MantaMate
User Manual

Snyderphonics

Version 0.7, July 30, 2017

Contents

Preface

Thank you for purchasing the *MantaMate*! The *MantaMate* is a Eurorack module intended for interfacing a variety of control devices with the world of Eurorack. As you may have guessed, the primary device we had in mind was the *Snyderphonics Manta*, but the module is in no way limited to just the *Manta*.

The *MantaMate* combined with a traditional USB-MIDI control device acts as a CV converter with up to 4-note polyphony and as an arpeggiator.

The *MantaMate* plugged into your computer treats the computer as though it were a USB-MIDI device and operates the same, so that you can control all the outputs from your DAW or a music programming language.

The *MantaMate* combined with a HID-compatible game controller or joystick acts as a simple CV converter to output the joystick axes as analog voltages and the buttons as gates.

The *MantaMate* with nothing plugged into it acts as a random voltage generator, a repeating random pattern generator, and a clock source.

The *MantaMate* combined with the *Manta* acts as a touch-keyboard or as a fully-featured pitch and rhythm sequencer. The sequencer features include:

- Two sequencers running in parallel, each of up to 32 steps
- Each sequencer can be a pitch or trigger sequencer
- Variable note length
- Variable CV control: four CV values per note, per sequencer allowing up to eight controllable CV outputs
- Pitch and CV glide
- Composition mode to chain together sequences into longer tracks
- Up to 90 saved compositions, each of up to 13x2 32-step sequences
- On-the-fly control for both in-studio and performance use

If you have any questions, feel free to reach out to Jeff Snyder <jeff@snyderphonics.com>

Section 1

Setting up the MantaMate

This section covers powering and installing the *MantaMate*.

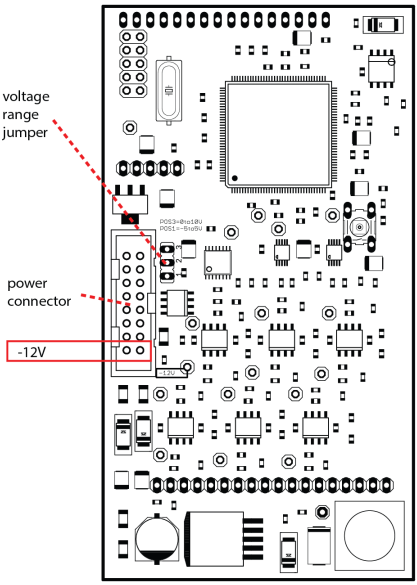
1.1 Connecting Power

The MantaMate requires all three power rails in the Eurorack standard: 12V, -12V, and 5V. The amount of current it draws varies depending on what device is plugged into the MantaMate's USB jack. With no device plugged in, it draws a maximum of around 75mA from the 5V rail, around the same from 12V, and a little less from the -12V rail. Power for USB devices is derived from the 12V rail through an onboard switching voltage regulator, so the additional current draw for USB devices is applied to the 12V line.

The Manta controller draws a lot of current for the LEDs, so if you are using a MantaMate with a Manta, make sure your Eurorack power supply has at least 400mA to spare on the 12V power rail.

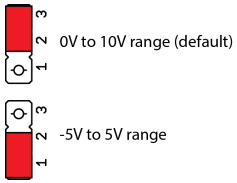
With the power to your Eurorack case turned off, plug the power cable into the 16-pin shrouded header on the MantaMate with the stripe on the cable indicating the negative rail pointing downward (it's marked on the circuitboard). Never plug in a MantaMate with the cable upside down. Also, never plug in the MantaMate with the power already on.

There is another smaller 0.100" header that has 10-pins on the back of the MantaMate. This may look like it might be for power cables that don't have the 5V rail, but it's NOT. It's a testing/debugging probe for factory use only - DO NOT plug a power cable into that connector or you may let out the magic smoke.



1.2 Output Voltage Range Jumper

There is a jumper on the back of the MantaMate that allows the user to change the MantaMate's output voltage range. The default setting is for the MantaMate's outputs to range from 0-10V (the upper position). You can switch the jumper to the lower position to set the range of the outputs to be from -5V to 5V instead if you prefer, but be aware that in this setting the output indicator LEDs will be off until the output goes above 5V so you will only see LED indication for half of the range of the DAC outputs. Also, with the current firmware, gates and triggers will rest at -5V rather than 0V if the range is set to -5V/5V.



There are no trimpots or calibrations that need to be done by the end user.

Section 2

The MantaMate Panel

This section covers the basic features of the *MantaMate* panel.

2.1 Output Jacks

The *MantaMate* features four 16-bit Digital-to-Analog converters (DACs) and eight 12-bit DACs. As such, if you are using a *Manta* device, the IO varies depending on the `Mode` the *Manta* is in. Throughout this chapter, the twelve 1/8 inch (3.5mm) outputs of the *MantaMate* will be referenced as follows:

`A1`	`B1`	`C1`
`A2`	`B2`	`C2`
`A3`	`B3`	`C3`
`A4`	`B4`	`C4`

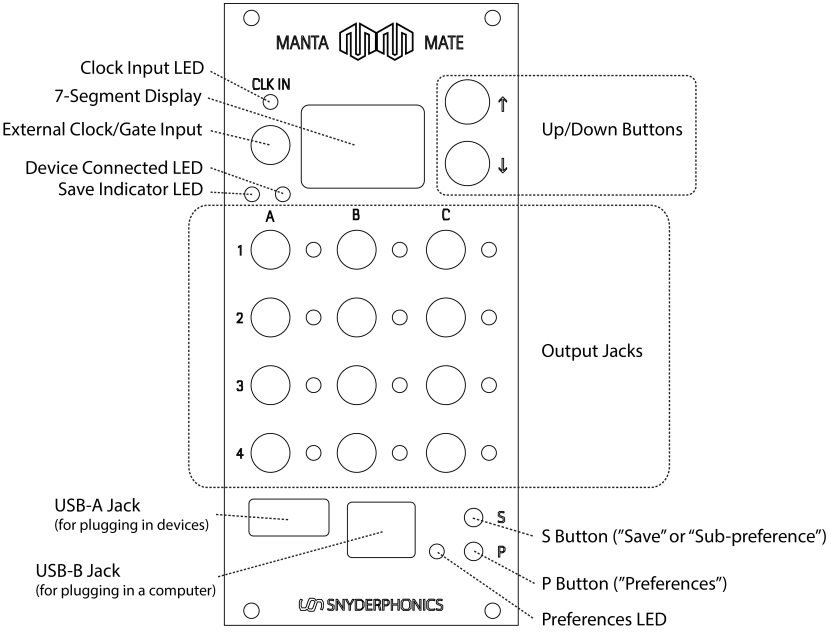
Note that the leftmost DAC outputs (the "A" column) are 16-bit and the remainder (the "B" and "C" columns) are 12-bit, therefore more precise outputs (such as 1V/O) will be output from `A1`, `A2`, `A3`, and `A4`.

2.2 Input Jack

The one 1/8 inch (3.5mm) input will always be a `CLOCK IN`, although some modes of operation may not make use of the clock.

2.3 USB jacks

There are two USB jacks on the MantaMate. One is a USB-A jack. Use this jack when plugging in a Manta, a USB-MIDI device, or a joystick. The other is a USB-B jack. This is only for plugging the Manta into a computer (in which case it appears as a device to the computer, instead of acting as a host for another device). You can't connect to a computer while also connecting to a



device (only one USB cable can be plugged in at a time). Also, the MantaMate does not recognize USB hubs, so you can only use one device at a time, and devices that include an integrated hub may not be recognized correctly. The MantaMate automatically detects which USB jack has something plugged into it.

