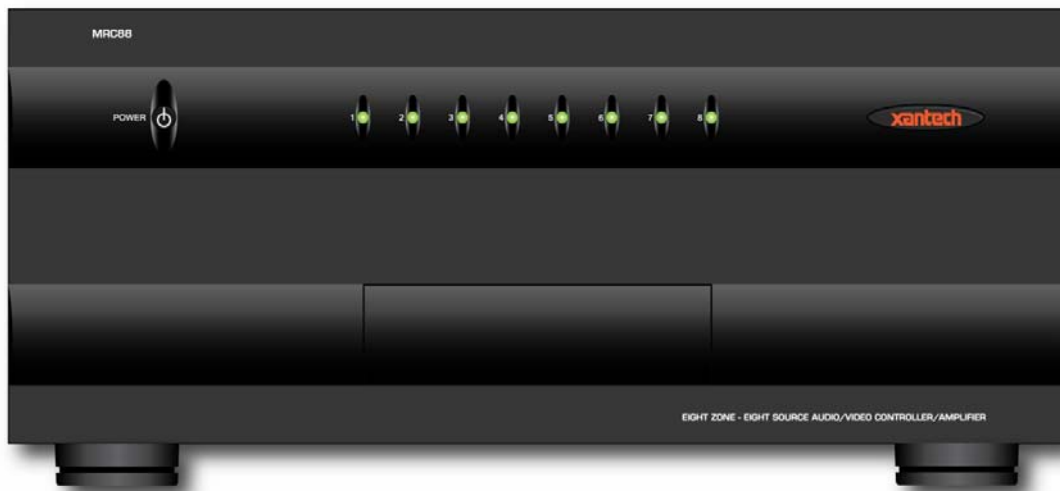
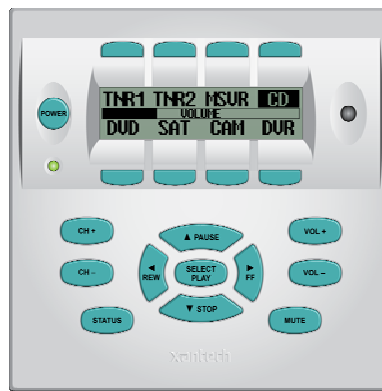


# QUICK START GUIDE

## MRC88 MRAUDIO8X8

EIGHT ZONE – EIGHT SOURCE  
AUDIO & VIDEO CONTROLLER/AMPLIFIER SYSTEMS



# xantech®

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## **READ THIS FIRST!!!**

### **About the MRC88/MRAUDIO8X8 Quick Start Guide**

The MRC88/MRAUDIO8X8 Quick Start Guide provides fundamental instruction for planning, installing, connecting and programming a basic MRC88 System. The MRC88 Series Controllers have features and options to accommodate functionality in the most basic or sophisticated of whole-house audio/video distribution and control applications. This Guide only provides instruction to the most basic application of a MRC88 System as used in a multi-zone audio/video system using standard MRC88 Keypads.

Advanced options such as integrating Xantech SPLCD Touchpanels (SPLCD64V, SPLCD64G, SPLCD39G), Music Server (XMUSICW+), Dual Tuner (XDT), HD video distribution (HD44CC5), doorbell and paging interface (DPC100, DCSS, DCCBB, DCH4), RS232 control and routing (RS2321X8), adding local sources (ZAKIT, ZATRAN, ZA8REC), sub-zone expansion and integration of high-power and multi-channel amplifiers (PA435X, PA635X, PA1235X, PA4100X) can all be implemented in a MRC88 System, but are not covered in this Guide. Please refer to the MRC88/MRAUDIO8X8 Installation Instructions or the appropriate individual Xantech product manuals for instructions on integrating those products.

Additionally, advanced programming instructions covering: macro programming, power management utilizing sensing modules and programming sensor triggers (SM Series Modules), RS232 control, zone linking, monitor lockout, and all other advanced programming options can be found in the MRC88/MRAUDIO8X8 Installation Instructions and/or individual Xantech product manuals.

Xantech Manuals can be downloaded from [www.xantech.com](http://www.xantech.com) .

The Xantech Technical Support Department is also available to assist in answering integration and programming questions at 1.800.843.5465 ext 335 or via email at [tech@xantech.com](mailto:tech@xantech.com) .

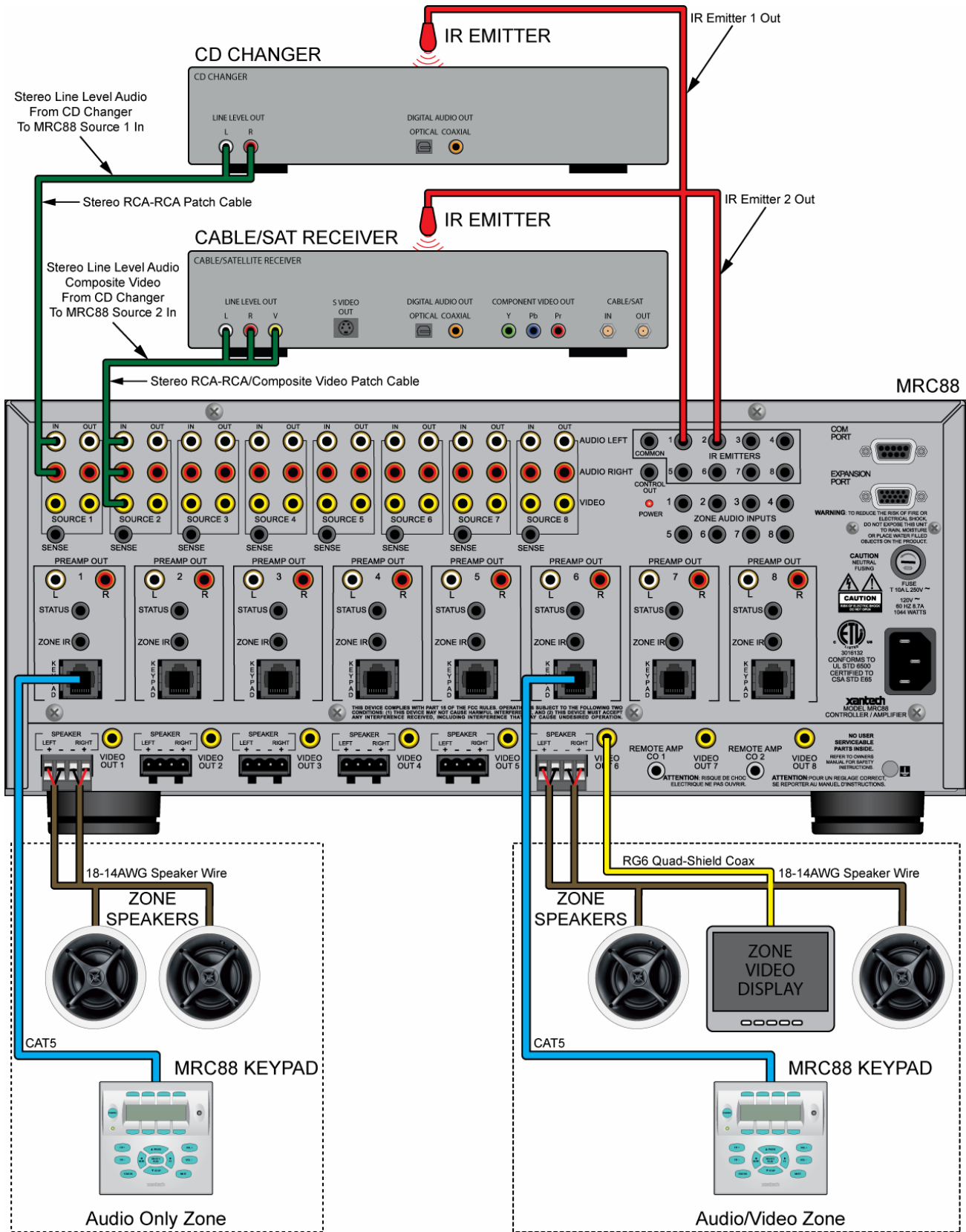


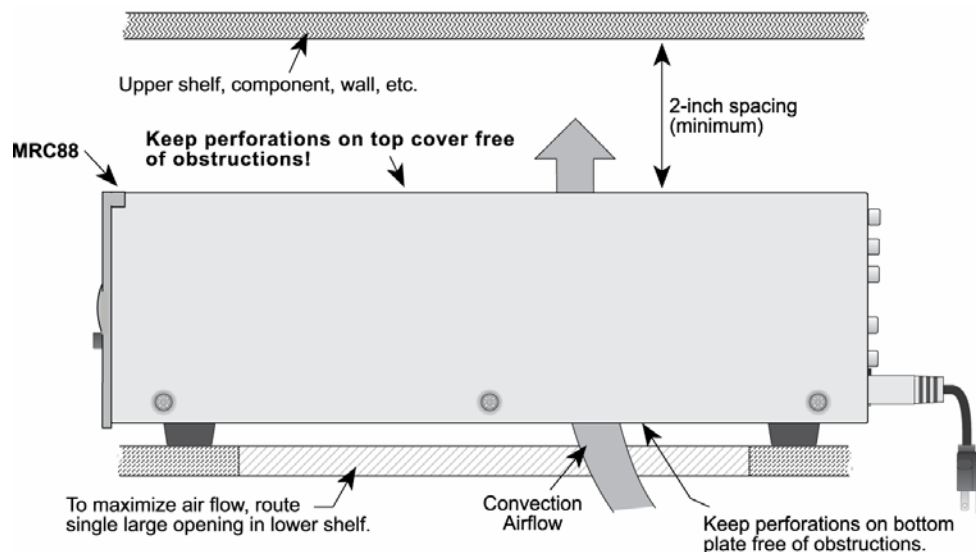
Figure 1 – Typical MRC88 System

## SYSTEM PLANNING

### CONTROLLER LOCATION

Consider all of the flowing when planning the Controller location:

1. The MRC88 depends on the natural free flow of air up through the slot perforations in the bottom plate, over the internal heat dissipating fins, then out the top cover, for adequate cooling.
2. Provide large holes in the shelf below the MRC88 and allow at least 2 inches of space above the top cover to allow adequate airflow.
3. Never remove the chassis feet. They are required to create space for adequate airflow.
4. Pay close attention to the overall thermal conditions within a cabinet if other heat generating components are also being used.
5. Both MRC88 and MRAUDIO8X8 have built-in fans that will automatically turn on at a manufacturer specified temperature. Use of external fans, (quiet, boxer type) is recommended to provide constant airflow for the MRC88 and other heat generating components when appropriate.
6. When rack mounting, always use a single ventilated rack space panel above and below the MRC88.
7. The MRC88 is designed for horizontal mounting on flat surfaces. When rack mounting, use a proper rack shelf or drawer. (Middle Atlantic or equivalent.)
8. In multi-zone installations there will be large bundles of wire and cable to accommodate audio, video, speaker and control connections. Be sure to leave enough room for the leads and dress them in such a manner as to not block airflow.



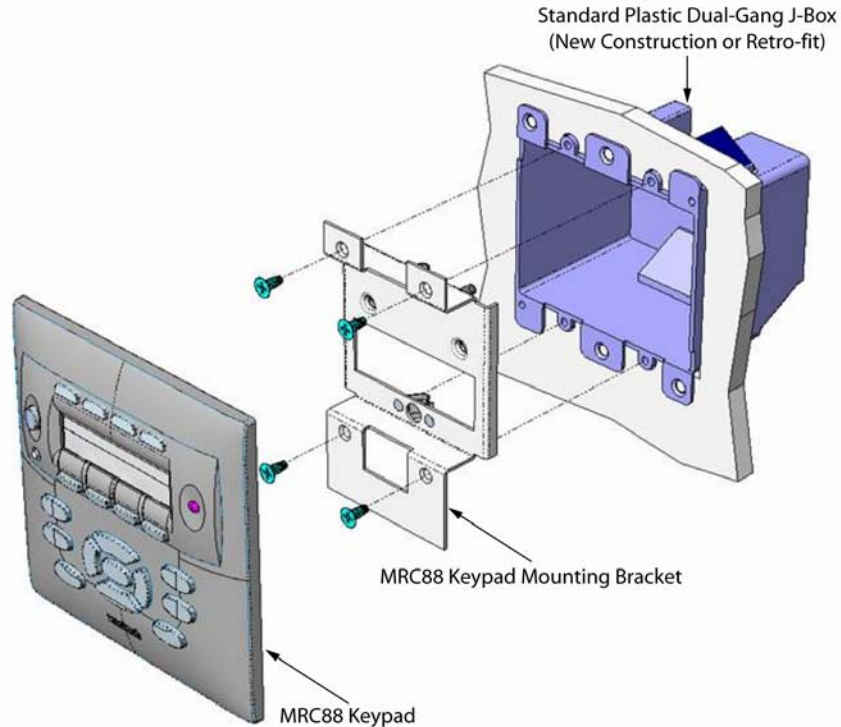
**Figure 2 – MRC88 Controller Installation**

## MOUNTING THE KEYPAD

### Keypad Location

- The MRC88 Keypad should be mounted in a convenient location, typically near the entrance to a room where other room controls such as light switches are located.  
**NOTE:** Some light dimmers can interfere with the Keypad and IR Sensor. Test compatibility prior to determining mounting location.
- Do not mount the Keypads in locations that will be exposed to sunlight or bright artificial light. Bright light sources can interfere with the IR Sensor on the Keypad, preventing use of remote controls. Cumulative light noise can interfere with system and source control from other zones as well.

