# Q450rs

Multiroom made easy!



v 2.1

**knoll**

## Important Safety Instructions:

1) Read these instructions.
2) Keep these instructions.
3) Read all warnings.
4) Follow all instructions.
5) Do not use this apparatus near water.
6) Clean only with dry cloth.
7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prongs are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10) Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11) Only use attachments/accessories specified by the manufacturer.
12) Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, be careful to avoid injury from tip over.
13) Unplug this apparatus during lightning storms or when unused for long periods of time.
14) Refer all servicing to qualified service personnel. Servicing is required when the apparatus is damaged in any way. Examples include   power-supply cord or plug is broken, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15).Under no circumstances should the output terminals of the amplifier be short-circuited.
16).Be sure that the loudspeakers connected can handle the output power of the amplifier at the loudspeakers rated impedance. The warranty on the amplifier does not cover damage to loudspeakers that have inadequate power handling capabilities.
17) Where an all-pole MAINS SWITCH is used as the disconnect device, the location on the apparatus and the function of the switch shall be described, and the switch shall remain readily operable.

CAUTION: These servicing instructions are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Note: Where the mains plug or an appliance cover is used as the disconnect devise, the disconnect device shall remain readily operable.

WARNING: This product may contain chemicals, including lead, known to the State of California to cause birth defects or other reproductive harm.
Wash hands after handling.

**Made in Canada/Fabrique au Canada**

## FCC Warning

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- •    Reorient or relocate the receiving antenna.

- •    Increase the separation between the equipment and receiver.

- •    Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

Canada
This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Caution: To reduce the risk of electrical shock, do not remove the cover (or back). No user serviceable parts inside. Refer to qualified service personnel.
Warning: To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.
The lightning flash with arrowhead, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the products that may be of sufficient magnitude to constitute a risk of electrical shock to persons.
The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operation maintenance (servicing) instructions in the literature accompanying the appliance.

## Knoll Systems

14-7163 Vantage Way Delta BC V4G 1N1, Canada
145 Tyee Drive, Point Roberts, WA 98281 USA
Tel: (604) 940-1689; Fax (855) 734-3363
**www.knollsystems.com**

## Table of Contents

**Unpacking:** The carton and packing materials used in shipping your new amplifier are designed to protect it from shock and vibration during shipping. We suggest that you save the carton and packing materials to use if you move, or if the unit ever needs to be returned to us for any reason.

## Installation Checklist

- Plan your installation. Consider what sources will be used and make provisions for infrared and sources, speakers and cabling.
- Collect the proper tools.
- Run all wires and label both ends.
- Install speakers as directed by speaker manufacturer. Test wire for short circuits.
- Terminate cat5 and test for short circuits and polarity for MR44 and BIX/BIB modules. Retest.
- Mount Q450rs if necessary.
- Test speaker wire for shorts and correct impedance with ohm meter.
- Connect speakers. Note which zone is for which room and which source is from which location.
- Connect cat5 connectors. Ensure cat5 keypads and sources are going to the correct socket.
- Connect audio outputs to Q450rs or to 'local' BIX/BIB inputs. Make a note of which input is used for each source.
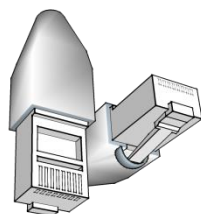
## Important Considerations

- Test all installed cabling before connecting to the Q450rs. Test the speaker and wires with a multi-meter set to ohms for correct impedance and short circuits. Resistance and impedance differ slightly so a very accurate reading is not expected. Long speaker wires will increase resistance. This also includes cat5 connectors. Incorrect polarity of a twisted pair can cause serious damage to the Q450rs and its peripherals.

- Do not make any wire connections of any kind with the power supply connected.

- During operation, the amplifier may become warm. This is normal; there are instances during high-level playback into low impedance speakers when the amplifier will become much warmer than usual. To ensure the amplifiers trouble-free operation, it is necessary to provide adequate ventilation. Keep the amplifier away from external sources of heat such as radiators and hot-air ducts. Never place the amplifier with other heat-producing components in a cabinet or enclosure lacking free airflow. Do not stack other components on top of your Q450rs.

- Care, maintenance, and cleaning: wipe with clean, dry, soft cloth. If necessary, first wipe the surface with a slightly dampened soft cloth with mild soapy water, then with a fresh cloth dampened with clean water. Wipe dry immediately with a dry cloth. **NEVER** use benzene, thinner, alcohol, or any other volatile cleaning agent. Do not use abrasive cleaners, as they will damage the finish of the metal parts. Avoid spraying insecticides, waxes, polishing agents, or any aerosol product near the Q450rs or any of its components.

- It is best to run extra cat5 wires to each room as this will make the installation more future proof and offers an inexpensive repair if a cable is damaged.

- It is important to know where the various wires required to operate the Q450rs will be run. Never run a cat5 or speaker cable parallel to a high voltage AC mains cable. This may cause problems with the operation of Q450rs. If possible don't locate a keypad next to a light switch for the same reason.

- The Q450rs needs to be a safe distance from any large AC motors, including an air conditioner, fridge/freezer, breaker panels, etc. as this can cause unwanted interference.
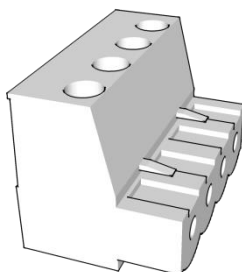
# WHAT IS IT?



## BIB Bluetooth Wall Plate



**Cat5** is a very reliable wire. The BIX and BIB remote input wall plates use a home run of cat5 wire. We use cat5 connectors terminated to the T568A protocol. It is strongly recommended to adhere to this standard.

**Speaker Connectors:** We use a detachable connector sometimes called a phoenix connector. There are four connectors included with the Q450rs. Each connects to one stereo zone.



## WHO IS IT FOR?

The Q450rs is a four source, four-zone multi-room controller amplifier in a small, efficient package. It is much like having four integrated HiFi amplifiers hidden away from sight and connected together for a seamless listening experience.

It is equally comfortable at home as it is scaled up, using the controlled audio outputs, for larger installations such as art galleries or coffee shops.
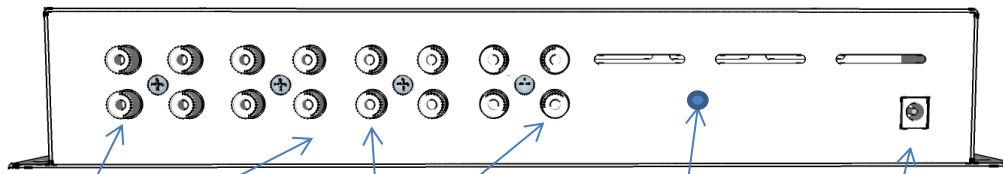
The Q450rs is controlled by RS232 commands and/or Knoll MR144 keypads. There is also a lower cost keypad only version available, model Q450rs. The balanced input wall plates (BIX) are a feature we are very proud of and we hope you will agree. The BIX plate allows the Q450rs to have an input from a room or space far away from the Q450rs without any drop in signal quality and best of all without any added unwanted hum and noise. This is an industry first.