2.4 Indicator LEDs

There are several LEDs on the MantaMate. The `Clock Input LED` lights up red when a gate signal is high on the input. The MantaMate clocks on the rising edge of gate signals. The `Device Connected LED` lights up green when a connection is active with a USB device or host. The `Save Indicator LED` lights up red while saving a preset, but also is occasionally used for other things, such as indicating a negative value when transposing. The `Preferences LED` lights up green when you are in a Preference Mode other than default Preset Select Mode. There are 12 amber LEDs that indicate the voltage level on the DAC outputs - they glow brighter as the voltage goes higher.

2.5 7-Segment Display

The `7-Segment Display` is a two digital numeric display. In the default Preset Select Mode, it shows the number of the loaded preset. In the other preference

modes, it shows other relevant data. It temporarily occasionally taken over by some other functionality when using a Manta with the MantaMate (such as displaying transpose amount). The decimal points on the `7-Segment Display` are used to indicate which Preference Mode you are in, and are never used to actually indicate a decimal place in the number displayed.

2.6 Up/Down Buttons

The large white buttons are used as navigation buttons to change values on the *MantaMate*. The values they adjust depend on what Preference Mode you are in on the panel.

2.7 P and S Buttons

The small black buttons near the bottom of the panel are called the `P` and `S` buttons. `P` is used to navigate the preferences modes, and `S` has different functions depending on which preference mode the *MantaMate* is in.

2.8 Default Mode / Preset Select Mode

2.8.1 Loading a Preset

By default, the *MantaMate* is in Preset Select Mode. In this mode, the green LED next to the lower-right `P` button is off, and there are no decimal points on the display. When in Preset Select Mode, the Up/Down buttons will navigate through the factory presets and the user presets.

2.8.2 Saving a Preset

You can save your own user presets, to quickly return to a particular state, by pressing the `S` button to enter Save Mode. The `Save Indicator LED` will light, the `7-Segment Display` will flash, and you can navigate to the preset number to which you wish to save. When you have the preset number you want, you press the `S` button again to save, or the `P` button to cancel.

2.9 Other Preference Modes

In order to enter the other preference modes, hit the lower-right button labeled `P`. In order to access a subpreference, go to the corresponding preference menu and then hit the button in the lower-right labeled `S`.

While in any of the three preference menus, the `Preferences LED` will be lit.

2.9.1 P1 : Tuning

In order to enter this preference menu, hit the lower-right `P` once. The right decimal point will light up in the 7-segment number display.

In this preference menu, you can select from any of the 100 factory tunings. Refer to A.2 to see a list of the alternate tunings that are built into the *MantaMate*. Most of them are from the Scala Tuning Archive. You can send your own custom tunings to the *MantaMate* from a computer using Sysex messages over MIDI. A Max patch is available that makes this easy, and the documentation of how the sysex messages are constructed is included the tuning section of the appendix A.1. The Max patch reads in any tuning text file written in the Scala scale format and allows you to save over any of the factory tuning presets (except for 12-tone equal temperament at tuning preset 00) with your own tunings.

2.9.2 P1-S : MIDI Learn Mode and Pattern Length

While in the P1 Tuning preference menu, you can press the `S` button to enter subpreference menu P1-S.

This menu does different things depending on the device that is plugged into the *MantaMate*. When a MIDI device or a computer is connected to the MantaMate, it enters MIDI Learn Mode. You will see that the first digit of the 7-segment display will go blank, and you can send MIDI messages to get the *MantaMate* to learn the MIDI values. When there is no device connected, the red LED under the Clk In jack will light, and the up/down buttons control the length of the randomized repeating patterns that the *MantaMate* generates.

2.9.3 P2 : Pitch Glide Time

In order to enter this preference menu, hit the lower-right `P` twice. The left decimal point will light up in the 7-segment number display.

The Up/Down buttons will increment and decrement the glide time for any V/Oct pitch outputs on the *MantaMate*.

2.9.4 P2-S : CV Glide Time

While in the P2 Pitch Glide Time preference menu, you can press the `S` button to enter subpreference menu P2-S.

You will see that the first digit of the 7-segment display will go blank, and the Up/Down buttons will increment and decrement the glide time for any general-purpose CV output on the *MantaMate* that is not a V/Oct pitch output or a gate/trigger.

2.9.5 P3 : Internal Clock Speed

In order to enter this preference menu, hit the lower-right `P` three times. Both decimal points will light up in the 7-segment number display.

This mode lets you control the *MantaMate*'s internal clock. Instead of using an external clock, you can generate a clock inside the MantaMate. A value of 00 for the clock's speed turns this internal clock off (the default state). Any positive number starts the clock. The tempo of the clock will be 60 + the number displayed on the 7-segment display. For instance, if the display shows the number 60, the tempo is 120.

2.9.6 P3-S : Internal Clock Subdivision

While in the P3 Internal Clock Speed preference menu, you can press the `S` button to enter subpreference menu P3-S. This is the subdivision of the internal clock. 0 is a double-whole-note. 1 is a whole-note, 2 is a half-note, 3 is a quarter-note, 4 is an 8th-note, 5 is a 16th-note, and so on.

Above 9 (the 256th-note division!) you enter clock randomize mode. This turns the clock into a random trigger generator. The `7-Segment Display` will show only the left digit, leaving the right digit blank. In the clock randomize mode, 0 means very infrequent random triggers, and 9 means very frequent. The numbers in between scale the general frequency of clicks between those extremes. To get back to the normal divisions of the tempo, just step the value back down below 0.

2.10 Konami Code : Arpeggiator Mode or Randomize Patterns

If you hold down the P button while you push up or down, you access a special option when certain devices are connected. Check the sections on *MIDI Input Device and Computer Connection* 4.6.2 and *No Input Device* 6.1.3 for more information.

Section 3

Manta Input Device

This section covers using a *Manta* device as a controller for the *MantaMate*.

3.1 Manta Quickstart

3.1.1 Getting Started/Basic Use

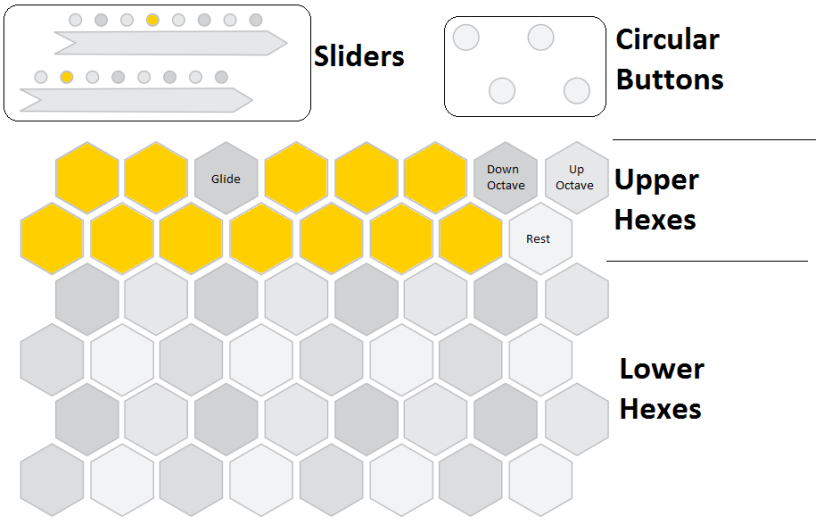
Trying Out the Manta as a Keyboard

The first thing to try when plugging a Manta into a MantaMate would be preset 01, which will give you a simple monophonic keyboard. The Top Left and Top Right buttons will transpose an octave down and up respectively, and the capacitance value of the current Hex will be output on C1, along with a 1V/O pitch on A1, a gate on B1, and a trigger on A2. The sliders will come out on their own outputs as well. You can test out the other polyphony options on presets 02, 03, and 04.

