH-PORT PROTOCOL , PORT Short form: ETHP	ETH-PORT PROTOCOL , PORT RESULT
Read protocol Ethernet port	ETH-PORT? PROTOCOL Short form: ETHP?	ETH-PORT PROTOCOL , PORT

PROTOCOL = TCP/UDP (transport layer protocol)
PORT = Ethernet port that accepts Protocol 3000 commands
1-65535 = User defined port
0 - Reset port to factory default (50000 for UDP, 5000 for TCP)

10.9 Machine Information Commands

Command	Syntax	Response
Set device time and date	TIME DATE_TIME	TIME DATE_TIME RESULT
Read device time and date	TIME?	TIME? DATE_TIME

Note: Time setting commands require administrator authorization.

Read in/out count	INFO-IO?	INFO-IO: IN INPUTS_COUNT, OUT OUTPUTS_COUNT
Read max preset count	INFO-PRST?	INFO-PRST: VID PRESET_VIDEO_COUNT, AUD PRESET_AUDIO_COUNT
Execute firmware upgrade*	UPGRADE	UPGRADE OK

Firmware usually uploads to a device via a command like LDFW. The device may need to be reset to complete the process.

Command	Syntax	Response
Reset to factory default configuration	FACTORY	FACTORY RESULT
Set model name	FCT-MODEL FACTORY_PASSWORD MODEL_NAME	FCT-MODEL MAC_ADDRESS RESULT

*If implemented by hard coding, protocol command is unnecessary

Set MAC address	FCT-MAC FACTORY_PASSWORD MAC_ADDRESS	FCT-MAC MAC_ADDRESS RESULT
Set SN #	FCT-SN FACTORY_PASSWORD SN#	FCT-SN SN# RESULT

* Machine factory settings commands are not for public knowledge. Reference is only for internal implementation

10.10 Protocol 3000 Syntax

Protocol 3000 is used to control the **908** via an RS-232 connection using a PC, touch screen, other serial controller or RC type controller.

10.10.1 Host Message Format

Start	Address (optional)	Body	Delimiter
#	*Destination_id@*	**Message**	CR

10.10.2 Simple Command

Command string with only one command without addressing:

Start	Body	Delimiter
#	**Command** SP *Parameter_1,Parameter_2,…*	CR

10.10.3 Command String

Formal syntax with commands concatenation and addressing:

Start	Address	Body	Delimiter
#	*Destination_id@*	**Command_1** *Parameter1_1,Parameter1_2,…*| **Command_2** *Parameter2_1,Parameter2_2,…*| **Command_3** *Parameter3_1,Parameter3_2,…*|…	CR

10.10.4 Device Message Format

Start	Address (optional)	Body	delimiter
~	*Sender_id@*	**Message**	CR LF

10.10.5 Device Long Response

Echoing command:

Start	Address (optional)	Body	Delimiter
~	*Sender_id@*	**Command** SP **[***Param1 ,Param2 …***]** **result**	CR LF

CR = Carriage return (ASCII 13 = 0x0D)
LF = Line feed (ASCII 10 = 0x0A)
SP = Space (ASCII 32 = 0x20)

10.10.6 Command Terms

Command
A sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').
Command and parameters must be separated by at least one space.

Parameters
A sequence of alphameric ASCII characters ('0'-'9','A'-'Z','a'-'z' and some special characters for specific commands). Parameters are separated by commas.

Message string
Every command entered as part of a message string begins with a **message starting character** and ends with a **message closing character**.
Note: A string can contain more than one command. Commands are separated by a pipe ('|') character.

Message starting character
'#' – For host command/query
'~' – For machine response

Query sign
'?' follows some commands to define a query request.

All outputs sign
'*' defines all outputs.

Message closing character
CR – For host messages; carriage return (ASCII 13)
CRLF – For machine messages; carriage return (ASCII 13) + line-feed (ASCII 10)

Command chain separator character
When a message string contains more then one command, a pipe ('|') character separates each command.

Spaces between parameters or command terms are ignored.

10.10.7 Entering Commands

You can directly enter all commands using a terminal with ASCII communications software, such as HyperTerminal, Hercules, etc. Connect the terminal to the serial, Ethernet, or USB port on the Kramer device. To enter **CR** , press the Enter key.
(**LF** is also sent but is ignored by command parser).

For commands sent from some non-Kramer controllers like Crestron, some characters require special coding (such as, /X##). Refer to the controller manual.

10.10.8 Command Forms

Some commands have short name syntax in addition to long name syntax to allow faster typing. The response is always in long syntax.

10.10.9 Command Chaining

Multiple commands can be chained in the same string. Each command is delimited by a pipe character ('|'). When chaining commands, enter the **message starting character** and the **message closing character** only once, at the beginning of the string and at the end.

Commands in the string do not execute until the closing character is entered.

A separate response is sent for every command in the chain.

10.10.10 Maximum String Length

64 characters.

LIMITED WARRANTY

The warranty obligations of Kramer Electronics for this product are limited to the terms set forth below:

What is Covered

This limited warranty covers defects in materials and workmanship in this product.

