

# **MC4**

## **MATRIX CONTROLLER MODULE**

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### **OPERATING INSTRUCTIONS and trouble-shooting guide**

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Rio Rancho, NM

# INTRODUCTION

The MC4 Matrix Combiner is a microprocessor based matrix mixer, which together with the CP4 Combining Preamp constitute a complete room combining system for up to four rooms. In addition, the MC4 connects to the VC1 Remote Volume/Source Select and the CS1 Remote Combine Switch user controls. The MC4 has inputs for both an external music source (for background music when sound reinforcement is not needed) and a paging input for announcements. Along with the paging audio input, a page logic input is provided which, when activated in conjunction with a page, will mute all other audio sources feeding the sound system to give the page complete priority. If the page logic input is not activated, the page is simply mixed in with the current audio sources.

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## TABLE OF CONTENTS

INTRODUCTION .....	1
GENERAL TECHNICAL DESCRIPTION .....	2
INSTALLATION .....	3
FRONT PANEL DESCRIPTION .....	3
REAR PANEL DESCRIPTION .....	4
MC4 / CS1 / VC1 SAMPLE INTERCONNECT DIAGRAM .....	5
OPERATING INSTRUCTIONS .....	6
TROUBLESHOOTING .....	8
SPECIFICATIONS .....	8
SERVICE AND REPAIR .....	9
RETURNING UNITS FOR REPAIR .....	9
WARRANTY .....	Back cover

# GENERAL TECHNICAL DESCRIPTION

The MC4 is a sophisticated 6 input/4 output matrix mixer which is optimized for combining the sound systems of up to four separate rooms. The MC4 is a microprocessor based system, allowing ease of programming and operation. The MC4 can accept up to 40 microphone/line inputs (using CP4 Combining Preamp modules), distributed arbitrarily between up to four rooms. Four balanced room outputs are provided, each with its own level control. In addition, balanced inputs for a background music source and a paging source are provided. A page logic input allows all room input sources (either mic/line or music) to be muted temporarily while a page is in progress.

The MC4 allows for user control of the volume of each room remotely, by means of an electronic volume control. User interface to the remote volume control (and source selection as well) is accomplished by the VC1 Remote Volume control switch. The CS1 Combine switch gives the user control over the combine status of all rooms in the system. VC1 Disable contacts are included on the MC4 which provide a lockout function for any or all the VC1's connected to the system.

Combine Status and AC Power are indicated by LEDs on the front panel. A 10 segment LED level meter is also present. The meter is switchable to monitor the outputs of any of the four rooms.

Several programmable options are available on the MC4. The Preset Attenuation option allows a pre-programmed amount of attenuation (from 0dB to 15dB) to be applied at power-up to all rooms. The Volume Limit option sets the range over which the VC1 volume control function is allowed to operate. The Volume Control Operation option selects whether the VC1 controls the level of its individual room only or the level of all rooms with which its room is combined. The Room Combine Switch option controls whether the CS1's cause rooms to combine and uncombine separately or in groups.

