Owner's Manual

ASM HYDRASYNTH





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Save Your Ears!

The product and its software, when used in combination with an amplifier, headphones or speakers, may be able to produce sound levels that could cause permanent hearing loss. DO NOT operate for long periods of time at a high level or at a level that is uncomfortable.

If you encounter any hearing loss or ringing in the ears, please consult an audiologist.

Precautions Include, but Are Not Limited to, the Following:

1. Read and understand all the instructions.
2. Always follow the instructions on the instrument.
3. Before cleaning the device, always remove the USB and DC cable. When cleaning, use a soft and dry cloth. Do not use gasoline, alcohol, acetone, turpentine or any other organic solutions; do not use a liquid cleaner, spray or cloth that's too wet.
4. Do not use the device near water or moisture, such as a bathtub, sink, swimming pool or similar place.
5. Do not place the device in an unstable position where it might accidentally fall over.
6. Do not place heavy objects on the device. Do not block openings or vents of the device; these locations are used for air circulation to prevent the device from overheating. Do not place the device near a heat vent at any location with poor air circulation.
7. Do not open or insert anything into the device that may cause a fire or electrical shock.
8. Do not spill any kind of liquid onto the device.
9. Always take the device to a qualified service center. You will invalidate your warranty if you open and remove the cover, and improper assembly may cause electrical shock or other malfunctions.
10. Do not use the device with thunder and lightning present; it may cause electrical shock.
11. Do not expose the device to hot sunlight.
12. Do not use the device when there is a gas leak nearby.
13. Ashun Sound Machines is not responsible for any damage or data loss caused by improper operation of the device.

Specifications Subject to Change

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

Before Requesting Service...

Please study this manual carefully and consult your dealer before requesting service. Service charges incurred due to a lack of knowledge relating to how a function or feature works (when the product is operating as designed) are not covered by the manufacturer's warranty, and are therefore the owner's responsibility.

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Everyone at Ashun Sound Machines would like to thank you for choosing one of our Hydrasynth instruments. We're very proud of what we have created, and are confident they will take you into musical realms that have never been explored.

Every aspect of these ground-breaking devices has been carefully considered, from the way the sounds are generated and processed, to the intuitive layout of the controls and displays. Everything from impulse to performance has been optimized to unleash the creative potential of these instruments in your hands.

Main Features

This chapter will only list the main features of the Hydrasynth. But there are many more, and each feature and its related parameters will be described in the pages ahead. Advanced users might find quick answers to important questions in *Hydrasynth Specifications (p. 97)*.

User interface

- Intuitive workflow, perceived at a glance
- Front-panel controls for instant access to important features
- Easy shortcuts for patch / mod route construction (connect / copy / paste)
- Two independent OLED displays
- 8 Control knobs and 8 Control buttons around the Right display
- LED rings around the Control knobs indicate parameter values
- 8 assignable Macros per patch, accessible on Home page
- Arpeggiator: 8 modes with direction, octave, chord, and phrase options
- Patch browser: Organize by Name, Category, or Patch number
- Memorize / instantly recall up to 32 Favorites
- Overflow mode can link two units for 16-voice polyphony

Patch features

- 5 banks of 128 patches each
- Mono and Unison voice modes, with unison detune
- Glide with programmable time, curve, trigger mode
- Mod Matrix with 32 routes per patch
- Programmable Analog Feel emulates circuit designs
- Randomize function for individual modules or an entire patch

Sound engine

- Eight voices, with three oscillators per voice
- Analog modeling (Osc 1-3) and WaveScan synthesis (Osc 1+2)
- Select from hundreds of waveforms and then morph / mutate / warp them at will
- Filter 1: 11 filter types, including vocal formant filters
- Filter 2: classic state-variable 12dB / octave
- Filters can be placed in series or parallel
- Loopable ADSR envelopes with Delay and Hold stages
- Curve and BPM value for each segment

Effects

- Delay: five types, including Left-Right-Center and reverse
    - All delays can sync to tempo
- Reverb: four types, with pre-delay and damping parameters
    - Reverb lengths to 90 seconds, plus "Freeze"
- Independent Pre/Post FX: Chorus, Flanger, Rotary, Phaser, Lo-Fi, Tremolo, EQ, Compressor

Hardware

- MIDI In/Out/Thru
- USB type B port, class-compliant
- CV/Gate inputs and outputs for integration with modular synthesizers
- Headphone output(s)
- Stereo 1/4" outputs
- Sustain pedal input (polarity-sensing)
- Assignable Expression pedal input (reversible)
- LED Dim feature for darkened rooms
- Kensington lock port

Keyboard-specific Features

- 49-key, velocity-sensitive keyboard with polyphonic aftertouch
- Ribbon controller with Pitch bend, Theremin, and Modulation modes
- Additional Filter controls (Envelope amount, LFO amount)
- Additional Arpeggiator controls (Tempo, Ratchet, Chance, Gate)
- Backlit pitch bend and modulation wheels
- Octave Down / Up buttons
- Chord mode with dedicated button
- Glide button
- Two headphone jacks share a dedicated Volume control

Desktop-specific Features

- Rack-mountable (ears included)
- Recessed connection jacks allow for straight connectors
- 24 velocity-sensitive RGB pads with polyphonic pressure
- Pad colors indicate note relationships for each scale
- Shift + Pad to access secondary functions (Octave, Scale, etc.)

Inside the Box

Your Hydrasynth was carefully packed at the factory with the following items:

- The Hydrasynth
- This manual
- The power supply (12VDC / 1A)
- Rack ears (Hydrasynth desktop only)

Save Your Receipt!

Ashun Sound Machines designed and constructed your Hydrasynth with extreme attention to detail. Our quality assurance personnel test each unit thoroughly before it goes out.

But in the unlikely event of a hardware problem, you will need to present your original receipt in order to obtain warranty service. This will help the service center to confirm your warranty coverage. So please be sure to save your receipt in a safe location!

Plug It In

Power

Use only the DC power supply that was in the box with your Hydrasynth (12 Volts DC, 1 Amp). Make sure the power switch is in the OFF position before making this connection.

Before switching the unit on, please lower the volume of your speakers or mute the input channels on your mixer. This will help prevent any damage to your speakers or ears.

Audio

Using a mixer

After muting the channel inputs or lowering the volume of your speakers, connect a pair of 1/4" cables from the rear-panel output jacks of the Hydrasynth to the inputs of your mixer. Then set the Hydrasynth power switch to the ON position.

Using headphones

If you plan to connect headphones to the Phone jack on the Hydrasynth, turn the unit on first and then connect the headphones. The Hydrasynth keyboard model has an independent level control for the headphones next to the connection jacks. The headphone level is controlled by the Master Volume knob on the Hydrasynth desktop unit.

Master Volume control

The Master Volume knob controls the overall output level of the Hydrasynth.

But there's an important thing to remember: the Master Volume knob is an analog control. This means it does not communicate its position or movements digitally to your computer via USB.

USB

Hydrasynth is a USB class-compliant device, so there are no drivers to install. Just plug it into your computer and it will be available immediately as a MIDI input/output device.

MIDI

The Hydrasynth has three 5-pin MIDI connectors to allow you to interface with other MIDI devices. MIDI Out sends data from the Hydrasynth, MIDI In receives data, and MIDI Thru passes data from the MIDI In *without* data from the Hydrasynth.

CV/Gate

Your Hydrasynth has a row of connectors that are used to interface with modular synthesizers. Each one can be configured to match the voltages and signal types of the most popular formats. For details, see *The CV / Gate Section (p. 77)*.

Make Some Noise!

By now you've already played the instrument and tweaked the controls. Now let's take a quick tour of some of the main features.

To get started, press the Home button. This will exit any page and take the Hydrasynth to the top level of the patch.

Select Patches

There are several ways to explore the patch banks inside the Hydrasynth. The simplest way is to turn the Patch knob (the big one in the middle), or use the left and right arrow buttons above the Home button. This will move you through the bank one patch at a time. You'll see the patch name, bank, and number in the Left display.

You can also hold [SHIFT] and skip through the bank by 10 patches at a time, which can save a lot of scrolling if you know what you're looking for.

The Browse button opens the patch browser in the Right display. You'll want to read the section *Using the Browser (p. 80)* to learn about things like Categories, Favorites, and other search techniques.

Octave shift

If you want to hear a sound in a higher or lower range than the keys or pads currently reach, you can shift the range quickly by one or more octaves. The Hydrasynth keyboard has dedicated buttons above the wheels that flash faster as the range moves further from center; at maximum shift the buttons are lit solid. To reset the range, press both buttons.

For the Hydrasynth desktop, hold [SHIFT] and press the first two pads in the top row ([Oct -] / [Oct +]). As the octave range moves further from center the selected pad glows brighter. You can see if the pads are transposed by pressing [SHIFT] when on the Home page. To reset the octave range, hold [SHIFT] and press both pads.

Arpeggiator basics

Arpeggiators can turn a great sound into a whole performance! So when you're ready, press the Arpeggiator [ON] button to activate the arpeggiator. Then hold down two or more keys or pads while experimenting with the other controls in the Arpeggiator section. Here's a quick description of each.

Arpeggiator: Both units

Control	Function
Mode	Determines the arpeggiator direction and other behaviors.
Octave	Sets the range of the arpeggiator.
Division	Selects the basic time division of the arpeggiator relative to the tempo.
Swing	Eight settings allow you to add a certain amount of "shuffle feel" to the arpeggio.
On	This toggles the arpeggiator on and off. Use it with [SHIFT] to enter Edit mode.
Latch	Lets you to take your fingers off the keys or pads and use both hands to adjust parameters.
Triplet	Subdivides the selected Division setting into triplets.
Tap Tempo	Tap several times to set the tempo.

There are words in orange letters under two of the buttons: EDIT and SUSTAIN. These are used with the [SHIFT] button to access their secondary functions. We'll describe those and the other arpeggiator features in *The Arpeggiator Section (p. 66)*.

Keyboard-specific controls

The following controls are present on the top panel of the Hydrasynth keyboard, not the desktop model. However, these parameters are available for both units: see *Arp parameters: page 2 (p. 67)*.

Control	Function
Tempo	Turn this to adjust the tempo, or use the Tap Tempo button.
Ratchet	Sets how many subdivisions of an arpeggiator step are possible (1, 2, 4, or 8).
Chance	Determines the likelihood of a Ratchet event happening on a given arpeggiator step.
Gate	Adjusts the relative duration of the arpeggiator notes.

Tweaking the sounds

The Right display provides information about what is happening and what the options are, no matter what you're doing with the Hydrasynth. We'll dig down into every parameter eventually, but for now let's start at the top again. So please press [HOME] to make sure you're seeing what we're describing.

The Home page: Macro City

When Hydrasynth is on the Home page the Control knobs and Control buttons become modulation sources for the Macros. Each Macro can alter as many as eight parameters at one time by activating a single control. Every patch has eight Macros available.

Macros allow you to achieve complex results, but they're easy to create. When you're ready to try that, see *Mastering the Macros (p. 69)*.

The rest of the Master Control section has buttons that will be useful in the near future. We'll cover them in *Variable knobs (p. 16)*.

The Filter section

This section has two buttons and either three or five knobs, depending on the unit you have. The buttons select which of the two filters the knobs will control, after which the knobs can do their thing.

Knobs 1 and 2 are the same for either filter: they control Cutoff and Resonance, respectively. If Filter 1 is selected the third knob controls the Drive amount for that filter; if Filter 2 is selected the third knob allows you to "morph" the characteristics of that filter.

Those descriptions barely scratch the surface, though. To delve more deeply into what the Hydrasynth filters can do, read *The Filters and their Controls (p. 42)*.

Saving

In the process of tweaking a sound you will often create something you'd like to keep. If that has already happened, jump ahead to the Patch Management chapter and follow the instructions in *Save the Patch (p. 82)*.

Check for Updates

Be sure to visit *www.AshunSoundMachines.com* soon, and often! It's your source for important things such as:

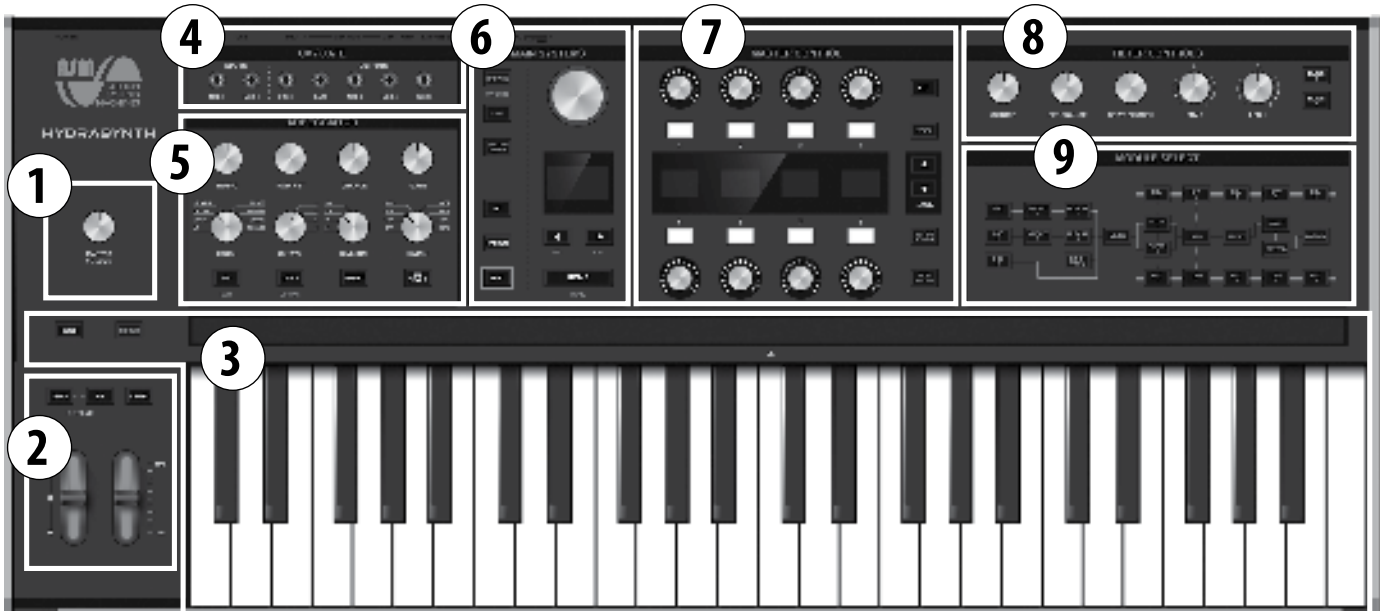
- Firmware updates for your Hydrasynth
- An interactive version of this manual
- Banks of new patches from our top-notch sound design team
- Tutorial videos to help you master the intricacies of the Hydrasynth
- …and more!

That's Enough Reading for Now.

We've covered the basics. Now let your creativity go wild!

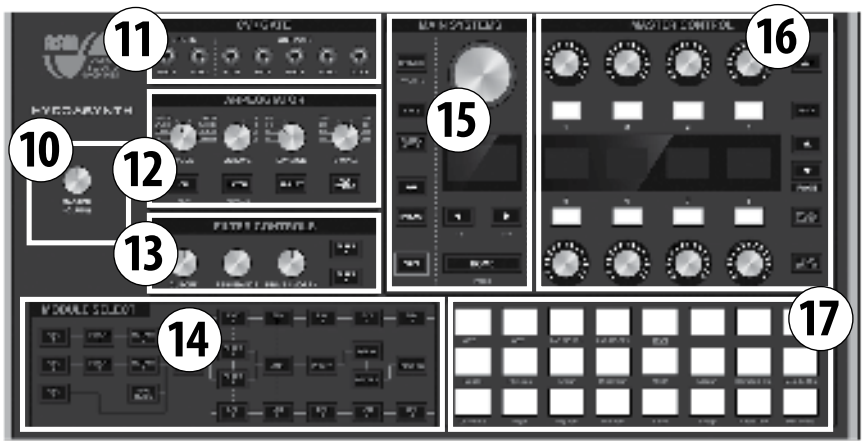
The Hydrasynth represents a perfect balance of instant access, intuitive workflow, powerful features, and great sound, all with a single aim: to make the creation and performance of mind-blowing music easier and more fun.

Top Panel: Hydrasynth Keyboard



Section	Name	Section	Name
1	Master Volume	6	Main Systems section
2	Wheels, Octave / Chord buttons	7	Master Control section
3	Keyboard, Ribbon, Ribbon / Glide buttons	8	Filter Controls section
4	CV / Gate connectors	9	Module Select section
5	Arpeggiator section		

Top Panel: Hydrasynth Desktop



Section	Name
10	Master Volume
11	CV / Gate connectors
12	Arpeggiator section
13	Filter Controls section
14	Module Select section
15	Main Systems section
16	Master Control section
17	Pads

The majority of the features of the Hydrasynth keyboard and desktop models are identical, and most sections of this manual apply to both. Please refer to *Hydrasynth Desktop (p. 24)* for more information about the features specific to that unit.

General Concepts

Access buttons

The orange-lettered Access buttons are located in several areas of the top panel. All of the buttons in the Module Select section and many of those in the Main Systems and Master Control sections are Access buttons. Their purpose:

- Press an Access button and the main parameter page for that feature appears in the Right display for editing.
- If more pages exist, one or both Page buttons will point to the other pages.
- Pressing an Access button repeatedly will also scroll through its pages.

Function buttons

These are the white-lettered buttons, and they make instant changes (load a patch, switch filters, toggle something, activate a Macro, etc.). It might help to remember that

- buttons with orange letters **select** things and
- buttons with white letters **do** things.

For example: To enable the Arpeggiator, press the [ON] button. To exit any page, press [EXIT] or [HOME].

Control knobs

Above and below the Right display are two sets of four knobs. They are "endless encoders": parameters are edited from their current value, rather than jumping to another value that was based on the position of the knob.

The Control knobs play different roles depending on the page that has been accessed:

- On the Home page they are used as Macro controls.
- On a parameter page they are used to adjust parameter values.

Control buttons

Each Control knob is paired with a Control button. Their function also depends on the page that has been accessed.

- On the Home page they can affect a Macro in one of four ways (Toggle, Trigger, Switch, or Reset). This choice is made on System Setup *Master: Page 2 (p. 85)*.
- On a parameter page they are used to:
  - select a parameter value for editing
  - toggle a value (Oscillator Solo on/off, for example), or
  - enter a lower-level editing page (i.e., Wavelist Edit for a WaveScan oscillator).

Module Select buttons

These buttons access the parameter pages of the selected Module (Osc 1, Delay, LFO 5, etc.) The signal path generally moves from left to right, but vertical lines between two buttons indicate:

- a pre-wired connection (Env 1 / LFO 1 to Filters, Env 2 / LFO 2 to Amp), or
- the ability to be routed in Series or Parallel, as with the Filters, or
- order of operations, such as the output of the Delay is fed to the input of the Reverb.

The Module Select buttons can be used as a quick way to set up a Mod Matrix route, too (hold one, press another). For information about that, see *The Mod Matrix (p. 73)*.

Knob types

Selection knobs

These are only found in the Arpeggiator section. A "selection knob" clicks between positions to select a value. Of these four, only the Swing parameter can be set to intermediate values (see *Swing (p. 66)*).

Note: The keyboard model also has four variable knobs in its Arpeggiator section. For a complete description, see *The Arpeggiator Section (p. 66)*.

Variable knobs

Hydrasynth uses two types of variable knobs:

- 270° encoders: The range has an upper and lower limit. Examples: Master Volume, Filter Cutoff
- Endless encoders: These have no range limits, so an edit always starts from the current value.

The displays

At the center of it all are two high-resolution OLED displays, also known as the Left display and the Right display. They serve different purposes:

- The Left display is for Patch selection and helpful graphics.
- The Right display is for parameter selection and adjustment.

When an Access button is pressed, the Right display and its surrounding controls change functions to allow instant access to the most-used parameters. The Page up/down buttons put all other parameters within easy reach.

Main Systems



Patch selection

One of the major functions of this section is patch selection. There are several methods, and you might use them all at different times depending on what you're doing.

Patch knob

From the Home page you can select an adjacent patch by turning the Patch knob a single click in either direction. You can also skip through the banks 10 patches at a time if you hold [SHIFT] while turning the knob.

Left / Right arrows

As with the Patch knob, press one of these buttons to select an adjacent patch. Hold [SHIFT] first to make the buttons jump through the patches 10 at a time.

Browse

This page lets you alter the way the patches are presented in each bank. There are three different sort orders: By Patch #, by Name, or by Category.

The Browse page also contains a robust Compare feature, as well as a sub-menu where you can designate a patch as a Favorite. You can stash up to 32 patches in your Favorites bank for instant access.

For details on each of these functions, see *Using the Browser (p. 80)* in the Patch Management chapter.

Favorites (Shift + Browse)

When you need to find your best sounds immediately you can jump straight to your Favorites bank from any other page.

- Hold [SHIFT] and press [BROWSE] to access your Favorites
- Use the Page Down/Up arrows to move between the four banks of Favorites
- Press the Control button next to the patch name to select it.

The HOME button

The Home button is located in the center of the top panel. It provides a quick way to get back to the top level of the Hydrasynth, where the Macro controls are. This is known as the Home page.

All Notes Off

Sometimes MIDI signals are disrupted and a note becomes stuck. If that happens, hold [SHIFT] and press [HOME] to transmit an "All Notes Off" command. This will silence any stuck notes.

The SAVE button

Whenever you've made an edit that you'd hate to lose, press [SAVE] to access the Save page. You'll be able to select a new location for the edited patch, rename it, and choose a category for the sound (Bass, Pad, etc.). You can even decide which color the Data knob and wheels will be when the patch is selected.

There's another feature that determines whether the positions of the Macro knobs will be stored as-is, returned to zero, or saved as edits to the parameters they control.

For details on each of these functions, see *Save the Patch (p. 82)* in the Patch Management chapter.

System Setup

This section is 12 pages deep. It houses all of the fundamental settings for the keyboard or pads, the knobs, the pedals, and the CV / Gate section, to name a few.

For details on each of these functions, see the *The System Setup Pages (p. 84)*.

The INIT button

Reset a parameter

The INIT button will reset any parameter to its default value: just hold [INIT] and press the Control button next to that parameter's value. The Control button will light up next to any parameter that has been edited, which helps you know which one to press.

Initialize a Module

You can reset the parameters for an entire Module using a similar method:

- Hold [INIT].
- Press the Access button for the desired module.
- Confirm the decision by pressing [INIT] again.
- If you decide not the initialize, press [EXIT] to cancel the procedure.

Initialize a Patch

If you want to build an entire patch from scratch, press [INIT] twice in a row. This will erase the contents of the Edit buffer, so be sure to save any edits you don't want to lose.

The RANDOM button

If you're the adventurous type, you will love this button! It can randomize the value of any parameter, any module, or even an entire patch.

Randomize a parameter

To randomize a single parameter, hold [RANDOM] and press the Control button next to that parameter's value. The Control button of every available parameter will light up, so you'll know which ones **not** to press (the dark ones won't do anything).

Randomize a Module

You can randomize the parameters for an entire Module using a similar method:

- Hold [RANDOM].
- Press the Access button for the desired module.
- Confirm the decision by pressing [RANDOM] again.
- If you decide not the randomize, press [EXIT] to cancel the procedure.

Random Patch generation

The Random feature can even randomize every value in an entire patch, including the Effects! Sometimes you'll get nothing but silence, but that's okay; just press [RANDOM] again. Once you get something interesting,

you can save it like that or tweak its parameters until everything is just right.