What is Not Covered

This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Kramer Electronics to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover cartons, equipment enclosures, cables or accessories used in conjunction with this product.

Without limiting any other exclusion herein, Kramer Electronics does not warrant that the product covered hereby, including, without limitation, the technology and/or integrated circuit(s) included in the product, will not become obsolete or that such items are or will remain compatible with any other product or technology with which the product may be used.

How Long Does this Coverage Last

Seven years as of this printing; please check our Web site for the most current and accurate warranty information.

Who is Covered

Only the original purchaser of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

What Kramer Electronics will do

Kramer Electronics will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1. Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Kramer Electronics will also pay the shipping costs necessary to return this product once the repair is complete.
2. Replace this product with a direct replacement or with a similar product deemed by Kramer Electronics to perform substantially the same function as the original product.
3. Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

What Kramer Electronics will not do Under This Limited Warranty

If this product is returned to Kramer Electronics or the authorized dealer from which it was purchased or any other party authorized to repair Kramer Electronics products, this product must be insured during shipment, with the insurance and shipping charges prepaid by you. If this product is returned uninsured, you assume all risks of loss or damage during shipment. Kramer Electronics will not be responsible for any costs related to the removal or re-installation of this product from or into any installation. Kramer Electronics will not be responsible for any costs related to any setting up this product, any adjustment of user controls or any programming required for a specific installation of this product.

How to Obtain a Remedy under this Limited Warranty

To obtain a remedy under this limited warranty, you must contact either the authorized Kramer Electronics reseller from whom you purchased this product or the Kramer Electronics office nearest you. For a list of authorized Kramer Electronics resellers and/or Kramer Electronics authorized service providers, please visit our web site at www.kramerelectronics.com or contact the Kramer Electronics office nearest you.

In order to pursue any remedy under this limited warranty, you must possess an original, dated receipt as proof of purchase from an authorized Kramer Electronics reseller. If this product is returned under this limited warranty, a return authorization number, obtained from Kramer Electronics, will be required. You may also be directed to an authorized reseller or a person authorized by Kramer Electronics to repair the product.

If it is decided that this product should be returned directly to Kramer Electronics, this product should be properly packed, preferably in the original carton, for shipping. Cartons not bearing a return authorization number will be refused.

Limitation on Liability

THE MAXIMUM LIABILITY OF KRAMER ELECTRONICS UNDER THIS LIMITED WARRANTY SHALL NOT EXCEED THE ACTUAL PURCHASE PRICE PAID FOR THE PRODUCT. TO THE MAXIMUM EXTENT PERMITTED BY LAW, KRAMER ELECTRONICS IS NOT RESPONSIBLE FOR DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF WARRANTY OR CONDITION, OR UNDER ANY OTHER LEGAL THEORY. Some countries, districts or states do not allow the exclusion or limitation of relief, special, incidental, consequential or indirect damages, or the limitation of liability to specified amounts, so the above limitations or exclusions may not apply to you.

Exclusive Remedy

TO THE MAXIMUM EXTENT PERMITTED BY LAW, THIS LIMITED WARRANTY AND THE REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, REMEDIES AND CONDITIONS, WHETHER ORAL OR WRITTEN, EXPRESS OR IMPLIED. TO THE MAXIMUM EXTENT PERMITTED BY LAW, KRAMER ELECTRONICS SPECIFICALLY DISCLAIMS ANY AND ALL IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IF KRAMER ELECTRONICS CANNOT LAWFULLY DISCLAIM OR EXCLUDE IMPLIED WARRANTIES UNDER APPLICABLE LAW, THEN ALL IMPLIED WARRANTIES COVERING THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY TO THIS PRODUCT AS PROVIDED UNDER APPICABLE LAW.

IF ANY PRODUCT TO WHICH THIS LIMITED WARRANTY APPLIES IS A "CONSUMER PRODUCT" UNDER THE MAGNUSON-MOSS WARRANTY ACT (15 U.S.C.A. §2301, ET SEQ.) OR OTHER APPICABLE LAW, THE FOREGOING DISCLAIMER OF IMPLIED WARRANTIES SHALL NOT APPLY TO YOU, AND ALL IMPLIED WARRANTIES ON THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE PARTICULAR PURPOSE, SHALL APPLY AS PROVIDED UNDER APPLICABLE LAW.

Other Conditions

This limited warranty gives you specific legal rights, and you may have other rights which vary from country to country or state to state.

This limited warranty is void if (i) the label bearing the serial number of this product has been removed or defaced, (ii) the product is not distributed by Kramer Electronics or (iii) this product is not purchased from an authorized Kramer Electronics reseller. If you are unsure whether a reseller is an authorized Kramer Electronics reseller, please visit our Web site at www.kramerelectronics.com or contact a Kramer Electronics office from the list at the end of this document.

Your rights under this limited warranty are not diminished if you do not complete and return the product registration form or complete and submit the online product registration form. Kramer Electronics thanks you for purchasing a Kramer Electronics product. We hope it will give you years of satisfaction.

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

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

Kramer Electronics, Ltd.
Web site: www.kramerelectronics.com
E-mail: info@kramerel.com
P/N: 2900-000537 REV 5