MRC88 KEYPAD FEATURE DESCRIPTIONS

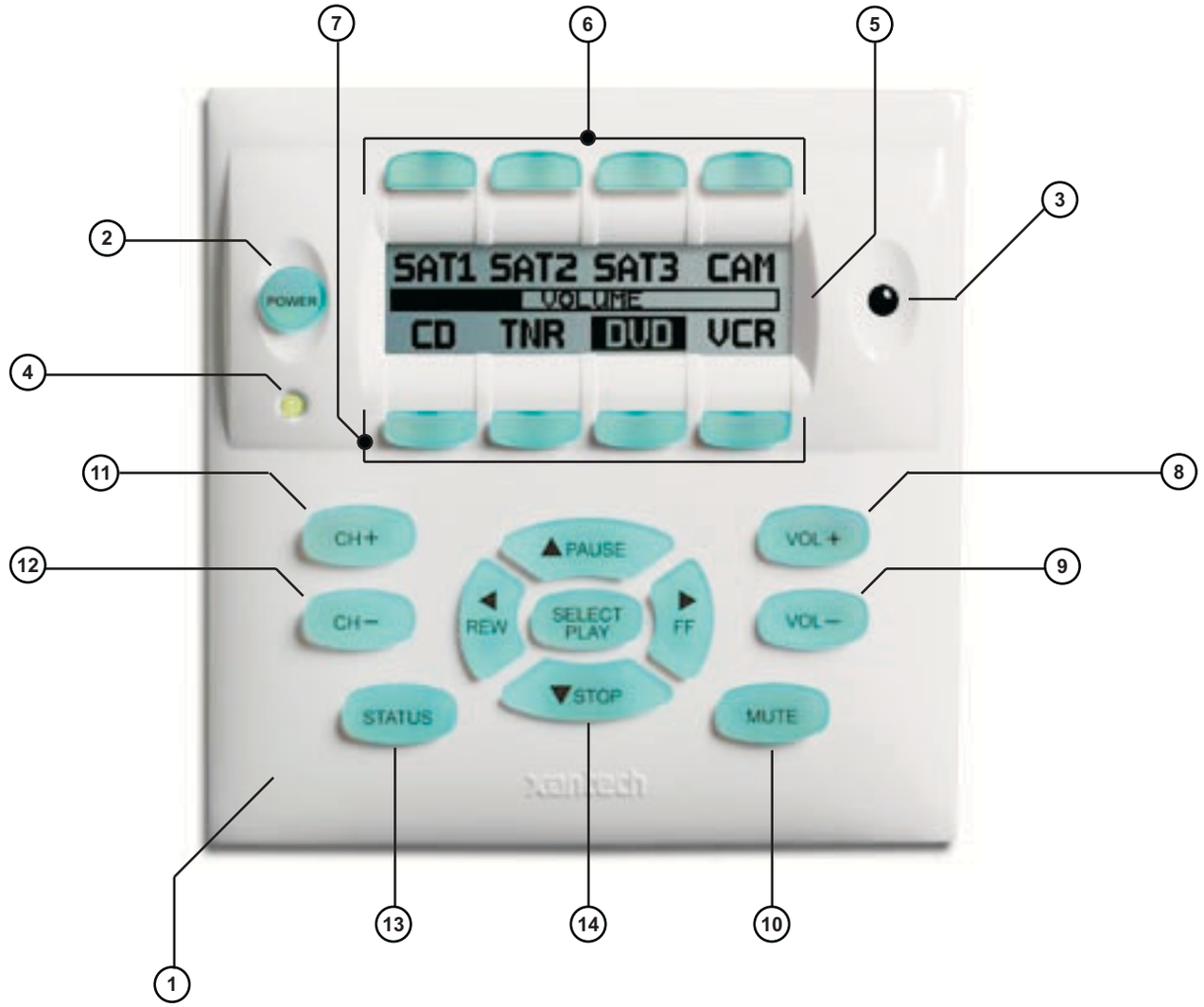

Figure 4 – The Model MRC88 Keypad – Front Panel Features and Functions

MRC88 KEYPAD - FRONT 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 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. Compatible with most brands of remote controls, though some 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 programmable via Dragon Drop-IR™ 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.

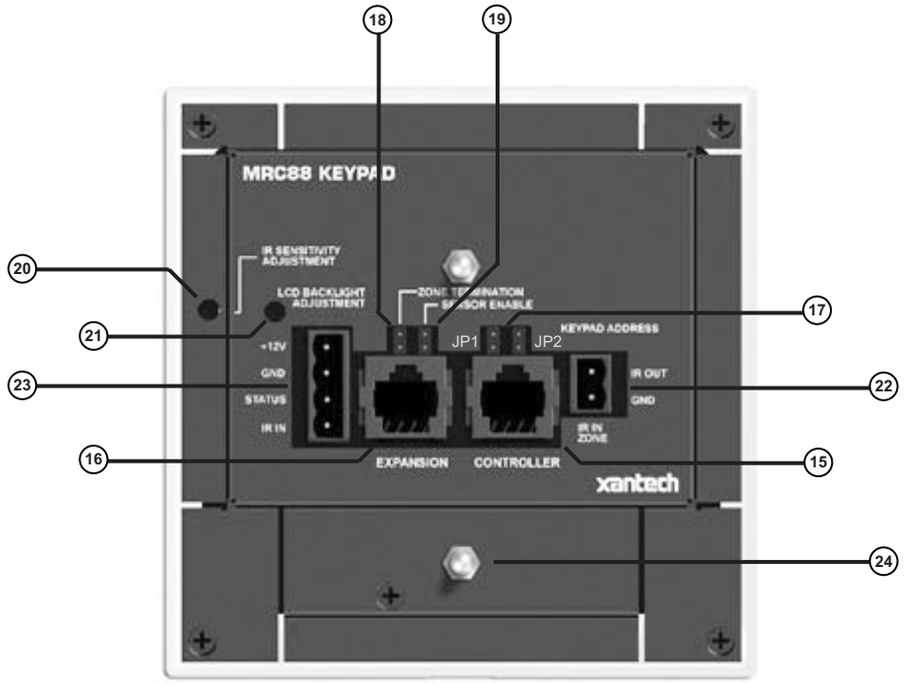

Figure 5 – The Model MRC88 Keypad – Rear Panel Features and Functions

MRC88 KEYPAD - REAR 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 the 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 then 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 Dragon Drop-IR™ 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 sub-zone 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.