Let's put this another way. Say you are enjoying a dip in the tub. Wouldn't it be nice to be able to plug in your iPod beside the tub and not have to run to the amp to change a playlist? Best of all, the floor stays dry!

**Balanced Input eXtenders (BIB and BIX).** Knoll extender plates allow stereo sources (iPod, CD player, etc.) to be in rooms close or far (up to 1000' or 300m) to the Q450rs. The BIX has a 3.5mm stereo input jack and an emitter output. The BIB is nearly identical with an added HD Bluetooth receiver.

The Q450rs is controlled with its RS232 port and or MR144 keypads. This port can be connected directly to a whole house control system or with third party adapters to the home Ethernet or Wi-Fi and controlled by iPad, iPhone, android tablets and other devices.  Each of the four zones can access any of the four sources, adjust volume, bass, treble, mute, and power on/off.

**Source Inputs explained**: The Q450 and Q450rs have 4 source capability. Each of the 4 source inputs can use either the balanced (black RJ45) input **or** the unbalanced (RCA) input but it is recommended to not use the balanced and unbalanced input of the same source input at the same time as they will mix the stereo signals and it will sound terrible.

## Line Inputs

Direct, non-balanced RCA inputs. We do not suggest connecting a line input and a balanced input(BIB) on the same input. It is acceptable to have (for example) a direct input on 1 and 2 and balanced inputs on 3 and 4.
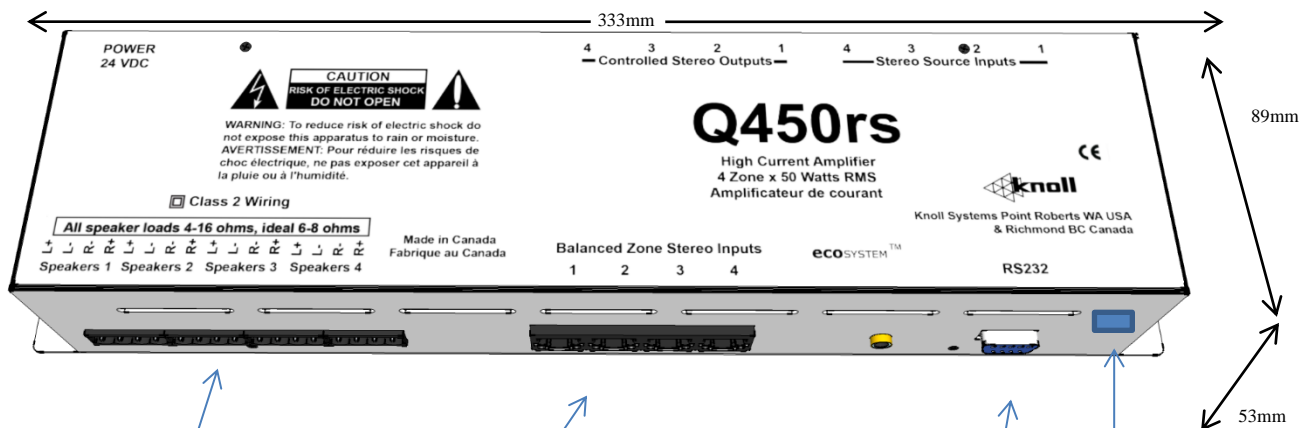
## Controlled Outputs

The line level controlled outputs the same content as the amplified outputs but at lower level that can feed larger and/or multiple amplifiers. They can be connected to subwoofers too!

Power Indicator

## Power Jack
24 VDC
Center pin positive

# GETTING TO KNOW THE Q450rs

POWER
24 VDC

4    3    2    1        4    3    2    1
— Controlled Stereo Outputs —    — Stereo Source Inputs —

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

WARNING: To reduce risk of electric shock do not expose this apparatus to rain or moisture.
AVERTISSEMENT: Pour réduire les risques de choc électrique, ne pas exposer cet appareil à la pluie ou à l'humidité.

## Q450rs
High Current Amplifier
4 Zone x 50 Watts RMS
Amplificateur de courant

CE

knoll

Knoll Systems Point Roberts WA USA
& Richmond BC Canada

Class 2 Wiring

All speaker loads 4-16 ohms, ideal 6-8 ohms

Speakers 1  Speakers 2  Speakers 3  Speakers 4

Made in Canada
Fabrique au Canada

Balanced Zone Stereo Inputs
1    2    3    4

ecoSYSTEM™

RS232

333mm

89mm

53mm

## Amplifier Outputs

The Q450rs is rated at 25 watts RMS per channel (50 watts per zone).

This is a lot of power to drive even the most demanding speakers.

## Balanced Zone Inputs

This feature is unique to the Q450rs. It allows the user to connect a local source in a distant room.
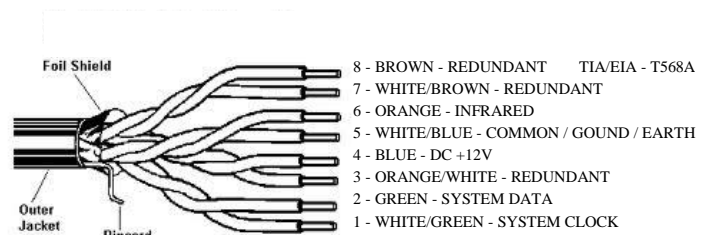
By being balanced, the signal quality is perfectly transmitted without any unwanted added hum or noise.

