QU-BIT Nautilus Complex Delay Network User Manual

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User Manual

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Foreword

“No, sir; it is evidently a gigantic narwhal.” — Jules Verne, Twenty Thousand Leagues Under the Seas

If I had to choose a desert island effect, it would certainly be a delay. Nothing else offers the transformative powers that delays do. It is almost supernatural, this ability to transform a single note into a compelling musical event. Sometimes, it feels like cheating, doesn’t it?
My own experience with delay processors in a modular environment started with a very simple BBD unit. The only controls were rate and feedback, and yet, I used that module to greater purposes than almost the rest of my rack combined. This module also contained a behavior unique to BBDs which proved very influential in my life; you could “break” it in musical ways. When you push a BBD’s rate control to its largest setting, the leaky capacitor stages will open up a new world of grit, noise, and unexplainable cacophony.
As a SCUBA diver, I am fascinated by things that live in the ocean. And as someone who works with sound each day, the ability of marine mammals to use audio signals to experience their world through echolocation is truly mind blowing. What if we could model this behavior digitally, and apply it to musical purposes in the hardware domain? That is the question which inspired the Nautilus. It was not an easy question to answer, and we had to make some subjective choices along the way (what does kelp sound like?), but the end result was something that transported us to new dimensions of sound and changed our conceptions of what a delay processor could be

Bon voyage!
Happy Patching,
Andrew Ikenberry
Founder & CEO

Description

Nautilus is a complex delay network inspired by sub-nautical communications and their interaction with the environment. In essence, Nautilus consists of 8 unique delay lines which can be connected and synced in interesting ways. Each time Nautilus pings its sonar system, the generated topography reveals itself through the delay, all while staying in time with the internal or external clock. Complex feedback interactions plunge sounds to new depths, while related delay lines pull fragments of sound in different directions. Manipulate the delay lines even further by configuring the stereo receptors, sonar frequencies, and aquatic materials that filter the space between Nautilus and its surroundings.

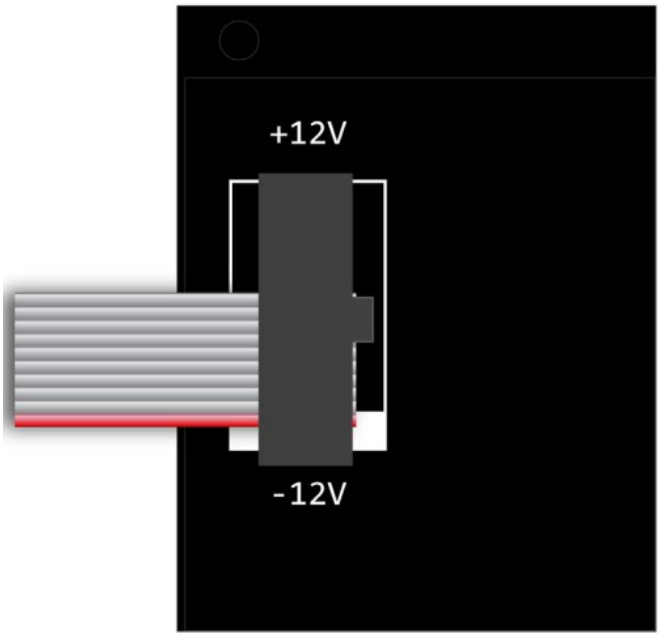
Though Nautilus is a delay effect at heart, it is also a CV/Gate generator. The Sonar Output creates either a unique Gate signal, or a unique CV signal algorithmically created from Nautilus's findings. Drive other parts of your patch with pings from the delay network, or use the generated topography as a modulation source.

From the deep ocean trenches, to shimmering tropical reefs, Nautilus is the ultimate exploratory delay network.

- Sub-Nautical Complex Delay Processor
- Ultra low noise floor
- 8 Configurable delay lines with up to 20 seconds of audio each
- Fade, Doppler and Shimmer delay modes
- Sonar envelope follower / gate signal output

Module Installation

To install, locate 14HP of space in your Eurorack case and confirm the positive 12 volts and negative 12 volts sides of the power distribution lines.
Plug the connector into your case's power supply unit, keeping in mind that the red band corresponds to negative 12 volts. In most systems, the negative 12 volt supply line is at the bottom.
The power cable should be connected to the module with the red band facing the bottom of the module.



Technical Specifications

General

- **Width:** 14HP
- **Depth:** 22mm
- **Power Consumption**: +12V=151mA, -12V=6mA, +5V=0m

Audio

- Sample Rate: 48kHz
- Bit-depth: 32 bit (internal processing), 24-bit (hardware conversion)
- True Stereo Audio IO
- High fidelity Burr-Brown converters
- Based on Daisy audio platform

Controls

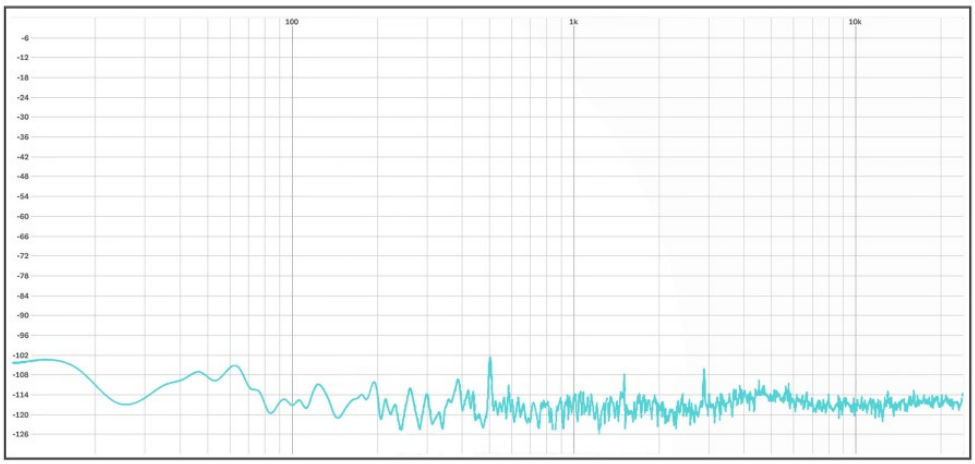
- Knobs
  Resolution: 16-Bit (65,536 distinct values)
- CV Inputs
- Resolution: 16-Bit (65, 536 distinct values)

USB Port

- Type: A
- External Power Draw: up to 500mA (for powering external devices via USB). Please note that additional power drawn from the USB must be considered within your PSU’s total current consumption.

