Perfect Circuit Qu-Bit Electronix Stardust Cosmic Tape Looper Owner's Manual

Contents

Perfect

Perfect Circuit Qu-Bit Electronix Stardust Cosmic Tape Looper

Specifications

- Resolution: 16-Bit (65,536 distinct values)
- USB Port Type: A
- External Power Draw: up to 500mA (for powering external devices via USB)

Product Information

Stardust is an all-encompassing looper device with impressive front panel controls, the ability to save, recall, or export recordings, load samples via USB, and configurable settings through the web editor Narwhal.

Module Installation

1. Locate 18HP of space in your Eurorack case.
2. Confirm the positive 12 volts and negative 12 volts sides of the power distribution lines.
3. Plug the connector into your case's power supply unit with the red band corresponding to negative 12 volts.
4. Connect the power cable to the module with the red band facing the bottom of the module.

Product Usage Instructions

Functions: Primary Controls

1. **In Level**
   The In Level knob and CV input control the incoming signal amplitude. Adjust knob from left for silence to the right for tape saturation and compression. In Level CV Input range: -5V to +5V.
2. **Mix**
   The Mix knob and CV input blend between dry and wet signals. Adjust knob for desired signal mix. Mix CV Input range: -5V to +5V.
3. **Record**
   The Record button and gate input start and stop recording audio to Stardust's buffer. The Record LED indicates

recording status (red when active, white when inactive).

FAQ

- **Q: How can I update the firmware of Stardust?**
  A: You can get the latest firmware for Stardust on our website. Download the firmware file and follow the instructions provided to update your device.
- **Q: Can I use Stardust with other music production software?**
  A: Stardust can be used as a standalone looper device or integrated into your Eurorack setup. It offers flexibility for various music production setups.

Foreword

“Exploration is in our nature. We began as wanderers, and we are wanderers still. We have lingered long enough on the shores of the cosmic ocean. We are ready at last to set sail for the stars.” — Carl Sagan
Ever since I was a child, I’ve had a fascination with outer space. I’ve always loved attempting to comprehend the vast distances between celestial objects, and realizing how just small humans are in the grand scheme of things. But overall, I think it’s the notion of exploring the un-known that has always kept me coming back for more. Contemplating the universe encourages so many questions. In a world of ubiquitous computing where every answer is just a browser search away, it’s some-times nice to gaze into the night sky and realize just how little we know about the universe at large.
If there’s any section of electronic music that has inspired a similar sense of awe in me, it’s sampling technology. At the surface it appears straight-forward, you record samples and you play them back. But once you get past the surface, an entire world of sound awaits. It’s a spectacular feature of audio that as soon as you slow it down, reverse the playback direction, or chop it into smaller pieces, it becomes something different entirely. I have countless memories of playing around with samplers and getting to the point where I could not recall the original source material for the audio that I was listening to.
So here we are, with Stardust. I could list off a number of technical achievements, features, and bells and whistles that this module has, but that’s not what makes it special. What truly makes it special is its ca-pacity for exploring sound. I invite you to let go of preconceived notions about sampling or looping and let the module take you to new areas of sonic discovery. Find new sounds within existing source material, and then find even more new sounds within those. The beautiful thing is, the more sounds you discover, the more you’ll realize are still out there.

Andrew Ikenberry October 2024 San Clemente, California

Description

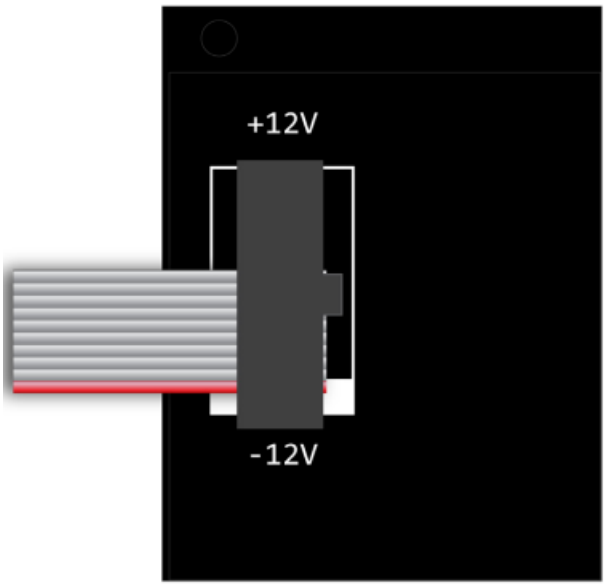
Module Meet Stardust, a cosmic tape looper. Much like the cacophony of galaxies, supernovas, and stars we find in our own celestial canvas, Stardust captures layers of audio to construct new sonic imagery, and finds ways to take the esoteric, and make it concrète. The foundation of Stardust is a stereo looper with all the essential controls to record and manipulate sound, while supporting click-less looping transitions, an ultra-low noise floor, and high-fidelity audio hard-ware. However, getting the perfect loop is only half of the equation – Stardust also focuses on the texture and vibe of your recordings. Dial in nostalgic warmth with wow & flutter / tape hiss controls, or take Star-dust to new horizons with out-of-this-world DSP effects. And, much like the tape-machines of yore, Stardust can splice and rearrange its loops at the twist of a knob. With an impressive set of front panel controls, the ability to save, recall, or export recordings, load samples via an included USB flash drive, and a host of configurable settings via our web editor Narwhal, Stardust is an all-encompassing looper device. Reach out into the vast

