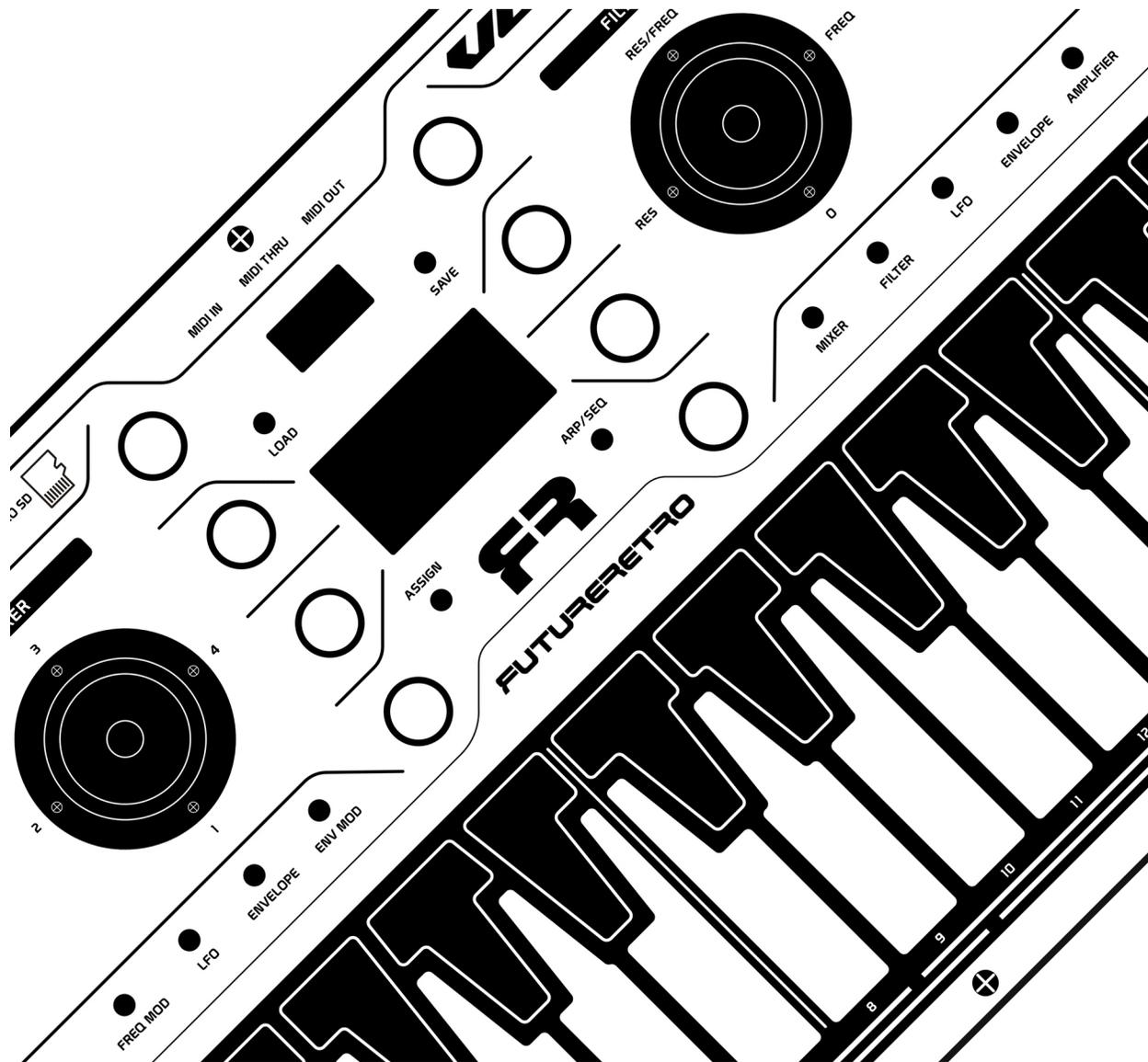


# FR

## FUTURERETRO



# VECTRA

*Operation Manual*

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## INTRODUCTION

Thank you for choosing the Vectra synthesizer. Please take time to read through the entire manual for a complete understanding of the operations and procedures needed to master this instrument.

### Contents

Included with your Vectra synthesizer, you should find an external power supply, micro SD card, and owner's manual. If any of these items are missing, please notify the dealer you purchased the unit from or contact Future Retro directly. Please keep the original box and all packaging material your unit came with, as they provide the best protection and will be required should you ever need to ship your unit.

### Overview

The Vectra is a unique hybrid synthesizer with a flexible architecture that allows many different forms of synthesis to be realized. It's the best of both worlds... The Vectra utilizes digital oscillators, ring modulators, noise sources, vector mixer, LFO's, complex envelopes, and modulation routings providing many capabilities that would be very difficult to produce with analog circuitry alone. This allows for accurate tuning, repeatability of complex patches, and patch storage. The Vectra also provides a multi-mode analog filter, VCA, and final output, as these provide the best sonic qualities.

The Vectra includes a powerful and fun sequencer and arpeggiator, with many new capabilities.

Although the Vectra is a self contained instrument, MIDI can be used to interface with other devices.

### Power

If the 15V DC power supply ever becomes lost or damaged, please contact us for a replacement.

Always make sure the power supply is correct for your country's power mains voltage.

### Care

Avoid exposing the unit to smoke or damp, dusty, or extreme hot and cold environments. To clean the unit, use a soft damp cloth. Do not use any chemical cleaners, as these may harm the surfaces and finish of the unit.

### Product Warranty and Support

The Vectra comes with a 1 year limited warranty covering mechanical or electrical manufacturing defects. Please keep all original packaging and purchase invoice as you will need to show proof of purchase to receive warranty coverage.

The warranty does not cover normal wear, or damage due to misuse, or abuse of the product. There are no user serviceable parts inside the unit. Disassembly or modifications performed to the unit will automatically void the warranty. Future Retro will not be held liable for any accidents or damages caused to the user or their surroundings when using this product.

Should your unit become damaged within the warranty period, please email product support: [support@future-retro.com](mailto:support@future-retro.com)

You will need to obtain authorization to return the unit to us for repairs.

Please visit the Support and Downloads pages of our website for the latest information, sound files, and support for this product:

[www.future-retro.com](http://www.future-retro.com)

## DEFINITIONS

The following are definitions and abbreviations of modulation sources and parameters used in the Vectra

### MODULATION SOURCES

**Off:** No modulation source.

**Rnd-1:** Creates a random value at the start of a single note-on.

**Rnd-2:** Creates a random value at the start of any new note-on.

**Key-1:** Covers the entire range of MIDI notes from 0-127.

**Key-2:** Covers the 29 note range of the internal keyboard.

**Vel:** The Velocity value of the keyboard, or sequencer.

**Touch:** The Touch value of the keyboard, or Aftertouch value of MIDI notes.

**ModW:** The ModW joystick axis, or the Mod Wheel MIDI message.

**Bend:** The Bend joystick axis, or Pitch Bend MIDI message.

**Stk-X:** The X-axis of the assignable Stick joystick.

**Stk-Y:** The Y-axis of the assignable Stick joystick.

**LFO-(1-4):** The Low Frequency Oscillator used to modulate Oscillators 1-4.

**Env-(1-4):** The Envelope used to modulate Oscillators 1-4.

**LFO-F:** The Low Frequency Oscillator for the Filter.

**Env-F:** The Envelope for the Filter.

**EnvAmp:** The output VCA's amplifier envelope.

**Link(1):** Routes all of Oscillator 1's modulation sources to Oscillator 2, 3, and 4.

**DC-:** A negative voltage potential.

**DC+:** A positive voltage potential.

**Mix-1:** Audio signal assigned to Mixer source 1.

**Mix-2:** Audio signal assigned to Mixer source 2.

**Mix-3:** Audio signal assigned to Mixer source 3.

**Mix-4:** Audio signal assigned to Mixer source 4.

### PARAMETER ABBREVIATIONS

**Mod:** Modulation

**Amt:** Amount

**Oct:** Octave

**Dtn:** Constant Beat Detuning

**FMoct:** The Frequency Modulation amount in Octaves.

**FMmod:** The Frequency Modulation Source.

**FMamt:** The Frequency Modulation Amount.

**Ctrl:** Control, a modulation source that controls the amplitude of another modulation amount.

**LFO:** Low Frequency Oscillator

**Env:** Envelope

**Dly:** Delay

**Atk:** Attack

**Hld:** Hold

**Dec:** Decay

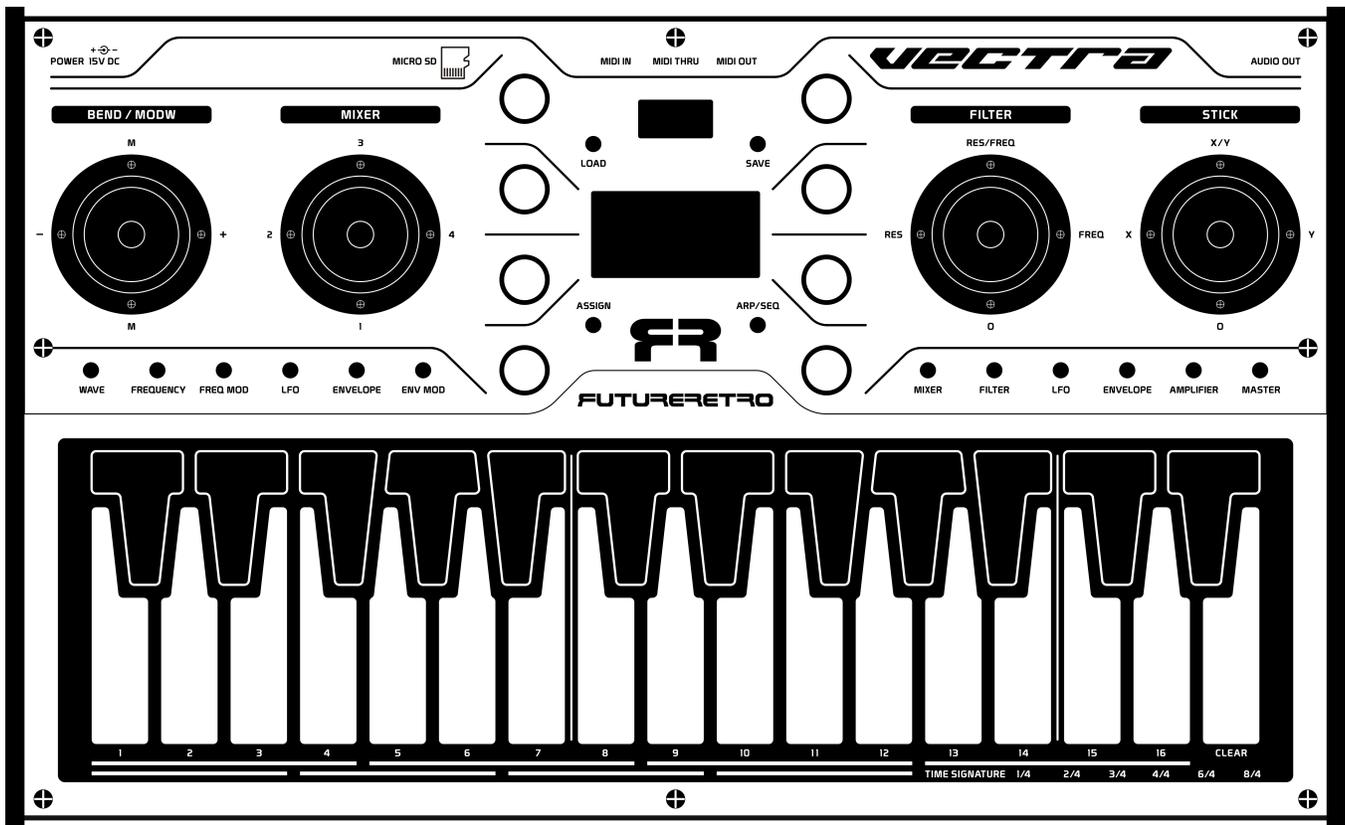
**Sus:** Sustain

**Rel:** Release

**Rpt:** Repeat

**VCS:** Control Voltage Slewing of filter's cutoff modulation signals.

## GETTING STARTED



To play the Vectra, follow these directions in order, starting with the power turned OFF.