To mount the Keypad, use a plastic, dual-gang, new construction or retro fit J-box and the included MRC88 Keypad Mounting Bracket as shown in **Figure 3**. **NOTE:** Do not mount the Keypad in the same box with high voltage (AC) devices. This can interfere with system performance and is a violation of building/electrical code in most places.

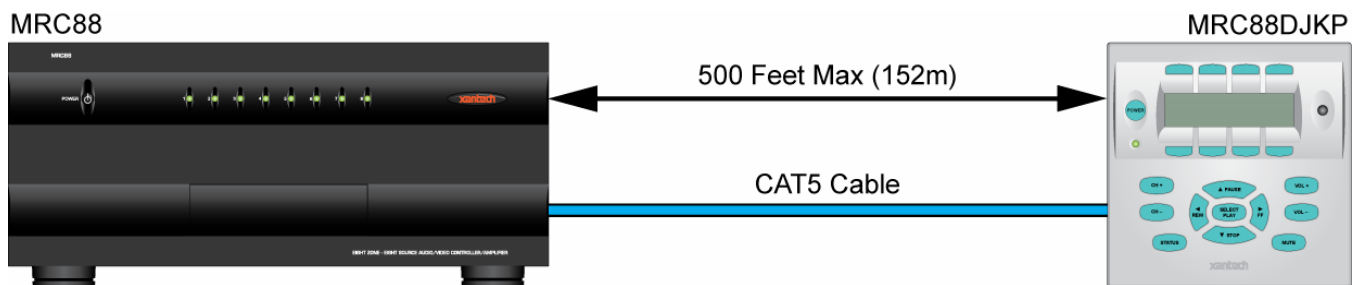


**Figure 3 – Installing the MRC88 Keypad**

## KEYPAD CABLE LENGTH

The maximum cable length for MRC88 connection to a single keypad is 500 feet (152m) over CAT5 cable.

- Zone Keypad CAT5 cables should be pulled in home-runs from the keypad locations to the MRC88 Controller.
- Label each end of the CAT5 with the Zone Number and Room Name to assure proper connection and assist in troubleshooting.
- CAT5 cable must be properly terminated with RJ45 connectors for MRC88 Keypad connections. See Sections: **Preparation, (Page 10)** and **Zone Connections/ Keypads, (Page 14)** in this Guide for additional information.



**Figure 4 – MRC88 Keypad CAT5 Cable Length**

**NOTE:** To connect additional MRC88 Keypads, WaterPads and IR Sensors, see: **MRC88/MRAUDIO8X8 Installation Instructions/Extended Runs and Secondary Keypads in Zone, (Page 31)**. For connecting SPLCD Keypads see: **SmartPad LCD Installation & Programming Manual/MRC Controller and Expansion Port Wiring, (Page 17)**.

## SPEAKER WIRE LENGTH

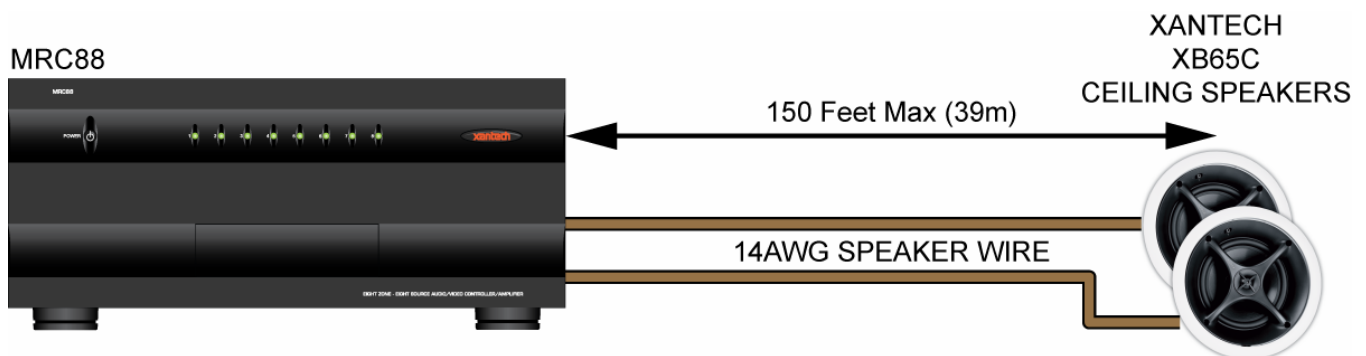
The maximum wire length for Zone Speaker connections is 150' (39m) over 14AWG stranded wire.

- Speaker wire should be pulled in home-runs from the speaker locations to the MRC88 Controller, two pair for each zone.
- Always use quality stranded speaker wire for zone speaker connections.
- Label each end of the speaker wire with the Zone Number and Room Name to assure proper connection and assist in troubleshooting.
- MRC88 Speaker Terminals are 4-Ohm safe. Be sure the combined impedance presented to the speaker terminals by the speakers (or any combination of speakers) is greater than 4-Ohms.

Use the following Table to determine speaker wire gauge based upon the length of the speaker wire run:

Length of Speaker Wire Run	Gauge of Wire
30' (9m)	18AWG
70' (21m)	16AWG
150' (39m)	14AWG

**Table 1 – Speaker Wire Length/Gauge**



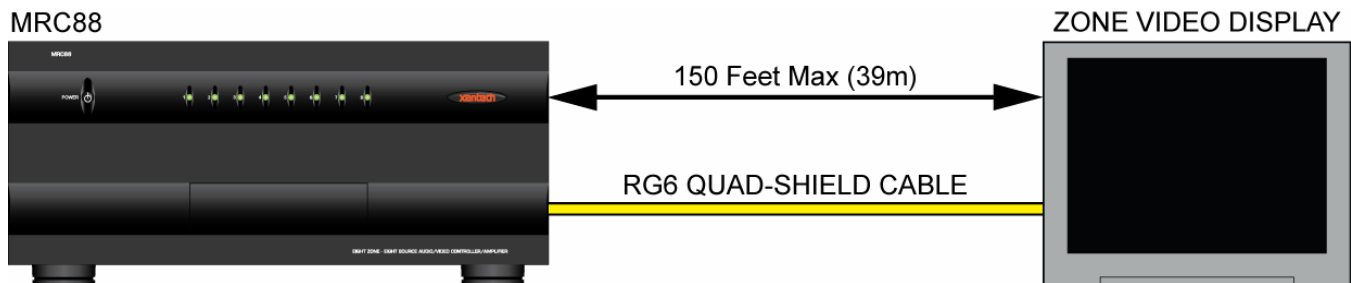
**Figure 5 – MRC88 Zone Speaker Wire Length**



## VIDEO DISPLAY CABLE LENGTH (MRC88)

The maximum coaxial cable length for Zone Video Output is 150' over RG6 quad-shield cable.

- Coax for zone video should be pulled in home-runs from the zone video display locations to the MRC88.
- Coax must be properly terminated with a shielded male RCA video plug on the MRC88 end and as appropriate for connection to the video display. (Shielded male RCA plug typical)
- Label each end of the coax with the Zone Number and Room Name to assure proper connection and assist in troubleshooting.



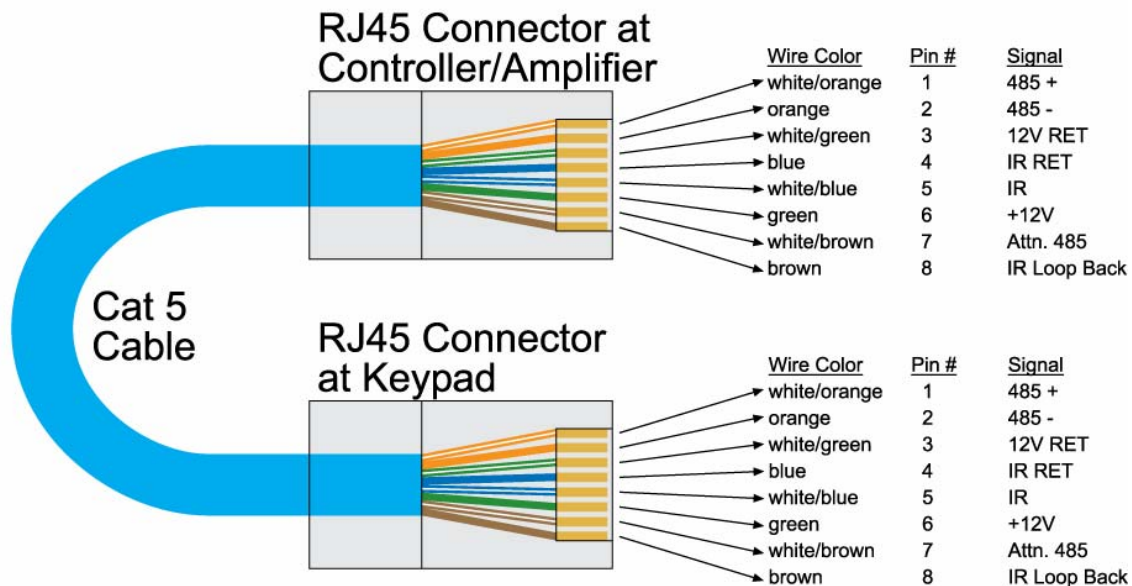
**Figure 6 – MRC88 Zone Video Cable Length**

## PREPARATION – WIRING

**CAUTION:** Power voltage for the keypad is transmitted along the CAT5 cable!  
**Incorrect wiring on this cable can destroy the MRC Keypad!**

### TERMINATING THE CAT5 CABLES

All MRC88 CAT5/RJ45 connections utilize the EIA/TIA 568B Standard pin-out as shown in **Figure 7**.



**Figure 7 – CAT5/RJ45 Pin-out (EIA/TIA 568B)**

Cables should be configured in a pass through (pin to pin) configuration. To terminate CAT5 cables:

1. Trim the end of the CAT5 so all eight conductors are the same length.
2. Using a CAT5 stripper, strip away approximately ½ inch of the cable jacket. **DO NOT STRIP THE INDIVIDUAL WIRES.** Strip only enough of the jacket to make connections. None of the individual wires should be hanging out the end of the RJ45 connector when finished. There must be sufficient jacket on the cable to allow the hinged tab on the RJ45 connector to apply pressure to the cable jacket to function as a strain relief when pressed together with the crimp tool.
3. With the RJ45 locking tab facing down, insert the individual wires into the RJ45 connector per EIA/TIA 568B Standard pin-out as shown in **Figure 7**.
4. Use a RJ45 crimping tool to press the electrical contacts into the individual wires and the hinged tab into place as the strain relief.

Test the cable connections using a proper CAT5 cable tester or use a multimeter to check pin to pin continuity and for possible shorts. Using either method, it is advisable to measure pins 3 and 6 to verify proper voltage. A 12VDC measurement should be read when the positive probe is on pin 6 and the negative probe is on pin 3. See **Figure 7**.

## **AC POWER**

It is recommended, but not required, that the MRC88 Controller and head-end source components be powered by a dedicated 20-amp circuit with an isolated ground.

Whole-house system components turning on/off at various times (head-end/common sources that may time out or local zone sources and amplifiers turning on/off), lighting systems and other household appliances, can introduce undesirable conditions (surges, ground hum, EMI, RFI, clicks and pops) on the AC line that can adversely affect overall system performance.

An AC line conditioner can also be incorporated to protect components from unstable AC and improve system performance by filtering AC line noise.

## **GROUNDING SCREW**

Connect to earth ground or other A/V components to aid in the reduction of system noise such as an audible hum created by the difference in ground potential between devices, if needed.

## SOURCE CONNECTIONS

Be sure the MRC88 power is off and the unit is disconnected from the AC supply when making connections to avoid potential electrical shock and damage to the MRC88, the Keypads, Sources and Speaker components.

### MRAUDIO8X8 (Audio Only)

1. Use a quality stereo audio patch cable to connect the **L&R line level audio outputs** of a source component to the appropriate **L&R line level source audio inputs** on the MRAUDIO8X8 rear panel.
2. Repeat for all sources.

