

# CONDUCTIVE LABS

Electronic Music Instruments

## MRCC

MIDI ROUTER CONTROL CENTER



User Manual as of FW v1.1.071

Specifications are Subject to Change:

The information contained in this manual is believed to be correct at the time of printing. However, Conductive Labs LLC reserves the right to change or modify any of the specifications without notice or obligation to update the hardware that has been purchased.

**Warning:**

The product may be able to produce sound levels that could cause permanent hearing loss when used in combination with synthesizers, headphones and/or speakers. It may be able to produce sound levels that could cause permanent hearing loss. DO NOT operate at high volume levels.

**Please Note:**

Conductive Labs LLC is not responsible for, and is not covered by, the manufacturer's warranty. Any fees incurred due to a lack of knowledge relating to how a function or feature works are therefore the owner's responsibility. Please read this manual completely before requesting service.

**Precautions, not limited to:**

1. Read and follow all instructions.
2. Unplug before cleaning and only use only a soft dry cloth. Do not use any cleaners.
3. Do not use the instrument near water or moisture, such as a bathtub, sink, swimming pool or similar place.
4. Do not expose the instrument to hot sunlight.
5. Do not spill any kind of liquid onto the instrument.
6. Do not place the instrument in an unstable position where it might accidentally fall. Do not place heavy objects on the instrument.
7. Do not open or insert anything into the instrument that may cause a fire or electrical shock.
8. Always contact Conductive Labs LLC if you have an issue. **You will invalidate your warranty if you open and remove the cover.**
9. Do not use the instrument when there is a gas leak nearby.
10. Conductive Labs LLC is not responsible for any damage or data loss caused by improper operation of the instrument.
11. Do not TAUNT The MRCC!

**Not following the above Precautions will void the manufacturer's warranty.**

# Special Thanks

To the Kickstarter project supporters – we would have never continued without you!

To the friends and family for enduring countless hours of insanely boring details  
of The MRCC's trials and tribulations.

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and The MRCC Beta Testers!

To the McGee family...  
for their generous use of their spacious and temperature-controlled basement  
also known as "The Lab"

And to our significant others for their support and understanding!

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Our lawyers are now ecstatic, try to have a nice day. 😊

Go confidently in the direction  
of your dreams



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**Thank you for purchasing the MRCC from Conductive Labs!**

## Introduction

With your MRCC from Conductive Labs you can route your controllers to your synths with a touch of a button; the MRCC never needs to be connected to a PC for configuration. The four USB host ports enable you to use all those cool USB only (USB MIDI Class Compliant) MIDI controllers that previously needed to be plugged into a PC to work. Imagine triggering your favorite drum machines with button pads or tweaking synth parameters from the knobs on your keyboard controllers with no PC in sight!

On the following pages are all the nuts and bolts of the MRCC. In addition to the simple button press routing there is USB virtual cable routing and some extras and tools that will be explained in this manual. For support please use our forum at: <https://www.conductivelabs.com/forum>.

The MRCC (MIDI Router Control Center) is a front panel configurable MIDI router which means no PC is required to configure the routings, message filters, or message modifiers.

The MRCC can be used in a variety of ways. For example:

- Connection between MIDI controllers and synths.
- A complex studio setup with MRCC as the hub, routing MIDI messages to several synths while transposing inbound keyboard notes, and driven by multiple MIDI controllers.
- With the “MRCC Remote 7” accessory, 5 MIDI out ports can be accessed via a single CAT5 shielded cable of up to 50’ away.



## Quick Start

1. Attach the power adapter plug prongs for your country. Plug your MRCC power adapter into an electrical socket. Plug the USB-C end of the power supply cable into the MRCC USB-C socket on the side of the unit. Turn on the MRCC. The OLED splash screen should show and the LEDs should light with a brief prismatic light show.
2. Plug your MIDI controller into any of the in-ports and press the button for that in-port. It should light green. If you are plugging it into a USB Host port be sure that the virtual in-port cable is set to #1:
  - a. You should see the MIDI out-port 1 light green
  - b. Hold down the USB Host in-port button to see out-ports 2-4 light a dim white. When you release the in-port button the in-port LED should remain lit green and out-ports 1-4 should not be lit.
3. Plug your synth into any of the out-ports and press the button for that out-port. It lights blue when selected, and becomes dimmer when it is routed and another output is selected. If the out-port is the USB PC port be sure that the virtual out-port cable is set to #1 (see step 2).
4. The route is made. Make sure your controller and synth are set to the same MIDI channel. The ROUTING screen will show you the inbound MIDI messages and channel if you're not sure. Of course, you can map the channel but you'll need to read a bit more to learn how to do that! 😊

Happy ROUTING!!!



## Product Features

- Desktop or 2U rack configurations
- 11 in x 17 out physical routable ports (39 in x 34 out total ports)
- Front panel button-per-port routing (no PC required)
- USB host ports x4, USB device port x1, MIDI 5-Pin and MIDI 3.5mm A and B ports (MIDI 1.0 spec 5V outputs)
- Virtual-cable ports on USB Host (In x4) and USB Device (In x12 & Out x12)
- USB class compliant MIDI interface
- Automatic port splitting and merging based on routings
- OLED Display shows MIDI message monitoring and easy menu system
- Port and/or routing filters (Clock, Note, CC, Prog Change, Stop/Start/Continue)
- Six routing modifier types (Channel, Velocity, CC, KB Range, Random & Transpose)
- Extras: MRCC Clock, and Arpeggiators
- Routing Presets (128), Extras Presets (30), & Sys Settings Presets (5)
- Firmware updates via USB



## USEFUL MIDI BACKGROUND

MIDI was mostly invented by a guy named Dave Smith who is famous for making the Prophet line of synthesizers, the first with digital controls that were polyphonic and had presets.



One of the original goals of MIDI was to have a keyboard on one synthesizer play the sound engine of a second synthesizer. Of course, once this was done the flood gates were opened for new ideas and innovative use cases. The inception of MIDI controllers with keyboard, button, knobs and sliders and MIDI sound modules exploded. A bit later, software applications for patch librarians, sequencing and controlling slowly emerged as connectivity to computers happened.

It was around 1983, when you listened to music on vinyl and cassette tapes in your car. VCRs were not too common yet, and half the people were still watching TV with antennas. A personal computer cost two to three times the price of a beater car and so did synthesizers!

Processing power of your smart-watch is about a zillion times more powerful than the processors used in synthesizers back then. So the goal was to make the MIDI communication protocol as lightweight as possible. Which means it's pretty dumb.

### Things you should know about MIDI...

MIDI 1.0 is a one-way communication standard, aka half-duplex. Which means each cable only carries messages from one machine to the other, and not back the other way. What this means is, if you send a MIDI message to your synth, you have no idea if it got there or if the message action was carried out.

Things changed a little bit when computers got cheaper and USB was invented. The companies that were making software for MIDI started to send MIDI messages over USB cables.

*USB cables* are a lot different than 5-Pin MIDI cables. For one, USB cables carry all kinds of *simultaneous* messages, from devices such as mice, keyboards, printers, scanners, external hard drives, memory sticks, cell phones, 3D printers and on and on and on. Messages can be sent in both directions too.

### MIDI over USB cables

Even though USB (and other cables/protocols) were now being used to send MIDI messages, the MIDI specification wasn't changed. So when you send a MIDI message the device is not required to send a response even though the USB cable can do this. Of course, there are some exceptions where some DAWs and quasi proprietary controllers do bi-directional (aka full-duplex) communication.

Also, USB has an egalitarian nature. This means that there is always a *HOST* and a *DEVICE*. Recall USB was invented for personal computers. So the *HOST* would be the PC and the *DEVICE* would typically be the mouse, keyboard or printer. So just like you can't plug a QWERTY keyboard into a printer, you can't just plug a MIDI controller into a synthesizer. One of them must be the *HOST* and one of them has to be the *DEVICE*.

Intel had a couple of goals in mind when they invented USB. The first was to make the PC the center of the universe. The second goal was to make adding USB compatibility to simple inexpensive peripherals (think mouse) as cost effectively as possible. Thus, a *DEVICE* is cheap and simple and the *HOST* is not! As a result, there aren't very many USB *HOSTs* in the music world. The MRCC solves many of these issues.

With all that said the MRCC treats 5-Pin cables a bit differently than USB cables. Notably, the USB cable is treated as both an in-port and an out-port, you can see each port has two physical buttons. Secondly, multiple "virtual" MIDI cables can be on one physical USB cable. More on this later.

## THE BASICS - PORT ROUTING

### 5 Pin Port Routing

The most fundamental use of the MRCC is to route in-ports to out-ports. This is simply done by choosing any in-port and then routing it by selecting one or more out-ports. When choosing an in-port the LED will shine green, out-ports shine blue. Notice when making routings using in-port and out-port buttons the Routing screen page info will follow and match, more on that later.

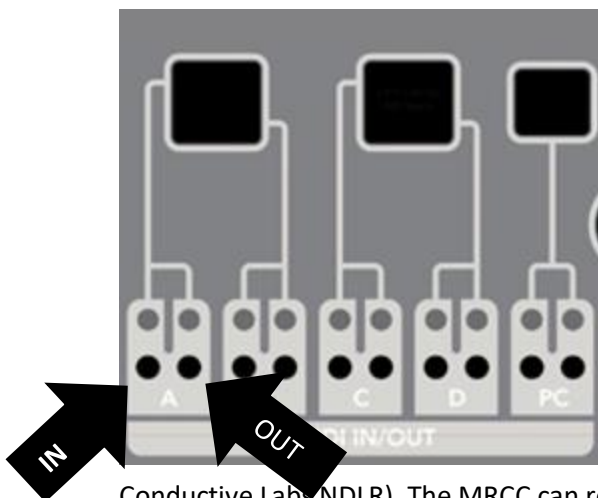
**Example:** route in-port 3 to out-port 5. Choose in-port 3 by pressing MIDI IN button #3 (LED lights green) and select out-port 5 by pressing MIDI OUT button #5 (LED lights bright blue).

**Example continued:** to route in-port 3 to additional out-ports just press any unlit MIDI OUT button (LED lights bright blue). To add out-port 7 press MIDI OUT button #7. Now three LEDs should shine, in-port 3 (green), out-port 5 (dim Blue), and out-port 7 (bright blue). Bright blue LEDs indicates the **selected** out-port.

To remove any out-port from the routing it first must be the **selected** out-port (bright blue LED). If not already lit brightly, press any dimly lit blue LED out-port button to turn it bright. Press it a second time and it will go dark and be un-routed from that chosen in-port.

### USB Port Routing

Notice that each USB Port has two buttons and two LEDs. This is because USB ports are bi-directional, meaning they are both an in-port and an out-port. This is different from 5 Pin ports which can only send or receive information in one direction. For each USB port the button and LED on the left are the in-port controls and the button and LED on the right are the out-port controls.



USB ports can also support multiple “virtual cables”, which means that a single physical USB cable can be several virtual cables. This can be most easily seen from a PC. When you plug in the MRCC to the PC the PC shows MRCC 1-12 as available ports.

All the MRCC’s USB *HOST* ports (A, B, C & D) each support four inbound “virtual cables” and one outbound. The MRCC’s USB *DEVICE* port (aka PC) supports 12 inbound “virtual cables” and 12 outbound “virtual cables”.

