Matrix Audio®

Multi-Room Controller Amplifiers MRC-8.4e/8.6e/8e

Installation *Guide*

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Thank you *for choosing a quality product by Matrix Audio Design Inc. We appreciate your business.*

Warning

No user serviceable parts inside.
Opening this unit may expose you to a potential electric shock capable of causing injury or death.
Please refer support to qualified technician, or contact us directly for service and support information.

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System Overview

The purpose of this manual is to provide an in depth review of the Matrix Audio MRC series of distributed audio control systems, the MRC-8.4e/8.6e/8e (referred to as the 'MRC') It will outline recommendations and step-by-step installation, configuration, and programming instructions to assist you in setting up the system to suit your clients' requirements.

System Description

The MRC is an audio control and distribution system designed and manufactured by Matrix Audio Designs in Barrie, Ontario, Canada. Its function is to allow centralized control of common audio equipment, and through ***"Speaker Wire Technology"*** provide for up to 8 independently controlled music zones, each capable of controlling one of 4 audio sources via keypad, IR receiver or optional infrared remote control, in one chassis.
Each zone is a music environment unto itself and can be configured independently for characteristics such as volume, bass and treble.

The MRC consists of a single centralized amplifier and control system, controlled locally by keypad control units (each zone may also be configured with 2 control keypads).
Up to 4 source devices such as compact disc players (or a multi-disc jukebox) radio tuners, satellite, MP3 players and similar devices may all be connected, simultaneously.

Matrix Audio Designs unique control technology (***Speaker Wire Technology***) utilizes standard speaker cable to provide not only music to each zone but uses the same cable or other 4 conductor cable to interface with the controlling keypad. This technology presents attractive installation options,which may allow you to utilize existing cable distribution in retrofit applications.

The modular design of the MRC also allows expansion from 4 to 8 zones (in 2 zone increments per chassis) and up to two MRC devices can be linked and stacked together accommodating larger and unique installations.

In addition to the keypad, IR receiver and infrared remote control, the MRC can be controlled via a standard 9-pin ASCII serial communications port. This makes the MRC a versatile device fully capable of interfacing with many home automation systems.

Source Components

Up to 4 stereo audio source components may be connected to the MRC. Devices supplied by most manufacturers will work with this system, and industry standard RCA connectors at the rear of the unit provide line-level input and output connections for devices such as Tuner, CD, Tape, DSS,MP3 players etc.

Each source component is selected using the appropriate button on the keypad, remote or other interface, which corresponds to one of the 4 audio devices (labelled as input 1, input 2, input 3, input 4). For maximum benefit, each of these audio sources can be controlled via infrared remote. The MRC is capable of learning infrared commands from the audio components remote control, allowing you to assign commands such as pause, play, shuffle, change tracks or stations to keys on any of the system keypads or via an optional hand held infrared remote control.

Please note: *Just as a radio is incapable of playing two different stations at the same time, if multiple zones are listening to the same source, they will be listening to the same music. You may wish to consider multiple components of the same type (such as the tuner) if different zones wish to listen to different radio stations at the same time.*

Infrared Emitters

In addition to the RCA line input / output connections for each of the audio devices, there are also connections for infrared emitters (supplied) which completes the control circuit between the MRC and the individual audio devices attached to the system.

Any commands received from the remote keypads are processed and sent down this control lead to the audio device. Commonly available IR emitter leads are unobtrusive, and attach to the audio devices remote control sensor with double sided tape, and connect to the MRC by infrared 3.5mm mono output jacks located at the back of the unit.

Keypad Controls

Matrix Audio Designs currently provides two styles of remote keypad, the KP-10e that provides basic control (transport) functions, and the KP-22e that provides enhanced control over connected devices, including direct access capability.

KP-10e

- Zone On/Off
- Source selection (Tuner/Tape/CD/Aux)
- Volume
- Bass
- Treble
- 6 Programmable function keys
- IR commands

KP-22e

- Zone On/Off
- Zone grouping
- Source selection (Tuner/Tape/CD/Aux)
- Volume
- Bass
- Treble
- 18 Programmable function keys
- IR commands

The entire complement of function and enhanced control keys are available for programming each device connected to the MRC system. For example, this would allow the user to program all the buttons to manage radio station presets while the tuner is selected, and then when the CD source is selected the same keys can be programmed to function as shuffle controls, track selections or any other function provided by the audio devices remote control.
Since each device can be programmed to use all 18-function keys,a total of 72 programmable functions are available!

IR-22e

In addition to the Matrix keypad selection, the system can be designed to include an IR-22e (infrared Receiver) which is a proprietary device to be used in conjunction with Matrix Audio Designs RC-10e or RC-22e. The IR-22e provides zone or room control in place of or in conjunction with a Matrix keypad. The IR-22e is a solution based product allowing the designer or installer the ability overcome either architectural or environmental constraints.

This Infrared Receiver consists of a small interface box which contains all of the control circuitry and a small cylinder which houses the receiver. The interface box is typically installed in a wall or ceiling and connected to the Receiver by a single wire. The Receiver wire (1 Meter) is attached by a 3.5mm male plug which simply plugs into the 3.5mm female jack, the location of the Receiver should be unobstructed so that it can be properly targeted by the remote control.

The IR-22e interface connects in exactly the same manner as either the KP-10e or KP-22e and can accommodate up to 2 devices per zone in any combination of keypads and the IR-22e. It offers the same level of control that a KP-10e or KP-22e provides, save and except the ability to perform bass and treble and zone grouping. These features are not available using the Matrix remotes, as the remotes pulse data and these functions are initiated by a push and hold command, currently available at the keypad only. This device will transport all 18 commands in exactly the same manner as a KP-22e, providing the RC-22e (or the RC-22e commands have been learned into learning remote) issues the command.

Infrared Remote Controls

Infrared transmitters provided by the manufacturer that operate any of the source components will still operate in a normal manner when used with the source equipment. The MRC and KP-10e/KP-22e/IR-22e user interfaces will not pass through IR commands issued by the manufacturer remotes.

An optional RC-10e or RC-22e infrared remote control is also available from Matrix Audio Designs Inc. The remote controls will operate all the functions of the remote keypad, and can be used in any location where a keypad has been installed. Each keypad has an integrated infrared receiver to detect and process infrared commands as if the keypad had been accessed directly.

Optional RC-10e or RC-22e Infrared Remote Control

System Layout

The MRC is extremely flexible. The system can be installed in several configurations depending on your audio needs. The capacity of a single unit is 8 independent zones, and is typically wired such that each keypad is located in the same zone as the speakers installed. In some cases it is desirable to operate a second set of speakers within the same zone controlled by the same or dual keypads (such as a powder room off of the main bedroom. The MRC can be configured to accommodate this configuration as well.
A system installation will go much faster and more smoothly if job plans are completed prior to the actual installation. Accurate record keeping will assist not only in installation, but also in explaining the operation of the unit to your client, and any future servicing issues that may arise.
This manual is accompanied by several pre- printed worksheets to aid you in this installation. We recommend that you make copies of these worksheets, or complete the information in this manual, and leave these behind with your client, as well as an additional copy in your client files.