Random Patch selection

Do you find yourself always resorting to the same patches? There's nothing wrong with that; we're glad you like the sound of the Hydrasynth! But if you're looking for something different, let the Hydrasynth select a new patch for you. This works from any page:

- Hold [RANDOM] and press one of the Left/Right arrows.
- Confirm the procedure by pressing [RANDOM] again.
- To cancel the random selection procedure, press [EXIT].

The SHIFT button

The Shift button is used in combination with various buttons and knobs to access secondary functions. When these are available the secondary functions are indicated with a row of orange text under the control.

In some cases [SHIFT] is used to accelerate value selection. For example, if you hold [SHIFT] and turn the Patch knob you can scroll through the Patch bank in units of 10, as opposed to the standard operation of +/- 1 patch.

You can also use [SHIFT] to help fine-tune a value that has a large range. For example, if you want to set a precise value for filter resonance, hold [SHIFT] and turn the appropriate Control knob.

For a complete list of the available Shift functions, see *Control Combinations (p. 92)*.

Master Control Section



If you like to make your own patches, you might enjoy this top-panel section the most. When a Module is accessed the parameter values are shown in the Right display, selected with the Control buttons, and adjusted with the Control knobs. The Page Up/Down buttons provide access to more parameters whenever a Module offers more than eight. We'll cover the parameters of each Module in *Hydrasynth Desktop (p. 24)*.

The Master Control section is also a lot of fun when you're on the Home page, thanks to the powerful Macro controls. For live performance or on-the-spot creativity, the Macros can kick everything into high gear. See *Mastering the Macros (p. 69)*

EXIT button

This button will light as soon as you enter any page. It will take you back to the previous page, and it can cancel a process if you decide not to do something (Initialize, Randomize, Save, etc.). The Home page is the only page where [EXIT] is not lit, because that's the top level of the patch.

VOICE button

This Access button takes you into a set of patch-level features like Pitch bend range, Vibrato settings, Mono/Poly/Unison voice modes, and the Glide settings. This is also where the Scale is defined for the keyboard and pads.

Perhaps more subtle but equally important, the Voice module is also home to the Analog Feel and Random Phase settings. These can really bring a patch to life.

See the Modules chapter for specifics about the *Voice module (p. 31)*.

PAGE Up / Down buttons

These two buttons are lit if the selected module has more than one page. If one of those buttons is lit that means there are pages available in that direction. If both are lit then pages are available in both directions. If neither is lit, there are no additional pages to select.

Access buttons can be used to flip between pages too, which works great if there are only a few pages. But if the module has a lot of pages and the parameter you want is more than a few pages away, hold [SHIFT] and press one of the lit arrows to jump to the first or last page. Then use the Page Up/Down buttons to reach the desired page.

MACRO ASSIGN button

This Access button opens a page that is like a hallway with eight doors, and behind each one is a lab that makes a powerful performance control called a Macro. You can define up to eight modulation routes for each Macro, and then use the Control knobs and Control buttons to manipulate the Macros from the Home page. Each patch has its own set of 8 Macros.

To learn more about what's on the other side of those doors, see the chapter *Mastering the Macros (p. 69)*.

MOD MATRIX button

The Mod Matrix button accesses a digital patch bay that provides up to 32 sets of modulation routes per patch. These are in addition to the Macros, although they can be controlled by them.

- Potential sources for the modulation routes include LFOs, Envelopes, Velocity, the Expression pedal, either of the CV inputs (Mod 1 and Mod 2), and any MIDI CC # (Continuous Control number).
- Destinations can be almost any parameter in the Hydrasynth, including any Mod Matrix route. Additional destinations include the Mod 1 and Mod 2 CV outputs and any MIDI CC #.

There's a lot to say about this topic, so you'll want to read *The Mod Matrix (p. 73)*.

CV/Gate Section



These seven connectors allow the Hydrasynth to interface with the wild and wonderful world of modular synthesizers. There are five outputs (Pitch, Gate, Mod 1, Mod 2, and Clock) and two inputs (Mod 1 and Mod 2). The outputs send voltages and signals that can control external devices, and the inputs receive voltages that allow external devices to control parameters inside the Hydrasynth.

The range of each voltage and what type of signals are sent are defined in *The System Setup Pages (p. 84)*, and information about how to use them is in *The CV / Gate Section (p. 77)*.

Arpeggiator Section



The Hydrasynth provides a comprehensive, cutting-edge set of arpeggiator features that you can enjoy immediately.

You may have noticed that the Arpeggiator sections are different on the Hydrasynth keyboard and desktop models. But their capabilities are identical; the only difference is the number of controls on the top panel.

If you'd like more information, there's a chapter dedicated to the ins and outs (or "ups and downs", if you will) of *The Arpeggiator Section (p. 66)*.

Filter Controls

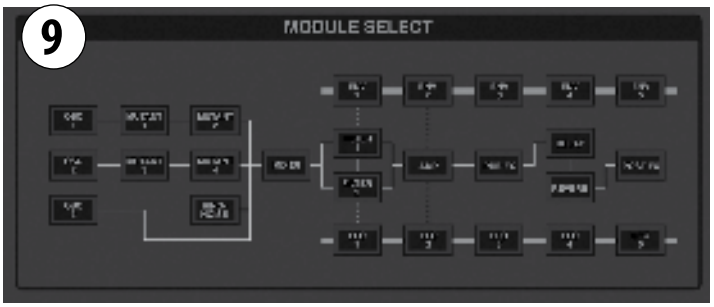


Sweeping the filter frequency of a sound is a great way to heighten the emotional impact of the music. This is especially true during an arpeggio or a sequenced passage.

Hydrasynth offers several controls for exactly this purpose. You can sweep the filter frequency, adjust the resonance, and increase the drive amount of Filter 1, for example, and then switch to Filter 2 and perform similar actions. However, for Filter 2 the third knob does not control the drive amount; instead it "morphs" the filter between the Low Pass, Band Pass, and High Pass types.

As with the Arpeggiator section, there are different top-panel Filter controls for the Hydrasynth keyboard and desktop models. But again, all of the same features are available in the pages of the Filter modules. For details, refer to *The Filters and their Controls (p. 42)*.

Module Select



The Module Select section has 26 Access buttons which are used to view and edit the parameters for each patch. Their placement provides a visual reference for the signal flow, which starts with the Oscillators, moves through the Filters, proceeds through the effects, and is sent to the outputs.

Pressing a Module button will reveal the first page of parameters for that module. If more than one page exists, the Page buttons are used to access the other pages, as described earlier in *PAGE Up / Down buttons (p. 19)*. Full details about the parameters of each Module are found in the chapters ahead.

Performance Controls

The Hydrasynth was designed to encourage the spontaneous exploration of sound and rhythm. We think you will quickly master the controls and start travelling the paths of creativity before you realize it has happened!

The keyboard and desktop models have slightly different layouts, but there are many similarities. Both instruments have Macro controls on the Home page, along with Filter controls, Arpeggiator controls, and CV/Gate/Clock connectors immediately accessible from their top panels.

If you have the one model and are curious about the differences between them, here are the most obvious:

- The Keyboard model has 49 keys, a ribbon controller, pitch/mod wheels, Octave buttons, Chord mode, a Glide button, and front-panel headphone jacks.
- The Desktop model has 24 RGB pads, which also offer quick access to secondary functions (Shift + Pad X). It can also be mounted in a rack.

Both models have identical voice architecture, OLED displays, parameters, and editing methods. And if you will forgive the shameless plug, if you buy one of each you can combine their polyphony by enabling *Overflow (p. 89)*. Twice the fun for less than twice the price!

Chord mode (keyboard only)

A single key can play up to 8 notes at once by activating the [CHORD] button. But a chord must be created before the button can be used.

To create a chord, hold [CHORD] and it will flash. Then play the notes you want the chord to contain. You can press them all at once or one at a time, which allows you to build chords that are outside your normal reach. The lowest note you enter will become the root note. When you're done, release the button.

There are a few things to remember about Chord mode:

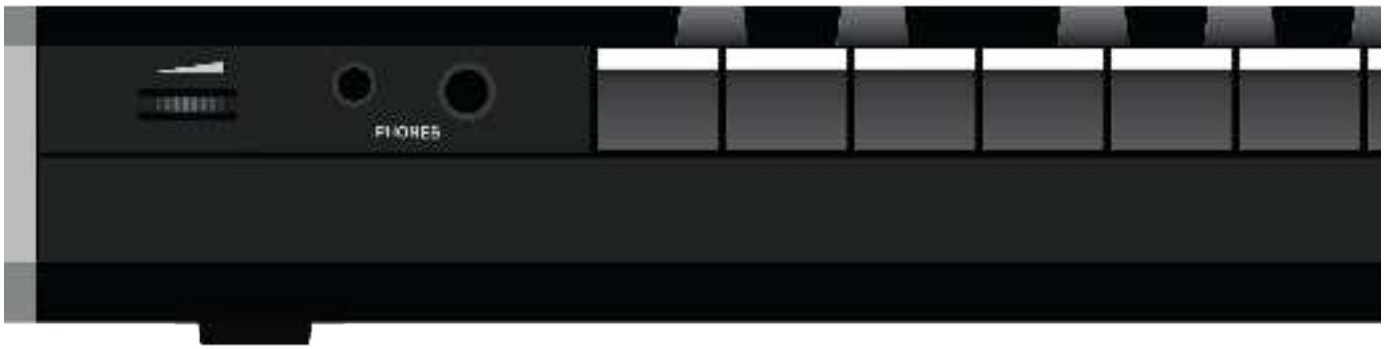
- A chord can contain between 2-8 notes; <2 notes are not stored; notes >8 are ignored.
- The chord is not saved with a patch, and will be erased when the Hydrasynth is power-cycled.
- Chord mode puts the keyboard into mono mode (last note priority)
- All notes in the chord will be quantized to notes within the selected scale. (See *Select a Scale (p. 63)* in *The Voice Module (p. 60)*.)
- The chord is not transmitted over USB or MIDI. A slaved device will only receive the played note.

Ribbon controller (keyboard only)

The ribbon controller can be used three ways: to bend the pitch of held notes, as a solo synthesizer (Theremin mode), or as a modulation source only. In Theremin mode its range matches that of the keyboard by default, but it can be scaled to cover 2 or 6 octaves. Full operational details are in the chapter, *Ribbon Controller (keyboard only) (p. 64)*.

Front Panel (keyboard only)

The Hydrasynth keyboard model has its headphone connectors on the front panel under the keyboard.



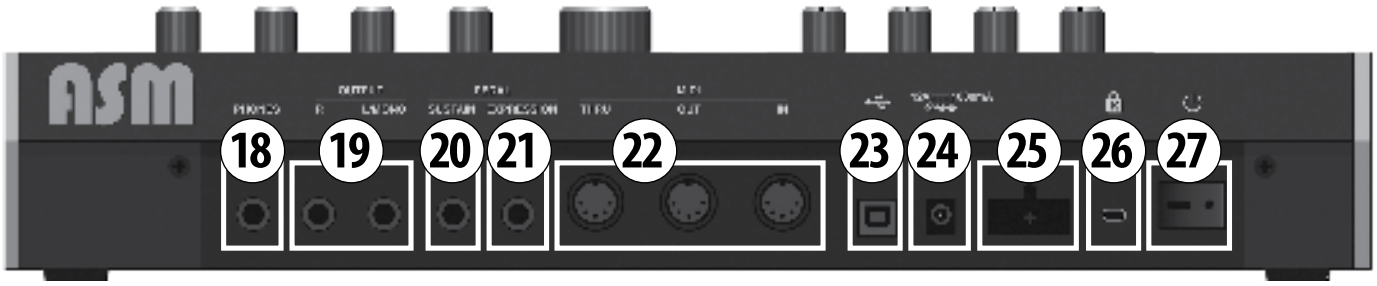
Headphone jacks

The two most common sizes for headphone connectors are provided. The signal and level are identical for both. The circuits were designed for compatibility with a wide range of headphone impedance ratings.

Phones volume control

Moving the level dial to the right will increase the volume to the headphones; moving the dial to the left will decrease the volume.

Rear Panel



Rear panel of the Hydrasynth desktop model is pictured

Section	Name	Description
18	Phones output (desktop only)	Keyboard: see Front panel description above
19	Outputs	Left (mono), Right (for stereo)
20	Sustain pedal input	Polarity sensing on startup
21	Expression pedal input	Polarity can be inverted in System Setup
22	MIDI connectors	In, Out, Thru
23	USB connector	Type B for computer connection
24	DC power connector	12 volts DC, 1A
25	Power cable guard	Helps prevent accidental disconnection
26	Kensington lock	Helps prevent unwanted relocation
27	Power switch	Gets the creative juices flowing!

Outputs

Headphones

As mentioned in the previous section, the headphone connectors for the Hydrasynth keyboard are located on its front panel, along with a dedicated volume control.

The Hydrasynth desktop has its headphone connector on the rear panel, and the volume is controlled with the Master Volume knob.

Stereo Outputs

Connect the Left output if monaural signal is desired; connect both outputs if stereo signal is preferred.

Control Inputs

Sustain

Connect a momentary footswitch here. Its polarity is detected on power-up, so any brand of pedal can be used.

Expression

Connect a variable foot pedal here. Its polarity and range can be adjusted in *The System Setup Pages (p. 84)*], which makes it compatible with a wide range of pedals.

This input can also be used as a modulation source in the Mod matrix, so it can do far more than control the volume!

MIDI

The Hydrasynth has three 5-pin MIDI connectors to allow you to interface with other devices that might not have a USB port or CV / Gate connectors.

- **MIDI Out** sends data from the Hydrasynth to another MIDI device
- **MIDI In** receives data from another MIDI device
- **MIDI Thru** passes the data that arrives at the physical MIDI In jack to another MIDI device. It does not send the MIDI information generated by the Hydrasynth keyboard or pads.

USB

Use this port to connect the Hydrasynth to your computer.

Power

Cable lock

There's nothing worse than having someone trip over a cable and unplug something. We encourage you to take advantage of this additional level of protection for the power supply cord.

On/off switch

There are only two options here:
O = Off and | = On.

Kensington lock

Let's face it: the music you make with your Hydrasynth will take people places! And just in case they get a bit carried away, we've included the Kensington lock system so you can keep your Hydrasynth from also being carried away.

The Hydrasynth desktop model has all of the firepower of the keyboard model, even though there are some obvious physical differences. Aside from the size, the most prominent distinction is that the desktop model has RGB pads instead of keys. The pads provide some interesting options for interactive creativity, which will be the main focus of this chapter.

Attaching the Rack Ears

We've included rack ears with the Hydrasynth desktop model so you can put it into a rack if you prefer. It's easy to attach them:

1. *Undo the 3 screws on each of the side panels.*
2. *Put one of the rack ears on the appropriate side of the unit.*
3. *Use the screws you removed to attach it.*
4. *Repeat the process for the other side.*

SHIFT + Pad Functions

The [SHIFT] button and the pads are used together to access secondary functions.

Row	[SHIFT] + pad #	Label	Secondary function
Bottom	1-8	(various)	Select Pad Scale
Middle	9-16	(various)	Select Pad Scale
Top	17	Oct -	Octave shift down
-	18	Oct +	Octave shift up
-	19	Pad Mode -	Cycle backward through pad modes
-	20	Pad Mode +	Cycle forward through pad modes
-	21	Key	Select Pad Key

Hold [SHIFT] and the lit pads indicate the current setting for all of the above functions.



The [SHIFT] + Pad function settings are not remembered when the power is turned off.



The Pad Scale "Minor" is the common name for the Voice scale "Aeolian."

Pad Scale selection

The first two rows of pads are used with the [SHIFT] button to select the Pad Scale (i.e., the notes that are available on the pads). 16 of the most widely-used scales are available this way, though there are many more options in *The Voice Module (p. 60)*. There's a chart that shows the notes of each scale in *Scales (p. 95)*. We'll focus on the Shift functions of the top row for the majority of this chapter.

This chapter will refer to the scale selected on [VOICE] page 3 as the Voice Scale. For a full description of the Voice Scale, see *Voice Parameters: page 3 (p. 63)*.

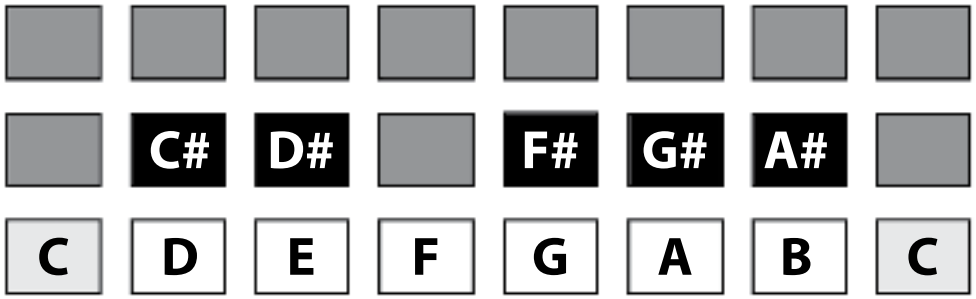
Octave Transpose

Hold [SHIFT] and press pad 17 or 18 to transpose the pad range in octave increments, up to four octaves in either direction. The pads become a deeper color the further the range is shifted from center. At zero transposition both pads are lit. To reset the pad range hold [SHIFT] and press both pads at the same time.

Changing the Pad Key

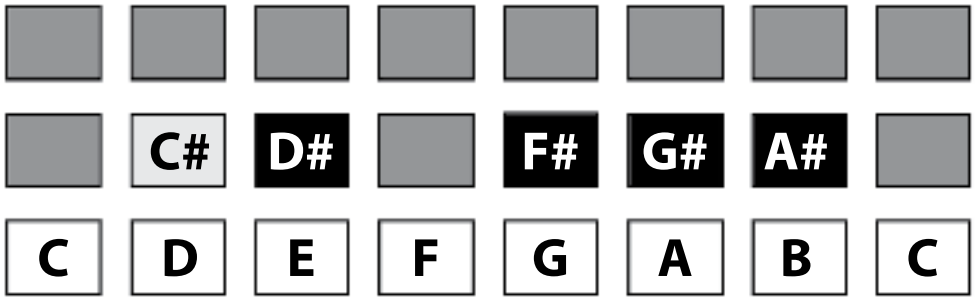
We'll describe this first before getting into the Pad Modes. In addition to selecting scales and Pad Modes it's also possible to define the root key for the pads. The default key is C, but you can choose any note in the chromatic scale. The process is simple:

1. *Hold [SHIFT] through the final step.*
2. *Press the top-row pad labeled [KEY]. The Left display shows the current Pad Key. The bottom two rows of pads show colors representing a single chromatic octave: yellow = the current root note (C), blue = white keys, green = black keys, grey = inactive.*



3. *Select pad 10 to change the Pad Key. The Left display shows Pad Key = C#.*
4. *Release [SHIFT]. Pads 1-24 now begin on a C# in the lower left corner and work their way upward according to the scale and Pad Mode settings. This is a global setting; it affects all presets.*

Note that the next time you repeat this process, pad 10 will be yellow in step 2 above since the Pad Key has been changed to C#.





The Pad Key setting does not transpose incoming MIDI note data.

Pad response options

Velocity and pressure

The velocity- and pressure sensitivity of the pads can be toggled on and off independently. These parameters are found on page 3 of the *Keys / Pads: Page 3 (p. 86)*.

Sustain

Use [SHIFT] + [LATCH] to toggle the Sustain function on and off if you don't have a sustain pedal connected.

Pad Modes

Each Pad Mode changes the pad colors visible on the Home page. Yellow pads normally play the root of the scale, although there are exceptions that will be described later.

For example, when the Pad Mode is Chromatic only two pads are yellow: pads 1 and 13. In the key of C, those two pads play a C. Other Pad Modes have more root notes, and therefore more yellow pads: Fretboard has three, Octave Row has six, and Octave has four. If the Pad Key is changed to C# the yellow pads play a C#, and all other pads conform to the selected scale in the key of C#.



Pad 1 is always yellow, regardless of all other factors.

To illustrate the differences between Pad Modes, press [INIT] twice and set the Pad Scale to Chromatic ([SHIFT] + pad 1). Then use [SHIFT] + pad 19 to change the Pad Mode.

- **Chromatic** starts with a C on the lower left (pad 1) and proceeds in half-step increments through pad 24.
- **Fretboard** arranges the pads in vertical stacks of musical 4ths, like the first 3 strings of a guitar or bass guitar. For example, pads 1, 9, and 17 play the notes C, F, and Bb, respectively; pads 2, 10, and 18 play the notes C#, F#, and B; and so on. it's possible for a vertical stack to contain augmented 4ths or other intervals when a non-chromatic Voice Scale is selected, due to the lack of certain notes in the selected scale. *Note: Fretboard is the only mode in which grey pads indicate notes that are outside the selected scale.*
- **Octave** assigns all notes in the scale to consecutive pads. This puts the largest number of notes from the scale on the pads at the same time. For example, the Chromatic Pad Scale covers almost 2 octaves with 24 pads; a Pentatonic Pad Scale covers over 4 octaves.

*To view **Octave Row** mode, select the Major scale ([SHIFT] + pad 2) and change the Pad Mode again.*

- **Octave Row** makes each row of pads into its own octave, with the root note assigned to the first and last pad in each row. The last pad in row 1 plays the same note as the first pad in row 2, etc.



The Pad Scale selection is ignored when the Pad Mode is Chromatic or Fretboard.

For the remainder of this chapter we'll describe the Pad Modes and how they interact with the Pad Scales and Voice Scales. Pad Key and Voice *Key Lock (p. 63)* are set to C unless noted otherwise.

Octave Row and the Pads

Different scales contain different numbers of notes. When the Pad Mode is set to Octave Row, sometimes the end pads will be dark, and therefore silent.

For example, use [SHIFT] + pad 4 to select Min Pentatonic as the Pad Scale. Pentatonic scales have five notes, and when sandwiched between two root notes only the first 6 pads are lit in each octave. The two furthest pads in each row are not needed, so they remain unlit and inactive.

Where is Octave Row?

Octave Row mode is only available when the selected Pad Scale contains fewer than 8 notes. Most of the Pad Scales fall into that category.

Conversely, Octave Row mode is *not* available when the selected Pad Scale contains more than 7 notes, because each row must contain one root note on either side. This is true for the Chromatic Pad Scale even if the Voice Scale has fewer than 8 notes, like PentaMaj (see the example at *Pad Scale vs. Voice Scale (p. 29)*).

In practical terms, if the Pad Mode is Octave Row and the Pad Scale is changed to Melodic Min, Bebop, or Chromatic from any other Pad Scale, the Pad Mode will change automatically from Octave Row to Octave mode. Those Pad Scales do not conform to the Octave Row format.

Pad Mode examples

Chromatic: C

Pad #								
17-24	E	F	F#	G	G#	A	A#	B
9-16	G#	A	A#	B	♪C♪	C#	D	D#
1-8	♪C♪	C#	D	D#	E	F	F#	G

Pad Mode = Chromatic, Pad Key/Scale = C Chromatic; ♪ = root (yellow), # = red, all others = blue

A Chromatic scale contains all 12 notes, so none of the pads are grey. Instead, red pads are the equivalent of the black keys on a piano, and blue keys are the equivalent of the white keys. The yellow pads are the root notes, which in this case play a C.

Chromatic: C#

Pad #								
17-24	F	F#	G	G#	A	A#	B	C
9-16	A	A#	B	C	♪C#♪	D	D#	E
1-8	♪C#♪	D	D#	E	F	F#	G	G#

Pad Mode = Chromatic, Pad Key/Scale = C# Chromatic; ♪ = root (yellow), # = red, all others = blue

Selecting a Pad Key of C# shifts the range of the pads up a half-step. The yellow pads are the root notes, which in this case play a C#. And again, the Chromatic scale contains all 12 notes, so none of the pads are grey. Instead, red pads are the equivalent of the black keys on a piano, and blue keys are the equivalent of the white keys. Their positions have simply been offset to the left by one pad compared to a Pad Key of C.