Section 2: Installation & Connections

INSTALLATION

OPERATION: OUT-OF-THE-BOX PRE TEST (BASIC/ADVANCED/EXPANDED)

The MRC-88 is shipped to operate basic functions 'Out-Of-The-Box' without any programming. Simply by plugging in keypads via standard CAT-5 RJ45 terminated patch cable and powering the controller 'on', you can control Source Selection, Volume Up/Down and speaker Mute capabilities.

Completing the Out-Of-The-Box Pre-Test will verify that all sources and zone components are working properly to select and distribute audio and video prior to programming with Dragon Drop-IR™. This will ensure that the unit is indeed functioning correctly 'prior' to fixed installation and allow proper troubleshooting procedures if a problem is encountered. Instructions regarding full programming for specific components and features will follow.

Note: For 'EXPANDED' configuration, test both units individually as outlined below.

Note: For simplicity of test set-up, only one Source Component, one pair of speakers, and one TV/Video Monitor will be necessary.

For the pre-test, you will need the following:

- 8-RJ45 Terminated CAT5 cables. (Pre test cables prior to use – See ⚠ Caution below)
- 1-Audio/Video Source Component (i.e. VCR, DVD or other) [Will be used to test ALL Source Inputs]
- 1 Audio/Video RCA Harness (Capable of Audio Left/Right and Video)
- 1-Pair of speakers with Speaker Cable properly terminated into a 4 conductor WECO Plug [Will be used to test Speaker outputs]
- 1-TV or Video Monitor [Will be used to test ALL Video Outputs – MRC88 only]
- 8-283M Blink Emitter
- All 8 MRC-88 Keypads
- MRC-88 Controller/Amplifier
- PA435X Two-Zone Stereo Amplifier (or other)
- 2 Pair of Stereo RCA Phono cables (for PA435X)
- AC Cord

1. Connect MRC88 Controller/Amplifier as shown in **Figure 13** to:
   a) All MRC88 Keypads via CAT5 Cables
   b) Pre Amp Out of Zones 7 and 8 to PA435X Zones 1 and 2 Audio Input
   c) Audio/Video Source to SOURCE 1 Audio Left/Right and Video Input terminals
   d) TV or Monitor to Video Out 1 (MRC88 Only).
   e) Speakers to Speaker Output #1
   f) All 8 IR emitters to IR Emitter Ports 1 thru 8 (rear connection Item #26)
   g) AC Power for MRC88 Controller and Audio/Video Source Component
2. Press "Power On" button on the front of the MRC88 Controller/Amplifier (wait for front panel LED's to stop flashing – should be less than 20 seconds).
3. Power ON the Zone 1 TV/monitor and select the appropriate input (on the TV or monitor).
4. Power ON the Source Component and press play.
5. Place the emitter from IR Emitter Port 1 near the front of the Source Components IR Sensor window.
6. Press "POWER" on the Zone 1 Keypad.
7. Select "SRC1" on the Zone 1 MRC88 Keypad.
   a) If Source 1 is an Audio/Video component, the video content of the source connected to the Source 1 inputs should be seen on the zone 1 TV/monitor.

b) Press “VOL+” on the Zone 1 Keypad. The Volume bar should move on the Keypad and the audio content of the source connected to the Source 1 inputs should be should be heard through the Zone 1 speakers.
c) Press “MUTE” on the Zone 1 Keypad. The Zone 1 speakers will mute. Press MUTE again and the speakers will un-mute. (Pressing VOL+ or VOL- will also un-mute the speakers).
d) Use the source 1 original equipment remote and verify that all source functions operate when aiming the remote at the Zone 1 Keypad IR sensor.
e) Press “POWER” on the Zone 1 Keypad and verify ALL Status LED’s on the Controller Front Panel are OFF.

8. Move the Audio/Video Source component to SOURCE 2 Audio Left/Right and Video Input terminals; Speakers to Speaker Output #2 and the TV/Video Monitor to Video Out #2.
9. Repeat Steps 5 thru 8 for source/Zone 2 thru 8

Note: For Zones 7 & 8 Speakers will be connected to the Speaker A and B output of the PA435x

Caution: Power voltage for the keypad is transmitted along the CAT5 cable! **Incorrect wiring on this cable can destroy the MRC Keypad.** Please test the cable connections using a proper CAT5 cable tester or using 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 with a Multimeter. A 12Vdc measurement should be read when the positive probe is on pin 6 and the negative probe is on pin 3. See **Figure 10**.