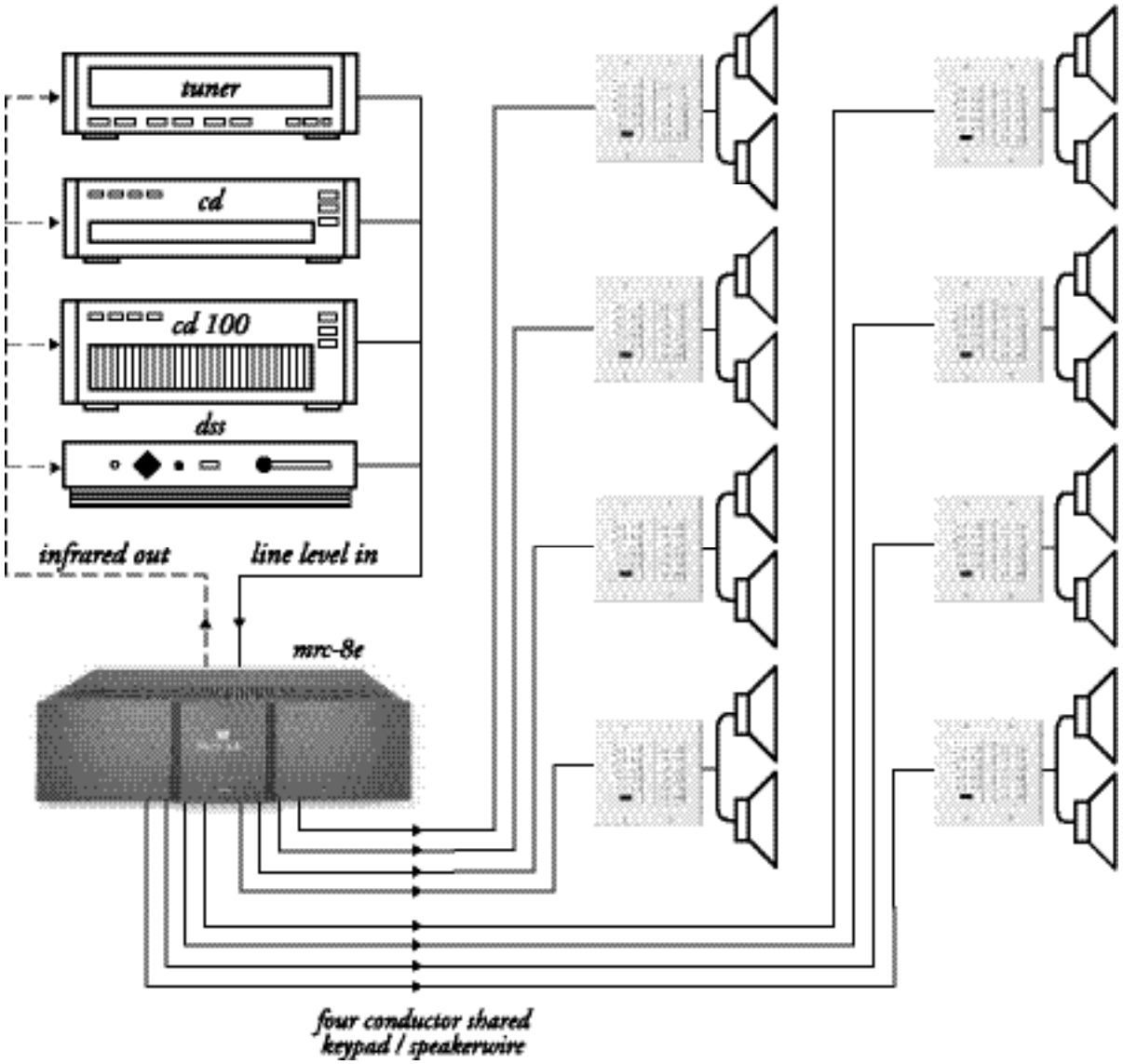
Cabling Installation Instructions

Please be sure to check for any wiring restrictions required by the electrical code in your area. This installation is low voltage cabling similar to telephone and alarm wiring, and as such does not commonly have very many restrictions on their installation. However rules may vary in different regions. Please check with your local electrician if any specific conditions must be met to comply with local electrical and codes.

Cable Type

The MRC is cabled using standard 4-conductor wire or speaker cable originating at the MRC passing through the keypad, and terminating at the speaker location.
Matrix Audio Designs generally recommends using a bundled 4 conductor 16 gauge stranded copper wire in a single continuous run.

System Integration Drawing
Four Conductor Shared Keypad / Speakerwire



RF Interference

Shielded cable is generally not required for audio installations. Although the MRC does generate radio emissions, and uses a digital signalling path during command entry, these have been accommodated for in design and conform to RF emission standards.
There is normally no ongoing data communications in the circuit path, but only at the time a key is depressed.
However many other systems do use microprocessor systems where the cabling may be in close proximity such as telephone and security systems, and it is possible for different systems to interfere with each other. If you face an installation where your cable runs are in parallel to these types of systems you may consider shielded cable to the keypads. In this case ground the drain wire by connecting it to the chassis of the MRC.

Distribution Wiring

In general, wiring is installed in a single continuous run between the MRC, the keypad and to the speaker location. Other cable routing options such as a home run to a common wiring distribution point, integration with home automation systems, or split zone applications can be significantly different than the general information presented here. These applications are left to the installer's discretion and experience. Examples of common wiring options can be found in the Special Wiring Configurations section of this document.

Installing The System

New Construction

Run the cables inside walls, in the attic and between the joists in the basement or crawlspace. When running cables in walls, drill the holes in the middle of the studs to avoid having them damaged by screws or nails that could penetrate the cable. Use metal nail plates where necessary to protect the cable.
When running cables in the attic or crawlspace, run them in such a way that they will be out of harm,where they will not be stepped on, snagged, punctured or otherwise damaged, or could pose a safety hazard. We recommend using electrical cable straps to keep the installation neat and secure. We do not recommend stapling the cables as a single misplaced staple can cause a short and causes trouble during operations, and set- up. Do not leave the wires lying in the dirt under the crawlspace. Neatness counts in a professional installation.

The keypad device itself will also fit in a standard electrical box, and you should install 1 or 2 gang (as required) standard electrical boxes to accommodate them before the drywall has been put into place.

Existing Construction

For existing construction, successful implementation can be achieved by using retrofit electrical boxes that do not require stud mounting, or metal electrical frames commonly used for telephone and cable installations,which can be placed in a standard opening in the wall. Care must be taken when using these frames that they must not come in contact with the back of the unit, or provide a shorting path at the cable connections.
When installing near other switches,make sure the boxes are dead level and lined up with existing electrical boxes.

Electrical Boxes

To install, due to the varying manufactured sizes of electrical plates and boxes, carefully mark a level and plumb outline of the switch box using the box itself as a template, and make a hole in the existing wall with a drywall, or reciprocating saw.
Please be careful and ensure that the space you're cutting into does not hide any plumbing, electrical or heating fixtures that could be damaged, or cause personal injury.
Care must also be taken when dealing with outside walls that the vapour barrier should be repaired if damaged.

Running Cable

A neat and careful installation will increase the customer satisfaction level as well as reduce the chance of service calls in the future. Run cables inside the walls to the attic, basement, or crawlspace. If a room is carpeted you can carefully place the cables under the baseboard, or by carefully lifting the edge of the carpet and placing the wiring between the carpets tack strip and the wall. Be careful going past doorways, or across a walking path.A cable doesn't seem too big until it's tripped over, or causes an unsightly lump in the carpet.

Tip: When running each cable carry a fine tip permanent marker with you and mark both ends of the cable. When you get to the keypad location,mark a couple of arrows on the cable to show which direction the speakers are in, and which direction the MRC is in. This will save you 'ohming- out' the cables later to find the one you're looking for, and knowing which end goes where at the switch box.
A few seconds spent now, will save you hours of chasing cables later.

Quick Tip: Some installers cut the long straight section from a coat hanger and chuck it into a drill to help establish a reference marker through ceilings and floors up against the edge of a wall. The coat hanger wire is tough enough to drill through most materials without snagging the carpet fibres, is fairly unobtrusive and the length makes it easy to spot on the other side. The small hole left behind is usually hidden by the carpet, or easily repaired. Holes in the stud wall for the wiring can then be made by taking into account the width of the baseboard, drywall, and half the stud (usually 1/2"+ 1/2"+ 1- 1/ 2 or 2- 1/ 2" from the pilot hole.)

Termination options

Terminations of the cable at the speaker side are left to the installer, although spring clip assemblies that fit into a standard electrical box are available, and offer an attractive alternative to loose wiring. If used, you should also install electrical boxes at the desired speaker locations. Also common, are in-wall speakers, complete with binding posts or spring clip connectors. Please read and follow the instructions that accompany the speakers for installation details.

Outside wiring

Special care should be taken when cables transit outside the home. It is not recommended that keypads be installed in environments subject to extreme temperatures, or moisture.
Typically keypads are installed inside the home and beside the door adjacent to the outside music zone. Keypads that must be installed outside are done at your own risk and should be installed in weatherproof electrical boxes. The IR-22e will provide an excellent solution for outdoor use (refer to page 7, for details).

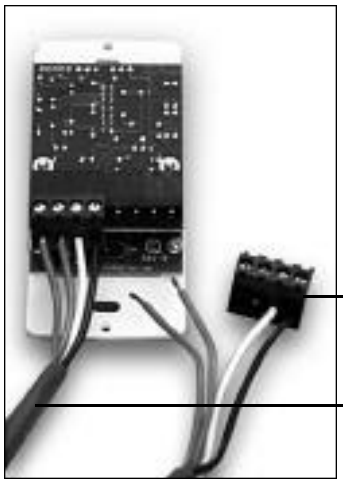
Keypads used outdoors should be safely mounted inside a weatherproof electrical box with a door covering the keypad and adequate water barrier seals to protect the unit.
External cabling should run through conduit (plastic electrical conduit works well) to protect it from the elements and small animals that may wish to chew on the cable.
You may wish to consider a qualified electrical contractor to install cable conduit for external applications.
Cable and installation accessories to complete your installation are not part of the system package, and can be obtained at your local electrical supply retailer.

Keypad Installation

Connections points at the MRC and keypad are solder-less and completed by screw type Molex connectors (provided).

Molex Wiring Connections

Looking at the rear of the keypad with the connectors at the bottom, you will see there are 2 plug type connectors (Molex). Generally the mating part is already installed in the unit when shipped, and lifting gently, and pulling the connector away from the keypad can remove it.
Each connector terminates 4 conductors that either arrive from the MRC, or continue on to the speakers in the zone. For example, the KP-10e as viewed from theback, the left side of the unit is for the line leading to the MRC and the right side of the unit is for the line leading to the speakers.



KP-10e Connection Diagram

Tools you'll need to complete this part of the installation. Wire strippers, small standard slotted screwdriver, and a permanent marker. Optional is an ohmmeter to determine which side of the wire you are working with, and where wires are not secured to an electrical box, some masking tape to help secure the cable while you are working on it.
There is nothing more frustrating than having the cable fall back behind the wall when trying to work on it.

Installation Tip: When working with the Molex connector, only strip away about 1/4" inch (about 6mm) of the insulation from each wire. Most common electrical problems occur when the wire is stripped too long, and can short out against neighbouring wires behind the wall. The complete assembly should not have any more than 1/ 16 th of an inch (or 1mm) bare wire visibly exposed from the bottom of the connector. A quick twist of the copper strands will ensure easy installation into the connector. Tighten the fastening screw securely.

Tip: Keeping it simple… You don't really need to know which pin does what. That information is located at the back of this book if you're interested, or trying to diagnose a problem. For now simply pick a colour pattern easy for you to remember, and simply repeat this pattern at all the connection points. For example, if you wire all the connectors so that from left to right they are black/ green/ red/ white (alphabetically) you will always configure the wiring properly. When you get to the speakers, black/ green will be for one speaker, and red/ white will be for the other. Most common wiring errors can be attributed to not following a standard colour pattern.