Trying Out the Manta as a Sequencer

Next, you may want to try the sequencer functionality. To get up and running with the *Manta* Sequencer Instrument, try out preset 00, which presents you with a blank sequencer. You will start in Play Mode (the upper right circular button is amber). In Play Mode, you can press the lower hexes in order to add them to the sequence. All hexes added to the active sequence will be lit up amber. After pressing a hex, you can press the upper hexes and sliders to change that hex's values.

To further edit hexes that are already added, you can hit the top-right circular button and it will turn red to indicate you are in Edit Mode. You can now select hexes to edit their pitch and CV values, as well as their note length. If you would like to edit more than one hex value at once, you can multi-select in Edit Mode by holding a selected hex down and picking more hexes. Once you have selected a hex (or hexes, indicated by red LED), the



list below covers all the values that can be changed for that hex (or hexes) and how to do so:

- 1V/O Pitch Class: Pick the note on the keybed presented on the upper hexes.
- 1V/O Octave: Press the top-right most hexes to transpose down or up and octave.
- CV1 Value: Press the top slider to change CV1 output value.
- CV2 Value: Press the bottom slider to change CV2 output value.
- CV3 Value: First, access the secondary CV values by pressing the top-left circular button until it is amber. Then, press the top slider to change CV3 output value.
- CV4 Value: First, access the secondary CV values by pressing the top-left circular button until it is amber. Then, press the bottom slider to change CV3 output value.
- Octave Value: First, access the misc. slider values by pressing the top-left circular button until it is red. Then, press the top slider to change to change the octave value.
- Note Length Value: First, access the access the misc. slider values by pressing the top-left circular button until it is red. Then, press the bottom slider to change to change the note length value.

- Pitch Glide Time: Press and hold the upper hex that lies between D# and F# to access the glide times. Press the upper slider to change the pitch glide time. Note this is the time to glide TO this note.

- CV Glide Time: Press and hold the upper hex that lies between D# and F# to access the glide times. Press the lower slider to change the CV glide time. Note this is the time to glide TO this hex CV value. This applied to all the CVs associated with the selected hex.

All the above values can be changed for each of the 32 hexes in the sequence. It should be noted that you actually have two sequencers running at once! Pressing and holding the bottom-left circular button will turn it red and present you with the Left Menu Page. From here you can select various sequencer modes, but most importantly you can access the second sequencer by pressing the top-right most hex.

The second sequencer (S2) acts similarly to the first (S1); they run in parallel and share an input clock, but they can have different numbers of steps, patterns and hex values.

Okay, so I've changed all these values, but now how do I get these values out of my *MantaMate*?! First, we need to clock the *MantaMate* from the Clk In input (or use the internal clock, see: 2.9.5). Then you can get the pitch/CV/gate from the respective outputs (where each cell represents a *MantaMate* output):

S1: 1V/O	S1: Trigger	S1: CV1
S1: CV2	S1: CV3	S1: CV4
S2: 1V/O	S2: Trigger	S2: CV1
S2: CV2	S2: CV3	S2: CV4

The gate/trigger out for each sequencer is derived from the input clock, but it takes into account the note length values of each hex and any rests you have created in the pattern, useful for triggering an ADSR or other envelope.

To try using the Manta as a keyboard instead of a sequencer, check out presets 01-04 for a monophonic keyboard through a 4-note polyphonic keyboard.

3.2 Manta Presets

With a *Manta* device, the *MantaMate's* 00-09 presets represent some different ways the *Manta* can be used as an instrument. These presets are all just instances of settings you can configure from the Manta interface itself, but they are provided for convenience. The remaining 10-99 presets are for user storage, and can store all aspects of the user's current configuration.

- `00` Blank sequencer

- `01` Monophonic controller

- `02` Duophonic controller
- `03` Triophonic controller
- `04` Tetraphonic controller
- `05` CV controller
- `06` Gate controller
- `07` Trigger controller
- `08` Mix of CVs and Gates
- `09` Mix of CVs and Triggers
- `10-99` User-saved compositions.

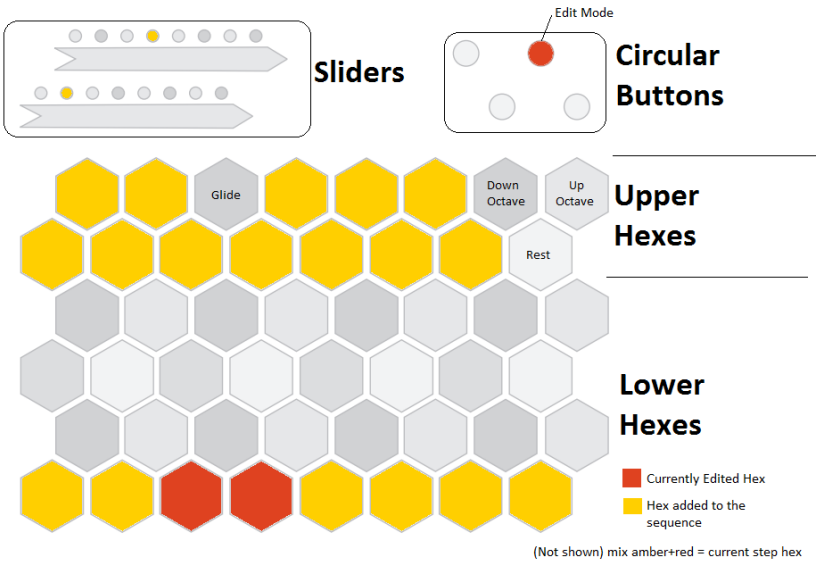
3.3 The Manta Instruments

The MantaMate allows the Manta to function as two simultaneously active "instruments". Each instrument can be either a Sequencer (pitched or trigger-based), a Keyboard (1-to-4-note polyphony), or a Direct Instrument (with hexes acting as CVs, gates, or triggers). You can navigate between the two active instruments by holding down one of the bottom circular buttons (either one) and touching one of the two upper-rightmost hexes (they represent the two different "instruments").

Each instrument takes up half of the MantaMate's outputs. Instrument 1 sends to the A and B rows, and Instrument 2 sends to the C and D rows. Some instruments can go into "takeover mode", where they commandeer all of the outputs - this is necessary for a keyboard with 4-note polyphony, for instance.

To change the type of an instrument, enter Left-Option-Mode or Right-Option-Mode by holding down either of the bottom circular buttons, and then touch one of the three top left hexes. These hexagons change the currently selected instrument between Sequencer, Keyboard, and Direct instrument types.

Each instrument type reassigns the meanings of the top two circular buttons, and fills the Left-Option-Menu (accessed with the bottom left circular button) and the Right-Option-Menu (accessed with the bottom right circular button) with options that are specific to that instrument type (below the top row of hexagons, which always show the instrument type selector and the "current instrument" selector).



3.4 Manta Sequencer Instrument

The Sequencer Instrument was already briefly introduced in the Manta Quick-start section 3.1, but this section explains the functionality in more detail.

3.4.1 Play Mode and Edit Mode

The top right circular button switches the Sequencer instrument between Play and Edit modes. In Play Mode, you can toggle new Lower Hexes on and off to add or remove stages from the sequence. In Edit Mode, touching a Lower Hex selects that stage for further editing, without affecting whether or not that stage is stepped in the sequence.

When in edit mode, you can select multiple Lower Hexes by holding one down while touching more.

The list of editable parameters is outlined in 3.1.1.

3.4.2 Left-option-mode and Right-option-mode

There are two option modes that you can enter that allow you to change Manta-level and Instrument-level parameters. They are entered by pressing and holding the bottom left circular button and the bottom right circular button. They are momentary, so the options disappear when you release the circular button. However, you can lock them if you want by pressing the other bottom circular button while holding down the option mode button you want to enter.

3.4.2 and 3.4.2 are images that show the layout of the options exposed in left-option-mode and right-option-mode. A description of these options follows.