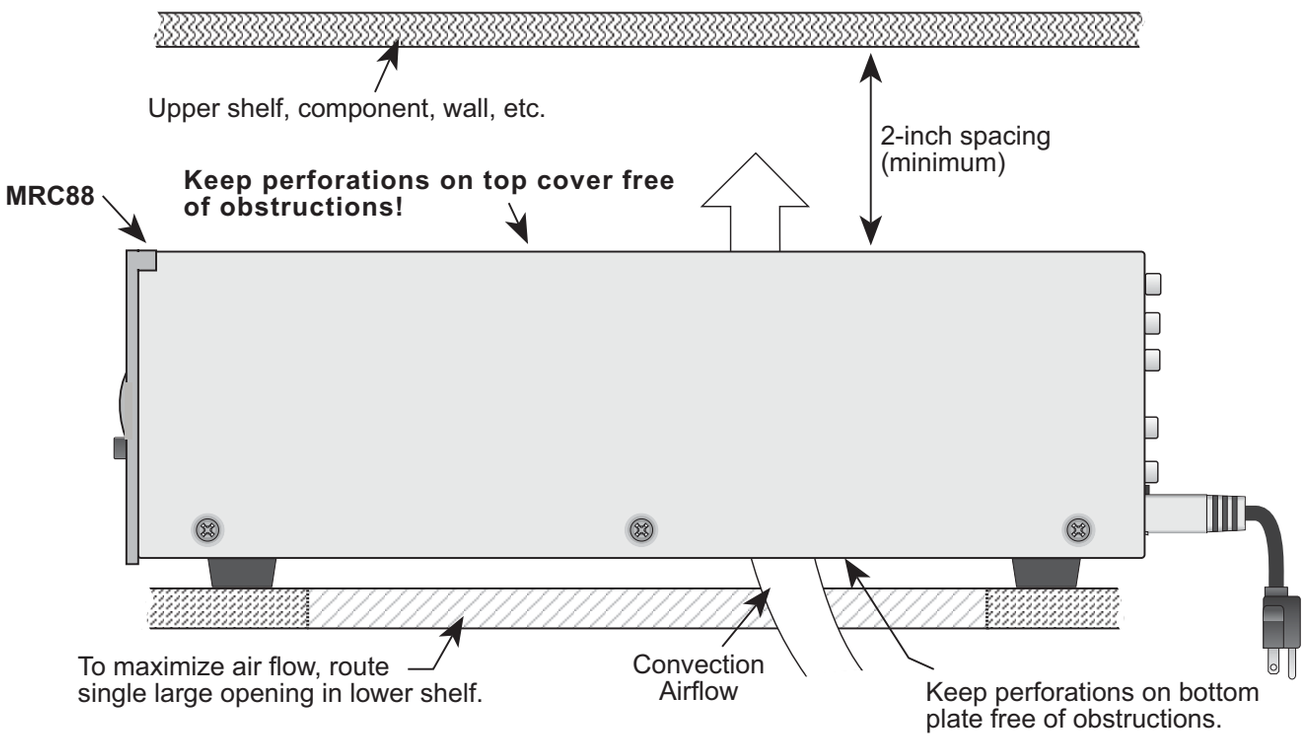

Figure 6A: MRC88 CTLR mounting

MRC88 CONTROLLER/AMPLIFIER PHYSICAL LOCATION AND MOUNTING (BASIC/ADVANCED)

When you mount the MRC88 Controller, you should plan its location carefully. Pay close attention to each of the following factors (refer to Figure 6A above):

1. The amplifier is convection cooled. That is, it 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. If mounted in an equipment cabinet or other confining location, allow at least 2 inches of space above the top cover. Be sure there are large openings in the shelf below the unit and in the cabinet to allow the entry of cool air and the escape of warm air.
3. If the cabinet contains other heat generating components or you are using several MRC88's in a large multi-zone system, you will have to pay even closer attention to adequate ventilation.
4. Do not hesitate to use fans (quiet, boxer type), if necessary, to ensure a constant flow of air through the MRC88's and the other heat generating components.
5. When mounting in a 19" (483mm) rack, adding a single RU (Rack Unit) spacer above and below the MRC88 will improve convection in heavy use applications. **Note: Rear support may be required.** [One Rack Unit size = 1-3/4" (44.5mm) in height].
6. In multi-zone installations, you will have large bundles of wire and cable to accommodate audio, video and speaker connections. Be sure to allow enough room for the leads and dress them in such a manner so as not to block airflow.
7. The MRC88 is designed for mounting on flat horizontal surfaces. When mounting into a 19" rack, use a proper rack shelf or drawer (i.e. Middle Atlantic or equivalent)
8. Do not remove chassis feet. They are necessary to provide proper ventilation.
   NOTE: You should consider some sort of rear support for rack mounted units when used in mobile applications or when located in seismically active areas.

(EXPANDED)
Place Controllers on separate shelves or provide 2 inches of space between Controllers for ventilation.

MRC88 KEYPAD PHYSICAL LOCATION AND MOUNTING (BASIC/ADVANCED/EXPANDED)

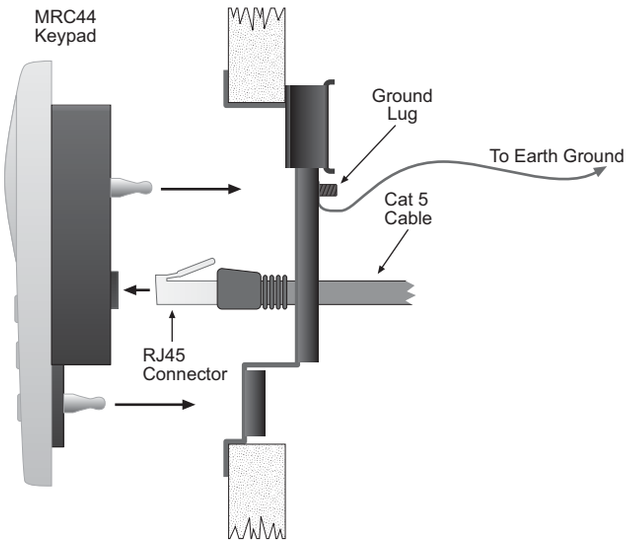

Figure 6 - Mounting and Installing the MRC88 Keypad

Keypad mounting for the MRC88 Keypad does not require a junction box. The MRC88 keypad can be mounted on drywall, lath & plaster, button board or other surfaces covering a hollow wall. Follow these simple procedures to install the provided MRC88 mounting bracket and keypad:
NOTE: Check local electrical codes. Some areas require a backbox in certain applications. For installations that require a back-box, see Xantech Part# MRCBOX. The MRC88 keypad will not fit in a standard 2-gang box. The Xantech MRCBOX must be used in applications that require a backbox.

1. Cutting the hole
   a. Mark the desired mounting location for the center of the keypad.

b. Using a level, make proper horizontal and vertical marks on surface to be cut, to properly orient template.

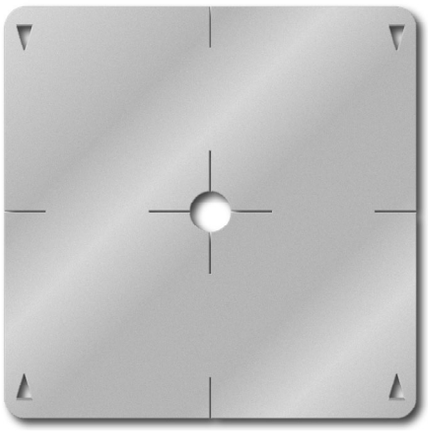

Figure 7 – MRC88 Keypad mounting template

c. Locate the provided template so that the mark is in the center of the hole, which is in the center of the template.
d. Rotate the template around the center until the template is level.
e. Press or hammer the template in place so that the holding tabs pierce the wall and hold the template in place.
f. Mark or scribe the outline of the template on the wall.
g. Remove the template and cut a clean hole through the wall along the outline of the template, being sure that your cut is on the outline. Any cut outside of the outline by more than ¼" may not be covered by the MRC88 Keypad.