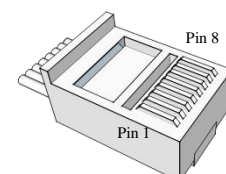## RS232 Connector    Keypad Connector

**Note:** The source inputs are shared throughout so any or all zones can play the same program material (or obviously some other input source).
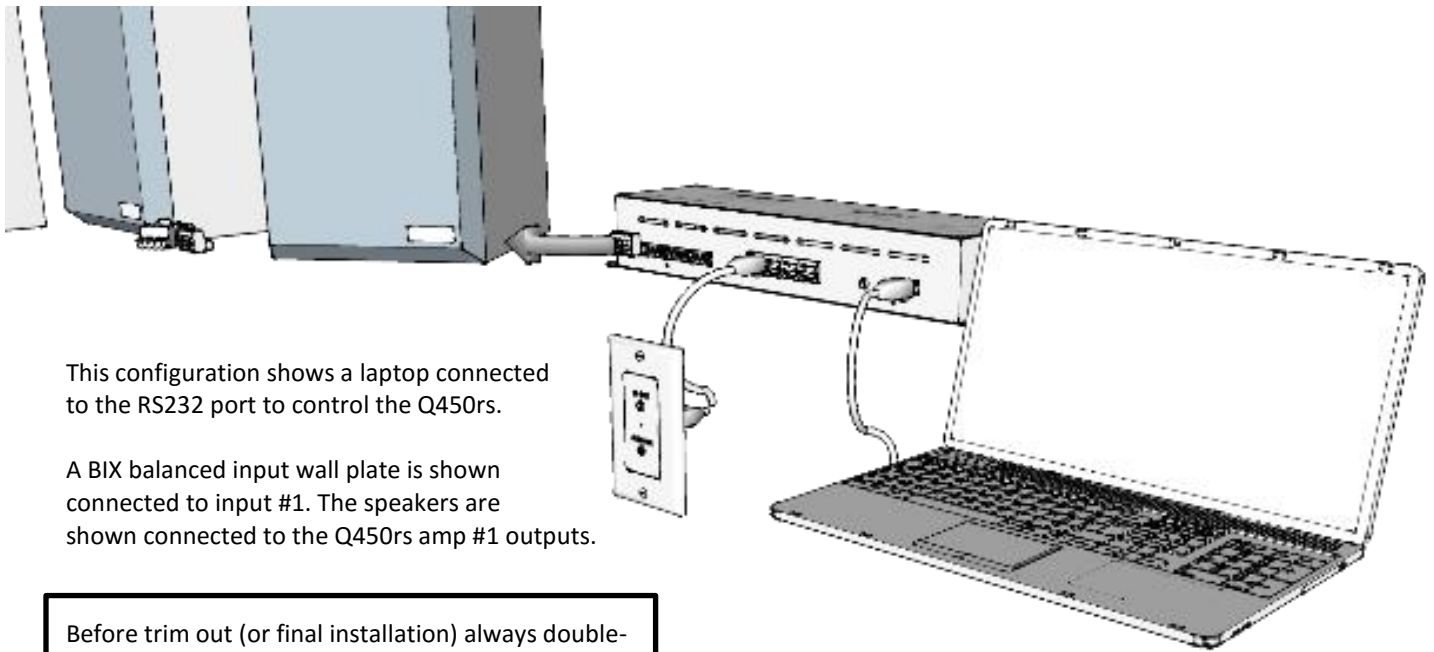
**Note:** It is perfectly acceptable to have more than one pair of speakers per zone. Make sure the series or parallel impedance is between 4-16 ohms.

**Note:** Each zone is effectively an integrated stereo amplifier. You can use the internal stereo amplifiers and/or connect the Q450rs to larger amplifiers to increase power output or to scale up the zone to larger sub-zones. Each zone functions identically; respective to its address.

Foil Shield

Outer
Jacket

Ripcord

8 - BROWN - REDUNDANT        TIA/EIA - T568A
7 - WHITE/BROWN - REDUNDANT
6 - ORANGE - INFRARED
5 - WHITE/BLUE - COMMON / GOUND / EARTH
4 - BLUE - DC +12V
3 - ORANGE/WHITE - REDUNDANT
2 - GREEN - SYSTEM DATA
1 - WHITE/GREEN - SYSTEM CLOCK

Pin 8

**CAT5e Termination**

Pin 1

This configuration shows a laptop connected to the RS232 port to control the Q450rs.

A BIX balanced input wall plate is shown connected to input #1. The speakers are shown connected to the Q450rs amp #1 outputs.

Before trim out (or final installation) always double-**check the wires for continuity and short circuits** as problems can arise such as a tradesperson driving a screw through the wire.

We suggest using a cat5 tester and investing in top quality crimp tools as **second-rate or poor crimping is the number one source of installation problems**.
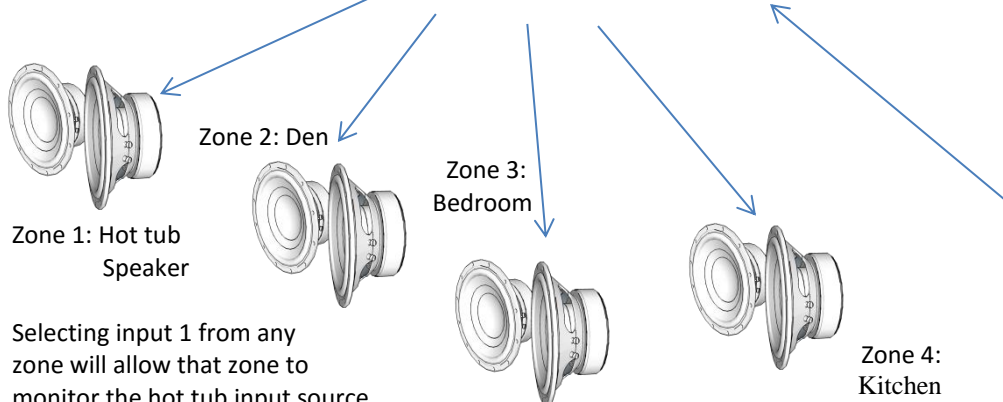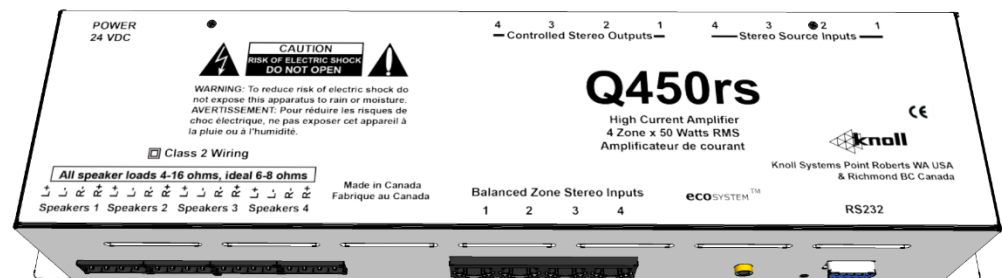
## Q450rs TYPICAL SYSTEM LAYOUT

Typical Installation with four zones, each connected to a pair of speakers.

Zone 1 also has a BIB balanced input plate.

Zone 1: Hot tub Speaker

Zone 2: Den

Zone 3: Bedroom

Zone 4: Kitchen

Selecting input 1 from any zone will allow that zone to monitor the hot tub input source

POWER 24 VDC

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

WARNING: To reduce risk of electric shock do not expose this apparatus to rain or moisture. AVERTISSEMENT: Pour réduire les risques de choc électrique, ne pas exposer cet appareil à la pluie ou à l'humidité.