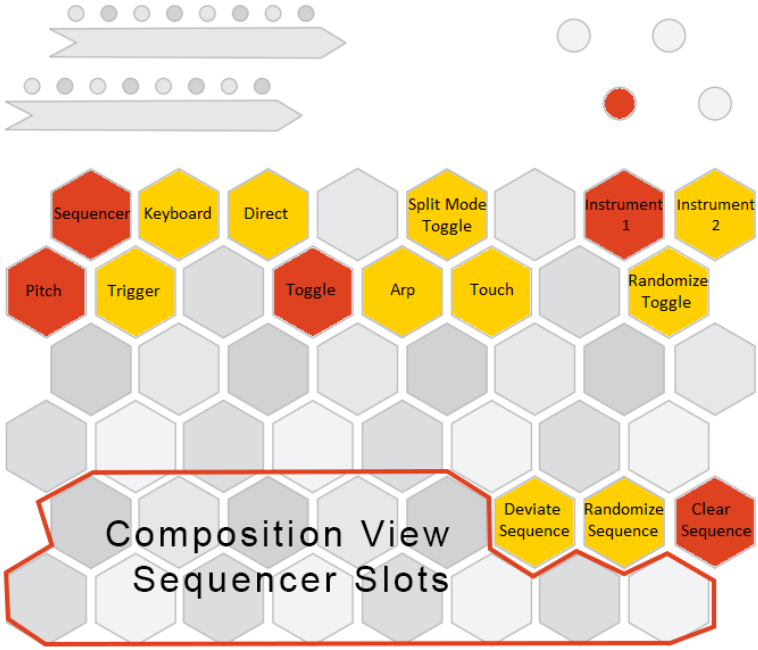


Figure 3.1: Sequencer Instrument left-option-menu

3.4.3 Pitched Sequencer and Trigger Sequencer

Pitched Sequencer

By default, the Sequencer instrument is a Pitched Sequencer, which shows a keybed in the Upper Hexes to assign pitches to particular Lower Hexes.

Below outlines the *MantaMate's* output of a sequencer when in pitched mode. Note, this output will correspond to row A and B if the first sequencer is in pitched mode, and C and D if the second sequencer is in pitched mode.

1V/O	Trigger	CV1
CV2	CV3	CV4

Figure 3.2: Sequencer Instrument right-option-menu

Trigger Sequencer

There is another Sequencer instrument, called Trigger Sequencer, that is more useful if you are creating percussion patterns.

In a Trigger Sequencer, there are only two CV slider outputs, and the remaining outputs are all triggers. There are four amber hexagons displayed in the Upper Hexes that correspond to these trigger outputs. Selecting a Lower Hex and then touching one of those Upper Hexes will set that stage to output that trigger. Touching the Upper Hex above that trigger (or below, if in Instrument 2) will mute that trigger until the mute toggle is touched again to turn mute off.

Below outlines the *MantaMate's* output of a sequencer when in trigger mode. Note, this output will correspond to row 1 and 2 if the first sequencer is in trigger mode, and 3 and 4 if the second sequencer is in trigger mode.

CV1	Trigger 1	Trigger 2
CV2	Trigger 3	Trigger 4

To switch between these two sequencer types, hold down the bottom left circular button to enter left-menu-option mode, and Pitched/Trigger sequencer types are the two left-most Upper Hexes one row down from the top.

Full Vs Split Modes

By default, a Sequencer Instrument has a maximum of 32 steps, and all 32 of the Lower Hexes are used. In order to see the other of the two Instruments, you need to touch the "Instrument 1" or "Instrument 2" Upper Hexes in either the left-option-mode or right-option-mode. However, if both of the two Manta "Instruments" are sequencers, than you can enter "Split Mode" by pressing the Split Mode Toggle hex in the middle of the top row of both left-option-menu and right-option-menu. In this mode, the 32 Lower Hexes are split between the two instruments, with the bottom 16 representing Sequencer 1 and the upper 16 representing Sequencer 2. In Split Mode, the maximum number of sequencer steps is reduced to 16, so that the two sequencers will fit on the same page. The two sequencers share an input clock, but are otherwise independent.

3.4.4 Sequencer Interaction Modes

In the left-option-menu (reached by pressing the bottom left circular button), you can change between different interaction modes using the middle Upper Hexagons in the second row from the top. The three modes, from left to right, are:

- Toggle Sequencer - Default (the sequencer always steps on every clock, and touching stages in Play Mode toggles them on or off)

- Arpeggiator (the sequencer only steps when at least one lower hex is touched, and active stages are just those that are currently touched)
- Touch (the sequencer ignores clocks and acts like a keyboard in which you can play the different sequencer stages as keys)

3.4.5 Edit Mode Randomization Options

In the left-option-menu (reached by pressing the bottom left circular button), you can also change between different variations on Edit Mode, which can introduce randomness into the process. These are stepped through by touching the right-most Upper Hex in the second row from the top. The Options are:

- Normal Edit (deterministic parameter setting)
- Deviate Edit (selecting a stage and then touching some parameter to edit actually subtly nudges that value in a random direction)
- Randomize Edit (selecting a stage and then touching some parameter to edit fully randomizes that parameter for the selected stage)

3.4.6 Slider Pages

In a Pitched Sequencer, the two sliders actually control six different values of the selected sequencer stage or stages. These six parameters are organized into three different pages, which are stepped through by pressing the top left circular button.

- Pitched Slider Page 1 = LED off : CV1 and CV2
- Pitched Slider Page 2 = LED amber : CV3 and CV4
- Pitched Slider Page 3 = LED red : Octave and Note Length

In a Trigger Sequencer, only the first page is available, since the other values aren't relevant. However, you can enter a momentary state that allows you to set the glide time on the CVs of a stage by holding down the upper left circular button and then touching the slider of the CV for which you want to change the glide time.

- Trigger Slider Page 1 = LED off : CV1 and CV2
- Trigger Momentary Slider Page = LED red : CV1 and CV2 glide times

3.4.7 Composition View

The MantaMate has the ability to store several sequences locally for immediate retrieval, so that you can compose a whole piece with different sequences and then switch between them on the fly in performance. We call this "Composition View". When in the left-option-menu (accessed by holding down the left circular button), the Lower Hexes show the Composition View. It takes up two rows per Instrument, and if both of your Instruments are Sequencers, then it will display both of them simultaneously in those Lower Hexes (with Instrument 1 on the bottom). Otherwise, only the bottom two rows of Lower Hexes will be used.

Save a Sequence to Composition View

To save a sequence to Composition View, enter the left-option-menu, and while there press the top right circular button. Then select the hex in the Composition View rows that you want to store it to. There are 13 Lower Hex slots available for sequences. The remaining three Lower Hexes in Composition View are for blanking the current sequence (right top, red), completely randomizing the current sequence (to the left of Blank, amber), and subtly deviating the current sequence from its current form (to the left of Randomize, amber).

Retrieve a Sequence from Composition View

To retrieve a sequence from Composition View, just be in left-option-mode, and then touch the Lower Hex slot for the sequence you want to retrieve.

Copy a Sequence from one slot to another in Composition View

To copy a sequence from one slot to another, enter the left-option-menu and press the top left circular button. The slots in Composition View will flash, and you can select one. Then touch the Lower Hex slot that you want to copy to. This is especially interesting when there are two Sequencer instruments running simultaneously, since you can copy between the two sequencers to have the same phrases played by different synthesizer voices.

3.4.8 Sequence Pattern Order

To select a different sequencer step pattern, enter the right-option-menu. The second row of Upper Hexes are all different pattern options. The available patterns are, from left to right:

- Left->Right Row Up
- Left->Right Row Down
- Left->Right Diagonal Up

- Right->Left Diagonal Up
- Left->Right Column Up
- Caterpillar
- Order Touched
- Random

To reverse a sequence pattern, select a <pattern>, then select the same <pattern> again, etc. It will toggle between forward and reverse versions.