Noise Performance

- **Noise Floor:** -102dB
- **Graph:**



Recommended Listening

Robert Fripp (1979). Frippertronics.
Robert Fripp is a British musician and member of the progressive rock group King Crimson. A guitar virtuoso, Fripp developed a new performance method using tape delay machines to loop and layer musical phrases to create ever evolving asymmetrical patterns. The technique was coined Frippertronics, and is now a fundamental technique for ambient performances.
Additional Listening: Robert Fripp (1981). Let The Power Fall.
King Tubby (1976). King Tubby Meets Rockers Uptown.
Osbourne Ruddock, better known as King Tubby, is a Jamaican sound engineer who greatly influenced the development of dub music in the 1960s and 70s, and is also credited as the inventor of the “remix” concept, now commonplace in modern dance and electronic music.
Cornelius (2006). Wataridori [song]. On Sensuous. Warner Music Japan
Keigo Oyamada, known under the moniker Cornelius, is a prolific Japanese artist who incorporates purposeful delays and stereo imagery to tow the line between experimental and popular musical styles. A pioneer of the “Shibuya-kei” music genre, Cornelius has been referred to as a “modern-day Brian Wilson.”
Other Cornelius recommended songs (though his full discography has plenty of great pieces):

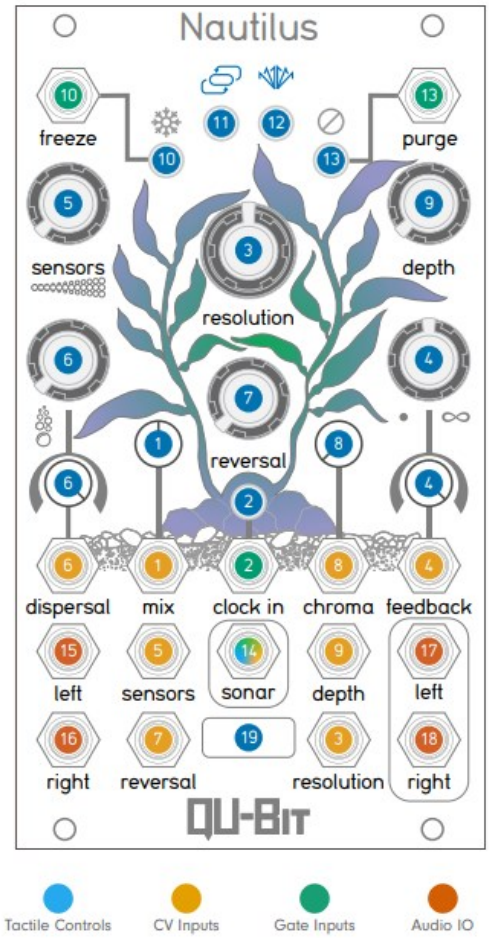
- If You’re Here, Mellow Waves (2017)
- Drop, Point (2002)
- Mic Check, Fantasma (1998)

Roger Payne (1970). Songs of The Humpback Whale.

Recommended Reading

Twenty Thousand Leagues Under the Sea – Jules Verne
Google Books Link
Dub: **Soundscapes and Shattered Songs in Jamaican Reggae** – Michael Veal
Good Reads Link
Ocean of Sound: Ambient Sound and Radical Listening in the Age of Communication – David Toop
Google Books Link
Sounds in the Sea: From Ocean Acoustics to Acoustical Oceanography – Herman Medwin
Google Books Link

Front Panel



Functions

The Knobs (and a button)

LED UI

The LED user interface is the primary visual feedback between you and Nautilus. It mediates a host of settings in real time to keep you in your patch, including Resolution position, Sensor amounts, Depth position, Chroma effect, and more!

Each section of the Kelp UI will ping in sync with Nautilus's different delay lines and clock pulses, creating a swirling, hypnotic light show providing information in real time.

Mix

The Mix knob blends between the dry and wet signal. When the knob is fully CCW, only the dry signal is present. When the knob is fully CW, only the wet signal is present.

Mix CV input range: -5V to +5V

Clock Input / Tap Tempo Button

Nautilus can either operate using an internal or external clock. The internal clock is determined via the Tap Tempo button. Simply tap along to whatever tempo you desire, and Nautilus will adjust its internal clock to your taps. Nautilus requires at least 2 taps to determine a clock rate. The default internal clock rate at boot up is always 120bpm.
For external clocks, use the Clock In gate input to sync Nautilus with your primary clock source, or any other gate signal. The clock rate is indicated by the Kelp base LEDs. You will notice that the clock LED blip is also affected by other knobs on the module, including Resolution, Sensors, and Dispersal. We dive deeper into the clock interactions within each of these sections!
Absolute minimum and maximum clock rate range: 0.25Hz (4 seconds) to 1kHz (1 millisecond)

Clock In gate input threshold: 0.4V

Resolution

Resolution determines the division or multiplication of the clock rate, and applies it to the delays. The div/mult range is the same for both internal and external clocks, and is listed below:

Resolution CV Input Range: -5V to +5V from the knob position.

Each time a new resolution position is selected, the Kelp LED UI will flash white indicating you are in a new division or multiplication of the clock signal.

Feedback

Feedback determines how long your delay will echo out into the ether. At its minimum (knob is fully CCW), the delay only repeats once, and at its maximum (knob is fully CW) will repeat indefinitely. Take care, as infinite repeats will cause Nautilus to eventually get loud!

Feedback Attenuverter: Attenuates and inverts the CV signal at the Feedback CV input. When the knob is fully CW, no attenuation occurs at the input. When the knob is at the 12 o'clock position, the CV input signal is fully attenuated. When the knob is fully CCW, the CV input is fully inverted. Range: -5V to +5V Did You Know? Nautilus's attenuverters are assignable to any CV input on the module, and can even become their own functions! Learn how to configure the attenuverters by reading the USB section of the manual.

Feedback CV Input Range: -5V to +5V from the knob position.

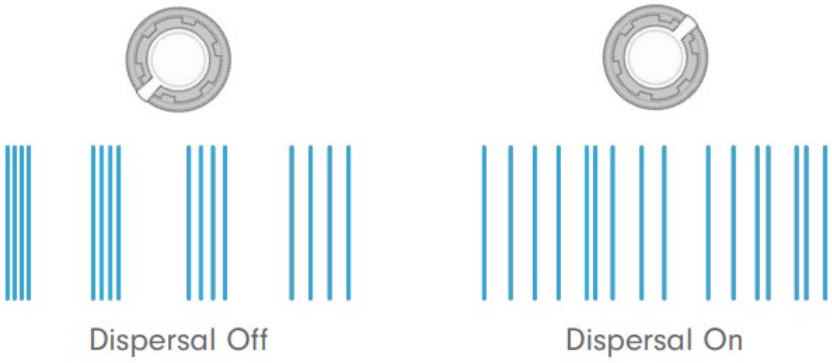
Sensors

Sensors controls the amount of delay lines active in Nautilus's delay network. There are a total of 8 delay lines available (4 per channel) that can be used to create complex delay interactions from a single clock input. When the knob is fully CCW, only 1 delay line per channel is active (2 total). When the knob is fully CW, 4 delay lines per channel are available (8 total).
As you turn up the knob from CCW to CW, you will hear Nautilus add the delay lines to its signal path. The lines will be fairly tight initially, firing in quick succession each hit. The Kelp LEDs will flash white each time Sensors are added or removed from the delay network. To open up the delay lines and reach their full potential, we have to take a look at the next function in the manual: Dispersal.