Why the complexity? Some modern sequencers support “virtual cables” over a single physical USB cable (like the Conductive Labs NDLR). The MRCC can route each “virtual cable” independently. Another example is standalone app “soft-synths” on a PC. Often each soft-synth requires its own “virtual cable” as an in-port. Another example is assigning DAW tracks to separate “virtual cables”.

The MRCC can route and filter MIDI messages from any in-port to any out-port regardless of the port type; 5-Pin, USB *HOST*, or USB *DEVICE* over any “virtual cable”. We know this adds a little complexity but it is what makes the MRCC free from requiring a PC to make routings.

Here are a few examples on how to route the USB ports including the “virtual cables”. Hopefully it’s easier to **do** than to **read**! An alternative is to check out our [YouTube channel](#)!

**Example:** Route in-port A1 (USB *HOST* A - virtual cable 1) to out-port 5. Choose in-port A1 by pressing MIDI IN/OUT left-button A. Notice if you hold the left-button A the first four (1-4) MIDI OUT LEDs light. Yep, the out-port LEDs are being used to show the in-port virtual cables. MIDI OUT LED 1 bright green (*selected*) and MIDI OUT LEDs 2-4 are dim white. These four help remind you that there are 4 virtual cables and enable you to choose a virtual cable, the default is #1. Make sure to release the left-button A. Next select out-port 5 by pressing MIDI OUT button #5. Two LEDs shine, in-port A (green) and out-port 5 (bright Blue).

Add another routing in-port A3 (virtual cable 3) to out-port 11

**Example continued:** Choose inbound port A3 by pressing and holding MIDI IN/OUT left-button A. The first four (1-4) MIDI OUT LEDs light, *select* “virtual cable” 3 by pressing MIDI OUT button #3. MIDI OUT LED 3 shines bright green, LEDs 1, 2 & 4 are dim white. Make sure to release the left-button A, and select outbound port 11 by pressing MIDI OUT button #11. Two LEDs shine, in-port A (green) and out-port 11 (bright Blue).

Routing the USB Device Port (PC) and its “virtual cables” is very similar to the routing the USB host ports.

**Example:** Route in-port 5 to out-port PC9 (virtual cable 9). Choose inbound port 5 by pressing MIDI IN button #5. Select outbound port PC by pressing and holding MIDI IN/OUT right-button PC, all 12 (1-12) MIDI OUT LEDs light dim white. *Select* “virtual cable” 9 by pressing MIDI OUT button #9. MIDI OUT LED 9 shines bright blue, all the other LEDs are dim white.

Add another outbound PC out-port routing.

**Example continued:** Add routing in-port 5 to out-port PC4. With in-port 5 chosen (lit green) press and hold MIDI IN/OUT right-button PC. Now MIDI OUT LED 9 is lit bright blue (because it was routed in previous example) and all the other MIDI OUT LEDs are lit dim white. Select “virtual cable” 4 by pressing MIDI OUT button #4. MIDI OUT LED 4 now shines bright blue, MIDI OUT LED 9 shines dim blue, and all the other LEDs are dim white.

Add another outbound out-port 8 routing.

**Example continued:** add routing in-port 5 to out-port 8. With in-port 5 still chosen (lit green) press MIDI OUT button #8. Now three LEDs should shine, in-port 5 (green), out-port PC (dim Blue), and out-port 8 (bright Blue).

## Remote Routing (as of FW 1.1.020)

If there is a MRCC Remote7 connected or there are two MRCC’s connected together routings can be made by first choosing the in-port (as before) then press and hold the “Y” button to select a remote out-port. The remote out-ports will light yellow (not blue). See Appendix A for more details.

## MIDI Routing Cache

Inadvertently removing a routing that has filters and modifiers can be “un-done” simply by making the same routing again. All the filter and modifier parameters are cached for the last 30 routings. To clear all the filter and modifier parameters for a routing press Shift+Enter button when on the routing screen.

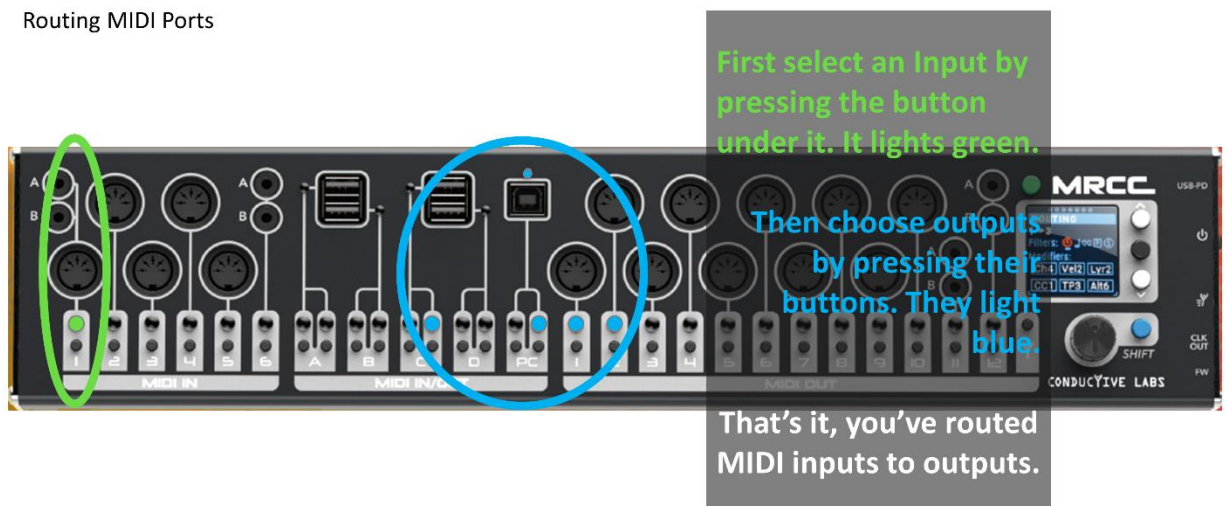
## MIDI Merging – it just happens... but be advised!

The MRCC implicitly merges when more than one in-port is routed to the same out-port, it just happens automatically.

**Example:** If in-port 3 and in-port 6 are both routed to out-port 9 then in-ports 3 and 6 are “merged” to out-port 9. Also note that in-port 3 and in-port 6 can also be routed to other out-port(s) at the same time.

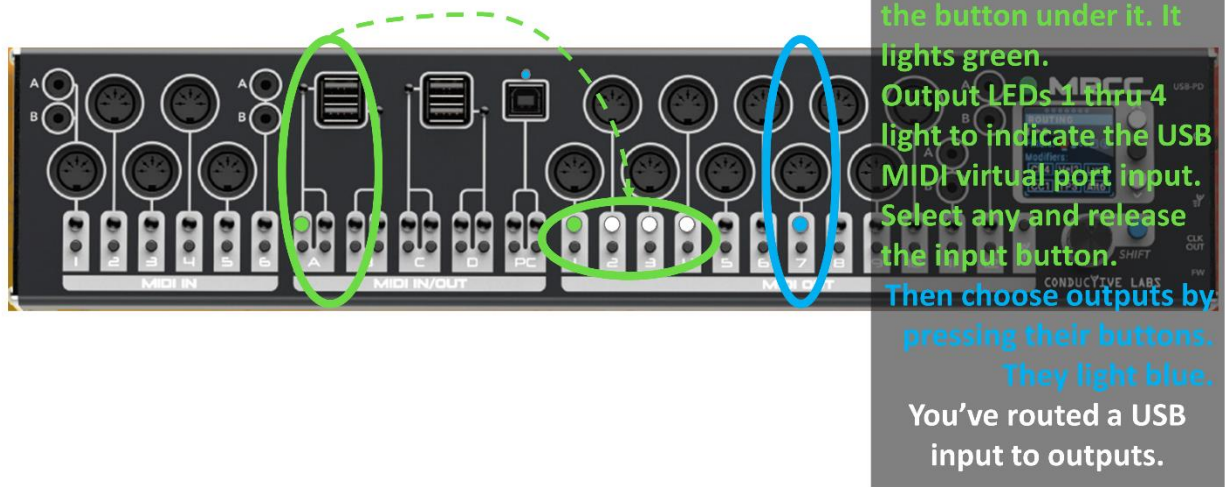
**Cautionary note:** the MRCC will merge any number of in-ports to a single out-port, but it cannot magically overcome the upper “speed limits” of MIDI message traffic. If too many MIDI messages are simultaneously merged to a given out-port, messages can be delayed or even lost. This is particularly an issue with MIDI Clock messages.