1. Install the micro SD card in the rear of the unit with the contact finger pointing up.
2. Connect the 1/4" unbalanced audio output to an input channel on your studio's mixer.
3. Press the power switch of the Vectra to turn the unit ON. Avoid touching the keybed, and pitch-bend joystick during the boot up period, as the unit is calibrating these functions.
4. To adjust the main output level of the Vectra, press the Master switch, then rotate knob 1. To save this setting, while in Master mode press the Save switch.
5. Adjust the input gain setting on your studio's mixer for the best signal to noise ratio without distortion.
6. To load different sounds and sequences, press the Load switch to enter the Load mode. Rotate knob 1 to select different sounds, then press the Load switch to load the current sound selected.
7. Touch the keyboard keys to begin playing the sound. Realize that some sounds may use velocity or aftertouch to modify the sound, so try to play the keyboard with different methods.
8. Try applying pitch-bend, mod-wheel, mixer, filter, and stick variations to see how these affect the currently selected sound.
9. Press the power switch again to turn the power off.

In some instances you may experience no response from the movement of the joysticks depending on how the instrument parameters are set. For a full understanding of this product and its features, please read through the entire manual.

We have lots to cover so let's get started.

## CONNECTIONS



### POWER

Connect the provided 15volt DC power supply to the power jack on the rear of the unit. Always check to make sure the power supply is correct for your country's power mains voltage.

### MICRO SD CARD

Always make sure the unit is turned OFF before installing or removing the micro SD card. Failure to do so may corrupt data stored on the card, or even cause damage to the card itself. We recommend using a memory card with 2 gigabytes (or more) of memory. It is also advised to use cards with a class 4, class 10 (or faster) read/write speed. Install the card in the unit with the contact fingers facing up as indicated on the front panel.

### MIDI IN

Information received at the MIDI IN jack can be used to play the internal sounds of the Vectra, or synchronize the playback of the internal sequencer and arpeggiator. Use a MIDI cable to connect this input to the MIDI OUT of an external sequencer or keyboard.

### MIDI THRU

All information received at the MIDI IN jack will be sent out the MIDI THRU jack. Use a MIDI cable to connect this output to the MIDI IN of another device for creating a daisy chain between multiple MIDI units.

### MIDI OUT

The MIDI OUT jack is used to send MIDI data from the internal keyboard, sequencer, or arpeggiator out to other external MIDI devices. Use a MIDI cable to connect this output to the MIDI IN of an external MIDI device.

### AUDIO OUT

Use a 1/4" unbalanced audio cable to connect the Audio OUT to an input channel on your studio's mixer.

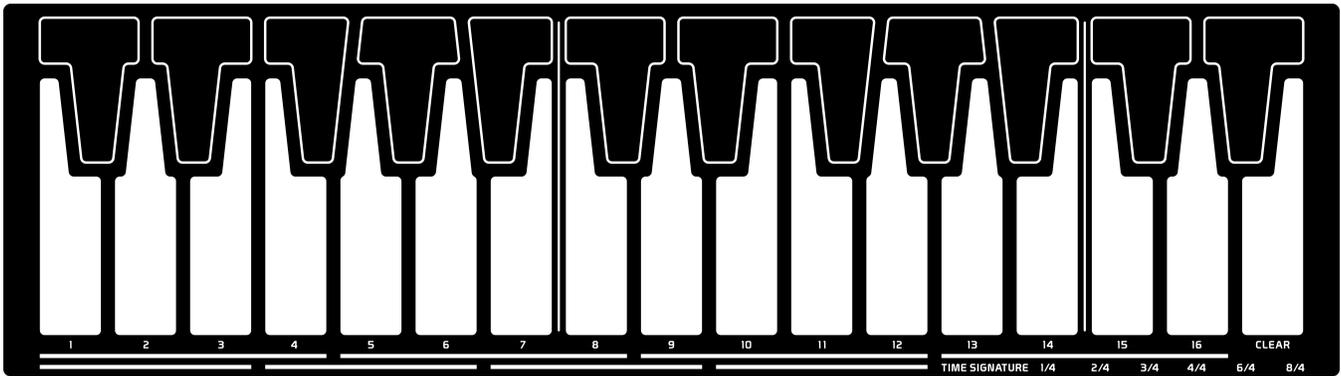
## A NOTE ON CAPCITIVE TOUCH

The Vectra uses capacitive touch keys instead of traditional mechanical switches. With capacitive touch keys your body acts as a capacitor that is used to detect touches. Devices that transmit wireless frequencies such as fluorescent and neon lighting, cordless phones, and wifi, may affect the touch response of the keyboard when in close proximity of the Vectra. If you experience unusual behavior, try moving the Vectra to a different location.

You do not need to hit or press on the keyboard hard. Velocity values are determined by how much of your finger comes into contact with the key when a new note is detected. Touch or aftertouch is determined by the surface area of your finger touching a key.

Note: You can increase your body's capacitance by touching the Vectra's metal chassis or front panel.

## OVERVIEW OF FRONT PANEL CONTROLS



### KEYBOARD

The Vectra provides a 29 note capacitive touch keyboard that can produce note-on/off, pitch, velocity, and aftertouch, as well as activate gliding of oscillator pitches, and is also used for data entry for the sequencer and arpeggiator. To produce glides, play two or more keys simultaneously, or drag your finger across the keyboard.

Note: Avoid touching the keyboard or pitch-bend joystick when the unit is first turned On during the boot up process, as these functions are being calibrated.

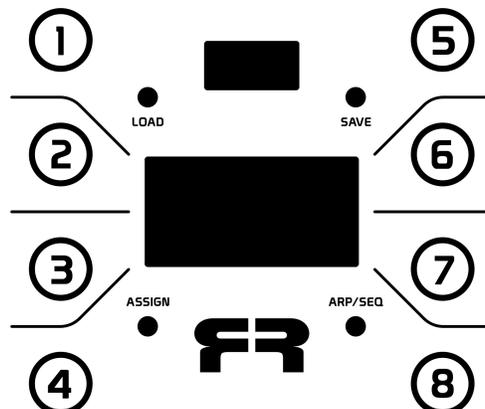
While the keyboard may have only 29 keys, most traditional instruments will have a limited number of notes they can play. However if greater range of notes is needed, simply assign a scale to the keyboard. The 29 keys can cover four octaves of notes in the Major scale, and six octaves for pentatonic scales.

### JOYSTICKS

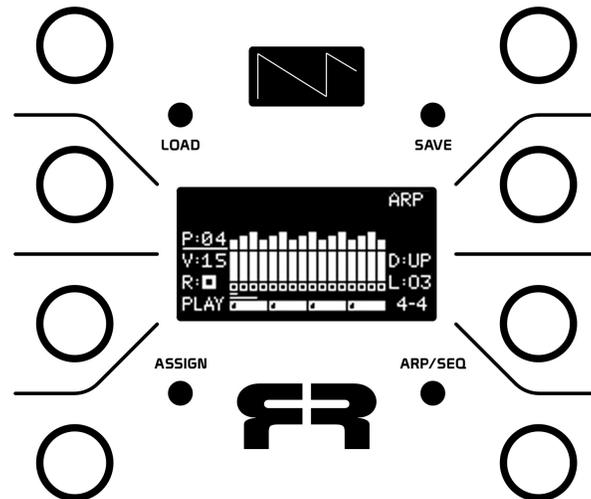
The Vectra provides four joysticks for Pitch-bend and Mod-wheel, Mixing of the oscillators, control of the Filter cutoff and resonance, and the Stick control which can be assigned to many different functions.

### CONTROL KNOBS

Eight control knobs are provided and their function will change depending on the mode you working in. In this manual we will refer to these knobs as 1-8, with knobs 1-4 being the left column (top to bottom), and knobs 5-8 being the right column (top to bottom). You will notice that each knob relates to a parameter shown in the display screen, as these parameters are also laid out as two columns of (up-to) four parameters. Knobs can be rotated to change parameter values. Each knob also has a switch that can be activated by pressing down on the knob. The function of these knobs will be described in each section of this manual.



## OVERVIEW OF FRONT PANEL CONTROLS



### SCOPE

The smaller display on the front panel is the Scope. This display allows you to visualize the waveforms and modulation signals happening for the most recently selected synthesizer mode.

### DISPLAY

The larger display on the front panel is the main display. This display will show main parameters to be adjusted for all the different modes.

### LOAD/SAVE

The Load and Save switches are used to load, save, and delete instruments and sequences.

### ASSIGN

The Assign switch allows individual synthesizer parameters to be assigned to the 8 knobs.

### ARP/SEQ

The Arp/Seq switch accesses parameters for the Arpeggiator, Sequencer, and Keyboard.

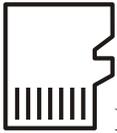


### SYNTH PARAMETERS

There are eleven switches to access the different synthesizer parameter modes. These will be discussed in detail in the synthesizer parameters section.

### MASTER

The Master mode contains master settings such as volume, MIDI channel, overall tuning, and the screen saver sleep time.



## MEMORY / MICRO SD CARD

# MEMORY CARD AND FILES

The Vectra can load up to 999 sounds and sequences stored on the external micro SD card.

Each memory location holds the parameters for an individual sound and sequence.

If no card is installed in the unit, you can still play and edit a simple default sound patch and sequence, however you will be unable to save or load any of your work.

A 2 gigabyte (or larger) micro SD card should be used with a speed rating of Class 4, Class 10 (or faster). Since sounds and sequences are loaded directly from the card, the speed of the memory card used can be critical for faster loading and saving.

Always turn the unit's power OFF before installing or removing the micro SD card. Otherwise damage may occur to the card, and data on the card may become corrupt.

The file system used in the Vectra requires the micro SD card to be formatted to the FAT16 or FAT32 standards. If you ever lose your card and need to replace it with a new one, make sure the card is formatted to this file type before inserting into the unit. When a newly formatted card is installed in the Vectra, basic files and folders will be automatically generated on the card.

## BACKING UP YOUR WORK

You can back up your work by connecting the micro SD card to your computer, and either drag and drop the files on the card to your computer, or by making a disk image of the micro SD card. The disk image is preferred if you ever want to reload the contents back onto the card exactly as it existed before.

Otherwise, if you drag and drop files from your computer back onto the card, sound files will appear in memory in the order that they were placed on the card.

If you ever replace or reformat your card, it is recommended that you install the freshly formatted card into the unit first and power up the unit so the basic folders, and default patch file are automatically placed on the card. This then will make the default file NEW\_INST the first file on the card, which is easily accessed when creating new sounds from scratch. Then if desired, you can remove the card, connect it to your computer, and drag and drop any additional sound files you may have previously saved on your computer back to the card. All sound files must be placed in the INSTR folder.

While it is possible to rename files on your computer, users should be aware that the Vectra file system uses short 8.3 names for files. This means that files should be eight characters in length and use only the following characters:

0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z ! # % & ' ( ) — \_

Using any other characters for a file's name may cause errors, or the inability to load that file. Vectra files all end in the ".txt" file format. This does not mean that you will be able to view or edit the contents of the file with a text editor.

## BAD FILES

If your card or files on the card ever become corrupt, it is recommended to back up the data on the card to your computer immediately. Reformat the card to the FAT32 file type. Then look over the files you saved from the card onto your computer. You can usually identify bad files by their size being different than other files of the same type. If you see these bad files, delete them and then reload only the good files back onto the freshly formatted card.

Note: It is not advised to store files on the micro SD card that the Vectra does not use or support.

## **LOAD / SAVE / DELETE**

### **LOAD**

Press the Load switch to enter the Load mode.

Here you can load an individual Sound, Sound and Sequence together, or an individual Sequence.

Rotate knob 1 to select the file to load.

You can also press knob 1 to quickly jump to the first or last file. How this works is, if you are at any selection other than 000, pressing the switch will select the 000 file. Pressing this switch again when selection is 000 will then select the last file on the card.

Rotate knob 2 to select the file type to load.

Here you can select an individual Sound, Sound and Sequence, or an individual Sequence.

Once your selection has been made, press the Load switch to confirm and load the current selection.

Note: If keys are being played on the keyboard when a new sound is loaded, the new sound will load once all keys on the keyboard have been released. If the sequencer or arpeggiator is playing when a sound or sequence is loaded, the new sound or sequence will load once the current loop point is reached.

Tip: Since you can load Sounds and Sequences independently, this is a great way to copy a sequence from one file to be used with the current sound, or copy a sound from another file to be used with the current sequence. Once you have the desired combination of sound and sequence, save it to a new file.

### **SAVE**

Press the Save switch to enter the Save mode.

Saving will write the current sound and sequencer parameter data to the memory card.

If you made a few changes to an existing Sound and/or Sequence and wish to overwrite these new changes to the same file, press the Save switch to confirm and save (overwrite) to the existing file name on the card.

You can also rename the file before saving. This then keeps the original file on the card, and writes the new changes you made to a file with another name on the card.

To rename a file, rotate the knobs to change the file name to something new. Then press Save to confirm and save the new file to the card. Beware, if you rename the file to the same name of another file already on the card, the existing file on the card will be replaced with this new file.