Class 2 Wiring

All speaker loads 4-16 ohms, ideal 6-8 ohms

Speakers 1   Speakers 2   Speakers 3   Speakers 4

Made in Canada
Fabriqué au Canada

4   3   2   1
Controlled Stereo Outputs

4   3   2   1
Stereo Source Inputs

# Q450rs

High Current Amplifier
4 Zone x 50 Watts RMS
Amplificateur de courant

knoll

Knoll Systems Point Roberts WA USA
& Richmond BC Canada

Balanced Zone Stereo Inputs
1   2   3   4

ecoSYSTEM™

RS232

IR OUT

AUDIO IN

# RS232 Connection

The RS232 connection is used to control the Q450rs by an external controller or computer and can work with our without keypads. The Q450rs connects to the RS232 controller with a 9-pin db9 connector. The programming reference follows.

## Terminal Settings

To control the Q450rs amplifier via other control systems, connect a RS-232 cable to the serial control connector on the rear of the Q450rs and set your computer's or control unit port settings to match the following configuration**:**

| Setting | Value |
|---|---|
| Bits per second | 19,200 |
| Data bits | 8 |
| Parity | None |
| Stop bits | 1 |
| Flow control | None |
| Emulation | Auto detect |

## Command Summary

All commands are enclosed in parentheses. The request can be in some cases a read request (followed by a "?"), or a write request (followed by 0-2 ASCII digits). A read command will return the current setting, and write command will change the setting. All commands are in lower case.

Read request format: (nAA?) where:
(      starts the command
n      denotes amplifier channel (if required)
AA      denotes the command (may be 1 or 2 letters)
?      denotes the read request
)      ends the command

**Read Request Example:**

| Function | Command | Response |
|---|---|---|
| Volume | (1vl?) | returns the volume on channel 1 (0-87) |

**Write request format** (nAA$$) where:
(      starts the command
n      denotes the amplifier channel (if required)
AA      denotes the command **(may be 1, 2 or 3 letters )**
$$      denotes the value to be written if required (leading zero's ARE necessary)
)      ends the command

**Write Request Examples:**

| Function | Command | Response |
|---|---|---|
| Turn Channel On | (1on) | turns on amplifier channel 1 on |
| Select Input | (1sl4) | turn amplifier channel 1 to input 4 |
| Set Volume | (1vl50) | turn amplifier channel 1 to volume 50 (of 87) |

## Supported Command Summary

# = numerical zone or amplifier channel value
$$ = second numerical value (may be one or two digits)

| Function | Command | Range | Read/Write | Remarks |
|---|---|---|---|---|
| Version | (vr?) | none | read only | |
| Reset | (rx) | none | write only | 1 second |
| Channel On | (#on) | 1-4 | write only | |
| Channel Off | (#of) | 1-4 | write only | |
| Mute | (#mu) | 1-4 | write only | |
| Un-mute | (#um) | 1-4 | write only | |
| Mute All | (amu) | none | write only | |
| Un-mute All | (aum) | none | write only | |
| Volume Request | (#vl?) | 1-4 | read only | |
| Volume Set | (#vl$$) | 1-4 / 0-87 | write only | |
| Volume All | (avl$$) | 0-87 | write only | |
| Input Request | (#sl?) | 1-4 | read only | |
| Input Set | (#sl$) | 1-4 / 1-4 | write only | |
| Input Select All | (asl$) | 1-4 | write only | |
| All Channels On | (aon) | none | write only | |
| All Channels Off | (aof) | none | write only | |
| All Channels Vol up | (avlu) | none | write only | Note 1 |
| All Channels Vol dn | (avld) | none | write only | Note 1 |
| Channel Vol up | (#vlu) | 1-4 | write only | Note 1 |
| Channel Vol down | (#vld) | 1-4 | write only | Note 1 |
| Bass adjustment | (#b$) | 1-4 / 0-f | write only | Note 2 |
| Treble adjustment | (#t$) | 1-4 / 0-f | write only | Note 2 |
| Display treble | (#b?) | 1-4 | read only | |
| Display bass | (#t?) | 1-4 | read only | |

**Note1**: Volume up or down requests increase or decrease volume level by 5

**Note 2**: Treble and bass commands use hexadecimal values 0-f, default (flat) is 8.

Also, it is best to leave about a ½ second between commands, as some integrators may miss commands if they are entered too quickly.

All commands also send a message back to the terminal after they have been completed, so that it is easy to keep track of the previous commands that were sent.

Note: Some commands are read or write only and some are both. For example "Mute All" is a write only command and "Version" is a read only command.

## Supported Command Messages

| Function | Command | Message |
|---|---|---|
| Version | (vr?) | Version Number |
| Reset | (rx) | "Resetting…" |
| Channel On | (#on) | "Zone # on" |
| Channel Off | (#of) | "Zone # off" |
| Mute | (#mu) | "Zone # muted" |
| Un-mute | (#um) | "Zone # unmuted" |
| Mute All | (amu) | "All zones muted" |
| Un-mute All | (aum) | "All zones un-muted" |
| Volume Request | (#vl?) | "Zone # volume level = $$" |
| Volume Set | (#vl$$) | "Zone # volume = $$" |
| Volume All | (avl$$) | "All volume levels changed to $$" |
| Input Set | (#sl$) | "Zone # is currently using input channel $" |
| Input Request | (#sl?) | "Zone # is currently using input channel $" |
| Input Select All | (asl$) | "All zones set to source $" |
| All Channels Off | (aof) | "All zones turned off" |
| All Channels On | (aon) | "All zones turned on" |
| All Channels Vol up | (avlu) | "All zones volume levels increased" |
| All Channels Vol dn | (avld) | "All zones volume levels decreased" |
| Channel Vol up | (#vlu) | "Zone # volume level increased" |
| Channel Vol down | (#vld) | "Zone # volume decreased" |
| Bass adjustment | (#b$) | "Zone # bass set to $" |
| Treble adjustment | (#t$) | "Zone # treble set to $" |

**Message Examples** e will use the example commands from before, and show what the responses are.

| Function | Command | Response Reply |
|---|---|---|
| On/Off | (1on) | Zone 1 on |
| Select Input | (1sl3) | Zone 1 is currently using input channel 3 |
| Set Volume | (1vl50) | Zone 1 volume level = 50 |
| Set Bass | (1bf) | Zone 1 bass to 15 |
| Set Treble | (2t4) | Zone 2 treble set to 4 |
| Increase Volume | (2vlu) | Zone 2 volume increased |

## Installing the BIX/BIB eXtenders

The BIB is almost identical to the BIX above with added Bluetooth capability. Both are connected to the Q450rs with a single home run cat5e or cat 6 wire up to 1000' (300m). BIB/BIX power is provided by the Q450rs. See page 11.