3.4.9 Alternative Tunings

To switch tunings, simply touch a Lower Hex while you have access to the Right Option Menu. Each Lower Hex in this menu represents a Tuning, and they default to the first 36 tunings, counting up from lower left. The bottom left hexagon is always whatever the global Tuning is currently set to. The other hexagons can be set to represent any of the 99 tunings.

To assign a different tuning to a [Tuning] hex, lock the right-option-menu, hold a [Tuning] hex, and select a tuning (0-99) via the MantaMate 7-Segment Display using the Up/Down buttons.

3.4.10 Saving Sequences

To write a sequencer to the global sequence bank (in which there are 100 slots labelled 0-99), lock the left-option-menu by touching the Bottom Right button. Then touch and hold the Top Right button and select a number (0-99) on the MantaMate number display. When you release the Top Right button, the current sequence will be saved to the selected slot (0-99) in the global sequencer bank. This is only for single sequences. If you wish to save and load an entire Composition View (along with all other properties of the MantaMate state), the save the whole preset, as described in .

3.5 Manta Keyboard Instrument

Each of the two "instruments" in the Manta can also be a Keyboard Instrument.

A Keyboard Instrument treats all of the hexagons on the Manta as keys of a keyboard. Left-option-menu and Right-option-menu are slightly different after the top row (which is the same as in the Sequencer Instrument).

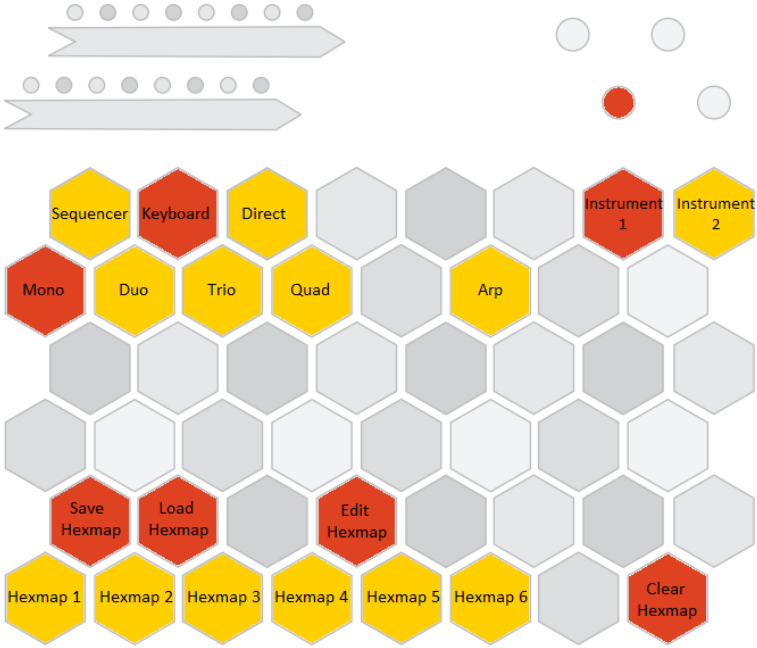


Figure 3.3: Keyboard Instrument left-option-menu

Figure 3.4: Keyboard Instrument right-option-menu

3.5.1 Polyphony

The Keyboard Instrument defaults to being monophonic (one note at a time). You can press the Upper Hexagons in the second row on the left side to change the number of voices from monophonic up to quadraphonic. When the Keyboard Instrument is in Duo, Trio, or Quadraphonic polyphony mode, the instrument takes over all of the outputs of the MantaMate (takeover mode). The monophonic instrument, however, can coexist with other instruments, as it only uses 6 outputs.

The monophonic keyboard has an output for 1V/O, gate, as well as a CV that corresponds to the surface area coverage of the current hex. It also has a trigger output.

V1: 1V/O	V1: Gate	V1: CV
Trigger	Slider CV1	Slider CV2

Figure 3.5: Monophonic Keyboard : 1 voice

The duophonic keyboard has two sets of outputs for 1V/O, gate, as well as a CV that corresponds to the surface area coverage of the current hex.

V1: 1V/O	V1: Gate	V1: CV
V2: 1V/O	V2: Gate	V2: CV
Unused	Slider CV1	Slider CV2
Unused	Unused	Unused

Figure 3.6: Duophonic Keyboard : 2 voice

The triophonic keyboard has three sets of outputs for 1V/O, gate, as well as a CV that corresponds to the surface area coverage of the current hex.

V1: 1V/O	V1: Gate	V1: CV
V2: 1V/O	V2: Gate	V2: CV
V3: 1V/O	V3: Gate	V3: CV
Unused	Slider CV1	Slider CV2

Figure 3.7: Triophonic Keyboard : 3 voice

The quadraphonic keyboard has four sets of outputs for 1V/O, gate, as well as a CV that corresponds to the surface area coverage of the current hex.

V1: 1V/O	V1: Gate	V1: CV
V2: 1V/O	V2: Gate	V2: CV
V3: 1V/O	V3: Gate	V3: CV
V4: 1V/O	V4: Gate	V4: CV

Figure 3.8: Quadraphonic Keyboard : 4 voice

3.5.2 Arpeggiator Mode

To turn on the arpeggiator in the Keyboard Instrument, press the Upper Hexagon in the second row, three from the right (see the Hex marked "Arp" in 3.5).

The arpeggiator will clock from either external input gates, or from the internal metronome clock.

To change the pattern of the arpeggiator, select one of the patterns from the right-option-menu (see the second Upper Hex row in 3.5).

The possible arpeggiator patterns are:

- Up
- Down
- Up/Down
- Order Touched Forward
- Order Touched Backward
- Order Touched Forward/Backward
- Random Walk
- Random

3.5.3 Hexmaps

The assignment pitches to the hexagons is called a Hexmap. In the left-option-menu, the bottom Lower Hexagons load different default Hexmaps, including a piano-style layout, a simple chromatic layout, and several isomorphic layouts. You can easily create and save your own Hexmaps.

Editing Keyboard Hexmaps

To Edit a hexmap, tap the Edit Hexmap button (See 3.5). The Hexmap will be displayed and will function as it normally does, except that when you press a hex multiple times the hex's color will change (Off, Amber, Red). While holding any single hex, you can assign its Pitch (0-256) with the Manta Mate 7-Segment Display or with Top Slider and you assign its Fine Tune with the Bottom Slider. To exit Hexmap Edit mode, tap the Bottom Right button or return to the Left Option Menu by tapping and holding the Bottom Left button.

Saving Keyboard Hexmaps

To Save the current Hexmap to the global Hexmap bank, lock the Left Option menu, hold the Save Hexmap hex, and select a number (0-99) on the MantaMate number display. When you release the Save Hexmap hex, the current Hexmap will be saved to that slot (0-99) in the global Hexmap bank.

Loading Keyboard Hexmaps

To Load a Hexmap from the global Hexmap bank in to the current keyboard's Hexmap, lock the Left Option menu, hold the Load Hexmap hex, and select a number (0-99) on the MantaMate number display. When you release the Load Hexmap hex, the Hexmap saved in that slot (0-99) of the global Hexmap bank will be loaded as your keyboard's current Hexmap.

3.5.4 Keyboard Alternative Tunings

These function the same as they do in the Sequencer Instrument. See 3.4.9.

3.6 Manta Direct Instrument

The last instrument type available on the Manta is the Direct Instrument. This means a hexagon is directly mapped to an output jack. The output jack voltage can represent either the continuous capacitance measurement, the touched/not-touched state, or can produce triggers on touch onsets. Left-option-menu and Right-option-menu are slightly different after the top row (which is the same as in the Sequencer and Keyboard Instruments).