Routing MIDI Ports

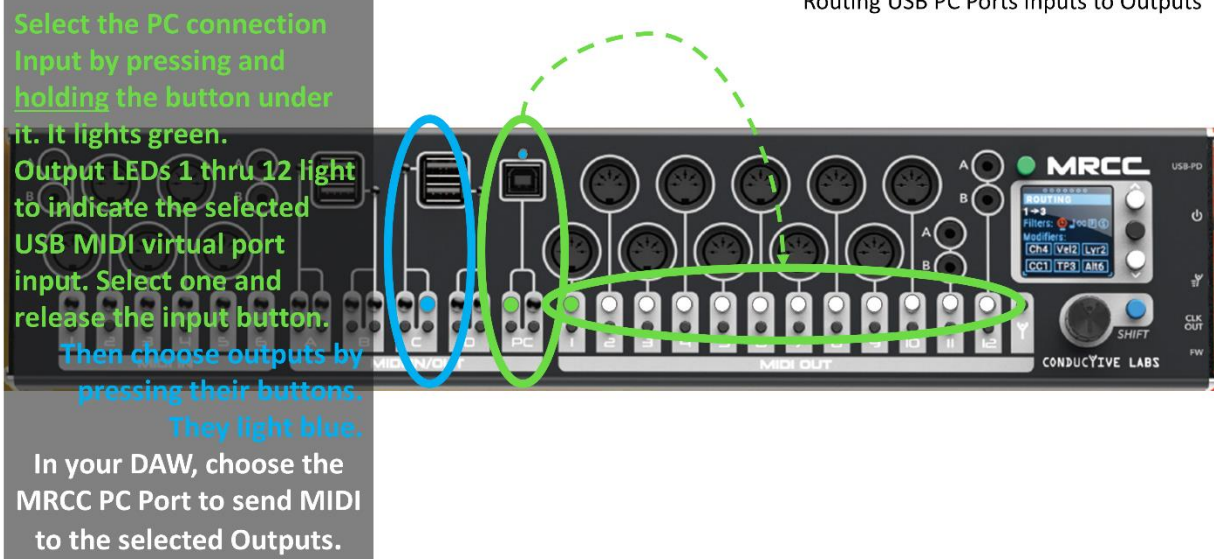




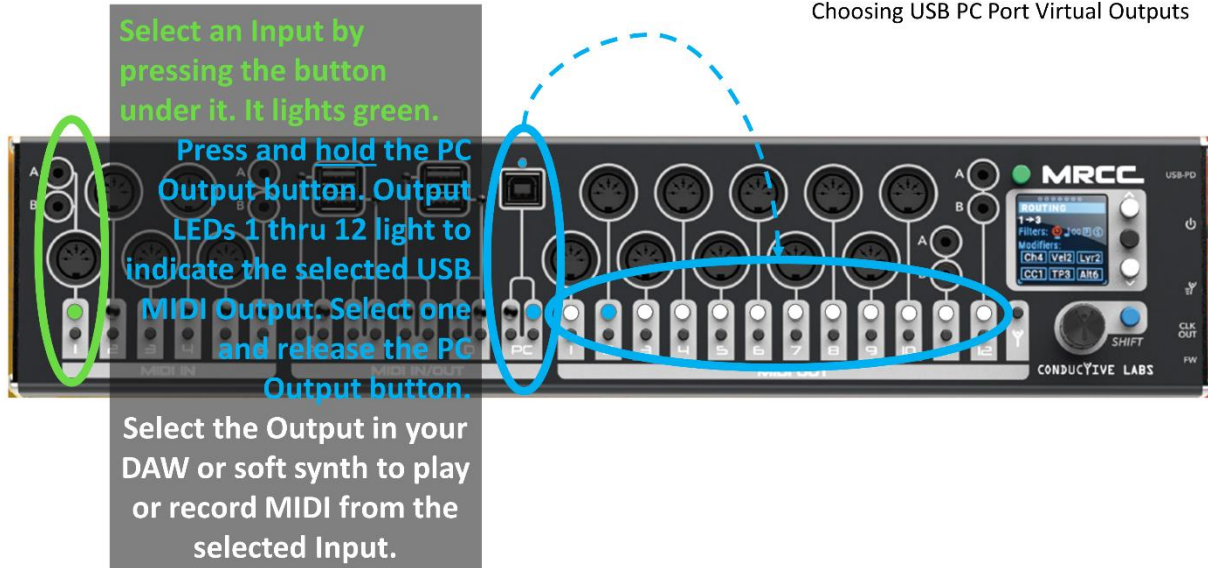
## Routing USB HOST Ports



## Routing USB PC Ports Inputs to Outputs







## THE MRCC BUTTONS

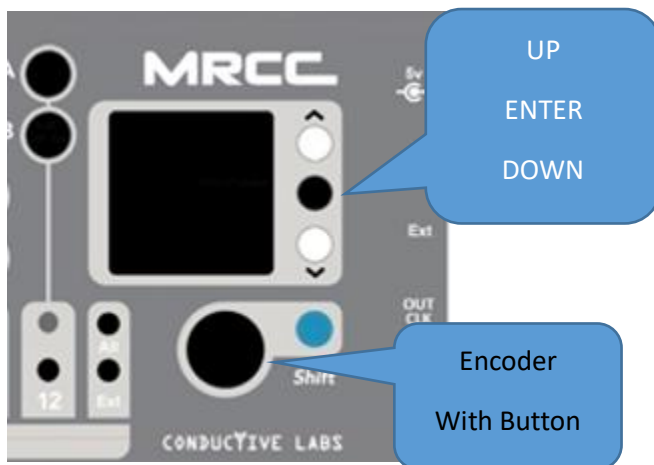
### Routing Buttons

The routing buttons are used to select/unselect port routings. There are 6 in-port buttons, 12 out-port buttons, and 10 USB port buttons for 5 physical USB ports. For each button pair, the USB port buttons on the left are in-port buttons and on the right out-port buttons. Read the section on [port routing](#).

### Menu & Navigation Buttons

There are two menu levels on the MRCC. A row of circles shown across the top of the screen for the top level menu, like this: “● ○ ○ ○ ○ ○ ○”. A second row of circles are shown on the title banner of each screen page for the second level menu. Not all screen pages have a second level. A filled circle shows your current location.

Pressing the Up/Down buttons, to the right of the OLED display, moves you from the top to second level menu circles and then through the tab-stops for that specific page. When you get to a tab-stop you’d like to change, rotate the Encoder knob to change the value. To move through values faster hold the blue Shift button and rotate. For Yes/No or On/Off settings the black Enter button, between the Up/Dn buttons, can also toggle the setting.



The Down button will eventually wraparound to the top of the screen, to the main navigation circles. The Up button will do the opposite.

Some screens have *on screen buttons* as tab-stops. Press the black Enter button to “press” the selected *on screen button*. For critical decisions you’ll need to use the blue Shift button while pressing the black Enter button.

#### !!! USEFUL FOR NAVIGATION !!!

Holding the Up button while rotating the Encoder knob quickly cycles you through the tab-stops on any page.

### Encoder Button

#### !!! USEFUL FOR NAVIGATION !!!

Pressing the Encoder button has two “fast navigation” functions. The first cycles you through 3 (optionally 4) display screens.

- 1<sup>st</sup> press displays Activity screen
- 2<sup>nd</sup> press displays the Routing screen
- 3<sup>rd</sup> press (optionally – set in settings) displays the MIDI MON screen
- 4<sup>th</sup> press brings you back to the screen you were on.

The second “fast navigation” function for pressing the Encoder button is for the modifiers. If you are on the Router screen and the tab-stop is on one of the MOD (modifier) boxes, pressing the Encoder button will jump you to the MOD (modifier) screen for editing. Press again and it returns you to the Router screen.

## Shift Button

Here is a list of the Shift button functions:

!!! USEFUL FOR NAVIGATION !!!

- Shift + Encoder rotate – speeds up the inc/dec of the tab-stop value
- Shift + Encoder button press – PANIC, sends MIDI Note-off messages to **routed** out-Ports.
- Shift + Encoder (long) button press – BIG PANIC, sends MIDI Note-off messages to **all** out-Ports.
- Shift + in-port or out-port button press – shows that port’s label name on the Routing screen banner without making any routing selection changes.
- Shift + “Y” button press – toggles on/off the LED light show
- Shift + Enter button press (Routing Page only) – clears all filters and modifier boxes

## Stand-By Button

Holding the green Stand-by button for ~2 sec will put the MRCC in Stand-by mode. This mode turns off the LEDs, the OLED screen, MRCC Clock and Arps, stops all MIDI message traffic, and optionally (menu setting) powers down all USB devices plugged into the *HOST* ports. To resume, press the green Stand-by button again.

Briefly pressing the Stand-by button will move the tab-stop to the top level button menu.

Holding the Stand-by button while booting (hold until you see the boot menu) will reset the MRCC settings and erases all the Preset files on the SD Card.

## MRCC Remote Routing Button “Y”

The “Y” button enables routing to MRCC Remote products or to a second MRCC\*. In order to route to a remote device press and hold the “Y” button while selecting a remote out-port.

\*More on the MRCC Remote “X” Devices in [Appendix A](#)

## MRCC SIDE PANEL BUTTONS

### Power Switch

Slide up to turn on power.

### Firmware (FW) Button

Get MRCC firmware updates from [ConductiveLabs.com](https://conductive-labs.com). Instructions on how to load the firmware is on the Downloads page. Firmware update software must be run from a computer (Windows, Mac or Linux). The MRCC must be connected to the computer with a USB cable connected to the PC port.

Summary:

- Download and install the firmware loader (1st time only).
- Download the .HEX.zip (firmware) file.
- Unzip the .HEX.zip (firmware) file.
- In the loader app click File and open the .HEX file.
- In the loader app click on the Auto button (1st time only).
- On The MRCC, use a toothpick or pen to briefly press the recessed FW button (located on the right-side panel).

## USB HOST AND PC PORT STATUS LEDS

### USB Type B PC Port

The Blue LED above the USB B PC port will light when the USB ports are ready to be used.

Seeing “sparks” on the PC Port connector? Nothing to worry about! That is just an internal amber colored LED. The LED flickers with screen updates and user input.

### USB Type A Host Ports

The Type A ports have a LED to the left or right of the port. When a USB device is plugged in, if it is recognized as a USB device the LED will light green. The LED will typically turn off if it cannot communicate with the device.

If a USB device demands more power than can be delivered with USB 2.0, it will light amber. Disconnect the USB device when it causes an amber LED to light, then cycle the power on MRCC to re-enable the port.

NOTE only **USB MIDI Class Compliant devices** and USB keyboards will work in the MRCC host ports. See [ConductiveLabs.com](http://ConductiveLabs.com) for a list of known working or incompatible USB devices.



## MRCC Screen Pages

### The Screen Page Overview

The MRCC display is a 1.5" dia OLED with 127x127 resolution. It is very crisp and readable with no apparent loss of quality at high viewing angles. The display can be dimmed in the Settings menu. This setting is stored and will remain for subsequent use.

Here are the titles of the top and second level screen pages...

#### ACTIVITY SCREENS:

##### **ROUTING** (no sub-pages):

##### **PORT FLTR** (Port Filter):

- IN PORT
- OUT PORT

##### **MODS** (Modifiers):

- CHAN MAP (Channel Map)
- VEL SCALE (Velocity Scaling)
- CC SCALE
- CHAN LAYERS (Channel Layers)
- ALTER
- TRANSPOSE

##### **EXTRAS:**

- MRCC CLK (MRCC onboard Clock)
- PROG CHNG (Program Change) *not implemented yet*
- MRCC ARP (MRCC onboard Arpeggiator)

##### **TOOLS:**

- LOAD/SAVE
- ASIGN LABELS
- EDIT LABELS
- MIDI MON (MIDI Monitor)
- PLAY NOTES
- NOTES > PORTS

##### **SETTINGS:**

- PAGE 1
- PAGE 2
- PAGE 3
- PAGE 4

## The Activity Screen Page

This screen is a snapshot of all the MIDI messages going through the MRCC.

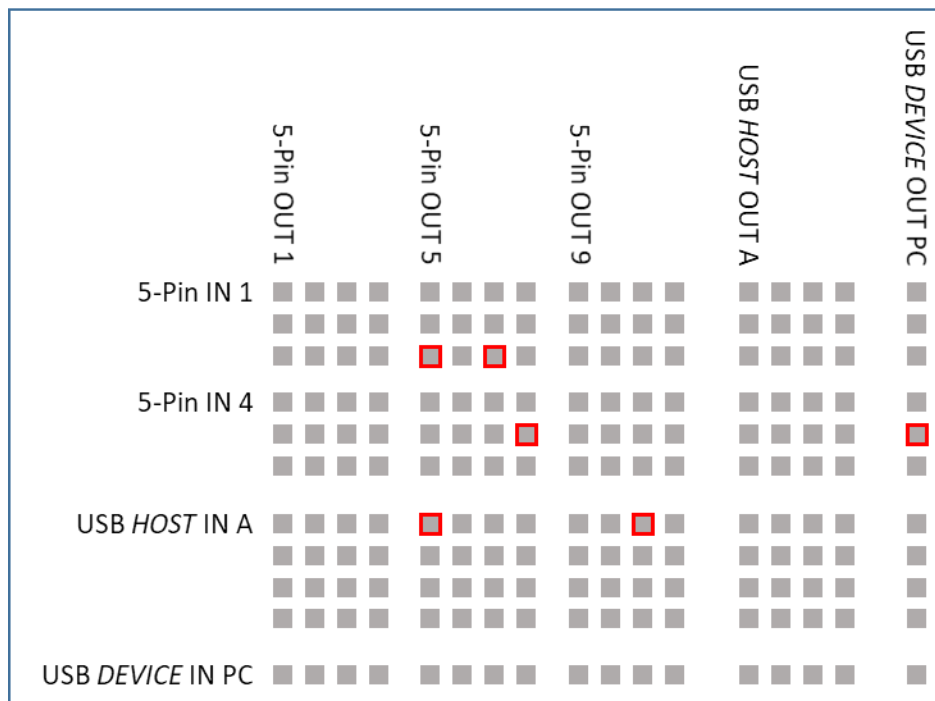


Activity Screen – Main

The screen's rows and columns... each row is an in-port and each column an out-port. The first six rows (two groups of three) are the 5-Pin in-ports. The next four rows are the USB *HOST* in-ports and the bottom row is the USB *DEVICE* in-port.