### **DELETE**

To delete a Sound and Sequence file from the card, you must first load the file you want to delete.

Once loaded, press and hold the Save switch, and then press the Load switch to confirm and delete the file. Once deleted, the switches can be released.

NOTE: When you save a file, this file will be written to the first available memory slot on the card. If no files have been deleted, this allows new files to appear in sequential order. However, if you delete a file and then save a new file, that new file will appear in the location as the previous file/s you deleted.

## ASSIGN PARAMETERS

### ASSIGN

The Assign mode allows (most) synthesizer parameters to be individually assigned to one of the eight knobs. This allows the most useful parameters for a particular sound patch to all be accessible at the same time while in the Assign mode. These custom control assignments will be stored with each individual sound.

The reason we say “most” synthesizer parameters is, any synthesizer parameter value that is changed by rotating the knob can be assigned. While there are a few synthesizer parameters in which the value is changed by pressing the knob. Those parameters that require pressing the knob, can not be assigned.

To assign a synthesizer parameter to one of the knobs, first navigate to the correct synthesizer parameter page so the display shows the parameter you want to assign. Hold down the Assign switch, and then press the knob representing the synthesizer parameter you want assigned.

The display will then show the ASSIGNED CONTROLS screen and you can see all current assignments. Now press the knob you want that synthesizer parameter assigned to, and then release the Assign switch.

The display will then jump back to the synthesizer mode/page you were last at. Use this method to assign individual parameters to all eight knobs.

To enter the Assign mode, simply press and release the Assign switch. The display will show all parameters assigned to the eight knobs. As you rotate one of the assigned knobs, the value for that parameter will appear at the top of the display. If you would like to simply see the value an assigned parameter is set to without adjusting the value, press that parameter’s knob.

Note: You can overwrite a previously assigned parameter to a knob simply by selecting a different parameter and assigning it to that knob location. Or if you would like to clear the assignment of a parameter, once the Assign mode is selected, press and hold the Assign switch, then press the knob twice representing the parameter assignment you want to clear, then release the Assign switch.

Note: Sequencer parameters can not be assigned to knobs. Most sequencer parameters are set using the keyboard, and all sequence editing and parameters changes are done in the sequencer mode only.

## MASTER SETTINGS

### MASTER

Press the Master switch to enter the Master mode. Here you can adjust global parameters.

### Level

Rotate knob 1 to change the volume level for the main Audio Out signal.

Press knob 1 to mute and unmute the output volume.

### MIDI

Rotate knob 2 to change the MIDI channel the Vectra will send and receive MIDI data on.

Press knob 2 to reset the MIDI channel to a value of 1.

Note: The MIDI channel can be changed at any time. The new MIDI channel setting will take effect once all internal or external playing notes have been released to prevent latched notes.

This allows you to redirect MIDI notes playing in the internal sequencer out to different MIDI channels on the fly, or to pick and choose from various external MIDI channels playing from an external DAW.

### Tune

The Tune parameter defines the overall fine tuning of notes.

Rotate knob 3 to adjust the tuning from -128 to 128. There are 128 fine tuning steps per semitone, so this parameter provides -/+ 1 semitone adjustment.

Press knob 3 to reset the tuning to a value of 0.

If you need to tune the instrument to greater than -/+ 1 semitone, you will need to use the Transpose feature mentioned in the sequencer section of this manual.

### Sleep

The Sleep parameter defines the number of minutes of inactivity before the screen saver will turn on.

The screen saver is designed to extend the life of the display and prevent image burn.

By default this parameter is set for 5 minutes.

Settings include: Off, 5, 10, 20, 30, and 60 minutes.

Rotate knob 4 to change the setting.

Press knob 4 and the parameter will reset to the 5 minute setting.

Warning: Setting the Sleep parameter to Off will prevent the screen saver from ever coming on.

Caution should be used with this setting, as extended periods of use without the screen saver active can cause image burn, and the overall lifespan of the display to decrease.

Once the screen saver is active, you can wake the unit up by simply pressing any parameter switch or turning a knob. Moving the joysticks or playing the keyboard will not wake the unit from sleep, however the unit will continue to play sounds as normal.

### SAVING MASTER SETTINGS

Master settings can be saved to the memory card, and are automatically loaded each time the unit is powered on.

To save Master settings, enter the Master mode, adjust your settings, and then press the Save switch.

## SYNTHESIZER OVERVIEW

The Vectra provides four oscillators, white and pink noise sources, four ring modulators, a four-channel mixer, five LFO's, six morphing envelopes, six primary multimode analog filter types, a main analog VCA, and numerous internal modulation routings and VCA's controlling modulation amounts.

It really is like having a powerful self-contained semi-modular synthesizer with approximately 500 internal signal routings, and around 256 storable sound parameters.

The synthesizer architecture is designed to allow the greatest flexibility in recreating multiple synthesis techniques of the past while introducing several new innovations. The sound section has been inspired by features of the greatest synthesizers ever made, while not focusing specifically on recreating any instrument in particular. The Vectra is in fact it's own unique self-contained instrument.

The oscillators are digital as this provides the highest degree of tuning stability, while allowing both virtual analog and digital waveform generations. With features like oscillator Sync, PWM, our new waveform Phase Slice, and Fade features, independent glide times per oscillator, constant beat detuning, and paraphonic voice modes, not to mention FM, AM, ring-modulation, and dedicated LFO's, envelopes, and VCA's per oscillator really make these oscillators a power house.

The four-channel mixer is unique in that it provides an even balance when mixing multiple sources, either manually with the joystick, or applying automated vector mixing, or mixer modulation.

The five LFO's provide 500+ waveforms to choose from, with their frequency spanning from sub-audio into the audio range. Their frequency can be stationary or track keyboard notes with glide. Waveforms can sync to any waveform phase at a note-on, and they can be frequency modulated as well. In short they can be used as LFO's, complex envelopes, or audio rate oscillators.

The six morphing envelopes are really something else. With each envelope providing initial Delay, Attack, Hold, Decay, Sustain, Release, as well as a loop time when they are set to Repeat. Ultra precise and snappy they provide envelope times from 0ms to 14.7 seconds per each stage. Each envelope provides multiple envelope curve selections, and can be one-shot, normal envelope types, or looping.

And did you notice they can morph? Yes, that's right! Envelopes can morph and modulate between two individual values per each envelope stage.

The analog multimode filter provides six primary filter types being: 4-pole low-pass, 2-pole low-pass, 1-pole low-pass, 2-pole band-pass, 2-pole high-pass, 2-pole notch, with some additional selections to define a filter's self resonance response, and also to recreate a very unique characteristic of the EMS VCS type filter modulation. The filter can track notes played on the keyboard, has a dedicated LFO, Envelope, and one additional modulation source.

And finally the analog VCA before all those sweet sounds hit our ears. The Amplifier VCA has a dedicated morphing envelope as well.

This synthesizer covers so much sonic territory from analog to digital sounds, traditional to experimental, bass, leads, solos, percussion, effects, drones, ambient sounds, and those yet to be discovered.

## OSCILLATORS 1-4

Let's take a moment to understand the navigation of the Oscillator modes.



The six switches to the left-hand side of the front panel access our oscillator parameters and modulations.

Since there are four oscillators, LFO's, and envelopes in this section, each of these switches can be pressed repeatedly to select a different number (1-4) of oscillator, LFO, envelope, or modulation. If for instance you are working on oscillator 1 adjusting the waveform, and want to change the frequency of oscillator 1, simply press the Frequency switch. On the other hand, if you are adjusting the frequency of oscillator 1, and then want to adjust the frequency of oscillator 2, simply press the Frequency switch to select the next oscillator number to edit.

Press the WAVE switch on the front panel to access the oscillator's wave parameters. The Scope will show what the current waveform looks like. The top of the main display shows the number for the current oscillator being edited.

### Wave

Rotate knob 1 to change the waveform selection.

The first five waveforms are analog models of the most traditional synthesizer waveforms being: Sine, Triangle, Sawtooth, Square, and Pulse Width Modulated.

The rest of the display appears rather empty since no further modulation of these waveshapes is possible. The benefit of these waveforms is they are all anti-aliased, meaning you can play them at any frequency and they sound good without digital artifacts.

These waveforms can be used to recreated most traditional analog synthesizer sounds.

### Width

When the Pulse Width Modulated waveform is selected, new parameters appear on the display.

Rotate knob 2 to adjust the initial Width of the pulse waveform.

Press knob 2 to reset the initial pulse width value to 50%.

### (Pulse Width) Mod

Rotate knob 4 to select a modulation source to modify the pulse width.

Modulation sources are defined on page 2 of this manual.

### (Pulse Width) Amt

Rotate knob 8 to set the modulation amount from 0 to 100.

Press knob 8 to quickly jump to a value of 0, or 100.

Tip: If you press knob 1 while any of the first five analog modeled waveforms are selected, the waveform will default to a sawtooth.

## OSCILLATOR WAVE 1-4

### Digital Waveforms

Rotating knob 1 beyond the PWM waveform selection, we now enter the digital waveforms numbered 000-500. These single-cycle waveforms come from all sorts of various sources including real instruments, and some of the most sought after vintage analog, digital, wavetable synthesizers, and others that were purposefully drawn, or randomized.

We realize that scrolling through 500 waveforms can be tedious, so when any digital waveform is selected, you can press knob 1 to quickly jump to waveform 000, or 500.

Since these waveforms are digital, their waveshape can range from very simple to very complex. Please understand that complex waveforms contain many harmonics, and as these complex waveforms are played higher in frequency, they do have the ability to alias and introduce digital artifacts. While this is alright for some sounds, it may not be for others. You will need to choose waveforms accordingly or limit the upper range if you wish to avoid some of these digital waveforms from aliasing.

There are three additional selections that can be made for the waveform once you pass waveform 500, these are DC-, OFF, and DC+. While not exactly waveforms selecting these options can allow you to PWM any of the digital waveforms using the Slice mode, or cause digital waveforms to transition to these levels when using the Fade mode.

When digital waveforms are selected the display changes quite a bit, as there are several things one can do to these waveforms. In fact, now the oscillator is capable of producing two unique waveforms at a time, and these waveforms can be modulated in new ways.

### Wave1

Rotate knob 1 to select Wave1.

Press knob 1 to quickly jump to waveform 000 or 500.

Wave1 is the only waveform you will hear if no modulation is applied to the waveshape.

### Wave2

Rotate knob 2 to select Wave2.

Press knob 2 to quickly jump to waveform 000 or 500.

Wave2 can be heard once modulation is introduced.

### Start

Rotate knob 3 to change the waveform start value.

Press knob 3 to reset this value to 000.

The start value ranges from 000 to 255. These numbers represent one of the 256 samples each single-cycle waveform is made up of. Therefore, Start offsets the point in memory both waveforms begin and end, and is continuously adjustable. This can be useful for changing the harmonic content of the waveforms. For instance if waveform XXX is a sine wave, and waveform XXX(+1) is a sawtooth, setting the start point to 128 would produce a waveform that was half sine wave, and half sawtooth.

### Mod

Rotate knob 4 to select the modulation source.

Modulation sources are defined on page 2 of this manual.

## OSCILLATOR WAVE 1-4

### Type

Press knob 5 to change the waveform modulation Type to Slice or Fade.

Slice (or Phase Slice) allows an abrupt jump from playing wave1 to wave2, at any phase from 0-360 degrees for both waveforms. The measurement in degrees is controlled by the modulation amount and source. The result can vary depending on the two waveforms you are slicing between, but overall will introduce changes to the harmonic content. At times it can sound as though two separate oscillators are going in and out of phase as though they are detuned.

Beware, the Slice method can introduce very high frequency harmonics causing other digital artifacts to be heard. You will typically have the best results using this method with lower frequency sounds.

Fade allows a smooth crossfading between wave1 and wave2.

### Amt

Rotate knob 8 to change the modulation amount from 000 to 100.

Press knob 8 to quickly jump to a modulation amount value of 000, or 100.

## OSCILLATOR FREQUENCY 1-4



### Key Tracking

Press knob 1 to turn oscillator key tracking On/Off.

The keyboard icon will show in the top-left corner of the display when key tracking is turned On.

### Oct

Rotate knob 1 to change the oscillator pitch in octaves.

### Pitch

Rotate knob 2 to change the oscillator pitch in semitones.

Press knob 2 to reset all Oct/Pitch/Fine settings.

### Fine

Rotate knob 3 to change the fine tuning of the oscillator.

There are 128 steps of fine tuning per semitone.

Press knob 3 to reset fine tuning to a value of 0.