Fretboard: C Major

Pad #								
17-24	a #	B	♪C♪	c #	D	d #	E	F
9-16	F	f #	G	g #	A	a #	B	♪C♪
1-8	♪C♪	c #	D	d #	E	F	f #	G

Pad Mode = Fretboard, Pad Key/Scale = C Major; Voice Scale = Chromatic

♪ = root (yellow), CAPS = in scale (blue), lower case = out of scale (grey)

Above: Grey pads show which notes are out of the scale, but the notes still can be played since the Voice Scale is Chromatic. Pad playback is very different after selecting a Voice Scale of C Major (see example below).

Fretboard: C Major x2

Pad #								
17-24	a	B	♪C♪	c	D	d	E	F
9-16	F	f	G	g	A	a	B	♪C♪
1-8	♪C♪	c	D	d	E	F	f	G

Pad Mode = Fretboard, Pad Key/Scale = C Major; Voice Scale = Major

♪ = root (yellow), CAPS = in scale (blue), lower case = quantized to note in scale (grey)

In this case the pads look the same, but the grey pads are forced to play notes within the Voice Scale. Pads that would otherwise trigger out-of-scale notes are quantized to a note within the scale. Generally the pitches of the in-scale notes are duplicated on the grey pads immediately to the right. But there are exceptions: for example, pad 17 in the top row was quantized to the pitch of pad 14. Exceptions like this are made in some modes to widen the range of a row.

Fretboard: C# minor

Pad #								
17-24	B	c	♪C# ♪	d	D#	E	f	F#
9-16	F#	g	G#	A	a #	B	c	♪C# ♪
1-8	♪C# ♪	d	D#	E	f	F#	g	G#

Pad Mode = Fretboard, Pad Key/Scale = C# minor

Octave Row: C Major

Pad #								
17-24	♪C♪	D	E	F	G	A	B	♪C♪
9-16	♪C♪	D	E	F	G	A	B	♪C♪
1-8	♪C♪	D	E	F	G	A	B	♪C♪

Pad Mode = Octave Row, Pad Key/Scale = C Major



Octave Row can only be selected for Pad Scales that contain fewer than 8 notes.

Octave Row: C Maj Pent

Pad #								
17-24	♪C♪	D	E	G	A	♪C♪		
9-16	♪C♪	D	E	G	A	♪C♪		
1-8	♪C♪	D	E	G	A	♪C♪		

Pad Mode = Octave Row, Pad Key/Scale = C Pent Major

A Pentatonic scale contains only 5 notes, which are framed by two root notes an octave apart. The two furthest pads in each row are not needed, so they are not lit.

Octave: C Major

Pad #	-	-	-	-	-	-	-	-
17-24	E	F	G	A	B	♪C♪	D	E
9-16	D	E	F	G	A	B	♪C♪	D
1-8	♪C♪	D	E	F	G	A	B	♪C♪

Pad Mode = Octave, Pad Key/Scale = C Major; ♪ = root (yellow), in-scale notes = blue

Octave: C Maj Pent

Pad #	-	-	-	-	-	-	-	-
17-24	D	E	G	A	♪C♪	D	E	G
9-16	G	A	♪C♪	D	E	G	A	♪C♪
1-8	♪C♪	D	E	G	A	♪C♪	D	E

Pad Mode = Octave, Pad Key/Scale = C Chromatic; ♪ = root (yellow), # = red, all others = blue

Pad Scale vs. Voice Scale

The Pad Scale and the Voice Scale both affect the notes played by the pads. For example:

- If Pad Mode = Octave Row and Pad Scale = Major Pentatonic, the pads play C-D-E-G-A-C for the first 5 Voice Scales.
- But if the Voice Scale changes to HarmMaj (the 6th scale) the pads play C-D-E-G-Ab-C.
- But the HarmMaj scale actually has 7 notes (C-D-E-F-G-Ab-B), so it was being filtered through the Major Pentatonic Pad Scale in the previous step and lost two notes (F and B).
- If Pad Mode = Octave or Fretboard, Pad Scale = Chromatic, and Voice Scale = HarmMaj, all 7 notes of that scale are available on the pads.

Pad Notes and MIDI Notes

The Pad Scale affects the pads but not incoming MIDI notes. The Voice Scale affects incoming MIDI notes AND the pads, with results also affected by the Pad Scale.

Scale type	Affects the pads	Affects incoming MIDI notes
Pad Scale	Yes	No
Voice Scale	Yes	Yes

Pad Notes vs. Key Lock

Key Lock (p. 63) forces the pads to play the notes of the selected Scale (Voice or Pad) in that Key. As a result, the selected Scale can cause pad 1 to play a different note than it does with other Scales, Locked Keys, or Pad Keys.

The orange-lettered Access buttons select particular modules for editing, and can also be used to create new mod routes. They are arranged in the order of signal flow, from left to right: [Osc] > [Mixer] > [Filter] > [Amp] > [FX]. The front panel graphics indicate this, and also show the interactions and independence of the modules.

There are two exceptions to the signal flow rule:

- The Voice module, located below the Exit button. It provides features such as the Unison modes and Scale.
- The Ribbon module (keyboard only), which defines the behavior of this performance control.

Module Groups

We'll only touch briefly on the modules here; most have their own chapters. Their purpose here is to introduce operations that can be performed by any two modules from any module group.

Oscillator group

The Oscillator group includes Oscillators 1-3, the four Mutant modules, and the Ring-Noise module. After the waveforms are generated by Oscillators 1 and 2 they pass through their respective Mutant modules before heading to the Mixer module, where they are joined by the outputs of Oscillator 3 and the Ring-Noise module.

The modules that are in the Oscillator group are described in *The Oscillator Group (p. 33)*.

Mixer module

This module has some simple but important functions, including the relative levels and panning of the oscillators, how they are routed through the filters, and whether the filters are in a series or parallel configuration. Full details are in *The Mixer Module (p. 40)*.

Filter group

Filter 1 and Filter 2 are similar in name and function but their features are very different.

- **Filter 1** has 11 different filter models, including Low- / High- / Band Pass and vocal formant options.
- **Filter 2** is a multi-mode filter that can "morph" between its Low Pass, Band Pass, and High Pass states.

The filters can be placed in parallel or series. Full details are in *The Filters and their Controls (p. 42)*.

Envelope group

All five Envelopes have identical parameters. Dotted lines connect ENV 1 to the Filter group and ENV 2 to the Amp module, which means they have pre-wired connections that show up as parameters in those modules. But all Envelopes can be used as modulation sources for any destination, and Envelopes 3-5 can be used as additional modulation sources for the Filters and the Amp module.

Note that Envelope 2 does not show up by name inside the Amp module, but its input level is controlled by the AmpLevel parameter.

LFO group

All five LFOs have identical parameters. Dotted lines connect LFO 1 to the Filter group and LFO 2 to the Amp module, which means they have pre-wired connections that show up as parameters in those modules. But all LFOs can be used as modulation sources for any destination, and LFOs 3-5 can be used as additional modulation sources for the Filters and the Amp module.

Amp module

The Amp module contains only three parameters:

- **LFO 2 Amount** adjusts the amount and polarity of the effect LFO 2 has on the Amplitude of the patch.
- **Velocity** controls the velocity response of the Amplitude stage. Negative values invert the response: increased velocities reduce the amplitude.
- **Amp Level** can be used to compensate for quieter or louder output from the oscillators and filters.

For information about how these parameters interact, see *The Amp Module (p. 46)*.

FX group

Rounding out each patch is a healthy array of effects processors, from pitch effects to spatial emulations and much more. With these a raw sound can become sweet or angry, pure or distorted, straightforward or mangled.

Once the rest of the synth has had its way, the signal flow is [Pre-FX] > [Delay] > [Reverb] > [Post-FX] > Output. For specific details read *The Effects (p. 55)*.

Other Modules

Voice module

Though it isn't located in the Module Select section, the Voice module has a significant impact on each patch. It determines how many notes are available, which ones will play, and how they sound, through parameters such as Polyphony, Detune, Analog Feel, Random Phase, Glide, and Scale. These are fully described in *The Voice Module (p. 60)*.

Ribbon (keyboard only)

The Ribbon controller has three modes of operation: Pitch Bend, Theremin, and Mod Only. It can be used in several ways as a modulation source via the Mod Matrix while also being used in Pitch Bend mode or Theremin mode at the same time. Full details are available in *Ribbon Controller (keyboard only) (p. 64)*.

Module Shortcuts

The front panel buttons can do a lot more than access parameters for editing. They can be used to create a mod route within seconds, for example, or to copy parameters between similar modules.

Create Mod routes

There's a shortcut to set up one or more mod routes very quickly. Instead of accessing the Mod Matrix through its button and navigating to the right page and field, try this from the Home page:

- Press and hold the module button for the desired *Modulation Sources (p. 75)*
- Press the module button for the destination you want to modulate. See *Modulation Destinations (p. 76)*

If you've chosen valid components for the route the Hydrasynth will jump directly into the Mod Matrix at the first empty modulation slot, with the first parameter of the destination module highlighted. From there you can select a different parameter within that module using the upper Control knob and set the modulation amount with the lower Control knob. If the destination parameter has a front panel knob available, turning that will select it as the destination.

This technique can also be used inside the Mod Matrix pages. The advantage to doing it there is that when you hold a source button, all of the potential mod route destinations will light up. They don't do that from the Home page.

The Mod Matrix will be covered more fully in *The Mod Matrix (p. 73)*.

Select Macro Destinations

When Hydrasynth is on the Home page the Control knobs and Control buttons are capable of the simultaneous manipulation of up to eight parameters each. The module buttons make it easy to set these up.

First the Hydrasynth must be on the Macro Assign page, where the module buttons become shortcuts to select the parameters you want to control. This is significantly faster than scrolling through all of the other modules to reach the one you want.

Everything you need to know about setting up Macros is in the chapter *Mastering the Macros (p. 69)*.

Copy / Paste settings

Some modules are identical, and their parameter values can be copied from one module to another. For example, you can copy the settings from Oscillator 1 to Oscillator 2, or vice versa, because their data is interchangeable.

Some modules have unique features and capabilities and their data is *not* interchangeable. For example: you can't copy the settings from Oscillator 3 to Oscillator 1 because their parameters are very different.

Copy / paste procedure

The process of copying the settings between compatible modules is simple:

- Press and hold the Save button: All modules that are potential copy sources are lit
- Select the copy source: Only potential paste destinations remain lit
- Select the paste destination. The process will execute and all buttons will become unlit, indicating success.

Here's a real-life example: Let's say you want to copy the settings from Envelope 1 to Envelope 2, and then make some slight adjustments so Envelope 2 comes in more slowly and fades out sooner. It's easy: Hold [SAVE], press [ENV1], and then press [ENV2]. Release the Save button and you're ready to edit Envelope 2.

Modules that will

When the Save button is held some of the Module buttons are lit. These are the ones that can be copied and pasted. There are limitations, of course; the parameters of an Oscillator cannot be pasted to one of the Filters, for example. Here's a table that shows the possible combinations.

Modules	Copy/Paste is possible between...
Oscillators	Oscillators 1 and 2
Mutants	Mutants 1, 2, 3, or 4
Envelopes	Envelopes 1, 2, 3, 4, or 5
LFOs	LFOs 1, 2, 3, 4, or 5

Modules that won't

When the Save button is held some of the Module buttons are not lit. These have unique parameters and can not be copied and pasted.

Modules	Copy/Paste NOT possible...
Oscillators	Oscillator 3, Ring-Noise
Filters	Filter 1, Filter 2
Effects	Pre-FX, Delay, Reverb, Post-FX
Others	Mixer, Amp

Oscillators are the foundation of a patch. They generate the most basic component of the sound, which is then shaped by other components such as Mutants, Filters, Envelopes, etc.

Hydrasynth has 3 oscillators per voice. Oscillators 1 and 2 can operate in two different modes: Single and WaveScan. Oscillator 3 operates only in Single mode. The same waveforms are available in both modes, but the features of each mode are very different.

The Mutant modules affect an oscillator the same way a mask or lipstick affect a face: they change the way the underlying component is presented to the world. The Ring-Noise module does a similar thing: it produces a sound based on the sum and the difference of two input signals.

The Oscillator, Mutant, and Ring-Noise modules form the Oscillator group. We'll cover them all in this chapter.



Settings can be copied between identical modules (Osc 1 and 2, Mutants 1-4): Hold [SAVE], press and release the source, and then press and release the destination. Then release [SAVE].

Oscillators 1 and 2

The features of these oscillators are identical, so the following descriptions apply to both. For a list of the available waveforms see the *Waveform List (p. 39)* at the end of this chapter.

Switching modes

To change an oscillator from Single mode to WaveScan mode or vice versa, access [OSC 1] or [OSC 2] and use Control knob 1.

Single mode

Single mode provides only a single waveform to the sound, hence the name. There's a lot you can do with a single waveform, though: the Mutant modules and the Ring Modulator make sure of that.

Single mode has one page of parameters.

Parameter	Range	Description
Wave	219 options (see *Waveform List (p. 39)*)	Choose a waveform as the starting point
Semi	+/- 36 semitones	Coarse tuning of oscillator pitch. Use [SHIFT] to jump by 12 semitones.
Cents	+/- 50 cents	Fine tuning of oscillator pitch
Keytrack	0-200%	Sets keyboard pitch tracking. 0 = fixed pitch; at 200% a 1-octave difference on the keyboard changes the pitch by 2 octaves. Default = 100%.

WaveScan mode

This mode offers all of the same waveforms found in Single mode, but then allows you to select up to eight of them in a Wavelist. WaveScan will morph gradually between the positions in the Wavelist, using an LFO or some other source through the Mod Matrix.

We'll list the parameters first and describe them in detail later. Some are also present in Single mode:

Parameter	Range	Description
Wavelist Edit...	(access)	Press Control button 2 to access the list. (See Wavelist Edit page below.)
Semi	+/- 36 semitones	Coarse tuning of oscillator pitch. Hold [SHIFT] to jump by 12 semitones.
Cents	+/- 50 cents	Fine tuning of oscillator pitch
WaveScan	1.0 to 8.0 in steps of 0.1	Select the starting position of the WaveScan. Hold [SHIFT] to jump by whole numbers. An intermediate value morphs between two waveforms, as seen in the Left display.
Keytrack	0-200%	Sets keyboard pitch tracking. 0 = fixed pitch; at 200% a 1-octave difference on the keyboard changes the pitch by 2 octaves. Default = 100%.

Wavelist Edit page

This lower-level page lets you pick a waveform for each of the 8 WAV locations. Options include OFF, Silence, and any one of the 219 waveforms.

The eight WAV slots correspond to the x.0 positions of the WaveScan parameter on the upper page: WAV 1 = position 1.0, WAV 2 = position 2.0, etc. A WaveScan value of 1.5, for example, is derived by "morphing" halfway between WAV 1 and WAV 2.

Two additional features make waveform selection and auditioning very easy:

- Press the corresponding Control button to audition that WAV position in isolation.
- Hold [SHIFT] and turn a Control knob to change that waveform and all that follow it. For example,
  - Hold [SHIFT] and turn Control knob 3.
  - As WAV 3 selects waveform X, WAV 4 selects waveform X+1, WAV 5 selects waveform X+2, etc.



When a WAV is set to OFF, any WAV after it is treated as if it were located in an earlier position. For example, if WAV 7 = OFF but WAV 8 = Pulse4, the Hydrasynth handles Pulse4 as if it were WAV 7.

Oscillator 3

Oscillator 3 operates in Single mode only, so it does not have the Mode select option in edit field 1. See the description of Single mode in *Oscillators 1 and 2 (p. 33)*.



While creating a patch it can be useful to solo an oscillator to see what it is contributing to the sound. This feature is located on the first page of the *The Mixer Module (p. 40)*. Ring & Noise can also be soloed.

Mutants 1–4

Each of the Mutant modules is identical so we will describe them all at the same time. They are arranged in pairs: two for Oscillator 1 and two for Oscillator 2. Depending on the selected mode, the output of one of the Mutants in a pair can be fed into the next Mutant and/or into any other Mutant, including itself. In some modes the Mutants are dedicated to the oscillators with which they are paired.

The first edit field of the Mutant module selects the mode. There are seven:

Mode	Description
FM-Lin	Modulate the oscillator frequency with the selected Source
WavStack	Adds phase-shifted copies of the waveform; simulates many oscillators using only one
OSC Sync	Force the harmonics of the oscillator to synchronize with those of the selected Source
PW-Orig	Classic method of adjusting the pulse width of a waveform
PW-Sqeez	Time-compressed pulse width modulation method
PW-ASM	Customizable pulse width modulation via FM; targets specific sections of the waveform
Harmonic	Emphasizes individual harmonics in the waveform, de-emphasizes all others

FM-Lin

This module provides a type of synthesis known as Linear FM (Frequency Modulation). Each voice is the equivalent of a 2-operator stack, with a carrier and a modulator. Unlike the most famous synth of the mid-1980s, which used only sine waves, the Hydrasynth can use any of its 219 waveforms as both the carrier and the modulator. The FM Source can also be generated by the Mutant itself (Sine or Triangle), another Mutant module, or the CV inputs (Mod In 1 or Mod In 2).

FM-Lin parameter	Range	Description
Source	Sine, Triangle, Osc 1-3, Ring Mod, Noise, Mutant 1-4, Mod In 1, Mod In 2	Selects the FM source
Ratio	0.250-64.000 in varying increments	Relative tuning of Source & oscillator (Source = Sine or Triangle only). Hold [SHIFT] to jump by harmonics.
Depth	0-128 in increments of 0.1	FM input level to the oscillator
Feedback	0-150%	Feeds the FM output back into itself
Dry/Wet	0-100%	Oscillator/Mutant blend; 100% = pure Mutant



Mod In 1 and 2 can process audio-rate input frequencies, so it's possible to use an instrument or an audio feed as an FM source in the Mutant module. Note that this works best with mono mode. It is not possible to dissect polyphonic audio and assign each part to individual voices.

WavStack

This mode stacks five detuned copies of the waveform on top of itself, which makes for a fat sound using only a single oscillator. Pro tip: Spreading out multiple voices with the StereoWidth parameter ([VOICE] page 1) can make the sound HUGE.

Depth controls the amount of detuning between each of the five copies. **Dry/Wet** adjusts the balance between the unprocessed input and the mutated output.

OSC Sync

Oscillator Sync is a classic analog synthesizer technique where an oscillator is forced to align its harmonics with another oscillator. Traditionally this is done with simple waveforms, and with the second oscillator affecting the first. Hydrasynth provides many more options, including the use of all 219 waveforms in either position, the ability to sync Osc 1 and/or Osc 2, and the ability for any of the three oscillators to be used as the sync source.

OSC Sync parameter	Range	Description
Source	Osc 1, Osc 2, Osc 3	Select sync source.
Ratio	0.250-64.000 in varying increments	How many times the wave will resync in a single cycle. Hold [SHIFT] to jump in whole numbers.
Depth	0-128 in increments of 0.1	Controls the strength of the sync effect
Feedback	0-150%	Feeds the sync output back into itself
Dry/Wet	0-100%	Mix raw waveform + sync result; 100% = pure Mutant

The Ratio parameter is unusual for oscillator sync. Normally the sync operates at a 1:1 ratio: the synced oscillator conforms to a single cycle of the host waveform, and that's that. But the Ratio parameter sets the number of times the oscillator will resync within that single cycle. See the next section for a more complete explanation.

About Ratio

The Ratio parameter is part of what makes the Hydrasynth unique. It gives you control over how many times PWM or Oscillator Sync happens during a single waveform cycle, instead of happening only once per cycle as with other synthesizers. It may help to think of it like this:

- At 1:1 there is one process for one cycle of the wave.
- At 2:1 there are two processes for one cycle of the wave.

So at 2:1 the PWM is happening twice in a cycle instead of once (the way "normal" PWM does); the Oscillator Sync is happening twice in the cycle.

The ratio can be as high as 64:1 or as low as 0.250:1. This means that the mutation process can occur as many as 64 times in the space of one waveform cycle, or as few as one time in the space of *four* waveform cycles.

Pulse Width modulation

Pulse Width Modulation (PWM) alters the basic shape of the waveform by shifting its internal structure over time, making some areas narrower and others wider. This is normally only heard with square waves, but Hydrasynth can apply PWM to any of its 219 waveforms.

And there's more! Hydrasynth takes PWM in entirely new directions by providing not one, but *three* types of PWM. Each has the same parameters (with one exception as noted below), but the results of each type can be radically different!

PWM parameter	Range	Description
Ratio	0.250-64.000 in varying increments	How many times PWM happens in a single cycle. Hold [SHIFT] to jump by whole numbers.
Depth	0-128 in increments of 0.1	Controls harmonic range of PWM
Feedback	0-150%	Feeds the PWM output back into itself
Custom Edit (PW-ASM only)	(access)	Press Control button 7 to access Warp points. (See PW-ASM [Warp] section.)
Dry/Wet	0-100%	Mix raw waveform + PWM result; 100% = pure Mutant

PW-Orig

This is the "vintage" PWM used by many analog polysynths in the '70s and '80s: a waveform is fixed at its center and both of its edges are moved to compress or expand its width. The PWM source is often an LFO, though an Envelope or other sources can yield excellent results.

PW-Sqeez

This form of Pulse Width modulation grabs the start and end points of the modulation and then squeezes them to the right. It might help to think of this as "time-warping" a waveform: It makes the oscillator go slow at first and then go fast, all in the space of a single cycle.

PW-ASM [Warp]

PW-ASM mode divides the selected waveform into 8 sections that are framed by Warp points. The values chosen for each Warp point determine how warped each section of the waveform can become.

Here's an example of PW-ASM mode in action.

1. Start with an initialized patch (press [INIT] twice).
2. Access [OSC 1] and select the sine wave.
3. Access [MUTANT 1] and select PW-ASM mode.
4. Set Mutant 1 Depth to 128.0 and Dry/Wet to 100%.
5. Press Control button 7 to access Custom Edit.
6. Hold a note and turn Control knob 2 slowly.
7. Listen and watch the display as Warp2 changes from 0 to 128 and back. Note how the waveform is affected only in one specific area (i.e., Warp point 2).
8. Repeat steps 6 and 7 with one or more Warp points at various values.
9. Also try different settings for Ratio, Feedback, and Dry/Wet. The sonic potential is nearly limitless.

PW-ASM mode is actually a form of Frequency Modulation (FM). It allows you to draw your own modulator waveform by selecting different values for each of the 8 Warp points. Construct a slope, a valley, a mound, jagged peaks, pseudo-random, etc.; your design will become an FM source (i.e., the modulator).



Each Warp point can be a destination in the Mod Matrix, so timbral changes can be as subtle or wild as you like. For example, use synced LFOs as mod sources and various Warp points as destinations.

Harmonic

At its maximum Depth and impact (100% wet) the Harmonic mutator emphasizes individual harmonics in a waveform and de-emphasizes the others. Its effect is heard more obviously on waveforms rich in harmonics, like a sawtooth wave, than on a simpler waveform such as a sine wave.