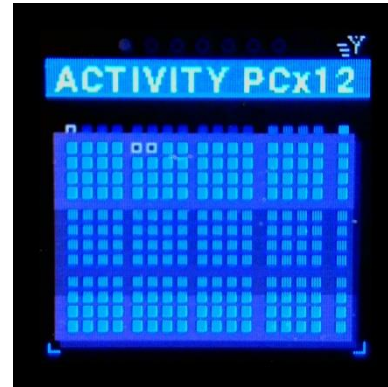
The first 12 columns (three groups of four) are the 5-Pin out-ports. The next four columns are the USB *HOST* out-ports. Finally the last column is the USB *DEVICE* out-port. The red outlines are the current routing as a result of the examples in section THE BASICS – PORT ROUTING.

Press and hold the “Y” button to show the “REMOTE” routings.





*Activity Screen – USB Host "A"  
Virtual Ports. (B,C & D not shown)*



*Activity Screen – USB "PC" Virtual  
Ports*

When any MIDI messages arrive, a green triangle will point to the in-port row. If that MIDI message happens to be a "clock" message, it will be a red triangle. This is very handy for monitoring where messages are coming from.

If any of the ports are routed the boxes at the intersection of an in-port and an out-port are outlined white. The boxes will fill and twinkle if MIDI messages are passing through that routing.

In this main view all the virtual cables are overlaid for each USB port. If you press on the Down button, 5 pop-up windows will show in progression displaying the specifics for each USB in-port with a separate row for each virtual cable.

NOTE: If there is a column of routings (outlined white) it means you are merging several in-ports to one (or more) out-ports. If too many MIDI messages are merged it could cause a device to drop messages.

NOTE: If there is a row of routings (outlined white) it means you are sending one in-port to many out-ports.



## The Routing Screen Page

On this screen you'll be able to get more detailed MIDI message information as well as filter, map, and modify the MIDI messages for a specific routing.



*Routing Screen - Main*

### *In/out-port selector (tab-stop)*

The first tab-stop is the in-port selector. Rotating the Encoder will scroll through all the in-ports. For each in-port the *selected* out-port will be shown, there can be more than one out-port per in-port. The info on the rest of the screen will update for the specific routing.

Notice that when scrolling through the in-ports the MRCC LEDs also update. This is a quick way to see which Out-ports are routed from each in-port. You can also choose the in-port by pressing any in-port button.

The next tab-stop is the out-port selector. If an in-port has no routing then the out-port shows as “none” and the rest of the screen is grayed out. No setting can be made if there is no out-port chosen.

Rotating the Encoder knob scrolls through the routed out-ports. The one displayed on the screen becomes the *selected* out-port and all the screen fields are updated for that specific routing. Notice when scrolling through the Out-ports that only one MRCC LED out-port is brightly lit, the newly *selected* one. All the other out-ports are dimmed. You can also choose an out-port by simply pressing any dimly lit out-port button. Pressing a dark out-port button will light it brightly and create an additional routing that is the *selected* out-port.

Notice that when you choose a new in-port or out-port the port label name (if one is assigned) briefly shows up in the banner. More on labeling ports later.

### !!! USEFUL FOR NAVIGATION!!!

Shift + Enter button press (Routing Page only) – clears all filters and modifier boxes.

Shift + in-port or out-port button press – shows that port's label name on the Routing screen banner without making any routing selection changes.

### *Real time MIDI message monitoring*

To the right of the In/out-port display is the real time MIDI information area. As MIDI messages come through the MRCC for this specific routing, you can see which channel and which type of message it is. In some cases more information such as CC number etc. is shown. A green arrow indicates MIDI message activity, a red arrow shows clock messages.

Here are the abbreviations for each message type:

NOTE ON/OFF: "O"/ "X"  
AFTER TOUCH - POLY/CHANNEL: "AT"  
PITCH BEND: "PB"  
CONTROL CHANGE: "CC"  
PROGRAM CHANGE: "PC"  
CLOCK: "TIC"  
START: "->"  
STOP: "!!!"  
CONTINUE: ">>"  
ACTIVE SENSING: "..?"  
SYSTEM EXCLUSIVE: "sX"  
TIME CODE QUARTER FRAME: "QT"  
SONG POSITION: "sP"  
SONG SELECT: "sS"  
TUNE REQUEST: "@" (EAR)  
SYSTEM RESET: "XX"  
UNKNOWN: "??"

### *Filters (tab-stop)*

The next row is the routing filters ([see Appendix "B" for details](#)). The icons represent:

1. Clock (tic only)
2. Note On/Off (including After Touch & Pitch bend)
3. CC
4. Program Change
5. Real Time (Stop, Start, Continue).

Use the Up/Dn buttons to tab through the icons. Once an icon is selected you can press the black Enter button or twist the encoder to toggle them On (red) or Off (light gray). Red means the filter is enabled. It's kind of a double negative but seems to work at a glance.

**Example:** you can filter those nasty Stop/Start/Continue messages from messing with your onboard Volca sequencer. Tab to the last icon in the row, the Stop Sign, press the black Enter button turning it red and those messages are filtered!

**Example:** if one of your USB keyboard controllers insists on sending clock and you can't turn it off go to the first icon in the row, the Clock Face, press the black Enter button or rotate the

Encoder to toggle the icon red to start filtering the inbound clock messages. (Actually, a port filter is a better way to do this... see below in-port filters)

Note that these are routing filters, not In-Port or out-port filters. This method only filters the messages that go through the specific routing. More on In/out-port filtering below.

#### *Modifier Slots (tab-stops)*

The six blue boxes at the bottom of the Routing screen are the modifier (MOD) slots. You can load any modifier to any MOD slot by rotating the Encoder knob. Each MOD slot has two tab-stops. The first scrolls through the MOD types and the second the variant numbers (typically 1-6) for each MOD.

The modifiers are applied to the MIDI messages in the order of the MOD slots. So the modifier in slot one is applied first, the modifier in slot two applied second and so on.

**Example:** if you load a channel modifier (i.e. CH2), which changes the MIDI channel in a MIDI message, the next modifier in the next MOD slot will “see” the message with that new channel; the original channel info is lost. Chaining modifiers is very powerful, but it also can be a little confusing.

To change the parameters of the modifiers, go to the MODS (Modifiers) screen pages: Channel Mapping, Velocity Scaling, CC Scaling and Mapping, Keyboard Ranges (Layering and Splitting), Alter (Random & Probability), Transpose, and Channel to Out-Port mapping.

## Port Filters Screen Page

MIDI message filters can be applied in three ways; based on the routing ([see Routing Filters](#)), the inbound port regardless of destination, and the outbound port regardless of source.



Port Filter Screen - In Ports (Out Ports Not Shown)

### In-Port Filters Sub-Page

Stops filtered MIDI messages coming in from a specific in-port regardless of the destinations. You might want to stop all CC messages coming from a keyboard synth, only allowing the Note On/Off messages to pass.

#### Horizontal Scroll bar (tab-stop)

Use the Up/Dn buttons to move to the scroll bar, the bar turns white. Use the Encoder knob to scroll through the 20 entries. Only the top line of the list is editable.

#### Port number (tab-stop)

Use the Up/Dn buttons to move to the port number, the number gets underlined. Use the Encoder knob to scroll through the in-

ports.

#### Filter Icon (tab-stop)

Use the Up/Dn buttons to move to the filter icon check box, the box gets underlined. Use the Encoder knob or black Enter button to toggle the filter on/off, on = solid blue, off = outline only.

### Out-port Filters Sub-Page

Stops filtered MIDI messages going out to a specific out-port regardless of the source. You might want to stop all “Stop”, “Start”, & “Continue” messages from reaching a synth, so as NOT to inadvertently trigger an on board sequencer.

#### Vertical Scroll bar (tab-stop)

Use the Up/Dn buttons to move to the scroll bar, the bar turns white. Use the Encoder knob to scroll through the 20 entries. Only the top line of the list is editable.

#### Port number (tab-stop)

Use the Up/Dn buttons to move to the port number, the number gets underlined. Use the Encoder knob to scroll through the out-ports.

#### Filter Icon (tab-stop)

Use the Up/Dn buttons to move to the filter icon check box, the box gets underlined. Use the Encoder knob or black Enter button to toggle the filter on/off, on = solid blue, off = outline only.

## Modifiers (MODS) Screen Page

There seven different MOD types:

1. Channel Mapping
2. Velocity Scaling
3. CC Scaling and Mapping
4. Keyboard Ranges (Layering and Splitting)
5. Alter (Random & Probability)
6. Transpose
7. Channel to Port Mapping (there is no screen settings for this mod)

### Channel Map (Chan Map) [Ch1-6] Sub-Page

This is the modifier that enables the re-mapping of MIDI message channels. It's helpful if you don't know how to change the channel of your MIDI device. By looking at the Routing Screen you can identify the channel messages are coming in on. So you can map that channel to any destination channel you need.



#### *Chan Map variation (tab-stop)*

There are 6 variations of channel maps #1- #6. Use the Up/Dn buttons to move to the variation number, the number gets underlined. Use the Encoder knob to scroll through the 6 variations.

#### *Exclusive (tab-stop)*

Exclusive is a Yes/No toggle. Yes = only pass the mapped channels, No = in addition to the channel mappings also pass all other channels that are not mapped. Use the Up/Dn buttons to move to the exclusive tag, the Y/N gets underlined. Use the Encoder knob or black Enter button to toggle the choice.

#### *Channel In 1-4 (tab-stop)*

Choose the inbound channel to map 1-16 or "none". On #1 "all" is an option, which grays out all other mappings. Use the Up/Dn buttons to move to the Ch In number, the number gets underlined. Use the Encoder knob to scroll through the choices.

**Note:** Channel In's can only be mapped once, so if an "In" channel is previously selected it is not available as any other mapping.

#### *Channel Out 1-4 (tab-stop)*

Choose the outbound channel to map 1-16. This enables multiple inbound channels to be mapped to a single outbound channel. Use the Up/Dn buttons to move to the Ch Out number, the number gets underlined. Use the Encoder knob to scroll through the choices.

## Velocity Scaling [Vel1-6] Sub-Page

This is the modifier that enables scaling the inbound velocity to outbound velocity. By scaling velocity you can set a “floor” and “ceiling” and “compress” or “expand” the velocity range. The inbound floor velocity means any inbound velocity below this value will be equal this value, same for ceiling. Any values between the floor and ceiling values are scaled. And yes they can invert the velocity by making the outbound max vel less than the min!

It’s helpful if your MIDI keyboard controller velocity is more sensitive to soft presses or hard presses. Also can be handy to map normal 0-127 velocity range to 0-100, like on some FM synths.



### *Vel Scale variation (tab-stop)*

There are 6 variations of velocity scale #1- #6. Use the Up/Dn buttons to move to the variation number, the number gets underlined. Use the Encoder knob to scroll through the 6 variations.

### *Src Ch (tab-stop)*

Choose the MIDI source channel “any” or 1-16. Use the Up/Dn buttons to move to the Src Ch number, the number gets underlined. Use the Encoder knob to scroll through the choices.

### *Inbound Velocity Min (tab-stop)*

Choose the inbound floor velocity 0-127. Any inbound velocity below this value will be equal this value. Use the Up/Dn buttons to move to the Vel In Min number, the number gets underlined. Use the Encoder knob to scroll through the choices.