### Dtn

Rotate knob 4 to change the constant beat detuning from  $\pm 5.00\text{Hz}$ .

Press knob 4 to reset constant beat detuning to a value of 0.

## OSCILLATOR FREQUENCY 1-4

### **Poly** (oscillator 1 only)

Press knob 5 to select a polyphonic mode type. Technically this is a paraphonic mode since all four oscillators share a common filter. However, Poly just sounded better than Para.

Selections include:

**OFF:** Poly mode is off, unit works normally as a monosynth.

Note: Poly modes 1SQ, 1ST, 1RR, and 1RT all use envelope 1 settings to control envelopes 2, 3, and 4. While envelopes 1, 2, 3, and 4 can all be set independently for Poly modes 4SQ, 4ST, 4RR, and 4RT .

**SQ:** Sequential, plays voices sequentially 1, 2, 3, 4 as multiple notes are played and held.

**ST:** Same as SQ with retriggering of Filter and Amplifier envelopes with each new note played.

**RR:** Round Robbin, each new note plays the next available voice.

**RT:** Same as RR with retriggering of Filter and Amplifier envelopes with each new note played.

Tip: When using any of the Poly modes, you should set the mixer joystick to center position, and set mixer sources to:

1: Osc1Env

2: Osc2Env

3: Osc3Env

4: Osc4Env

Note: The sequencer is monophonic. Should you try and play a sound using any of the Poly modes with the sequencer, Poly mode will be turned Off automatically.

### **SynK** (oscillator 1 only)

Rotate knob 7 to set the waveform phase this oscillator will jump to when a new key is played.

When set to Off, no oscillator Sync will occur.

Press knob 7 and the SynK value will quickly jump to Off, 000, 090, 180, and 270 degree values.

### **Sync1** (oscillator 2-4)

Rotate knob 7 to set the waveform phase this oscillator will jump to when it syncs to Oscillator 1's frequency. When set to Off, no oscillator sync will occur.

Press knob 7 and the Sync1 value will quickly jump to Off, 000, 090, 180, and 270 degree values.

### **Glide**

Rotate knob 8 to set the glide time for each individual oscillator.

Press knob 8 to reset the glide time for the currently selected oscillator to a value of 0.

Tip: You can set Oscillators 2, 3, and 4 glide values to (1), and they will track the glide time set for oscillator 1.

Note: The Vectra uses an autoglide circuit, where notes will glide only when two or more notes are played simultaneously when using the normal monophonic mode. When glide is set greater than 0 in any of the poly modes, individual voices can glide from their last played pitch to the currently played pitch.

## OSCILLATOR FREQUENCY MODULATION 1-4

### **Ctrl**

Rotate knob 2 to select a source to control the amplitude of the LFO.  
Press knob 2 to turn this mod source Off.

Rotate knob 3 to select a source to control the amplitude of the Envelope.  
Press knob 3 to turn this mod source Off.

Note: By selecting a source to control either the LFO or Envelope, this source will control the amplitude of this LFO or Envelope signal even when routed to modulation destinations other than oscillator frequency.

### **Mod**

Rotate knob 4 to select a third modulation source to modulate the oscillator frequency directly.

### **FMoct**

Rotate knob 5 to select the overall range in octaves the modulation sources will have on this oscillator's frequency. The range is from 0.5 to 10 octaves.  
Press knob 5 to reset the modulation octave range to a value of 1.

### **LFO(1-4)**

Rotate knob 6 to change the modulation amount this LFO will have on the oscillator's frequency. The range is from -99 to 100.  
Press knob 6 to quickly jump to a value of 000, 100, or -99.

### **Env(1-4)**

Rotate knob 7 to change the modulation amount this envelope will have on the oscillator's frequency. The range is from -99 to 100.  
Press knob 7 to quickly jump to value of 000, 100, or -99.

### **Amt**

Rotate knob 8 to change the modulation amount the defined third modulation source will have on the oscillator's frequency. The range is from -99 to 100.  
Press knob 8 to quickly jump to a value of 000, 100, or -99.

## OSCILLATOR LFO 1-4



### Key Tracking

Press knob 1 to turn LFO key tracking On/Off. The keyboard icon will show in the top-left of the display when key tracking is turned On, and the frequency of the LFO will follow notes played on the keyboard, and sequencer.

### Freq

Rotate knob 1 to set the initial pitch of the LFO. The range is 0.001Hz to 1001Hz.

Note: The LFO frequency will be higher than the frequency shown when key tracking is turned On.

### Fine

Rotate knob 2 to adjust the LFO's frequency in fine steps from 000 to 127.

There are 128 fine steps of tuning per semitone of pitch or frequency.

Press knob 2 to reset this fine tune amount to a value of 0.

### Sync

Rotate knob 3 to set the waveform phase this LFO will jump to when a new note is played.

When set to Off, no LFO sync will occur, and the LFO waveform will be free-running.

Press knob 3 and the Sync value will quickly jump to values of Off, 000, 090, 180, and 270 degrees.

### FMmod

Rotate knob 4 to select a source to modulate the LFO's frequency.

### Wave

Rotate knob 5 to select the waveshape for this LFO.

Press knob 5 to reset the LFO waveshape to sine when any of the virtual analog waveforms are selected, or quickly jump to waveform 000, or 500, when any of the 500 digital waveforms are selected.

### Start

The Start parameter is only shown when the waveshape is set to any of the 500 digital waveforms.

Rotate knob 6 to change the start point this digital waveshape will begin reading it's shape from memory. The value ranges from 000 to 255 samples, and going beyond the 000 or 255 sample values will begin selecting the previous or next waveform in memory.

Press knob 6 to reset the Start parameter to a value to 0.

Note: This start parameter can be used to combine different portions of two adjacent waveforms in memory for more complex shapes.

### FMoct

Rotate knob 7 to define the number of octaves the modulation amount will have on this LFO's frequency. The range is from -99 to 100.

Press knob 7 to quickly jump to a value of 000, 100, or -99.

### FMamt

Rotate knob 8 to change the amount of effect the modulation source will have on the LFO's frequency. The range is from -99 to 100.

Press knob 8 to quickly jump to a value of 000, 100, or -99.

## OSCILLATOR ENVELOPE 1-4

This mode sets the initial parameters for the Oscillator Envelopes 1-4.

The envelope stages in order are: Delay, Attack, Hold, Decay, Sustain, Release, Repeat/loop.

### Atk

Rotate knob 1 to set the Attack time of the envelope from 0ms to 14.7 seconds.

Press knob 1 to quickly jump to 0ms, or 14.7 seconds.

### Dec

Rotate knob 2 to set the Decay time of the envelope from 0ms to 14.7 seconds.

Press knob 2 to quickly jump to 0ms, or 14.7 seconds.

Note: When both the Attack and Decay settings are 0ms, both parameters will show Skip as their value. This means the envelope will skip over these stages and jump immediately to the Sustain level instead.

### Sus

Rotate knob 3 to set the Sustain level from 0 to 100.

Press knob 3 to quickly change the Sustain level to 0, or 100.

### Rel

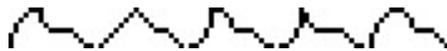
Rotate knob 4 to set the Release time of the envelope from 0ms to 14.7 seconds.

Press knob 4 to quickly jump to 0ms, or 14.7 seconds.

## ENVELOPE SHAPE

Press knob 5 to change the envelope shape.

There are five DAHDSRR type envelopes.



These envelopes will play or loop as long as a key is held on the keyboard, and then jump to the envelope Release stage when the key is released.

There are four DAHDR one-shot envelopes.



These envelopes will play through all stages (except Sustain and Release) each time a key is played. When set to loop, these envelopes will continue to loop even after a key is released.

### Dly

Rotate knob 5 to set the initial Delay time of the envelope from 0ms to 14.7 seconds.

### Hld

Rotate knob 6 to set the Hold time of the envelope from 0ms to 14.7 seconds.

Press knob 6 to quickly jump to 0ms, or 14.7 seconds.

### Rpt

Rotate knob 7 to set the Repeat (loop) rate from 0ms to 14.7 seconds, or NoLoop.

Press knob 7 to quickly jump to a Repeat value of 0ms, or NoLoop.

### Reset

Press knob 8 to activate/deactivate the Attack Reset feature. When activated, if an envelope has an Attack time greater than 0ms, the envelope will start producing attack from the 0 level.

## OSCILLATOR ENVELOPE TIME MODULATION 1-4

This mode sets the modulated parameters for Oscillator Envelopes 1-4. Applying modulation to these envelope times and levels allows the envelopes to morph from the initial parameter values to the mod parameter values. If an envelope modulation parameter is set to Off, this mod parameter will not morph but instead remain at the initial envelope parameter value.

### **Atk**

Rotate knob 1 to set the modulation Attack time of the envelope from 0ms to 14.7 seconds.  
Press knob 1 to quickly jump to the initial envelope's Attack parameter value, or Off.

### **Dec**

Rotate knob 2 to set the modulation Decay time of the envelope from 0ms to 14.7 seconds.  
Press knob 2 to quickly jump to the initial envelope's Decay parameter value, or Off.

Note: When both the Attack and Decay settings are 0ms, both parameters will show Skip as their value. This means the envelope will skip over these stages and jump immediately to the Sustain level instead.

### **Sus**

Rotate knob 3 to set the modulation Sustain level from 0 to 100.  
Press knob 3 to quickly jump to the initial envelope's Sustain parameter value, or Off.

### **Rel**

Rotate knob 4 to set the modulation Release time of the envelope from 0ms to 14.7 seconds.  
Press knob 4 to quickly jump to the initial envelope's Release parameter value, or Off.

### **Dly**

Rotate knob 5 to set the modulation Delay time of the envelope from 0ms to 14.7 seconds.  
Press knob 5 to quickly jump to the initial envelope's Delay parameter value, or Off.

### **Hld**

Rotate knob 6 to set the modulation Hold time of the envelope from 0ms to 14.7 seconds.  
Press knob 6 to quickly jump to the initial envelope's Hold parameter value, or Off.

### **Rpt**

Rotate knob 7 to set the modulation Repeat (loop) rate from 0ms to 14.7 seconds, or NoLoop.  
Press knob 7 to quickly jump to the initial envelope's Repeat parameter value, or Off.

### **Mod**

Rotate knob 8 to select the modulation source used to morph from the initial envelope values to the modulation envelope values.  
Press knob 8 to reset the envelope modulation source to Off.

Tip: Always turn Off envelope stages that are unused, or do not need to change (morph).

## MIXER

The mixer has two pages of parameters. The first page is always the same, while the second page shows parameters dependant on the mixer's Type setting. To access the different mixer pages, simply press the Mixer switch.

### Mixer Source (1-4)

Rotate knobs 1-4 to select the audio source for each of the four vector positions of the mixer. Press knobs 1-4 to reset each mixer source to the default setting of Oscillator 1, 2, 3, and 4.

Mixer audio sources include:

**Off:** This mixer input will be turned Off, no audio will be heard if the joystick is moved to this position.

**Osc(1-4):** Selects the direct oscillator output for oscillators 1-4.

**Osc(1-4)Env:** Each oscillator's envelope controls the amplitude of the oscillator number shown.

**Osc(1-4)LFO:** Each oscillator's LFO controls the amplitude of the oscillator number shown.

**Ring(1&2, 2&3, 3&4, 4&1):** Ring-modulates the oscillator numbers shown.

**White:** Selects white-noise directly as the audio source.

**WhiteEnv:** Each oscillator's envelope controls the amplitude of the white-noise source.

**Pink:** Selects pink-noise directly as the audio source.

**PinkEnv:** Each oscillator's envelope controls the amplitude of the pink-noise source.

### Lock

Press knob 5 to turn the mixer lock function On or Off. When turned On, a lock icon  will also appear in the top-right of the display.

When Lock is turned Off, and mixer Type is set to Off, the Mixer joystick can be used to manually control the mixing of the four mixer sources selected.

When the Lock is turned On, it will prevent any further changes to the Mixer joystick settings.

### Type

Rotate knob 6 to select the Type of mixer to use.

Press the knob 6 to quickly jump to Off, or Key.

Mixer Types include:

**Off:** Mixer is controlled manually with the Mixer joystick (when Lock is Off)

**Env:** Automatically mix from stage 1, 2, 3, and remain at stage 3 until a key is released, where it will then transition to stage 4.

**One:** Automatically mix from stage 1, 2, 3, 4 once, and remain at stage 4 each time a single key is played.

**Key:** Starts at stage 1 at the press of a new note, and automatically loops 1, 2, 3, 4, continuously.

**Run:** Continuously loop through all stages (free-running).

**Mod:** The Mixer can be modulation between any two points within the joystick vector area.

### Gain

Rotate knob 7 to adjust the mixer's final output from 1.00x to 5.00x gain.