## BIB Bluetooth Pairing

1. Go to the Bluetooth Manager of your source device by following these steps.
   a. From your source (iPhone, iPod etc.) home page, select "Settings"
   b. Inside Settings tap on "General" or "Wireless settings"
   c. Inside General, tap on "Bluetooth"
2. Select "Bluetooth devices" or "Bluetooth settings" and scan for (Bluetooth) devices.
3. A device should soon be displayed on the list that usually reads "Knoll DC-8BT". Select it by touching it or clicking on it.
4. If required enter '0000' if the player asks for the pin code. This will allow the source to pair with the BIB.
5. Once paired the blue LED light will stay on when a connection is established.

Some devices, such as the iPhone, will connect immediately after pairing and the LED will stay on. Other devices, such as laptops, may ask you if you wish to connect and the LED may turn off until after pairing is established.

Although the BIB can only play music from one device at a time, it is capable of being paired with up to four source devices. This means that you only have to enter the PIN code one time for each device.

Please note the BIB Bluetooth a typical 20-30' (6-8m) range in ideal conditions.

## Reconnecting your Device

If you move out of range or turn off the Bluetooth feature on your iPhone or iPod, the BIB will disconnect from your device. To reconnect, simply access the Bluetooth Manager on your device, and select the appropriate device listed. You should not be asked to enter the PIN code again.

## Changing Connected Device

If you want to switch to another device follow these steps:

End the existing Bluetooth connection with the connected device. Access the Bluetooth Manager and disable the Bluetooth function of the iPhone or iPod touch.

1. The DC-8BT Bluetooth Dock can now be connected to a different source such as an iPhone or iPod.
2. Follow the directions in "Bluetooth Pairing" to connect to a different device.

**Out of Range or Lost Signal**

If the source music device is out of range (beyond 20-30')
of the BIB or if something is blocking the signal, the LED
light will turn off to indicate that the Bluetooth connection
with the music device has been lost. To avoid lost
connections:

1. Move the music device back into range (within
   20-30 feet) and/or make sure there is a clear line
   of sight and that there are no obstructions
   between the BIB and the music source (iPhone
   or iPod etc.).
2. Within 15 seconds the connection will
   automatically be reestablished and the blue LED
   light will turn on.
3. If the connection is lost for more than 15
   seconds, the connection will need to be
   reestablished. Follow the directions in
   "Reconnecting your Device" above.

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**Troubleshooting Solutions:** You can quickly
solve most problems with your BIB:

*"Music is not playing on my stereo speakers"*

- Make sure an audio cable is correctly and firmly
  connected to the BIB.
- Make sure the Q450rs is powered on and the
  right source is selected.
- Make sure the stereo volume is set to a
  comfortable listening level (on both the stereo
  amp and the source).
- Make sure you are within range of the BIB and
  that your source (iPhone, iPod etc.) is properly
  paired to the BIB/Knoll DC-8BT.
- If you are still unable to get sound from the BIB,
  it may be necessary to un-pair and re-pair with
  your device. This can be done by removing or
  'forgetting' the Knoll DC-8BT from your device
  Bluetooth manager and repeating the steps to
  pair to your device.

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## Speaker Termination

To ensure that the high quality signals produced by your
amplifier are carried to your speakers without loss of
clarity or resolution, Knoll advises that you use high-quality
speaker wire. Many brands of wire are available — the
choice may be influenced by the distance between your
speakers and the amplifier, the type of speakers you use,
personal preferences, along with other factors.

For safety reasons, if any wires are placed inside walls or
ceilings, they may be required to be fire rated. Always
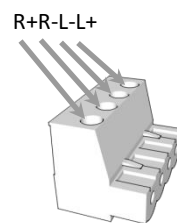check with local building officials.

Regardless of the brand or type of speaker wire chosen,
we suggest that you use a wire constructed of multi-strand
copper with a gauge of 16 or less (the lower the number,
the thicker the cable). 16 gauge wire may be used for runs
up to 33' (10 m). 14 -12 gauge wire is recommended for
longer runs. We do not recommend that you use any wires
with an AWG equivalent of 18 or higher due to the power
loss and degradation in performance.

A detachable plug is provided for each stereo channel
output. Strip approximately ¼" (6 mm) of insulation from
the end of each speaker wire and carefully twist the
strands of each conductor together. Be sure not to cut the
individual strands or twist them off. All strands must be
used for optimal performance. Insert the wire into the
plug and screw the screws very tight. Inspect that there
are no stray wire "hairs" that can short circuit in the plug.

Correct polarity connections are important to maintain
proper speaker phasing. When speaker phasing is correct,
all speakers move in and out at the same time preserving
the imaging and bass response of the program material.

Run the wires to speaker locations. Do not coil any excess
cable, as this may become an inductor that creates
frequency response variations in your system. Lastly,
connect the wires to the speakers, again being aware of
proper polarity. Remember to connect the negative or
black wire, to the matching terminal on the speaker.
Connect the positive or red wire to the matching terminal
on the speaker. After powering up the system, check the
speakers to verify that they are operating properly.

Note: While most speaker manufacturers follow industry
convention of using red terminals for positive connections
and black terminals for negative, some manufacturers may
vary from this configuration. To ensure proper phase
connections and optimal performance, consult the
identification plate on our speaker terminals, or the
speaker's manual to verify polarity. Contact the speaker's
manufacturer if you do not know the speaker polarity.

R+R-L-L+

### Inputs

| Direct Inputs | 4 gold stereo RCA |
|---|---|
| **Balanced Inputs** | 4 RJ45 from BIX or BIB |
| **Control** | 1 RS232  port and 1 RJ45 keypad port |
| **Infrared** | Not implemented |

### Outputs

| Stereo amplifiers | 4 x 50 watts 4-16 ohms |
|---|---|
| **Direct Outputs** | 4 controlled gold stereo RCA |

### System

| Frequency Response | 20 Hz to 20 kHz |
|---|---|
| **Operating Temp.** | -20°C to 45°C ( |
| **Dimensions** | 89 x 53 x 333 mm (3.5 x 2 x 13.2") |
| **Weight** | 820 g (1.81 lbs.) |
| **Power** | DC 24 V center pin + |
| | 100-240 VAC 50-60 Hz |

# Expanding Capabilities

The Q450rs sports some unique features that provide for larger and more sophisticated installations. To control any amplifier a larger zone will require additional equipment. This is an example that will allow the Q450rs's flexibility to cater to larger spaces like bars, coffee shops and large zones like open design. Usually these are living room, dining room and kitchens. In a coffee shop, the kitchen staff can listen to different program material than the customers, for example. In bars, TV's can have their own zones while customers playing pool can listen to music. An external amplifier or amplifiers can be used to extend a zone's size.