### *Inbound Velocity Max (tab-stop)*

Choose the inbound ceiling velocity 0-127. Any inbound velocity above this value will be equal this value. Use the Up/Dn buttons to move to the Vel In Max number, the number gets underlined. Use the Encoder knob to scroll through the choices.

### *Outbound Velocity Min (tab-stop)*

Choose the inbound floor velocity 0-127. Any inbound velocity below this value will be equal this value. Use the Up/Dn buttons to move to the Vel Out Min number, the number gets underlined. Use the Encoder knob to scroll through the choices.

### *Outbound Velocity Max (tab-stop)*

Choose the outbound ceiling velocity 0-127. Any inbound velocity above this value will be equal this value. Use the Up/Dn buttons to move to the Vel Out Max number, the number gets underlined. Use the Encoder knob to scroll through the choices.

## CC Scaling and Mapping [CC1-6] Sub-Page

This is the modifier that enables mapping the inbound CC number (and velocity) to any outbound CC number. Also scales the inbound CC value to the outbound CC value. By scaling the value you can set a “floor” and “ceiling” and “compress” or “expand” the CC value range. The inbound floor value means any inbound value below this amount will be equal this amount, same for ceiling. Any values between the floor and ceiling values are scaled. And yes they can invert the value by making the outbound max less than the min!

This is useful for mapping the Velocity to a CC (i.e. #41) for some FM synths.



### *CC Scale variation (tab-stop)*

There are 6 variations of CC scale and map #1- #6. Use the Up/Dn buttons to move to the variation number, the number gets underlined. Use the Encoder knob to scroll through the 6 variations.

### *Src Ch (tab-stop)*

Choose the MIDI source channel “any” or 1-16. Use the Up/Dn buttons to move to the Src Ch number, the number gets underlined. Use the Encoder knob to scroll through the choices.

### *CC from (tab-stop)*

Choose the MIDI CC from number 0-127. If you rotate counter clockwise there is also Vel (velocity) and Aft (After touch – channel and poly). Use the Up/Dn buttons to move to the MIDI CC from number, the number gets underlined. Use the Encoder knob to scroll through the choices.

### *CC to (tab-stop)*

Choose the MIDI CC to number 0-127. Use the Up/Dn buttons to move to the MIDI CC to number, the number gets underlined. Use the Encoder knob to scroll through the choices.

### *Inbound CC Value Min (tab-stop)*

Choose the inbound floor CC value 0-127. Any inbound CC value below this value will be equal this value. Use the Up/Dn buttons to move to the Value In Min number, the number gets underlined. Use the Encoder knob to scroll through the choices.

### *Inbound CC Value Max (tab-stop)*

Choose the inbound ceiling CC value 0-127. Any inbound CC value above this value will be equal this value. Use the Up/Dn buttons to move to the Value In Max number, the number gets underlined. Use the Encoder knob to scroll through the choices.

### *Outbound CC Value Min (tab-stop)*

Choose the inbound floor CC value 0-127. Any inbound CC value below this value will be equal this value. Use the Up/Dn buttons to move to the Value Out Min number, the number gets underlined. Use the Encoder knob to scroll through the choices.

### *Outbound CC Value Max (tab-stop)*

Choose the outbound ceiling CC value 0-127. Any inbound CC value above this value will be equal this value. Use the Up/Dn buttons to move to the Value Out Max number, the number gets underlined. Use the Encoder knob to scroll through the choices.

## Channel Layers (Splits and Layers) [Lyr1-6] Sub-Page

This is the modifier that enables channel splitting and layering aka “Splits and Layers”. Each of the 6 variants has a source and destination MIDI channel. But what makes this mod really work is how it only passes the notes that are inside the note range and filters out notes below and above. It also can blend (aka “crossfade”) the ends of the note range. The *Blend* setting is the number of crossfaded notes above and below the note range. How it works is the velocity of the blended notes are scaled from 100% to 0% above the note range and the opposite below, like a crossfade ramp. So if two note range blend zones overlap, it creates a cross fade from layer to layer. Of course the synth voices used needs to assign velocity with volume.

The Note ranges are drawn in the graphic at the bottom of the screen. Each line represents a layer. The note ranges are shown between the circles. The note being edited is a square. The note ranges are between the circles and the blend is shown by a line beyond the circles. Note: each Src Channel has a different color in the graphic.



### *Channel Layers variation (tab-stop)*

There are 6 variations of Channel Layers #1- #6. Use the Up/Dn buttons to move to the variation number, the number gets underlined. Use the Encoder knob to scroll through the 6 variations.

### *Src Ch (tab-stop)*

Choose the MIDI source channel 1-16. Use the Up/Dn buttons to move to the Src Ch number, the number gets underlined. Use the Encoder knob to scroll through the choices.

### *Dest Ch (tab-stop)*

Choose the MIDI destination channel 1-16. Use the Up/Dn buttons to move to the destination channel number, the number gets underlined. Use the Encoder knob to scroll through the choices.

### *Note Range Min (tab-stop)*

Choose the lowest Note of the range. Notes are lettered and can be followed by # (sharp) or b (flat), then by a number which is the MIDI octave i.e. C#3. Notice Notes labeled 1-11 are the -1 octave notes.

### *Note Range Max (tab-stop)*

Choose the highest Note of the range. Notes are lettered and can be followed by # (sharp) or b (flat), then by a number which is the MIDI octave i.e. C#3. Notice Notes labeled 1-11 are the -1 octave notes.

### *Blend (tab-stop)*

Choose the number of notes for the blend (0-127).

### *Chaining (tab stop) – future feature*

## Typical Use...

If you'd like to have a keyboard split at middle C, here are the steps. We'll use MIDI IN 3 for the controller and MIDI OUTS 6 & 8 for the two synths:

- 1) plug in your MIDI controller keyboard (or sequencer) into MIDI IN 3.



- 2) plug in your 2 synths one to MIDI OUT 6 and the other to MIDI OUT 8.
- 3) route MIDI IN 3 to both MIDI OUT 6 and MIDI OUT 8.
- 4) on the routing screen select routing 3->6 and add "Lyr1" modifier to the first modifier box.
- 5) on the routing screen select routing 3->8 and add "Lyr2" modifier to the first modifier box.
- 6) go to the MOD-CH LAYERS screen and make sure you are on #1 (top right )
- 7) arrow down to the low note of the range and make it C1
- 8) arrow down to the high note of the range and make it C4
- 9) arrow back up and change to #2 (top right )
- 10) arrow down to the low note of the range and make it C4
- 11) arrow down to the high note of the range and make it C8
- 12) to add a crossfade adjust the number of Blend notes in both #1 & #2.

The notes from the controller should be routed to the synth attached to MIDI OUT 6 if below C4 and attached to MIDI OUT 8 if above C4. If blending, make sure that the synth voices that you use assign velocity to volume.

## Alter [Alt1-6] Sub-Page

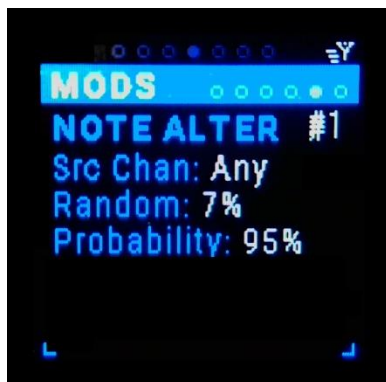
This is the modifier that enables Random and Probability.

### *Alter variation (tab-stop)*

There are 6 variations of Alter #1- #6. Use the Up/Dn buttons to move to the variation number, the number gets underlined. Use the Encoder knob to scroll through the 6 variations.

### *Src Ch (tab-stop)*

Choose the MIDI source channel "Any" or 1-16. Use the Up/Dn buttons to move to the Src Ch number, the number gets underlined. Use the Encoder knob to scroll through the choices.



*Modifier Screen - Note Alter*

### *Random (tab-stop)*

Randomizes the inbound note value 0%-100%. Use the Up/Dn buttons to move to the Random percent, the percent gets underlined. Use the Encoder knob to scroll through the percentages.

### *Probability (tab-stop)*

Give a probability if the inbound note is played 0%-100%. Use the Up/Dn buttons to move to the Probability percent, the percent gets underlined. Use the Encoder knob to scroll through the percentages.

## Transpose [TP1-6] Sub-Page

This is the modifier that enables transposing all the inbound notes.



### *Alter variation (tab-stop)*

There are 6 variations of Transpose modifier #1- #6. Use the Up/Dn buttons to move to the variation number, the number gets underlined. Use the Encoder knob to scroll through the 6 variations.

### *Src Chan (tab-stop)*

Choose the MIDI source channel “Any” or 1-16. Use the Up/Dn buttons to move to the Src Ch number, the number gets underlined. Use the Encoder knob to scroll through the choices.

### *Transpose (tab-stop)*

Transposes all the notes by the number of half steps chosen, -12 to +12. Use the Up/Dn buttons to move to the Transpose number, the number gets underlined. Use the Encoder knob to scroll through the values.

## Note Map [NMp] Sub Page

**NOTE:** Screen shot missing for this modifier.

If this modifier is added to a routing then only the MIDI Note messages that match the NoteMap note list will pass or be mapped according to the Note Map Type selected.

### **Note Map Types:**

- Ignore Map – no mapping/filtering
- Match Only – only sends MIDI Note messages that match the NoteMap note list
- Map To Lower - sends MIDI Note messages that are mapped to the next note below the note in the NoteMap note list
- Map To Upper - sends MIDI Note messages that are mapped to the next note above the note in the NoteMap note list
- Map To Closest - sends MIDI Note messages that are mapped to the closest note in the NoteMap note list

## Channel to Port Mapping [C-P1] Sub Page

**NOTE:** There is no screen for this modifier because there are no setting.

If this modifier is added to a routing then only the MIDI messages on the channel number that matches the out-port number will be passed. The MIDI messages will be sent out on channel 1. All other MIDI messages are suppressed.

**Example:** if you have a routing (i.e. in-port 3 -> out-port 7) and there are inbound MIDI messages on channels 6, 7 & 8, only the MIDI messages on channel 7 will be sent. And they will be sent on channel 1 / out-port 7. No other message will be sent on out-port 7.

**Example Continued:** if you have an additional routing (i.e. in-port 3 -> out-port 8) with the same inbound MIDI messages on channels 6, 7 & 8, only the MIDI messages on channel 8 will be sent. And they will be sent on channel 1 / out-port 8. No other message will be sent on out-port 8.

**Example Continued:** if you have an additional routing (i.e. in-port 3 -> out-port 2) with the same inbound MIDI messages on channels 6, 7 & 8, no MIDI messages will be sent on out-port 2

**Example Continued:** if you have an additional routing (i.e. in-port 3 -> out-port 2) with the same inbound MIDI messages on channels 6, 7 & 8, and there is NO “C-P1” modifier loaded on that routing, then all the MIDI messages will be sent on their respective channels on out-port 2.

This is the modifier is best used when several MIDI channels are received on the same in-port and need to be “split” out to several out-ports. An example could be MIDI messages coming from a multitrack sequencer or something similar.

## Extras Screen Page

The MRCC Extras are the built-in clock, the program change cascading macros, and 6x built-in arpeggiators.

## MRCC Clock Sub-Page

This is the extra that enables the onboard MRCC Clock. Notice when the MRCC Clock screen page is visible, the MRCC LEDs are red. This is to remind you that you can route the clock to any out-port. The in-port LEDs are used as a metronome when the clock is enabled, solid red when not. The out-port buttons (and LEDs) are used to set the destination routing of the MRCC MIDI clock messages.