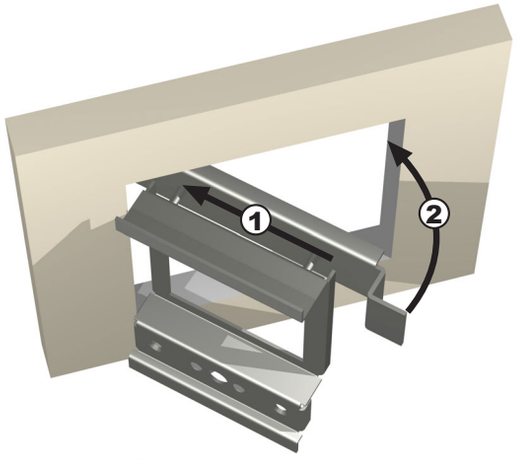

Figure 8 – Installing the MRC88 Keypad mounting bracket in the wall

2. Installing the Mounting Bracket
   a. Attach the ground wire to the ground lug to the rear of the back-bar with the provided green nut, before beginning the bracket installation process.
      NOTE: A ground wire connected to Earth ground is required to protect against static discharge.
   b. Orient the Mounting Bracket so the ground lug is on the top portion of the bracket and run the supplied screws through the top front of the mounting bracket into the back-bar as shown in **Figure 6**.
      Note: Do not tighten screws.
   c. Pull the CAT5 cable through the hole in the wall.
   d. Pull the CAT5 cable through the hole in the mounting bracket.

e. Slide the left or right side of the back-bar into the wall as shown in **Figure 8**.
f. Center the mounting bracket in the wall and tighten the screws until the bracket is firmly held in the wall. Over tightening will distort the bracket and prevent the Keypad from snapping tight against the wall. Under tightening will cause the Keypad to be loose against the wall.
g. If there is not enough room to slide the keypad in as described above, you can hold the back-bar in place as you run the screws through the mounting plate and into the back-bar. TIE A LONG STRING TO THE BACK-BAR so that you can easily retrieve it in case you drop the back-bar into the wall!

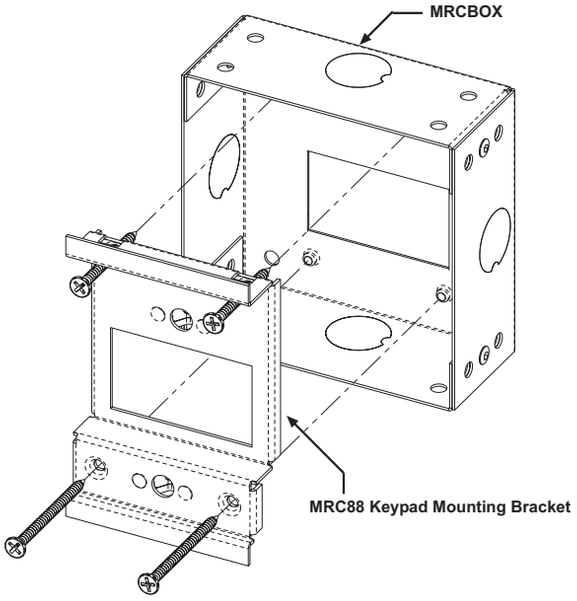

Figure 8B: Optional Keypad Back-Box for pre-install applications

2-1. MRCBOX (Back-Box) Installation (optional)
   a. Position Back-Box so inner rectangle is in a horizontal position. as shown in **Figure 8B**
   b. Affix MRCBOX to Wall Stud at desired height with front of box flush with front of stud (or set back slightly) as to not interfere with Sheetrock.
   c. Attach ground wire to ground lug as described in Step 2a as shown above.
   d. Orient the Mounting Bracket so the ground lug is on the top portion of the bracket and using two 1.5" (38.1mm) self-tapping drywall screws (or sheet metal screws), mount the bracket to the Back Box. For extra rigidity use two 2" (50.8mm) self-tapping drywall screws (or sheet metal screws) through the bottom two screw holes.
3. With the Controller/Amplifier turned off, connect the CAT5 cable to the appropriate RJ45 connector, using **Figure 10** as a guide for CAT5 termination.
4. Add or remove jumpers on the rear of the MRC88 keypad-according to Table 1 (Keypad connections).
5. Firmly snap the MRC88 Keypad into the bracket that you have just installed (see **Figure 6**).
6. Confirm all Keypad operations.

MRC88 KEYPAD REMOVAL

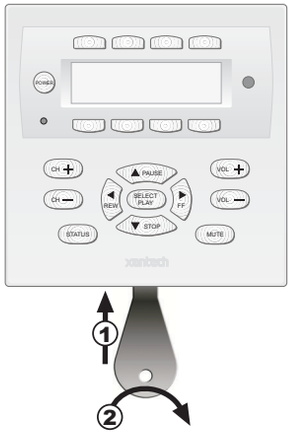

Figure 9 – Removing the MRC88 Keypad from the wall

1. Insert the MRC88 keypad removal tool into the slot at the bottom of the keypad, as shown in **Figure 9**, being sure that the tool is inserted so that the "insert to here" line slides under the Keypad. This will reduce the risk of damage to the Keypad or the wall.
2. Twist the removal tool in either direction until the bottom of the Keypad pulls away from the wall, then carefully grip the edges of the Keypad with your fingers and pull it off the wall.
   NOTE: Since the Keypad snaps into the mounting bracket and there are a large variety of wall textures, the Keypad may POP OUT or require some additional effort to pull it off the wall, depending on your particular installation.

CONNECTING THE MRC88 CONTROLLER/AMPLIFIER

When making connections to the MRC88 Controller be sure the power cord is unplugged. Proceed as follows, referring to **Figure 3** and **Figure 13** for a typical MRC88 system layout and interconnections:

SOURCE RELATED CONNECTIONS

The following relates to all source related connections to the MRC88 Controller Unit (A/V In/Out, IR Control, Sense Inputs etc.)

SOURCE COMPONENT CONNECTIONS

Audio Connections
(BASIC/ADVANCED)
Using good quality RCA-type patch cables connect the LEFT and RIGHT OUTPUT jacks of the source component (DVD, CD, Satellite receiver, etc.) to the appropriate source AUDIO LEFT and AUDIO RIGHT **IN**PUT jacks on the MRC88 **- Figure 3-(22).**. Do this for each source component.
(EXPANDED)
Using good quality RCA-type patch cables connect the source AUDIO LEFT and AUDIO RIGHT **OUT**PUT Jacks of the 'Primary Controller' **- Figure 3-(23).** to the corresponding source AUDIO LEFT and AUDIO RIGHT **IN**PUT jacks on the 'Secondary Controller' **- Figure 3-(22).**

Video Connections (MRC88 Only)
(BASIC/ADVANCED)
Using good quality RCA-type video patch cables connect the **VIDEO OUT**PUT jacks of the source component to the **VIDEO IN**PUT jacks on the MRC88 - **Figure 3-(22)**. Do this for each source Component.