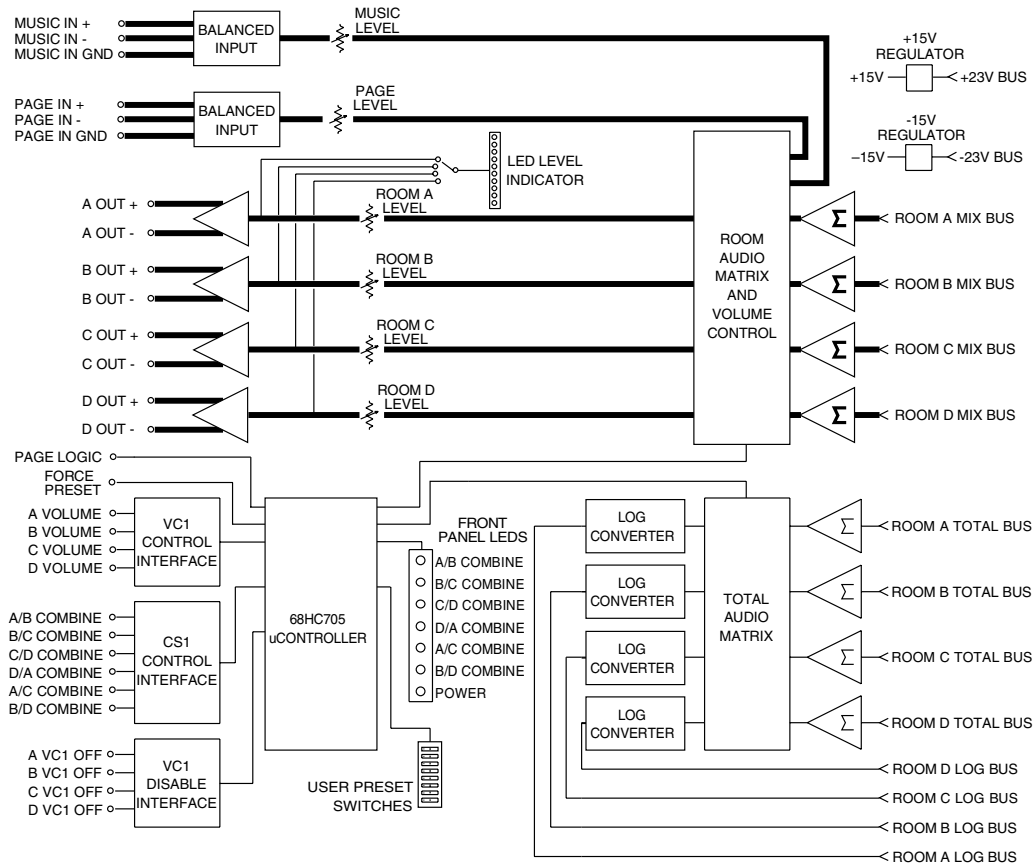


Figure 1 - MC4 Block Diagram

# INSTALLATION

Before installing the module, see the Operating Instructions section for guidance as to how to select the various dipswitch and jumperable options on the MC4.

The MC4 module is installed from the rear of the Modular Audio Processor mainframe. Both the printed circuit and the transformer shield fit into their respective sets of card guides. The module is then slid forward in the mainframe until the female edge connector is seated firmly onto the male pins of the main bus board. Care should be taken when inserting the edge connector onto the pins to be sure there is correct alignment. Four #4 machine screws with captive washers are provided to secure the rear panel of the MC4 module to the top and bottom rear rails of the Modular Audio Processor mainframe. Four #4 flat head screws are provided to secure the front panel of the MC4 module to the front panel of the Modular Audio Processor mainframe. Once these eight screws are in place, the installation of this module is complete.

## FRONT PANEL DESCRIPTION

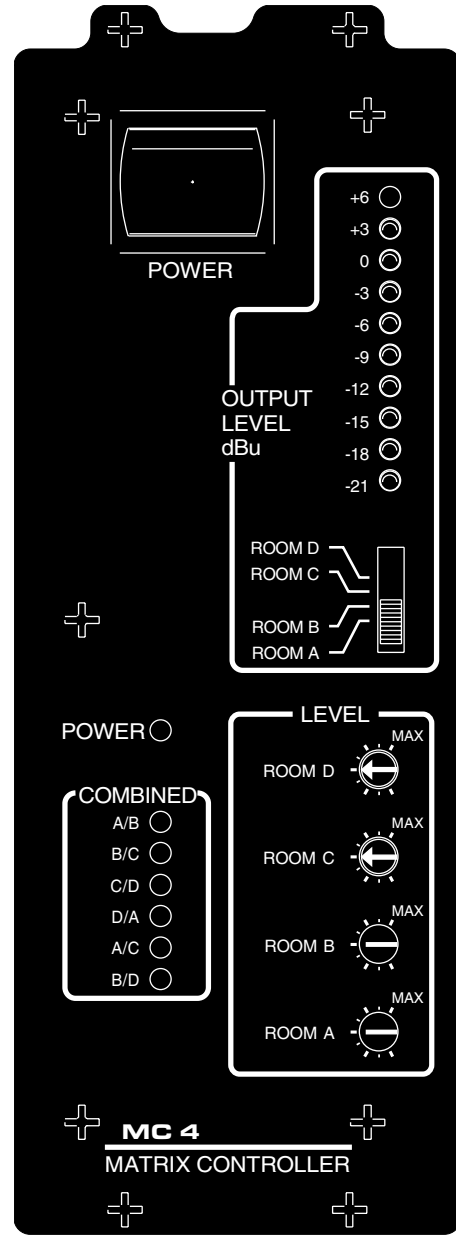
**POWER** - Main AC power switch for the MC4.