Press knob 7 to reset the mixer output gain value to 1.00x.

Note: Higher gain settings can cause waveforms to become clipped at the mixer output.

## AUTOMIX / MIXER MOD

To access the second page of Mixer settings, simply press the Mixer switch again.

### AUTOMIX

Here we will cover the parameters shown for mixer Type settings of Env, One, Key, and Run, where you set the X:Y location for each of the four stages, and the time it takes to fade from each stage to next.

#### X:Y Location

Press knobs 1-4 to activate and deactivate the X:Y location for each of the four vector mixing stages. When a X:Y location is active (underlined), move the Mixer joystick to change the X:Y mix location for that stage.

Press knobs 1-4 to deactivate selected stages (1-4), or select a different stage (1-4).

#### Time

Rotate knobs 5-8 to set the time each stage will take to fade to the next stage.

Press knobs 5-8 to quickly jump to a time value of 0ms, or 14.7 seconds.

### MIXER MOD

Slightly different parameters will be shown when the mixer Type is set to Mod.

The Mod type mixer setting allows you to modulate between any two mixer locations using various modulation sources.

#### X:Y Location 1 and 2

Press knob 1 or 2 to activate and deactivate the X:Y locations for stages 1 and 2.

When a X:Y stage is active (underlined), move the Mixer joystick to change the X:Y location for that stage.

Press knob 1 or 2 to deactivate, or select a different location.

#### Ctrl

Rotate knob 3 to select a modulation source to control the amount of modulation.

Press knob 3 to reset the control modulation source to Off.

#### Mod

Rotate knob 4 to select a modulation source to modify the mixing between the two X:Y mixer locations.

#### Amt

Rotate knob 8 to adjust the modulation amount from 000 to 100.

Press knob 8 to quickly jump to a value of 000, or 100.

Tip: X:Y mixer locations can be changed on the fly while the Automix or Mixer Mod functions are happening. Be sure to deselect the X:Y location when done making adjustments to these settings.

## FILTER



### Key Tracking

Press knob 1 to turn filter key tracking On/Off. When turned On, the keyboard icon will appear in the top-left of the display. The filter's cutoff frequency will track notes played on the keyboard.

### Type

Rotate knob 1 to select one of the six primary filter types. Filter types include:

- 4-pole low-pass
- 2-pole low-pass
- 1-pole low-pass
- 2-pole band-pass
- 2-pole high-pass
- 2-pole notch

Filter types that include the "\*" are self-resonant, and those that end in VCS activate a feature found on EMS brand synthesizers where any fast-changing filter modulation signals will be slewed .

### Ctrl

Rotate knob 2 to select a source to control the amplitude of the LFO.  
Press knob 2 to turn this mod source Off.

Rotate knob 3 to select a source to control the amplitude of the Envelope.  
Press knob 3 to turn this mod source Off.

### Mod

Rotate knob 4 to select a third modulation source to modulate the filter cutoff frequency directly.

### Lock

Press knob 5 switch to turn the filter lock function On/Off. When turned On, a lock icon  will appear in the top-right of the display.

When Lock is turned Off, the Filter joystick can be used to manually control the cutoff and resonance levels for the filter. When the Lock is turned On, it will prevent any further changes to the filter cutoff and resonance settings.

### LFO

Rotate knob 6 to change the modulation amount the filter LFO will have on the filter cutoff frequency. The range is from -99 to 100.  
Press knob 6 to quickly jump to values of 000, 100, or -99.

### Env

Rotate knob 7 to change the modulation amount this envelope will have on the filter cutoff frequency. The range is from -99 to 100.  
Press knob 7 to quickly jump to values of 000, 100, or -99.

### Amt

Rotate knob 8 to change the modulation amount the third modulation source will have on the filter cut-off frequency. The range is from -99 to 100.  
Press knob 8 to quickly jump to values of 000, 100, or -99.

## FILTER LFO



### Key Tracking

Press knob 1 to turn LFO key tracking On/Off. The keyboard icon will show in the top-left of the display when key tracking is turned On. The frequency of the LFO will follow notes played on the keyboard.

### Freq

Rotate knob 1 to set the initial pitch of the LFO. The range is 0.001Hz to 1001Hz.

Note: The LFO frequency will be higher than the frequency shown when key tracking is turned On.

### Fine

Rotate knob 2 to adjust the LFO's frequency in fine steps. There are 128 fine steps of tuning per semitone of pitch or frequency.

Press knob 2 to reset this fine tune amount to a value of 0.

### Sync

Rotate knob 3 to set the waveform phase this LFO will jump to when a new note is played.

When set to Off, no LFO sync will occur, and the LFO waveform will be free-running.

Press knob 3 and the Sync value will quickly jump to values of Off, 000, 090, 180, and 270 degrees.

### FMmod

Rotate knob 4 to select a source to modulate the LFO's frequency.

### Wave

Rotate knob 5 to select the waveshape for this LFO.

Press knob 5 to reset the LFO waveshape to sine when any of the virtual analog waveforms are selected, or to quickly jump to waveform 000, or 500, when any of the 500 digital waveforms are selected.

### Start

The Start parameter is only shown when the waveshape is set to any of the 500 digital waveforms.

Rotate knob 6 to change the Start point this digital waveshape will begin reading it's shape from memory. The value ranges from 000 to 255 samples, and going beyond the 000 or 255 sample values will begin selecting the previous or next waveform in memory.

Press knob 6 to reset the Start value to 0.

Note: The Start parameter can be used to combine different portions of two adjacent waveforms in memory for more complex shapes.

### FMoct

Rotate knob 7 to define the number of octaves the modulation amount will have on this LFO's frequency. The range is from -99 to 100.

Press knob 7 to quickly jump to a value of 000, 100, or -99.

### FMamt

Rotate knob 8 to change the amount off effect the modulation source will have on the LFO's frequency. The range is from -99 to 100.

Press knob 8 to quickly jump to a value of 000, 100, or -99.

## FILTER ENVELOPE

This mode sets the initial parameters for the Filter Envelope.

The envelope stages in order are: Delay, Attack, Hold, Decay, Sustain, Release, Repeat/loop.

### Atk

Rotate knob 1 to set the Attack time of the envelope from 0ms to 14.7 seconds.

Press knob 1 to quickly jump to 0ms, or 14.7 seconds.

### Dec

Rotate knob 2 to set the Decay time of the envelope from 0ms to 14.7 seconds.

Press knob 2 to quickly jump to 0ms, or 14.7 seconds.

Note: When both the Attack and Decay settings are 0ms, both parameters will show Skip as their value. This means the envelope will skip over these stages and jump immediately to the Sustain level instead.

### Sus

Rotate knob 3 to set the Sustain level from 0 to 100.

Press knob 3 to quickly change the Sustain level to 0, or 100.

### Rel

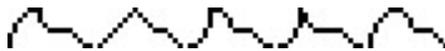
Rotate knob 4 to set the Release time of the envelope from 0ms to 14.7 seconds.

Press knob 4 to quickly jump to 0ms, or 14.7 seconds.

## ENVELOPE SHAPE

Press knob 5 to change the envelope shape.

There are five DAHDSRR type envelopes.



These envelopes will play or loop as long as a key is held for on the keyboard, and then jump to the envelope Release stage when the key is released.

There are four DAHDR one-shot envelopes.



These envelopes will play through all stages (except Sustain and Release) each time a key is played. When set to loop, these envelopes will continue to loop even after a key is released.

### Dly

Rotate knob 5 to set the initial Delay time of the envelope from 0ms to 14.7 seconds.

### Hld

Rotate knob 6 to set the Hold time of the envelope from 0ms to 14.7 seconds.

Press knob 6 to quickly jump to 0ms, or 14.7 seconds.

### Rpt

Rotate knob 7 to set the Repeat (loop) rate from 0ms to 14.7 seconds, or NoLoop.

Press knob 7 to quickly jump to a Repeat value of 0ms, or NoLoop.

### Reset

Press knob 8 to activate/deactivate the Attack Reset feature. When activated, if an envelope has an attack time greater than 0ms, the envelope will start producing attack from the 0 level.

## FILTER ENVELOPE TIME MODULATION

The Filter Envelope is comprised of two pages. The first page sets the initial times and levels for the envelope, while the second page adjusts the modulation envelope parameters. To jump from one page to the other, simply press the filter Envelope switch.

This mode sets the modulated parameters for the Filter envelope. Applying modulation to these envelope times and levels allows the envelope to morph from the initial parameter values to the modulation parameter values. If an envelope modulation parameter is set to Off, this modulation parameter will not morph but instead will remain at the initial envelope parameter value.

### **Atk**

Rotate knob 1 to set the modulation Attack time of the envelope from 0ms to 14.7 seconds.  
Press knob 1 to quickly jump to the initial envelope's Attack parameter value, or Off.

### **Dec**

Rotate knob 2 to set the modulation Decay time of the envelope from 0ms to 14.7 seconds.  
Press knob 2 to quickly jump to the initial envelope's Decay parameter value, or Off.

Note: When both the Attack and Decay settings are 0ms, both parameters will show Skip as their value. This means the envelope will skip over these stages and jump immediately to the Sustain level instead.

### **Sus**

Rotate knob 3 to set the modulation Sustain level from 0 to 100.  
Press knob 3 to quickly jump to the initial envelope's Sustain parameter value, or Off.

### **Rel**

Rotate knob 4 to set the modulation Release time of the envelope from 0ms to 14.7 seconds.  
Press knob 4 to quickly jump to the initial envelope's Release parameter value, or Off.

### **Dly**

Rotate knob 5 to set the modulation Delay time of the envelope from 0ms to 14.7 seconds.  
Press knob 5 to quickly jump to the initial envelope's Delay parameter value, or Off.

### **Hld**

Rotate knob 6 to set the modulation Hold time of the envelope from 0ms to 14.7 seconds.  
Press knob 6 to quickly jump to the initial envelope's Hold parameter value, or Off.

### **Rpt**

Rotate knob 7 to set the modulation Repeat (loop) rate from 0ms to 14.7 seconds, or NoLoop.  
Press knob 7 to quickly jump to the initial envelope's Repeat parameter value, or Off.

### **Mod**

Rotate knob 8 to select the modulation source used to morph from the initial envelope values to the modulation envelope values.  
Press knob 8 to reset the envelope modulation source to Off.

## AMPLIFIER ENVELOPE

This mode sets the initial parameters for the Amplifier Envelope.  
The envelope stages in order are: Delay, Attack, Hold, Decay, Sustain, Release, Repeat/loop.

### Atk

Rotate knob 1 to set the Attack time of the envelope from 0ms to 14.7 seconds.  
Press knob 1 to quickly jump to 0ms, or 14.7 seconds.

### Dec

Rotate knob 2 to set the Decay time of the envelope from 0ms to 14.7 seconds.  
Press knob 2 to quickly jump to 0ms, or 14.7 seconds.

Note: When both the Attack and Decay settings are 0ms, both parameters will show Skip as their value.  
This means the envelope will skip over these stages and jump immediately to the Sustain level instead.

### Sus

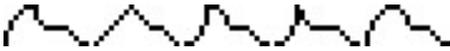
Rotate knob 3 to set the Sustain level from 0 to 100.  
Press knob 3 to quickly change the Sustain level to 0, or 100.

### Rel

Rotate knob 4 to set the Release time of the envelope from 0ms to 14.7 seconds.  
Press knob 4 to quickly jump to 0ms, or 14.7 seconds.

## ENVELOPE SHAPE

Press knob 5 to change the envelope shape.

There are five DAHDSRR type envelopes.   
These envelopes will play or loop as long as a key is held for on the keyboard, and then jump to the envelope Release stage when the key is released.

There are four DAHDR one-shot envelopes.   
These envelopes will play through all stages (except Sustain and Release) each time a key is played.  
When set to loop, these envelopes will continue to loop even after a key is released.  
Another envelope type is called DRONE. Select this and audio will continuously pass to the output.

### Dly

Rotate knob 5 to set the initial Delay time of the envelope from 0ms to 14.7 seconds.

### Hld

Rotate knob 6 to set the Hold time of the envelope from 0ms to 14.7 seconds.  
Press knob 6 to quickly jump to 0ms, or 14.7 seconds.

### Rpt

Rotate knob 7 to set the Repeat (loop) rate from 0ms to 14.7 seconds, or NoLoop.  
Press knob 7 to quickly jump to a Repeat value of 0ms, or NoLoop.

### Mod

Rotate knob 8 to select a modulation source to control the Amplifier Envelope's amplitude.  
Press knob 8 to reset this modulation source to Off.