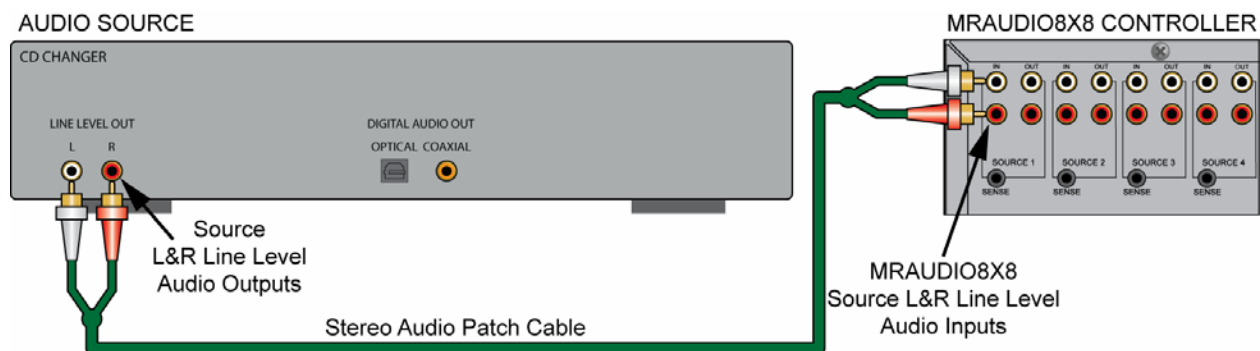


Figure 8 – Audio Source Connections

### MRC88 (Audio/Video)

1. Use quality stereo audio/video patch cables to connect the **L&R line level audio and composite video outputs** of a source component to the appropriate **L&R line level source audio and composite video input** on the MRC88 rear panel.
2. Repeat for all sources.

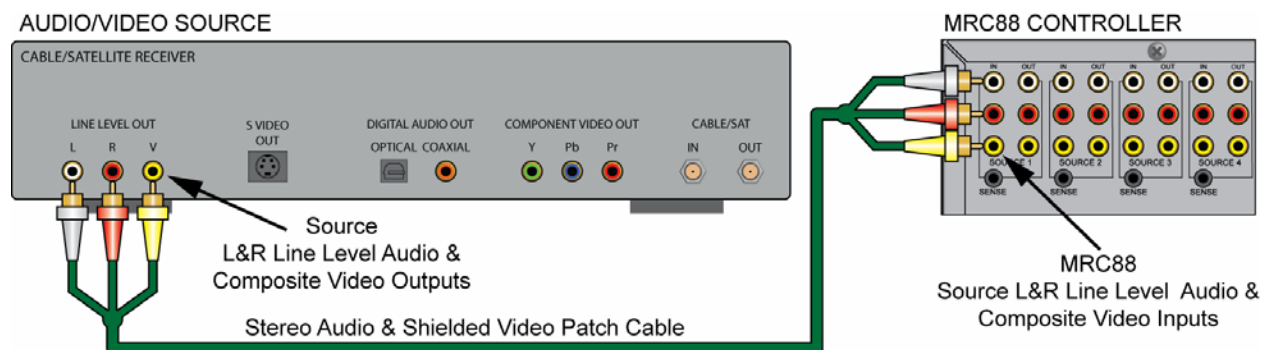


Figure 9 – Audio/Video Source Connections

## IR EMITTERS

Use the 8 included 283M Emitters for IR control of common source components.

1. Locate the **IR sensor** on the device to be controlled. If the sensor is not obvious, shine a small flashlight into the device front panel display to locate the sensor or refer to the product manual for that device.
2. Remove the **adhesive protective cover** on the flat side of the emitter and attach the emitter over the **IR sensor** on the front panel of the source to be controlled via IR.
3. Carefully pull the emitter wire around to the back of the unit. Do not block disc and tape accesses. Do not pinch the wire between components.
4. Plug the emitter into the appropriate source **IR Emitter Output** on the MRC88 rear panel.
5. Repeat for all sources to be controlled via IR.

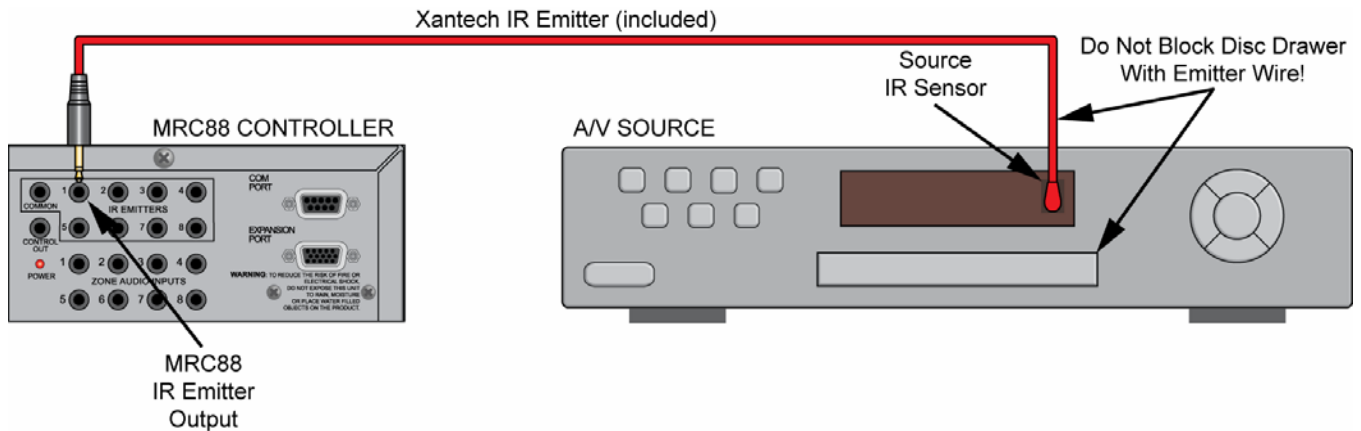


Figure 10 – IR Emitter Connection

## ZONE CONNECTIONS

### KEYPADS

Prior to connecting the keypads, be sure the zone dual-gang boxes and keypad mounting brackets have been installed and the keypad CAT5 runs have been terminated and tested as described in the previous sections.

### Head End Connections

1. Connect the zone CAT5 keypad cable to the appropriate **Zone Keypad Terminal** on the MRC88 rear panel. Be sure the RJ45 connector 'clicks' into place.
2. Repeat for all zones.

### Zone Connections

1. Connect the zone CAT5 cable to the **Controller Terminal** on the MRC88 Keypad rear panel. Be sure the RJ45 connector 'clicks' into place.
2. Firmly snap the keypad into the Keypad Mounting Bracket. (Figure 3)
3. Repeat for all zones.

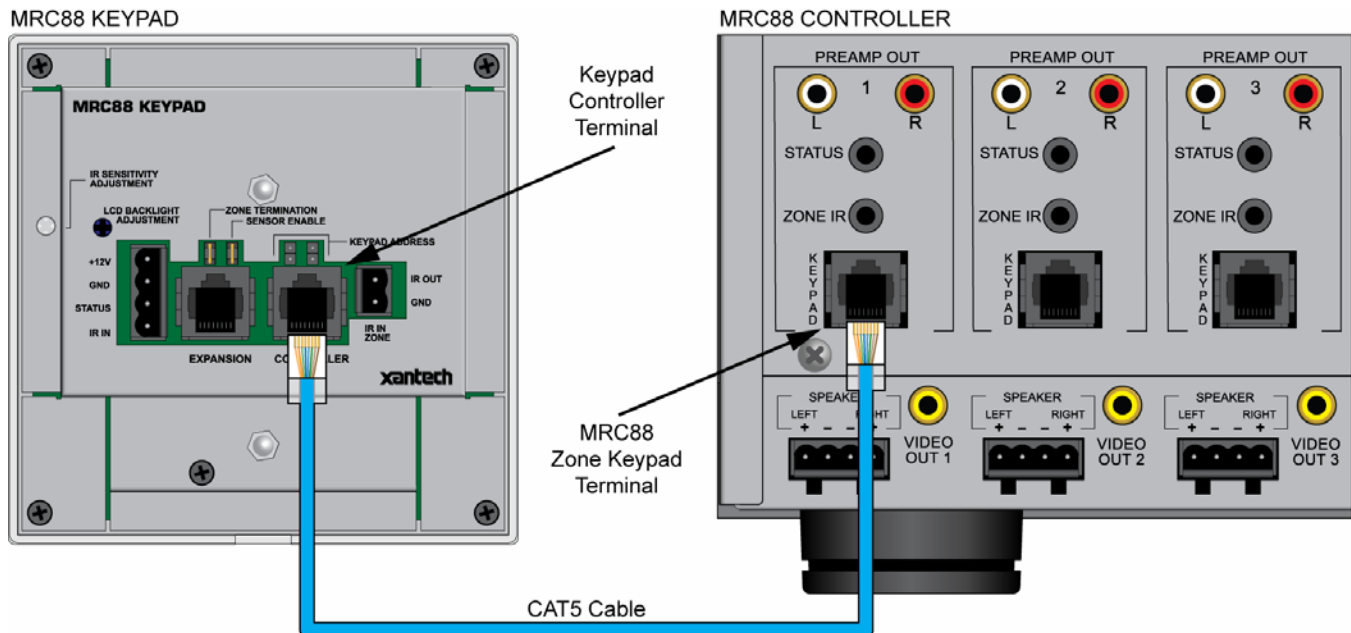


Figure 11 – Zone Keypad Connections

## SPEAKERS

### Head End Connections

Use the included 4-conductor plug-in connectors, (6 included) to connect speaker wires to the MRC88.

1. Strip each speaker wire conductor's insulation back about  $\frac{1}{4}$  inch (6mm) and twist the ends to prevent fraying.
2. Insert the leads into the appropriate "L+, L-"/"R+, R-" Terminals on each **plug-in connector**. Confirm polarity. Slightly pull the connected wire to confirm connection.
3. Be sure there are no loose strands that can cause shorts.
4. Plug the connector into the appropriate **Zone Speaker Terminal**.
5. Repeat for all zones.

### Zone Connections

Prior to connecting speakers, be sure ceiling/wall openings have been properly prepared and that any required mounting hardware is in place.

1. Strip each speaker wire conductor's insulation back about  $\frac{1}{4}$  inch (6mm) and twist the ends to prevent fraying.
2. Connect the leads to the appropriate "L+, L-"/"R+, R-" Terminals on each speaker. Confirm polarity. Slightly pull the connected wire to confirm connection.
3. Be sure there are no loose strands that can cause shorts.
4. Install speakers per manufacturer's instructions.
5. Repeat for all speakers in all zones.

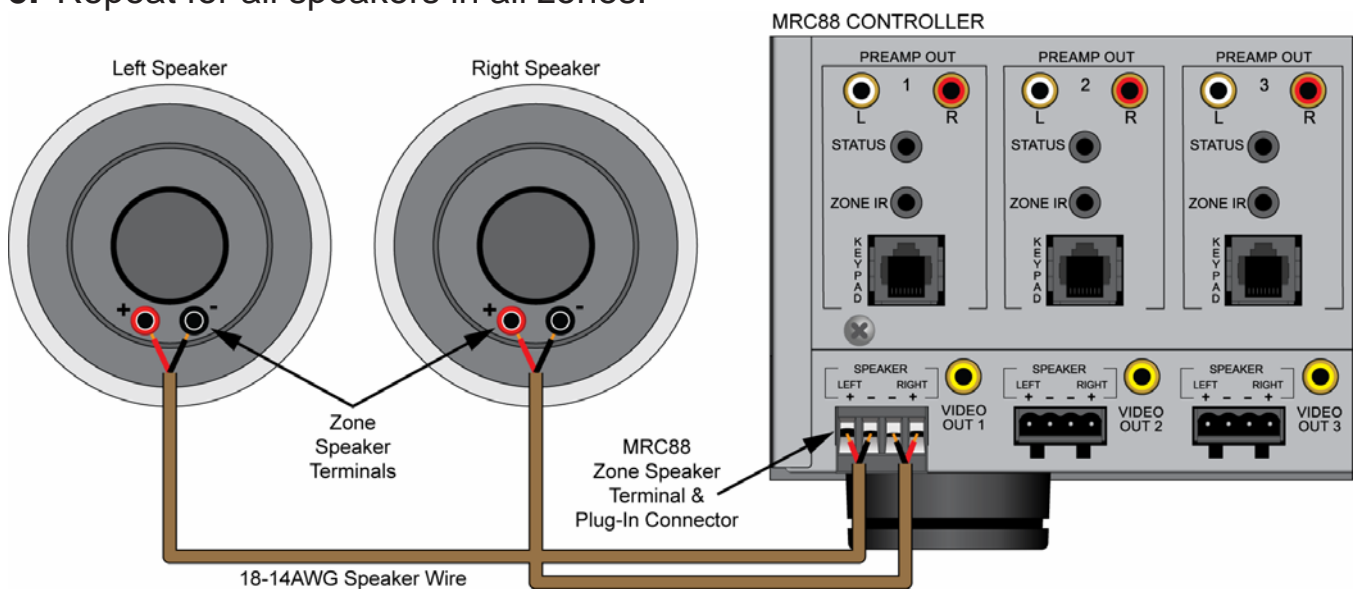


Figure 12 – Zone Speaker Connections

## VIDEO DISPLAY (MRC88)

### Head End Connections

1. Connect the zone video cable to the appropriate **Zone Video Output** on the MRC88 rear panel.
2. Repeat for all zones with video displays.