**POWER LED** - Indicate the presence of AC power

**OUTPUT LEVEL** - The output level meter and switch give the capability to monitor the signal level of any of the four room outputs.

**LEVEL** - These potentiometers control the maximum system gain for each room. They should be set for greater system sound level than is normally needed (to accommodate unusually noisy circumstances), but with ample feedback margin. Note that the user remote volume control (VC1) is a cut only (i.e. maximum gain of unity) system.

**COMBINED LEDs** - These LEDs indicate the current status of adjacent rooms with respect to whether they are combined or not.



## REAR PANEL DESCRIPTION

**AC POWER INPUT AND FUSE** - The AC power input accepts a standard molded power connector. The fuse is a 1A, Slo-blo type.

**MUSIC/PAGE LEVEL** - These potentiometers provide input level control for both the Music and Page signal inputs.

**MUSIC/PAGE IN** - Balanced inputs for the Music and Page audio signals.

**PAGE LOGIC** - The page logic input attenuates all audio sources in all rooms except the page audio signal when activated (by an electrical or mechanical contact closure).

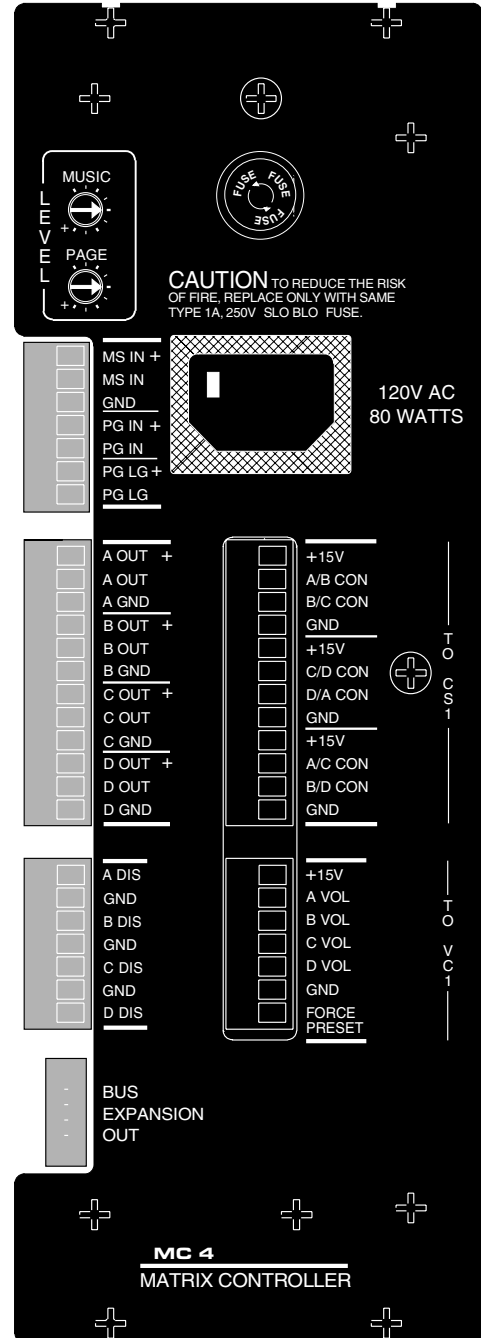
**A/B/C/D OUTPUTS** - Balanced outputs for each of the four rooms. These outputs may also be used as unbalanced outputs.