Harmonic parameter	Range	Description
Ratio	0.250-64.000 in varying increments	Selects initial harmonic for emphasis. Hold [SHIFT] to jump by harmonics.
Depth	0-128 in increments of 0.1	Controls harmonic range
Feedback	0-150%	Feeds the harmonic output back into itself; can tame effect due to phase cancellation
Dry/Wet	0-100%	Mix raw waveform + harmonic; 100% = pure Mutant

Try this experiment to see how the Harmonic mutator affects different waveforms:

1. Initialize the patch by pressing [INIT] twice. This provides a Single mode saw wave from oscillator 1.
2. Access [MUTANT 1] and turn Control knob 1 to select the Harmonic mode.
3. Set the Depth parameter to 0.0.
4. Set the Dry/Wet parameter to 100% so only the effect will be heard.
5. Hold the second-lowest C until step 8. You should hear almost nothing at this point.
6. Slowly increase the Depth to 128. Each of the frequencies in the harmonic series is emphasized.
7. Return the Depth slowly to 0. Gradually all harmonics disappear, even the fundamental.
8. Release the note.
9. Access [OSC 1] and change the Wave to Square.
10. Access [MUTANT 1] and repeat steps 5-8. You will hear a limited set of harmonics emphasized.

Here's why they were different: As the depth increased the Harmonic effect revealed the harmonics that are present in each waveform. A sawtooth wave contains all harmonics, but a square wave contains only odd-numbered harmonics.

Try the experiment with other waveforms. It's a good way to learn why the various waveforms sound different: each contains a different set of harmonics in varying strengths.

Ring-Noise Module

This module contains two additional sound sources that can be blended with the oscillators to make sounds that are even more interesting.

Ring Modulation (Ring Mod or RM) takes two audio signals and generates a sound based on the sum and the difference of their frequency content. Depending on the sources the result can be bell-like and pure, or it can be wiry, robotic, trashy, and/or pleasingly unnatural.

A noise generator produces random, simultaneous frequencies across a broad range. The different colors represent specific frequency ranges and power levels:

- **White noise** sounds brightest: it has a relatively flat frequency spectrum.
- **Pink noise** has more initial low frequency content, which decreases at a rate of 3 dB per octave.
- **Brown noise** is darkest: its frequency content decreases at a rate of 6 dB per octave.

Parameter	Pertains to...	Range	Description
Source 1	RM	Osc 1-3, Noise, Mutant 1-4, Mod In 1, Mod In 2	Select the first input source
Source 2	RM	Same as Source 1	Select the second input source
RM Depth	RM	0-128 in increments of 0.1	Depth of Ring Modulation
Ring Vol	RM	0-128 in increments of 0.1	RM volume. Parameter is shared with Mixer page 1, edit field 5; changing one also changes the other.
Noise Type	Noise	White, Pink, Brown	Select the noise type
Noise Vol	Noise	0-128 in increments of 0.1	Noise volume. Parameter is shared with Mixer page 1, edit field 6; changing one also changes the other.



Mod In 1 and 2 can process audio-rate input frequencies, so it's possible to use an instrument or an audio feed as an input source for the ring modulator. Note that this works best with mono mode. It is not possible to dissect polyphonic audio and assign each part to individual voices.

Waveform List

Waveform group	Waveforms
Classic	Sine, Triangle, TriSaw, Saw, Square
Pulse	Pulse 1-6
Horizon	Horizon 1-8
SyncLav	SyncLav 1-5
Esquire	Esquire 1-4
ChriMey	ChriMey 1-6
Spect A	Spect A 1-7
Spect X	Spect X 1-7
Klangor	Klangor 1-5
Induct	Induct 1-3
Scorpio	Scorpio 1-9
Belview	Belview 1-5
Chendom	Chendom 1-8
Glefan	Glefan 1-7
Sqarbel	Sqarbel 1-2
Obob	Obob 1-3
Ingvay	Ingvay 1-3

Waveform group	Waveforms
Particl	Particl 1-3
Vokz	Vokz 1-6
Flux	Flux 1-5
Alweg	Alweg 1-8
Tronic	Tronic 1-6
Duotone	Duotone 1-6
Bobanab	Bobanab 1-4
Melotic	Melotic 1-7
Cluster	Cluster 1-8
Micoten	Micoten 1-5
Orland	Orland 1-8
Neuton	Neuton 1-7
Xfer	Xfer 1-7
Resyn	Resyn 1-4
Sano	Sano 1-4
SquRoo	SquRoo 1-15
Harmon	Harmon 1-23

This module has three pages with a few simple but important functions. We'll refer to the oscillators, Ring modulator, and Noise generator as "the sources" to make the information easier to read.

Page	Feature	Range	Description
1	Source Level	0.0-128.0	Individual levels for Osc 1-3, Ring modulator, and Noise generator
1	Solo	On/Off	First press: all 5 sources are active. Use Control buttons to solo a source.
2	Source Pan	100:0 - 0:100	Pan controls for Oscillators 1-3
2	Filter Ratio	100:0 - 0:100	Ratio of Oscillators 1-3 fed to the two filters
3	Source Pan	100:0 - 0:100	Pan controls for Ring modulator and Noise generator
3	Filter Ratio	100:0 - 0:100	Ratio of Ring modulator / Noise generator fed to the two filters
3	Filter Routing	Series, Parallel	Places the filters in Series or Parallel configuration.

Setting Levels

To set the relative levels of the sources, access [MIXER]. The first page is selected automatically. In the top row are the levels for Oscillators 1-3, while the levels for Ring and Noise are on the bottom row. Use the appropriate Control knob to adjust the level of each item, and use [SHIFT] + Control knob X to fine-tune the level.

The Solo Function

When creating a patch you may want to hear one of the sources on its own while making adjustments to that source. Rather than setting the other levels to zero temporarily and restoring them later, Hydrasynth includes a Solo function.

It's easy to use:

- Press Control button 8 to toggle Solo from Off to On. The Control buttons for all 5 sources will light, which means they are still active.
- Press the Control button of the source you want to hear. Its Control button will become brighter than the others.
- Press another Control button to solo that source. The first Control button will dim and the selected one will brighten.
- Press Control button 8 again to defeat the Solo function.

Set the Pan Positions

Osc 1-3 Pan

To set the stereo placement of the oscillators, access [MIXER] and use the Page Down arrow to select page 2. In the top row are the pan positions for Oscillators 1-3. Use the appropriate Control knob to adjust the pan position of each item, and use [SHIFT] + Control knob X to fine-tune the value.

Ring + Noise Pan

To set the stereo placement of the Ring modulator and Noise generator, access [MIXER] and press the Page Down arrow twice to select page 3. In the top row are the parameters Ring Pan and Noiz Pan. Use the appropriate Control knob to adjust the pan position of each item, and use [SHIFT] + Control knob X to fine-tune the value.

Filter Routing of Sources

Osc 1-3 Filter routing

To adjust the routing of each oscillator between Filter 1 and Filter 2, access [MIXER] and use the Page Down arrow to select page 2. In the bottom row are the filter routing values for Oscillators 1-3. Use the appropriate Control knob to adjust the filter routing of each item:

- 100:0 sends the source only to Filter 1.
- 0:100 sends the source only to Filter 2.
- Intermediate values send the source to both filters in varying amounts.

Use [SHIFT] + Control knob X to fine-tune the values.

Ring + Noise Filter routing

To adjust the routing of the Ring modulator and Noise generator between Filter 1 and Filter 2, access [MIXER] and press the Page Down arrow twice to select page 3. In the bottom row are the filter routing parameters RingFilt and NoizFilt. Use the appropriate Control knob to adjust the filter routing of each item:

- 100:0 sends the source only to Filter 1.
- 0:100 sends the source only to Filter 2.
- Intermediate values send the source to both filters in varying amounts.

Use [SHIFT] + Control knob X to fine-tune the values.

Filter Configuration

This setting specifies whether the filters operate in Series or Parallel mode. When they are in Series, Filter 1 always passes through Filter 2. When they are in Parallel, sources can be routed so they pass through only one of the filters or through both filters in varying amounts (as described above in *Filter Routing of Sources (p. 41)*).

The setting is linked to Filter 1 page 2, edit field 1; changing one also changes the other.

Filters are second only to oscillators in defining the sound of a patch. If the oscillators were passengers in a car, for example, then the filters are the doors: Some open and close luxuriously to reveal the occupants; others have more grit and meet a different need. The Hydrasynth filters cover the range from a silky Lamborghini to a rugged Jeep, with all the sophistication and aggression implied by those extremes. You're ready for any sort of musical journey with Hydrasynth.

There are two filters available, each with its own characteristics. They can be used in series, with Filter 1 feeding Filter 2, or used in parallel, where each filter has a direct path to the output.

Filter 1

This filter is actually a collection of filter types. Each one has its own character, and some may be similar to analog filters you have encountered. But we didn't want Hydrasynth to sound like a clone of any instrument, so we took some of the flavor of the original filters and made something new. As with the oscillators, you will find that the Hydrasynth filters add their own signature to the sound.

Filter 1 types

Name	Description
LP Ldr12	12dB Uncompensated Ladder filter
LP Ldr24	24dB Uncompensated Ladder filter
LP Fat12	12dB Compensated Ladder filter
LP Fat24	24dB Compensated Ladder filter
LP Gate	Low Pass Gate filter
LP MS20	Low Pass filter with an MS-20 flair
HP MS20	High Pass filter with an MS-20 flair
LP 3-Ler	The Low Pass flavor of a boutique modular synth
BP 3-Ler	The Band Pass flavor of a boutique modular synth
HP 3-Ler	The High Pass flavor of a boutique modular synth
Vowel	Vocal formant filter

Compensated vs. Uncompensated filters

Filter compensation could be an unfamiliar concept. It's another way in which ASM has adapted the sonic profile of various analog synthesizers. Here's the difference:

- Uncompensated filters: As resonance increases the low frequency content of the sound is reduced.
- Compensated filters: The bass response is *not* reduced as resonance is increased.

Filter 1 parameters: page 1

All of the Filter 1 types have the same parameters, with one exception as noted. Access [FILTER 1] and turn Control knob 1 to select the Type, and then adjust these parameters as needed:

Control knob	Parameter	Range	Description
2	Control (type = Vowel only)	0.0-128.0	Formant control
3	Cutoff	0.0-128.0	Cutoff frequency for most; vowel control for Vowel filter
4	Resonance	0.0-128.0	Controls resonance or Q
5	ENV 1 amount	+/- 64.0	Sets amount & polarity of Envelope 1 effect on filter
6	LFO 1 amount	+/- 64.0	Sets amount & polarity of LFO 1 effect on filter
7	Vel Env	+/- 64.0	Allows velocity to set maximum range of filter envelope
8	Keytrack	+/- 200%	Scales filter response across keyboard; C2 = center note

Control

This parameter is visible only when the Filter type is set to Vowel. It provides control over location and spread of the formants, which are certain peaks and nodes in the filter frequencies that help to approximate the resonance of the human vocal apparatus. Use this with the Cutoff, Resonance, and Vowel Order parameters for greater precision.

Cutoff

This controls the Cutoff frequency for every filter type except the Vowel filter, for which it becomes the vowel control. When Filter 1 is selected on the top panel, the Cutoff knob also controls this parameter.

Resonance

This adjusts the resonance of the filter. When Filter 1 is selected on the top panel, the Resonance knob in the Filter Controls section also controls this parameter.

ENV 1 amount

This parameter defines the amount and polarity of the effect Envelope 1 will have on Filter 1. There is a similar, separate parameter for Filter 2.

Envelope 1 has a pre-wired connection to the Filter section, which saves a mod route. But a different envelope can be used to control the filter if you want; just set this value to 0 and create a new route via *The Mod Matrix (p. 73)*

Keyboard model only: When Filter 1 is selected on the top panel, the ENV 1 knob in the Filter Controls section also controls this parameter.

LFO 1 amount

This parameter defines the amount and polarity of the effect LFO 1 will have on Filter 1. There is a similar, separate parameter for Filter 2.

LFO 1 has a pre-wired connection to the Filter section, which saves a mod route. But a different LFO can be used to control the filter if you want; just set this value to 0 and create a new route via *The Mod Matrix (p. 73)*.

Keyboard model only: When Filter 1 is selected on the top panel, the LFO 1 knob in the Filter Controls section also controls this parameter.

Vel Env

This is an abbreviation for "Velocity to Envelope". It adjusts the depth of the filter envelope based on note velocity: notes played at maximum velocity allow Envelope 1 to have maximum impact on the filter frequency, within the range set by the Env 1 amount parameter. It can be set negatively, so that higher velocities reduce the range of a positive-going filter envelope or increase the range of a negative-going filter envelope.

There is a similar, separate parameter for Filter 2.



Vel Env operates within the range set by the Env 1 Amount parameter; if you have no envelope amount set, the parameter will do nothing.

Keytrack

This parameter scales the filter response across the keyboard, with C2 as the center note. A positive value means that notes above the center note increase the filter cutoff frequency, and notes below the center note *decrease* the filter cutoff frequency. A negative value means that notes above the center note decrease the filter cutoff frequency, and notes below the center note *increase* the filter cutoff frequency. There is a similar, separate parameter for Filter 2.

Filter 1 parameters: page 2

Control knob	Parameter	Range	Description
1	Filter Route	Series, Parallel	Places the filters in Series or Parallel configuration.
2	(blank)	-	-
3	Drive	0.0-128.0	Drive amount
4	Drive Route	Pre, Post	Drive placement in signal path
5	Vow Order (type = Vowel only)	8 orders	Changes formant order during frequency sweeps

Filter Route

This setting specifies whether the filters operate in Series or Parallel mode. When they are in Series, Filter 1 always passes through Filter 2. When they are in Parallel, sources can be routed so they pass through only one of the filters or through both filters in varying amounts (as described in *Filter Routing of Sources (p. 41)*).

The setting is linked to the parameter on Mixer page 3, edit field 4; changing one also changes the other.

Drive

To add extra warmth or grit to a patch, try adjusting the Drive parameter. As the value climbs the waveform begins to clip, and at the highest settings the waveform can be radically distorted. The Drive route setting determines the point at which the overdrive is applied (see below).

When Filter 1 is selected on the top panel, the the Drive parameter is shared with the Drive / Morph knob in the Filter Controls section.

Drive Route

There are two configurations for routing the Drive effect: Pre or Post. The difference is whether the waveform is boosted before it hits the filter or whether the filter output is boosted before it reaches the Amp stage.

- **Pre** places the Drive effect between the waveform and the filter.
- **Post** places the Drive effect after the filter.

Vowel Order

This parameter is only visible when the Vowel filter type is selected. It provides eight different arrangements of the vocal formants, ranging from AEIOU to UIEAO. Combined with creative use of the Cutoff and Resonance parameters, nearly any vowel or diphthong can be achieved.

Filter 2

Filter 2 is our adaptation of a classic 2-pole state-variable filter. It is the only filter type offered by Filter 2, and it provides a perfect complement to Filter 1.



The filters can be used in Series or Parallel.
This setting is found on page 2 of Filter 1.

Filter 2 parameters

Control knob	Parameter	Range	Description
1	Morph	0.0-128.0	Adjusts filter: 0 = LP, 64 = BP, 128 = HP, with gradual changes
2	(Sliding arrow)	LP>BP>HP	Arrow indicates filter character
3	Cutoff	0.0-128.0	Cutoff frequency
4	Resonance	0.0-128.0	Controls resonance or Q
5	ENV 1 amount	+/- 64.0	Sets amount and polarity of Envelope 1 effect on filter
6	LFO 1 amount	+/- 64.0	Sets amount and polarity of LFO 1 effect on filter
7	Vel Env	+/- 64.0	Allows velocity to set maximum range of filter envelope
8	Keytrack	+/- 200%	Scales filter response across keyboard; C2 = center note

Morph

This parameter adjusts the filter between its various states, with a Low Pass filter at one extreme, a High Pass filter at the other, and a Band Pass filter at the middle setting. Along the way there are hundreds of intermediate settings. As the value changes, a sliding arrow indicates the current setting.

When Filter 2 is selected on the top panel, the Morph parameter is shared with the Drive / Morph knob in the Filter Controls section.

The rest of the Page 1 parameters are identical in function to the same parameters in Filter 1 (Cutoff, Resonance, ENV 1 amount, LFO 1 amount, Velocity, and Keytrack). Please refer to *Filter 1 parameters: page 1 (p. 42)* for their descriptions.



Set up mod routes quickly from an Envelope or LFO to the Filter: Hold the module button for the desired source, then press the module button for the destination.

The Amp module is relatively simple, and has only three parameters.

Control knob	Parameter	Range	Description
6	LFO 2 amount	+/- 64.0	Sets amount and polarity of LFO 2 amplitude modulation
7	Velocity	+/- 64.0	Adjusts amplitude velocity response
8	Amp Level	0.0-128.0	Controls pre-FX level of patch

How the Parameters Interact

All three of the parameters in the Amp module work together. The LFO 2 amount and Velocity parameters operate within the limits set by the Amp Level setting.

LFO 2 Amount

This parameter adjusts the amount and polarity of the effect LFO 2 has on the Amplitude of the patch. It uses the current value of the Amp Level parameter as its starting point.

A negative value for LFO 2 Amount literally inverts the phase of the LFO waveform. For example, if the LFO 2 wave is set to Saw Up, it will behave like a Saw Down wave when the LFO 2 Amount is set to a negative value.

The Amp Level setting also sets the upper limit of the amplitude modulation. In other words, a bi-polar LFO waveform will not cause the amplitude of the patch to rise higher than the Amp Level value. This helps prevent unwanted clipping of the signal as it heads into the Effects section.

Velocity

The Velocity parameter determines how much the amplitude stage will respond to note velocity. Negative values invert the response, so that an increase in velocity reduces the amplitude.

When Velocity is set to 0 there will be no velocity response at the amplitude stage. However, other parameters might still respond to velocity, depending on the settings in the Mod Matrix and elsewhere in the signal path.

As the Velocity value is increased the amplitude will *decrease* if a note is played at less than maximum velocity. What the Velocity parameter does is create "headroom" for the velocity-to-amplitude response.

In other words, the Amp Level parameter sets the upper limit for the velocity response. That way a note cannot push the amplitude of the patch higher than the Amp Level value. This helps prevent unwanted clipping of the signal as it heads into the Effects section.

Amp Level

The Amp Level parameter is the boss, or at least "middle management"; it sets the maximum output level for the signal path before it heads into the Effects section. This helps prevent a situation that could cause the Amp Level output to exceed an value of 128 and cause clipping in the Effects.

Another way to think of the Amp Level parameter is that it can be used to compensate for quieter or louder output from the oscillators and filters.

What's an Envelope?

An envelope defines the shape of a modulation: how it begins, how it ends, and how big it will be in the middle. Hydrasynth has 5 envelopes that can be used to shape any available parameter through the Mod Matrix. All 5 have identical parameters, so every description applies equally to all.

Envelope features

ADSR plus

A Hydrasynth envelope provides the classic ADSR form factor (Attack, Decay, Sustain, and Release). But they've been enhanced with delay and hold stages, so technically the form factor is DAHDSR.

Adjustable curves

The Attack, Decay, and Release segments have curves that can be adjusted gradually from Logarithmic to Linear to Exponential. They can be snappy, lazy, or anything in-between. This allows you to specify exactly how you want the patch to proceed from start to finish.

Time-based segments

Envelopes can operate in one of two modes: synchronized or unsynchronized. If the BPM Sync option is On each segment can occupy a specific rhythmic value. If the BPM Sync option is Off the duration of each segment is measured in seconds (or milliseconds). Every envelope and segment will last exactly as long as you want.

Note that the BPM Sync setting affects all stages except Sustain, which is merely a level (i.e., a place, not an event).

The wonderful thing about triggers

Once it is triggered an envelope can run freely (Freerun: On), reset with each new note (Reset: On), or reset only if all other notes have been released (Legato: On).

It's easier to hear an envelope reset with a monophonic patch than with a polyphonic patch. For an example see the description of *Reset (p. 49)*.

Looping envelopes

Hydrasynth envelopes can loop a specific number of times or indefinitely.

Modulation and interaction

An envelope can be used as a modulation source for any destination, and individual envelope segments can be modulated (shortened or lengthened) by LFOs or by other envelopes.

Thanks to the Mod Matrix, envelopes and LFOs can interact and evolve in a nearly infinite number of ways. For a quick tip on how to do this, see *Envelope Shortcuts (p. 50)* at the end of this chapter.

Envelopes 1 and 2

Hydrasynth has pre-wired connections linking ENV 1 to the Filters and ENV 2 to the Amp module. This is because every sound has amplitude and timbre, even if a distinct pitch is not present. More envelopes can be routed to these destinations as needed through *The Mod Matrix (p. 73)*.

Envelope parameters: page 1

Control knob	Parameter	Range	Description
1	Attack	BPM = Off: 0 ms to 36.0 seconds BPM = On: 0, 1/64T to 64' (16 measures)	After the delay period, this is the length of time the envelope takes to reach its full amplitude.
2	Decay	BPM = Off: 0 ms to 60.0 seconds BPM = On: 0, 1/64T to 64' (16 measures)	After the hold period, this is the length of time the envelope takes to reach its sustain level.
3	Sustain	0.0 to 128.0	The resting level of the envelope prior to note off
4	Release	BPM = Off: 0 ms to 60.0 seconds BPM = On: 0, 1/64T to 64' (16 measures)	The length of time the envelope takes to reach its zero point after note off
5	Delay	BPM = Off: 0 ms to 32.0 seconds BPM = On: 0, 1/64T to 64' (16 measures)	The length of time before the attack segment begins
6	Hold	BPM = Off: 0 ms to 36.0 seconds BPM = On: 0, 1/64T to 64' (16 measures)	The length of time between the attack and decay segments
7	(blank)	-	-
8	BPM Sync	Off, On	Toggles all envelope segments from seconds to synchronized time divisions.



To set the length of an envelope segment quickly: While on page 1, hold [SHIFT] and press the appropriate Control button for the desired length of time. This works with BPM On or Off.

BPM Sync settings

When the BPM Sync parameter is set to On, all of the segments with durations are measured in rhythmic values. This includes the Delay, Attack, Hold, Decay, and Release stages of the envelope. A duration can be set to 0, which means it happens instantly and therefore has no rhythmic value.

All other settings have a quantized duration ranging from 1/64T (a sixty-fourth note triplet) to 64' (64 quarter notes, or 16 measures in 4/4 time). Dotted values are also available. The chart on the right contains examples of how the values are shown:

Value	Duration
1/16	Sixteenth note
1/16Dot	Dotted sixteenth note
1/16T	Sixteenth note triplet
1/1	Whole note, or one measure
8'	Eight quarter notes, or two measures
64'	Sixty-four quarter notes, or sixteen measures

Envelope parameters: page 2

Control knob	Parameter	Range	Description
1	AtkCurve	Log (-64) > Lin (0) > Exp (64)	Defines the curve for the attack segment.
2	DecCurve	Log (-64) > Lin (0) > Exp (64)	Defines the curve for the decay segment.
3	(blank)	-	-
4	RelCurve	Log (-64) > Lin (0) > Exp (64)	Defines the curve for the release segment.
5	Legato	Off, On	When On, an envelope won't reset unless all notes have been released.
6	Reset	Off, On	When On, an envelope is reset when polyphony is exceeded. If Legato = On, Reset is not available.
7	Freerun	Off, On	When On, an envelope will always run from Delay to the Sustain stage (note held) or from Delay through the Release stage (note released).
8	Env Loop	Off, 2-50, Infinite	Toggles the looping feature and defines the number of times the envelope will loop.

Envelope curves

A logarithmic curve "picks up steam" as it goes: During the attack segment it starts rising slowly and accelerates upward. During the decay and release segments it starts falling slowly and accelerates until it reaches its resting state.

An exponential curve is the opposite of a logarithmic curve: During the attack segment it starts rising quickly and its rate of change slows as it nears the peak. During the decay and release segments it starts falling quickly and decelerates until it reaches its resting state.