The layout below shows two 12 channel KES600 amplifiers (50 watts per channel) powering up to 12 pairs of speakers, significantly increasing the driving capability of this system.

*We recommend an amplifier that will allow you to adjust the individual outputs like the KES600.* Note that these sub zones are receiving the identical input that the Q450rs internal amp receives. The source, bass, treble and mute functions will behave in the exact same way as the Q450rs integrated amplifiers do.
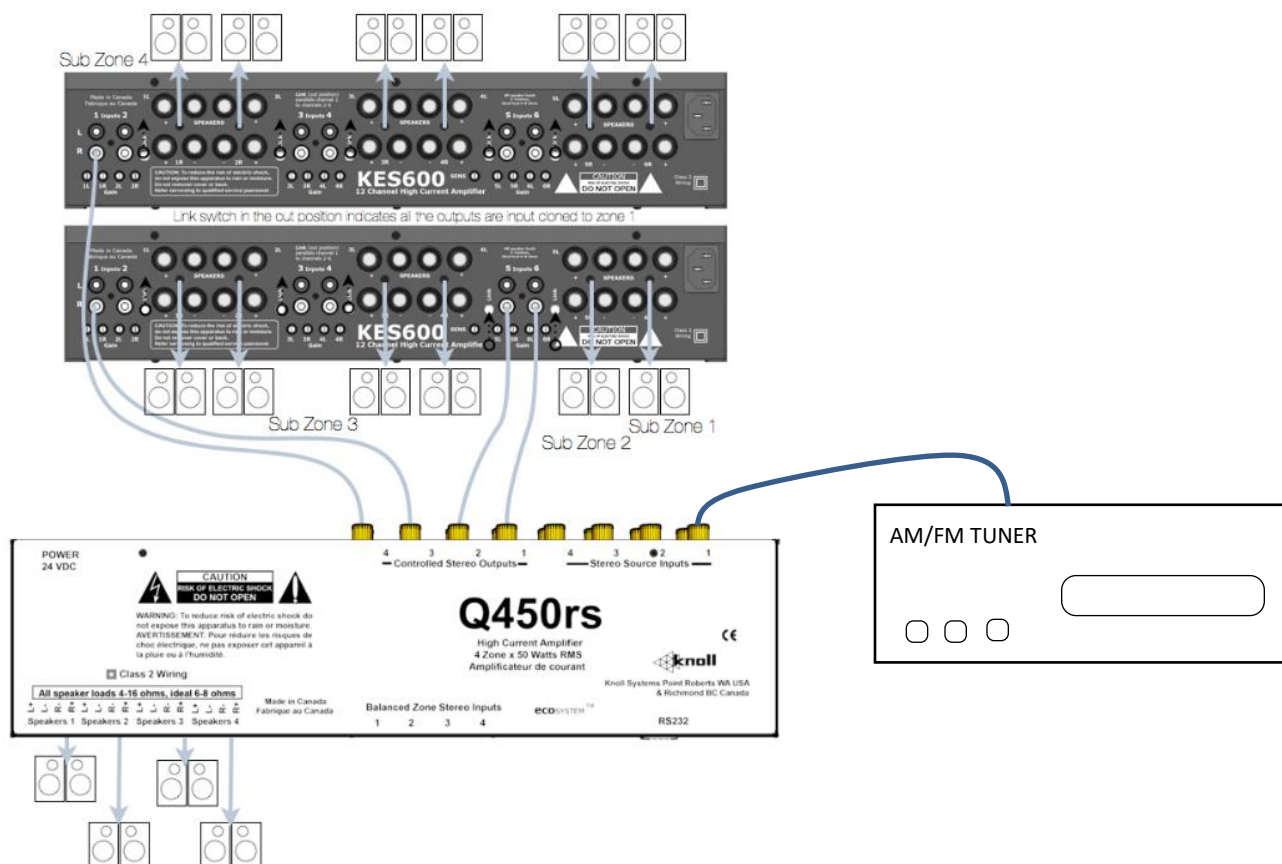
*This will allow for fine tuning the output volume of your sub zone so there aren't spots that are too loud or too quiet.*

In this example, zone one has one speaker pair connected to the Q450rs. Zone 2 is the same.

Zone 3 is connected to seven pairs of speakers. One pair is being driven directly from the Q450rs and the other 6 pairs by the lower KES600. The zone 3 total output power is 650 watts.

Zone 4 is also connected to seven pairs of speakers. One pair is being driven directly from the Q450rs and the other 6 pairs by the upper KES600. The zone 4 total output power is 650 watts.

*As you can see, the Q450rs is very versatile.*

# INSTALLATION

## Tools You Will Need

These tools are specific to Q450rs and more may be required depending on speakers and peripherals used.

### Screwdriver
A small flat head screw driver with a blade that is about 3.5mm (1/4") is ideal. This is for terminating the speakers into the Q450rs speaker or Phoenix connector. Too big won't fit in the opening, too small won't allow for enough torque for a good seating of the speaker wire.

### Wire Strippers
Suitable for stripping speaker wire.

### Multi-meter or Impedance Meter
This is required to avoid damage to Q450rs and the speakers and will save much time and frustration should a speaker wire be damaged during installation. Do it.

### Cat5/RJ45 Crimper Tool
This must be top quality. The 'Ideal' by 'Telemaster' is a very good choice. **Most calls to tech support are a result of poor connections caused by an inferior crimper tool used for cat5 termination.**

### Cat5 Tester
Until we figure out how to see electricity, we need a way to ensure that it's being transported correctly. A cat5 tester that shows that not only continuity of the wire, but shows that they are going to the correct pins. This is very useful and highly recommended.

### Labeling Medium
Some method to identify the different cables from one another and apart from other systems/networks. During installation other trades people can move or even remove the ends of long wires. Two labels on both ends can offer a little redundancy.

> **Note:** It is important you know where you'll run the various wires required operate Q450rs. You cannot run a cat5 or speaker cable parallel to a high voltage AC mains cable. This may cause problems with the operation of Q450rs. Q450rs needs to be a safe distance, about 1m (3') from any large AC motors, like in an air conditioner or fridge/freezer, or breaker panels.

# INSTALLATION PROCEDURE

Installing the Q450rs is intended to be a relatively easy procedure with no programming required.

## Part One - Planning
Before installing we recommend you make an installation plan. This involves deciding where the speakers will go, and if you're intending to, where to place the local zone inputs, or BIX as we call them and of course the various music sources. There are up to four pairs of speaker wire (one pair per zone) and up to four cat5 for the BIX/BIB's.