3.6.1 Number of Direct Outputs

The only Upper Hexagon option in the Direct right and left option menus is a selector for whether the Direct Instrument has six or twelve outputs. If the Direct Instrument is put in Twelve Output mode, then it will take over the outputs for the other instrument.

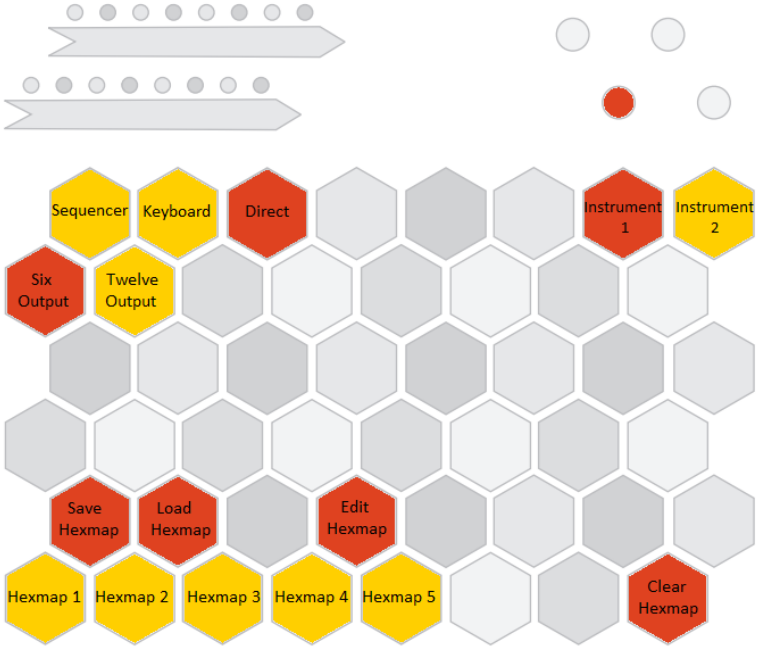


Figure 3.9: Direct Instrument left-option-menu

Figure 3.10: Direct Instrument right-option-menu

3.6.2 Direct Hexmaps

Direct Instruments have Hexmaps much like Keyboard Instruments do, but the contents of the map are different because there is no pitch information.

Editing Direct Hexmaps

To Edit a direct layout, tap the Edit Direct button. The direct layout will be displayed and will function as it normally does, except that when you press a hex multiple times the hex's color and function will change (Amber = CV, Red = Gate, Red/Amber = Trigger, Off = disabled). While holding any single hex/slider, you can assign its output (1-12) via the Manta Mate 7-Segment Display. If you go below 1, the hex/slider will be disabled/turn off. [Note: if six or twelve (takeover) outputs are already being used, you will not be able to assign a hex/slider to an output or change its type. First disable a hex/slider, then add a new one. Also, sliders can only be CVs.] To exit Direct Edit mode, tap the Bottom Right button or return to the Left Option Menu by tapping and holding the Bottom Left button.

Saving Direct Hexmaps

To Save the current direct layout to the global direct bank, lock the Left Option menu, hold the Save Direct hex, and select a number (0-99) on the MantaMate 7-Segment Display. When you release the Save Direct hex, the current direct layout will be saved to that slot (0-99) in the global direct bank.

Loading Direct Hexmaps

To Load a direct layout from the global direct bank in to the current direct instrument, lock the Left Option menu, hold the Load Direct hex, and select a number (0-99) on the MantaMate 7-Segment Display. When you release the Load Direct hex, the direct layout saved in that slot (0-99) of the global direct bank will be loaded as your current direct layout.

3.6.3 Direct Alternative Tunings

Alternative Tunings don't apply to Direct Instruments, but since the tuning is actually global to a Manta combination of 2 instrument, the Tuning Interface is also available on the right-option-menu of a Direct Instrument as a convenience. See 3.4.9.

3.6.4 CV Contoller Direct Preset

Switching the *MantaMate* to preset 05 sets it to a 12-output Direct Instrument where most of the outputs are continuous CV.

There are 10 CV outputs corresponding to 10 hex surface area coverage values, and 2 outputs for the slider values.

CV	CV	CV
CV	CV	CV
CV	CV	CV
CV	Slider CV1	Slider CV2

3.6.5 Gate Contoller Direct Preset

Switching the *MantaMate* to preset 06 sets it to 12-output Direct Instrument where most of the outputs are gates.

There are 10 gate outputs corresponding to 10 hexes touched/not touched states, and 2 slider values.

Gate	Gate	Gate
Gate	Gate	Gate
Gate	Gate	Gate
Gate	Slider CV1	Slider CV2

3.6.6 Trigger Contoller Preset

Switching the *MantaMate* to preset 07 sets it to to 12-output Direct Instrument where most of the outputs are triggers.

There are 10 trigger outputs corresponding to 12 hexes onsets, and 2 slider values.

Trigger	Trigger	Trigger
Trigger	Trigger	Trigger
Trigger	Trigger	Trigger
Trigger	Slider CV1	Slider CV2

Section 4

MIDI Input Device and Computer Connection

This section covers using a MIDI controller with the MantaMate, and also connecting the MantaMate to a computer.

4.1 Connecting a MIDI device or a computer to the MantaMate

If a USB-MIDI keyboard or a USB-MIDI controller is connected to the MantaMate's USB-A port, the MantaMate acts like a USB-MIDI host and converts the information to analog voltages.

If a computer is connected to the MantaMate's USB-B port, then the MantaMate shows up as a USB-MIDI device in the computer, and can send and receive MIDI data.

It's not possible to plug USB cables into both ports at the same time, neither will work in that case. Also, you can't plug multiple USB-MIDI devices into the MantaMate with a hub.

4.2 Presets

- `00` Arpeggiator Mode
- `01` Monophonic Keyboard Mode
- `02` Duophonic Keyboard Mode
- `03` Triophonic Keyboard Mode
- `04` Quadraphonic Keyboard Mode
- `05` All CV

- `06` All Gates
- `07` All Triggers
- `08` CVs + Gates
- `09` CVs + Triggers
- `10-99` User storable presets

4.3 Types of outputs

There are a few different types of outputs from MIDI information that the MantaMate can produce. We call them "pitch keyboard", "CC CV", "note gate" and "note trigger". They can all be combined in the same preset interface, except for "note gate" and "note trigger".

"Pitch keyboard" - there can be from zero to four pitch keyboard outputs on the MantaMate. They consist of a 1V/oct pitch output in the A column, a gate output in the B column, and a velocity output in the C column. If you are in monophonic mode (one "pitch keyboard" output) then there is an additional trigger output in output 2A. All "pitch keyboard" outputs are smoothed by the **Pitch Glide** parameter set in preference mode P2.

"CC CV" - Continuous controllers can be mapped to CV outputs on the MantaMate. By default, they are mapped to CCs 1-12, and they come out the first available output. All "CC CV" outputs are smoothed by the **CV Glide** parameter set in preference mode P2-S.

"Note gate" - particular MIDI numbers can be mapped to turn gates on and off. If you are using a preset that has gates, the default MIDI notes to trigger the gates are the chromatic notes counting up from MIDI note 60.

"Trigger gate" - the same as "note gate" except the outputs are short triggers instead of gates.

4.4 MIDI Learn

You can change the defaults by entering MIDI learn mode. Start from a preset that has the number of "pitch keyboard" outputs that you want. Then, enter P1 (press the P button once) and then press S to enter P1-S. This is MIDI learn mode (when a MIDI device or host is plugged in). Now turn the knobs or press the keys in the order you want them to come out the outputs, and it will count on the 7-segment display as it sees new CCs or notes. Notes will become gate outputs (the gate turns on when the note is pressed). Press S

again to exit P1-S back into just P1, and then hit P three more times to cycle back out of the Preferences modes. Now you should see the CVs and gates coming out the outputs when you turns those knobs or press those keys.