A linear curve rises and falls at the same rate throughout its duration. However, linear changes seem less natural or "musical" to the human ear than the other curves.

Legato

When sheet music uses the term "Legato" it means to play a passage smoothly, with no rests between the notes. Likewise, when this parameter is set to On, the envelope will not retrigger if previous voice has not been released. This allows a filter envelope to remain at its sustain stage when a series of notes are played, for example, which can help a solo or a bass line to be more expressive.

Reset

The Reset parameter is only available when Legato is Off. When Reset is On an envelope will reset when a new note is played, even if the previous note has not been released.

The difference between Reset On and Off is easy to hear with a monophonic patch. But with a polyphonic patch the behavior is more obvious after the available polyphony has been exceeded. You'll need a sustain pedal for the following example.

1. **Set speaker/headphone levels low**; this could be loud.
2. Press [INIT] twice to initialize the patch
3. Access [FILTER 1] and set Type to HP MS20
4. Set Cutoff to 50, Resonance to 100, and ENV1 amount to 64
5. Access [ENV 1] and set Attack and Decay to ~1 second
6. Hold down the sustain pedal
7. Play 7 notes on the lowest C
8. Wait for the filter to reach the sustain level for all 7 voices

9. Play the 8th note and listen as the filter sweeps through all frequencies
10. Wait until the filter stabilizes for voice 8, then play C again.
11. Listen as the filter sweeps from the sustain level, not the lowest frequencies.
12. Release the pedal.
13. Press the Page Down arrow and set Reset to On.
14. Repeat steps 6-12.
15. The difference: The filter sweeps through all frequencies for all notes, not just the first 8.

In summary, here's what to expect with a polyphonic patch:

- **Reset = On:** The 9th voice starts the envelope from its beginning.
- **Reset = Off:** The 9th voice starts the envelope from the sustain level.

Freerun

An envelope set to Freerun passes through all segments, even if the note is released before the end of the decay segment. If the note is held then the envelope proceeds to the sustain level and remains there until the note is released, after which the envelope proceeds through the release segment.

Envelope loop

This parameter enables an envelope to loop a specific number of times (between 2 and 50), and when set to Infinite it can loop forever. This means an envelope can even be used as a complex LFO (if 5 LFOs aren't enough!). The loop includes the attack, hold, and decay segments.

Envelope Shortcuts

These are described in greater detail in other chapters, but they're so easy and useful we've included them here too.

Copy Env A to Env B

1. Hold [SAVE]
2. Press and release the source (Envelope A)
3. Press and release the destination (Envelope B)
4. Release [SAVE].

Create a Mod route

1. Hold [ENV X] to select the source
2. Press the module button for the desired destination, then release both buttons
3. Those items appear in the first open Mod Matrix slot, with the first parameter of the destination module selected
4. Select a different parameter within the destination module, if needed
5. Set the modulation amount with the lower Control knob.

What's an LFO?

LFO is an abbreviation for Low Frequency Oscillator. LFOs are the cause of familiar effects like vibrato and tremolo, but they can be used in very complex ways (as the presets will attest). Hydrasynth has 5 LFOs that can modulate any available parameter through the Mod Matrix. All 5 have identical parameters, so every description applies equally to all.

LFO features

Hydrasynth LFOs might be more flexible than any you have encountered. Here are some highlights:

- Delayed onset through the Delay and Fade-in parameters
- Adjustable phase: start the modulation from any point in the LFO waveform
- Synchronized or unsynchronized modes
- A wide range of rates, from super slow to audio
- Independent LFO per voice
- LFOs can modulate themselves, each other, and/or anything else
- An LFO can be triggered a single time or loop indefinitely
- Design your own LFO with the Step LFO features



The Vibrato feature is a sixth LFO dedicated to the mod wheel. It is not available as a source or destination in the Mod Matrix. For details, see the *Vibrato settings (p. 62)* of the Voice module chapter.

LFOs 1 and 2

Hydrasynth has pre-wired connections linking LFO 1 to the Filters and LFO 2 to the Amp module. More LFOs can be routed to these destinations as needed through the *The Mod Matrix (p. 73)*.

LFO parameters: page 1

Control knob	Parameter	Range	Description
1	Wave	Sine, Triangle, Saw Up, Saw Down, Square, Pulse27%, Pulse13%, S&H, Noise, Random, Step	Selects LFO waveform. "Step" is user-defined
2	Rate	BPM = Off: 0.02 to 150.0 Hz BPM = On: 64' to 1/64T	Sets duration of LFO cycle
3	BPM Sync	Off, On	Toggles LFO rate from Hz to synchronized time divisions
4	TrigSync	Poly, Single, Off	Poly: independent LFO per voice Single: LFO affects all voices; each new note retriggers LFO Off: LFO runs freely

5	Delay	BPM = Off: 0 ms to 32.0 seconds BPM = On: 0, 1/64T to 64' (16 bars)	Length of time before LFO begins
6	Fade In	BPM = Off: 0 - 5943 ms BPM = On: 0, 1/64T to 64' (16 bars)	Length of time LFO takes to rise to maximum amplitude
7	Phase	0° - 360°	Defines starting point of LFO waveform
8	Level	0.0 - 128.0	Maximum amplitude of LFO



There's a quick way to set the LFO rate: While on page 1, hold [SHIFT] and then hold Control button 2 for the desired period of time. This works with BPM On or Off.

Some of those parameters may require additional explanation.

BPM Sync option

When the BPM Sync parameter is set to On the LFO rates are represented by rhythmic values. These range from 1/64T (a sixty-fourth note triplet) to 64' (64 quarter notes, or 16 measures in 4/4 time). Dotted values are also available. Here are some examples of how the values are shown:

Value	Duration
64'	Sixty-four quarter notes, or sixteen measures
8'	Eight quarter notes, or two measures
1/1	Whole note, or one measure
1/16Dot	Dotted sixteenth note
1/16	Sixteenth note
1/16T	Sixteenth note triplet

TrigSync

This parameter governs whether an LFO resets with each new note or operates independently per voice.

- **Poly:** Each new note triggers its LFO independently. Use this for lush pads, etc.
- **Single:** Each new note retriggers the LFO of each voice.
- **Off:** The LFOs run freely, regardless of when notes are triggered. An LFO could be anywhere in its cycle when it appears.

Phase

An LFO doesn't need to start at a zero-crossing point. This parameter allows you to specify the exact point at which it will begin, as measured in degrees from zero to 360.

Level

You may wonder why this parameter is needed, when the Mod Matrix allows you to set a level for each modulation route. That's a good question with a great answer.

For example, imagine that an LFO is routed to multiple destinations in the Mod Matrix (which is often the case). This parameter makes it possible to adjust all of those routes with a single edit, rather than needing to adjust each mod route separately. The LFO Level parameter is a fine-tune control that allows you to dial in a modulation amount with precision.

LFO parameters: page 2

Control knob	Parameter	Range	Description
1	Steps (only visible when Wave = Step)	2-8	Specific LFO points can be defined
2	Smooth	0-127	Slows waveform changes (hidden for Triangle waveform)
3	One-Shot	Off, On	On = LFO completes 1 cycle and stops
8	Step Edit... (only visible when Wave = Step)	(access)	Enters the Step Edit page

The first and last parameters are hidden for most waveform selections, so we'll describe the other two first.

Smooth

Also known as "slew", this parameter softens the transitions from one amplitude of an LFO to the next. When a waveform with abrupt changes is selected (Saw, Square, S&H, Step) the Smooth parameter makes the LFO "glide" between adjacent values. At the highest setting the square and triangle LFO waveforms are identical.

One-Shot

An LFO will run its course only once if this parameter is set to On. For example, it could:

- allow a single warble from a sine wave LFO
- introduce a short burst of chaos from the Noise waveform
- run the Step LFO sequence one time, etc.

"Step LFO sequence?" Let's discuss that feature next.

The Step LFO

The following parameters are only available when the LFO Wave selection is set to Step. When that is done, two more parameters appear on Page 2. These unlock the features of the Step LFO.

The Step LFO allows you to define up to eight stages through which the LFO will pass. The number of steps is set by the Steps parameter on Control knob 1, and Control button 8 is used to enter the page where the step values are chosen. Let's walk through an example.

1. Press [INIT] twice to initialize the patch
2. Hold [LFO 1] and press [OSC 1] to create a mod route
3. Use Control knob 6 to set Depth to 128.0
4. Access [LFO 1]
5. Use Control knob 1 to select the Step wave
6. Use the Page down arrow to select page 2
7. Use Control button 8 to access the Step Edit page
8. Hold [SHIFT] and use Control knob 1 to set Step 1 to 60.0
9. Do the same with Control knob 2 and set Step 2 to -60.0
   Note: These values provide specific pitches, as described after the example.
10. Hold a note. Three octaves of the same pitch will play. The third pitch is longest.
11. Keep holding the note and the sequence will loop.
12. Press [EXIT] and try other LFO settings (Rate, BPM = On).
13. Repeat steps 6-9 and set other steps to exact multiples of 5. A melody will take shape.

Intermediate values can be used, of course. But increments of 5.0 provide chromatic intervals when the other settings are observed (mod route Depth and LFO Level both at 128.0). And since there are 12 chromatic steps in an octave, for a full octave use values of +/- 60.0 (because 12 x 5 = 60).

Here are more ideas for using the Step LFO:

- The maximum Step values are +/- 64.0, so the total range is a little wider than an octave above and below the root pitch.
- Try using one or more oscillators with a Step LFO and BPM set to ON. Different Rate values provide interesting rhythms.
- Oscillators 1 and 2 could play step sequences while Osc 3 drones on the root pitch, for example.
- Use different values of the Steps parameter to create odd time signatures like 5/4, 6/8, 7/8, etc.
- To hold a pitch for one or more steps, use the same value as previous step or the next one.
- For longer step sequences, use LFO Delay so LFO 2 comes in for the 2nd bar (set LFO 1 to One-Shot = On).
- The Copy feature described below is very useful here: Copy one LFO to another and make slight changes to create counterpoint or to harmonize. Be sure to copy *The Mod Matrix (p. 73)* settings also.
- You can invert a melody with mod route level of -128.
- Remember, if you run out of LFOs, you can use a looping envelope as an LFO.

LFO Shortcuts

These are described in greater detail in other chapters, but they're so easy and useful we've included them here too.

Copy LFO A to LFO B

1. Hold [SAVE]
2. Press and release the source (LFO A)
3. Press and release the destination (LFO B)
4. Release [SAVE].

Create a Mod route

1. Hold [LFO X] to select the source
2. Press the module button for the desired destination, then release both buttons
3. Those items appear in the first open Mod Matrix slot, with the first parameter of the destination module selected
4. Select a different parameter within the destination module, if needed
5. Set the modulation amount with the lower Control knob.

The Hydrasynth has such a powerful synthesizer engine that it only made sense to pair it with an equally powerful effects section. There are four independent effect modules available, two of which provide awe-inspiring delay and reverb effects, while the other two are the aural equivalent of a set of Swiss Army knives. Any tool you need for your music, Hydrasynth has it.



Some parameter names are shown below in [brackets]. These are available as mod destinations for Macros and the Mod Matrix. The values for these parameters have finer increments than the others, which ensures maximum resolution when they are being modulated.

Pre- and Post-FX

The only difference between these two FX modules is that one precedes the Delay and Reverb and the other follows them. They serve different purposes due to their placement in the signal path, so they will often have different settings. But since their FX types and parameters are identical, both modules will be covered in this section.

These are the FX types available for the Pre-FX and Post-FX modules:

- Chorus
- Flanger
- Rotary
- Phaser
- Lo-Fi
- Tremolo
- EQ
- Compressor

Each FX type has preset templates that can be used as starting points for your own creations. When the patch is saved the FX settings are preserved.

Bypass

This is the default option. To disable the effect module, set it to Bypass.

Chorus

Control knob	Parameter	Range	Description
2	Preset	1-3	Selects preset template
3	[Rate]	0.02-10.0 Hz	Controls the chorus rate
4	[Depth]	0.0-128.0	Controls the chorus depth
5	Offset	+/- 180°	Sets initial phase of effect relative to input
6	Feedback	+/- 63	Feeds chorus back into itself (positive or negative polarity)
7	Mono/St	Mono, Stereo	Selects mono or stereo output
8	[Dry/Wet]	0.0-100.0%	Blends unaffected and affected signals

Flanger

Control knob	Parameter	Range	Description
2	Preset	1-3	Selects preset template
3	[Rate]	0.02-10.0 Hz	Controls the flanger rate
4	[Depth]	0.0-128.0	Controls the flanger depth
5	Offset	+/- 180°	Sets initial phase of effect relative to input
6	Feedback	+/- 63	Feeds flanger back into itself (positive or negative polarity)
7	Mono/St	Mono, Stereo	Selects mono or stereo output
8	[Dry/Wet]	0.0-100.0%	Blends unaffected and affected signals

Rotary

Control knob	Parameter	Range	Description
2	Preset	1-3	Selects preset template
3	[Lo-Speed]	0.02-10.0 Hz	Sets speed of low rotor
4	[Hi-Speed]	0.02-10.0 Hz	Sets speed of high rotor
5	Lo-Depth	0-127	Controls depth of low rotor
6	Hi-Depth	0-127	Controls depth of high rotor
7	Low/High	-/+ 63	Volume balance between the low and high rotors
8	[Dry/Wet]	0.0-100.0%	Blends unaffected and affected signals

Phaser

Control knob	Parameter	Range	Description
2	Preset	1-3	Selects preset template
3	[Rate]	0.02-10.0 Hz	Controls the rate of the phase modulation
4	[Feedback]	+/- 63.0	Feeds phaser back into itself (positive or negative polarity)
5	Depth	0-127	Controls the depth of the phase modulation
6	Phase	0-127	Adjusts lowest frequency point of phase modulation
7	Offset	+/- 180°	Controls amount of phase offset relative to input
8	[Dry/Wet]	0.0-100.0%	Blends unaffected and affected signals

Lo-Fi

Control knob	Parameter	Range	Description
2	Preset	1-2	Selects preset
3	[Cutoff]	160-20,000 Hz	Filter cutoff frequency
4	[Resonance]	1.0-12.0	Filter resonance
5	Filter Type	Thru, PWBass, Radio, Tele, Clean, Low	Selects filter model
6	Output	- 6 / + 36 dB	Gain compensation control
7	Sampling	44,100-2,756 Hz	Sets downsampling rate
8	[Dry/Wet]	0.0-100.0%	Blends unaffected and affected signals

Tremolo

Control knob	Parameter	Range	Description
2	Preset	1-3	Selects preset template
3	[Rate]	0.02-10.0 Hz	Controls the tremolo rate
4	[Depth]	0.0-128.0	Controls the tremolo depth
5	LFO shape	Sine, Square	Selects tremolo waveshape
6	Phase	+/- 180°	Phase relationship of left / right LFOs
7	Pitch Mod	0-127	Controls vibrato depth
8	[Dry/Wet]	0.0-100.0%	Blends unaffected and affected signals

EQ

Control knob	Parameter	Range	Description
2	Preset	Flat, LowBoost, Bass Cut, High Cut, Smile, Lo-Fi, Warm	Selects preset template
3	[LowGain]	- 36.0 / + 24.0 dB	Controls low frequency cut/boost amount
4	[HighGain]	- 36.0 / + 24.0 dB	Controls high frequency cut/boost amount
5	MidGain	- 36 / + 24 dB	Controls mid frequency cut/boost amount
6	Xover Lo	32-2,000 Hz	Sets crossover point from low to mid range
7	Xover Hi	512-16,000 Hz	Sets crossover point from mid to high range
8	[Dry/Wet]	0.0-100.0%	Blends unaffected and affected signals

Compressor

Control knob	Parameter	Range	Description
2	Sidechain	Off, BPM Duck, Tap, Mod In 1, Mod In 2	Selects sidechain source: Arpeggiator clock, Tap Tempo button, CV Mod Input 1 or CV Mod Input 2
3	[Ratio]	1.0 :1 to 20.0 :1	Controls compressor strength above threshold
4	[Threshold]	-64.0 to 0.0 dB	Controls level at which compression begins
5	Attack	1-400 ms	Time until maximum compression
6	Release	5-560 ms	Time to zero compression if signal is below threshold
7	Output	0-512	Gain compensation
8	[Dry/Wet]	0.0-100.0%	Blends unaffected and affected signals

Delay Types

Hydrasynth offers 5 delay types, each with distinct characteristics:

- **Basic Mono** combines the stereo input signal and produces a mono delay.
- **Basic Stereo** preserves the stereo positioning of the input signal.
- **Pan Delay** alternates between the right and left input signals.
- **LRC Delay** outputs the left input, then the right input, then both, and repeats that pattern.
- **Reverse** takes whatever comes in during the delay period and plays it backward.

Delay Parameters

All of the delays have identical parameters, so we'll describe them once.

Control knob	Parameter	Range	Description
2	[Time]	BPM = Off: 1 ms to 3.00 seconds BPM = On: 0, 1/64T to 1/1 Dot	Delay period
3	[Feedback]	0.0-128.0	Fade-out time for delay
4	[Wet Tone]	-/+ 64.0	Filter control for Wet signal: -64.0 to -0.1: Low pass filter 0.0: No filtering 0.1 ~ 64.0: High pass filter
6	BPM sync	Off, On	Toggles delay sync
7	[Feed Tone]	0.0-128.0	Feedback high-frequency decay time
8	[Dry/Wet]	0.0-100.0%	Blends uneffected and effected signals

Reverb Types

Hydrasynth provides 4 reverb types, each with distinct characteristics:

- Hall
- Room
- Plate
- Cloud

Reverb Parameters

All of the reverbs have identical parameters, so we'll describe them once.

Control knob	Parameter	Range	Description
2	PreDelay	0.5-250 ms	Length of time before reverb
3	[Time]	120 ms - 90 seconds, Freeze	Decay time of reverb Freeze is indefinite without damping
4	[Tone]	-/+ 64.0	Filter control for Wet signal: -64.0 to -0.1: Low pass filter 0.0: No filtering 0.1 ~ 64.0: High pass filter
6	[Hi Damp]	0.0-128.0	Reverb high-frequency decay time
7	[Lo Damp]	0.0-128.0	Reverb low-frequency decay time
8	[Dry/Wet]	0.0-100.0%	Blends uneffected and effected signals

Freeze the Reverb

While on Reverb module page 1, hold [SHIFT] and press Control button 3 and the reverb time will jump to Freeze. If the Hi / Lo Damp parameters are set to zero, the Freeze setting will hold the reverb indefinitely. Any notes that are played will be added to the effect.

A Macro button can toggle the Freeze value on and off; just set the BTN VALUE to 128.0. To learn more about setting up a Macro, see *Mastering the Macros (p. 69)*.

Mod Route Shortcut

Here's how to set up mod routes quickly from an Envelope or LFO to an effect:

- Hold the module button for the desired source
- Press the module button for the destination. This will create a mod route in the Mod Matrix at the first available slot with the first parameter of the effect selected.
- Change the selected parameter if needed
- Set the mod amount with the appropriate Control knob.

Remember: not all FX parameters are available as mod destinations.

Technically the Voice module isn't in the signal path, so it isn't located in the Module Select section of the top panel. But its functions have a significant impact. Many settings related to the playability and performance of the patch are found here.

Voice Parameters: page 1

Control knob	Parameter	Range	Description
1	Polyphony	Poly, Mono, MonoLo, MonoHi, Unison, UnisonLo, UnisonHi	Sets polyphony mode, note priority
2	Density	1-8	Density of voices in Unison modes
3	Detune	0-127	Detune amount in Unison modes
4	Analog Feel	0-127	Adjusts parameter drift (see below)
5	Random Phase	Off, On	Toggles random phase per voice
6	Stereo Mode	Rotate, Alter, Random	Stereo voice allocation (see below)
7	Stereo Width	0-127	Stereo dispersion for Unison and Poly modes. Has no effect on Mono mode.
8	Warm Mode	Off, On	Simulates a "warm" frequency curve

Polyphony settings

It's possible to stack all 8 voices on a single note, if you like. There are seven settings here, but they fall into three main groups..

Poly, Mono, Unison

The Poly setting allows all eight of the Hydrasynth voices to trigger independently. When the ribbon is set to Theremin mode, one voice is reserved for that purpose and the other seven are available from the keyboard.

Mono and Unison modes are monophonic; they only allow you to play one note from the keys or the pads.

Lo, Hi, or both

Both Mono and Unison modes have additional Lo- and Hi- options. Here's the difference:

- **Lo** (low note priority): The only way to trigger a new note is to play one below the held note.
- **Hi** (high note priority): The only way to trigger a new note is to play one above the held note.
- If an option doesn't say "Lo" or "Hi", it's both: A new note can be triggered by any note above or below the held note.

Density & Detune

The Density and Detune parameters are only active when one of the Unison modes is selected. **Density** sets the number of voices that are triggered by the monophonic note. **Detune** offsets the tuning of each of those voices equally within the range set by the Detune value.

Random Phase

Part of what breathes life into the sound of an analog synth is that its oscillators are always running; waveforms could be anywhere in their cycles when they are triggered. It's the nature of their circuits; they must be told to reset. This parameter emulates that behavior by telling the digital oscillators **not** to reset their phase to 0° when they are triggered.

How does Analog Feel?

Another thing that makes an analog synthesizer seem so "alive" is its inherent instability. This unpredictability is an issue not only in the tuning of the oscillators but throughout the signal path. The Analog Feel parameter allows you to dial in as much of this behavior as you like, from "a little bit" to an amount that would summon a repair tech if you hadn't done it on purpose.

Stereo mode

The Stereo mode setting is only noticeable when Stereo Width is > 0 and Polyphony is not set to one of the Mono modes.

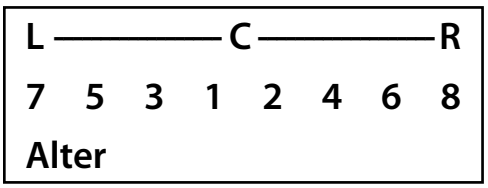
Rotate

This setting arranges the 8 voices in an orderly fashion across the stereo field. The Hydrasynth will change voices every time a note is played, even if the same note is repeated. The voices will play in order from left to right (1-2-3-4-5-6-7-8), with the stereo spread defined by the Stereo Width value.

The Unison modes follow the same pattern. The results may seem somewhat random for odd-numbered Density values, but they're predictable. For example, with a Density of 3 voices you'll hear *1-2-3, 4-5-6, 1-7-8, 2-3-4, 5-6-7, 1-2-8,* etc.

Alter

With this option the voices take turns spreading further and further from center. Stacked voices progress in the same fashion (*3-1-2-4, 7-5-6-8,* etc.). When all notes are released the voice order resets so that the next note on will trigger voice 1 in the center. And again, the stereo spread is defined by the Stereo Width value.



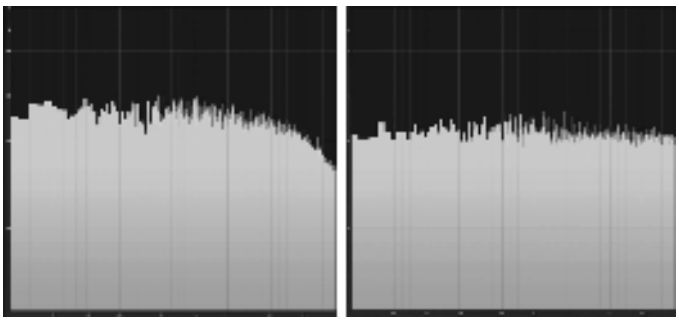
Stereo mode: Alter

Random

This option randomizes the voice position in the stereo field every time a new voice is triggered.