There is also an analog Clock-Out port on the side of the MRCC which pulses a 0-5v (or 0-12v, see Settings 2) at a PPQ rate.



### *STOP (tab-stop button)*

Sends a Stop MIDI message to all the clock destinations. Use the Up/Dn buttons to move to the “STOP” button, the button gets outlined in white. Use the black Enter button to press the screen button.

### *START (tab-stop button)*

Sends a Start MIDI message to all the clock destinations. Use the Up/Dn buttons to move to the “START” button, the button gets outlined in white. Use the black Enter button to press the screen button.

### *CONT (tab-stop button)*

Sends a Continue MIDI message to all the clock destinations. Use the Up/Dn buttons to move to the “CONT” button, the button gets outlined in white. Use the black Enter button to press the screen button.

### *Clock Enable (tab-stop)*

Clock Enable is a Y/N toggle. Y = send clock and button messages to the routed destinations, N = no clock or buttons messages sent. Use the Up/Dn buttons to move to the Clock Enable tag, the Y/N gets underlined. Use the Encoder knob or black Enter button to toggle the choice.

### *BPM (tab-stop)*

The BPM (Beats Per Minute) range is 10-240. Use the Up/Dn buttons to move to the BPM value, the value gets underlined. Use the Encoder knob to scroll through the values. Note that the Shift + rotation scrolls faster.

### *PPQ (tab-stop)*

The PPQ (Pulse Per Quarter note) value can be set to 1,2,4, or 24 and only affect the analog Clock-Out signal on the 1/8” jack on the side of the MRCC. Use the Up/Dn buttons to move to the PPQ value, the value gets underlined. Use the Encoder knob to scroll through the choices.

### *Tick on STOP (tab-stop)*

Tick on STOP is a Y/N toggle. Y = send MIDI clock messages regardless of the “Stop”/“Start”/“Continue” messages sent, N = do not send MIDI clock messages after a “Stop” message is sent. Use the Up/Dn

buttons to move to the Tick on STOP tag, the Y/N gets underlined. Use the Encoder knob or black Enter button to toggle the choice.

#### *out-port S/S/C Filter (tab-stop)*

The OutPrt SSC Fltr is a Y/N toggle. Y = do not send MIDI “Stop”/”Start”/”Continue” clock messages if the S/S/C filter is enabled for the specific out-port, N = send MIDI “Stop”/”Start”/”Continue” clock messages regardless of out-port filter setting. Use the Up/Dn buttons to move to the out-port S/S/C Filter tag, the Y/N gets underlined. Use the Encoder knob or black Enter button to toggle the choice.

### Program Change Sub-Page

This is the extra that enables the configuration and cascading Program Change messages on the MRCC inbound MIDI control channel. *Not implemented as of the publishing of this manual. (TBD)*

### MRCC Arpeggiator Sub-Page

This is the extra that enables the 6x arpeggiators. Since this is an “extra”, the MRCC port routings or clock routings are NOT associated with the Arp’s source and destination ports/channels. If there are ports/channels routed to the same synth as the Arp destination it can result in double triggering notes.

NOTE: While on the Arp screen the black “Return” button always toggles the Arp On/Off screen button and the blue “Shift” + black “Return” button always toggles the Arp Latch screen button. A great time saver!



#### *Alter variation (tab-stop)*

There are 6 variations of Arp #1- #6. Use the Up/Dn buttons to move to the variation number, the number gets underlined. Use the Encoder knob to scroll through the 6 variations.

#### *Play/Pause (tab-stop button)*

Enables the Arp. Use the Up/Dn buttons to move to the “▶ / ||” button, the button gets outlined in white. Use the black Enter button to enable the Arp. NOTE the black Enter button will enable/disable the Arp regardless of which tab-stop is highlighted.

#### *Latch (tab-stop button)*

Enables the Arp “key-hold” latch. Use the Up/Dn buttons to move to the “½ / —” button, the button gets outlined in white. Use the black Enter button to press the screen button. NOTE the shift+Enter button combo will latch/un-latch the Arp regardless of which tab-stop is highlighted.

#### *Mode (tab-stop)*

Choose the Arp Mode: Up, Down, Ping-Pong Inclusive (repeat end notes), Ping-Pong Exclusive (does not repeat end notes), Order (order of notes played), Shuffle (Randomizes the order and repeats that order). Use the Up/Dn buttons to move to the Mode choice, the choice gets underlined. Use the Encoder knob to scroll through the choices.

#### *Octave (tab-stop)*

Choose the Arp Octave: 1-3. This repeats the Arp once in each successive octave. Use the Up/Dn buttons to move to the Octave value, the value gets underlined. Use the Encoder knob to scroll through the values.

#### *Gate (tab-stop)*

Choose the percentage Gate length: 10%, 30%, 50%, 70%, 90%, RND%. If the length of the gate percentage gets smaller than the MRCCs ability to calculate (clock tick granularity) it is rounded to the nearest tick). Use the Up/Dn buttons to move to the Gate choice, the choice gets underlined. Use the Encoder knob to scroll through the choices.

#### *Rhythm (tab-stop)*

Choose the predefined Rhythm A-O. The subscript number is the repeating length of the Rhythm. So if there is a subscript 9 try using 3,6,9,etc notes in the Arp and listen to the repeating pattern. If you choose 4 notes then it will take 36 beats (4\*9) to repeat. Use the Up/Dn buttons to move to Rhythm choice, the choice gets underlined. Use the Encoder knob to scroll through the choices.

#### *Clock Source (tab-stop)*

Choose the Clock Source: "Int" (MRCC Clock) or any in-port (1-6, A(1-4)-D(1-4), PC(1-12)). If the source clock is active the source label will be green and a small clock face icon will show. Use the Up/Dn buttons to move to the Clock Source choice, the choice gets underlined. Use the Encoder knob to scroll through the choices.

#### *Clock Div (tab-stop)*

Choose the Clock Divider: 4:1, 2:1, 1:1, 1:2, 1:4, 1:8 ("T" = triplet). This divides the clock ticks to be a fraction of or multiple of the clock source beat rate (BPM). Use the Up/Dn buttons to move to the Clock Div choice, the choice gets underlined. Use the Encoder knob to scroll through the choices.

#### *Source Port (tab-stop)*

Choose the source port: (1-6, A(1-4)-D(1-4), PC(1-12)). Use the Up/Dn buttons to move to the Source Port choice, the choice gets underlined. Use the Encoder knob to scroll through the choices.

#### *Source Chan (tab-stop)*

Choose the MIDI source channel: 1-16. Use the Up/Dn buttons to move to the Source Channel choice, the choice gets underlined. Use the Encoder knob to scroll through the choices.

#### *Destination Port (tab-stop)*

Choose the destination port: (1-12, A-D, PC(1-12)). Use the Up/Dn buttons to move to the Destination Port choice, the choice gets underlined. Use the Encoder knob to scroll through the choices.

#### *Destination Chan (tab-stop)*

Choose the MIDI destination channel: 1-16. Use the Up/Dn buttons to move to the Destination Channel choice, the choice gets underlined. Use the Encoder knob to scroll through the choices.

## Tools Screen Page

The MRCC Tools are the Load / Save, the Assign Label, Edit Labels, MIDI Monitor, Play Notes, and Play Notes to Ports.

### Load/Save Sub-Page

This is the tool to Save and Load the presets for the MRCC. Note the current Preset Name is displayed to the right of the “LOAD/SAVE” label. Also, the “Program Change” number that correlates to the Preset Name is displayed on the bottom of the screen. (Ex: User1 = ProgChange #1) All the parameters of the Routings, Modifiers, Extras and Labels assignments are saved with the preset. There are 127 presets.



Preset 0 (“FACTORY”) is the factory parameters and can’t be saved. The next three presets are labeled “User 1-3”. You can store anything you like in these three slots but is a good place to save your favorite preset “starting points”. The next 124 preset slots are setup in “banks” of 20 (“A1-20” – “E1-20”), just to make it easier to remember. If the preset is empty the preset number will be red, if previously saved it will be green. The Presets are saved on the included SD Card (found behind the left side cover). If the SD Card is removed and not replaced no Presets can be saved. Note the last Preset saved will be loaded the next time the MRCC is turned on. Any changes NOT saved will be lost.

If at some point the MicroSD Card needs to be replaced, most typical inexpensive MicroSD cards will work. Use as small a card as you can find, MRCC requires very little storage for presets. However, you can use cards up to 32GB. MRCC will create the required data files on a fresh MicroSD card.

#### *Preset (tab-stop)*

The Preset range is: 1-127. Use the Up/Dn buttons to move to the Preset number, the number gets underlined. Use the Encoder knob to scroll through the values. Note that the Shift + rotation scrolls faster.

#### *LOAD +shift (tab-stop button)*

Loads the Preset from SD Card and updates all the parameters of the MRCC. Use the Up/Dn buttons to move to the “LOAD” button, the button gets outlined in white. The SHIFT button combo has been removed, caution the LOAD will overwrite any unsaved preset data.

#### *SAVE +shift (tab-stop button)*

Saves (& overwrites) the Preset to the SD Card. Use the Up/Dn buttons to move to the “SAVE” button, the button gets outlined in white. The SHIFT button combo has been removed, caution: the SAVE will overwrite any previous preset data.

## Assign Labels Sub-Page

This is the place to Assign port labels to In/out-ports. This is the “digital” version of an original design concept of “scribble strips” that is typically found on mixing consoles.

Note: this screen is for assigning only, there is a separate screen for editing the port labels.



#### *Port (tab-stop list box)*

Choose the in-port: (1-6, A(1-4)-D(1-4), PC(1-12)) or out-port: (1-12, A-D, PC(1-12)) by rotating the Encoder knob (shift rotate goes faster). Notice that the MRCC LEDs are light purple, this is to remind you that you can also choose the Assign port by pressing the MRCC In/Out -port buttons and not change the actual port routings.



#### *Label (tab-stop list box)*

Choose the Label from the label list by rotating the Encoder knob (shift rotate goes faster). The label list is an alphabetically sorted combination of three lists: the MRCC built-in labels, the User defined labels, and the USB labels.

#### *ASSIGN (tab-stop button)*

Pressing the Assign button assigns the label to the port. Note that the MRCC will not remove the label assignment if you remove the MIDI or USB cable, you must unassign the port label manually. If the label is already assigned the text will appear purple and the Assign button will

be disabled.

### Edit Labels Sub-Page

This is the place to add and remove the user labels from the label list. As a quick start there are 20 or so built-in labels (these can't be removed). You can add user labels (up to 100) by plugging in a QWERTY USB keyboard and typing in the text box. Also USB "device" names are automatically added to the label list when plugging in a USB device. Sometimes the manufacturer name is also in the device name, the MRCC will remove this to keep the label readable on the small screen.

NOTE: A great time saver is to plug in a QWERTY keyboard and type in ALL the device names of the gear in your studio. Then later when convenient or "in the moment" you can assign them to the ports.

The labels list is a combination of three lists: the MRCC built-in labels, the User defined labels, and the USB labels, all alphabetically sorted.

NOTE: this screen is for editing only, there is a separate screen for assigning the port labels.



#### *Port (tab-stop list box)*

Choose the label to edit. Use the QWERTY keyboard to edit the label. The Back-Space key will remove the last letter of the label. The Delete key will delete all the text in the edit box. The Tab key or Arrow up/dn keys will move thru the tab stops. The Return key will press the highlighted button.