4.5 High Resolution CC messages

When a computer is connected to the MantaMate, the high resolution CCs can also be sent to give finer control over the outputs by sending the bits 2-8 of a 16-bit number on CC 33-44. These bytes get added together into a 14-bit message. The low bits of CC 65-77 can carry bits 0-1 to get the final 2 bits of detail out of the 16-bit DACs.

There is a Max patch available from http://www.snyderphonics.com/ that makes the sending of high resolution CC messages easy by handling the conversion from a 16-bit number into the correct MIDI messages. If you want to send messages without the use of this Max patch, the procedure is described below.

Here is an example of how a high-resolution message would be constructed to send to the first output (A1) over CC 1.

CC 1	CC 33	CC 65
15 14 13 12 11 10 9	8 7 6 5 4 3 2	X X X X X 1 0

So, as an example, to send the value 43261 to output B1, you would:

- 1. Split the number into three parts, a HIGH 7-bit word (the most significant 7 bits), a LOW 7-bit word (the next 7 bits), and the remaining 2 bits.
  - **Original Number** = 43261 (decimal), 1010100011111101 (binary)
  - **High Word** = 84 (decimal), 1010100 (binary)
  - **Low Word** = 63 (decimal), 0111111 (binary)
  - **Remaining 2 Bits** = 1 (decimal), 01 (binary)
- 2. Send the separate bytes over different CC#s. Since output B1 is the 4th output on the MantaMate, we start with CC# 4 instead of CC# 1, and we add 3 to the numbers for the other CCs as well.

  This means that we send 84 over CC# 4, send 63 over CC# 36, and send 1 over CC# 68.

Even though the B and C columns of outputs have only 12-bit resolution as compared with the 16-bit resolution of the A-column outputs, they still expect data in the same format, they just ignore the bits they don't need.

4.6 MIDI Input to a Computer from the MantaMate

When the MantaMate is connected to a computer, it can send metronome clock information over MIDI messages. When an external gate input or a tick of the internal clock occurs, the MantaMate sends a MIDI message of a note-on at middle C at velocity of 127.

4.6.1 Saving a User Preset

To save a user preset, press `S` while in the default preference mode. Then navigate to the preset number you want to store it to, and press `S` again to save, or press `P` to cancel. You can save up to 90 user presets for MIDI modes. These are independent from the Manta user presets and the "No Device" user presets, and will not write over them. However, each MIDI user preset slot applies to both host-mode USB-MIDI (connected to a keyboard or controller) and device-mode USB-MIDI (connected to a computer). MIDI user presets store the full state of the MantaMate, including information gleaned from MIDI-learn operations, global tuning settings, global glide settings, and internal clock tempo information.

4.6.2 Konami Code When a MIDI Device or a Computer is Connected

When connected to a MIDI keyboard or a computer, this switches between Touch Mode (normal keyboard mode) and Arpeggiator Mode, and if Arpeggiator Mode is selected, it changes between different arpeggiator patterns.

- `0` Touch Mode (Arpeggiator Off)
- `1` Up (Arpeggiator On)
- `2` Down (Arpeggiator On)
- `3` Up/Down (Arpeggiator On)
- `4` Order Touched Forward (Arpeggiator On)
- `5` Order Touched Backward (Arpeggiator On)
- `6` Order Touched Forward/Backward (Arpeggiator On)
- `7` Random Walk (Arpeggiator On)
- `8` Random (Arpeggiator On)

Section 5

Joystick Input Device

This section covers using a joystick or game controller with the MantaMate.

5.1 Presets

- 00 Axes + DPads (as an axis) + Buttons (as gates)
- 01 Axes + DPads (as buttons) + Buttons (as gates)
- 02 DPads (as buttons) + Buttons (as gates)
- 03 Buttons (as gates)
- 04 Buttons (as triggers)

5.2 Using a Joystick or Game Controller with the MantaMate

Plug in a HID-compliant USB game controller or joystick, and the MantaMate will automatically detect what the outputs of the device are. It will prioritize any continuous controls such as X, Y or Z axes, and output all of those in the first few outputs, and then move on to output as many buttons there is space for in the remaining outputs. The various presets let you skip the axes if you need more buttons, read a DPad as buttons instead of an axis, or output buttons as triggers.

The axes are smoothed by the CV Glide parameter, accessed through P2-S.

5.3 Tested Working HID Game Controllers and Joysticks

Joysticks that have been verified to work with the MantaMate are:

Logitech Extreme 3D Pro
Logitech F310
Thrustmaster T.16000M FCS
Thrustmaster T.Flight Hotas 4
iBuffalo Nintendo controller USB clone BGCFC801RDA
Betop BTP-2118 (turn on the MODE button)

5.4 Non-Working Game Controllers and Joysticks

Joysticks that have been verified to **NOT** work:

Steam Controller
MadCatz GameTrak
Power A Wired XBox controller

Section 6

No Input Device

This section outlines *MantaMate* presets when using no input device.

6.1 Presets

Presets 0-2 output a clock trigger on A1, and randomized voltages on A2 and A3. The rest of the outputs described below:

Clock Trigger	Random Voltage	Random Voltage
CV/G/Trig	CV/G/Trig	CV/G/Trig
CV/G/Trig	CV/G/Trig	CV/G/Trig
CV/G/Trig	CV/G/Trig	CV/G/Trig

- 00 9 Random voltages on each clock
- 01 9 Random Gates on each clock
- 02 9 Random Triggers on each clock

Presets 3-6 output a clock trigger on A1, then act as dividers from that clock for the rest of the outputs. Each consecutive output is divided by the integer one greater than the last.

Clock Trigger (/1)	/2	/3
/4	/5	/6
/7	/8	/9
/10	/11	/12

- 03 Consecutive integer dividers – Random Voltages
- 04 Consecutive integer dividers – Gates
- 05 Consecutive integer dividers – Toggles

- 06 Consecutive integer dividers – Triggers

Presets 7-10 output a clock trigger on A1, then act as dividers from that clock for the rest of the outputs. Each consecutive output is divided by 2n̂.

Clock Trigger (/1)	/2	/4
/8	/16	/32
/64	/128	/256
/512	/1024	/2048

- 07 Power of 2 dividers – Random Voltages
- 08 Power of 2 dividers – Gates
- 09 Power of 2 dividers – Toggles
- 10 Power of 2 dividers – Triggers

Presets 11-18 use randomly generated patterns of a certain length that repeat These presets have the same top three outputs (A1, B1, and C1), but what follows is changed depending on the preset.

Clock Trigger	CV1 Pattern	CV2 Pattern
CV/G/Tog/Trig	CV/G/Tog/Trig	CV/G/Tog/Trig
CV/G/Tog/Trig	CV/G/Tog/Trig	CV/G/Tog/Trig
CV/G/Tog/Trig	CV/G/Tog/Trig	CV/G/Tog/Trig

- 11 All patterns same length – Continuous Voltages
- 12 All patterns same length – Gates
- 13 All patterns same length – Toggles
- 14 All patterns same length – Triggers
- 15 Each pattern has its own random length – Continuous Voltages
- 16 Each pattern has its own random length – Gates
- 17 Each pattern has its own random length – Toggles
- 18 Each pattern has its own random length – Triggers
- 19-99 User savable presets (save randomly generated patterns that you particularly like)

6.1.1 Starting No Device Mode

The No Device functionality is activated by pressing the up or down button while no device is plugged into the MantaMate. It will then continue until power is turned off or a device is plugged in.