(EXPANDED)
Using good quality RCA-type patch cables connect the source **VIDEO OUT**PUT jacks of the 'Primary controller' **[Figure 3-(23)]** to the corresponding source **VIDEO IN**PUT jacks on the Secondary Controller - **Figure 3-(22).**

ZONE AUDIO INPUTS

(ADVANCED)

Use 3.5mm Stereo Mini Jack to Stereo RCA Plug adapter to connect Zone Specific Audio Sources (i.e. Audio Server or other Zone Specific Audio Component – i.e. MP3 player located in Bedroom 1) to the appropriate Zone Audio Input - **Figure 3-(24)**. The 3.5mm Stereo Jack is wired as follows: Tip = Right Audio Input; Ring = Left Audio Input; Sleeve = GND. The Zone Audio Input feature is enabled via Dragon Drop-IR™ software in the ADVANCED configuration only. When enabled, the Zone Audio Input will override the Source 1 Input connected at the Audio Left/Right RCA Input terminals - **Figure 3-(22).** Zone Audio Inputs do not support Video.

(EXPANDED)

For Zones 1-8, connect to the Primary Controllers Zone Audio Input as stated above. For Zones 9-16 connect to the Secondary Controllers Zone Audio Input [**Figure 3-(24)**] as stated above.

IR CONTROL CONNECTIONS

(BASIC/ADVANCED)

Plug the supplied 283M IR emitters into the appropriate IR Emitter jacks **- Figure 3-(26)**. Be careful to match the source audio and video connection number on the MRC88 to the IR Emitter jack number. This will ensure that the IR control signal will be routed to the correct source component. Find the IR sensor window on the source component and attach the emitter to the components sensor window after removing the protective paper cover on the flat side of the emitter head. A Common IR jack is also provided for connection to other auxiliary devices that are not source specific **- Figure 3-(27)**.

(EXPANDED)

Connect emitters to the 'Primary Controllers' IR Emitter jacks **- Figure 3-(26)** as noted above.
Note: The appropriate source IR Emitter of the 'Secondary Controller' will also flash regardless of what zones keypad issues the command but it is recommended to use the emitter jacks of the Primary unit.

SENSE INPUT CONNECTIONS

(BASIC/ADVANCED)

The sense input connection will typically be used to sense the power state of a source component using the Xantech CSM1 Current Sense Module (optional). Plug the 3.5mm mini plug from the CSM1 into the appropriate sense jack – **Figure 3-(22)**. Be careful to match the source audio and video connection number on the MRC88 to the appropriate sense jack number. The CSM1 plugs into an AC power source. The component power cord plugs into the CSM1. (Refer to instructions included with the CSM1 unit).

CSM1 Threshold Adjustments

a. First, make sure the 3.5mm mini-plug is plugged into the appropriate sense jack on the MRC44 and that the MRC44 is powered ON. (The CSM1 gets low-voltage DC power from the MRC44 – not from the AC line. See Figure 2-Top for mini-jack pin out)
b. Select the correct position of the RANGE slider switch – the HI position is for devices with a high current draw when ON, the LO position is for devices with a low current draw when ON (based upon the lowest current draw state of the component when ON).
c. Manually turn the component ON.
d. Using a small (1/8" wide) blade screwdriver, rotate the current control to the full CLOCKWISE position (LO CURRENT).
e. Rotate the control COUNTER-CLOCKWISE (towards the HI CURRENT position) until the Threshold Adjustment LED goes OFF.
f. Turn the component OFF (Standby Mode).
g. Rotate the control CLOCKWISE until the Threshold Adjustment just goes ON.
h. Set the control to a point midway between these two settings. This should be the correct setting.

NOTE 1: If you have trouble with the threshold adjustment correctly detecting the ON and OFF states of the component, try changing the RANGE slider to the opposite position and then try the adjustment again.
NOTE 2: If the Threshold Adjustment LED does not go ON and OFF with the component power, make minor adjustments to the threshold adjust until the LED is in proper sync.
NOTE 3: Program IR commands for the MRC44 Controller current sensing as described in the MRC44 Installation Instructions, "PROGRAMMING SENSE CODES".

(EXPANDED)
Connect CSM1's as described above to the Primary Controller. Sense inputs are not available on the Secondary Controller.

ZONE RELATED WIRING CONNECTIONS

In typical applications, each zone will have at least one MRC88 Keypad and a pair of stereo speakers. In those zones with both audio and video, at least one video monitor or television will also be used. In order to make these connections, the minimum requirement is home runs of one CAT5 cable for each zone's keypad(s), two pairs of 12-18AWG wire for each pair of speakers, and one coaxial cable for a TV or monitor from each zone to the MRC88 Controller/Amplifier location.

SPEAKER CONNECTIONS
(BASIC/ADVANCED/EXPANDED)

1. Using good quality speaker wire, connect the individual speaker leads to the 4-terminal "SPEAKER" connectors on the MRC88 as shown in **Figure 3-(22)**.
2. The MRC88 Speaker Terminals (amplifier outputs) are 4-Ohm safe. Make sure the combined impedance presented to the speaker terminals by the speakers (or any combination of speakers) is 4-Ohm minimum.
3. Be sure to observe correct polarity by connecting the "+" and "–" terminal from each channel on the MRC88 to the corresponding "+" and "–" terminals on each speaker. This will ensure proper "phasing" (See Step 6). Since the connectors are removable, you may unplug them for ease of lead assembly.
4. As a rule of thumb, use 18 gauge speaker wire for speaker runs up to 30' (9m), 16 gauge up to 70' (21m), and 14 gauge up to 150' (39m). The 4-terminal connectors accept wire sizes up to 12-gauge max.
5. Strip the insulation back about 1/4" (6mm) and twist the strands on each lead to prevent fraying.
6. **Speaker Phasing:** To obtain stable imaging and full bass response, it is imperative that stereo speakers be connected "in phase" with each other. You can verify this as follows:
   a) If the "+" (positive) and "–" (negative) terminals on your speakers are correctly marked, and visible, and you have wired the system with the positive connector on the rear of the MRC88 Controller/Amplifier connected to the positive connector on the speaker and the negative connector on the rear of the MRC88 Controller/Amplifier connected to the negative connector on the speaker, then the system will be "in phase". No further action is required. Most manufacturers identify the positive terminal with a red binding post, a "+" sign, or a red dot.
   b) If you are unsure of the markings, you can verify the phasing. Using a mono sound source, such as AM radio, alternately reverse the leads to one of the speakers. Pick the connection that delivers a solid center image between the speakers as well as best bass response.

CAUTION: After lead ends are inserted and the screws tightened down, be sure there are no free strands that could cause shorting!