### Zone Connections

Prior to connection, confirm the input to be used for the zone video feed and appropriately terminate the video cable. (Shielded male RCA video plug typical.)

1. Connect the zone video cable to the appropriate **composite video input** on the zone video display.
2. Use the other inputs on the zone video display for local devices such as DVD, Sat, Cable, Video Games, etc. as needed.
3. Repeat for all zones with video displays.

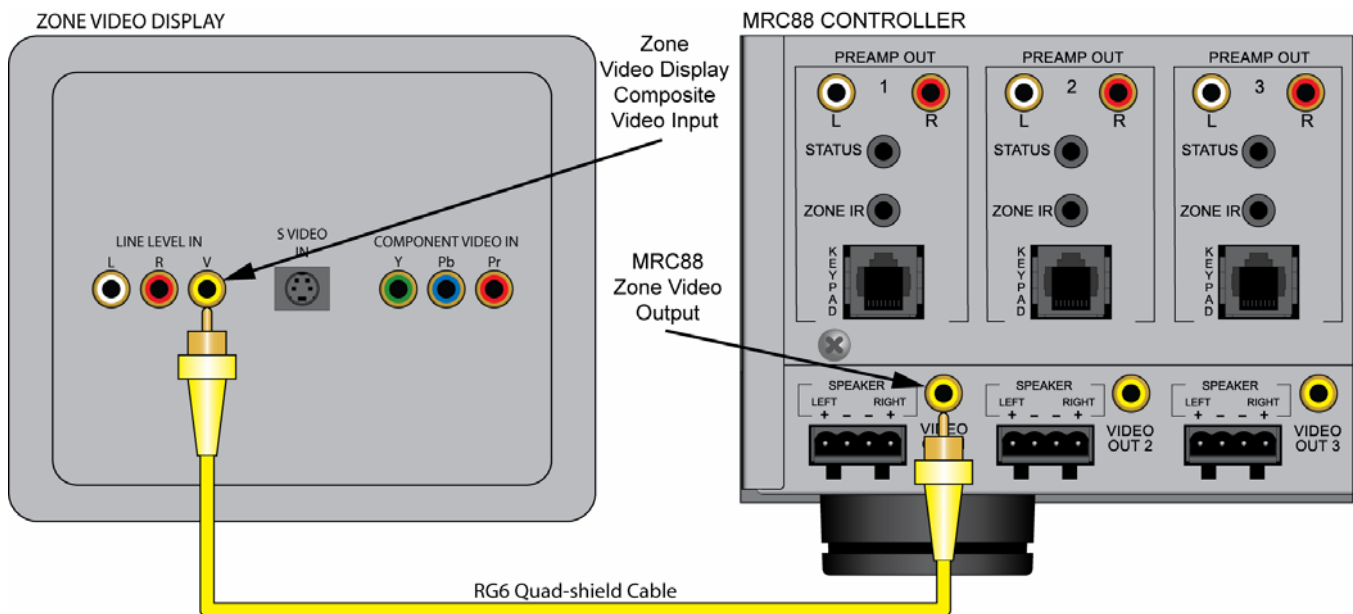


Figure 13 – Zone Video Display Connections



## SYSTEM INITIALIZATION

When all system connections (head-end and zones) have been made and confirmed, connect the AC power cords for the MRC88 and all system devices.

Press the **Power Button** on the **MRC88 Front Panel**. The Xantech logo will illuminate indicating the main power is ON. The **Status LEDs** (1-8) on the MRC88 front panel will flash as follows while performing a system status check:

- **Slow Orange Blink** – Indicates general initialization is occurring.
- **Fast Green Blink** – Indicates that the keypad(s) on the associated zone is currently being initialized.
- **All Lights Off** – Initialization is complete, system is ready for operation.

**NOTE:** If a fast green blink does not occur on any Status LED, confirm that the keypad for the associated zone is connected at the MRC88 and at the keypad. If the keypad is connected, test the CAT5 cable to confirm proper pin-out and termination. See Section: **Preparation – Wiring/Terminating The CAT5 Cables, (Page 10)** in this Guide for additional information.

## OUT-OF-BOX SYSTEM FUNCTIONALITY

A properly installed and connected MRC88 system has a default level of functionality pre-programmed at the factory. It allows the system to be operated on a most basic level for the purpose of testing overall system connections and functionality (keypad, source, speaker, video display connections, etc).

In this default, the keypad buttons that control system operation (ON/OFF, Volume, Source Select, Mute, etc) will be functional. The other buttons, (CH+, CH-, Play, Stop, Pause, etc) will still need to be programmed using Xantech Universal Dragon™ Software in order to be able to control the common sources.

The following Table shows out-of-box default functionality of a MRC88 Keypad when connected to an un-programmed (factory default) MRC88:

Button Name	Default Function/ Non-Programmable	Default Function/ Programmable	No Default/ Must Be Programmed
Power		X	
Source Buttons		X	
CH+			X
CH-			X
Status	X		
Pause			X
Select/Play			X
REW			X
FF			X
Stop			X
VOL+		X	
VOL-		X	
Mute		X	

**Table 2 – MRC88 Keypad Default Functionality**

## SYSTEM DEFAULT SETTINGS

A MRC88 has a wide range of system, source and zone audio settings that can be adjusted to tweak system performance based upon the source characteristics, individual zone environment and user preference. Some of these adjustments (Treble, Bass, Balance) can be made from the keypads and can be considered user adjustable settings. The others, (Z-Adjust, Trim Levels and Code Group) must be executed with a Xantech RC-68X IR Remote Programmer and should be considered Installer Only adjustable settings.

The following Table shows the out-of-box default audio and Code Group Settings of a MRC88:

Function	Default Setting
Mute	Off
Treble and Bass	Flat
Balance	Center
Z-Adjust Treble and Bass	Flat
Z-Adjust Balance	Center
Z-Adjust Max-V(olume)	Cleared
Z-Adjust Max-On-V(olume)	Cleared
Trim Levels	Cleared
IR Code Group	A8

**Table 3 – MRC88 Default Audio and Code Group Settings**

## ZONE AUDIO ADJUSTMENTS (MRC88 Keypad – User Settings)

To adjust Treble, Bass and Balance from a MRC88 Keypad:

1. Simultaneously press the **Status** and **VOL+ Buttons**. The '**Audio Setup Mode**' will appear on the **keypad LCD**.
2. To adjust **Balance**, press the button under '**BAL**'. The '**<**' **REW Button** will shift audio to the **left speaker**. The '**>**' **FF Button** will shift audio to the **right speaker**. The **Select/Play Button** will restore **center balance**. Display will return to normal after 10 seconds of no activity.
3. To adjust **Treble** or **Bass**, press the appropriate button in the LCD Display. The '**<**' **Button** will **decrease** the amount of treble or bass. The '**>**' **Button** will **increase** the treble or bass. The **Select/Play Button** will restore the audio to the '**flat**' setting. Display will return to normal after 10 seconds of no activity.  
**NOTE:** These adjustments do not affect Z-ADJUST default settings.

## AUDIO ADJUSTMENTS (Z-Adjust – Installer Settings)

These settings are 'permanent' settings that will affect system or zone performance whenever the system is turned on, (even after a power outage) until the settings are changed using the following procedure:

### Trim

This procedure adjusts the MRC88 Source Input levels to compensate for the different output levels of the common sources. When this procedure has been properly executed, the audio level of the common sources should be the same when switching from one source to another.

With all sources ON and playing relatively similar program material:

1. Cycle through the inputs to get a reference to the relative audio levels of the different sources.
2. Using an **RC68X** with overlay "**A**", **select the input that has the lowest apparent volume level** (from any zone).
3. Point the **RC68X** at the **IR sensor** on the **MRC88 Keypad** (IR sensor enabled) and press the **Trim Button** (button F8). This activates the Trim mode.  
**NOTE:** Trim mode allows 10 seconds after each button press for the next command to be executed. If 10 seconds is exceeded, simply press Trim again. To confirm Trim mode, press the **Mute ON Button**. If the sound mutes, the MRC88 Controller is **NOT** in the Trim mode.
4. Select any other input that sounds louder.

5. Adjust **Volume Buttons** until the apparent loudness is the same as the device in **Step 2** (lowest output).
6. Select another input that sounds louder.
7. Adjust **Volume Buttons** again until the apparent loudness is the same as the device in **Step 2** (lowest output).
8. Repeat this procedure for each remaining input.
9. Verify settings by selecting each input again, making adjustments as necessary until all inputs have the same relative audio level.
10. When the last input is adjusted, press one more input (the same or any other), to save the last setting.
11. Press the **ADJ-OFF Button** (Adjustments Off - 90) to drop out of the Trim mode. (Trim mode will automatically drop out if you wait more than 10 seconds). The Trim settings are now saved for all inputs, for all zones, completing this procedure.

### Zone Audio Adjustments

These adjustments allow customized bass, treble, balance and maximum level settings to best compliment the acoustics and preferences for each zone.

1. Go to the zone to be adjusted.
2. Using an **RC68X**, select desired **Input** (source).
3. Point the **RC68X** at the **IR sensor** on the **MRC88 Keypad** (IR sensor enabled) and press the **Z-ADJ Button** (18). (This activates the Zone Adjustments mode).  
**NOTE:** Z-ADJ mode allows 10 seconds after each button press for the next command to be executed. If 10 seconds is exceeded, simply press Z-ADJ again. To confirm Z-ADJ mode, press the **Mute On Button**. If the sound mutes, the MRC88 Controller is **NOT** in the Z-ADJ mode.
4. While listening to the program material, set **Bass** (E0, 88, & A8), **Treble** (20, 60, & 08) and **Balance** (C8, 58, D8) as desired. Repeat this procedure as often as necessary to arrive at a pleasing tonal balance for the zone.
5. Adjust **Volume Buttons** (F0 & 98) to set the maximum volume desired for the zone.
6. Press **MAX-V Button** (78) to save this maximum volume setting (this will become the loudest volume possible in that zone).
7. Set the Volume level to the desired **Zone On** volume setting (i.e. the maximum volume setting desired for when a zone is first turned ON – usually a low to moderate listening level).
8. Press the **ON-VOL Button** (E1). This will now be the maximum volume to which a zone will power on. The zone will turn on to the last volume set, up to, but over the **Zone On** volume setting.

**NOTE:** The MRC88 remembers the last volume setting on a power down and returns to that level when the Zone is powered back up. The ON-VOL feature will ensure that if the volume was turned off at a loud volume setting, when it is turned back on it will never go above the preset level (ON-VOL) setting as a maximum. If user preference is to have the zone always turn on the last volume set, **do not** program an ON-VOL Setting.

9. Press the **ADJ-OFF Button** to drop out of the Z-ADJ mode. (Z-ADJ mode will drop out automatically after 10 seconds). The Z-ADJ settings are now saved, completing the procedure.
10. Repeat **Steps 1-9** for each zone.

## RESTORE SYSTEM DEFAULT SETTINGS

To restore system default levels, press the recessed **Reset Button** behind the **MRC88 Front Panel Access Door** twice within 1 second. System and Zone settings will be reset to the settings shown in **Table 3**.

## PROGRAMMING – UNIVERSAL DRAGON™

**NOTE:** This section only covers the most fundamental aspects of MRC88 programming: Installing the software, Firmware updates, Programming and testing source IR commands, configuring the keypad source icons and transferring the project. For complete MRC88 programming instructions, see: **MRC88/MRAUDIO8X8 Installation Instructions/Pre-Programming the MRC88, (Page 34)** and **Programming the Controller, (Page 47)**.

## SOFTWARE INSTALLATION

Universal Dragon™ minimum requirements:

- Windows 2000/XP/Vista
  - 1.5GHz Processor or better
  - 512MB Ram (1GB recommended)
  - 600MB\* Hard drive space (more recommended as projects expand)
  - .NET Framework 2.0 (included)
  - Mouse, USB, RS232 ports
- \*600MB = 300 MB Universal Dragon™, 300MB DotNet Framework

Universal Dragon™ can be installed using the included CD-ROM or as a download from [www.xantech.com](http://www.xantech.com). Given the size of the program, it is recommended that downloading only be done with a high-speed internet connection. Universal Dragon™ will automatically update when a PC running Universal Dragon™ is powered up, but it is always a good idea to check the website for the latest version and Application Advisories before starting a new project. To check for updates to Universal Dragon™, with the PC connected to the internet, simply click **Check For Updates** in the **Universal Dragon™ Help Menu**.

When finished installing Universal Dragon™ double click the shortcut on the PC desktop to launch the program.

## WHO AM I

Before starting a new project or doing any programming, it is highly recommended that a 'Who Am I' procedure be performed to confirm the firmware version of the MRC88. This will serve two purposes. One, it will confirm the connection between the PC and the MRC88 that will be required for all programming; and two, it will assure that the MRC is up to date with all of the latest features and fixes.