Sensors CV Input Range: -5V to +5V

Dispersal

Going hand in hand with Sensors, Dispersal adjusts the spacing between the delay lines currently active on Nautilus. The spacing amount is heavily dependent on available delay lines and resolution, and can be used to create interesting polyrhythms, strums, and cacophonies of sound from a single voice.
When only 1 Sensor is active, Dispersal offsets the left and right delay frequencies, acting as a fine tune for the delays.



Dispersal Attenuverter: Attenuates and inverts the CV signal at the Dispersal CV input. When the knob is fully CW, no attenuation occurs at the input. When the knob is at the 12 o'clock position, the CV input signal is fully

attenuated. When the knob is fully CCW, the CV input is fully inverted. Range: -5V to +5V Did You Know? Nautilus's attenuverters are assignable to any CV input on the module, and can even become their own functions! Learn how to configure the attenuverters by reading the USB section of the manual

Dispersal CV input range: -5V to +5V

Reversal

Reversal controls which delay lines within Nautilus are played backwards. Reversal is much more than a simple on/off knob, and understanding the whole of the delay network will open up its full potential as a powerful sound design tool. With one Sensor selected, Reversal will range between no reversed delays, one reversed delay (left channel), and both delays reversed (left and right channel).
As Nautilus adds delay lines using Sensors, Reverse instead incrementally reverses each delay line, with zero reversals on the far left of the knob, and every delay line reversing on the far right end of the knob.
The reversal order is as such: 1L (first delay line in the left channel), 1R (first delay in the right channel), 2L, 2R, etc.
Note that all reversed delays will remain reversed until you bring the knob back below its spot in the range, so if you are setting Reversal above the "both 1L and 1R" position, those delay lines will still be reversed. The graphic below illustrates reversal when all delay lines are available:

Reversal CV input range: -5V to +5V
Note: Due to the nature of the internal algorithms driving the Nautilus feedback network, reversed delay lines will repeat 1 time before pitch shifting in Shimmer and De-Shimmer modes.

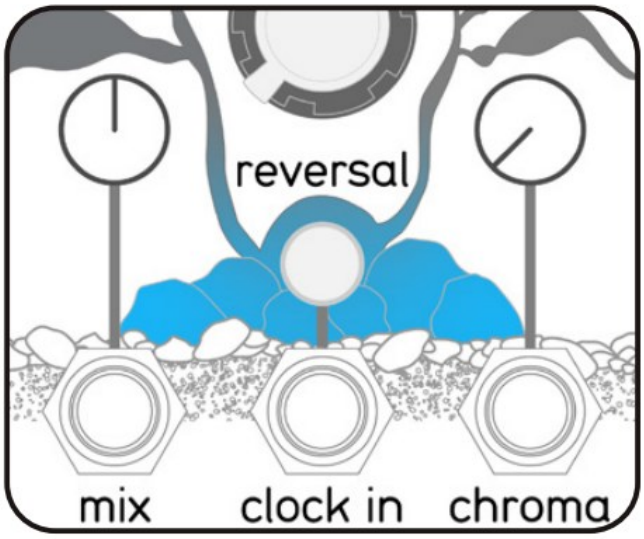
Chroma

Much like the Corrupt knob found on Data Bender, Chroma is a selection of internal effects and filters that emulate the sonic passage through water, oceanic materials, as well as mimic digital interference, damaged sonar receptors, and more.
Each effect is applied independently within the feedback path. What does this mean? It means that one effect can be applied to a single delay line and will exist for said delay line's duration, while an entirely separate effect can be placed on the next delay line. This allows for complex effect layering within the feedback path, perfect for building huge textural spaces from a single sound source.
Chroma effects are indicated by the Kelp base LEDs, and are color coordinated. See the next page to learn about each effect and their corresponding LED color! To better understand how to use Chroma's effects, we recommend reading the Depth section next!

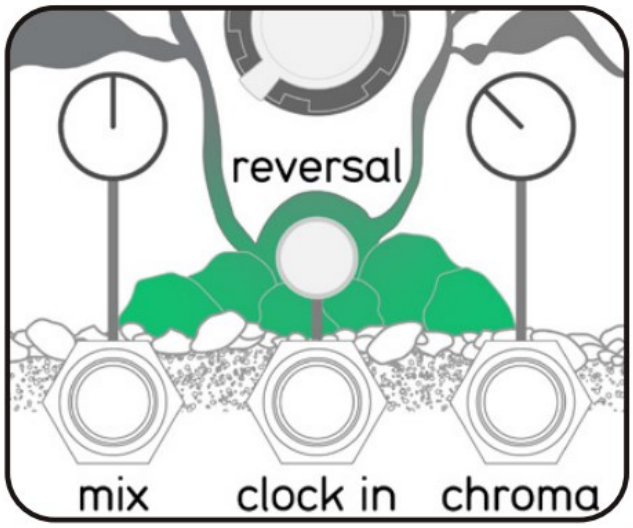
Chroma CV input range: -5V to +5V

Oceanic Absorption

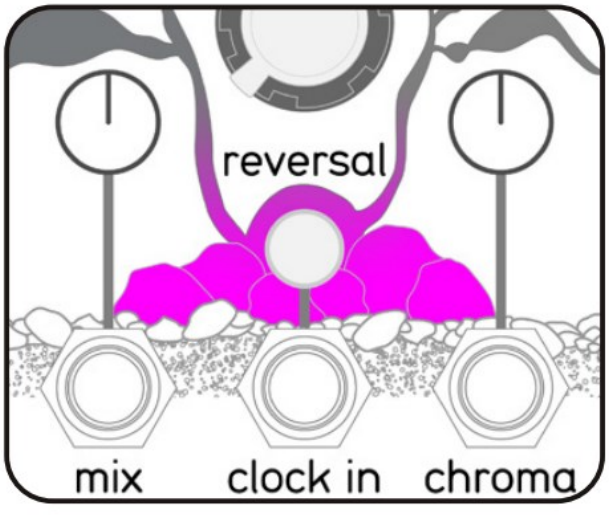
A 4-pole lowpass filter for dampening the delay signal. When Depth is fully CCW, no filtering is occurring. When Depth is fully CW, maximum filtering is occurring. Indicated by a blue Kelp base.