Since you will be cutting this cable at the keypad location to perform the connections it is a good idea to mark the cable with a permanent marker to identify where each end goes.
If the cable is run behind a wall, you may need to use your ohmmeter to help determine which end of the cable goes in which direction.

Common Equipment

Place all the common audio equipment on individual shelves. Stacking equipment is not recommended as this presents situations in which airflow may be restricted, or component cooling is impaired. Audio equipment sources, and the MRC will generate small amounts of heat that must be dissipated to extend component life.
Equipment should have adequate room on all sides for proper air circulation and heat dissipation, as well as room for all the cables to reside. If rear access, or a rack mounted structure has been provided, then cable installation will be much easier.

Zone Connections

The cables that run from each of the keypads connect to the MRC via the same Molex connectors used at the keypads. In this case, the connectors will not already be installed in the MRC, and will be found in a bag in the equipment box.

Again, please note: *When stripping cable for use in the Molex connector, only strip away about 1/4 inch (about 6mm) of the insulation from each wire. The complete assembly should not have any more than 1/ 16th of an inch (or 1mm) bare wire visibly exposed from the bottom of the connector.*

Audio Component Connection

Plug the audio cables from each source device into the RCA jacks provided on the back of the MRC.
A switched power outlet is provided on the rear of the MRC. Plug a power bar into the switched outlet and then plug the power cords from all the audio sources into the power bar.
The power limitation of the switched outlet is 200 Watts which should be sufficient for the audio sources in your system, however you should check the power rating of each device to ensure the total load does not exceed this amount.
When the MRC powers on or off, it will then power on all the related equipment.
The MRC remains in a standby mode until the first zone is activated at which time the unit will power up all components. Similarly, when the last zone in the system is turned off, the MRC will power down all audio equipment (after about 10 seconds) and return to standby mode.

Infrared Emitter Leads

Finally connect the infrared emitter lead for each audio source into the appropriate connector on the back of the MRC, and run the optical end of the emitter lead to the source device's IR receiver window.

Quick Functionality Test

With all the components now wired in place you should be able to power each zone on and off from the remote keypads. To test the system connections, activate one zone, and manually activate one of the audio sources such as the tuner, or CD (since programming has not taken place yet), and move through each zone and test that keypads respond to the on/ off and volume commands and that the source can be heard at all zones. Basic functionality of the MRC, on/ off volume up/ down and treble/ bass are functions performed without programming.

Programming Section
General Information

All programming activities take place in front of the MRC device.
You will need to have the remote control from each of your audio sources.
We suggest you read this section through carefully in its entirety before starting to program the MRC. With a general understanding of what to see and expect, when you go through the programming exercise you will understand the behaviour of the MRC throughout the step-by-step exercise. Programming only becomes a complicated procedure when you are trying to solve all operating issues at the same time (learning the equipment, learning the sources operational behaviours, and learning the MRC programming routines). Careful planning, documentation and experimentation on your part with the sources prior to taking on programming will pay off in an easy and painless installation.

Source Documentation

Ensure you have readily available the documentation for each device in case you need to reference the operation of the source. The key to successful programming is to understand how each of the source components work first, and then determine how you would like them to behave as part of the home audio system.

Key by Key Programming

The MRC learns the specific codes for each function, one-at-a-time, by recognizing and mimicking the infrared signal generated on the original (or donor) remote control.
To explain this a different way, you are training the MRC to recognize what the infrared signal looks like that means "stop", what the infrared signal looks like that means "play" for each of the devices in your system. By programming keys one at a time, it allows maximum flexibility in allowing you to assign each key a specific function. You do not have to program every key if you don't want/ need to, keypad programs should be simple, functional and intuitive.
From a clients perspective, sometimes less is more.

Programming Worksheets

Before getting started, to assist in setting up the remote training sessions please use the programming worksheets accompanying this guide.

You will find they will not only help you plan in advance which keypad key performs a function, but will assist in the event that codes need to be re-learned or changed, and reduce the time needed to program/reprogram the device. As well, should any of the audio devices be changed or upgraded in the future, you will know what the configuration looked like for the original device,so they keypad can be programmed in a similar configuration. Consistency in keypad programming across all devices, and clear documentation will reduce frustration and shorten the operational learning curve for your client.

Tip: New equipment is rarely shipped with batteries installed in the remote. Be sure you're sources remote is functioning properly before continuing to program the MRC.

Tip: You should take some time to familiarize yourself with the basic operation of the audio devices remote control to better understand the operating characteristics of the device and which functions you wish to program into the MRC. If you can operate and manage the audio device as a standalone unit, it will aid you in determining which functions you want to program into the MRC.

Technique Tip: Programming is an interactive exercise between you, the MRC and the audio sources remote control, and results may vary from unit to unit. You will learn the techniques to best train the MRC through some trial and error and observation. You may need to modify your programming technique on a remote-by-remote basis. Some remotes may need to be closer to, or further away from the receiver, some may program better with quick key presses, and some with long key presses,some may require a change in angle between the remote and the MRC.
If a particular method doesn't seem to be working for you, try to modify your approach to understand the characteristic behaviour of the donor device.

Getting Started in Programming
The Programming Panel

The programming controls are located by removing the cover plate on the MRC. This cover is located front and centre to the unit, and is simply held in place with several small magnets. To remove, firmly grasp the small cover, and pull directly away from the unit.

You will find underneath a keypad that resembles the layout of the KP-22e remote keypad. This will aid you in working with the correct keys for programming. Note that these keys are unlabeled, since each key can be programmed for multiple functions are not labelled to avoid confusion.
This is where the programming worksheets will assist you in keeping track of the keys you program, and what function they perform.

Placement of the Remote

The audio source remote (donor remote) should be located about 6 inches away from the infrared port on the MRC, the path between the devices should be unobstructed with a clear line of sight.

The general steps you will follow for each device will be:

1.) Enter programming mode (depress the program button)
2.) Select the source device to program (input adjacent to the LED, the LED will light)
3.) Program the Special Commands (play, power on & power off)
4.) Program basic & advanced functions (next, back, pause/stop, etc...)
5.) Exit programming mode (depress the program button)
6.) Test the program (select source and function, observe source component behavior)

The Most Important Indicator:

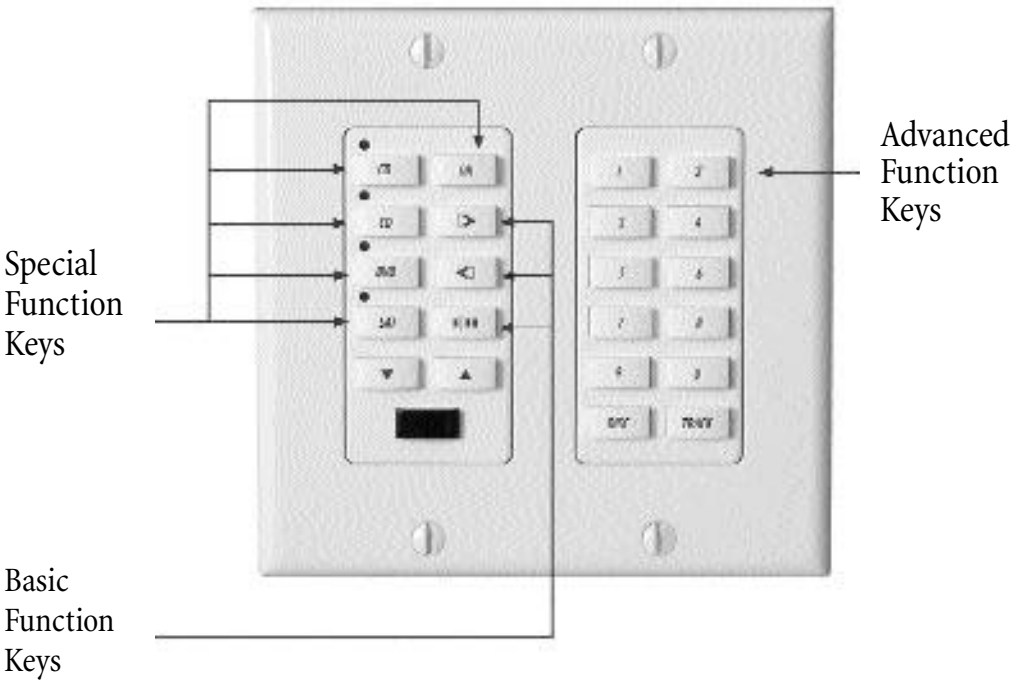
Training consists of first identifying which keypad key you want to program, and then getting the MRC to recognize an infrared signal. The LEARN/ ERROR LED is the most important indicator of this process.

Memorize the following lighting sequences to understand how the programming is proceeding.

Ready to Learn slow flashing RED of the LEARN/ ERROR LED
Good Signal will make the LED quickly flash GREEN 3 times.
Bad Signal will make the LED quickly flash RED 3 times.

If you get a bad signal, you simply have to reselect they key you're trying to program to get the MRC ready to learn a code again, and retry the remote until you are successful.
If you are having difficulty, refer to the technique tips earlier in this document.

For many, a picture is worth 1000 words. If you are comfortable with following flowcharts, then you may refer to them through your programming exercise.
If you are uncomfortable, and need more information, then the step-by-step sequence is also outlined here in detail.