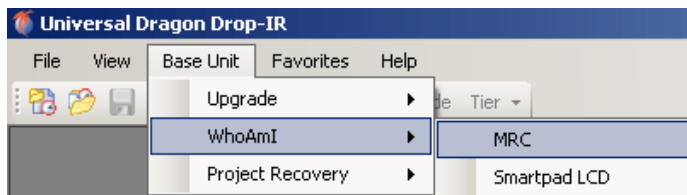


Figure 14 – Who Am I/MRC



Figure 15 – Firmware Page Link

1. Connect the included DB9 Programming Cable (Xantech P/N 05913410) to a Serial Port on the PC and to the RS232 COM Port on the MRC88 Front Panel or connect a USB Type-A to USB Type-B Cable (not included) to a USB Port on the PC and to the USB COM Port on the MRC88 Front Panel.
2. In the **Base Unit Menu**, select **WhoAmI**, then **MRC**. The **Who Am I? Window** will appear with all of the firmware version information for the MRC and all connected keypads.
3. In the **Favorites Menu**, select **Xantech Firmware Page**. This will load the **Xantech Firmware Updates Page** in the web browser.
4. Compare the firmware version from **Who Am I?** to the version on the **Firmware Updates Page**. If the version on the **Updates Page** has a higher

version number, the firmware in the MRC88 should be updated using the steps in the following section. If the firmware numbers are the same, click OK in the **Who Am I? Window** and proceed to section: **Starting A New MRC88 / MRAUDIO8X8 Project, (Page 26)**.

## FIRMWARE UPGRADE OPTIONS

The MRC88 has been designed to be “Future Proof”. As product feature improvements are developed, new System Firmware versions will be made available. Check [www.xantech.com](http://www.xantech.com) for upgrades when starting a new MRC Project.

There are two types of Firmware Upgrades. If a controller has a very old version of firmware, more than 5 revs previous, or is just not functioning properly, that calls for a **Cold Upgrade**. A controller with more recent firmware that is functioning properly, should get a **Warm Upgrade**.

MRC88CTL / MRAUDIO8X8CTL Current Firmware Version		
Post Date	Description	Download
03-07-07	MRC88 Firmware v217 <ul style="list-style-type: none"> <li>Fixed Dynamic Monitor Lockout. Previously would cause system to reboot.</li> </ul>	<a href="#">mrc88_v217.fdl</a>
<a href="#">&gt; Archived Firmware Versions</a>		

Figure 16 – [www.xantech.com](http://www.xantech.com) Firmware Updates Page

### Downloading Firmware Files From The Web

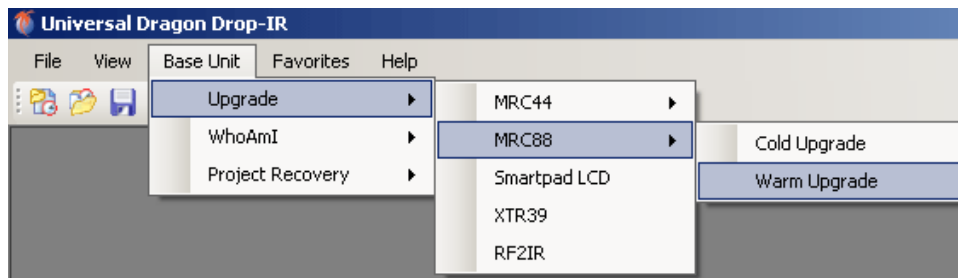
1. Open the **Universal Dragon™ MRC88 software**. Make sure the PC is connected to the Internet and that the MRC88 is connected to the computer's COM port (or USB port).
2. In the **Favorites Menu**, select **Xantech Firmware Page**. This will load the Xantech Firmware Updates Page in the web browser. This step and the following steps cannot be completed without an Internet connection.
3. The most recent MRC88 firmware update file will be featured in the **MRC88CTL / MRAUDIO8X8CTL Current Firmware Version Box**. Click the link to download the most current Firmware Update. For older versions click

on **Archived Firmware Versions** and scroll to the desired version (entries are sorted with the newest entries at the top of the list and the oldest at the bottom). Click on the desired filename link to begin the download process.

4. The **File Download Window** will appear. Select **Save**.
5. The **Save As Window** will open. Navigate to:  
**Program Files/Xantech/Universal Dragon/Firmware** (usually located on the local C Drive.). Click **Save**.
6. Once the download is complete, click on **Close** to close the download window. The browser can also be closed if no longer needed.

## WARM FIRMWARE UPGRADE

Warm Firmware Upgrades can be conducted to keep the MRC88 Controller up to date and take advantage of new features.



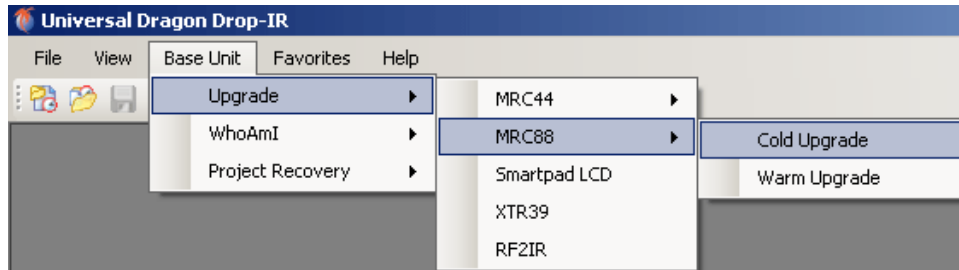
**Figure 17 – Warm Upgrade**

1. Start Universal Dragon™, connect a programming cable to the front of the MRC88 and open a MRC88 Project.
2. In the **Base Unit Menu**, select **Upgrade**, then **MRC88**, then **Warm Upgrade**.
3. The **Open Window** will appear. Double-click the **firmware file** that was just downloaded in **Step 6** above to begin the update process.
4. After the firmware transfer is completed, in the **Base Unit Menu**, select **WhoAmI**. The **WhoAmI ? Window** will appear and display the three-digit firmware version that was just loaded into the MRC88 Controller. If this is true, the new firmware has been successfully installed and is ready for use. If not, confirm downloaded firmware version, connections and try again.
5. After the upgrade is complete it recommended that a **Transfer Project** be performed to assure that the system project has not been affected by the firmware upgrade.



## COLD FIRMWARE UPGRADE

Cold Firmware Upgrades should be performed when the MRC88 firmware is more than 5 versions older than the most current version on the Xantech Firmware Upgrade Page or if the MRC88 Controller is not functioning correctly.

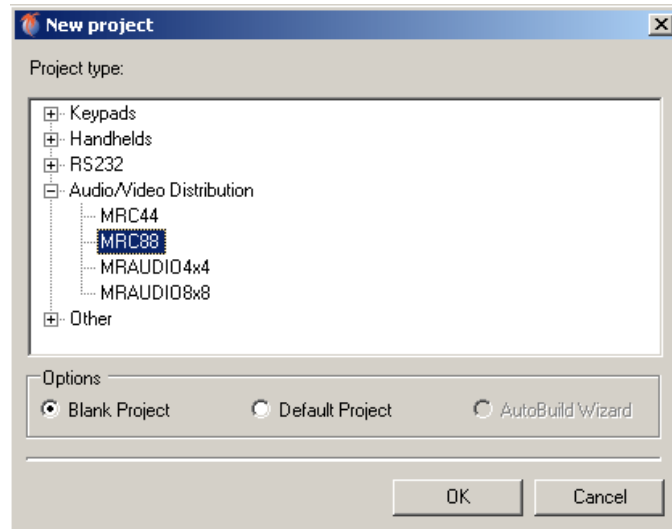


**Figure 18 – Cold Upgrade**

1. Start Universal Dragon™, connect the programming cable to the front of the MRC88 and open a MRC88 project.
2. In the **Base Unit Menu**, select **Upgrade**, then **MRC88**, then **Cold Upgrade**.
3. The **Open Window** will appear. Double-click the **firmware file** that was just downloaded in Section: **Downloading Firmware Files From the Web/Step 6** above to begin the update process.
4. Follow the instructions in the pop-up for completing the procedure.
5. After the firmware transfer is completed, in the **Base Unit Menu**, select **WhoAmI**. The **WhoAmI ? Window** will appear and display the three-digit firmware version that was just loaded into the MRC88 Controller. If this is true, the new firmware has been successfully installed and is ready for use. If not, confirm downloaded firmware version, connections and try again.
6. After the upgrade is complete it will be necessary to do a **Transfer Project** to load the system project back into the Controller.

## STARTING A NEW MRC88 / MRAUDIO8X8 PROJECT

For purpose of example, a Blank MRC88 Project similar to the system shown in **Figure 1 – Typical MRC88 System** will be used.



**Figure 19 – New Project Window**

1. In the **File Menu**, select **New Project**. The **New Project Window** will appear.
2. Under **Project Type**, click the '+' next to **Audio/Video Distribution**.
3. Select **MRC88** (or **MRAUDIO8X8** if appropriate).
4. Select the Radio Button for **Blank Project**. Click **OK**. A Blank MRC88 Project will open.
5. Resize the **MRC88 Window** until the full keypad and all tabs are visible (**Figure 21**).

## CONFIGURING THE SOURCE ICONS

Each of the Source Icons can be configured to show the source on each input. Each Icon can be up to four characters (CD, TUNR, DVD, MSRVL, iPod, etc.)

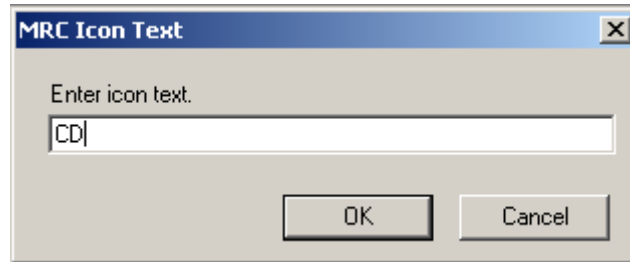


Figure 20 – MRC Icon Text Window

1. Double click a **Source Button** or **Icon** to name the Source. The **MRC Icon Text Window** will appear.
2. Type the **Icon Name** (CD, DVD, SAT, etc.) in the **MRC Icon Text Window**. Click **OK**. The Icon will appear on the virtual keypad LCD.
3. Repeat for all Icons (sources).

## PROGRAMMING SOURCE IR COMMANDS

IR Commands can be easily and quickly programmed to the keypad function buttons (Play, Stop, Pause, etc.) using the built-in IR Code Library.

**NOTE:** Some buttons are not programmable and some have default factory-programmed functions already loaded. See section: **Out-Of-Box Functionality** in this Guide for additional information (Page 17).

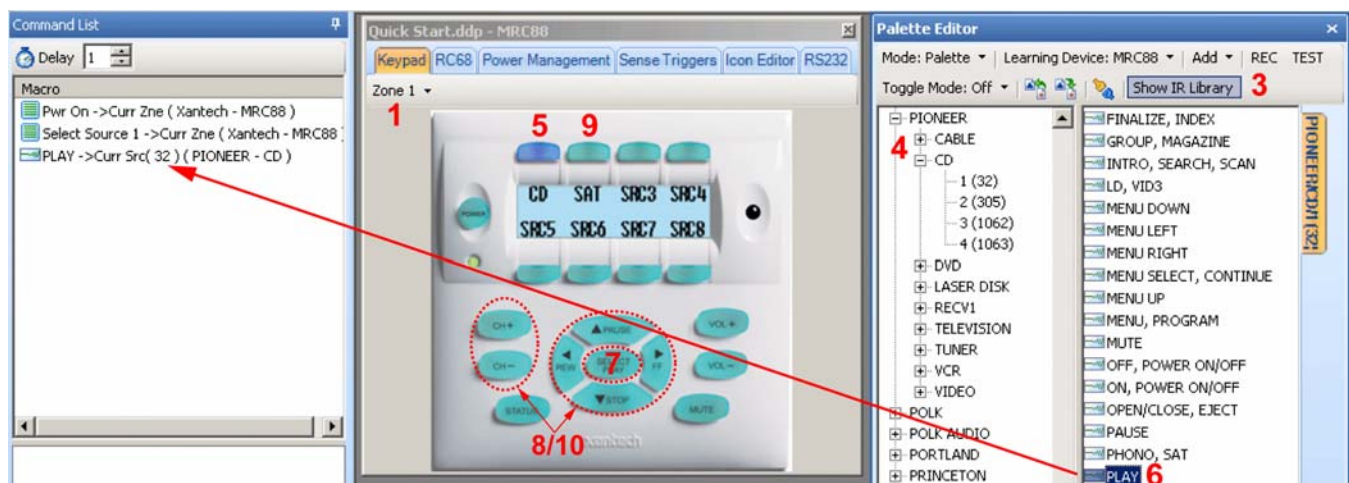


Figure 21 – Programming IR Commands

1. In the **MRC88 Window** select **Zone 1** from the pull-down.
2. If the **Palette Editor** is not already open, in the **View Menu**, select **Palette Editor**.
3. In the **Palette Editor**, click **Show IR Library** to open the **IR Code Library**.
4. Select the **brand**, (Denon, Pioneer, Sony, etc.) and the **type** of component, (CD, DVD, Sat, etc.) connected to **Input 1** on the MRC88 (Pioneer CD).  
**NOTE:** Some brand/type sets (Pioneer CD, etc) will include multiple IR code sets. It may be necessary to try the different code sets to find the proper set for the device being used in the system. Typically, testing the Power or discrete ON/OFF Commands is a good test.