Warm mode

Warm Mode simulates the frequency curve of a popular "warm" synthesizer. As you can see in the image below, it reduces the high end a bit and boosts the low end.



White noise from Hydrasynth with Warm Mode ON (left) and OFF (right)

Voice Parameters: page 2

Control knob	Parameter	Range	Description
1	Pitch Bend	0-24	Positive/negative pitch bend range in semitones
2	Vibrato Amount	0-12	Maximum depth of mod wheel vibrato in semitones
3	Vibrato BPM	Off, On	Toggles Vibrato from Hz to tempo divisions

4	Vibrato Rate	BPM = Off: 0.30-10.00 Hz BPM = On: 1/4 to 1/32Dot	Sets rate of Vibrato effect
5	Glide	Off, On	Toggles Glide effect
6	Glide Time	0-127	Controls Glide rate (hidden if Glide = Off)
7	Glide Curve	Log (-64) > Lin (0) > Exp (64)	Sets Glide curve (hidden if Glide = Off)
8	Glide Legato	Off, On	If On, only legato playing activates Glide (hidden if Glide = Off)

Pitch Bend

This parameter enables the pitch bend wheel to cover as much as a four-octave range: two octaves up and two octaves down (+/- 24 semitones). You can set the range to a whole step, or a musical fifth, or whatever you prefer. The setting is saved when you save the patch.

Vibrato settings

The Vibrato feature provides a sixth LFO that modulates the pitch of all 3 oscillators at once. It is controlled by the mod wheel. This avoids having to use a mod route to make the same connection. The mod wheel can still be used for other purposes through the Mod Matrix, and also as a volume control for the Ribbon when it is in *Theremin Mode (p. 64)*.

The Vibrato rate locks to tempo when its BPM parameter is set to On. This enhances the musicality of the vibrato; singers and musicians do this naturally to match the music.

Glide settings

Glide causes the pitch to slide between notes rather than changing in chromatic steps. When the Glide effect is enabled it reveals another three parameters on Voice page 2. The same thing happens when the Glide button is toggled on the keyboard model.

The Glide curves are similar in shape to the envelope segment curves:

- A **logarithmic** curve "picks up steam" as it goes, rising slowly at first and accelerating upward. In the opposite direction it starts falling slowly and accelerates until it reaches its resting state.
- An **exponential** curve does the opposite: It rises quickly at first and its rate of change slows as it nears the peak. When moving downward it starts falling quickly and slows down as it approaches its destination.
- A **linear** curve rises and falls at the same rate throughout its duration.

Enabling the Glide Legato setting changes the way Glide works: staccato notes will not glide; notes played in a legato fashion will glide.



Glide Legato can be less predictable when Polyphony mode = Poly. The reason: Each individual voice has its own legato, and legato playing only happens when the same voice is retriggered. For example, if voice 1 is the next one that will be triggered, playing a legato note will glide voice 1 from its current note to the new note.

Voice Parameters: page 3

Control knob	Parameter	Range	Description
1	Key Lock	(Chromatic octave)	Lock keyboard or pads to a specific key. Has no effect if Scale = Chromatic.
2	Scale	Custom + 38 presets	See *Scales (p. 95)* for contents
4	Scale Edit	(access)	Enter Scale Edit page (visible when scale = Custom)
8	Snap	Off, On	Quicker attack, for sharp initial transients

Key Lock

This parameter locks the keyboard or pads to the key you select. You'll hear no difference unless you have selected a scale besides Chromatic. After that the Key Lock parameter works together with the non-chromatic scale to specify the notes the keyboard or pads are allowed to play.

Select a Scale

There are 38 preset scales available. It is possible to create a custom scale if you don't find the one you want (see the next section).

When a non-chromatic scale is selected, notes that are not in the scale are filtered out. So if you play notes outside of the selected scale, they will be quantized to the pre-determined scale notes. This also affects incoming MIDI notes. However, outgoing MIDI notes are not affected; if C#3 is not in the scale and you play the C#3 key, a C#3 will be transmitted over MIDI and USB.

For a list of the scales and the notes they contain, See *Scales (p. 95)*.

Custom Scale

The Custom scale option is located at the bottom of the scale list. To get there from Voice page 3, turn Control knob 2 fully counter-clockwise.

Scale Edit

After the Custom scale is selected, press Control button 4 to enter the Scale Edit page. Here's what you'll see:

- Control button 1: This is the first note in the custom scale, and it is based upon the Key Lock setting. The Control knob is disabled.
- Control knobs 2-8: These represent notes 2-8 of the custom scale.

Quick assign

To assign notes quickly to the custom scale, hold Control button 1 and play the desired notes on the keyboard or pads. The existing notes will be cleared as soon as you play the first note.

Note that if the root note is entered it will be ignored (it's the Key). It's okay to enter the notes out of order; they'll be placed in chromatic order when Control button 1 is released.

Clear a note

To clear one or more notes, hold [INIT] and press the corresponding Control button(s). You can't clear the Key selection on Control button 1; that's the root key of the scale. To change it, exit this page and adjust the Key Lock parameter.

Individual note assign

If you entered a wrong note, hold the corresponding Control button and play the correct note. The Control knob also can be used to select the note. Again, it's okay if the new note is not in chromatic order; this will be corrected after pressing [EXIT].

Snap

Snap shortens the initial attack time to provide sharper initial transients. When Snap is Off the original timing on the fade in of the waveform is retained; when it's On the start time is shortened to be nearly instant. This gives bass and percussive patches more presence.

Ribbon Controller (keyboard only)

The Ribbon controller has three modes of operation. Press the [Ribbon] button and use Control knob 1 to select the desired mode:

- **Pitch bend** is like the pitch bend wheel, only horizontal. Wherever it is touched becomes the center point. **Lock Global** makes this true for all patches.
- **Theremin** allows the ribbon to be played like a monophonic synthesizer. It also reveals more parameters and adds another page where its key and scale can be set. These are described below in the Theremin mode section.
- **Mod Only** routes the ribbon entirely through *The Mod Matrix (p. 73)*, where it can be used in several ways as a modulation source. Two more parameters appear in this mode:
  - **Hold** will maintain the modulation level of the ribbon if you lift your finger
  - **Lock Global** makes the ribbon settings of this patch apply to all patches. Otherwise the ribbon status can be different for each patch.



The Ribbon button can be used as a Source shortcut to set up a route in the Mod Matrix: hold [RIBBON], select the module you want it to control, select the specific parameter, and then set an amount.

Theremin Mode

When the ribbon controller is in Theremin mode it reserves a voice for itself. This reduces the number of voices available on the Hydrasynth keyboard from 8 to 7.

Theremin mode offers the **Hold** and **Lock Global** settings described above, and several more. There are two parameter pages in this mode; the others have only one page.

Theremin parameters: page 1

- **Key span** sets the ribbon range. 4 oct matches the keyboard; 2 oct compresses the range; 6 oct expands it.
- **Octave shift** moves the ribbon center to reach notes beyond the keyboard range.
- **Quantize** allows the ribbon to play only notes within the selected key and scale (see Theremin parameters: page 2).
- **Glide** lets notes triggered by the ribbon travel from one note to the next. Set the rate with the Control knob. When Quantize is enabled Glide conforms to the selected key and scale (see Theremin parameters: page 2). These settings are independent from the Glide settings on [VOICE] page 2.
- **Wheel volume** enables the mod wheel to act as an inverted volume control for the ribbon in Theremin mode. As the wheel moves upward the volume of the ribbon note is reduced.

Theremin parameters: page 2

- **Key Lock** sets the root note for the ribbon scale.
- **Scale** determines which notes the ribbon is allowed to generate. This setting is independent from the keyboard Scale on [VOICE] page 3. The *Custom Scale (p. 63)* feature works the same way for both the ribbon and the keyboard.



The Ribbon can be in Pitch Bend mode or Theremin mode and be a mod source in the Mod Matrix at the same time.

The Ribbon as a Mod Source

There's a separate chapter that describes how to use *The Mod Matrix (p. 73)*, so you'll want to read that too. But the way the ribbon interacts with the Mod Matrix deserves special coverage here. It actually provides three different mod sources, not just the one you see!

The fastest way to learn about the different sources is to build a mod route, so here we go:

1. Press [INIT] twice to initialize the patch
2. Press [RIBBON] and select Mod Only with Control knob 1
3. Press [MOD MATRIX]
4. Press Control button 2 to activate the Assign function
5. Press [RIBBON]. "RbnAbs" appears in the Source field.
6. Turn Control knob 2 slowly clockwise
7. Note the values of "RbnAbs+" and "RbnRel".
8. Press Control button 6 to select the Destination field
9. Press [OSC 1] and set a value of any amount with Control knob 6
10. Press Control button 2 and use Control knob 2 to select the various ribbon sources
11. Hold a note on the keyboard and experiment with the different ribbon sources.

- **RbnAbs** (*Ribbon Absolute*): the middle of the ribbon = 0. Move to the left for negative mod values; move to the right for positive values.
- **RbnAbs+** (*Ribbon Absolute Positive*): the left end of the ribbon = 0, the right end = maximum modulation. Touch a spot in the middle and it generates a value based on the distance between the left and right endpoints.
- **RibbnRel** (*Ribbon Relative*): Wherever the ribbon is touched = 0. Move to the left for negative mod values; move to the right for positive values.

A well-designed arpeggiator can make someone who's new to music sound like a pro. Add a bit of music theory and some sound design chops to the mix and the results can be amazing. The presets make an ironclad case for that.

An overview of the Hydrasynth arpeggiator features was provided in the *Arpeggiator basics (p. 11)* section of the Quick Start Guide. This included the similarities and differences between the controls of the keyboard and desktop models. The main focus of this chapter is to describe the arpeggiator parameters and how to use them.

Arp Edit Mode

To enter Arp Edit mode, hold the [SHIFT] button and press [ON] in the Arpeggiator section of the top panel. The Right display will reveal the first eight parameters of Arp Edit mode. Use the Page Down arrow to access the second page of parameters.

Arp parameters: page 1

Tempo

Use Control knob 1 to adjust the tempo, or press [TAP TEMPO] three or more times to set the tempo manually. Hold [SHIFT] while turning Control knob 1 to fine-tune the tempo.

If Clock Sync is set to an external source the letters EXT will be shown prior to the tempo. This setting is found on *MIDI: Page 4 (p. 86)*.

Division

Control knob 2 selects the basic time division of the arpeggiator relative to the tempo. There are 12 settings here, 4 more than the top panel knobs can reach. The Triplet options are there too, and the Triplet LED will light as they are selected. You can also press [TRIPLET] to select that setting immediately.

Swing

The top panel Swing knob offers eight settings, including Off. But there are actually 26 settings between 50% and 75%. Use Control knob 3 to select a value, or use the Swing knob first and then Control knob 3 to select a nearby value.

Gate

Turn Control knob 4 to adjust the relative duration of the arpeggiator notes. The full range of the parameter is available here for both models: 5% to 100%.

Octave mode

This parameter is not present on the top panel. It works together with the Octave setting, which must be >1 or you may not hear a difference. Use Control knob 5 to select the options. The descriptions are based on an Octave setting of 2 except as noted:

- **Up** plays the notes in the original octave and then repeats the pattern an octave higher.
- **Dn (down)** plays the notes in the original octave and then repeats the pattern an octave lower.
- **UpDn** (Octave = 3) plays the notes in the original octave, repeats them in the next 2 octaves, repeats them in the middle octave, and starts over.
- **Alt** plays the notes in the original octave, repeats them in the next octave, and then reverses the entire pattern. The top and bottom notes are repeated.
- **Alt 2** is identical to Alt except the top and bottom notes are *not* repeated.

Octave

Use Control knob 6 to set the range of the arpeggiator. Minimum range is 1 octave; maximum range is 4 octaves.

Mode

Control knob 7 is used to specify the direction of the arpeggio and other behaviors. For the following descriptions we'll use a 3-note chord with Octave Mode = Up and Range = 2.

- **Up** plays the notes from low to high in each octave and starts again from the bottom.
- **Down** plays the notes from high to low in each octave and starts again from the top note of the low octave.
- **Up / Dn** plays the notes forward/backward in each octave and starts again from the bottom. The top and bottom notes are repeated in each octave.
- **Up & Dn** is identical to Up / Dn except the top and bottom notes are *not* repeated in each octave.
- **Order** plays the notes in the order they were played, repeats the pattern in the next octave, and starts again from the bottom.
- **Random** plays the notes in a random order in each octave.
- **Chord** plays all held notes at one time in the first octave and then plays them again in the second octave.
- **Phrase** provides preset musical phrases that repeat in each octave. There are 64 phrases, and the selection is made on Arp Edit page 2.

Length

This parameter specifies the number of notes that will be part of the arpeggio before the pattern repeats itself. When Mode = Phrase the Length setting determines how many steps of the Phrase will be allowed to play.

We'll give a couple of examples, but it is necessary to try different settings to gain an understanding of the way this parameter interacts with the other settings. For these examples use Mode = Up, Oct Mode = Up, and Range = 2.

- With Length = 3, hold a 4-note chord. The arpeggiator will only play the first 3 notes in the chord. To hear all four, set Length to 4. They will only play in the first octave.
- Increase Length to 5. The lowest note of the chord will appear in the second octave.
- Increase Length to 6, then 7, then 8. Gradually each note of the chord will appear in the second octave.
- Increase Length to 9. The lowest note of the chord will be repeated in the first octave and the pattern will repeat.
- Increase Range to 3. The lowest note of the chord will appear in the third octave instead of the first octave.

When Length = Default the arpeggios play their full length based on the various settings and the number of held notes.

Arp parameters: page 2

Tap Trig

When Tap Trig is enabled the arpeggiator triggers a note every time [TAP TEMPO] is pressed. This lets you walk through the pattern one note or chord at a time, depending on the Mode and other settings.

Note that Tap Trig sends signals only to the Gate output. The Clock out still runs at the selected clock rate.

Phrase

The Phrase selection is made here. To audition the phrases the Mode must be set to Phrase on Arp Edit page 1.

Ratchet

This specifies how many subdivisions of an arpeggiator step are possible (1, 2, 4, or 8). A Ratchet event is sent to the Gate output, but does not affect the clock output.

Note that Ratchet and Tap Trig work together: Ratchet events are still generated but are triggered manually.

Chance

This determines the likelihood of a Ratchet event happening on a given arpeggiator step. Its values range from 0% (no chance) to 100% (highly likely on every step).

Additional Arp Features

Latch and Sustain

Press [LATCH] to activate Latch mode. This enables you to take your fingers off the keys or pads and use both hands to adjust parameters while an arpeggio is running.

Use [SHIFT] + [LATCH] to activate Sustain mode. This works whether an arpeggio is running or not. It's the same response as using a sustain pedal.

Between these two parameters there are four potential combinations, as shown below. The lighting of the [LATCH] button LED provides a visual clue as to which settings are active.

Latch	Sustain	[LATCH] LED status
On	Off	Button lit constantly
On	On	Flashing cycle: 0.8s lit, 0.2s unlit
Off	On	Flashing cycle: 0.5s lit, 0.5s unlit
Off	Off	Button dimly lit

Initialize the Arp

Hold [SHIFT] and press the [ON] button to initialize the Arpeggiator module. All parameters will return to their defaults.

Macros are powerful, expressive tools for song creation and live performance. Every factory patch has up to 8 Macros that maximize their creative potential. Each Macro is a combination of one of the Control knob / button pairs and a list of destinations, sort of like a private Mod Matrix grouped around the Right display. In fact, Macros can even control the Mod Matrix mod routes. You can create and modify Macros to match your music and your style.

Home Page

If you haven't tried out the Macro controls yet, press the [HOME] button to jump to the Home page. That's where the action is: the Control knobs and buttons are supercharged on this page, sort of like the pedals on steroids. Each Control knob is paired with a Control button to affect up to 8 parameters at once: The knobs sweep parameter values and the buttons (toggle, trigger, or reset them; see *Master: Page 2 (p. 85)*). Modulation levels can be positive or negative, so a Macro can reduce values, increase them, or do both at the same time.

It's easy to see which Macros are active on the Home page: If a Macro field displays a zero or some other number, it has at least one parameter assigned. If the Macro field has a dash, not a number, then it is empty.

Here's a handy tip when using Macros on the Home page: If you hold [INIT] and turn a Control knob, the Macro will jump to 0.0 from its current value. This prevents the generation of intermediate values.

Make a Macro

Find a fun patch, press [MACRO ASSIGN], and let's explore how they work. At this point all eight Macros say "Macro Edit..." whether they're empty or not. From here you can inspect or modify an existing Macro by pressing its Control button to enter the Macro Edit page. After that, here's what you'll see in the Right display:

- Destinations 1-3 are listed across the top row. Use the Page arrows to select Des 4-6 and Des 7-8.
- The middle line of the page shows the Button Value.
- The bottom line of the display shows the modulation Depth.

Assign a Destination

For the purposes of this exercise, let's start with an empty Macro. We'll be working with Macro 1.

Additional information for some steps is included below in italics.

1. If you're not already there, press [MACRO ASSIGN].
2. Hold [INIT] and press Control button 1 to initialize Macro 1.
3. Release [INIT] and press Control button 1 again to enter the Macro Assign page.
4. Press Control button 2 to activate the Assign function.

   Many orange-lettered Access buttons are lit now; these are potential destinations.
5. For this example, press [OSC 1] to select it. Instantly the first column is populated with Osc 1, Pitch, and zeroes.
6. Turn Control knob 6 to set an amount of 120.0. Use [SHIFT] to fine-tune the value.
7. Press Control button 6 to reach the Button Value field.

   The bottom Control button cycles through all of the fields, and also escapes the value fields.

   The Module buttons cannot change the page when a highlight cursor is visible.
8. Use Control knob 2 and [SHIFT] to set a value of 20.0.

   The upper Control knob always edits the highlighted field.

9. Hold a note and use Control knob 5 and Control button 5 to audition the Macro. All 8 routes will respond.

   The Macro knob/button pair you are editing will behave this way on the Home page.

10. With these settings the knob sweeps an octave; the button jumps a whole step.

    The MacroBtn parameter on System Setting page 2 defines the behavior of the Macro buttons: If the setting is "Trigger" or "Reset" the button is a Trigger. When set to "Toggle" or "Switch," the button behaves as a Toggle.



The Macro button is exclusive; when it is engaged the Control knob is locked out temporarily. This allows you to change the Control knob "behind the scenes", so that the new Macro value is revealed after disengaging the Macro button.

Name the Macro

Macros can be given a name with up to 8 characters, so you'll know at a glance what the Macro does. The name is displayed on the Home page and on the Macro Assign page. Here's what to do:

1. From the Home page, press [MACRO ASSIGN].
2. Select the Macro you want to edit by pressing its Control button.
3. Use the Page arrows or [MACRO ASSIGN] to reach page 4.
4. Control knob 1 selects the naming function: List name or Custom name.
5. **List name:** Use Control knob 2 to choose a preset name. There are 100+ of them; see *Preset Macro Name List (p. 72)* at the bottom of this chapter.
6. **Custom name:** Control knob 2 chooses characters; use Control button 2 to select the next character.

Macro Slot Copy

There's a quick way to set up as many as three complementary routes within a Macro, as long as they're on the same Destination page.

1. Press [MACRO ASSIGN] to access the Macro Assign page.
2. Press the Control button of the desired Macro to enter its Destination page.
3. Press and hold the top or bottom Control button of the copy source.
   Note: The destination Macro slot must be on the same page as the copy source.
4. The top and bottom Control buttons for the other two slots are flashing. Press one of those to paste the settings to that Macro slot.
5. The Destination Group & Parameter are copied to the target slot; Button Value & Depth are set to default values.
6. Make adjustments to the Destination, Button Value and Depth parameters as needed.

Save the Patch: Macro Options

The [SAVE] button has its own chapter, but we want point out this part of it now. While saving the patch, Control knob 4 lets you specify whether the current positions of the Macro knobs will be returned to zero (Return), stored in their current positions (Save), or converted into new values for the parameters they control (Convert). For more information see *Patch Management (p. 80)*.

Macro Button Response

There's a separate chapter for *The System Setup Pages (p. 84)*, but this information affects how the Macro buttons behave on the Home page and while auditioning a Macro during editing.

To access the Macro Button settings, press [SYSTEM SETUP] and press the Page Down arrow once to reach page 2. Use Control knob 4 to select one of the four options: Toggle, Trigger, Switch, and Reset.

- **Toggle**: The Macro button toggles between the Button Value setting and the current Control knob value.
- **Trigger**: The Macro button triggers the Button Value On when pressed and Off when released.
- **Switch**: Only one Macro button can be selected at a time.
- **Reset**: The Macro button resets the corresponding Macro Knob to zero

Using a Macro button on the Home page while holding [SHIFT] changes the behavior.

When MacroBtn setting is...	[SHIFT] + Macro button response is...
Toggle	Trigger the Button Value On when pressed and Off when released.
Trigger	Hold the Button Value setting until released manually
Switch	Allow more than one Macro Button to be selected
Reset	(no response)

Preset Macro Name List

These are the preset Macro names found on Macro Edit page 4. You can also create your own Macro names; see *Name the Macro (p. 70)*.

Macro name	Macro name	Macro name	Macro name	Macro name
2nd	Crystal	Harmony	Phrase	Stretch
3rd	Cutoff	Hurt	Pitch	Sub
4th	CV 1	Itch	Pressure	Swing
5th	CV 2	Jianbing	PulsWdth	Teardown
6th	Darken	Level	Purr	Thicken
7th	Decay	LFO Amt	PWM	Thin
Air	Delay	Mai Tai	Range	Time
Amp	Depth	Major	Ratchet	TimeDiv
ArpMode	Distort	MakeHuge	Rate	Twist
Attack	Dry/Wet	Mangle	Ratio	Velocity
Bacon	Env Amt	Massage	Release	Vowel
Bark	EQ - Hi	MIDI CC	Reso	Warp
BassDrop	EQ - Low	Minor	Reverb	Wavescan
Beef	EQ - Mid	Mod 1	RingMod	WavStack
Bend	Fast	Mod 2	Rotary	Width
Bite	Feedback	Mod Amt	Rumble	Wobble
Bleed	Filter	Morph	Scratch	Woof
Breath	Flanger	Noise	Slow	Wow
Brighten	FM	Oct -	Snarl	-
Buildup	Force	Oct +	Space	-
Chance	Funk	Oh	Speed	-
Chord	GateTime	Ouch	Spin	-
Chorus	Glide	Overdriv	Spread	-
Compres	Go	Pan	Stank	-
Crunch	Harmonic	Phase	Stop	-

Modular synthesizers use cables to make connections. Hydrasynth has a much neater solution: an easy-to-use internal patch bay with 32 sets of modulation sources and destinations.

Creating Mod Routes

There are two ways to create a new mod route in the Mod Matrix. The first one is to access the Mod Matrix page directly. *Additional notes are entered below some steps in italics.*

The Whole Process

1. Press [MOD MATRIX] to access the Mod Matrix page.
2. Press one of the Control buttons for the desired slot (top or bottom) to enter assign mode.

   The orange-lettered buttons are now lit; these are the available source modules.
3. Scroll the top Control knob to select a source.

   Shortcut 1: Hold [SHIFT] while turning the Control knob to jump through modules by category.

   Shortcut 2: Press the desired module button to select it.
4. Press the bottom Control button to access the destination field.

   The orange-lettered buttons are now lit; these are the available source modules.
5. Scroll the top Control knob to select the destination module. Its default parameters appear in rows 2-4.

   Shortcut 1: Hold [SHIFT] while turning the Control knob to jump through modules by category.