## Part Two - Prewire
Prewiring is a very important step. The effort you put into planning should make this step easier. When running wire, leave an extra 1m (3') on both ends. Terminate all Cat5 wires with RJ45 connectors.

## Part Three – Installation or Trim Out
You should now install the speakers and install the wires in them. Take care to ensure the speaker wire polarity is correct (in phase), the wire is neat and no wire fibers are outside the connectors.

At the Q450rs terminate the speaker wires with the supplied connector. Check each speaker circuit for shorts and proper impedances. Take extra care at this step to ensure your twisted pairs are correctly routed and that the phasing is correct. A fault here can seriously damage Q450rs and its peripherals. Check this three times!

Mount the Q450rs. Plug in all connectors except for the powers supply unit (PSU). Double check that the connectors are routed to the correct Q450rs terminals.

Plug in a known working audio source directly to Q450rs. Preferably, use a source input that is not being used for a BIX/BIB. Plug in the Q450rs power supply. Check Q450rs to see that the power LED is illuminated. Press play on your known working audio source and head to your closest zone.

Select the audio source on your control device you activated in previous step. Turn up volume and listen for signal. Check signal for distortion or clipping. Move to next zone, rinse, repeat until all zones are active.

Bring a known working audio source to BIX/BIB locations to test for signal. After completing this test, perform the same test on BIX/BIB in other zones. Grab a soda and pat yourself on the back. Throw on a tune and enjoy your hard work.

## MR144 Keypad Connection

The Q450rs can be controlled by the MR144 keypads and/or an external controller or computer (using the RS232 port), so keypads may not be needed.

**More than one or two keypads can be used in a zone and five (5) is the maximum number of MR144 keypads per Q450rs allowed.**

Note: MR144 keypads are not designed for outdoor use, high humidity or temperatures or any extremes.

The MR144 contains an almost all brand infrared repeater and most functions can be controlled by the Knoll RB12 remote control. RB12 commands can easily be stored in a learning remote.

The MR144 is connected to the Q450rs with CAT5e or CAT6 wire. Each keypad can have a home run or be daisy chained on one wire. Five of the eight CAT5 wire conductors are used.

Run CAT5 wire from the keypad location to the Q450rs location for each keypad or run it from keypad to keypad location. Ideally use home runs as they leave the installation more "future proof" and reliable. Leave an extra 1 m or 3 feet on each side to make it easier to work on. Add a RJ45 connector of the right type for the CAT5 wire you have selected (not all CAT5 wires are the same) and crimp the connector to the wire on each side. Plug the RJ45's into the MR144 and the Q450rs keypad port.

Note: All cat 5e keypad wire runs are paralleled together. This can be hardwired or a dedicated paralleling board like the Knoll BOB110 can be used.

## MR144 Keypad Programming

After the MR144 is installed in the wall and the system is switched on, each keypad needs to be programmed.

Program it for:
1. Room or zone identification
2. Source input labels
3. Equalization (if required)

**Note: If you intend to use the "PARTY MODE!" (all zones on to source #1) at volume 60, connect that PARTY MODE source to Source #1.**

## 1. Room or zone keypad identification.

Now that the system has been installed and powered up it is time to let the keypads know which rooms are which. Keypads can be connected to any keypad jack.

Go to the first keypad connected to room #1 (speakers are connected to SPEAKERS 1). When powered up, the keypad will go through some splash screens identifying its software version and the keypad displays:

If the keypad displays **Zone?** Skip to #4 below:

Without pressing any other buttons on the keypad:

1. Press **MUTE** for about 1-2 seconds then:

2. Press **INPUT** and hold for about 5-10 seconds.

   The keypad will then display: Release the INPUT button

3. Press **OFF**

4. The keypad displays:

5. Use ▼ ▲ the keypad buttons to select which zone 1-6 this keypad controls

6. Press **INPUT** to confirm your zone assignment selection.

   Note: More than one keypad can be assigned to a single zone.

**2. Source input labels**. The four source input labels have to be programmed individually into each keypad. There are over 25 labels available for each source.

Labels can be programmed from the keypad only when it is powered up and not from a remote control.

Each keypad must be programmed individually and it will save the label names even if the keypad is disconnected from the systems. The MR144 keypad labels can be programmed offsite if desired.

> **Note:** All of the MR144 keypads in this system have to be programmed with the same source input labels and in the same source order.

The sources should be connected, but it is not necessary to have the source wires connected to program the keypad labels.

Using the back of this manual, please write down the source name connected to source 1, source 2, source 3 and source 4.

With the Q450rs turned on and the zone keypad identification completed (above), the source input labels are now ready to be programmed. This is how the source that has been selected, and is playing, is easily identified on the keypad LCD readout.

First the system must be powered up, but all zones turned off, the keypad displays:

**System Off**

Without pressing any other buttons on the keypad:

1. Press **MUTE** for about 1-2 seconds then:

2. Press and hold **INPUT** for about 5-10 seconds.

   The keypad should display:
   Release the INPUT button

   **Source 1 Set 1**

3. Use the ▼ ▲ keypad buttons to select the source name. All keypads need to have the same source names assigned to each of the 4 inputs.

4. Press **INPUT** to confirm your input source name assignment.

5. Continue programming for sources 2, 3 and 4 in the same manner. To change any of the labels you can re-enter the installer menu and scroll through all four labels and reset the ones needed.

> **Note:** If a mistake is made, go through the rest of the programming setup, and restart the installer mode again.

**3) Equalization (if required).** After the Source Input labels have been assigned, bass, treble and balance can be assigned (installer only)

1. The keypad displays:

   **Bass 00**

2. Use ▼ ▲ the keypad buttons to select the bass boost or drop (maximum +/-7). Keypads assigned to the same zone or room should have the same bass, treble and balance assignments.

3. Press **INPUT** to confirm your bass level assignment.

4. The keypad displays:

   **Treble 00**

5. Use the ▼ ▲ keypad buttons to select the treble boost or drop (maximum +/-7). Keypads assigned to the same zone or room should have the same bass, treble and balance assignments.

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6. Press **INPUT** to confirm your treble level assignment.

7. The keypad now displays:

**Balance 00**



8. Use the ▼ ▲ keypad buttons to select the left/right balance (maximum +/-7). Keypads assigned to the same zone or room should have the same bass, treble and balance assignments.