**A/B/C/D DISABLE** - The disable inputs, when activated (by an electrical or mechanical switch connection to ground), temporarily defeat any input from the VC1 remote volume/source select switch selected.

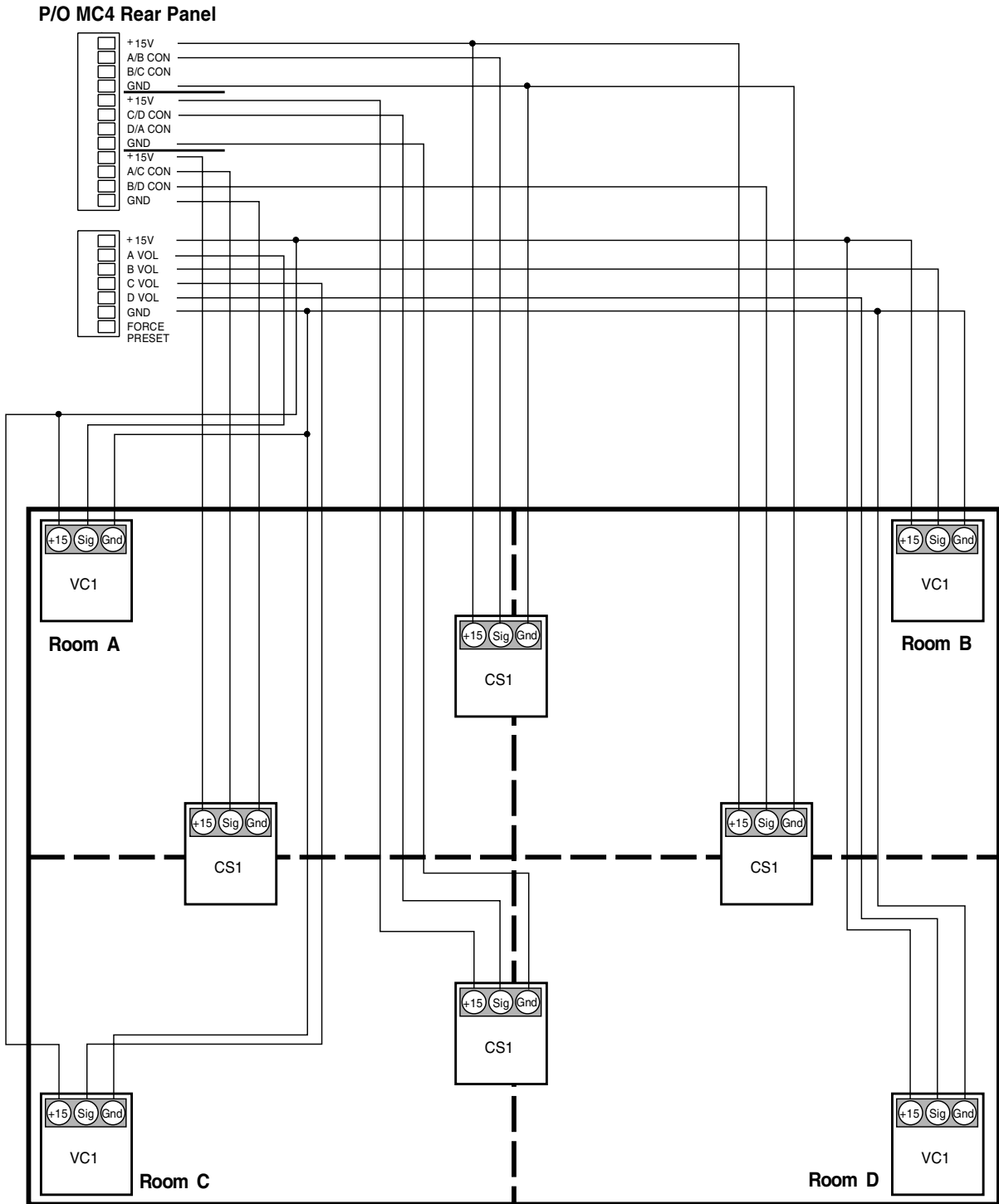
**CS1 INTERFACE** - This terminal block provides the interface to CS1 remote combine switches.