#### *SAVE +shift (tab-stop button)*

Saves the label to user labels list on the SD Card.

#### *DELETE +shift (tab-stop button)*

Deletes the label from the user labels list on the SD Card.





## MIDI Monitor Sub-Page

This is the place to watch the outbound MIDI messages flow by. Note: inbound messages do NOT show. If there are no routings then no MIDI messages will show.



The format is: nn i->o MsgType d:data1.data2

**Ex:** 23 2->11 On d:3:127

= Line 23 – in-port = 2, out-port = 11, Message=NoteOn, Data1=Ch3, & Data2=Vel 127.

### Format:

nn = line number 0-99 (wraps around) just for reference

i = in-port name

o = out-port name

MsgType = (Note)On, (Note)Off, CC, Pit(ch)...

data1 = 0-127, defined by MsgType

data2 = 0-127, defined by MsgType

### *Play/Pause (tab-stop button)*

Enables/disables the scrolling of MIDI messages. Or simply press the Enter button and it will toggle the play/pause button. Shift + Enter will clear the message list.

## Play Notes Sub-Page

This tool plays notes on one or more of three port ranges 5-Pin, USB Host & USB Device on all channels. The port the note is play on is indicated by a yellow blinking LED above the in/out-port buttons.



### *Start Test (tab-stop button)*

Play/Pause a single note on all the ports selected on all 16 channels. Each channel has a slightly different pitch, starting on MIDI note 52 to 68, incrementing one semitone per channel.

### *5 Pin (tab-stop)*

Toggle on (Y) or off (N) the 5-pin out-ports (1-12).

### *USB Host (tab-stop)*

Toggle on (Y) or off (N) the USB Host out-ports (A-D).

### *USB Device (tab-stop)*

Toggle on (Y) or off (N) the USB Device out-ports (virtual 1-12).

## Gear Search Sub-Page

This tool plays a repeated note out a specific port and channel(s) selected by you so you can test/identify which synths are connected to which ports and channels. The port the note is played on is indicated by a yellow blinking LED above the in/out-port buttons.



### *Start Test (tab-stop button)*

Play/Pause a repeated note on the port and channel(s) you selected. Each channel has a slightly different pitch, starting on MIDI note 52 to 68, incrementing one semitone per channel.

### *Port (tab-stop)*

Choose port from 5-pin out-ports (1-12), USB Host out-ports (A-D), & USB Device out-port (virtual 1-12).

### *Channel (tab-stop)*

Choose the channel(s) to play the note on (All, 1-16). All = channels 1-

16.

## Settings Screen Page

The MRCC Settings is a place to set global parameters for the MRCC. These settings are stored in the “onboard” memory of the MRCC, NOT on the SD Card.

### Settings Page1/4 Sub-Page

Settings: MRCC Control Port and Channel and MRCC Brightness of the LEDs and OLED Screen.



#### *MRCC Control Port (tab-stop)*

Choose the port: (1-6, A(1-4)-D(1-4), PC(1-12)). This is the port that the MRCC “listens-to” for CC and Program Change commands. Use the Up/Dn buttons to move to the Port choice, the choice gets underlined. Use the Encoder knob to scroll through the choices.

#### *MRCC Control Chan (tab-stop)*

Choose the channel: 1-16. This is the channel that the MRCC “listens-to” for CC and Program Change commands. Use the Up/Dn buttons to move to the Channel choice, the choice gets underlined. Use the Encoder knob to scroll through the choices.

#### *LEDs brightness (tab-stop)*

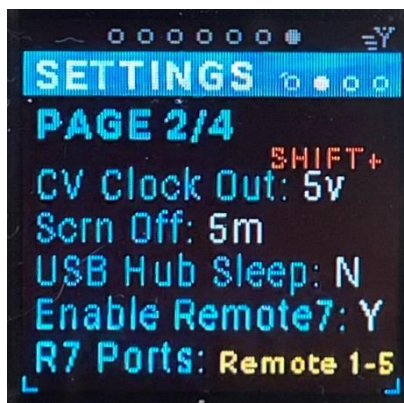
The brightness range is: 1-10. Use the Up/Dn buttons to move to the Preset number, the number gets underlined. Use the Encoder knob to scroll through the values. Note that the Shift + rotation scrolls faster.

#### *OLED Display brightness (tab-stop)*

The brightness range is: 1-10. Use the Up/Dn buttons to move to the Preset number, the number gets underlined. Use the Encoder knob to scroll through the values. Note that the Shift + rotation scrolls faster.

### Settings Page2/4 Sub-Page

Settings: Clk Out voltage, Scrn Off, USB Hub Sleep Enable, Enable Remote7, & R7 Ports



#### *Clock Out voltage (tab-stop)*

The voltage choices are: +5v or +12v. Use the Up/Dn buttons to move to the voltage choice, the choice gets underlined. Use the Encoder knob to scroll through the choices.

#### *Screen Off (tab-stop)*

The OLED screen should NOT be left on 24-7. We added a screen off feature that will ensure that the screen turns off even though the MRCC is powered on. This setting is the time until the screen turns off after the last MRCC activity. The screen will automatically turn on by pressing any button or knob twist or any inbound MIDI data.

### *USB Hub Sleep (tab-stop)*

USB Hub Sleep is a Y/N toggle. Y = turn USB Hub off in MRCC Stand-by mode. N = do not turn USB Hub off in MRCC Stand-by mode. If “Y”, the USB Hub off will turn off all USB devices attached to all the Host ports, and can lose your presets on those devices if not saved. Use the Up/Dn buttons to move to the Tick on USB Hub Sleep tag, the Y/N gets underlined. Use the Encoder knob or black Enter button to toggle the choice.

### *Enable Remote7 (tab-stop)*

(Y/N) to enable the Remote7 hardware extension box via the RJ45 jack on the side of the MRCC. When a connection is made the “=Y” icon in the upper right corner of the screen will illuminate. See appendix A for more details.

### *R7 Ports (tab-stop)*

(Copy 1-5 / Remote 1-5) configuration of ports on the Remote7.

Copy 1-5 mode - ports are copied (Thru) from the MRCC out-ports1-5 and can be used on both devices at the same time.

Remote 1-5 mode - add 5 additional out-ports. To route to these port press and hold the “Y” button while selecting an out-port 1-5 the LEDs will light Yellow (not blue).

See appendix A for more details.

## **Settings Page3/4 Sub-Page**

Settings: LED Show, If X Port Panic, If X Arp Panic, Filter Active Sense



### *Light Show (tab-stop)*

This is a list of all the Light Shows to choose from (default = first). The MRCC will pause the light show if any In / Out Port buttons are pressed or the encoder twisted. And resume 3 seconds after the last press or twist.

### *If X Port Panic (tab-stop)*

This is a Y/N toggle (default = Y). When removing a routing (disconnecting), the MRCC will send an “All Notes Off” to that Out Port. This turns off any notes that may be “On” at the time of the disconnection, removing any “stuck” notes.

### *If X Arp Panic (tab-stop)*

This is a Y/N toggle (default = Y). When turning off an Arp, the MRCC will send an “All Notes Off” to the port the Arp was sending notes. This turns off any notes that may be “On” at the time of the toggle, removing any “stuck” notes.

### *Filter Active Sense (tab-stop)*

This is a Y/N toggle (default = Y). Yes means any inbound Active Sense MIDI message will be filtered and will not be sent to any out-port

## Settings Page4/4 Sub-Page

Settings: PC Name, Product ID, FW ver & Serial Number



### *PC Name*

Name used by the PC Device manager

### *Product ID (USB)*

Reported USB product ID

### *MRCC FW Version*

Shows the current FW version. Note: this is not editable.

### *MRCC Serial Number*

Shows the current Serial Number. Note: this is not editable.

## MRCC Setup Examples

In this section we'll outline some MRCC physical setups. These examples aren't meant to be exhaustive but should help with some of the more common ways you're likely to use MRCC with other hardware and software.

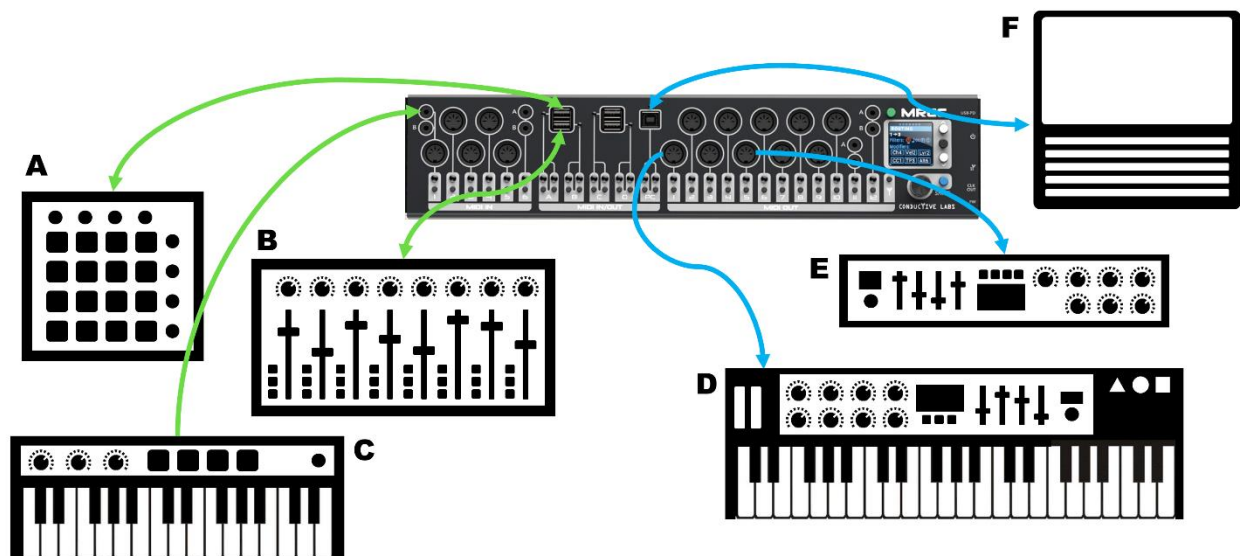
### Hardware Connections

Here is an example of a typical setup. There are controller devices that connect to the in-ports and synths that connect to out-ports, and a PC that connects to the PC port.

Note that the USB Host and PC ports are bi-directional so controllers A & B and the computer F can send and receive MIDI data.

As many controllers as you choose can send data to the same device. So you can have controllers B & C sending MIDI messages to synth E.

Keyboard controller C can be routed to both synths D & E (or to several virtual cables to PC F) with split and layer modifiers to create deep multi-timbral voices.



## Tips and Tricks

### Navigation

**Shift + Encoder rotate** increments values faster.

**Arrow-up + Encoder rotate** moves rapidly through the tab-stops on a page.

**Encoder press** switches between Activity, Routing, (optionally MIDI Monitor, if enabled), & your starting screen.

**Encoder press** (if starting on any Routing modifier box) toggles between the modifier box and the modifier edit page.

**Shift + “Y” press** toggles Light Show mode. Select a light show on Setting menu 3.

**Short Stand-by press** (green button) moves the cursor to the top level navigation circles.

Arp short cuts: the black **Enter** button press always stops/starts the Arp and **Shift + Enter** button press always toggles the latch regardless of which tab-stop the cursor is on.

### Performance

Avoid merging, especially clock messages. MIDI data rates are rather slow and too many messages can cause issues at the receiver.