## AMPLIFIER ENVELOPE TIME MODULATION

The Amplifier Envelope is comprised of two pages. The first page sets the initial times and levels for the envelope, while the second page adjusts the envelope modulation parameters. To jump from one page to the other, simply press the Amplifier switch again.

This mode sets the modulated parameters for the Amplifier Envelope. Applying modulation to these envelope times and levels allows the envelope to morph from the initial parameter values to the modulation parameter values. If an envelope modulation parameter is set to Off, this modulation parameter will not morph but instead remain at the initial envelope parameter value.

### **Atk**

Rotate knob 1 to set the modulation Attack time of the envelope from 0ms to 14.7 seconds.  
Press knob 1 to quickly jump to the initial envelope's Attack parameter value, or Off.

### **Dec**

Rotate knob 2 to set the modulation Decay time of the envelope from 0ms to 14.7 seconds.  
Press knob 2 to quickly jump to the initial envelope's Decay parameter value, or Off.

Note: When both the Attack and Decay settings are 0ms, both parameters will show Skip as their value. This means the envelope will skip over these stages and jump immediately to the Sustain level instead.

### **Sus**

Rotate knob 3 to set the modulation Sustain level from 0 to 100.  
Press knob 3 to quickly jump to the initial envelope's Sustain parameter value, or Off.

### **Rel**

Rotate knob 4 to set the modulation Release time of the envelope from 0ms to 14.7 seconds.  
Press knob 4 to quickly jump to the initial envelope's Release parameter value, or Off.

### **Dly**

Rotate knob 5 to set the modulation Delay time of the envelope from 0ms to 14.7 seconds.  
Press knob 5 to quickly jump to the initial envelope's Delay parameter value, or Off.

### **Hld**

Rotate knob 6 to set the modulation Hold time of the envelope from 0ms to 14.7 seconds.  
Press knob 6 to quickly jump to the initial envelope's Hold parameter value, or Off.

### **Rpt**

Rotate knob 7 to set the modulation Repeat (loop) rate from 0ms to 14.7 seconds, or NoLoop.  
Press knob 7 to quickly jump to the initial envelope's Repeat parameter value, or Off.

### **Mod**

Rotate knob 8 to select the modulation source used to morph from the initial envelope values to the modulation envelope values.  
Press knob 8 to reset the envelope modulation source to Off.

## ARPEGGIATOR / SEQUENCER OVERVIEW

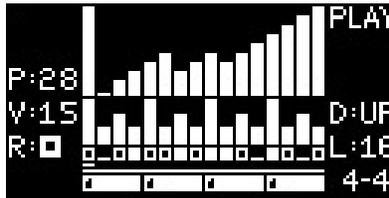
The Vectra provides an integrated arpeggiator and sequencer, so you can begin arpeggiating and then edit the arpeggiation just like you would a sequence, or be playing a sequence and jump into playing an arpeggiation. All arpeggiator and sequence data is stored with each individual sound file. For the sake of simplicity, we may refer to both as the Sequencer in this manual.

Please note the sequencer is monophonic. If you try to sequence or arpeggiate a sound using any of the internal Poly modes, those poly modes will be turned off to make the sound compatible for sequencing.

Sequence parameters can not be custom assigned to the knobs using the Assign mode. That is reserved only for synthesizer parameters. Instead many of the sequencer parameters are set using the internal keyboard, as this allows faster data entry, and a way to actually play these parameter values.

The sequencer has two main pages, which are accessed by pressing the Arp/Seq switch. The first sequencer page we will refer to as “Sequencer Parameters” and can select the keyboard Scale, linear Transposition, scalar Transposition, octave reiteration Range, start/stop the sequencer playback, adjust the tempo or set the tempo to sync to MIDI, and adjust the Swing amount.

The second sequencer page we will refer to as the “Show” page. It is here where you get to see and edit the sequences and arpeggiations.



Note: As long as a parameter is selected (or underlined) to be entered with the keyboard, you can be outside the sequencer modes editing synth parameters for instance, while still being able to edit the current sequencer parameter with the keyboard.

Often you do not need to deselect a sequencer parameter, but instead can simply select another parameter to edit in the sequencer. This allows for faster selection and deselection of parameters.

Tip: When the sequencer stops playback, you can then play the keyboard as normal and hear notes play. However, if you do not hear notes playing normally from the keyboard, it may be due to one of the sequence parameters being selected that uses the keyboard for data entry. Once the selected parameter is deselected, the keyboard can be used to play notes normally.

This may also be true if you are in one of the sequencer modes such as Edit or Auto where the keyboard is used for entering sequencer data.

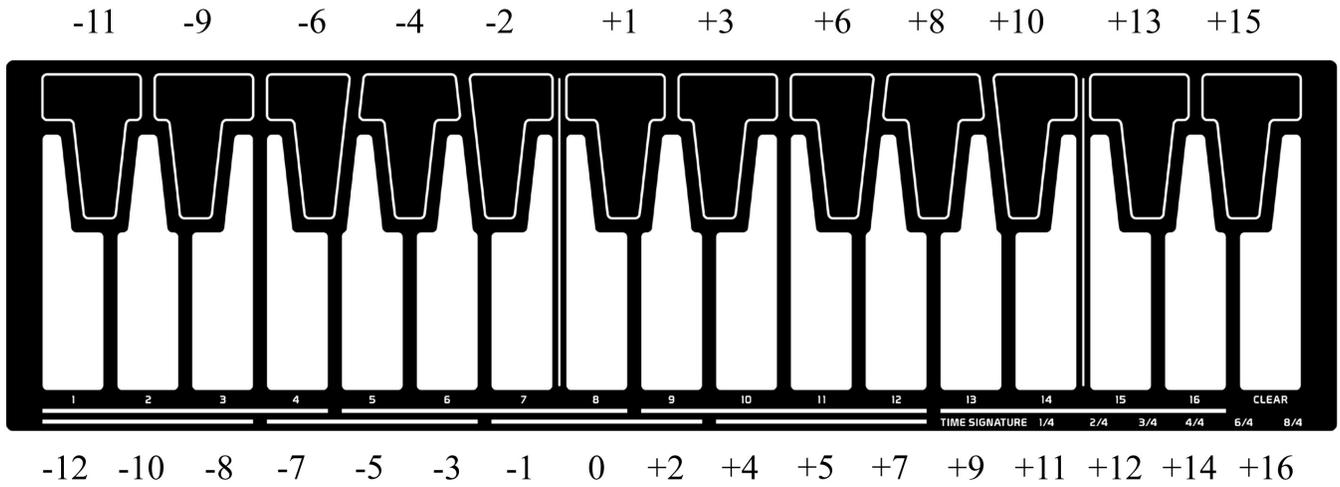
Tip: Although the sequencer does not record Pitch Bend, Mod Wheel, or Aftertouch messages, these can still be produced while the sequencer plays. Simply move the Pitch Bend or Mod Wheel joystick. Aftertouch messages can be generated by altering the amount of finger area on a key.

The following four pages show the mapping of different parameter values on the keyboard.

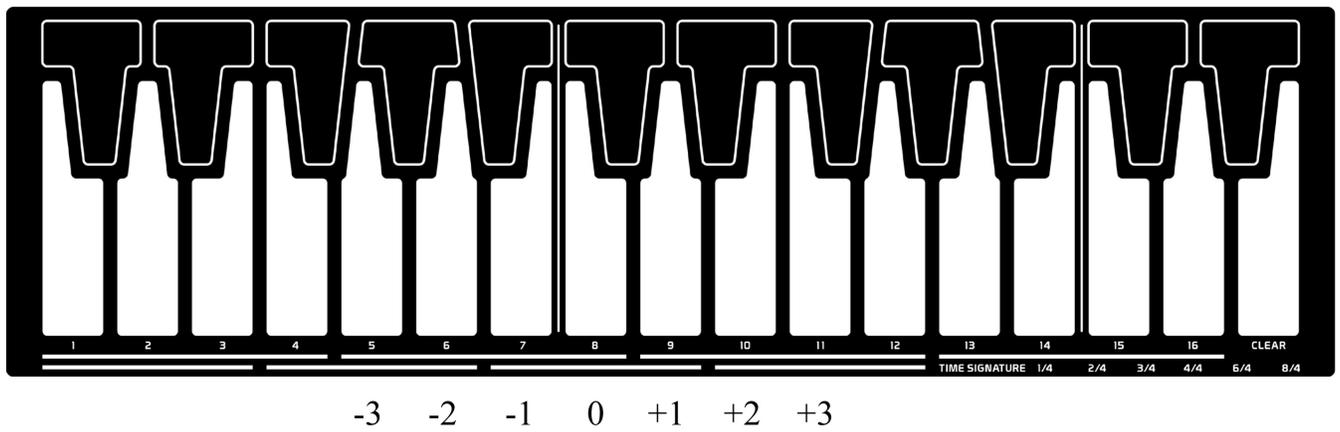
# SCALES

Japanese	16	4/4	Chinese
Hirajoshi	15	3/4	Egyptian
Blues	14	2/4	8-Tone Spanish
Bebop Minor	13	1/4	Enigmatic
Bebop	12		Byzantine
Melodic Minor	11		Hindu
Harmonic Minor	10		Hungarian
Blues Minor Pentatonic	9		Romanian Minor
Egyptian Pentatonic	8		Algerian
Major Pentatonic	7		Locrian
Minor Pentatonic	6		Minor
Blues Major Pentatonic	5		Mixolydian
	4		Lydian
	3		Phrygian
	2		Dorian
	1		Major

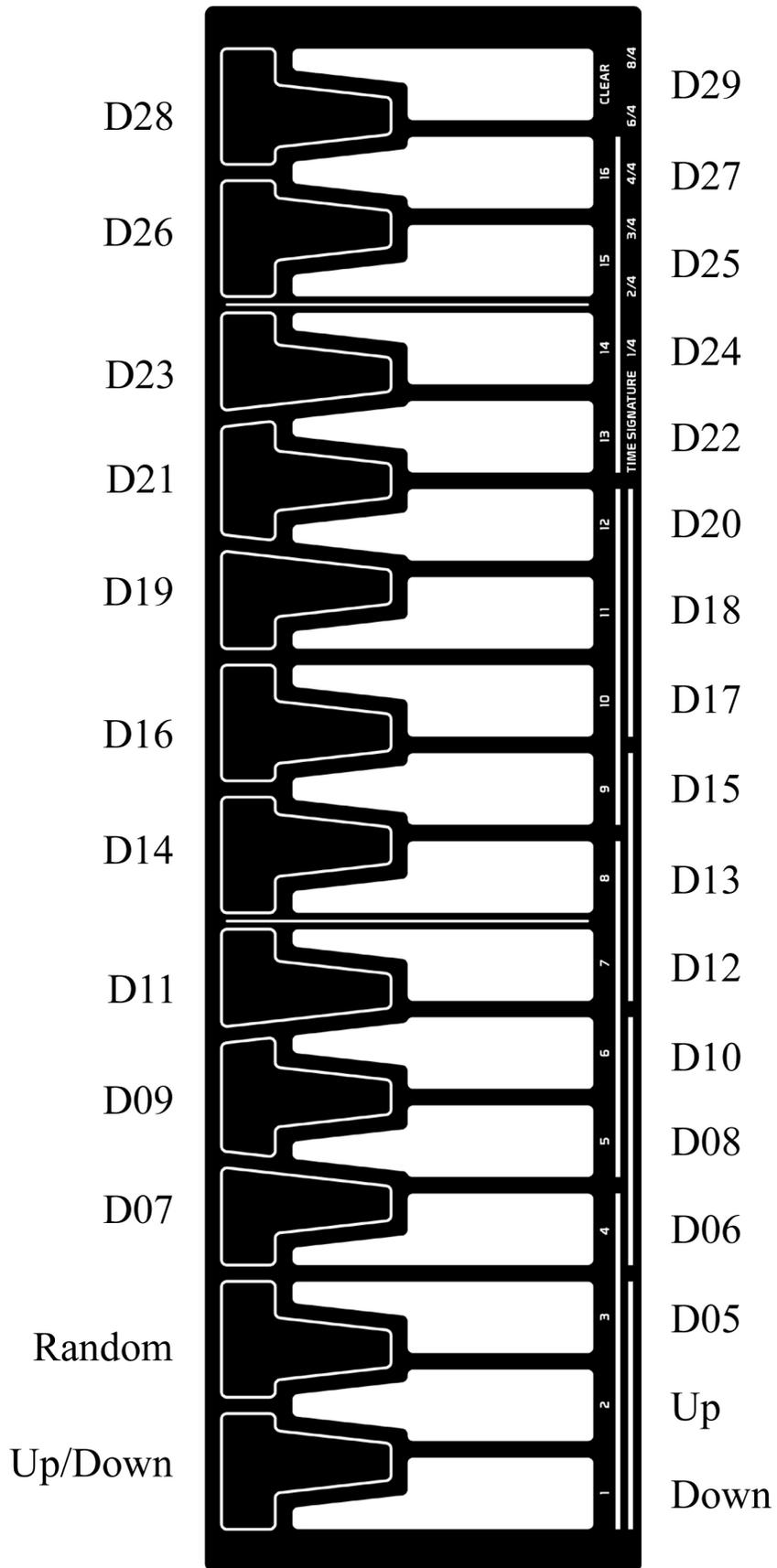
### XPOSE and XSCALE



### RANGE



# DIRECTIONS



# LOOP POINT

A musical staff with 16 measures. The first 12 measures are grouped under a 'TIME SIGNATURE' label with a 1/4 note. The 13th measure has a 2/4 note, the 14th has a 3/4 note, the 15th has a 4/4 note, and the 16th has a 6/4 note. A 'CLEAR' label is at the end of the staff. Below the staff, the numbers 1 through 16 are printed.