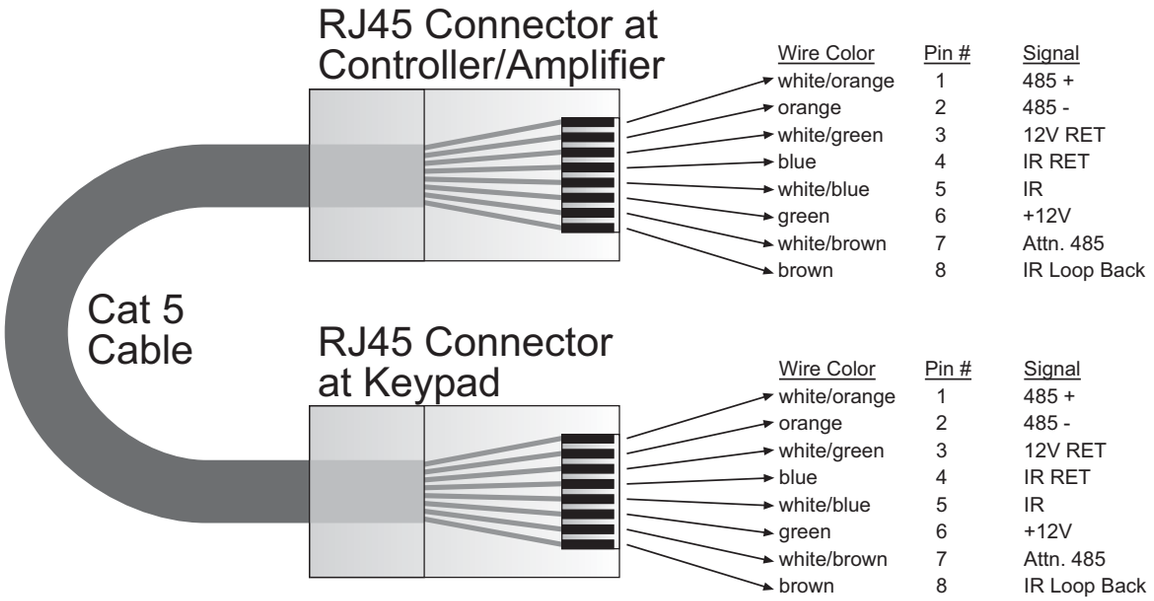

Figure 10 - CAT5 Pin Assignments (per EIA/TIA 568B) Pinned 1:1

MRC88 KEYPAD CAT5 CABLE CONNECTIONS AT THE MRC88 CONTROLLER/AMPLIFIER (BASIC/ADVANCED/EXPANDED)

The MRC88 'Pin-to-Pin' CAT5 cabling that can be purchased pre-fabricated at fixed lengths or self-assembled to custom lengths. The color-coded wiring standard is EIA/TIA 568B as shown in **Figure 10**. The plastic connector on the end of the CAT5 wire is "registered jack" RJ45.

1. See **Figure 10** for proper termination of the CAT5 cables to the RJ45 connectors.
2. Connect the zone keypad to the appropriate zone Keypad connector on the rear of the MRC88 Controller/Amplifier **– Figure 3-(16)**.

Caution: Power voltage for the keypad is transmitted along this cable! **Incorrect wiring on this cable can destroy the MRC Keypad!** Be sure to test cable for proper connections **before** making connections.

VIDEO CONNECTIONS (MRC88 ONLY) (BASIC/ADVANCED/EXPANDED)

Composite Video

1. When running composite video to a TV or monitor, use RG-6 coaxial or RG-59 quadshield cable with RCA type phono plugs on each end. This connection can be run up to 150 feet, as this is a buffered video output from the MRC88 Controller/Amplifier.
2. Connect the zone video cable to the appropriate zone video jack on the rear of the MRC88 Controller/ Amplifier – **Figure 3-(18)**.

Modulated Video

3. When modulating the zone video output and using the RF/ANT input to a television, connect the VIDEO OUTPUT from the MRC88 Controller – **Figure 3-(18),** to the VIDEO INPUT of a Modulator, using high quality RCA type video patch cords. Use RG-6 coaxial cable with "F" connectors on each end to connect the Modulator, to the RF/ANT IN on the room TV.

STATUS CONNECTIONS AND COMMON CONTROL OUT

Status

(BASIC/ADVANCED/EXPANDED)

Each zone has a Status Output –**Figure 3-(19),** that provides a control output of +12 VDC, 50mA that turns ON and OFF with the zone ON/OFF condition. ON = +12VDC, OFF = 0VDC. Using a 3.5mm mono mini phone connector, this control can be used to close a relay, such as a Xantech CC12, to raise a TV lift or drop a projection screen automatically when a zone is turned ON. Connect one end of the 3.5mm Mono

Mini jack to the appropriate zone Status connector on the rear of the MRC88 Controller/Amplifier and the other end to the device to control. Tip=Control Voltage; Sleeve=GND

Control Out
(BASIC/ADVANCED)
A single Common Control Output is provided on the rear of the MRC88 Controller/Amplifier –**Figure 3-(20)**. When the Common Control Output is High (+12 volts, 50 mA), this indicates that 'at least' one zone is powered ON. When the Common Control Output is Low (0 volts), this indicates that 'all' zones are OFF. Using a 3.5mm mono mini phone connector, this control can be used to close relays (Xantech CC12) or turn on an AC outlet (Xantech AC1, AC2) for activity common to the system. Connect one end of the 3.5mm Mono Mini jack and the other end to the device to control. Tip=Control Voltage; Sleeve=GND
(EXPANDED)
When at least one zone on either the PRIMARY or SECONDARY controller is turned ON, the Control Out on the PRIMARY Controller is High (+12VDC). The Control Out on the SECONDARY Controller is inactive in EXPANDED mode.

PREAMP OUT
(BASIC/ADVANCED/EXPANDED)
Each zone has a Preamp Out to send 'zone selected' audio to another amplifier such as the Xantech PA435x or PA4100x. This may be desired for feeding a sub-zone on a separate amplifier, zones that require more than 35W, or for sending audio to another amplifier with Dolby™ surround decoding for 'theater quality' audio in the zone.

Using good quality RCA-type patch cables, connect the Preamp Out, Left(L) and Right(R) connectors **– Figure 3-(25)**, to the desired external amplifiers Audio Left and Right Input connectors.