**VC1 INTERFACE** - This terminal block provides the interface to VC1 remote volume/Source select switches.

**BUS EXPANSION OUT** - Connects to the Bus Expansion In/Out connectors (using the supplied cable) of the adjacent CP4.

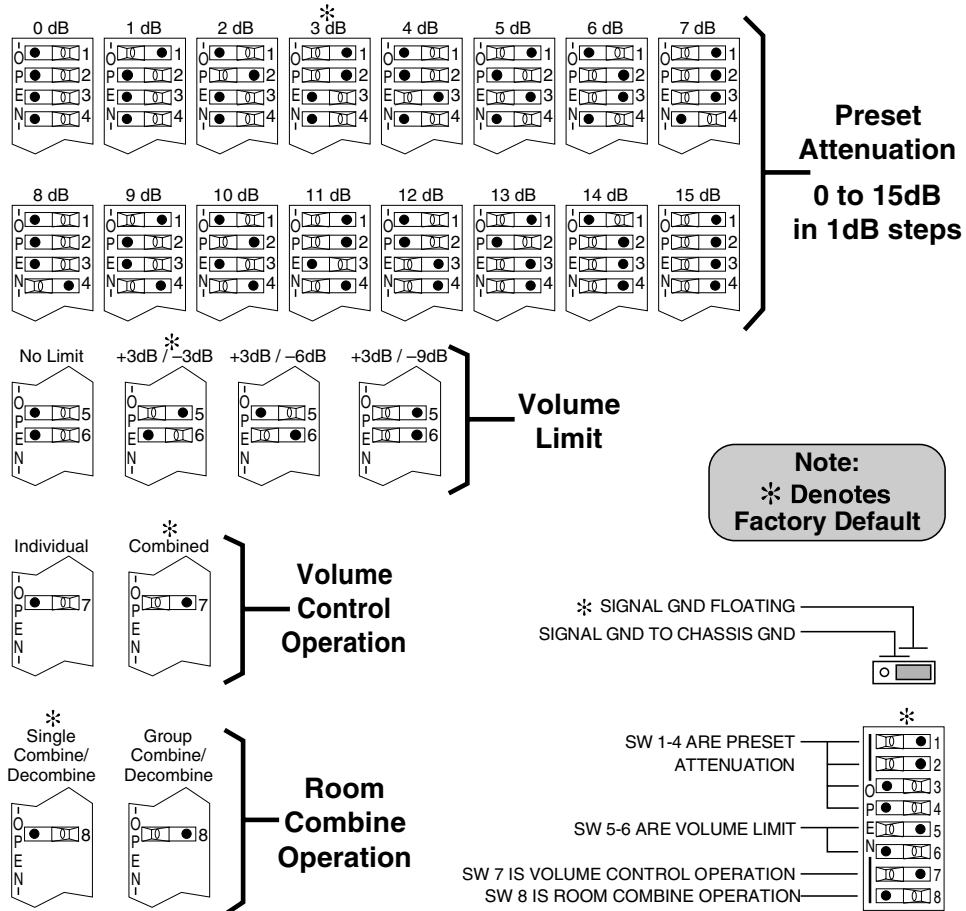


# MC4 / CS1 / VC1 SAMPLE INTERCONNECT DIAGRAM



# OPERATING INSTRUCTIONS

1) Be sure that the Bus Expansion cables are firmly seated in their connectors. Select the proper chassis/signal ground connect jumper setting. Connecting the left and center pin connects signal ground to chassis ground. Connecting the right and center pins isolates signal and chassis ground. Set the desired dipswitch settings for the application. Below is the table which describes the programming dipswitch settings and their functions.