6.1.2 Preference P1-S: Pattern Length

There is a Pattern Length parameter that is set by going into the first preference menu (P1 - tuning) and pressing `S` to get to the subpreference menu P1-S. You can then alter the length parameter. In the case of the "all patterns same length" presets, this Pattern Length value enforces the reset of all patterns, so that they all cycle at the same time. In the case of "each pattern has its own random length" presets, the Pattern Length is treated as a "maximum pattern length" and will reset any patterns that are not already repeating in a shorter time period. The value defaults to 16, and valid values are 1-32.

6.1.3 Konami Code - Randomize Repeating Patterns

Each of the 11 available outputs has its own pattern that is 32 steps long. The repeating patterns are randomly generated on power-up.

However, you can generate new ones by holding down the `P` button and then pressing the up or down buttons.

`UP` results in a completely new set of random patterns.
`DOWN` subtly changes the current patterns.

Appendix A

Tunings and Temperaments

There are 100 factory tunings installed in the MantaMate that allow the user to easily perform music outside the 12-tone equal tempered scale. The MantaMate also includes a procedure for loading new tunings into the module via MIDI sysex messages.

A.1 How to Upload Your Own User Tuning

There is a free Max patch available from http://www.snyderphonics.com that makes it easy to upload your own tuning to the MantaMate when it is connected to your computer. In this provided software, the user loads up a tuning text file in the Scala scale format, selects the tuning slot (1-99) to write to, and clicks a button to upload the tuning.

This Max patch formats the data as MIDI sysex messages that the Manta understands. If you would prefer to write your own software to send the sysex messages, this section explains the message format the MantaMate expects:

- 240 (to indicate Sysex start)
- 126 (to indicate non-realtime Sysex)
- 73 (the MantaMate product ID)
- 1 (tells the MantaMate that a tuning is what you are uploading)
- <number from 1-99> (this is the number of the tuning preset you want to store it to)

Next, the tuning should be expressed as follows: All of the following numbers are written as a series of 4 7-bit words, which are added up into a 28-bit value (highest byte first).

- <cardinality> (how many pitches are in your tuning - i.e. 12)

- <offset for each pitch from the fundamental in 100ths of a cent>

This is a list of the cents offsets from the first pitch for each note in the scale. 1/1 (0 cents) should be explicitly included in the set (even though that is unlike the Scala format). The numbers are expressed in 100ths of a cent to give higher resolution (for instance, the just major third of 386.31 cents is sent as 38631. (or, broken up into 4 7-bit words with the MSB sent first, 0 2 45 103) The MantaMate will repeat each scale at the octave. You can send tunings with up to 128 distinct pitches.

When you have sent all the bytes to express the tuning, end the sysex message.

- 247 (to end sysex transmission)

So, as an example, if you wanted to store at slot 45 a tuning that had only 3 pitches (0 cents, 500 cents, and 700 cents) the message would be this.

- 240 126 73 1, 45, 0 0 0 3, 0 0 0 0, 0 3 6 80, 0 4 34 112, 247

If at any time you want to recall one of the factory tunings that you have written over, just write a blank tuning (with the cardinality set to 0) to that slot, and the original factory tuning will return. The MantaMate will not allow you to write over tuning 00, which is 12-tone equal temperament.

A.2 Factory Tunings

Here is a list of the Factory Tunings. Apart from the first 9, these are all taken from the freely available Scala scale archive.

Here is a rough outline of how they are organized:

0-9 = A fun grab bag
10-29 = Just
30-49 = African
50-62 = European
63-69 = various tunings from Jacques Dudon
70-88 = Indian and Southeast Asian
89-99 = Turkish, Arabic, other

Here are the specific scale names, and their cardinality. If you would like more information, such as what the cents offsets are, you can look them up in the Scala scale archive.

0 twelve-tone_equal_temperament 12
1 overtone_just (custom) 12

2 kora (custom) 12
3 1/4 comma meantone (custom) 12
4 werckmeister1 (custom) 12
5 werckmeister3 (custom) 12
6 georgian choir (custom) 12
7 pythagorean (custom) 12
8 mbira (custom) 12

Factory tunings 9-99 are selections from the Scala scale archive.

9 yugo_bagpipe.scl (yugoslavian bagpipe) 12
10 young-lm_guitar.scl LM young guitar 12
11 young-lm_piano.scl LM young piano 12
12 awraamoff.scl 12
13 carlos_super.scl 12
14 doty_14.scl 14
15 dudon_harry.scl 12
16 ellis_harm.scl 12
17 fokker_12.scl 12
18 harrison_slye.scl 12
19 johnston.scl 12
20 johnston_22.scl 22
21 johnston_25.scl 25
22 johnston_6-qt_row.scl 12
23 kimball.scl 18
24 kurzweil_ji.scl 12
25 lumma5.scl 12
26 rosati_21.scl 21
27 schulter_jot17a.scl 17
28 sullivan_zen.scl 12
29 catler.scl 24
30 mambuti.scl 8
31 mboko_zither.scl 7
32 sanza.scl 8
33 sanza2.scl 7
34 xylophone2.scl 10
35 xylophone4.scl 10
36 dudon_kora-chimere.scl 12
37 dudon_kora_snd.scl 12
38 kora1.scl 7
39 kora2.scl 7
40 kora3.scl 7
41 kora4.scl 7
42 mbira_banda.scl 7
43 mbira_banda2.scl 21

44 mbira_chisanzhi2.scl 7
45 mbira_gondo.scl 21
46 mbira_zimb.scl 7
47 mbira_mujuru.scl 21
48 mbira_mude.scl 21
49 fortuna_eth.scl 12
50 freiberg.scl 12
51 ganassi.scl 12
52 hinsz_gr.scl 12
53 maihingen.scl 12
54 organ1373a.scl 12
55 galilei.scl 12
56 schlick-barbour.scl 12
57 thomas.scl 12
58 trost.scl 12
59 wiese3.scl 12
60 banchieri.scl 12
61 biezen2.scl 12
62 couperin_org.scl 12
63 dudon_gnawa-pelog.scl 12
64 dudon_egyptian_rast.scl 12
65 dudon_country_blues.scl 12
66 dudon_byzantine.scl 12
67 dudon_joged-bumbung.scl 12
68 dudon_kidarvani.scl 10
69 dudon_madhuvanti.scl 12
70 dudon_purvi.scl 12
71 dudon_segah.scl 12
72 gunkali.scl 7
73 indian-vina.scl 12
74 indian-srutiharm.scl 22
75 indian-hrdaya1.scl 12
76 indian-ayyar.scl 22
77 indian_12.scl 12
78 indian_12c.scl 12
79 indian4.scl 22
80 pelog1.scl 7
81 pelog12.scl 7
82 pelog_he.scl 7
83 slendro_ang2.scl 5
84 slendro4.scl 5
85 slendro_laras.scl 7
86 slen_pel_jc.scl 12
87 slen_pel_schmidt.scl 12
88 tranh3.scl 6

89 turkish_aeu.scl 24
90 turkish_awjara_on_b.scl 12
91 turkish_bagl.scl 17
92 turkish_segah-huzzam-mustear_v2_on_e.scl 12
93 bagpipe1.scl 12
94 bagpipe2.scl 7
95 scotbag4.scl 7
96 arabic_huzam_on_e.scl 12
97 ekring2.scl 12
98 chin_di2.scl 7
99 persian-far.scl 18

Thank you!

This manual was written by Jeff Snyder, Josh Becker, and Mike Mulshine.

Thanks to Till Bovermann for the nice Manta graphic used for the images.

In addition to Jeff, Mike, and Josh, the following individuals contributed at some point or another to the MantaMate development: Tommy DOG (inspiration and constant prodding), Elaine Chou (firmware development), Chloe Song (firmware development), Andrew McPherson (analog design help). Also thanks to the many Manta users who asked for this to exist!

Very special thanks to Mike Mulshine who poured countless hours of serious thinking into this, and to Nica who was willing to put up with me doing this whole crazy thing.