Special Commands

Keys associated with source selection and on/ off controls are slightly different than the other function keys.

Source Select:

This key not only switches the listening zone to that particular source device, but it will also automatically transmit a specified infrared command to that unit. In the case of CD players, the "play" or "shuffle" function is usually put in this key, so the source begins regular or shuffle play as soon as the device is selected.

On/ Off:

This key is the only button that can store 2 commands per device.
One command for ON, and the other command for OFF.

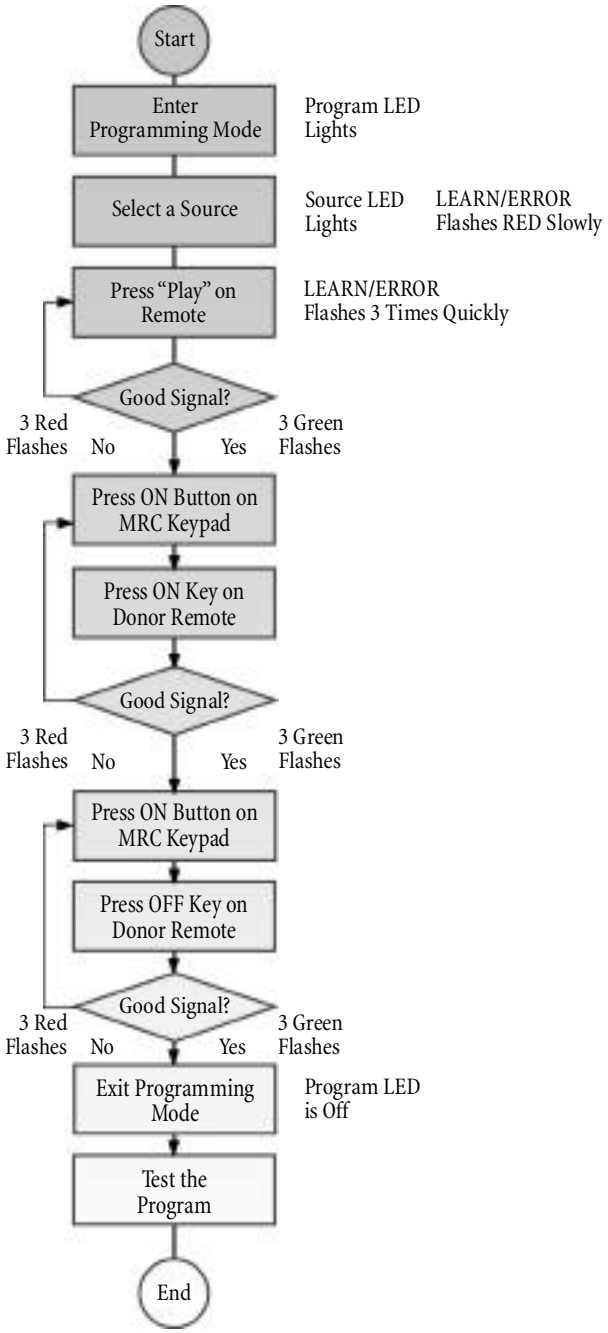
Basic Transport Command Keys:

These are associated with the >> << and || buttons. The RC- 10e, and KP- 10e keypad only allows these functions to be processed.

Advanced Command Keys:

These are associated with the KP-22e keypad, and are labelled 0 through 9 plus a "Disc" and "Track" button.

Over time you will find that all keys are really programmed with the same sequence of steps, and can all be programmed at once. To start however, we have broken the procedure down into two sets of instructions. Once you become familiar with the sequence you will see that you can follow one set of instructions for all programming.
Each keypad worksheet also contains the programming flowchart for quick reference.


Start
Enter Programming Mode
Program LED Lights
Select a Source
Source LED Lights
LEARN/ERROR Flashes RED Slowly
Press "Play" on Remote
LEARN/ERROR Flashes 3 Times Quickly
Good Signal?
3 Red Flashes
No
Yes
3 Green Flashes
Press ON Button on MRC Keypad
Press ON Key on Donor Remote
Good Signal?
3 Red Flashes
No
Yes
3 Green Flashes
Press ON Button on MRC Keypad
Press OFF Key on Donor Remote
Good Signal?
3 Red Flashes
No
Yes
3 Green Flashes
Exit Programming Mode
Program LED is Off
Test the Program
End

Step-by-Step Programming of Special Keys

Step 1. Enter Programming Mode: Press the button on the MRC marked program.
The red LED above the program button will light up.

Step 2. Select a Source: Press the source buttons on the left side of the panel you wish to configure. The LED beside the source you have selected will light, and the LEARN/ ERROR light will begin to flash RED slowly.

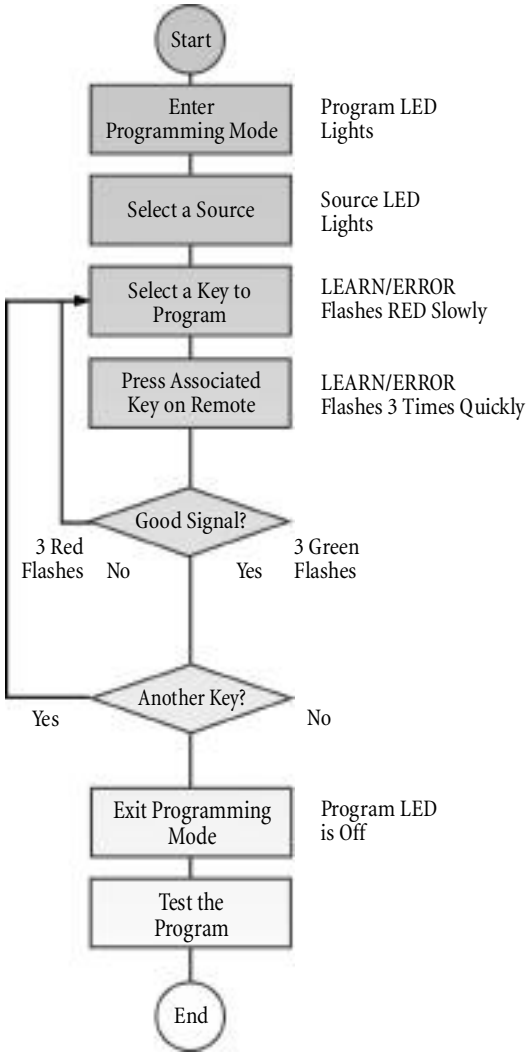
Step 3. Send the signal from the remote: Press or tap the "Play" button on the remote control. Good signal, you may proceed to step 4. Bad signal go back to step 2.

Step 4. Press the ON/ OFF button on the MRC programming keypad
(always the top row 2nd key from the left). This will get you ready for the ON Command.
Press or tap the "POWER ON" button the remote control.Good signal: Proceed to 5.
Bad Signal: Start Step 4 over again.

Step 5. Press the ON/ OFF button again for the OFF Command.
Press or tap the "POWER OFF" button on the remote. If it's the same key on the remote, store that code in again.Good signal: Proceed to Step 6.
Bad Signal: Start step 5 over again.

Step 6. Press the Program key to exit programming mode. The program light will go out.

Step 7. Test your program.When you're not in programming mode, the programming panel functions just like a regular keypad and zone (but without the speakers).
If all your audio equipment is hooked up and turned on when you press the unit select button, the source you programmed should start playing.
If the source unit is powered off, the ON button will toggle the source power button.
Make sure the on/ off function works and when you're done leave the device on, and then press the unit select button. The device should start playing again.


Start
Enter Programming Mode
Program LED Lights
Select a Source
Source LED Lights
Select a Key to Program
LEARN/ERROR Flashes RED Slowly
Press Associated Key on Remote
LEARN/ERROR Flashes 3 Times Quickly
Good Signal?
3 Red Flashes
No
Yes
3 Green Flashes
Another Key?
Yes
No
Exit Programming Mode
Program LED is Off
Test the Program
End

Step-by-Step Program for Basic / Advanced Commands

Step 1. Enter Programming Mode: Press the button on the MRC marked program.
The red LED above the program button will light up.

Step 2. Select a Source: Press the source buttons on the left side of the panel for the device you wish to program. The LED beside the source you have selected will light, and the LEARN/ ERROR light will begin to flash RED slowly.

Step 3. Select the function key on the programming keypad you wish to program.

Step 4. Press or tap the associated button on the sources remote control.
Good signal, you may proceed to step 5. Bad signal, go back to step 3.

Step 5. Do you have any more keys to program for this source?
YES – Go to Step 3. NO - Go to step 6.

Step 6. Press the Program key to exit programming mode. The program light will go out.

Step 7. Test your program.
When you're not in programming mode, the programming panel functions just like a regular keypad and zone (but without the speakers). If all your audio equipment is hooked up and turned on when you press the source select button, the source you programmed should start playing. If the source unit is powered off, the ON button will toggle the source power functions.
Press all of the keys that you programmed and observe the source equipment.
If it responds to the keypress, then the command is working correctly.
If it does not behave as expected, make a note of that key, and reprogram it again and re-test.

Operating and Testing Procedures

Now that the unit has been installed, wired and programmed, you can test each zone for operations, and begin to educate your client on how to use their new Matrix Audio device. At each zone, test for zone on/ off, volume, source selection, bass/ treble setting, and function key programming. Make sure each speaker in the zone is working.