# TIME SIGNATURES

A musical staff with 16 measures. The first 12 measures are grouped under a 'TIME SIGNATURE' label with a 1/4 note. The 13th measure has a 2/4 note, the 14th has a 3/4 note, the 15th has a 4/4 note, and the 16th has a 6/4 note. A 'CLEAR' label is at the end of the staff. Above the staff, the numbers 3/4 and 6/4 are printed. Below the staff, the numbers 1 through 16 are printed.

## SEQUENCER PARAMETERS



Note: Scale, Xpose, Xscale, and Range values are all entered by using the keyboard.

### Scale

Press knob 1 to underline the Scale. The keyboard icon will appear in the top-left display to indicate you can press one of the 29 keys on the keyboard to enter the scale. The default scale is Chromatic, which is selected by pressing the “CLEAR” (high E) key on the keyboard.

Note: Changing the scale selection will affect both the internal keyboard and the sequencer/arpeggiator. Scale key assignments are shown on page 30.

### Xpose

Press knob 2 to underline the Xpose. The keyboard icon will appear in the top-left display to indicate you will use the keyboard to enter the Xpose value. This is a linear transposition value.

Press one of the 29 keys on the keyboard to select a different linear transposition.

Middle C key represents a transposition value of 0.

Xpose key assignments are shown on page 31.

### Xscale

Press knob 3 to underline Xscale. The keyboard icon will appear in the top-left display to indicate you will use the keyboard to enter the Xscale value. This is a scale transposition value, which is a very musical way of transposing notes within the notes of a musical scale only.

Press one of the 29 keys on the keyboard to select a different scale transposition.

Middle C key represents a scale transposition value of 0.

Xscale key assignments are shown on page 31.

### Range

Press knob 3 to underline Range. The keyboard icon will appear in the top-left display to indicate you will use the keyboard to enter the Range value. This Range value determines how many octave reiterations will play. This Range value can be from -3 to +3 octaves.

When values other than 0 are selected, each time the sequencer reaches the loop point, the pitch will transpose up or down by 1 octave for each Range value selection.

Range key assignments are shown on page 31.

### Clock

Press knob 6 to Start/Stop playback of the internal sequencer.

The value shown after Clock: is the current state of playback.

### Tempo

Rotate knob 7 to adjust the Tempo of the internal sequencer.

The tempo can range from 10-250 BPM or beats per minute.

Press knob 7 when playback is stopped to switch from internal clock to syncing to an external MIDI clock. MIDI will be shown for the Tempo whenever the sequencer is set to sync to external MIDI clocks. Playback Start, Stop, and Tempo will then be controlled by the external MIDI sequencer.

### Swing

Rotate knob 8 to adjust the Swing value from 50% to 75%.

Increasing the Swing value will delay the timing of even numbered steps to add a human feel to the sequencer timing.

Press knob 8 to reset the Swing amount to 50%.

## SEQUENCER SHOW

The Sequencer Show page is where you can see, enter, edit, and manipulate sequence and arpeggiations.

### Sequencer Modes

There are five sequencer modes within this Show page.

Rotate knob 5 to change the current sequencing mode to: Play, Arp, Fill, Edit, and Real (or Auto).

Pressing knob 5 will select the Fill mode.

The playback Direction, Loop Point and Time Signature can be changed in all of the sequencer modes, so let's cover those first.



Note: Direction, Loop Point, and Time Signature values are all entered by using the keyboard.

### Direction (D)

Press knob 6 to select and underline (D) for Direction. The keyboard icon will appear in the top-left display, indicating that direction will be entered with the 29 keyboard keys.

Selecting the four lowest keys on the keyboard will select Down, Up/Down, Up, and Random directions.

Selecting any other keys will show a number from 05 to 29. These numbered directions are similar to some of our previous Remix directions, where the selection of steps to play are generated in most cases by a mathematical process.

Direction key assignments are shown on page 32.

Press knob 6 again to deselect the Direction parameter.

### Loop Point (L)

Press knob 7 to select and underline (L) for Loop Point. The keyboard icon will appear in the top-left display, indicating that the Loop Point will be entered with the 16 numbered major keys on the keyboard. Simply press any of the keyboard keys numbered 1-16 to set the loop point from 1 to 16 steps.

Loop Point key assignments are shown on page 33.

Press knob 7 again to deselect the Loop Point parameter.

### Time Signature (4-4)

The current time signature is shown as the grid bars near the bottom of the display, and also by the numbers shown in the bottom-right of the display.

Press knob 8 to select and underline the time signature shown as numbers. The Keyboard icon will appear in the top-left display, indicating that the Time Signature will be entered with the keyboard keys.

Legends on the bottom of the keyboard help identify time signature keys.

Time Signature key assignments are also shown on page 33.

Press knob 8 again to deselect the Time Signature parameter.

Note: Changes made to the Time Signature setting will update when the loop point is reached, if the sequencer is playing, or will update instantly if the sequencer is stopped. When changes are made to the Time Signature, the loop point will automatically reset to the maximum number of steps available for that time signature.

## SEQUENCER PLAY AND ARP MODES

Now let's have a look at the other parameters each sequencer modes offer.

### **PLAY**

Play is a "safe" sequencer mode, where only the sequencer Direction, Loop point, and Time Signature can be changed. In this mode, you can still view sequencer data such as the currently playing Pitch (P), Velocity (V), and Rhythm (R).

### **ARP**

This is the Arpeggiator mode.

### **Play/Hold**

Press knob 4 to set the arpeggiator to PLAY or HOLD.

In the Arp PLAY mode you can have notes arpeggiate momentarily as long as keys are held on the keyboard. In the Arp HOLD mode you can play up to 16 notes, and once all keys have been released the notes entered will remain and continue to arpeggiate in the order they were played.

### **Pitch (P)**

To enter new pitches into the arpeggiator, press knob 2 to select and underline (P).

Notice when you enter less than 16 pitches, the remaining steps of the arpeggiator will automatically be filled with these same notes.

Press knob 2 again to deselect entering pitches into the arpeggiator.

### **Velocity(V)**

To enter velocity values into the arpeggiator, press knob 3 to select and underline (V).

You can rotate knob 3 to set the velocity value notes entered will play at.

Press knob 3 again to deselect entering velocity data.

### **Rhythm(R)**

To enter rhythm data into the arpeggiator, press knob 4 to select and underline (R).

When (R) or rhythm is selected, new notes entered into the arpeggiator will be written as a note-on.

Press knob 4 again to deselect entering rhythm data.

The reason you can select individual Pitch, Velocity, and Rhythm to enter is that you may have some interesting Pitch, Velocity, or Rhythm data already entered into say a sequence, yet when you enter this mode you simply want to arpeggiate one or more of these parameters, while unselected parameters remain playing as they were originally programmed.

Note: The Loop Point value will automatically change to the number of notes entered for the current arpeggiation. If you were just working in the Arp PLAY mode, and release all keys the loop point will be set at a value of 0. This then prevents any notes from playing in the arpeggiator or sequencer.

You should keep this in mind, as if you were to then change to one of the sequencer modes you might wonder why you are not hearing any sequencer steps playing. In this case, you will need to change to loop point to 1 or more steps.

## SEQUENCER FILL MODE

### FILL

The Fill mode allows momentary changes to a sequence, without changing the sequence permanently. This mode can be used in multiple ways to introduce variations for a period of time before returning to the original programmed sequence.

Multiple steps can be selected to fill, as well as different combinations of Pitch, Velocity, and Rhythm parts.

First you should define what steps to Fill, then select the parts to Fill, and finally play keys on the keyboard to activate the Fill.

### Step Selection (S)

Press knob 4 to select and underline the (S) or Step Selection.

Steps currently selected to edit will be shown underlined on the bottom row of the display.

Individual steps can be turned On/Off by pressing any of the 16 numbered major keys on the keyboard. Note there are the 4-4 and 3-4 time signature legends just below these keys to help locate steps.

To clear all selected steps, you can press the “CLEAR” (high E) key.

Tip: To quickly clear the current selection and then select all steps, Press “CLEAR” (high E) key, and then drag your finger over the major keys to Key 1 (low C).

Tip: To invert the current selection, press Key 16 (high D), and then drag your finger over the major keys to Key 1 (low C).

When the sequencer is playing, you can also tap any of the black keyboard keys to enter the selection of steps in real-time.

Note: At anytime you can shift or rotate the current selection to other steps by simply rotating knob 4. Press knob 4 again to deselect Step Selection, and now you can begin creating fills.

### Pitch (P)

Press knob 1 to select and underline (P) for Pitch, and then play any note/s on the keyboard. All steps selected to fill will play at this pitch as long as one or more keys on the keyboard are held.

Press knob 1 again to deselect Pitch when creating fills.

### Velocity (V)

Press knob 2 to select and underline (V) for Velocity. Rotate knob 2 to change the Velocity level filled steps will produce. All steps selected to fill will play at this velocity as long as one or more keys on the keyboard are held.

Press knob 2 again to deselect Velocity when creating fills.

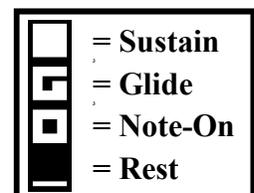
### Rhythm (R)

Press knob 3 to select and underline (R) for Rhythm.

Rotate knob 3 to change the type of note filled steps will produce.

All steps selected to fill will play at this note type as long as one or more keys on the keyboard are held.

Press knob 3 again to deselect Rhythm when creating fills.



## SEQUENCER EDIT MODE

### EDIT

The Edit mode allows you to manually edit one or more steps simultaneously, while the sequencer is playing or stopped.

First you should define the steps to edit.

### Step Selection (S)



While in Edit mode, the keyboard is always used to control the selection of steps.

Steps currently selected to edit will be shown underlined on the bottom row of the display. Individual steps can be turned On/Off by pressing any of the 16 numbered major keys on the keyboard. Note there are the 4-4 and 3-4 time signature legends just below these keys to help locate steps.

To clear all selected steps, you can press the “CLEAR” (high E) key.

To quickly clear the current selection and then select all steps, Press “CLEAR” (high E) key, and then drag your finger over the major keys to Key 1 (low C).

To invert the current selection, press Key 16 (high D), and then drag your finger over the major keys to Key 1 (low C).

When the sequencer is playing, you can also tap any of the minor (black) keys to enter the selection of steps in real-time.

Note: At anytime you can shift or rotate the current selection to other steps by simply rotating knob 4.

### Pitch (P)

Rotate knob 1 to change the pitch of the selected steps.

Selected step's pitch will increase as you rotate the knob clockwise, and decrease as you rotate counter-clockwise. Pitch values can not go beyond the 0 (lowest) and 28 (highest) values.

### Velocity (V)

Rotate knob 2 to change the velocity of the selected steps.

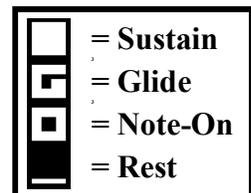
Selected step's velocity will increase as you rotate the knob clockwise, and decrease as you rotate counter-clockwise. Velocity values can not go beyond the 1 (lowest) and 15 (highest) values.

### Rhythm (R)

Rotate knob 3 to change the rhythm or note type of the selected steps.

Selected step's note-type will increase as you rotate the knob clockwise, and decrease as you rotate counter-clockwise.

These note values can not go beyond Rest (lowest) and Sustain (highest) values.



Tip: Watch and listen to what happens when multiple steps are edited at the same time. Also notice how multiple steps of different values can be forced to the same value once they exceed the lowest and highest limits in values.