CO1 AND CO2 (ZONES 7 & 8)
(BASIC/ADVANCED/EXPANDED)
Zones 7 and 8 have a Remote Mute/Standby output for interfacing and controlling a Xantech PA435X (included) or PA4100X amplifier. The control is provided via a Stereo Mini Jack with the TIP controlling STANDBY logic (Standby Power On = +12 volts, Standby Power Off = 0 volts) and the RING controlling MUTE logic (Mute = +12 volts, Un-Mute = 0 volts).

Using a 3.5mm Stereo Mini Jack to 3.5mm Stereo Mini Jack cable, plug one end into the CO1 (or CO2) output jack on the rear of the MRC88 Controller/Amplifier **– Figure 3-(21)** and the other end into the corresponding jack labeled CO1 (or CO2) on the PA435X or PA4100X amplifier.
NOTE: Be sure to set the Control In (CI) switch to ON located on the rear of the PA435X or PA4100X amplifier.

ZONE IR
(BASIC/ADVANCED/EXPANDED)
Using Xantech Emitters (282M, 283M,284M, or 286M), plug the 3.5mm Mono Mini jack into the appropriate zones Zone IR connector – **Figure 3-(28)**. Affix the mouse emitter side to the desired *zone related* component you wish to control. If more than one device needs to be controlled, use a mono mini to stripped-ends wire (PN#6015900) wired to a Xantech 791-44 Amplified Connecting block. Any IR generated in the zone (either from MRC-88 Keypad, IR received at the Keypad, or routed from another zone (ADVANCED only)) will be passed to this emitter port.

AC POWER CONNECTIONS
(BASIC/ADVANCED/EXPANDED)
Use the supplied power cable and plug into a power source capable of delivering the rated amps shown in the specification section of this manual.

CONNECTIONS AT THE ZONE LOCATION (BASIC/ADVANCED/EXPANDED)

KEYPAD CONNECTIONS AND JUMPER SETTINGS

Single Keypad CAT5 Connections

1. Refer to **Figure 10** for proper termination at the zone-end of the CAT5 cable.
2. Set Keypad Address jumper configuration on the rear of the keypad – **Figure 5-(17)** according to **Table 1** below.
2. Connect the CAT5 cable from the MRC88 Controller/Amplifier into the RJ45 jack marked "Controller" on the rear of the MRC88 keypad.

Caution: Power voltage for the keypad is transmitted along this cable! **Incorrect wiring on this cable can destroy the MRC Keypad!** Be sure to test cable for proper connections **before** making connections.

Multiple Keypad Connections

1. For a second keypad in the same zone, terminate the CAT5 cable in the same way as shown in **Figure 10**.
2. Connect the CAT5 coming from the MRC88 Controller to the "CONTROLLER" jack on the Primary Keypad. Plug a CAT5 cable into the "EXPANSION" jack on the Primary Keypad and connect it to the "CONTROLLER" jack on the Secondary Keypad. Repeat for all keypads in zone (up to a total of 4 Keypads) Set the Address jumpers on the rear of the keypad – **Figure 5-(17)** according to **Table 1** below.

Application	Keypad Address Setting JP1	JP2
First (or Single) Keypad in Zone (Primary Keypad connected directly to MRC88 Controller)	**OFF**	**OFF**
Second Keypad in Zone (Connected to Primary keypads Expansion Port)	**OFF**	**ON**
Third Keypad in Zone (Connected to Second keypads Expansion Port)	**ON**	**OFF**
Fourth Keypad in zone (Connected to third keypads Expansion Port)	**ON**	**ON**

Table 1 – MRC88 Keypad Address Settings

Zone Termination

The LAST keypad connected in the zone (Keypad with no other keypad plugged into its EXPANSION port) must have the **Zone Termination** Jumper installed **– Figure 5-(18).**

Sensor Enable

To disable the Keypads on-board IR Receiver, remove the **Sensor Enable** jumper on the rear of the keypad – **Figure 5-(19).**

External IR Terminal Block

To conveniently add other Xantech IR Receivers or Keypads (SMARTPAD or WATERPAD) in conjunction with the MRC88 Keypads, you may wire 18AWG-24AWG 4-conductor wire, directly to the terminal block on the rear of the Keypad **– Figure 5-(23)**. A 4-conductor screw-type removable connector is provided to safely wire the +12v, STATUS, IR IN and GND to the rear of the Keypad. This might be useful when adding a Plasma Friendly (or other) IR Receiver (490-90 etc.) or adding a sub-zone keypad either outdoors or in a bathroom (WATERPAD Keypad).

Note: The 12VDC output terminal is rated at 100mA and can power up to one SMARTPAD/WATERPAD Keypad or up to 4 IR Receivers. Anymore then this will require the use of an external power supply. **Do not wire the external power supply to the MRC88 keypad. Wire directly to the units to be powered.**
The STATUS line is an output and is active Hi (+12VDC) when the MRC88 Keypad is powered ON and is LOW (0VDC) when the Keypad is OFF. Use this to provide Bank Tracking LED on the SMARTPAD/WATERPAD keypad or other.

In Zone IR

To wire *local* emitters in-the-zone (emitters used to control components in the same general area as the keypad), wire the IR OUT and GND terminals on the rear of the MRC88 Keypad –**Figure 5-(22)** to the IR (white stripe) and GND of the emitter cable. To control numerous components in the same area, wire these terminals to an amplified connecting block (Xantech 791-44) using 18-20AWG 2-conductor cable. A 2-conductor screw-type removable connector is provided.

ZONE EXPANSION (CONNECTING TWO MRC88 CONTROLLERS) (EXPANDED)

For systems greater than 8 Zones, two MRC88 Controller/Amplifiers can be linked together for systems up to 16 Zones. Zone expansion is only available in Advanced programming configurations.

LINKING TWO MRC88 CONTROLLER/AMPLIFIER UNITS

To connect two systems, simply connect the supplied DB15 Expansion Cable to the EXPANSION Port on the rear of one unit to the EXPANSION Port on the other – **Figure 3-(30)**. These units should be placed either side by side or if installed in a 19” (483mm) equipment rack, leave 2 rack unit spaces (2U space) between the two units [One Rack Unit space = 1-3/4” (44.5mm) in height].
CAUTION: Do not place these units directly on top of each other. This may cause damage to the units due to increased heat dissipation.

CONNECTING SOURCE COMPONENTS

When connecting two units together, designate one unit as the PRIMARY Unit (Zones 1-8) and the other unit as the SECONDARY Unit (Zones 9-16). All source components should be connected directly to the PRIMARY Units Source A/V Inputs – **Figure 3-(22)**. Use the PRIMARY Units Audio and Video Loop-Thru connectors – **Figure 3-(23)** to feed the source component inputs of the SECONDARY Unit – **Figure 3-(22)**.