White Water
A 4-pole highpass filter applied to the delay signal. When Depth is fully CCW, no filtering is occurring. When Depth is fully CW, maximum filtering is occurring. Indicated by a green Kelp base.

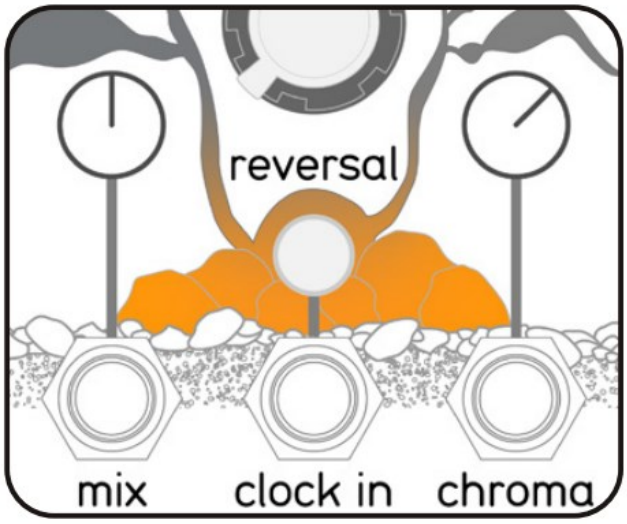


Refraction Interference
A collection of bit-crushing and sample-rate reduction. Depth knob scans range of set of varying amounts of each effect. Indicated by a purple Kelp base.



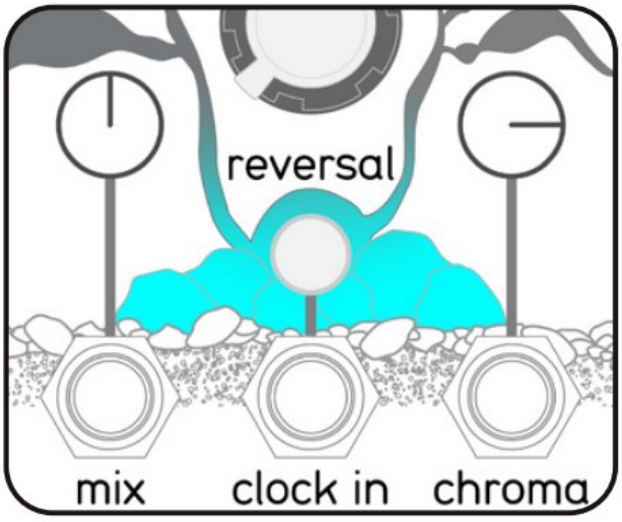
Pulse Amplification

A warm, soft saturation applied to the delays. When Depth is fully CCW, no saturation is occurring. When Depth is fully CW, maximum saturation is occurring. Indicated by an orange Kelp base.



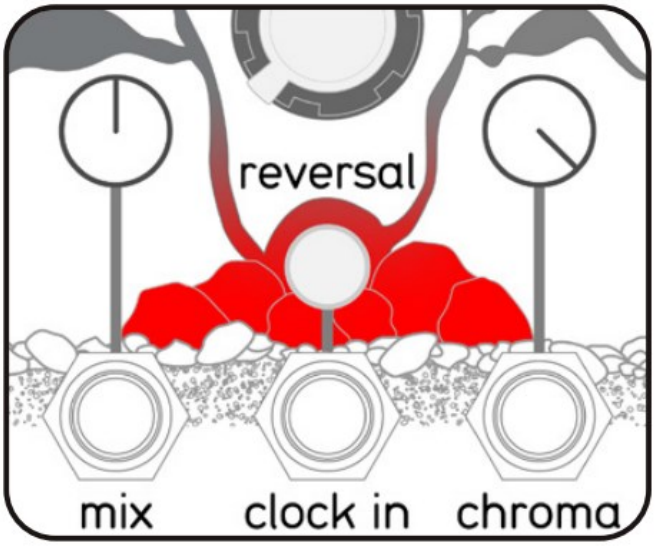
Receptor Malfunction

Applies a wavefolder distortion to the inputted audio. When Depth is fully CCW, no wavefolding is occurring. When Depth is fully CW, maximum wavefolding is occurring. Indicated by a cyan Kelp base.



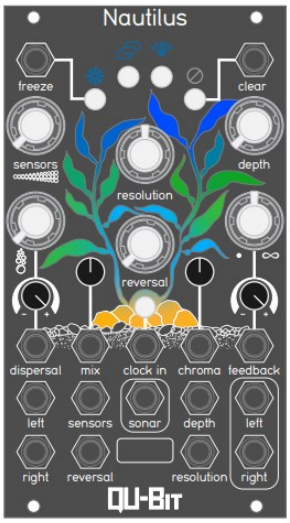
SOS

Applies heavy distortion to the inputted audio. When Depth is fully CCW, no distortion is occurring. When Depth is fully CW, maximum distortion is occurring. Indicated by a red Kelp base.

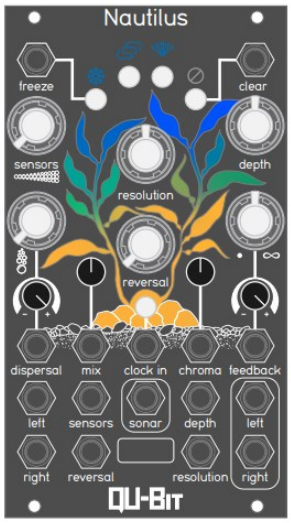


Depth

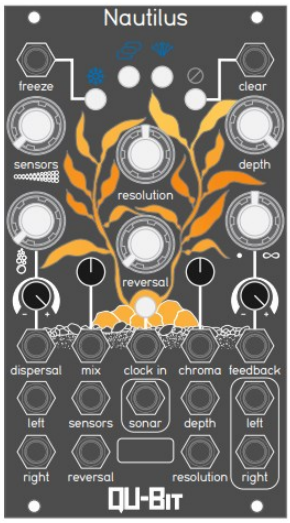
Depth is the complementary knob to Chroma, and controls the amount of the chosen Chroma effect applied to the feedback path.
When Depth is fully CCW, the Chroma effect is off, and will not be applied to the buffer. When Depth is fully CW, the maximum amount of the effect is applied to the active delay line. The only exception to this knob range is the variable bit-crusher, which is a fixed set of random amounts of lo-fi, bit-crushed, and sample rate-reduced settings.
Depth amount is indicated by the Kelp LEDs, as more Depth is applied to the Chroma effect, The Kelp LEDs slowly change into the Chroma effect color.