   Shortcut 2: Press the desired module button to select it.

   Shortcut 3: Turn one of the top-panel knobs to select that parameter.
6. Press the bottom Control button to access the next row.
7. Scroll the top Control knob to change the destination parameter...

   ...unless you used Shortcut 3 in step 5 already.
8. Press the bottom Control button to exit assign mode.
9. The bottom Control knob can change the modulation depth at any time during steps 3-8.

The Shortcut

Mod routes can be established quickly from almost any page:

1. Press and hold the module button for the Modulation Sources (p. 75).
2. Press the module button for the Modulation Destinations (p. 76).

   The Mod Matrix opens at the first available slot with the first parameter of the destination module highlighted.
3. To select a different target parameter from that module, use the bottom Control button to enter the next field.

   Shortcut: If the parameter has a top-panel knob, turn it to select that destination.
4. Use the upper Control knob to select the desired parameter.
5. Use the Control knob on the bottom row to set the modulation amount.

   The modulation amount can be positive or negative.



The shortcut method works inside and outside of the Mod Matrix page. The difference: Inside the Mod Matrix the available destination module buttons light up when the source module button is held. Outside the Mod Matrix they don't.

Notes About Mod Routes

Here are some concepts to keep in mind while working with Mod Routes:

- Some modules cannot be modulation sources, such as the Oscillators or the Mutants.
- Some modules can be used as sources and destinations, such as the Envelopes and the LFOs. In this case, the order in which you press them determines the source and the destination.
- Only the first two parameters and the Wet/Dry mix of the Pre-/Post-FX can be modulated.
- Some modules only have one parameter that can be modulated, such as the Ring-Noise module; in this case, there is nothing else for the upper Control knob to select when that field is highlighted.
- The Ribbon offers three different sources via the Mod Matrix. If you want to use a different one move the cursor to Source field and select it. For a description of each source see *Ribbon Controller (keyboard only) (p. 64)*.



If all 32 modulation routes are occupied and you try to add another, the Hydrasynth will show a message for two seconds that says "Mod Matrix Slots Full!"

More Shortcuts

Copy Mod X to Mod Y

You can copy one Mod matrix slot to another and make one or more derivative routes. But it won't work if a mod route field is highlighted; press [EXIT] first.

1. Hold the Control button of the source route.
2. **Warning!** The next step will replace what's there, so choose an empty slot.
3. Press the Control button of the destination route.
4. Modify the destination module, parameter, and depth as needed.

Clear a Mod Slot

To clear a single Mod matrix slot, hold [INIT] and press its top Control button.

Clear the Entire Mod Matrix

If you want to start over with all new mod routes, hold [INIT] and press the [MOD MATRIX] button. A prompt will ask you to confirm the decision, because it's a big one. If you're sure, press [INIT] again.

Be Random

If you're looking for something crazy, randomize the entire Mod Matrix! You might get lucky or you might get nothing. You can always try again!

Before you do, though, try a few mod sources: the wheels, the ribbon controller, start the arpeggiator, etc. There could be a hidden gem there. And once you get something interesting, dial in a few changes to make it perfect. It's okay, you can take all the credit! You're the one who saw what was cool about it; we just rolled the dice.

Modulation Sources

These the mod sources available in the Hydrasynth. A few may need explanation; see below the chart.

Group	Modulators
Env	Env 1, Env 2, Env 3, Env 4, Env 5
LFO [1]	LFO 1, LFO 2, LFO 3, LFO 4, LFO 5, LFO 1+, LFO 2+, LFO 3+, LFO 4+, LFO 5+
Aftertouch	MonoAftT (Channel Aftertouch), PolyAftT (Polyphonic Aftertouch)
Keytrack	Keytrack (center note = C4 for all mod sources except filter keytrack [center = C2])
Velocity	Velo On (Note On velocity), Velo Off (Note Off velocity)
Wheel	PitchWhl (Pitch wheel), ModWhl (Modulation wheel)
Ribbon [2]	RbnAbs (Ribbon Absolute bipolar), RbnAbs+ (Ribbon Absolute unipolar), RbnRel (Ribbon Relative)
Pedal	ExpPedal (Expression pedal)
CV	Mod In 1, Mod In 2
MPE [3]	MPE-X, MPE-Yabs, MPE-Yrel, MPEoffVc
MIDI	CC [000-127]

[1] An LFO is normally a bipolar source. A plus sign [+] indicates a unipolar source derived from that LFO.

[2] See *The Ribbon as a Mod Source (p. 65)* for a description of each mode.

[3] MPE-X = pitch bend
MPE-Yabs = CC# 74 in some devices (absolute mode)
MPE-Yrel = CC# 74 in some devices (relative mode)
MPEoffVc = note off velocity

Modulation Destinations

These the potential mod destinations in the Hydrasynth. A few may need explanation; see below the chart.

Type	Group	Parameters
1	Arp	Mode, TimeDiv, Swing, Gate, Range, OctMode, Length, Phrase, Ratchet, Chance
2	Osc 1 Osc 2 Osc 3 All Osc [1]	Pitch (+12/-12 semitones), WaveScan Pitch (+12/-12 semitones), WaveScan Pitch (+12/-12 semitones) Pitch (+12/-12 semitones)
3	Mutator 1 Mutator 2 Mutator 3 Mutator 4	Ratio, Depth, Window, Feedback, Dry/Wet, Warp [1-8] Ratio, Depth, Window, Feedback, Dry/Wet, Warp [1-8] Ratio, Depth, Window, Feedback, Dry/Wet, Warp [1-8] Ratio, Depth, Window, Feedback, Dry/Wet, Warp [1-8]
4	Ring Mod	Ring Depth
5	Mixer	Osc1Vol, Osc2Vol, Osc3Vol, RingVol, NoiseVol, Osc1Pan, Osc2Pan, Osc3Pan, RingPan, NoisePan, Osc1F1/2, Osc2F1/2, Osc3F1/2, RingF1/2, NoisF1/2
6	Filter 1 Filter 2	Cutoff, Resonance, Drive, Control, Env1Amt, LFO1Amt, Keytrack Morph, Cutoff, Resonance, Env1Amt, LFO1Amt, Keytrack
7	Amp	LFO2Amt, Level
8	Pre-FX Delay Reverb Post-FX	Param1, Param2, Dry/Wet Time, Feedback, Wet Tone, FeedTone, Dry/Wet PreDelay, Time, Tone, HiDamp, LoDamp, Dry/Wet Param1, Param2, Dry/Wet
9	Env 1 Env 2 Env 3 Env 4 Env 5	Attack, Hold, Decay, Sustain, Release Attack, Hold, Decay, Sustain, Release Attack, Hold, Decay, Sustain, Release Attack, Hold, Decay, Sustain, Release Attack, Hold, Decay, Sustain, Release
10	LFO 1 LFO 2 LFO 3 LFO 4 LFO 5	Rate, Level Rate, Level Rate, Level Rate, Level Rate, Level
11	ModMtrx [2]	Depth [1-32]
12	CV	ModOut 1, ModOut 2
13	MIDI [3]	CC [000-127]

[1] All Osc: A mod route can be applied to all three oscillators simultaneously.

[2] ModMtrx: A source can modulate the depth of any mod route. "Depth 1" targets mod route 1, etc.

[3] MIDI CC #: Incoming MIDI data can modulate certain parameters, and they can return the favor.

The seven CV/Gate connectors have a longer history in the music world than MIDI does! This is how the modules of early synthesizers were connected, using cables to carry the control voltages, gate triggers, and clock signals. And the resurgence of modular synths and Eurorack modules in the 21st century has brought these connection protocols back to the forefront of the music creation process for many musicians.

Hydrasynth is well-stocked in this area too, with two CV inputs and three CV outputs, plus a Gate Out connector and another that transmits clock signals. Each of the CV/Gate connectors can be configured to match the voltages and signal types of the most popular formats.

Basic Concepts

If you're new to the world of CVs and Gates, here are a few descriptions and ideas on how to put this stuff to work.

First, "CV" stands for "Control Voltage". It's a quick way to say "Use a change in this voltage value to control that device." A "gate" is something that opens and shuts, allowing the passage of electricity and preventing it, respectively. In practical terms, when a note is triggered by a key or a pad, Hydrasynth generates a CV (Pitch) and two Gate voltages (high and low, for "Note on" and "Note off").

This is done by converting digital data into analog voltages, which are then regulated by the System Setup preferences and supplied to the CV/Gate/Clock connectors. Likewise, incoming CVs are translated into digital data and supplied to the Hydrasynth, which taps into them via the Mod Matrix.

It's a two-way street, with the Mod Matrix as the "traffic cop": you can route the CVs from Mod 1 and Mod 2 to any mod destination, and route any mod source to Mod 1 and Mod 2, all at the direction of the Mod Matrix. In other words, the keys, pads, wheels, ribbon, expression pedal, even incoming MIDI data can be routed to the inputs of a modular synthesizer through the CV/Gate section.

And in the other direction, just imagine: The incoming voltage could be generated by some crazy Eurorack module and used as a complex source to modulate a Hydrasynth parameter. There has never been a better time to own a synth!

A Few More...

CV/Gate Polyphony

The output of the CV connectors is naturally monophonic, so they are best suited for monophonic applications. Depending on the desired results, it may be good to try the Mono or Unison options found on page 1 of the [VOICE] menu. Or you could read the next section...

The Ribbon and CVs

There's an option on *CV – Pitch Gate: Page 7 (p. 89)* that selects whether the keyboard or the ribbon will be the CV/Gate source. This is an ideal pairing, since the ribbon is naturally monophonic also. For even better results, set the ribbon to *Theremin Mode (p. 64)* and activate its Quantize parameter so its output will conform to the selected Scale. Then play the ribbon with one hand, the keyboard with the other, and it's literally like having two instruments in one!

Clocks and Sync

The Hydrasynth arpeggiator can drive or be driven by external sequencers (and LFOs and Envelopes will follow if their BPM Sync parameters are set to On). The Clock connector in the CV/Gate section can send one of several sync rates to non-MIDI devices, as can the MIDI and USB ports. But incoming clocks must arrive via USB or MIDI. These options are set on pages 4 and 8 of *The System Setup Pages (p. 84)*.

Compatibility

There are several voltage standards that companies use, so the Hydrasynth allows you to set the voltage ranges to match the source device. Those are defined on System Setup pages 7-9. More later about that.

Output Connectors

The output connectors (Pitch, Gate, Mod 1, Mod 2, and Clock) convert data from the Hydrasynth into voltages, which can then be used to trigger notes and control parameters on an external device.

Each of the five output connectors has a different purpose.

Pitch

A control voltage from this connector is intended to control the pitch on an external device. The output voltage is derived from the MIDI note number that corresponds to the key or pad being played. This output is monophonic, so for the best results use one of the Mono or Unison options. A description of each of those modes and their note priority variations is available in the *Polyphony settings (p. 60)*. The voltage ranges for this output are defined on *CV – Pitch Gate: Page 7 (p. 89)*.

Gate

When the keys or the pads are played, two Gate signals are generated: Gate high (note played) and Gate low (note released). The same signals are sent by the Tap Tempo button for each held note when the Tap Trig parameter is active on Arp Edit page 2.

Gate signals are normally transmitted to the same device that receives the control voltages generated by the Pitch output, and will conform to the note priority settings. Two types of gate signals are available (V-trig or S-trig); please refer to the documentation for the external device so you'll know which type to use.

The settings for this output are defined on *CV – Pitch Gate: Page 7 (p. 89)*.

Mod 1 and 2

These are also control voltage outputs. They can be used to modulate almost anything on a modular synth, but a common scenario is to route Mod 1 to a VCA (Voltage Controlled Amplifier) and Mod 2 to a VCF (Voltage Controlled Filter). The combined use of these two outputs and the Pitch/Gate outputs enable the Hydrasynth to control the entire signal path of an external monophonic device from start to finish.

The settings for these outputs are defined on *CV – Mods: Page 9 (p. 90)*.

Clock

As stated earlier, four different sync rates are available for this connector. This selection and those for three related parameters are found and explained on *CV – Clock: Page 8 (p. 90)*.

Input Connectors

Mod 1 and 2 are equally capable: they can be used as modulation sources to control any parameter that is a Mod Matrix destination. They can be set to independent voltage ranges, though, which expands their capabilities even further.

The settings for these inputs are defined on *CV – Mods: Page 9 (p. 90)*.

Esoteric Uses

These are a few ideas that will take you beyond the basics of using the CV/Gate connectors. We'll refer to Mod 1 in the following examples, but the statements apply equally to Mod 2.

CV Attentuator

You can create a CV attenuator or CV booster by routing Mod In 1 to ModOut 1 in the Mod Matrix. The amount of boost or cut is determined by the mod route Depth setting. The best results require matching the Mod 1 input and output settings on *CV – Mods: Page 9 (p. 90)*.

CV Inverter

You can also use the CV/Gate section as a CV inverter, though this involves both Mod 1 and Mod 2. For example, as the mod source use Mod In 1, as the mod destination use CV / ModOut 2, and then set Depth to a negative amount.

Process Audio

As mentioned in the Oscillator chapter, the *Mutants 1–4 (p. 35)* can process audio signals that arrive at the CV Mod Inputs. Refer to the notes in the FM-Lin and Ring Modulator sections of that chapter for more details.

CVs and Arpeggios

The Hydrasynth arpeggiator can be used to modulate external devices, too. When the arpeggiator plays notes it's the same as playing the keys or pads manually: each note sends a Pitch CV and Gate signals. Again, for the best results use one of the monophonic *Mode (p. 67)*.

The process of saving a patch and finding it later are closely related, so both are covered in this chapter.

Using the Browser

Whether you're hunting for a specific patch or looking for something in a particular category, the Browser has several features that will help you quickly locate what you need.

The Browse page

Press the [BROWSE] button to reveal these features:

Control knob	Parameter	Range	Description
1	Patch select	5 banks x 128 patches	Scroll to select; [SHIFT] + scroll jump +/- 10
2	Patch name	(view only)	Shows name of selected patch
3	Category	(view only) [1]	Lead, Pad, Bass, etc.
4	Find By	Patch #, Name, Category	Sorting method (see below)
5	Compare	5 banks x 128 patches	Compare active patch to another
8	Favorite Assign	(access)	Press Control button 8 to assign Favorites [2]

[1] Control knob 3 is only active when the Find By option is set to Category.

[2] Patches are assigned to the Favorites banks on this page. Use [SHIFT] + [BROWSE] to access current Favorites.

Browsing is fairly simple. This page presents all of the main functions:

- Turn Control knob 1 to select a patch (or use the big knob).
- Basic information about each patch is shown in fields 2 and 3.
- The patches will appear in a different order depending on the "Find By" selection.
- Use [SHIFT] + the Left/Right arrows to skip through the list 10 patches at a time.

The Compare and Favorite Assign features are described later in this chapter.

Sort Methods

There are three ways to sort the patches. What this does is reorganize the patch list based on the selected sort method. The patches stay where they are, they're just displayed in a different order.

Find by Patch

This puts the patches in order first by the Bank they occupy (A-E) and then in numerical order within the Banks.

Find by Name

This option puts all of the patches in alphabetical order. As Control knob 1 is turned the patch Bank and number might jump around a lot; this is because the patches are still in their original locations. They are not relocated when the Find By option is changed.

Find by Category

This sorts the patches by their categories (Arp, Bass, FX, etc.). The categories themselves are sorted in alphabetical order, and Control knob 3 is used to scroll through the categories. Note that Control knob 3 is only active when Find By Category is selected.

Control knob 1 is used to select individual patches within the selected category. As it is turned the patch Bank and number might jump around a lot; this is because the patches are not relocated when the Find By option is changed.

Compare

The patch shown in edit field 5 can be used to compare the current state of an edited patch with its unedited version (the default selection) or with any other Hydrasynth patch. Control knob 5 is used to scroll through the patches, which are always displayed here in their original order (by Bank and number). To jump through that list 10 patches at a time, hold [SHIFT] while turning Control knob 5.

Once the desired patch number appears in edit field 5, use Control button 5 to make the patch active. Toggle that button as often as needed to compare it to the edited patch. Note that temporary edits can be made to the comparison patch, but those edits will be lost as soon as Control button 5 is toggled back to the patch being edited.

Favorite Assign...

There are times when it is very useful to group certain patches together without having to relocate them. This feature helps you to prepare by designating certain patches as Favorites. It makes them available for rapid selection later.

There are four banks of Favorites containing eight patches each. You can put the same patch in several of those locations if you know you'll need that patch more than once during a performance, for example.

Favorites are *not* selected from inside the Favorites Assign page; this will be explained shortly. So the first step is to select the desired patch on the Home page. After that, here's how to add that patch to the Favorites list.

1. Press [BROWSE] to access the Browse page.
2. Press Control button 8 to access the Favorite Assign page.
3. To assign that patch to the first Favorites slot, press Control button 1.

   The LED ring will flash quickly to confirm the assignment.
4. Use the Down/Up arrows to select the next group of 8 patches, if the current patch belongs there too.

   The Left display indicates which of the 4 groups is selected.
5. Return to the Home page to select another patch, then repeat steps 1-4 to place it in a Favorites group.
6. Repeat steps 1-5 until the Favorites groups are full.

During the steps above the Patch knob and the Left/Right arrows are disabled. This helps prevent the accidental replacement of a Favorite within one of the groups.

Browse Favorites

Your Favorite patches can be accessed from any other page.

- Hold [SHIFT] and press [BROWSE] to access the Favorites.
- Use the Page Down/Up arrows to move between the four groups of Favorites.
- Press one of the Control buttons to select a patch within the current group.

  The Control button and the display field for the active patch are brightly lit.

Save the Patch

Patch Protection

There's a Protect setting on System Setup that is on by default. So the first time the [SAVE] button is pressed the Left display might show the message "Protection is On!" This will need to be disabled before a patch can be saved.

It's easy to find: press [SYSTEM SETUP] and the first page will appear. The Protect feature is in edit field 4. Turn Control knob 4 to deactivate or reactivate the feature. Press [EXIT] and the setting will be saved. Note: This setting is remembered when power is turned off.

If you know you'll be using the Hydrasynth somewhere that a curious person might have access to it, it's probably a good idea to turn Protect back to On. This is a simple thing to change, and it could prevent the loss of an important patch later.

The Save page

If Protect is Off, press the [SAVE] button to open the menu. Everything is on one page:

Control knob	Parameter	Range	Description
1	Select target location	5 banks x 128 patches	Scroll to select; hold [SHIFT] + scroll to jump +/- 10
2	Patch name	Numbers, letters, symbols	Select up to 16 characters (see below)
3	Category	42 categories	Choose patch category (Arp, Bass, FX, etc.)
4	Macro options	Return, Save, Convert	Process current Macro values (see below)
5	Name of current target	(in memory)	This patch will be replaced if you [SAVE]
8	Color	32 colors	Select LED color for wheels, Patch knob

It's fairly easy to save a patch. This page presents all of the main functions:

- Turn Control knob 1 to select a location for the patch (the Patch knob and arrows are disabled).

  Use [SHIFT] + the Left/Right arrows to skip through the list 10 patches at a time.
- Give the patch a name up to 16 characters long. The process is described in the next section.
- Select one of the preset patch categories with Control knob 3.
- Decide what will happen with the current Macro settings when the patch is saved (descriptions below).
- Choose one of 32 colors for the LEDs under the wheels and the Patch knob.

Name the Patch

The naming of a patch happens in edit field 2. The current character is highlighted. Turn Control knob 2 to select a character. Use [SHIFT] + Control knob 2 to select the first character of the next character group: blank, 0-9, A-Z, a-z, and other characters (!, #, +, -, etc.).

Press Control button 2 to advance to the next character field. Use [SHIFT] + Control button 2 to select the previous character field.

Select a Category

Turn Control knob 3 to select one of the preset patch categories.

Macro Options

Control knob 4 lets you decide what will happen with the current settings of the Macro knobs and buttons when the patch is saved.

Return

This option returns all Macro knobs to zero and sets the Macro buttons to Off.

Save

This option preserves the positions of all Macro knobs and the status of all Macro buttons (On or Off).

Convert

This option converts the positions of all Macro knobs and buttons into new values for the parameters they control.

Here's what else happens with the Macro Convert option:

- After the patch is saved, the depth of all Macro knobs returns to zero and all buttons are set to Off.
- If the current relative value of a parameter exceeds that parameter's range, the value will be limited to the lowest or highest possible value depending on its current state. The Left display will show a warning when this is true.
- External CV and MIDI parameters under Macro control will be returned to their zero values.

Choose a Color

As an added degree of personal touch, you can choose from 32 different colors for each patch when saving. The selection affects the LEDs under the Patch knob, the Pitch wheel, and the Mod wheel. The selected wheel colors will vary within that color as the wheels are used.

Patch Backup

Whenever you get to the point where you'd hate to lose something you've created on the Hydrasynth, be it a patch or a list of Favorites, that's the time to back them up to your computer. You can back up a single patch or the entire memory with your favorite sys-ex librarian by using one of the Send features on System Setup *MIDI: Page 6 (p. 88)*.

Operational Notes

Navigation

The System Setup pages work the same way all other modules do, but here are some reminders:

- To access the next or previous page, use the Page Down / Up arrows.
- Cycle forward to the desired page quickly by pressing [SYSTEM SETUP] repeatedly.
- Use [SHIFT] + the Page Down / Up arrows to jump to the last page or back to first page.

Access, Action

- Some fields have Control buttons that execute a function, such as the Factory Reset. These are indicated by the word (action) in the charts.
- Some pages have access buttons that open a Calibration page. These are indicated by the word (access) in the charts . Follow the instructions in the Left display to calibrate the selected item.

Saving the Settings

Press [EXIT] or any module button to save System Setup changes. The message "System saving..." will be shown in the Left display for about 1 second. Note that sound output is silenced while the settings are being saved.

Notes About Notes

Some parameters are self-explanatory, but others have additional information below the chart.

Master: Page 1

Control knob	Function	Range	Description
1	Transpose	- / +11 semitones	Transpose keys, pads chromatically
2	Tuning	380 to 500 Hz	Sets center tuning frequency
3	O'Scope	On, Off	Toggles waveform animation in Left display
4	Memory protect	On, Off	Prevents overwriting of patches
5	Left contrast	0 to 127	Sets contrast for Left display
6	Right contrast	0 to 127	Sets contrast for Right display
7	LED Dim	On, Off	Toggles LED brightness between 50% and full
8	Light show	Off, 5-, 15-, 30 minutes	Sets timeout period for onset of light show

Master: Page 2

Control knob	Function	Settings	Description
1	Knob Mode	Absolute, Pickup, Scale	How Direct knobs edit values when moved
2	Knob Speed	Slow, Medium, Fast	Sets Control knob response speed
3	Tempo Lock	On, Off	Selects Global tempo or per-patch tempo
4	Macro Button	Toggle, Trigger, Switch, Reset	Determines behavior of Macro Buttons
5	Safe Edit	On, Off	Prevents accidental loss of edited patch

Knob Mode

This setting governs the response of the *Variable knobs (p. 16)* in the Filter and Arpeggiator sections, not the *Selection knobs (p. 16)*.

- **Absolute**: the parameter value jumps to the physical position of the knob
- **Pickup**: the knob must pass through the parameter value before an edit will happen
- **Scale**: parameter value edit begins from the current knob position; the remaining throw of the knob covers the remaining range of the parameter. After the knob reaches its minimum or maximum position the parameter value range conforms to the physical position of the knob (see Absolute).

Knob Speed

This determines the response speed of the Control knobs only. It also affects the finer [SHIFT] + scroll movements. With a setting of **Slow** a full turn is required to cover the full parameter range; with a setting of Fast it takes less than half a turn, which can also sacrifice parameter resolution.