All of the source components emitters should be connected to the PRIMARY Units IR Emitter Output Ports – **Figure 3-(26)**. This rule applies to the SENSE INPUTS also.

Extended Runs and Secondary Keypads In Zone

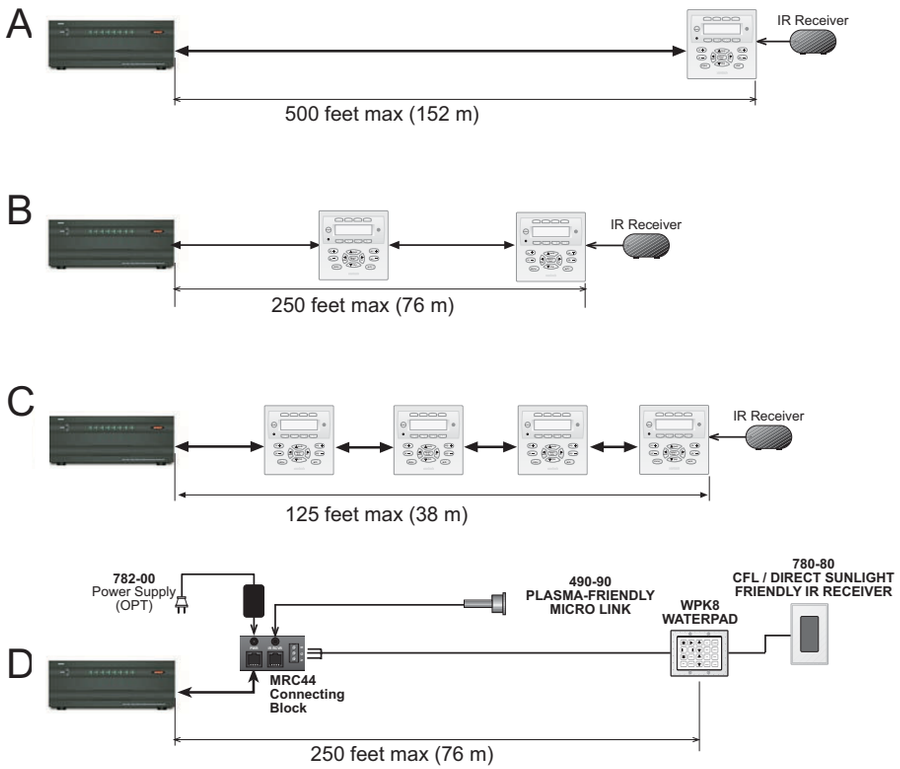

Figure 11 – MRC88 Keypad CAT5 Cable Lengths

The maximum cable length for CAT5 connections to a single keypad is 500 feet (see **Figure 11-A**). For two keypads in a zone, the distance to the last keypad is cut in half to 250 feet (see **Figure 11-B**). This same relationship applies to systems with 4 Keypads in the zone (Max distance to last keypad is 125ft.).

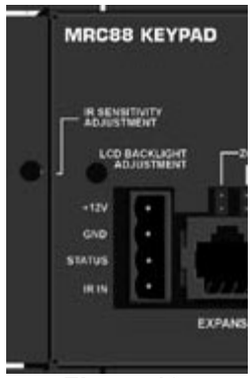

Figure 12:
MRC88 Connecting Block located on rear of Keypad

If any keypad in the zone is using an external IR receiver, or if an outdoor keypad is necessary in a sub-zone, the MRC88 Terminal Block on the rear of the keypad (see **Figure 12**) can be used to expand the connections on the back of the keypad as shown in **Figures 11A, B, & C**. The Maximum cable run to the external IR receiver/keypad in each of the above cases can be up to 125 feet from the keypad depending upon type and gauge of wire used.

Note: If no MRC-88 Keypad will be used in a particular zone, IR Receivers and/or IR based Keypads may be used as shown in **Figure 11D** using the MRC44CB1 Connecting Block. This will be desired for:

1. Zones with IR Receiver ONLY
2. Outdoor Zone where WaterPad Keypad and/or IR Receiver is needed

The MRC44CB1 connecting block can be used as shown in Figure 11D above. Using a CAT5 wire, connect one end into the desired Zone output of the MRC88 controller and connect the other end to the RJ45 connector labeled CONTROLLER on the MRC44CB1 connecting block. IR Receivers terminated with a Stereo Mini Jack may directly connect to the MRC44CB1 connector labeled IR IN. For all others IR Recv's with bare wire or Keypads) use 24AWG or higher and connect using the +12v, GND, and SIG screw terminals. A separate power supply is required for configurations in which the current load will exceed 85mA. Consult the MRC44CB1 manual for complete instructions.

SPEAKER CONNECTIONS
(BASIC/ADVANCED/EXPANDED)

SPEAKER PHASING: TO OBTAIN STABLE IMAGING AND FULL BASS RESPONSE, IT IS IMPERATIVE THAT STEREO SPEAKERS BE CONNECTED "IN PHASE" WITH EACH OTHER. YOU CAN VERIFY THIS AS FOLLOWS:

1. If the "+" (positive) and "–" (negative) terminals on your speakers are correctly marked, and visible, and you have wired the system with the positive speaker connector on the rear of the MRC88 Controller/Amplifier connected to the positive connector on the speaker and the negative speaker connector on the rear of the MRC88 Controller/Amplifier connected to the negative connector on the speaker, then the system will be "in phase". No further action is required. Most manufacturers identify the positive terminal with a red binding post, a "+" sign, or a red dot.
2. If you are unsure of the markings, you can verify the phasing. Using a mono sound source, such as AM radio, alternately reverse the leads to one of the speakers. Pick the connection that delivers a solid center image between the speakers as well as best bass response.

CAUTION: After lead ends are inserted and the screws tightened down, be sure there are no free strands that could cause shorting!

VIDEO CONNECTIONS
(BASIC/ADVANCED/EXPANDED)

Composite Video

The buffered, composite video output from the MRC88 Controller/Amplifier will drive a VIDEO INPUT on a TV or monitor directly. Use RG-6 coaxial or RG-59 quadshield cable with RCA type phono plugs on each end. This connection can be run for 100 feet.

Modulated Video

When using the RF/ANT input on a television, use RG-6 coaxial or RG-59 quadshield cable with "F" connectors on each end to connect to the RF output on the Modulator to the RF/ANT in on the zone TV.