**Figure 5 MC4 Dipswitch Settings**

A short description of each dipswitch option follows:

**PRESET ATTENUATION** - Allows a preset amount of attenuation, from 0dB to 15dB, to be loaded into the electronic volume control at power up. The typical use of the Preset Attenuation option is to set the normal operating level of the sound system a few decibels below maximum gain. In this way, the system volume may be increased when the ambient noise is higher than normal.

**VOLUME LIMIT** - Allows the range of the VC1 volume control action to be restricted, to prevent inadvertant gross misadjustment of system volume. In addition, volume control action may be left unrestricted if desired. The limits operate with the Preset Attenuation as the 0dB point. For example, if the +3dB/-3dB limit were chosen, any VC1 could increase or decrease the system level 3dB relative to the Preset Attenuation.

**VOLUME CONTROL OPERATION** - Allows the operation of the VC1 volume control function to be set. In the Individual mode, VC1's control only the volume of the room to which they are physically connected, irrespective of the combine status of the room. In the Combined mode, all VC1's in a group of combined rooms will control the volume of the combined group.

**ROOM COMBINE OPERATION** - Allows the operation of the CS1 combine switch function to be set. In the Single Combine/Decombine mode, only the room connections that are made explicitly (i.e. by a CS1 button press) will be shown on the front panel LEDs of the MC4 and on the status LEDs on the CS1's. In the Group Combine/Decombine mode, implicit as well as explicit room connections will be displayed by the MC4. For example, assume rooms A and B are combined (using the CS1 assigned to the common boundary of rooms A and B) and rooms B and C are combined similarly. In the Single mode, only the front panel LEDs labeled A/B and B/C would light. In addition, the status LEDs on the CS1's assigned to common boundary of rooms A and B and rooms B and C would light. In contrast, in the Group mode all of the above would happen plus the A/C front panel LED and the room A and C CS1 status LED light. This is because the room A to room C connection is implied by the combination of the room A to room B and room B to room C connections.

2) Connect the required number of VC1 Remote Volume controls and CS1 Remote Combine switches to the proper terminals in the rear of the MC4. See Appendix 1 for a system interconnection diagram.

3) With AC power off, short the Force Preset input to ground and turn on the AC power. The Power LED will begin to flash in about 1 second. This special setup mode puts the internal electronic volume control at maximum gain, irrespective of the Preset Attenuation. This allows the maximum room sound level to be set via the four front panel level controls. The room level should be set higher than would be necessary under normal circumstances, but below feedback. In this way, there is no possibility of system feedback as the users change the gain with the VC1 level controls. The Preset Attenuation value can be then adjusted for acceptable sound system level under normal conditions of use.

4) In order to leave the special setup mode, it is necessary to cycle the AC power off and then back on. The Power LED should glow steadily. If background music is desired, connect the music source to the Music In terminals on the rear panel of the MC4. Using the VC1 control, set the source for each room to music, and adjust the background music level with the Music Level control on the rear panel. If paging capability is desired, connect the page signal source to the Page In terminals. Adjust the Page Level control for proper paging level. If page ducking (i.e. all other signal sources are fully attenuated) is desired, a mechanical or electrical closure must occur between PG LG + and PG LG -. Ducking will continue for as long as the closure is made.

5) In some applications, it may be desirable to disable temporarily the VC1 remote functions. For instance, if all rooms are connected together to be used as a single large room, all VC1 remote controls but the one nearest the main talker can be disabled to prevent accidental or willful misadjustment of the system. In order to disable any VC1, simply short the appropriate disable terminal on the rear panel to ground. The affected VC1 will be disabled until the short is removed.



## TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE
1) No sound from system	1) Room level control not turned up 2) Channel level on CP4 not turned up 3) Input trim on CP4 not turned up 4) Page Logic terminals shorted

## SPECIFICATIONS

<b>Maximum Number of Combined Rooms:</b>	4
<b>Electronic Level Control Range:</b>	23 steps covering a 31dB range plus off
<b>THD, 20-20KHz:</b>	Less than 0.05% (0dB gain, 0dBu out)
<b>IMD, 60/7kHz:</b>	Less than 0.08% (0dB gain, 0dBu out)
<b>Music Input Impedance:</b>	40K Ohms, balanced 20K Ohms, unbalanced
<b>Page Input Impedance:</b>	40K Ohms, balanced 20K Ohms, unbalanced
<b>Power Consumption:</b>	±200mA at 15 Volts

## SERVICE AND REPAIR

If your system malfunctions, you should attempt to correct or isolate the trouble before concluding that the equipment needs repair. Make sure you have followed the setup procedure and operating instructions. Check out the inter-connecting cords and then go through the TROUBLE SHOOTING section in the manual

We strongly recommend that you **do not** try to repair the equipment yourself and **do not** have the local repair shop attempt anything other than the simplest repair. If the repair is more complicated than a broken wire or loose connection, send the unit to the factory for repair and service. Don't attempt to adjust any controls inside the units. Once set at the factory, the various controls and trimmers do not drift with age or vibration and never require readjustment. **There are no adjustments inside that will make a malfunctioning unit start working.**

LECTROSONICS service department is equipped and staffed to quickly repair your equipment. In-warranty repairs are made at no charge in accordance with the terms of the warranty. Out of warranty repairs are charged at a modest flat rate plus parts and shipping. Since it takes almost as much time and effort to determine what is wrong as it does to make the repair, there is a charge for an exact quotation. We will be happy to quote approximate charges by phone for out of warranty repairs.

## RETURNING UNITS FOR REPAIR

You will save yourself time and trouble if you will follow the steps below:

- A. DO NOT return equipment to the factory for repair without first contacting us by letter or by phone. We need to know the nature of the problem, the model number and the serial number of the equipment. We also need a phone number where you can be reached 8 am to 4 pm (Mountain Standard Time).
- B. After receiving your request, we will issue you a return authorization number (R.A.). This number will help speed your repair through our receiving and repair departments. The return authorization number must be clearly shown on the outside of the shipping container.
- C. Pack the equipment carefully and ship to us, shipping costs prepaid. If necessary, we can provide you with the proper packing materials. UPS is usually the best way to ship the units. Heavy units should be "double-boxed" for safe transport.
- D. We also strongly recommend that you insure the equipment, since we cannot be responsible for loss of or damage to equipment that you ship. Of course, we insure the equipment when we ship it back to you.

Mailing address:  
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Telephones:  
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FAX: (505) 892-6243

**World Wide Web:** <http://www.lectrosonics.com>

**email:** [sales@lectrosonics.com](mailto:sales@lectrosonics.com)

## **LIMITED ONE YEAR WARRANTY**

The equipment is warranted for one year from date of purchase against defects in materials or workmanship provided it was purchased from an authorized dealer. This warranty does not cover equipment which has been abused or damaged by careless handling or shipping. This warranty does not apply to used or demonstrator equipment.

Should any defect develop, we will, at our option, repair or replace any defective parts without charge for either parts or labor. If we cannot correct the defect in your equipment, we will replace it at no charge with a similar new item. We will pay for the cost of returning your merchandise to you.

This warranty applies only to items returned to us, shipping costs prepaid, within one year from the date of purchase.

This warranty gives you specific legal rights. You may have additional legal rights which vary from state to state.

**LECTROSONICS, INC.**

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