Depth at 0%



Depth at 50%



Depth at 100%

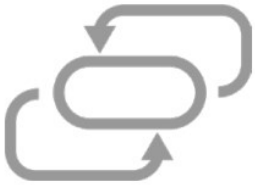
Depth CV input range: -5V to +5V

Freeze

Freeze locks the current delay time buffer, and will hold it until released. While frozen, the wet signal acts as a beat repeat machine, letting you change the Resolution of the frozen buffer to create new interesting rhythms out of the delays, all while staying perfectly synced with the clock rate.
The frozen buffer length is determined by both the clock signal, and the Resolution rate at the time for freezing the buffer, and has a maximum length of 10s.

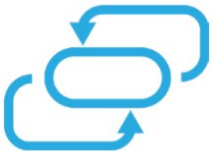
Freeze Gate input threshold: 0.4V

Delay Modes



Pressing the Delay mode button selects between 4 unique delay types. Just as we use varying underwater acoustic instruments to map, communicate, and navigate the aquatic world, Nautilus carries a set of powerful tools to re-evaluate how you experience the generated delays.

Fade



The Fade delay mode seamlessly cross-fades between delay times, whether changing the external or internal clock rate, the resolution, or the dispersal. This delay mode is indicated by a blue LED graphic above the button.

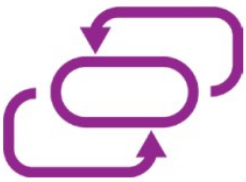
Doppler

The Doppler delay mode is the vari-speed delay time variant of Nautilus, giving you
the classic pitch shift sound when changing delay times. This delay mode is indicated by a green LED graphic above the button.

Shimmer

The Shimmer delay mode is a pitch shifted delay, set to one octave above the input signal. As the shimmer delay continues to loop through the feedback path, the delay frequency increases as it slowly fades away. This delay mode is indicated by an orange LED graphic above the button.
Did You Know? You can change the semitone that Shimmer pitch shifts your delay to. Create fifths, sevenths, and everything in between using the settings app and USB drive. Head to the USB section to learn more.

De-Shimmer



The De-Shimmer delay mode is a pitch shifted delay, set to one octave below the input signal. As the de-shimmered delay continues to loop through the feedback path, the delay frequency decreases as it slowly fades away. This delay mode is indicated by a purple LED graphic above the button.
Did You Know? You can change the semitone that De-Shimmer pitch shifts your delay to. Create fifths, sevenths, and everything in between using the settings app and USB drive. Head to the USB section to learn more.

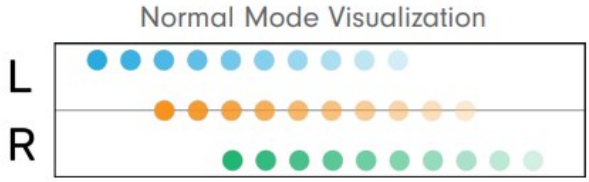
Feedback Modes

Pressing the Feedback mode button selects between 4 unique feedback delay paths. Each mode brings different functionality and characteristics to the delays.

Normal

The Normal feedback mode has the delays match the stereo characteristics of the input signal. For example, if a signal is sent to only the left channel input, the delay will only be in the left channel output. This mode is indicated by a blue LED graphic above the button.

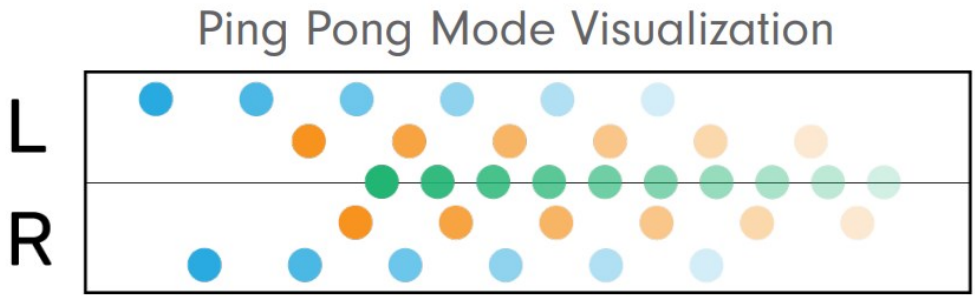
= audio's stereo position



Ping Pong

The Ping Pong feedback mode has the delays bounce back and forth between the left and right channel, with respect to the audio input's initial stereo characteristics.
For example, a hard panned input signal will bounce back and forth wider in the stereo field versus a more "narrow" input, and a mono signal will sound mono. This mode is indicated by a green LED graphic above the button

= audio's stereo position



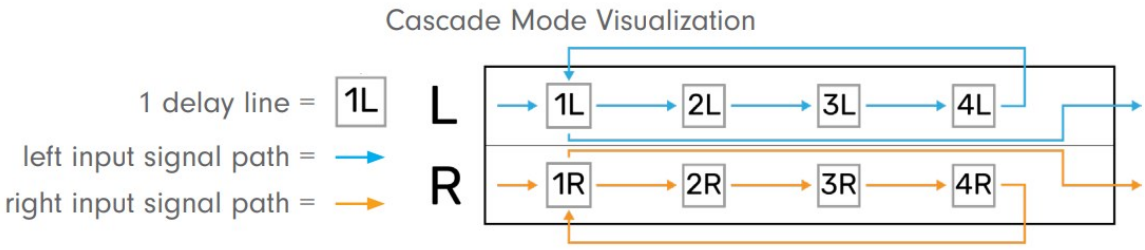
How to Ping Pong a Mono Signal: Since Nautilus has an analog normalization at the inputs, the left channel input signal is copied to the right channel when no cable is present in the right channel input. There are a couple options to use this mode with a mono signal.

1. Insert a dummy cable into the right channel, this will break the normalization and your signal will enter the left channel only.
2. Send your mono audio input into the right channel input. The right channel does not normalize to the left channel, and will sit in the right channel while the delay pans left and right.

Another way to “stereo-ize” your mono signal is to use Dispersal, which offsets the left and right delay lines from one another, creating unique stereo delay patterns!