Basic keypad Functions

On/Off

Pressing the ON key momentarily will activate, or deactivate the zone. The red LED beside the ON button should light, and you may hear the audio source playing, or you may need to select a source and adjust the volume before the source can be heard. When the zone has been powered on for the first time, the LED's beside each source will cascade until one has been selected. If you do not get any lights, or do not hear audio sources make a note of the condition and refer to the troubleshooting section of this document.

The ON button also performs the function of ALL ZONES OFF. This is useful when you desire to shut all components off regardless of which zone is active. To perform this function, press and hold the ON button for a few seconds to send the appropriate command to the MRC.

Source Select & Treble/Bass

Try to select all of the sources by momentarily pressing the source keys. The LED beside the selected source should light, and you will be switched to that audio source, and the programmable function keys will take on the properties of that particular devices keypad program. If you do not get any lights, or do not hear audio sources make a note of the condition and refer to the troubleshooting section of this document.

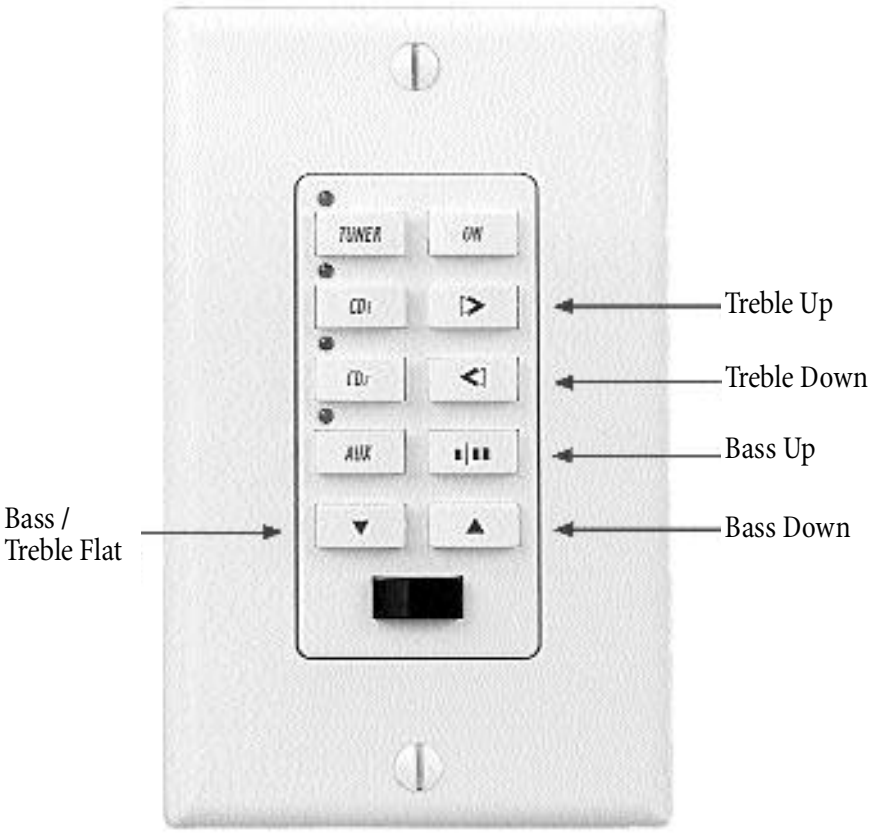
The source key also performs a secondary function. Pressing the source key and holding for a few seconds will put the keypad into a mode to change the treble and bass settings for that zone (the LED will flash rapidly). See the associated diagram for the keypad function while in this mode.

Volume Controls

The volume controls are located at the bottom of the keypad and are identified by the ▼ and ▲ symbols. Check to make sure that the volume keys work appropriately.

Programmable Keys

Select each source, and test the function of each of the keys you have programmed. Pressing these keys should produce the desired effect. If the source does not behave as expected make a note of the problem, and recheck your source programming.



Zone Grouping

This feature is specifically designed to accommodate a situation where it is desirable to link a combination of rooms (zones) to a common source. For example when hosting a party and you wish to have the common areas all linked to the same audio source.

1. Go to any KP-22e in the house. If it is not on, turn it on.

2. Press both volume buttons simultaneously. The currently selected source led will begin to flash, indicating group mode.

3. Press the numeric keys (1- 8) on the numeric side of the KP- 22e corresponding to the zones you want to add to the group. The zone you are creating the group from is automatically added to the group (the user must know which rooms are assigned to which zones in order to set the group up). The zones that are added to the group will turn on if they were not already on.

4. After all the desired zones are added to the group, press the desired source key for the group. This will exit group mode (led stops flashing), and set all the zones in the group to that source. Selecting a source on any keypad in the group will cause the rest of the zones in the group to follow.

5. Adjust the volume for the zone your in. The other zones in the group will set their volume the same. Within the first 30seconds of initaiating the zoning grouping command, a 30 second timer resets every time a volume key is pressed. When the volume has not been adjusted for 30 seconds, the volume settings will stop tracking each other in the group.
This is so you can set a general listening level for all grouped zones in the beginning, and then go around later and make any necessary volume adjustments on a room-by-room basis.

6. There are three ways to delete a group.

1) Go into group mode and create a new group. The old group will be deleted.
2) Go into group mode and press the zero button. The group will be deleted.
3) Perform an all off from any keypad. (Depress and hold the ON button for 4 or 5 seconds). For the first two methods, the group is deleted, but the zones that were in the group maintain their current status. For the third method, the group is deleted, and all zones turn off.

Troubleshooting

OK something has gone wrong. You have installed, and tried to program but something just doesn't seem to be working right, or at all. Try working your way through this troubleshooting section to help isolate the problem. Before units leave the factory they are 'burned in' to ensure proper operation,so they should be in working condition when they arrive on site.

Test all zones to collect enough information to localize your problem. Make note of similarities in issues across multiple zones. For instance, if you can power on each zone except #1, then you have a localized problem. However, if the CD player doesn't work in any zone, then the issue is likely at the source connections or with programming.

Symptom	Possible Causes	Section
Everything is dead	Power	Power
All keypads are dead (No lights)	Power-Cabling between MRC and Keypad incorrect Keypad connections reversed	Power Keypad Cabling
Some keypads OK, Some dead	Cabling between MRC & Keypad-Keypad Connections Reversed Defective keypad Defective cable run (possible short)	Keypad Cabling
Sources don't work manually or automatically	Power or power bar connected to switched outlet	Power
Sources and Keypads work but no sound in zone	Speakers not connected-Problem between keypad and speakers Problem with speakers. Volume too low RCA cables from source at wrong connection points	Keypad Cabling Source Cabling
Sources work manually, but keypads don't control device	Device Programming Incomplete Infrared emitter lead missing Infrared emitter lead connected to wrong device	Programming Source Cabling
Sources power off when selected	Program error in ON/ OFF function	Programming
Sources don't start playing when selected	Program error in device select function	Programming

Power
Power Connections

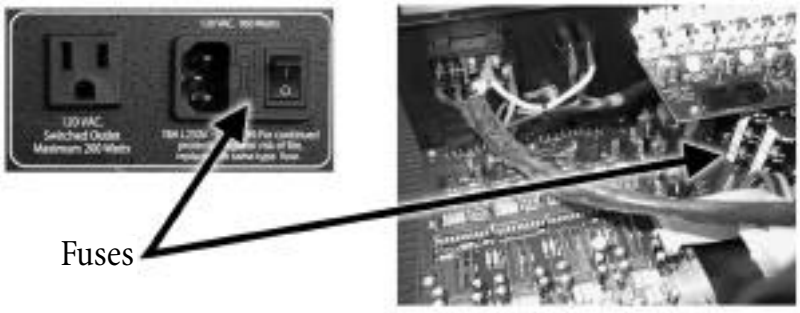
Check to make sure you are attached to a functioning live electrical circuit (plug in a lamp or something similar). Ensure that both ends of all power cords are firmly seated in all of the component devices. If you're plugged into power bars, check them for operation as well. If the branch circuit is dead, look for the breaker, or a light switch that may be controlling power to the outlet. If it's on a switched circuit, then try to obtain power elsewhere.

Power Switches

There is a power switch located at the rear of the MRC, check to see that it is in the ON or (1) position, and if you have a power bar plugged into the switched outlet on the unit, make sure the power bar switch (if present) is in the on position and any mini- breakers on the power bars are on.

Fuses

There is a fuse beside the power switch at the back of the MRC. Remove the fuse and inspect it to see that it is intact. If you have an ohm meter, test for continuity across the fuse (sometimes they look good, but they're really broken near one of the ends). If you are using a power bar they often have mini-breakers on them, and you should check to ensure that all is well. An internal 2 Amp fuse protects the switched outlet. Removing the external cover will provide access to the fuse. Please observe all safety precautions and ensure power has been disconnected from the unit before removing the cover.



Cabling
Dead Zones

There is power at the source, and source devices and MRC seem to be powering up OK, but one or more of the zones are not working. Check each zone keypad and press the ON button, and look for the ON LED, or source LED's to light.

LED does not light

You are not getting power and command connectivity to the zone.

Possible Causes
- Zone connectors at MRC not secure
- Connector at Keypad to MRC not secure
- Wiring standard not followed *(Ensure the centre two wires are in the same orientation at the MRC, and the keypad. They may be inadvertently reversed in the installation)*
- Input and output connectors on keypad reversed

LED does light

You are getting power and command connectivity to the zone. Check other zones and select each source to determine if this is specific to a source, or the room in general. If the problem is in a particular room, then there may be an issue with cabling to your speakers, or the keypad itself.