9. Press **INPUT** to confirm your balance left/right assignment.
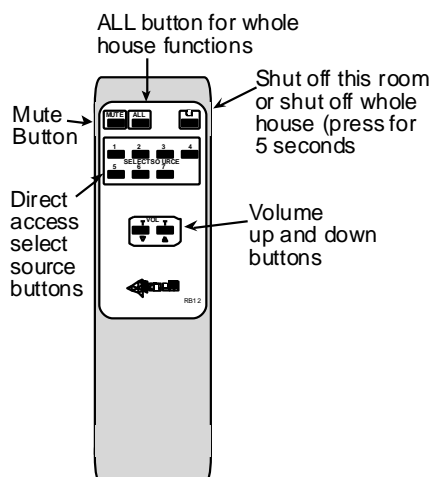
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## Adjusting the MR144 Keypad Backlighting

MR144's are backlit for easy nighttime operation. To adjust the backlighting make sure the power for the keypad is on and the MR144 is off (not playing any sources).
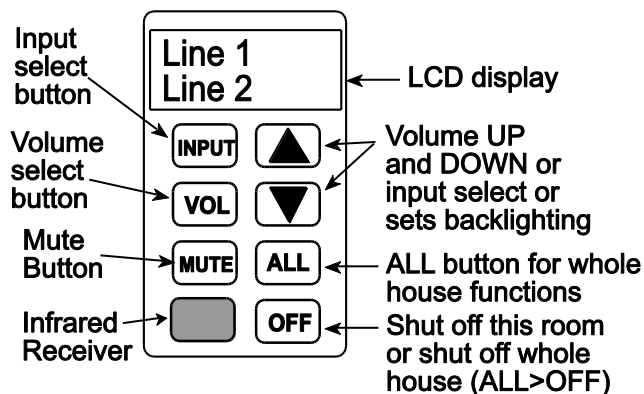
The LCD display then displays:

**System Off**

Without pressing any other buttons press the UP or DOWN button to increase or decrease the backlighting illumination. The level selected for this keypad will remain in the memory even if the power is disconnected.

**RB12 Remote control functions**

ALL button for whole house functions

Shut off this room or shut off whole house (press for 5 seconds

Mute Button

Direct access select source buttons

Volume up and down buttons

RB12

---



Input select button
LCD display
Volume select button
Volume UP and DOWN or input select or sets backlighting
Mute Button
ALL button for whole house functions
Infrared Receiver
Shut off this room or shut off whole house (ALL>OFF)

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## MR144 "ALL" Keypad Commands

To work with ALL the MR144 keypad zone must be turned on and the word VOL needs be in the lower left of the keypad LCD display.

**ALL OFF**

1. The zone with the MR144 keypad you are in must be on and the word VOL needs to be in the lower left of the keypad display. This won't work if this zone is turned off.

2. Push **ALL** the button and release. The LCD display on the keypad you just pressed displays:

**System All**

3. Push the **OFF** and all zones of the Q450rs immediately turn off and the keypad displays:

**Cool Down**

for about 5-10 seconds.

Then the keypad displays:

**System Off**

**ALL ON or PARTY MODE**

1. The zone with the MR144 keypad you are in must be on and the word VOL needs to be in the lower left of the keypad display. This won't work if this zone is turned off.

2. Push the **ALL** button and release. The LCD display on the keypad you just pressed displays:

   System
   All

3. Push the **INPUT** button and hold it on for about 5 seconds. The display will briefly show:

   PARTY
   MODE!

All zones of the Q450rs immediately select Source 1 and with a volume setting of 60. All MR144 keypads will display this in all zones. The keypad that initiated **PARTY MODE** cannot change volumes up and down in other zones other than the volume 60 selected. After **PARTY MODE** has been activated, each zone keypad can now select different volume or change sources as desired.

The RB12 remote control can turn off all zones that are on by pressing the RB12 remote control "ALL" button then the power button on the top right with red around it. **PARTY MODE** cannot be activated from the remote, only by pressing the MR144 keypad buttons.

**TROUBLESHOOTING**

**No Q450rs Power**
   1. **Observe if LED on Q450rs is on.**
   2. **Check to see if Q450rs is plugged in.**
   3. **Test AC outlet with a lamp to see if it is active.**

**Q450rs led on but no sound**
   1. **Ensure the source input is connected to the input selected and the source is playing.**
   2. **If a BIX or BIB balanced input plate is being used, inspect and if necessary test the cat5 cable with a cat5 tester.**
   3. **If the cable tests correctly try connecting the source directly to the corresponding Stereo source input on the Q450rs. If it works then something is wrong with the BIX/BIB plate or its wiring.**
   4. **Make sure the controlling devise is properly installed with the correct app and hardware.**

**Sound is distorted**
   1. **Try turning down the sound source volume (example: iPod) and turning up the Q450rs volume.**
   2. **Turn down zone volume.**
   3. **Check the speaker impedance with a multi-meter to make sure it is not short circuited or partially short circuited.**
   4. **Check speakers for damage or for loose material in cavity.**

## LIMITED WARRANTY

Knoll Systems ("Knoll") warrants that each Q450rs ("the Product") sold hereunder will conform to and function in accordance with the written specifications of Knoll. Said limited warranty shall apply only to the first person or entity that purchases the Product for personal or business use and not for the purpose of distribution or resale. Said warranty shall continue for a period of three years from the date of such purchase. Accessories such as remote control, keypads and balanced input plates when sold with or without Knoll amplifiers or controller amplifiers have a warranty that shall continue for a period of one year from the date of such purchase. Knoll does not warrant that the Product will meet the specific requirements of the first person or entity that purchases the Product for personal or business use. Knoll's liability for the breach of the foregoing limited warranty is limited to the repair or replacement of the Product or refund of the purchase price of the Product, at Knoll's sole option. Replacement Product may be re-furbished in "like-new" condition, at Knoll's sole discretion. To exercise the Purchaser's rights under the foregoing warranty, the Product must be returned at the Purchaser's sole cost and expense, to Knoll or to any authorized Knoll service center provided, and the Product must be accompanied by a written letter explaining the problem and which includes (i) proof of date of purchase; (ii) the dealer's name; and (iii) the model and serial number of the Product. When sending your unit in for repair, please ship your unit in its original packing material or a Knoll approved ATA Shipping Case, or have a professional packaging company pack the unit. Please insure your shipment for its full value. A return authorization number, issued by the Knoll customer service department, must also be clearly displayed on the outside of the shipping carton containing the Product.

**Note:** Remanufactured Products are exempt from the foregoing Limited Warranty. Please refer to the Remanufactured Product Warranty for applicable warranty information.

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## MR144 Source Input Labels

The source input label choices are:

Source x, AM, AM/FM, AUX, AUX 2, Cable, Cable 2, CD, BluTooth, Classic, Country, Contemp, WiFi, DVD, BluRay, FM, HipHop, iPod, Jazz, SiriusXM, KIDS, MP3, NEWS, Computer, Pop, Rap, Rock, SAT, DISH, Sports, Talk, TV.

Write Source Inputs here

Source 1_____

Source 2_____

Source 3_____

Source 4_____

Installation Date_____201_____