#### **Transport Devices (CD, DVD, VR, Music Server, MP3 Player, etc)**

5. In the **MRC88 Window**, click the **CD Source Select Button**. It will highlight dark blue.
6. If desired, click the **play command** in the **IR Library** to add the play command to the CD source select macro. (By doing so, if stopped or paused, the CD will automatically play any time CD is selected.) The command will appear in the **Command List Macro Window**.
7. With the CD Source Button still highlighted, click the **Play Button**. Again, click the **play command** in the **IR Library** to program the **Play Button**. This creates a manual play command.
8. Repeat **Step 7** for all CD commands. (Pause, REW, FF, Stop). REW and FF can be programmed for track/chapter skip or scan per device type and user preference. The CH+/- Buttons can be programmed for Disc Up/Down when using a CD/DVD Changer.

#### **Tuning Devices (AM/FM, Sat, Cable, XM, Sirius, etc.)**

9. Click the **SAT Source Select Button**. Select the brand/type as described in **Step 4** above.
10. Program the CH+/- Buttons for channel, preset or scan UP/DOWN given device type and user preference. Program the UP/DOWN/LEFT/RIGHT/SELECT Buttons for cursor functions when appropriate for menu driven devices, or other functions per device type and user preference.
11. Repeat **Steps 4-9** for all **Sources**.  
**NOTE:** Commands not found in the IR Code Library can be learned or imported in Universal Dragon™. See: **MRC88/MRAUDIO8X8 Installation Instructions/Learning IR Commands, (Page 39)** for additional information.

## TEST IR COMMANDS

To test IR Commands, the PC must be connected to either the RS232 COM or USB COM Port on the MRC88 Front Panel and IR emitters must be connected to the appropriate IR Emitter Outputs on the MRC88 Rear Panel and correctly attached to the appropriate devices.



**Figure 22 – Select Test Mode**

1. In the **Universal Dragon™ Tool Bar**, in the **Mode Menu**, select **Test**.
2. On the virtual keypad, click the **Power Button**. The **MRC88 Front Panel Zone 1 LED** and **Zone 1 Keypad** should turn ON.
3. Click the **CD Button**. The **Keypad** should switch to **Source 1 (CD)**. If a play command was added to the source select macro, the device should play.
4. Click all other buttons that have been programmed with IR Commands for the selected source. Visually confirm function on the device.
5. Repeat **Steps 3-4** for all **sources**.
6. Click the **Power Button**. The **MRC88 Front Panel Zone 1 LED** and **Zone 1 Keypad** should turn OFF.
7. In the **Universal Dragon™ Tool Bar**, in the **Mode Menu**, select **Normal**.
8. Reprogram any commands that did not function properly or that were missed in initial programming.

## PUNCH SYSTEM (Copy IR Programming to all Zones)

Once the IR programming for Zone 1 has been confirmed, if all zones are to have the same programming, the Zone 1 Keypad can be 'punched' or copied to all zones saving valuable programming time.

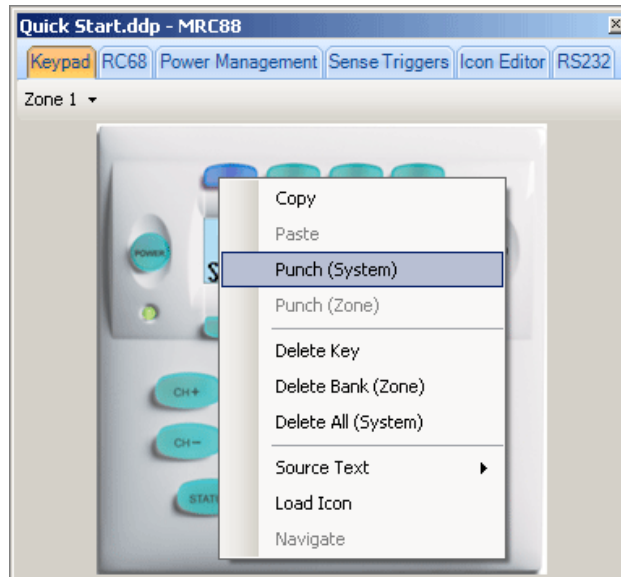
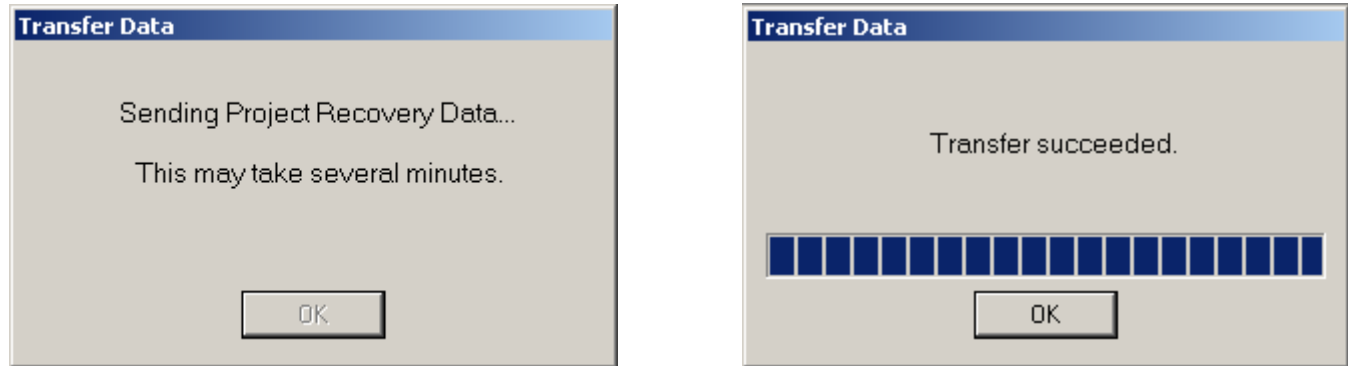


Figure 23 – Punch System

1. With **Zone 1** (the programmed zone) selected in the **MRC88 Window**, right click **any button**.
2. Select **Punch (System)**. A **Punch System Level Caution Message** will appear. Click **YES**. All programming for Zone 1 will now be punched to all zones.
3. Test all zones to confirm programming as described in Section: **Test IR Commands**, (Page 29) in this Guide.

## TRANSFER THE PROJECT

With all Zone IR programming confirmed, the Project can be transferred to the MRC88. With the PC connected to either the RS232 COM or USB COM Port on the MRC88 Front Panel:

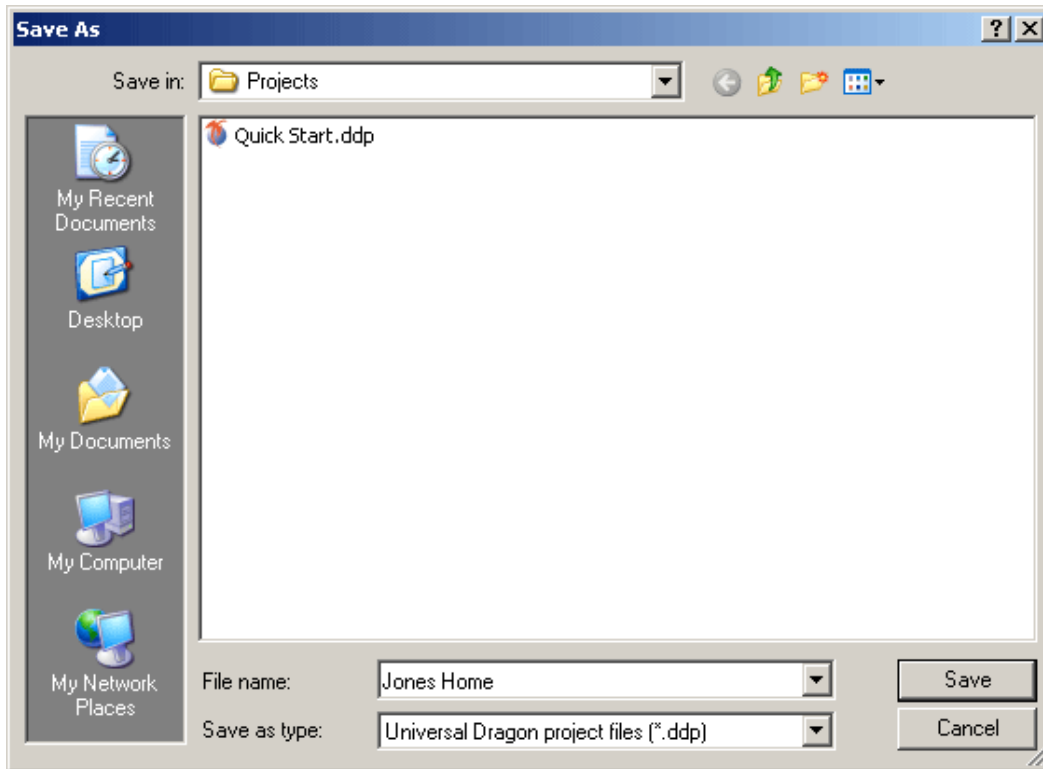


**Figure 24 – Transfer Data Window**

1. In the **File Menu**, select **Transfer Project** or in the **Tool Bar**, click the **Transfer Project Icon**.
2. The **Transfer Data Window** will appear. When transfer is complete, the message: **Transfer Succeeded** will display in the window. Click **OK**.
3. The MRC88 will update itself and the keypads.
4. The System is now ready for use.
5. If the message: '**Error while Transmitting Data...**' displays in the **Transfer Window**, check connection between PC and MRC88. Confirm Com Port. See: **MRC88/MRAUDIO8X8 Installation Instructions/Troubleshooting, (Page 92)** for additional information.

## SAVING THE PROJECT

Unlike previous versions of Xantech Dragon Drop-IR™ Software, Universal Dragon™ does not auto-save work in progress. Therefore it is necessary to save all work and it is highly recommended that it be saved frequently.



**Figure 25 – Save Project**

1. In the **File Menu**, select **Save Project** or in the **Tool Bar**, click the **Save Project Icon**.
2. The **Save As Window** will appear for a new, unsaved project. (No window will appear when saving new work on a previously saved project.)
3. The default Folder for Universal Dragon™ Projects is:  
**C:\Program Files\Xantech\Universal Dragon vX.X\Projects**. Navigate to this location if the **Projects Folder** does not appear in the **Save In Box**.
4. Enter a name for the project in the **File Name Box**. (The client's name, ie: 'Jones Home' is a good way to keep track of individual projects.)
5. Click **Save**.
6. To close a project without saving changes, In the **File Menu**, select **Close Project**. In the **Save Window**, click **NO**. The project will close without saving changes. The project will still be available for future use, in its last saved form.



## SAVE PROJECT AS

When programming a project for a new client that is similar or identical to an existing project, **Open** the existing project. In the **File Menu** select **Save As**, then enter the new file name as described in **Step 4** above. The project will be saved with the new file name. At this point, the project can be transferred to the Controller if no additional changes are required, or after making the necessary changes for the new client.

## PROJECT RECOVERY

1. In the **File Menu**, select **Base Unit -> Project Recovery -> MRC88**.
2. Universal Dragon will extract the project from the MRC88.
3. If the message: '**Error recovering project.**' displays in the **Project Recovery Window**, check connection between PC and MRC88. Confirm Com Port. See: **MRC88/MRAUDIO8X8 Installation Instructions/Troubleshooting, (Page 92)** for additional information.

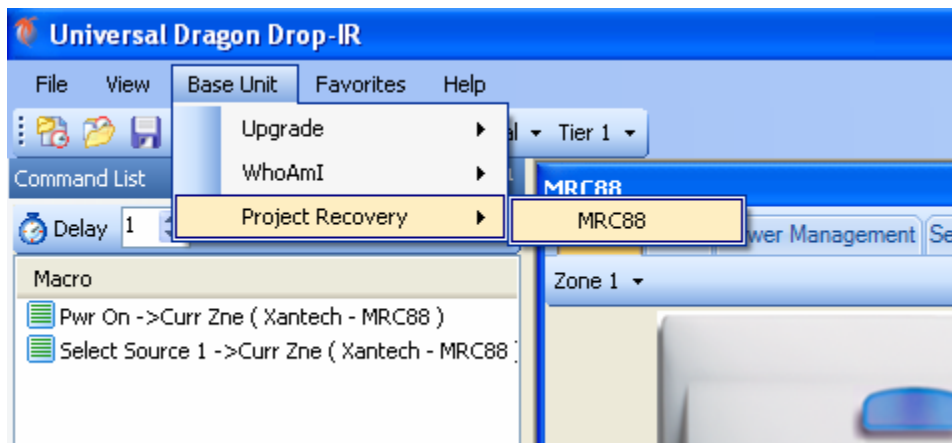


Figure 26 – Project Recovery

## ADVANCED PROGRAMMING

For complete advanced feature programming instructions, see: **MRC88/MRAUDIO8X8 Installation Instructions/Pre-Programming the MRC88, (Page 34)** and **Programming the Controller, (Page 47)**.