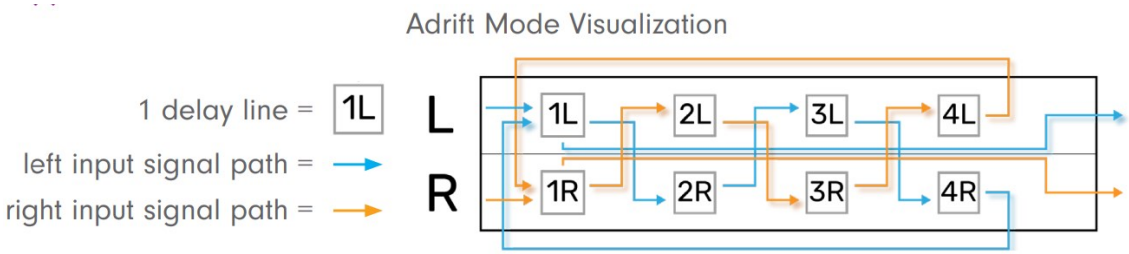
Cascade

Cascade feedback mode literally turns Nautilus into the Qu-Bit Cascade… Gotcha. In this mode, the delay lines feed into one another in serial. What does this mean? It means that each delay in their respective stereo channel feeds into the next one, looping back to the first delay line at the end.
Cascade mode can be used to create incredibly long delay times. Depending on certain settings, Nautilus can achieve up to 80 second delays in this mode.



Adrift

Adrift feedback mode is a combination of both Ping Pong mode and Cascade mode. Each delay line feeds into the next delay line on the opposite stereo channel. This leads to a sort of meandering delay line that can create interesting stereo surprises.
You never quite know what sound is going to pop up where.



Sensors and Cascade/Adrift modes: Sensors takes an additional function on when in either Cascade or Adrift mode. When Sensors is set to the minimum, these modes only send the first delay lines of each channel to the wet signal output. As you bring Sensors up, each time delay lines are added, Cascade and Adrift modes include the new delay line outputs to the wet signal output.
For a visual explanation, imagine that, when you turn up Sensors to 2, new lines from the 2L and 2R boxes in the above graphics connect from both boxes to their respective signal output lines next to them.
Here's a fun patch to show this interaction: Patch a simple, slow arpeggio into Nautilus. Set delay mode to Shimmer, and set Feedback mode to either Cascade or Adrift. Resolution and Feedback should be at 9 o'clock. Turn Sensors up to 2. You will now hear the pitch shifted 2nd delay line. Turn Sensors up to 3. You will now begin to hear the pitch shifted 3rd delay line, which is 2 octaves up from the original. Same goes for setting Sensors to 4. Turn up feedback to hear the additional outputs better if needed!

Purge

Pressing the Purge button clears all the delay lines from the wet signal, similar to purging ballasts on a ship or submarine, or purging a regulator while diving. Purge activates when the button is pressed/the gate signal goes high.

Purge gate input threshold: 0.4V

Sonar

Sonar is a multifaceted signal output; a collection of Nautilus's sub-nautical findings and interpretations of the aquatic world. In essence, the Sonar output is a set of algorithmically generated signals designed by different aspects of the delays. By analyzing overlapping delay pings and delay time phases, Nautilus creates an ever evolving stepped CV sequence. Use Sonar to self patch Nautilus, or to control other patch points in your rack! A staff favorite is running Sonar out into Surface's Model input!
Did You Know? You can change Sonar's output using the Nautilus Configurator tool and the USB drive onboard. Sonar can be a ping generator based on the delay taps, an additive stepped CV sequencer based on the overlapping delays, or simply a clock pass through. Head to the USB section to find out more!

Sonar CV output range: 0V to +5V

Sonar Gate output amplitude: +5V. Gate Length: 50% duty cycle

Audio Input Left

Audio input for Nautilus's left channel. The left input normals to both channels when no cable is present in Audio Input Right. Input Range: 10Vpp AC-Coupled (input gain configurable via Tap+Mix function)

Audio Input Right

Audio input for Nautilus's right channel.
Input Range: 10Vpp AC-Coupled (input gain configurable via Tap+Mix function)

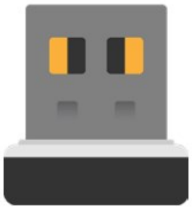
Audio Output Left

Audio output for Nautilus's left channel.
Input Range: 10Vpp

Audio Output Right

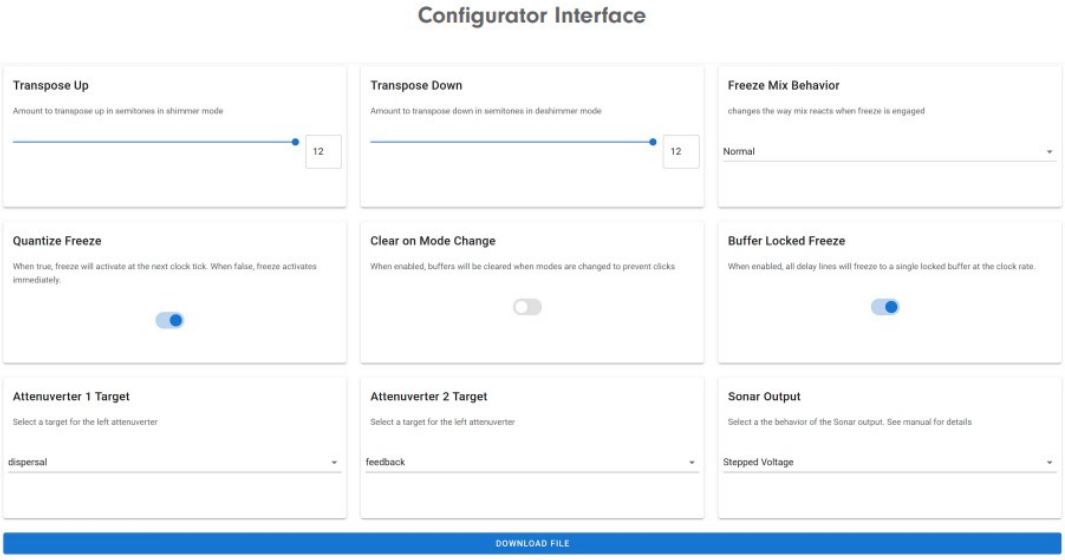
Audio output for Nautilus's right channel.
Input Range: 10Vpp

USB/Configurator



The Nautilus USB port and included USB drive are used for firmware updates, alternate firmwares, and additional configurable settings. The USB drive does not need to be inserted in Nautilus for the module to operate. Any USB-A drive will work, as long as it is formatted to FAT32.