Tempo Lock

Each patch stores its own Tempo setting. Setting Tempo Lock to On enables the tempo to remain the same while selecting patches.

Macro Button

These settings are described in the *Macro Button Response (p. 71)* section of the Mastering the Macros chapter.

Safe Edit

With this parameter set to On, if you try to select another patch before saving an edited patch, a message will ask for confirmation first. If a Macro control was the only thing changed, the confirmation message will not be displayed.

Note: This does not prevent Hydrasynth from responding to MIDI program changes.

Keys / Pads: Page 3

Control knob	Function	Settings	Description
1	Velocity	On, Off	Toggle velocity sensitivity
2	Velocity Curve	Very Soft, Soft, Medium, Hard, Very Hard	Select velocity response
3	Aftertouch Delay	0-400 ms	(see description)
4	Aftertouch Fade	0-400 ms	(see description)
5	Aftertouch	On, Off	Toggle aftertouch sensitivity [1]
6	Aftertouch Curve	Softer through Harder (6 settings)	Select Aftertouch response
7	Aftertouch Offset	- 4 to + 4	(see description)
8	Aftertouch Release	0-400 ms	(see description)

[1] This will also disable or enable polyphonic aftertouch.

Velocity settings

The velocity-sensitivity of the keyboard and pads can be disabled by setting Velocity to Off. The Velocity Curve setting determines the amount of force required to reach maximum velocity values.

Aftertouch settings

- Aftertouch **Delay**: the time that transpires between note on and the onset of aftertouch.
- Aftertouch **Fade**: the time it takes to ramp aftertouch to its current value from 0.
- Aftertouch **Curve**: determines the amount of force required to reach maximum aftertouch values.
- Aftertouch **Offset**: reduces the dynamic range of the aftertouch. Positive values set a higher minimum point, so it takes more pressure to start the aftertouch. Negative values set a lower maximum point, so it takes less pressure to reach the maximum aftertouch value.
- Aftertouch **Release**: more like a compressor than an envelope, this applies to all upwards movements. This can help avoid unwanted modulation "wobble" while pressure is applied, and can sustain even after note off.

MIDI: Page 4

Control with...	Function	Settings	Description
Knob 1	Clock Sync	Internal, USB, MIDI In, Auto	Clock source for Arp, LFOs, Envelopes, Delay FX (see below)
Knob 2	Local	On, Off	Disconnect keys, pads from internal engine
Knob 3	MIDI TX	1-16	Set MIDI transmission channel
Knob 4	MIDI RX	Omni, 1-16	Set MIDI receive channel
Knob 5	Sus pedal	+, -, Auto	Set polarity of sustain pedal or detect on power-up
Knob 6	Exp pedal	+, -	Set polarity of expression pedal
Button 7	Exp pedal set	(access)	Calibrate expression pedal
Knob 8	Exp pedal curve	Log, Lin, Sigmoid, Exp	Select response curve for expression pedal

Clock Sync

- I**NT RUN**: selects Hydrasynth as the master tempo clock. Sync signals are sent to MIDI, USB, and the CV Clock output.
- **USB**: selects the DAW as the clock master. Sync signals are sent to MIDI and the CV Clock output. Tempo cannot be changed from the Hydrasynth.
- **MIDI In**: slaves the Hydrasynth to incoming MIDI clock data. Sync signals are sent to USB and the CV Clock output. Tempo cannot be changed from the Hydrasynth.
- **AUTO**: Hydrasynth sets the clock source automatically to the first source that arrives. If the clock signal is interrupted, another is selected. Order of priority: USB > MIDI > Internal.

Note: Hydrasynth cannot be synced to an incoming CV clock signal.

Local

When working with a DAW, setting Local to Off can prevent a MIDI loop. Most DAWs have the ability to prevent this also.

Expression Pedal setup

Press Control button 7 to access the pedal calibration page. The Left display will prompt you to sweep the expression pedal through its full range.

MIDI: Page 5

Control knob	Function	Settings	Description
1	PolyAT transmit	Off, Mono, Poly	Send channel, polyphonic, or no aftertouch data to USB / MIDI
2	(empty)	-	-
3	Sustain pedal transmit	On, Off	Send sustain pedal data via USB / MIDI
4	Expression pedal transmit	On, Off	Send expression pedal data via USB / MIDI
5	Mod wheel transmit (MIDI CC #1)	On, Off	Send mod wheel data via USB / MIDI (Keyboard only)
6	Mod receive (MIDI CC #1)	On, Off	Receive mod wheel data via USB / MIDI
8 [1]	MPE support	On, Off	Send / receive MPE data

[1] This will lock out, change or disable some system parameters (see note).

PolyAT Transmit

Polyphonic aftertouch is an amazingly expressive tool. But it also generates a lot of control information, which can clog the MIDI data stream. Setting this to Off still allows both forms of aftertouch to be used locally but stops them from being transmitted. Mono enables Channel aftertouch values to be sent (one value for all active voices); Poly allows polyphonic aftertouch values to be sent.

What is MPE?

MPE stands for "MIDI Polyphonic Expression". It's a newer MIDI protocol used mainly by alternate controllers like Roli instruments, Haken Continuum, and LinnStrument. When active, the voices of your Hydrasynth break into individual channels so each note can have its own pitch bend, timbre and pressure control.

Hydrasynth already supports polyphonic aftertouch, so MPE pressure is mapped automatically to Poly aftertouch. Any patch that uses PolyAftT as a modulation source should respond automatically to pressure sent by an MPE controller.

There are also several modulation sources dedicated to MPE. For a full list, see *Modulation Sources (p. 75)*.



Enabling MPE will lock out, change or disable certain system parameters:
- MIDI page 4: MIDI Tx & MIDI Rx = MPE Lock
- MIDI page 5: At TX = MPE Lock
- MIDI page 6: Overflow = MPE Lock (disabled).

MIDI: Page 6

Control with...	Function	Settings	Description
Knob 1	NRPN transmit	On, Off	See website for implementation chart
Knob 2	NRPN receive	On, Off	See website for implementation chart
Button 3	Send Patch	(action)	Sends sys-ex of the current patch via MIDI / USB
Button 4	Send All Patches	(action)	Sends sys-ex of all patches and banks via MIDI / USB
Knob 5	Overflow [1]	Off, On	Connect two Hydrasynths for 16-voice functionality
Knob 6	Arp TX [1]	On, Off	Send Arp note on/off messages via MIDI / USB
Knob 7	Pgm Chg TX	On, Off	Send MIDI Program Change upon patch selection
Knob 8	Pgm Chg RX	On, Off	Receive MIDI Program Change commands

[1]The Arp TX setting has no effect when Overflow is set to On. Overflow must be set to Off to transmit the arpeggiator notes.

What's a NRPN?

NRPN stands for Non-Registered Parameter Number. It's a way of allowing higher-resolution control data to be sent and received. Implementation is not standardized, so each manufacturer uses different methods. The NRPN implementation data for Hydrasynth is available at AshunSoundMachines.com.

Send Patch / All Patches

These actions allow you to transmit the sys-ex data of a patch or all patches to any sys-ex librarian.

You can also send those items to another Hydrasynth. Note that doing that over MIDI requires two MIDI cables. Ideally both units would be connected to the same computer via USB and then patches and banks could flow freely between the two.

Overflow

Two Hydrasynths can act like a single unit using Overflow mode. It's simple: Connect a MIDI cable from the MIDI Out of one unit (the "master") to the MIDI In of the other unit (the "slave"). Next, enable Overflow for both units. Connect the audio outputs of each unit to your sound system, set good levels for each, and then:

1. Select a patch on the master: it is sent via sys-ex and appears on the slave.
2. Play 9 notes on the master: the first 8 voices come from the master; the ninth comes from the slave.

Here are some other things to know about Overflow mode:

- The two units will play the same sound. If you want to layer different sounds, disable Overflow mode.
- When a Mono or Unison patch is selected, the voices on both units are stacked as a single instrument.

Arp TX

Set this parameter to On if you want the Arpeggiator to transmit note on / note off commands over MIDI or USB. Sync information will be sent whether Arp TX is On or Off.

Pgm Chg TX / RX

These parameters determine whether the Hydrasynth will transmit (TX) or receive (RX) MIDI program change commands.

CV – Pitch Gate: Page 7

These settings are compatible with most modular synthesizer equipment. Please refer to the specifications of other devices and match those settings on the Hydrasynth.

Control knob	Function	Range
1	Control Voltage Range [1]	Octave 0-10V, -/+5V Hz 0-10V
2	Reference note [2]	C-1 to G9
3	Control Voltage Offset	-99 cents to +99 cents
4	Control Voltage Source	Keyboard, Theremin
5	Gate Type	V-trig, S-trig
6	Gate Volt	3V, 5V, 10V

[1] 1Volt per octave, Hz = Hz/Volt

[2] 1V reference note for Hz/V, or lowest V reference note for V/Oct.

CV Source: Keyboard, Theremin

This setting allows you to specify whether the keyboard or the ribbon will be the CV/Gate source. For best results, set the ribbon to *Theremin Mode (p. 64)* and enable the Quantize parameter so its output will conform to the selected Scale.

CV – Clock: Page 8

These are the settings required to synchronize with most non-MIDI devices. Please refer to the specifications of other devices and match those settings on the Hydrasynth.

Control knob	Function	Range
1	Clock Control Voltage	3V, 5V, 10V
2	Clock Rate	1 PPS, 2 PPQ, 24 PPQ, 48 PPQ
3	Clock Division	Off, 1/2, 2, 4
4	Clock Offset	-100ms to +100ms

PPS (Pulse Per Step) sends a single cycle of the clock output with every Arpeggiator step, or every time [TAP TEMPO] is pressed when the Tap Trig parameter is active on Arp Edit page 2. PPS works well with modular synths: the clock output behaves a bit like a Gate output (with Tap Trig) or even as a square wave LFO.

PPQ stands for Pulse Per Quarter note. Between these three options and the Clock Division value it is possible to generate a wide variety of clock signals from 1/2 PPQ to 96 PPQ.

Clock Division

This subdivides or multiplies the clock output: 1/2 divides by 0.5, so the clock speeds up (to double tempo); 2 and 4 slow down the clock to half tempo and one-quarter tempo, respectively. A setting of Off = no change.

CV – Mods: Page 9

These settings enable the use of devices with different CV standards. For example, Input / Output Mod 1 can be set to +/- 5V while Input / Output Mod 2 are set to 0-10V. The Offset ranges are independent in each direction, which allows the voltages to be fine-tuned to compensate for the idiosyncrasies of individual devices.

Control knob	Function	Range
1	IM1 Range (Mod 1 input)	+/- 5V, 0-10V, 0-5V, 0-1V
2	IM2 Range (Mod 2 input)	+/- 5V, 0-10V, 0-5V, 0-1V
3	OM1 Range (Mod 1 output)	+/- 5V, 0-10V, 0-5V, 0-1V
4	OM2 Range (Mod 2 output)	+/- 5V, 0-10V, 0-5V, 0-1V
5	IM1 Offset (Mod 1 input)	+/- 3.0V
6	IM2 Offset (Mod 2 input)	+/- 3.0V
7	OM1 Offset (Mod 1 output)	+/- 3.0V
8	OM2 Offset (Mod 2 output)	+/- 3.0V



The allowable range for input /output voltages is from -5V to 10V. If an input or output value attempts to exceed the range, it will be clipped automatically to the lowest or highest possible value depending on which value has been exceeded.

Calibration: Page 10 (keyboard)

Control button	Function	Range	Description
2	Calibrate Ribbon	(access)	(see below)
3	Calibrate Wheels	(access)	Full-range motion of each wheel

Calibrate Ribbon

Keyboard model only: Press Control button 2 to access the calibration page and follow the instructions on Left display. Press and hold the ribbon above each C on the keyboard, including the lowest and highest keys. After each point has been calibrated the page will exit automatically.

Calibrate Wheels

Keyboard model only: Press Control button 3 to access the calibration page and follow the instructions on Left display. Move each wheel slowly through its entire range, then press [EXIT].

System: Page 10 (desktop) / System: Page 11 (keyboard)

Control button	Function	Description	Range
1	Self Test	(action)	Press the button and the Hydrasynth will run a series of self-tests.
2	Factory Reset	(action)	Resets all parameters in System Setup to their default values. This does not erase the patch banks.

OS: Page 11 (desktop) / OS: Page 12 (keyboard)

There's only one item on this page: the OS version. Please include that in any communications you might have with our Technical Support department. And always install the latest firmware in your Hydrasynth so you can take advantage of new features as they are added!

[INIT] + Button X

The following modules can be initialized by holding [INIT] and pressing the Access button.

Button	Button	Button	Button
Amp	LFO (1-5)	Mutant (1-4)	Reverb
Arp On	Macro Assign	Osc (1, 2, 3)	Ribbon
Delay	Mixer	Post-FX	Ring-Noise
Env (1-5)	Mod Matrix	Pre-FX	Voice
Filter (1, 2)	-	-	-

[INIT] + Control Button X

The following parameters can be initialized by holding [INIT] and pressing the appropriate Control button.

Location	Parameter
Arp	Time Div, Swing, Gate, OctMode, Range, Mode, Length, Ratchet, Chance
Voice	Density, Detune, AnalogFL, StWidth, PitchBnd,Vib Amt, Vib Rate, GlidTime, GlidCurv
Voice / Scale Edit	Note 2-8
Macro / Assign Edit	Depth (or turn Control knob to initialize Depth value)
Mod Matrix	Depth (or turn Control knob to initialize Depth value)
Osc	Wave, Semi, Cents, WaveScan, Density, Detune, Keytrack
Mutant	Smooth, Ratio, Depth, Window, Feedback, Dry/Wet
Mutator / Custom Edit	Warp 1-8
Ring Noise	RMDepth, RingVol, NoiseType, NoiseVol
Mixer	Osc1Pan, Osc2Pan, RingPan, NoisePan, Osc1Filt, Osc2Filt, RingFilt, NoisFilt
Filter	Type, Morph, Cutoff, Resonance, Drive, Control, Env1Amt, LFO1Amt, Keytrack
Amp	LFO2Amt, AmpLevel
Pre-FX	[Param1-5], Dry/Wet
Delay	Time, Feedback, HiDamp, LoDamp, PreDelay, Dry/Wet
Reverb	Size, Time, Tone, HiDamp, LoDamp, PreDelay, Dry/Wet
Post-FX	[Param1-5], Dry/Wet
Env	Attack, Decay, Sustain, Release, Delay, Hold, AtkCurve, DecCurve, SusCurve, RelCurve, Repeat
LFO	Wave, Rate, TrigSync, Delay, Fade In, Phase, Level, Steps, Smooth
LFO / Step Edit	Step 1-8

[RANDOM] + Button X

The following modules can be randomized by holding [RANDOM] and pressing the Access button.

Button	Button	Button	Button
Amp	LFO (1-5)	Osc (1, 2, 3)	Ring-Noise
Arp On	Macro Assign	Post-FX	Voice
Delay	Mixer	Pre-FX	< or > (select random patch)
Env (1-5)	Mod Matrix	Reverb	-
Filter (1, 2)	Mutant (1-4)	Ribbon	-

[SHIFT] + Button X

These shortcuts are available by holding [SHIFT] and pressing the button.

Button	Function
Octave Down	Jump to lowest octave (-4)
Octave Up	Jump to highest octave (+4)
Arp On	Access Arp Edit page
Arp Latch	Sustain Hold toggle
Browse	Access Browse Favorites page
<	Decrease patch number by -10
>	Increase patch number by +10
Home	Send All Notes Off command to engine, USB, and MIDI Turn off all voices and end all Envelopes Set all Gates to Off
Page Up	Jump to top page
Page Down	Jump to bottom page

[SHIFT] + Control Knob X

The following value jumps are available by holding [SHIFT] and turning the appropriate Control knob.

Location	Control knob	Behavior
Arp	Tempo	Fine-tune by 0.1
Arp	Length	Jump to the closest special value [1, 2, 4, 8, 16, 32]
Arp	Phrase	Jump to the closest first phrase of each group
Browse	Patch	Jump by 10
Browse	Compare	Jump by 10
Patch	Save Patch #	Jump by 10
Voice	Pitchbend	Jump to the closest special value [0, 2, 4, 5, 7, 12, 24]
Macro Assign	Edit Destination Module	Jump to the closest first group of each type
Mod Matrix	Source	Jump to the closest first modulator of each group
Mod Matrix	Destination Module	Jump to the closest first group of each type
Osc X	Wave	Jump to the closest first wave of each group
Osc X	Semi	Jump to the closest special value [-36, -24, -12, 0, 12, 24, 36]
Osc X	Wavescan	Jump to the point of Wave position shown in inverted color [1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0]
Mutant X	Ratio	Jump to the closest special value [0.25, 0.5, 1, 2, 3, 4, 5, 6, 7... 64]

[SHIFT] + Control Button X

Location	Control Button	Behavior
Home	Macro	Depends on settings on System Setup page 2. See *Macro Button Response (p. 71)*.
Reverb	Time	Toggle activation of Time Freeze
Envelope	Delay, Attack, Hold, Decay, or Release	Duration of holding the button determines the time value.
LFO	Rate, Delay, Fade In	Duration of holding the button determines the time value.

Scales

Below are the notes of each scale relative to the key of C. An "x" means that note is in the scale; a dash means it is not.

Scale	**C**	**C♯/D♭**	**D**	**D♯/E♭**	**E**	**F**	**F♯/G♭**	**G**	**G♯/A♭**	**A**	**A♯/B♭**	**B**
Chromatic	x	x	x	x	x	x	x	x	x	x	x	x
Major	x	-	x	-	x	x	-	x	-	x	-	x
BeBop Maj	x	-	x	-	x	x	-	x	x	x	-	x
BeBop	x	-	x	-	x	x	-	x	-	x	x	x
Mixolydian	x	-	x	-	x	x	-	x	-	x	x	-
Harmonic Major	x	-	x	-	x	x	-	x	x	-	-	x
Lydian	x	-	x	-	x	-	x	x	-	x	-	x
Lydian Aug	x	-	x	-	x	-	x	-	x	x	-	x
Acoustic	x	-	x	-	x	-	x	x	-	x	x	-
Pentatonic Maj	x	-	x	-	x	-	-	x	-	x	-	-
Locrian Maj	x	-	x	-	x	x	x	-	x	-	x	-
Prometheus	x	-	x	-	x	-	x	-	-	x	x	-
Whole Tone	x	-	x	-	x	-	x	-	x	-	x	-
Melodic Minor [1]	x	-	x	x	-	x	-	x	x	x	x	x
Half Diminished	x	-	x	x	-	x	x	-	x	-	x	-
Aeolian	x	-	x	x	-	x	-	x	x	-	x	-
Dorian	x	-	x	x	-	x	-	x	-	x	x	-
Harmonic Minor	x	-	x	x	-	x	-	x	x	-	-	x

[1] For the Melodic Minor scale both the ascending and descending scales are included.

Scale	C	C♯/D♭	D	D♯/E♭	E	F	F♯/G♭	G	G♯/A♭	A	A♯/B♭	B
Algerian	x	-	x	x	-	x	x	x	x	-	-	x
Gypsy	x	-	x	x	-	-	x	x	x	-	x	-
Hungarian	x	-	x	x	-	-	x	x	x	-	-	x
Ukranian	x	-	x	x	-	-	x	x	-	x	x	-
Dim. Whole Tone	x	x	-	x	x	-	x	-	x	-	x	-
Locrian	x	x	-	x	-	x	x	-	x	-	x	-
Neapolitan Major	x	x	-	x	-	x	-	x	-	x	-	x
Neapolitan Minor	x	x	-	x	-	x	-	x	x	-	-	x
Phrygian	x	x	-	x	-	x	-	x	x	-	x	-
Flamenco	x	x	-	-	x	x	-	x	x	-	-	x
Persian	x	x	-	-	x	x	x	-	x	-	-	x
Phrygian Dominant	x	x	-	-	x	x	-	x	x	-	x	-
Enigmatic	x	x	-	-	x	-	x	-	x	-	x	x
Tritone	x	x	-	-	x	-	x	x	-	-	x	-
In	x	x	-	-	-	x	-	x	x	-	-	-
Insen	x	x	-	-	-	x	-	x	-	-	x	-
Augmented	x	-	-	x	x	-	-	x	x	-	-	x
Blues	x	-	-	x	-	x	x	x	-	-	x	-
Pentatonic Minor	x	-	-	x	-	x	-	x	-	-	x	-
Hirajoshi	x	-	-	-	x	-	x	x	-	-	-	x

Keyboard

Dimensions: 80 x 35 x 10.3 cm
(31.5 x 13.78 x 4.05 inches)

Weight: 10kg (22.05 lbs)

Desktop

Dimensions: 44 x 22.3 x 7 cm
(17.32 x 8.78 x 2.76 inches)

Weight: 3.6kg (7.94 lbs)

Connections: Rear Panel

- MIDI In/Out/Thru
- USB type B port, class-compliant
- Headphone output (Desktop only)
  - Impedance: 16 – 75 Ohm
- Stereo 1/4" outputs (unbalanced)
- Sustain pedal input (polarity-sensing)
- Expression pedal input (reversible)

Connections: Top Panel

CV inputs: Two (1/8" TS)

- Mod 1
- Mod 2

CV/Gate/Clock outputs: Five (1/8" TS)

- Pitch
- Gate
- Mod 1
- Mod 2
- Clock

Control Voltages

- Range: -5V to 10V
  - Pitch: + / - 99 cents
  - Mod: + / - 3.0V
- Standards: 1Volt per octave, Hz/Volt

Clock Output

- Range: 3V, 5V, 10V
- Rates: 1 PPS, 2PPQ, 24 PPQ, 48PPQ
  - Offset: + / - 100ms
  - Division: 1/2x, 2x, 4x

Gate Output

- Range: 3V, 5V, 10V
- Type: V-trig, S-trig

Connections: Front Panel (keyboard)

- Two headphone connectors
  - 6.35 mm (1⁄4 in)
  - 3.5 mm
- Impedance: 16 – 75 Ohm
- Shared volume control

USA

Important Notice:
DO NOT MODIFY THE UNIT!

This product, when installed as indicate in the instructions contained in this manual, meets FCC requirements. Modifications not expressly approved by Ashun Sound Machines could void your FCC authorization to use this product in the USA.

IMPORTANT: When connecting this product to accessories and/or another product, use only high-quality shielded cables. The cable(s) supplied with this product MUST be used. Follow all installation instructions. Failure to follow instructions could void your FCC authorization to use this product in the USA.

NOTE: This product has been tested and found to comply with the limit for a Class B Digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide a reasonable protection against harmful interference in a residential environment. This equipment generates, uses, and may radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause interferences harmful to the operation to other electronic devices. Compliance with FCC regulations does not guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference, which can be determined by turning the equipment off and on, please try to correct the interference by one or more of the following measures:

- Relocate either this product or the device that is affected by the interference.
- Use power outlets that are on different branch (circuit breaker or fuse) circuits or install AC line filter(s).
- In the case of radio or TV interference, relocate and/or reorient the antenna. If the antenna lead-in is a 300 ohm ribbon lead, change the lead-in to the coaxial cable.
- If these corrective measures do not achieve satisfactory results, please consult the dealer or an experienced radio/TV technician for help.

The above statements apply ONLY to those products distributed in the USA.

CANADA

NOTICE: This class B digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

AVIS: Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

EUROPE

CE

This product complies with the requirements of European Directive 89/336/EEC

This product may not work correctly as a result of electro-static discharge. If that happens, simply restart the product.