## APPENDIX

### MRC88 / MRAUDIO8X8 CONTROLLER/AMPLIFIER PANEL FEATURE DESCRIPTIONS

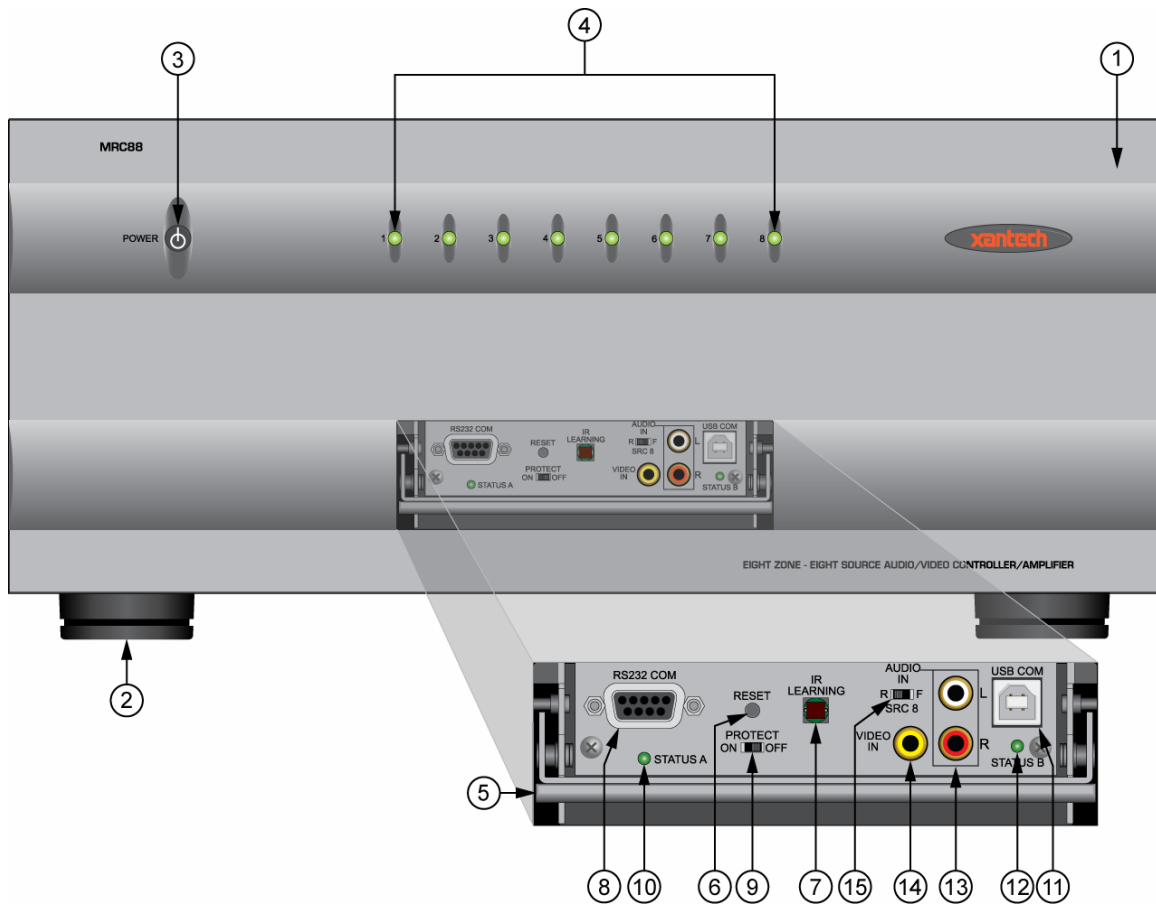


Figure 26 – MRC88 Front Panel Features

#### MRC88 FRONT PANEL FEATURES AND CONNECTIONS

1. **Front Panel.**
2. **Chassis Feet.** Set high enough to provide through-chassis cooling by natural convection.
3. **Master AC Line On/Off Switch.** Turns AC power On/Off to the entire unit.
4. **Power and Status LED Indicators.** Eight indicators, one for each Zone, provide the following status information:
  - System Status (Power-Up Mode)**
    - a) Slow Orange Blink – indicates general initialization is occurring.
    - b) Fast Green Blink – indicates that a keypad on the associated zone is currently being initialized.
    - c) All Lights Off – initialization is done, system is ready for operation.
  - Zone Status (Active-Operational Mode)**
    - a) Steady Green – indicates that the Zone is Active (Keypad ON), is not muted and is not within 5 dB of MAX-V.
    - b) Steady Red – indicates that the Zone is Active, is not muted and is within 5 dB of MAX-V.

- c) Slow Green Blink – indicates that the Zone is in the Active, is muted and is not within 5 dB of MAX-V.
  - d) Slow Red Blink – indicates that the Zone is Active, is muted and is within 5 dB of MAX-V.
  - e) Fast Green Blink – indicates that Zone is Active, is being ramped Up or Down and is not within 5 dB of MAX-V.
  - f) Fast Red Blink – indicates that the Zone is Active, is being ramped Up or Down and is within 5 dB of MAX-V.
  - g) Off to indicate that Zone is in Not Active (Keypad OFF).
5. **Front Panel Access Door.** Push gently on lower half of door to open. Allows access to programming connections, Level Reset and Front Panel Source 8 A/V Input.
6. **Level Reset.** Pressing this button twice within 1 second restores all of the Factory Default Settings for all zones. The Factory Defaults are as follows:
- Mute Off
  - Treble and Bass Flat
  - Balance Centered
  - Z-Adjust Treble and Bass Flat
  - Z-Adjust Balance Centered
  - Z-Adjust Max-V Cleared
  - Z-Adjust Max-On-V Cleared
  - Trim Levels Cleared
- NOTE:** The Control Amp will always return to last set values (plus any unaltered factory defaults) after main power shut down or after any power interruptions.
7. **IR Learning Eye.** The IR Eye on the MRC88 Controller front panel allows teaching IR Codes to Universal Dragon™ Software via the Control Amp when connected to a PC's com port.
8. **RS232 Com Port.** DB9 Connector. Used to program the MRC88 Controller from a PC using Universal Dragon™ Software and for Firmware Upgrades.
9. **PROTECT On/Off Switch.** Selects between Programming Mode (OFF position) and PROTECT (ON) position to keep program secure in memory. It is recommended to leave this switch in the ON position at all times.
10. **STATUS A Led.** Green Activity LED, lights during Program Download from Universal Dragon™ Software, during IR Learning and for Firmware Upgrades when using the RS232 Port located on the front panel.
11. **USB Com Port.** Used to program the MRC88 Controller from a PC using Universal Dragon™ Software and for Firmware Upgrades.
12. **STATUS B Led.** Green Activity LED, lights during Program Download from Universal Dragon™ Software, during IR Learning and for Firmware Upgrades when using the USB Port located on the front panel.
13. **Source 8 AUDIO IN L/R.** Front panel Source 8 line level audio input. Gold-plated RCA Jacks for use with any desired A/V source component such as Camcorder, Video Game or other device.
14. **Source 8 VIDEO IN. (MRC88 Only)** Front panel Source 8 composite video input. Gold-plated RCA Jacks for use with any desired A/V source component such as Camcorder, Video Game or other device.
15. **Source 8 Front/Rear Selector Switch.** Selects whether the Source 8 Audio/Video inputs will come from the Front (F) or Rear (R) panel jacks.

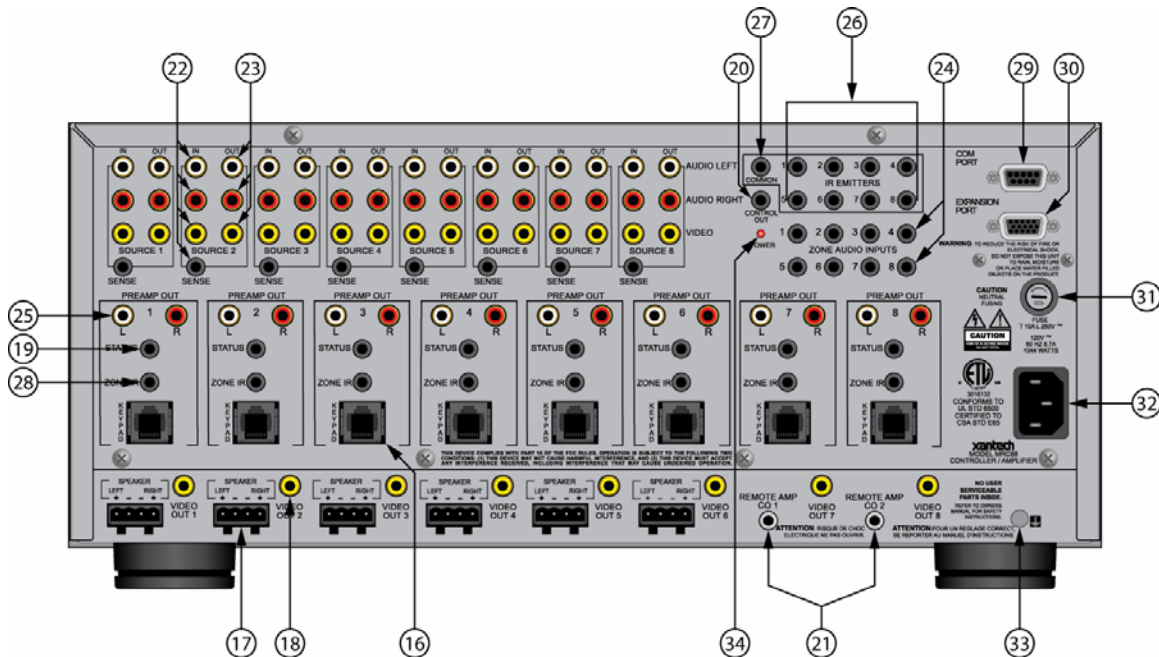


Figure 27 – MRC88 Rear Panel Features

## MRC88 REAR PANEL FEATURES AND CONNECTIONS

16. **Keypad Terminals (8).** Each Zone has one RJ-45 jack for Keypad Interface. Each connector interfaces the following: Power (Enough for 1 Primary & up to 1 Secondary Keypad per Zone), RS-485 Data I/O, and IR Input.
17. **Speaker Terminals (6).** Plug-in 4-terminal screw type connectors for zones 1 thru 6, permit speaker wire sizes up to 12AWG.
18. **Composite Video Output (8).** RCA type connector sends zone selected source video to the composite video input on a zone TV or modulator.
19. **Status Out (8).** Provides a control output of +12 VDC that turns on and off with the zone to drive voltage sensing relay modules and AC strips.
20. **Control Out (8).** Mono 3.5mm Mini Phone Jack provides a Control Output that goes high (+12 volts) when any Zone is first turned ON and goes low (0 volts) when the last Zone is turned OFF. [Tip=+VDC; Shield=GND]
21. **Remote Amp Control Out (CO1 & CO2).** Stereo 3.5mm Mini Phone Jack connects to CONTROL IN jack of Remote Amp PA435X or PA4100X. Provides STANDBY and MUTE Control of remote Amp from Zone 7 (CO1) and Zone 8 (CO2). [Tip = STANDBY Logic; Ring = MUTE Logic; Shield = GND]
22. **Source Component Input Connections (8)**
  - a) **Source Audio Inputs.** Gold-plated RCA Jacks for Stereo/Dolby Pro line level audio input from source components.
  - b) **Source Video Inputs.** Gold-plated RCA Jacks for composite video input from source components.
  - c) **Sense Inputs.** 3.5mm Stereo Mini Phone Jacks for use with any Xantech SM Series Sensor Module.
23. **Source Loop-Thru Connections (8).**
  - a) **Audio Loop-Thru.** Parallel Connection to Audio Inputs for connecting Audio Source to another MRC-88 in Expanded Mode or to other local devices. This is not an active output.

b) **Video Loop-Thru.** Buffered Video Connection for connecting Input Video Source to another MRC-88 in Expanded Mode or to other local devices. **NOTE:** Since this is a *Buffered* video connection, this loopthru is not active when POWER is removed from the MRC88