Configurator
Effortlessly change Nautilus USB settings using Narwhal, a web-based settings app that let's you change a multitude of functions and interconnectivity within Nautilus. Once you have your desired settings, click the "generate file" button to export an options.json file from the web app.
Place the new options.json file onto your USB drive, insert it into Nautilus, and your module will instantly update its internal settings! You'll know the update is successful when the Kelp base flashes white.
Head To The Narwhal

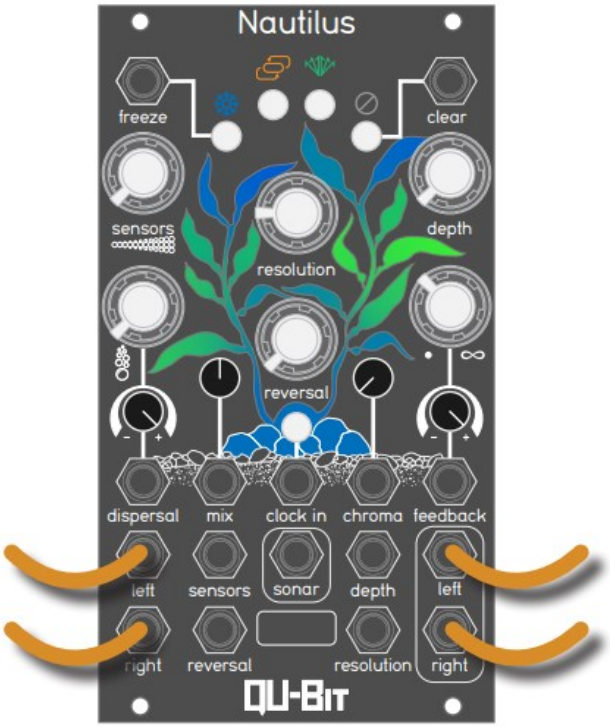


These are the current settings available in the Configurator. More configurable settings will be added in future updates

Setting	Default Setting	Description
Transpose Up	12	Set the amount to transpose in semitones in Shimmer Mode. Cho osebetween **1** to **12** semitones above the input signal.
Transpose Down	12	Set the amount to transpose in semitones in De-Shimmer Mode. Choosebetween **1** to **12** semitones below the input signal.
Freeze Mix Behavior	Normal	Changes the way mix reacts when Freeze is engaged. **Normal:** F reeze has no forced effect on the Mix knob. **Punch In:** Activating Freeze when Mix is full dry forces the signal full wet. **Always Wet:** Activating Freeze forces Mix to go full wet.
Quantize Freeze	On	Determines whether Freeze actives immediately on Gate input/bu tton press or at the next clock pulse. **On:** Freeze activates on the next clock pulse. **Off:** Freeze activates immediately.
Clear On Mode Chang e	Off	When enabled, buffers will be cleared when Delay and Feedback Modesare changed to minimize clicks.
Buffer Locked Freeze	On	When enabled, all delay lines will freeze to a single locked buffer at theclock rate.
Attenuverter 1 Target	Dispersal	Assign the Attenuverter 1 knob to any CV input.
Attenuverter 2 Target	Feedback	Assign the Attenuverter 2 knob to any CV input.
Sonar Output	Stepped Voltage	Selects the algorithm used to analyze the delays and generate th e Sonar output signal. **Stepped Voltage:** Generates an additive st epped CV sequence built by analyzing overlapping delay lines. Ra nge: 0V to +5V **Master Clock:** Passes the Clock Input signal thro ugh to be used else- where in your patch. **Variable Clock:** Gener ates a variable clock output based on the Resolu-tion rate.

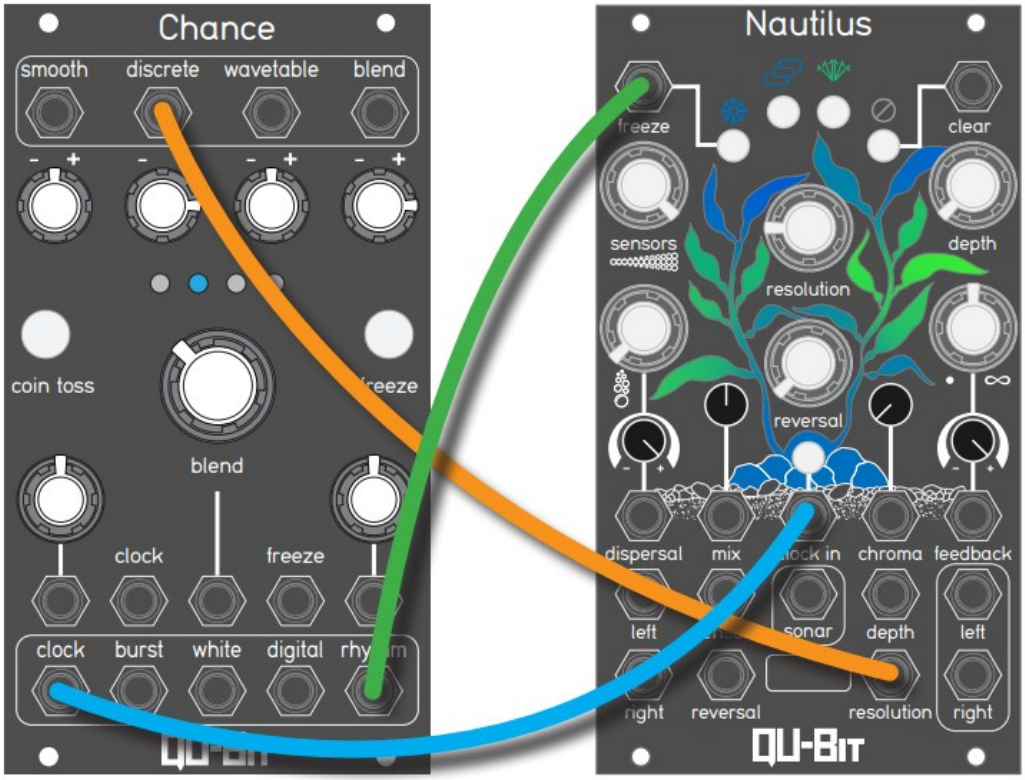
Patch Example

Slow Shimmer Delay



Settings
Resolution: Dotted Half, or longer
Feedback: 10 o'clock
Delay Mode: Shimmer
Feedback Mode: Ping Pong
Turning on Shimmer for the first time can lead to some powerful, and impressionable results. With bright, ramping pitch shifted delays, faster clock rates can easily overpower the sound. If you are looking to take shimmer in a different direction, we recommend slowing things down a bit.
Not only slowing down your Resolution, but also your input signal. Having a simpler, slower sound source opens up more room for the beautiful shimmer delay to shine through. If the pitch shifting is getting too high up there as well, dial back Feedback, or try the Cascade and Adrift Feedback modes to lengthen the delay times.
Quick Tip: Try different semitones for varying pitch shifting, and rhythmic results. Also, using an "unreliable"clock source, such as a gate signal with subtle frequency variations, can introduce pleasant pitch flutters in the delay