## SEQUENCER REALTIME RECORDING

### REAL

Real-time entering of data into the sequence can only occur while the sequencer is playing. Whenever the sequencer is stopped, this mode then becomes AUTO, which will be discussed in the next page.

Select the Pitch, Velocity, and Rhythm parts (in any combination) to enter in real-time.

When playing new data into the sequence, this new data is always quantized to the nearest step. Therefore if you play a new note during the 2nd half of a step, this new data will be written to the following step, and you will hear the new data play when the following step plays. If you play a new note during the 1st half of a step, this new data will be written to that step, however since that step is already playing, you will not hear the new data play until the sequence loops and that step plays again.

### Pitch (P)

Press knob 1 to select and underline (P) for Pitch, and then play the keyboard to enter a pitch into the sequencer.

Press knob 1 again to deselect Pitch, and stop entering pitch information.

### Velocity (V)

Press knob 2 to select and underline (V) for Velocity. Rotate knob 2 to change the Velocity value you want to enter. Play the keyboard to enter this velocity into the sequencer.

Press knob 2 again to deselect Velocity, and stop entering velocity information.

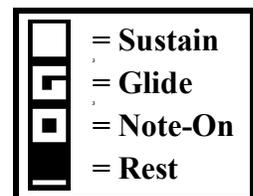
### Rhythm (R)

Press knob 3 to select and underline (R) for Rhythm.

Rotate knob 3 to change the Rhythm note type value you want to enter.

Play the keyboard to enter this note-type into the sequencer.

Press knob 3 again to deselect Rhythm, and stop entering rhythm information.



### SET

Press knob 4 to Set all steps of the sequence to the currently selected Pitch, Velocity, or Rhythm parts value shown. This can be used to quickly turn all notes to Off, On, Glide, or Sustain, or set all pitches or velocities to some particular value instantly.

## ADDITIONAL NOTE

You could be working in the Sequencer Show mode creating fills, editing, or entering a sequence in real-time, and decide you want to change one of the sequencer parameters such as the scale, or transposition. Simply press the Arp/Seq key to enter the Sequencer Parameters page, and select the parameter you want to change. Enter the new value, and then deselect this parameter for editing.

When you then return to the Sequencer Show mode, by pressing the Arp/Seq key again, you will find that your previous selection for creating fills, editing, or entering a sequence are selected and ready for you to continue your work.

## SEQUENCER AUTO RECORDING

### AUTO

Auto record mode of the sequence can only be accessed when the sequencer is stopped.

In Auto record mode, you will simply play data into the sequencer one step at a time. The sequencer step to write to will automatically advance one step each time new data is entered, until all 16 steps are recorded.

With the sequencer stopped, Rotate knob 5 to select AUTO.

Next, press knob 4 to cue up recording and underline (S). By default this will select step 1 as the step we will begin entering data into.

### Pitch (P)

Press knob 1 to select and underline (P) for Pitch.

Keys played on the keyboard will enter the pitch into the sequencer and advance the sequencer one step. Press knob 1 again to deselect Pitch, and stop entering pitch information.

### Velocity (V)

Press knob 2 to select and underline (V) for Velocity.

Rotate knob 2 to change the Velocity value you want to enter.

Play any keyboard key to enter this velocity into the sequencer, and advance the sequencer one step.

Press knob 2 again to deselect Velocity, and stop entering velocity information.

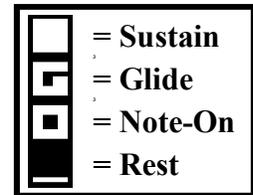
### Rhythm (R)

Press knob 3 to select and underline (R) for Rhythm.

Rotate knob 3 to change the Rhythm note type value you want to enter.

Play any keyboard key to enter this note-type into the sequencer, and advance the sequencer one step.

Press knob 3 again to deselect Rhythm, and stop entering rhythm information.



Note: If you make a mistake while entering information, you can simply rotate knob 4 to select the current step you wish to redo.

Once 16 steps have been entered, (S) or Step Selection will automatically turn Off, and recording will stop. Or you can manually deselect (S) or Step Selection to force recording to stop.

To hear the sequence you just entered, you will need to Start playback of the sequencer.

## MIDI

Anytime you play the internal keyboard, MIDI note-on/off, velocity, aftertouch, pitch-bend, and mod-wheel messages will be transmitted to the Vectra MIDI OUT jack so that you can play other MIDI sound modules. When the internal sequencer is playing, these same MIDI values will be sent out as well as MIDI Clock/Start/Stop commands for controlling the playback of other sequencers.

Note: The Mixer, Filter, and Stick joysticks do not transmit MIDI messages.

## SPECIFICATIONS

### **OSCILLATORS (1-4)**

**Frequency Range:** <0.01 Hz to 20.00 kHz

**Analog Modeled Waveforms:** Sine, Triangle, Sawtooth, Square, Pulse Width Modulated

**Pulse Width Range:** 1% to 99%

**Pulse Width Modulation Sources:** Random1/2, Key1/2, Velocity, Aftertouch, Mod-Wheel, Stick X/Y, LFO, Envelope

**Digital Waveforms:** 500

**Number of Digital Waveforms per Oscillator:** 2

**Waveform Modulation Types:** PWM, Slice, Fade

**Waveform Start:** 0 to 255 samples

**Waveform Modulation Sources:** Random1/2, Key1/2, Velocity, Aftertouch, Mod-Wheel, Stick X/Y, LFO, Envelope

**Waveform Modulation Amount:** 0 to 100

**Octave Range:** -7 to +5

**Pitch Tuning:** Semitones

**Fine Tuning:** 128 steps per semitone

**Constant Beat Detuning:** -/+5.00Hz

**Paraphonic Modes:** 8 total

**Sync:** Off/On, 0-360 degrees

**Glide Time per Oscillator:** 0ms to 14.7 seconds

**Key Tracking:** On/Off

### **OSCILLATOR FREQUENCY MODULATION (1-4)**

**Modulation 1 Source:** LFO

**Modulation 1 Control:** Off, Random1/2, Key1/2, Velocity, Aftertouch, Mod-Wheel, Stick X/Y, LFO, Envelope

**Modulation 2 Source:** Envelope

**Modulation 2 Control:** Off, Random1/2, Key1/2, Velocity, Aftertouch, Mod-Wheel, Stick X/Y, LFO, Envelope

**Modulation 3:** Random1/2, Key1/2, Velocity, Aftertouch, Mod-Wheel, Stick X/Y, Filter LFO, Filter Envelope, Amplifier Envelope

**Total Modulation Range:** 0.5 to 10 octaves

**Individual Modulation Amounts:** -99 to 100

### **LFO (1-4, Filter)**

**Analog Modeled Waveforms:** Sine, Triangle, Ramp, Sawtooth, Square, Random

**Digital Waveforms:** 500

**Waveform Start:** 0 to 255 samples

**Initial Frequency Range:** 0.001 to 1001Hz (greater with key tracking and modulations)

**Fine Tuning:** 128 steps per semitone

**Key Tracking:** On/Off

**Sync:** Off/On, 0-360 degrees

**Frequency Modulation Sources:** Random1/2, Key1/2, Velocity, Aftertouch, Mod-Wheel, Stick X/Y, LFO, Envelope, Filter LFO

**Total Modulation Range:** 1 to 10 octaves

**Modulation Amount:** -99 to 100

## SPECIFICATIONS

### **ENVELOPES (1-4, Filter, Amplifier)**

**Initial Envelope Stages:** Delay, Attack, Hold, Decay, Sustain, Release, Repeat/Loop

**Modulated Envelope Stages:** Delay, Attack, Hold, Decay, Sustain, Release, Repeat/Loop

**Normal Envelope Contours:** 5

**One-Shot Envelope Contours:** 4

**Looping:** On/Off with repeat time

**Envelope Times per Stage:** 0ms to 14.7 seconds

**Sustain Level:** 0 to 100%

**Key Sync:** on/off (retriggering)

**Attack Reset:** Off/On

**Time Modulation Sources:** Off, Random1, Key1/2, Velocity, Aftertouch, Mod-Wheel, Stick X/Y

### **MIXER**

**Channels:** 4

**Audio Sources:**

Oscillator (1-4)

Oscillator (1-4) controlled by Envelope (1-4)

Oscillator (1-4) controlled by LFO (1-4)

Ring-Modulation of Osc 1&2, Osc 2&3, Osc 3&4, Osc 4&1

White-Noise

White-Noise controlled by Envelope (1-4)

Pink-Noise

Pink-Noise controlled by Envelope (1-4)

**Mixer Types:** Manual, Envelope, One-Shot, Key-Synced, Free-Running, Modulated

**Automix X:Y Location Stages:** 4

**Automix Stage Times:** 0ms to 14.7 seconds

**Mod Mix X:Y Location Stages:** 2

**Mod Mix Control Sources:** Off, Random1/2, Key1/2, Velocity, Aftertouch, Mod-Wheel, Stick X/Y, LFO, Envelope

**Mod Mix Sources:** Random1/2, Key1/2, Velocity, Aftertouch, Mod-Wheel, Stick X/Y, LFO, Envelope, Filter Envelope

**Mod Mix Amount:** 0 to 100

**Output Gain:** 1.00x to 5.00x

### **ANALOG FILTER**

**Primary Filter Types:** 4p low-pass, 2p low-pass, 1p low-pass, 2p band-pass, 2p high-pass, 2p notch

**Filter Frequency Range:** approximately 20 Hz to 20 kHz

**Resonance:** 0 to 100

**Key Tracking:** Off/On

**Modulation 1 Source:** LFO

**Modulation 1 Control:** Off, Random1/2, Key1/2, Velocity, Aftertouch, Mod-Wheel, Stick X/Y, LFO-4, Filter Envelope

**Modulation 2 Source:** Envelope

**Modulation 2 Control:** Off, Random1/2, Key1/2, Velocity, Aftertouch, Mod-Wheel, Stick X/Y, LFO-4, Envelope-4

**Modulation 3:** Random1/2, Key1, Velocity, Aftertouch, Mod-Wheel, Stick X/Y, DC+, Mix-1, Mix-2, Mix-3, Mix-4, LFO-1, Env-1, Amplifier Envelope

**Individual Modulation Amounts:** -99 to 100

## SPECIFICATIONS

**ANALOG AMPLIFIER** (see also Envelope parameters)

**Additional Envelope Type:** Drone

**Envelope Amplitude Modulation Control:** Off, Random1/2, Key1/2, Velocity, Aftertouch, Mod-Wheel, Stick X/Y, LFO-4, Envelope-4

### **KEYBOARD / SEQUENCER**

**Keys:** 29

**Scales:** 29

**Linear Transpose:** -12 to +16

**Scale Transpose:** -12 to +16 notes

**Octave Reiterations:** -3 to +3

**Tempo:** 10 to 250 BPM

**Swing:** 50% to 75%

**Sequencer Modes:** Play, Arpeggiate, Fill, Edit, Real-time, Auto

**Max Steps per Sequence:** 16

**Sequencer Parts:** Pitch, Velocity, Rhythm (Note-On/Off, Glide, Sustain)

**Time Signatures:** 1-4, 2-4, 3-4, 4-4, 6-4, 8-4

**Directions:** Down, Up/Down, Up, Random, (plus 25 complex directions)

**Loop Point:** 1 to 16 steps

### **MEMORY**

**Max Number of Sounds and Sequences:** 999

**Global Parameters Saved:** Output level, MIDI Channel, Fine Tuning, Screen Saver Time, Last File

### **MIDI**

**Channels:** 1-16

**MIDI Messages Supported:** Note-Pitch, Note-On/Off, Velocity, Aftertouch, Pitch-Bend, Mod-Wheel,

**MIDI Sync:** Clock, Start, Stop

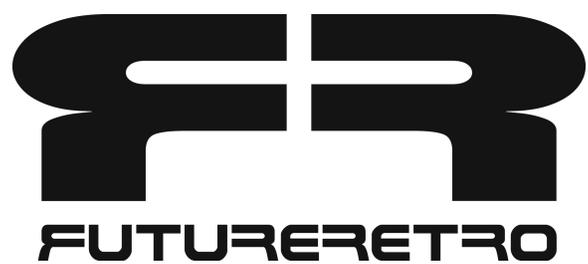
### **OTHER**

**Input/output:** 15V DC input, MIDI (IN/THRU/OUT), 1/4" unbalanced Audio Out

**Unit Dimensions:** (width) 18.25" x (depth) 11.0" x (height) 3.5"

**Unit Weight:** 5.0 lbs

**Power:** 15V DC (center-pin positive) rated at 1 Amp current.



Written by Jered Flickinger  
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