If you get similar results for a particular source in multiple zones, then there may be an issue with the source equipment, and you should check to see that the selected source is 'playing'. If every other zone is ok, check to make sure cables to the speakers are secure, and that you have tried to increase the volume level in that zone.

Source Connections

Problems in source cabling display some of the following characteristics.

The source cannot be heard in any zone.

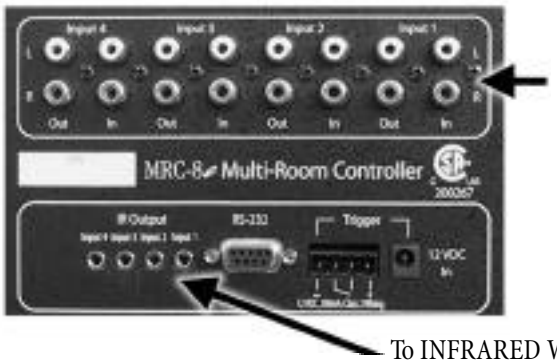
The source doesn't seem to respond to keypad commands.

Ensure that the sources LINE OUT connection are connected to the MRC LINE IN connection for the correct device.

Check to see that the I/R emitter lead is secured to the IR source infrared window and that you have the correct lead plugged into the appropriate control jack.

When a keypad command is received and communicated to the source device, there is a LED that lights on the front of the MRC indicating the processing of the command.
If the LED does not light with a keypad press, then it is possible that the device has not been programmed. If the LED does light, there may be a problem with the infrared emitter lead.

Techniques you can use to help isolate a sources problem include swapping the source with another on the MRC to see if the problem stays with the MRC device, or follows the movement of the source. Try swapping I/R emitter leads. Take a look at the source to ensure that any MUTE functions have not accidentally been activated.



Programming

Programming is an exercise unique to almost every installation, and the most difficult to troubleshoot. Most common problems occur in training the MRC to recognize and recreate the Infrared signal that controls the source device.

Technique, and the flexibility to change your approach in programming will ultimately grant you success. Typically the position, and duration of the key press on the donor remote during the training exercise influence the success of the training routine.

Try to vary your approach in training. Try to get a little closer to the detector, or a little further away. Try approaches like short bursts from the donor (source) remote by tapping the key, as well as longer (holding the key down).

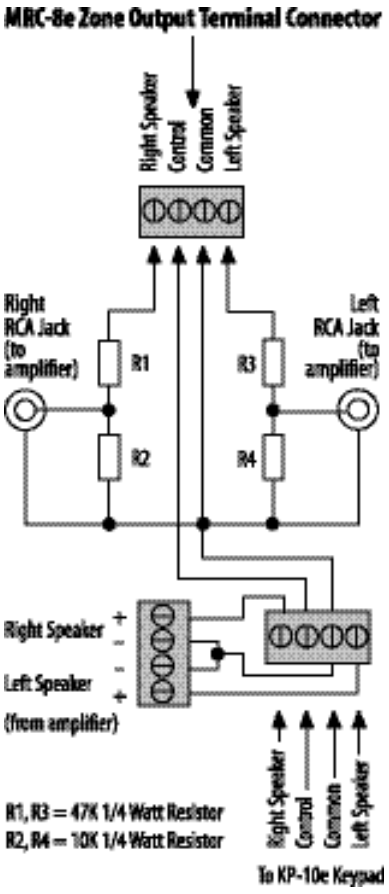
Watch and wait for confirmation of a good signal from the MRC (3 quick green flashes). Be patient, it may take an extra second or two longer to get a confirmation than you may expect (especially on a short tap).

Ensure the appropriate device has been selected from the programming keypad.

If you're skipping more than one track at a time when pressing the >> or << key, it is possible that the MRC has trained to send multiple instances of that particular code. Retrain the command and try a shorter single tap on the donor remote.

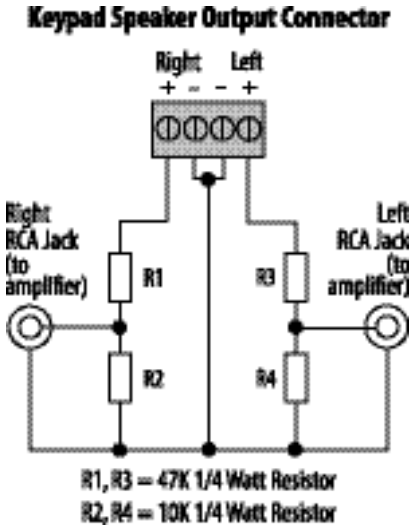
Special Wiring Configurations Auxiliary Amplifier Configuration

In some cases you may require more power for a given zone. This diagram shows the construction of a simple circuit of discrete components to reduce the "speaker level" output of the MRC to a "line level" so that it in turn can drive an auxiliary amplifier. This amplifier would typically be installed at the equipment rack (head end).



Special Wiring Configurations Remote Amplifier Configuration

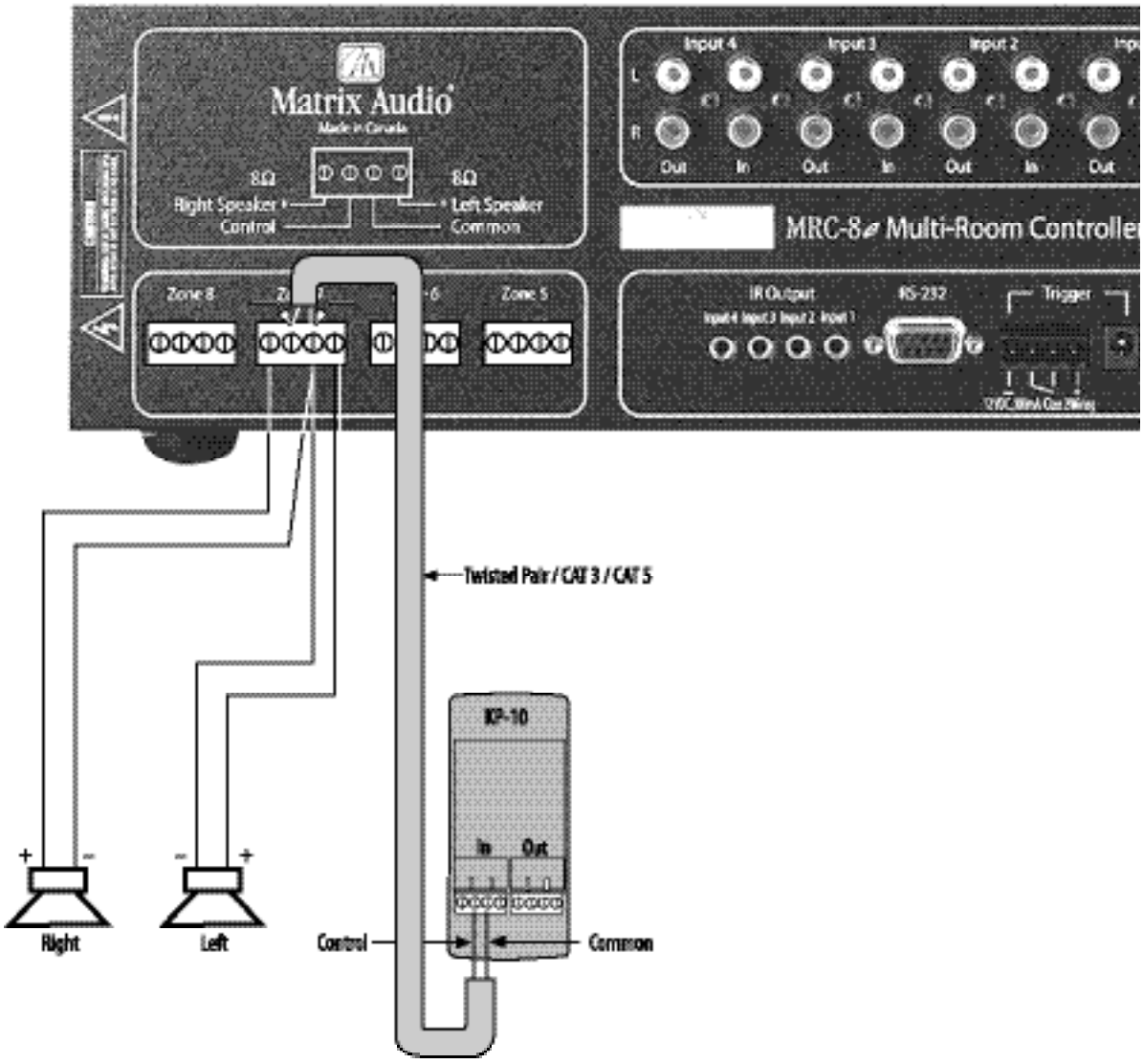
In some cases, especially where the distance between the MRC and the zone is unusually long (such as another building on the property i. e. cottage-to-boathouse for example). It is sometimes desirable to have a remote amplifier at the zone end. This diagram shows the construction of a simple circuit of discrete components to reduce the MRC output to "line- level" so that it can in turn be fed into an auxiliary amplifier.).