Glitch Delay

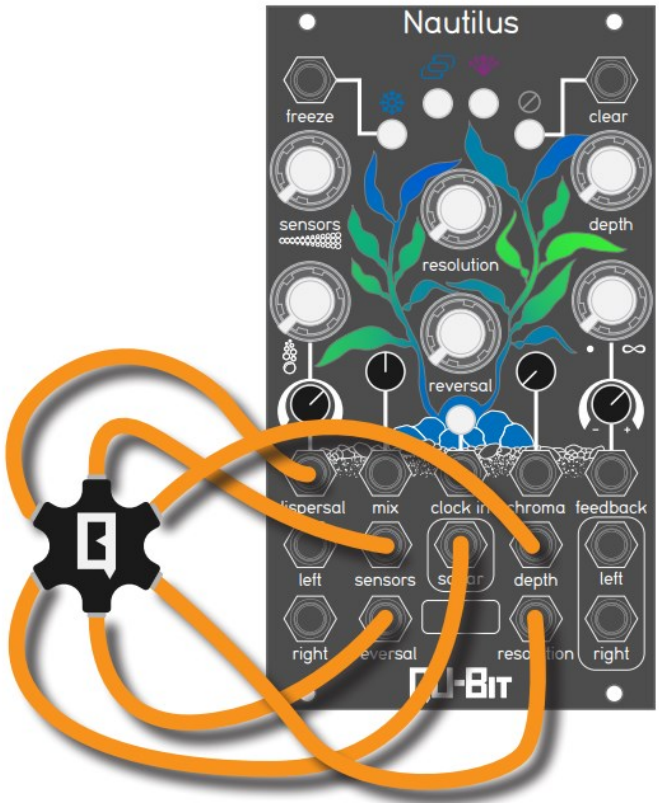


Modules Used
Random CV/Gate source (Chance), Nautilus

Settings
Resolution: 9 o'clock
Delay Mode: Fade
Feedback Mode: Ping Pong
Freeze Behavior: Default

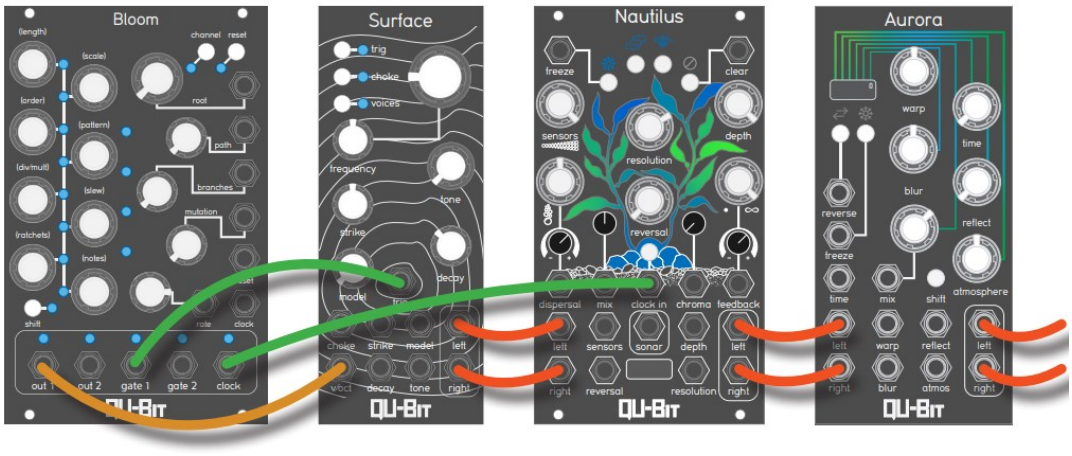
With Nautilus's Freeze behavior, our sub-nautical delay network can easily take its complex delay rhythms and lock them into a beat repeat/glitch state. And, in Fade mode, Nautilus can create additional delay time rhythms using Resolution and random CV, seamlessly changing between delay frequencies.
Need to dial back the incoming CV? You can assign either of the Attenuverter knobs to the Resolution CV input to get just the right amount of variation for your patch!

The Octopus



Gear Used
Nautilus, Qu-Splitter
Settings
All knobs to 0
Attenuverters to whatever you want to dial back For when you are out of modulation sources, why not let Nautilus modulate itself? Using a signal splitter, we can patch the Sonar output to multiple spots on Nautilus. Want to dial back the modulation on some of the patch points? Assign the Attenuverters to wherever you see best. We personally love assigning them to Resolution, Reversal, or Depth!

Train Horn



Gear Used
Nautilus, Sequencer (Bloom), Sound Source (Surface), Spectral Reverb (Aurora)
Settings
Resolution: 12-4 o'clock
Sensors: 4
Dispersal: 12 o'clock
Feedback: Infinite
Chroma: Lowpass Filter

Depth: 100%

All aboard! This fun sound design patch involves fast clocks and faster delays, and really showcases the delay time range on Nautilus! Your clock signal should be pushing audio rate for this patch to work. If you have a Bloom, matching the Rate knob above should do the trick.
With the above Nautilus settings, you should hear nothing. The trick is to turn down Depth to blow the train whistle. And, depending on your sound source, you can hear the faint chugging of the train on the tracks prior to the whistle.
Aurora is not necessary for this patch, but it's pretty awesome to take your Train whistle and spectrally mangle it into a haunting space horn!

More Than Sound

Being located in a small beach town, the ocean is a constant inspiration for us at Qu Bit, and Nautilus is the modular personification of our love for the deep blue.
With every Nautilus purchase, we are donating a portion of the proceeds to the Surfrider Foundation, to help protect our coastal environment and its inhabitants. We hope you enjoy the mysteries uncovered by Nautilus just as we have, and that it continues to inspire your sonic journey.

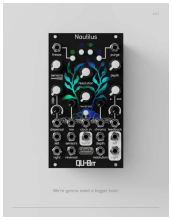
Lifetime Repair Warranty

No matter how long you've owned your module, or how many people have owned it before you, our doors are open to any and all Qu-Bit modules needing repair. Regardless of circumstances, we will continue to provide physical support for our modules, with all repairs being completely free of charge.*
Learn more about the lifetime repair warranty.
*Issues that are excluded from the warranty, but do not void it includes scratches, dents, and any other user-created cosmetic damage. Qu-Bit Electronix holds the right to void warranty at their own discretion and at any time. Module warranty may be voided if any user damage is present on the module. This includes, but is not limited to, heat damage, liquid damage, smoke damage, and any other user created critical damage on the module.

Changelog

Version	Date	Description
v1.1.0	Oct. 6, 2022	• Release firmware.
v1.1.1	Oct. 24, 2022	• Fixed text box issue in Rever- sa l section.
v1.1.2	Dec. 12, 2022	• Added USB power section to Te chnical Specifications

Documents / Resources

	QU-BIT Nautilus Complex Delay Network [pdf] User Manual Nautilus Complex Delay Network, Nautilus, Complex Delay Network, Delay Network