- 24. Zone Audio Inputs (8).** 3.5mm Stereo Mini Phone Jack for Zone specific stereo audio Server Inputs. Zone Audio Inputs override rear panel, Source 1 connection. Allows each of the 8 Zones to have a dedicated Server Output by selecting Source 1 on keypad. Can also be used with Xantech ZA Series Zone Audio components for adding zone local source audio devices that can be selected by a keypad/remote and played through the MRC88 to that zone.
- 25. Zone Audio Pre-Amp Out (8).** Gold-plated RCA Jacks for connecting Zone Audio Output to an external amplifier. For use with applications where either more power is required for Zone or passing to a Dolby Pro compatible receiver for theater quality audio in zone.
- 26. IR Emitters (1-8).** 3.5mm Mono Mini Phone Jacks. These mini jacks are for the connection of IR emitters to individually control the eight common source components. These jacks are “steerable” with Universal Dragon™ Software for IR Routing and Priority Lockout. IR received from a Zone will be routed to the emitter port corresponding to the Zones active source selection. Can also be configured as 8 common emitter ports with Universal Dragon™ Software.
- 27. IR Emitter (Common).** 3.5mm Mono Mini Phone Jacks. Single Common IR Output that can be used to control devices such as Multi Zone Audio Server, motorized drapery systems, TV lifts and lighting systems or any other IR controlled component. IR Received from any Zones Keypad will be output the Common emitter port *regardless* of source selection.
- 28. Zone IR Out (8).** 3.5mm Mono Mini Phone Jacks. IR received from a Zone will always be passed to the corresponding Zone IR output. This can be used to control *Zone Specific* components not located in the zone.
- 29. Com Port.** DB9 RS232 Control Port allows full control from an external PC component of all Internal Amplifier Commands of the MRC88 Controller and the ability to trigger programmed IR Macros for control of devices connected to the Controllers emitter ports. The Com Port can also be used in the *reverse* to send ASCII/Hex commands OUT to control an external RS232 device directly from the MRC88 Keypad and/or handheld remote.
- 30. Expansion Port.** DB15. Allows two MRC88's to be connected together, via included Expansion Cable, to provide an 8 Source/16 Zone system with full control between units. With optional cable (Xantech P/N 05913565) can also be used as an additional RS232 serial control port.
- 31. User Replaceable Fuse.** 10 AMP 250 VAC, Slow Blow Fuse (Domestic version). 5 AMP 250 VAC, Time-Lag Fuse (European version).
- 32. AC Power Input.** Standard IEC 3-Conductor AC Line Cord Receptacle for plug-in of a 3-conductor power line cord.
- 33. Grounding Screw.** “Knurled Screw” provides a means for chassis connection to earth ground or to other Audio/Video products to aid in the reduction of system noise.
- 34. Power On/Off LED.** This LED indicates the Main Power ON/OFF Condition of the MRC88 Controller.

## MRC88 KEYPAD FEATURE DESCRIPTIONS

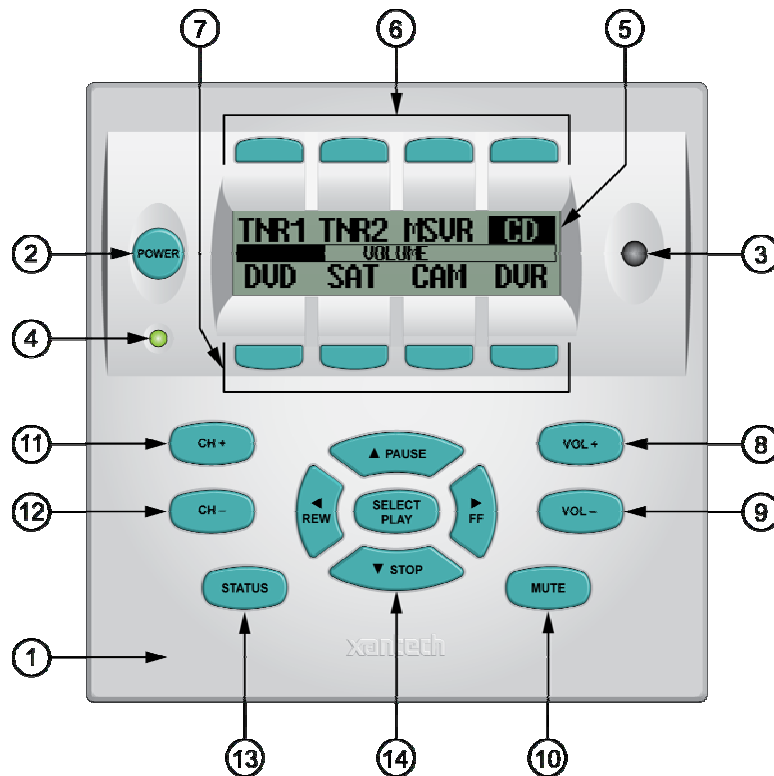


Figure 28 – MRC88 Keypad Front Panel Features

## MRC88 KEYPAD FRONT PANEL FEATURES

## 1. MRC88 Keypad.

2. **Power.** Turns the zone ON and OFF. Can be programmed with IR codes or sequences.

3. **IR Sensor.** Receives IR from hand-held remotes to control both source components and the MRC88 system. A Pre-Programmed remote such as the Xantech MRCREMRP or a Programmable Learning Remote such as the Xantech URC2 is recommended for integrating the IR commands of the MRC88 and source components into a single controller. The IR sensor is compatible with most brands of remote controls, though some remotes may not be programmable and will therefore only control the source components.

4. **Status Indicator LED.** Will indicate zone/system status and will flash as IR is received at the IR Sensor. These indicators, one for each Keypad, provide the following Information:

- a) LED Off = Zone OFF
- b) Steady Green = Zone ON
- c) Slow Green Blink = Zone MUTE
- d) Fast Red Blink = IR Sensor INPUT or Keypad OUTPUT
- e) Fast Amber Blink = System BUSY

5. **LCD Display.** When the zone power is ON, the LCD will indicate the selected source, zone volume level, zone and system status and other system conditions. The display is automatically backlit when any button is pressed (backlight is configurable via Universal Dragon™ software).

6. **Source 1-4 Selector Buttons.** Pressing of Source Button selects the corresponding source's Audio/Video signal to be played in the Zone of the keypad pressed. Pressing of the Source Button will reverse the source

icon on the LCD Display and sends IR commands programmed to the button (if any) to the corresponding source and common emitter outputs as well as Zone Emitter port.

7. **Source 5-8 Selector Buttons.** Pressing of Source Button selects the corresponding source's Audio/Video signal to be played in the Zone of the keypad pressed. Pressing of the Source Button will reverse the source icon on the LCD Display and sends IR commands programmed to the button (if any) to the corresponding source and common emitter outputs as well as Zone Emitter port.
8. **Vol +.** Increases zone volume and moves the Volume Bar on the LCD Display to indicate volume level (non-programmable).
9. **Vol -.** Decreases zone volume and moves the Volume Bar on the LCD Display to indicate volume level (non-programmable).
10. **Mute.** Mutes zone speaker output. Sends IR commands programmed to this button (if any) to the selected source emitter, common emitter, and zone emitter outputs.
11. **CH +.** Sends IR commands programmed to this button to the selected source emitter, common emitter, and zone emitter outputs.
12. **CH -.** Sends IR commands programmed to this button to the selected source emitter, common emitter, and zone emitter outputs.
13. **Status.** Displays zone and system status. Allows access to Dynamic Zone Linking and Zone EQ/Balance settings (non-programmable).
14. **Select/Play, Stop, Pause, Rew, FF.** Each send IR commands programmed to these buttons to the selected source emitter, common emitter, and zone emitter outputs.

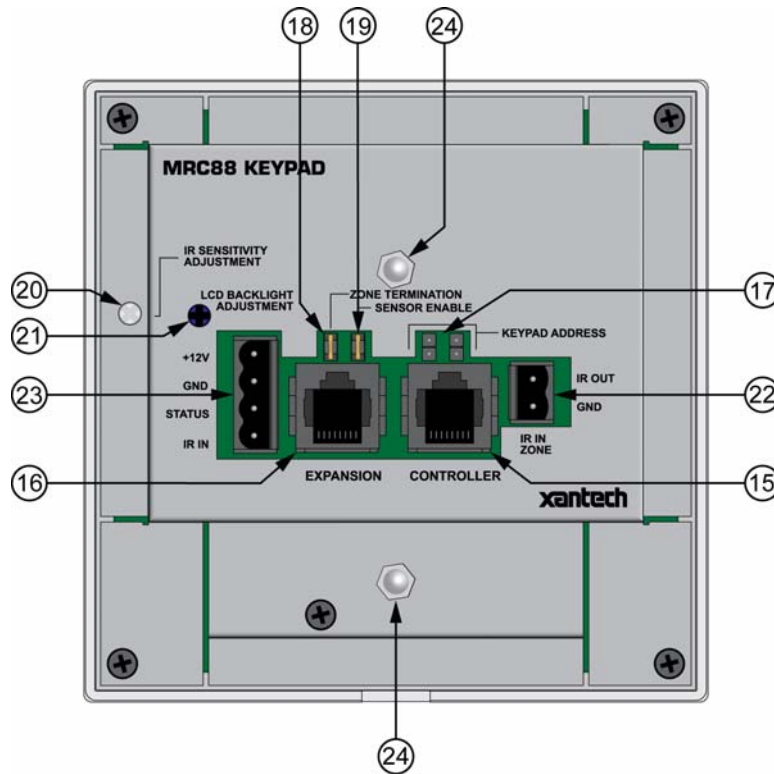


Figure 29 – MRC88 Keypad Rear Panel Features

#### MRC88 KEYPAD - REAR PANEL FEATURES AND CONNECTIONS

15. **Controller Terminal.** RJ45 Jack. Connects Keypad to zone keypad input on MRC88 Controller via CAT5 cable.
16. **Expansion Terminal.** RJ45 Jack. Allows keypad to be daisy chained to another keypad for multiple control locations within a zone. Up to 4 keypads are supported per zone.
17. **Keypad Address.** Pair of Jumpers. Used to assign Keypad Address. Each Keypad in a zone must have a unique address (up to 4 keypads in a Zone).
18. **Zone Termination.** Jumper. Do not remove jumper if there is only one keypad in a zone. If there is more than one keypad in a zone, remove from all but the last keypad in the daisy chain configuration.
19. **Sensor Enable.** Jumper. Enables IR sensor on Keypad. Remove when using an external IR receiver.
20. **IR Sensitivity Adjustment.** Carefully adjust for background light level to prevent false triggering of the IR circuits. Slowly turn counter-clockwise to reduce sensitivity.
21. **LCD Backlight Adjustment.** Adjusts brightness of LCD backlight. This adjustment does not affect the backlight level for the buttons. Slowly turn counter-clockwise to reduce brightness.
22. **IR In-Zone.** 2-Terminal WECO style socket - Zone IR out for local 'In-Zone' emitter out. Used for IR control of equipment in the same location as the keypad. Any IR generated from within the Zone (or routed to that zone from another) will be output from the IR IN-Zone connector as well as the Zone IR jack on the rear of the Controller. This feature is 'selectable' via Universal Dragon™ Software.



**23. External IR Terminal Block.** 4-Terminal WECO style socket – Allows connection of other Xantech IR Receivers and/or Keypads to be used in conjunction with the MRC88. (i.e. Use WaterPad Keypad in subzone in shower or outdoor zone or Plasma Friendly IR Receiver in place of Keypad IR Receiver).

**24. Snap-in Pins.** These pins snap into the MRC88 Keypad wall bracket for mounting.

## SPECIFICATIONS

### Audio (ea channel)

Min Input .....	250mV for full rated Output
Input Overload .....	>2.2 V RMS (@ max VC)
Input Impedance .....	> 20 k Ohms
Power Output.....	35 Watts RMS @ 4-8 Ohms
Signal to Noise.....	>96dB A-Weighted
THD (VC -10dB) .....	<0.08% @ 2V input level
Frequency Response ( $\pm$ 3dB).....	12 Hz to 55 kHz
Bass Control Range (@ 100Hz).....	$\pm$ 14dB (in 2 dB steps)
Treble Control Range (@ 10 kHz).....	$\pm$ 14dB (in 2 dB steps)

### Video

Input/Output Impedance .....	75 Ohms
Video Insertion Loss .....	0 dB (50 Hz to 6 MHz)

### IR Sensor

IR Modulation Frequency Bandwidth .....	30 Hz to 100 kHz
Nominal Reception Range.....	>30 feet
Nominal Reception Angle .....	40 degrees off axis

### General

RC68 Code Group Number .....	A8
Control Output .....	12v @ 50 mA
Status Output.....	12v @ 50 mA
Power Requirements .....	120 VAC, 60 Hz, 660 Watts max, TMRA 30° Celsius - If this temperature is exceeded, you will need to provide additional ventilation to insure proper operation.
Gold Plated RCA type phono jacks .....	All A/V inputs/outputs
Dimensions (Controller).....	17" W x 7.5 H x 11.75 D (432mm x 191 mm x 298mm)
Dimensions (Keypad) .....	4.5" W x 4.5 H x 1.5 D (114mm x 114 mm x 38mm)
Weight (Controller) .....	45 lbs (20.4 kg)
Weight (Keypad) .....	0.6 lbs (0.3 kg)

## CERTIFICATIONS

Product is certified as marked on the rear panel.

## NOTES

## NOTES

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