Keypad 2 Wire Control Only Configuration

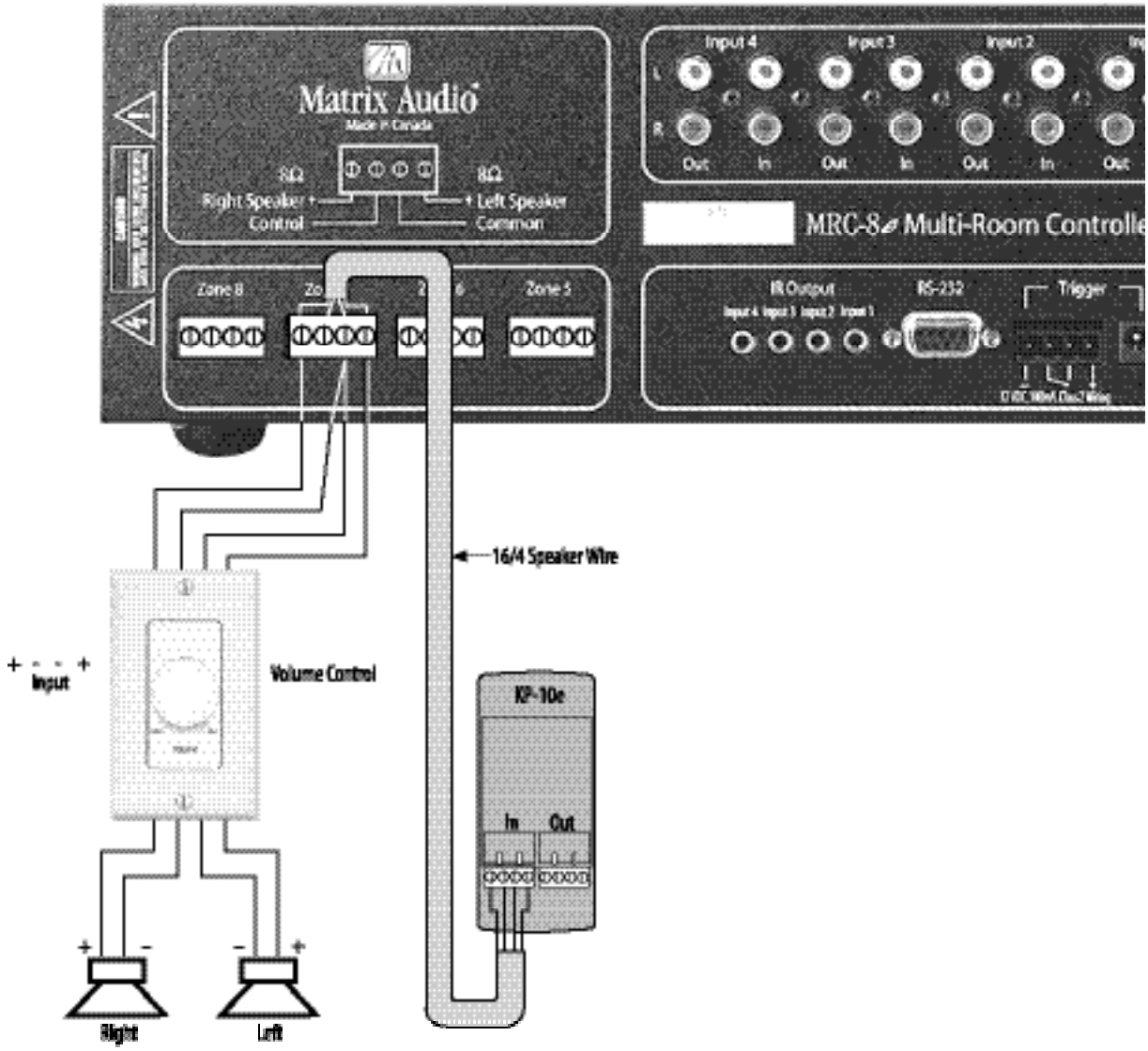
In some retrofit configurations it is not feasible or possible to re-route the speaker cable through the keypad. In cases such as this, it is possible to run a separate cable pair (CAT- 3 / CAT- 5 / Twisted Pair) cable from the MRC to the keypad device for control purposes. This diagram shows the connections of the control signal path to the keypad, and the speaker connections to the MRC.

Wiring diagram to be used when a house has been pre-wired in a conventional manner using separate speaker cable and CAT 5 keypad wiring.



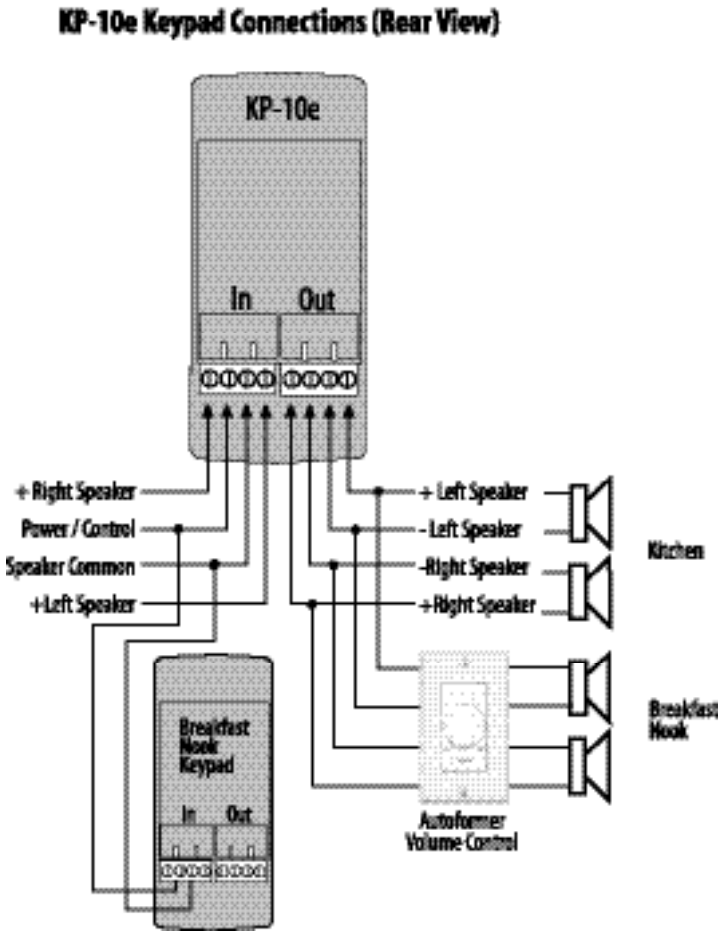
Split Zone / Analogue Volume control (Option 1)

In cases of split zones where more than one set of speakers are driven from the same keypad (such as an en-suite off of a master bedroom) it is sometimes desirable to place a volume control in the split zone. The following diagram shows the connections to a remote zone, and "Autoformer" volume control device.



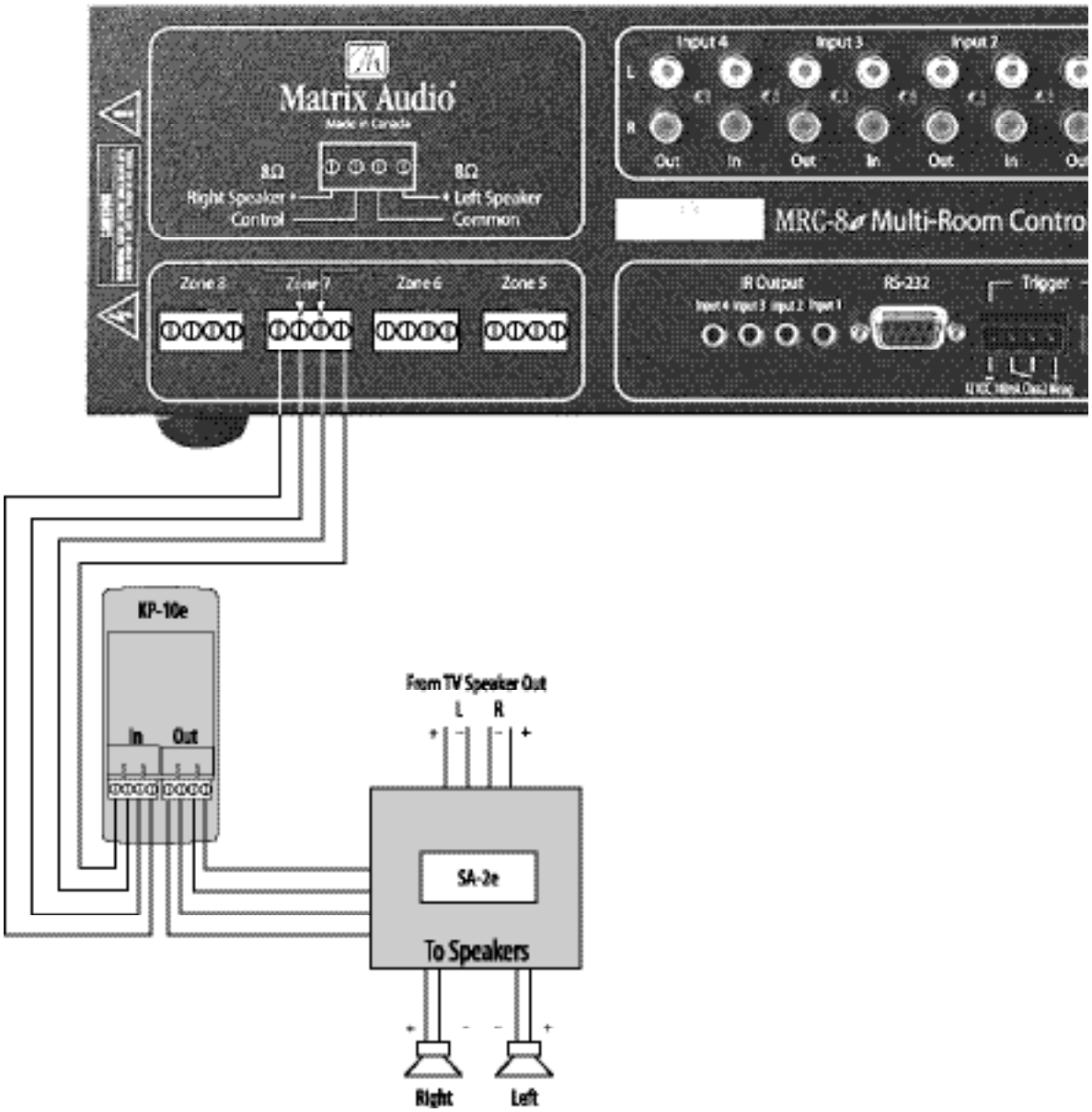
Split Zone / Analogue Volume Control
(Option 2 Multiple Control Keypads)

In this case,two keypads are shown. Please note this does not truly split the zone, but provides controls in two areas of the same zone. If one keypad selects a different source, or changes the volume, the listening selection and master volume to the entire zone changes.