Avoid routing to ports that no devices are connected to ... the MIDI messages are still “sent” to the empty ports and wastes CPU cycles.

### Setup and Getting Started

Loading the Default preset is a great way to quickly “zero” out all the settings for all the routings, modifiers, and extras.

### MRCC Clock

When on the clock screen simply press any out port button (red LED shows) to send the clock out to that port.

### MRCC Arpeggiator

The Arp can be controlled externally by sending CC messages to the MRCC using the MRCC MIDI Control Port and Channel. See the Appendix for MIDI implementation details.

### System Exclusive

With current firmware, SysEx messages are passed through all ports. There is no theoretical max size message, however if SysEx messages are coming in USB and out 5-Pin the data rate of the inbound message must be no faster than the 5-Pin data rate. The sending software must throttle the transmit speed.

FOR MORE TIPS & TRICKS BE SURE TO VISIT THE MRCC FORUMS AT:

[ConductiveLabs.com/forum](https://ConductiveLabs.com/forum)



## Appendix

### A. Optional MIDI Remote Devices (THIS IS NOT ETHERNET!)

The MRCC can be extended via the RJ45 jack on the side of the device labeled “=Y”. It connects to devices using a straight thru (not cross-over) Cat5 (or higher) **shielded** cable with **shielded connectors**. We have tested up to ~50’ (15m) long cables. The RJ45 connectors must have a metal shield which is connected to a shield (drain) wire in the cable. This is known as Shielded Twisted Pair (STP). Higher quality Cat6a cables are typically made with STP wire that includes a drain wire, and are available with shielded connectors.

#### MRCC Remote 7 (R7)

In order to use the R7 it must be first enabled in the Setting Menu 2 – “Enable Remote7: Y”. The R7 works in two modes (as of firmware 1.1.020) either “Copy 1-5” mode or “Remote 1-5” mode, these are also found in the Setting Menu 2. When a connection is made the “=Y” icon in the upper right corner of the screen will illuminate.

So where did we get “7” from? There are 7 outputs, 5 of which are routable. R7 out-port 1 has both 5-Pin DIN and 3.5mm TRS type A jacks, and out-port 2 has both 5-Pin DIN and 3.5mm TRS type B. In most cases the 5-pin DIN and 3.5mm jacks can be used at the same time, though they are not electrically separated. The same MIDI data will come out both jacks, so pay attention to MIDI channel choices.

**“Copy 1-5” mode** copies MIDI messages to the R7 out-ports jacks 1-5. So whichever MIDI messages are routed to MRCC jacks 1-5 also show up on the R7 1-5, they are usable at the same time. The “Y” button is NOT required to route to these copied ports. Pay attention to MIDI channel choices.

**“Remote 1-5” mode** extends the number of out-ports by 5. In order to route MIDI messages to an extended out-port press and hold the “Y” button, then select the desired out-port (1-5). This mode works the same way routing MRCC out-ports but with Yellow LEDs (not blue). Press and hold the “Y” button while on the Activity screen and it will say “REMOTE” and show all the remote routings in yellow. Press and hold the “Y” button while on the Routing screen and it you will see that the out-port names are prefixed with an “r” i.e. “1 -> r4”

#### MRCC-to-MRCC “remote” connection

Two MRCCs can connect to each other via the RJ45 cable. When 2 MRCCs are connected they will auto detect each other and the “=Y” icon in the upper right corner of the screen will illuminate.

The MRCC-to-MRCC connection extends the number of out-ports by 12x 5-pin + 4x USB Host + 1 USB device ports on the connected MRCC. In order to route MIDI messages to an extended out-port press and hold the “Y” button, then select the desired out-port. This mode works the same way routing MRCC out-ports but with Yellow LEDs (not blue). Press and hold the “Y” button while on the Activity screen and it will say “REMOTE” and show all the remote routings in yellow. Press and hold the “Y” button while on the Routing screen and you will see that the out-port names are prefixed with an “r” i.e. “1 -> r4”

#### MRCC-to-MRCC + Remote 7 connection

It is possible to have both a MRCC-to-MRCC connection at the same time as a Remote 7 connection. It requires a special RJ45 “splitter”, where on the MRCC-to-MRCC side of the splitter only connection pins 4 & 5 (middle row) are present and all the connection pins on the Remote 7 side are present. All RJ45 cables should be as described above, the Remote 7 will not function without shielded connectors on the Ethernet cables. Note that the R7 status on Setting Menu2 will automatically turn blue and switched into “Copy 1-5” mode when using the splitter with 2 MRCCs.

If you have 2 Remote 7’s you can use 2 splitters to connect a Remote 7 to each MRCC.

If you have 2 MRCC’s and Remote 7 that you want to connect together, use the contact form on [conductivelabs.com](https://conductivelabs.com) for instructions on how to get one.

## B. MIDI Implementation: CC (Control Change) & Program Change

Go to the Setting Page 1 in the MRCC to set which Port and Channel to receive CC and Program Change messages on.

CC (Dec)	CC (Hex)	Target	Range	Range Description
<b>21-27</b>		<b>Arpeggiator</b>		<b><i>Receives CC messages on the port &amp; channel the arpeggiator is setup to listen on</i></b>
21	15	Enable	0-127	Off < 63 < On
22	16	Arp Latch	0-127	Off < 63 < On
23	17	Set Arp Mode	0-5	0-Up, 1-Down, 2-PingPong inclusive, 3-PingPong exclusive, 4-Order Played, 5-Shuffle, (6-Random - TBD)
24	18	Set Arp Octave	1-3	Plays note in 1-1 octave, 2-2 octaves, 3-3 octaves
25	19	Set Arp Gate	0-5	0-10%, 1-25%, 2-50%, 3-75%, 4-90%, 5-Random %
26	1A	Set Arp Rhythm	0-14	0-14 map to rhythms A - L
27	1B	Set Arp Clk Div	0-9	0-4 bars, 1-2bars, 2-1bar, 3-3/bar, 4-1/2note, 5-triplet ½ note, 6-1/4 note, 7-triplet 1/4, 8-1/8 note, 9-triplet 1/8 note
<b>30-32</b>		<b>MRCC General</b>		<b><i>Receives CC messages on the port &amp; channel defined in the Setting Menu #1 Port and Channel parameters.</i></b>
30	1E	MRCC Clock Enable	0-127	Off < 63 <= On
31	1F	MRCC Clock Beats per Min (BPM)	5-120	x2 value -> 10 to 240 BPM ex. 5=10BPM, 50=100BPM, 75=150BPM
32	20	MRCC Clock Pulses per Quarter Note (PPQ) for CV analog output	0-3	0-1 PPQ, 1-2 PPQ, 2-4 PPQ, 3-24 PPQ
<b>Program Change</b>			0-127	Loads the Preset 0 (Default) to 127 into the MRCC

## C. MIDI Message Filtering Details

MRCC MIDI Message Filter Categories	Description	Actual Filtered MIDI Message Values
<b>Clock</b>	Clock messages	240 (0xF0, B1111 1000) Timing Clock 24PPQ 241 (0xF1, B1111 0001) MIDI Time Code Quarter Frame
<b>Notes</b>	Notes, Pitch Bend, & After Touch messages	8 (0x8n, B1000 nnnn) Note Off 9 (0x9n, B1001 nnnn) Note On 10 (0xA n, B1010 nnnn) Poly After Touch 13 (0xD n, B1101 nnnn) After Touch 14 (0xE n, B1110 nnnn) Pitch Bend
<b>CCs</b>	Control Change ( <b>NO</b> Channel Mode) messages	11 (0xB n, B1011 nnnn) Control Change
<b>Prog Chnge</b>	Program Change & Song messages	12 (0xC n, B1100 nnnn) Program Change 242 (0xF2, B11110010) Song Position Pointer 243 (0xF3, B11110011) Song Select
<b>S/S/C</b>	Stop, Start, & Continue messages	250 (0xFA, B1111 1010) Start 251 (0xFB, B1111 1011) Continue 252 (0xFC, B1111 1100) Stop
<b>Never Filtered</b>	All Other Messages	244 (0xF4, B1111 0100) Undefined (Reserved) 245 (0xF5, B1111 0101) Undefined (Reserved) 246 (0xF6, B1111 0110) Tune Request 249 (0xF9, B1111 1001) Undefined (Reserved) 253 (0xFD, B1111 1101) Undefined (Reserved) 254 (0xFE, B1111 1110) Active Sensing* 255 (0xFF, B1111 1111) Reset

\* Active Sensing – can be turned off in the System Settings

## D. MRCC Specifications

### Requirements:

- Power Supply
  - Output: 5V DC, 3A USB-PD (Power Delivery) with Type C connector
  - A 5V, 3A (15 watt min.) USB-PD power supply may be used in place of the included power supply. However, some power supplies may exhibit a large voltage drop. The longer the USB cable the bigger the drop. USB devices in the host ports may not operate correctly under 4.75V. The MRCC may not operate correctly under 4.5V DC measured at the USB host ports.
- USB Type B PC Port
  - Works with most computers or tablets that support USB MIDI class compliant devices. Tested primarily with Microsoft Windows\* 10 PC and Apple iPad. See our forum for more information.
- USB Type A Host Ports
  - Support USB 2.0 bus powered (0.5A each) or self-powered USB devices.
  - For USB MIDI class compliant devices and USB keyboard (for label entry) only. See our forums for a list of reported compatible and incompatible devices.
- MIDI input and sound modules that meet MIDI 1.0 specification standards, including MPE (MIDI Polyphonic Expression) devices are supported.

### Features:

- Power Supply Included:
  - Input: 100~240V AC, 50/60Hz
  - Output: 5.2V, 3A USB-PD (Power Delivery) with Type C connector
- All 5-Pin DIN and 1/8" TRS MIDI inputs are isolated with a high-speed opto couplers.
- All 5-Pin DIN and 1/8" TRS MIDI outputs are MIDI spec 5 Volts.
- Some features of the MRCC can be controlled with external MIDI controllers and/or sequencers. See Appendix A for the MIDI implementation chart.
- Extensive protection circuitry throughout for static discharge, over voltage and over current control on DC input, and over current control on USB host ports.

### Physical Layout:

- Dims: Size 15.25" x 3.5" x 1.5" (~ x x cm)
- Color OLED display, 1.5" (128x128)
- 28 Port Buttons and RGB LEDs
- 1 Expansion Routing button
- 1 Navigation Rotary Encoder w/ press switch
- 4 Navigation Buttons (Up, Enter, Down and Shift)
- 1 Stand-by Button (green)
- 1 side-panel Power Switch
- 1 side-panel Recessed Firmware Button

### Physical Input/Output:

- 5x MIDI 5-Pin DIN Inputs
- 4x MIDI 1/8" TRS Inputs (MIDI Type A and B)
- 4x USB 2.0 (High Speed, 480Mbit) Type A Host Inputs/Outputs
- 1x USB 2.0 (Full Speed, 12Mbit) Type B Device Inputs/Outputs
- 10x MIDI 5-Pin DIN Outputs
- 4x MIDI 1/8" TRS Outputs (MIDI Type A and B)
- 1x MRCC Remote (RJ45) connector – NOT ETHERNET. Only for use with Conductive Labs accessories.
- 1x CV Clock Output 1/8" TS jack (requires a TS mono cable, not TRS stereo). +5V (default) or +12V configurable.
- 1x MicroSD Card slot (behind left panel).
- 1x USB-PD Type C power connector (power only, no USB data)