Shared Speakers – Priority Selection

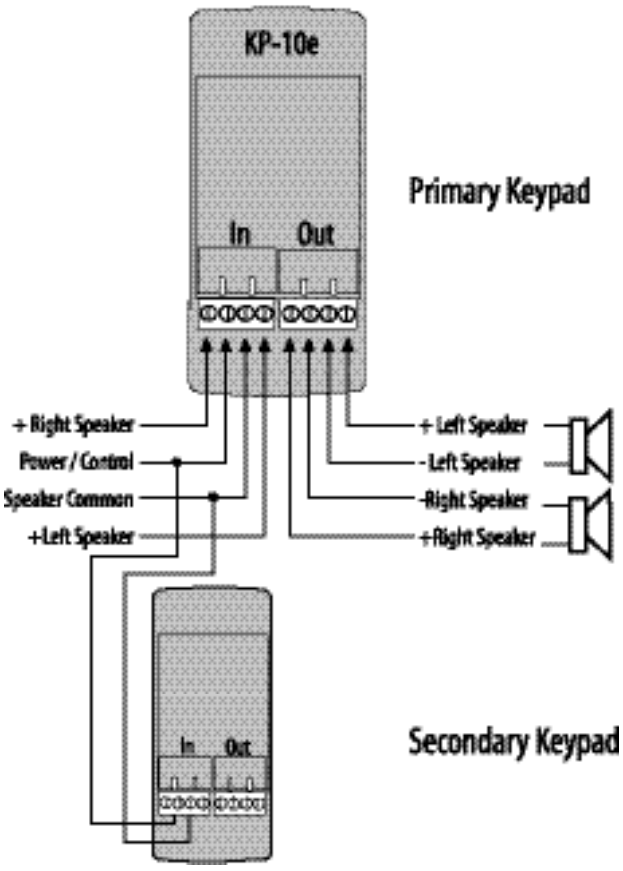
Some home automation devices are configured such that background music (such as provided by the MRC) is available on a common speaker system to a home theatre.
When the home theatre is active the signal switches and the primary source takes control of the speaker system. Devices such as the Matrix SA-2e can accommodate this.
Typical configuration is as shown in the following diagram.

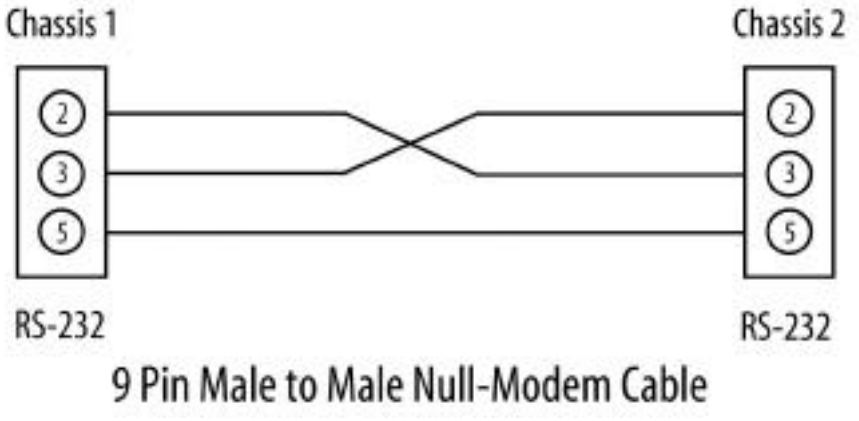


Multiple Keypads in Zone

Certain situations such as large rooms, or rooms with more than one common entrance may require more than one keypad control to conveniently manage the zone.
This configuration allows for 2 controls to be placed on the control circuit.

KP-10e Keypad Connections (Rear View)





Null Modem Cable

Please note: The primary design of the MRC is to operate in a single chassis configuration. While dual chassis configurations are possible, you need to be aware that some of the behavioural characteristics surrounding the source device selection.
You may not wish to take advantage of the switched power of the sources since power synchronization will be an issue between multiple MRC chassis.
It is recommended that in dual system scenarios, you may want to leave the source devices fully powered at all times.

The RS232 also provides real time status reporting on keypad activities.
Information messages are sent using the above syntax, and are recognizable because the 1st character in the string is repeated.
ZZ11 is the same as Z11, but the 1 st was generated by the keypad, and the latter via command from the RS232 port. Volume is sent only AFTER the user has completed adjusting the zone and released the volume key for more than 2 seconds.
This minimizes unwanted strings of volume commands while the user adjusts and only reports the end value.

RS 232 Interface Specifications & Command Reference

RS232 Com Port.
9 Pin D Connector (Female)
DTE configuration.
Transmit ——— Pin 2
Receive ——— Pin 3
Ground ——— Pin 5
4800 Baud, Asynchronous, 8 Data bits, No Parity, No Handshake

- Commands must be in UPPERCASE
- Valid Commands are confirmed with "OK"
- Valid Commands do not require CR/LF
- Invalid commands are responded to with "ERR"

Command	Syntax	Parameters	Comments
Zone Power	Zxy	x=Zone: Valid range 1-8 y=State: D=OFF 1=ON	Similar to pushing the "ON" button on the remote keypad. This will power-up/ down the specified zone.
All Zones Power	ZAy	y=state: 0=OFF 1=ON	Similar to holding the ON key at a remote keypad. This will power-up/down all zones
Source Select	Sxy	x=Zone: Valid Range 1-8 y=State: Valid Range 1-4	Similar to selecting one of the 4 source keys from the remote keypad.
Function	Fxy	x=Zone: Valid Range 1-8 y=State: F=>> R=<< S=pause/stop	Similar to selecting one of the >>,<<, ||, keys from the remote keypad.
Numeric	Nxy	x=Zone: Valid Range 1-8 y=Number: Valid Range 1-9,0,A, B	Similar to selecting functions on the right hand side of a KP-22e
Volume	Vxyy	X=Zone: Valid Range 1-8 yy=Volume Setting: Valid Range 00-31	00 =Mini 05 =Normal 15 =Moderate 20 =Loud 31 =Maximum
Volume Step	Vx++ Vx--	x=Zone: Valid Range 1-8	Increases or decreases volume level by 1 relative to it's current setting
Treble	Tx++ Tx––	x=Zone: Valid Range 1–8	Increases or decreases treble level by 1 relative to it's current setting
Bass	Bx++ Bx––	x=Zone: Valid Range 1–8	Increases or decreases bass level by 1 relative to it's current setting

MRC Specifications

Features

- Eight Independent Zones
- Modular Construction
- Easy to program and install
- Programming buttons under the front panel (no external programmer required)
- RS232 port on board to interface with home automation systems
- Trigger inputs/outputs
- Infrared commands stored in flash memory
- High current toroidal power transformer
- Each Zone is separately fused
- Zone Grouping
- Amplifiers are protected from overload and thermal runaway
- Ten button (KP-10e)or Twenty-two button (KP-22e) keypad with IR receiver
- Hand Held Remote control
- Independent volume, Bass, Treble controls per zone
- All Off feature

Technical Information

- Eight independent Zones (2 x Four Zone Modules)
- Eight 20 Watt per channel stereo amplifiers (20Hz to 20Khz @ .1% THD.).
- Four Stereo Inputs,47K impedance
- Four Stereo Looping Outputs
- Infrared learning microprocessor
- Four infrared 3.5mm mono output jacks
- 12VDC, trigger out @ 100 ma. Dry contact N.O. Relay
- 12 VDC trigger input (from external device)
- Switched 120VAC. Outlet 200 Watts
- RS232 Port (9 Pin D connector)
- Keypad Wiring: Patent (pending) "Speaker Wire Technology" allowing control and audio to share the existing or newly installed four conductor speaker wiring
- 17"W x 5"H x 13"D (including feet and connectors)
- Shipping Weights (Rackmount Version):
  MRC-8.4e 23.35 lbs.(10.59 kg)
  MRC-8.6e 25.95 lbs.(11.77 kg)
  MRC-8.e 26 lbs.(11.79 kg)

***MRC**
Multi-Room Controller
**also available in Silver and Rack Mount*

***SA-1e** Multi-Room
Multi-Speaker
Stereo Amplifier
**also available in Silver and Rack Mount*

***SA-2e** Multi-Room
Stereo Amplifier
**also available in Silver and Rack Mount*

ZS-2e
ZoneSplitter

KP-22e Keypad

KP-10e Keypad

***RC-22e** Remote Control
***RC-10e** Remote Control
**also available in silver*

IR-22e Infrared Receiver