unknown, one overdub at a time.

- Cosmic stereo tape looper
- Click-less looping, with minutes long buffers and 4 Looping Modes
- High-Fidelity Audio: 48kHz, 32-bit internal, 24-bit hardware, ultra-low noise floor
- Save, recall, import and export recordings via USB drive
- Wow & Flutter, Tape Hiss, Vintage Saturation, Reverb, and other DSP effects onboard
- Built on the Daisy platform for continued official updates, and community firmware hacking

Module Installation

- To install, locate 18HP 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: 18HP
- Depth: 22mm
- Power Consumption: +12V=175mA, -12V=8mA, +5V=0mA

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)

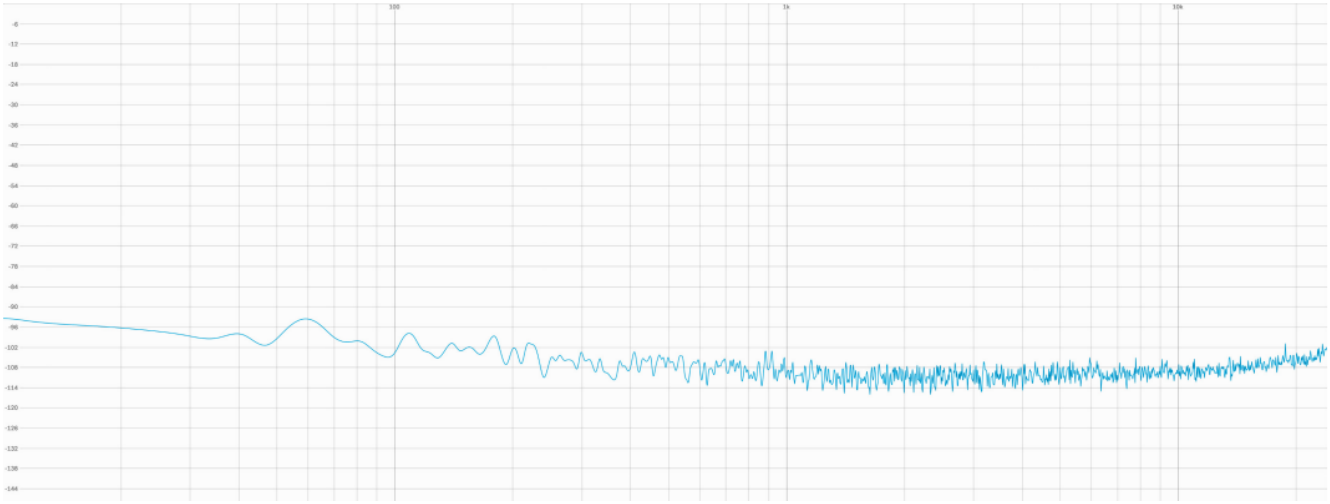
USB Port

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

Noise Performance

- Noise Floor: -94dB

Graph:



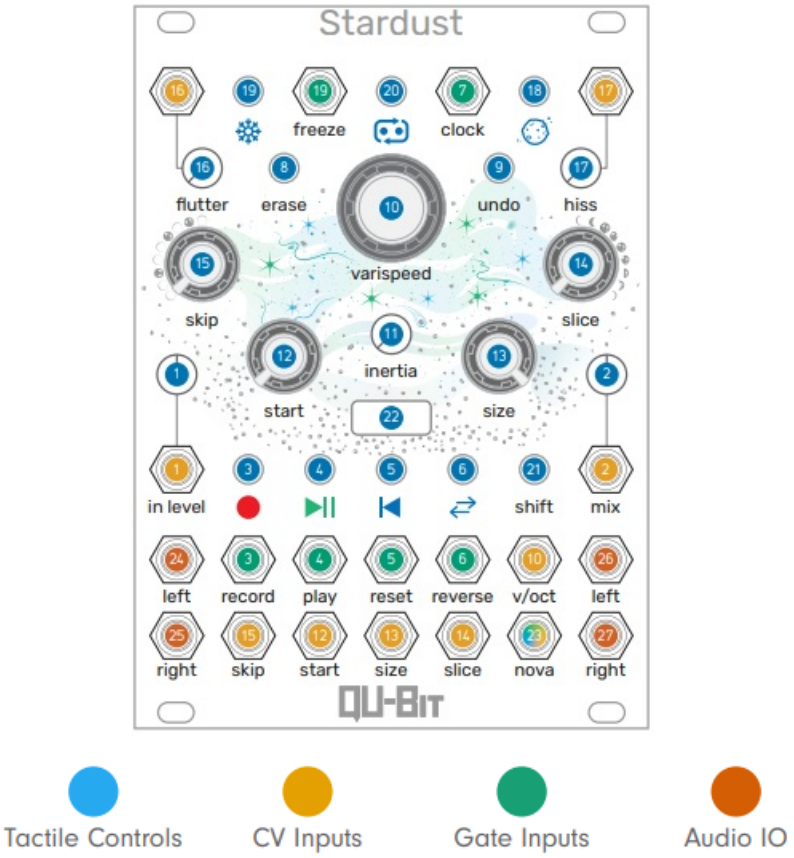
Recommended Listening

Robert Fripp (1979). Frippertronics.
Robert Fripp is a British musician and member of the progressive rock group King Crimson. A guitar virtu-oso, 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.

- Marcus Fischer – Live at the Whitney Museum
- YouTube
- Edgard Varèse – Poème èlectronique

- YouTube
- John Cage – Williams Mix
- YouTube
- Recommended Reading
- Musique Concrète Wikipedia
- Pierre Schaeffer Wikipedia
- Michael Chanan – Repeated Takes: A short history of recording and its effect on music Google Books
- Francesco Balilla Pratella – The Art of Noises. Futurist Manifesto
- Library of Congress
- John Cage – Williams Mix Wikipedia

Front Panel



Functions: Primary Controls

LED UI

Stardust's LED UI is more than just pretty lights. It also provides visual feedback for all sorts of functions, controls, and indications. This includes but is not limited to loop position, VU metering, loop saving and import/exporting, and more.

In Level

- The In Level knob and CV input control the incoming signal amplitude.
- The knob is silent when the knob is fully to the left.
- Audio is at full amplitude when the knob is at center position.
- As the knob turns from center position to the right, tape saturation and compression are introduced to the incoming signal!
- In Level CV Input range: -5V to +5V

Mix

The Mix knob and CV input blend 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.

The default Mix curve is Constant Power.

Mix CV Input range: -5V to +5V
Did You Know? You can change Stardust's mix curve using Narwhal? Learn about the different mix curve options in the Configurator section of the manual, then head to Narwhal to try them out!

Record

- The Record button and gate input start and stop recording audio from the stereo input to Stardust's buffer. The Record LED is red when recording is active, and white when recording is inactive. The record state will change on button release, or on the rising edge of the gate input.
- When Stardust does not have an active buffer, the first recording sets the max buffer length to create your loop. Subsequent recordings are made within the active loop, and can be no longer than the maximum buffer length.
- If record is active past the loop end point, then it will continue recording at the loop start point.
- Record Gate Input threshold: +0.4V
- Did You Know? There are other settings that change the default behavior of Record, which are listed below. You can read more about each setting further in the manual!
- Loop Mode: Sets the macro recording behavior. Includes Sound on Sound, Replace, Frippertronics, and Re-sample recording modes.
- Punch-In Mode: Determines when recording will start/stop, either by manual input, stopping at the end of loop, or starting at the loop start and ending at the loop end.
- Persistent Buffer Memory: When a recording is complete, Stardust will automatically start saving the recording to memory. This is indicated by an orange LED blip under the Varispeed control. Once the blip has stopped, the buffer is saved and will be recalled between power cycles.

Play/Pause

The Play/Pause button and gate input start and stop the loop playback.
Pressing the button will start the loop playback from the current tape head position, and turn the play/pause LED green. Pressing the button again will pause playback and turn the LED white, leaving the tape head at its latest position.
The playback state will change on button release, or on the rising edge of the gate input.

Play/Pause Gate Input threshold: +0.4V
Continuous Recording: If Stardust is making an initial recording, ending the recording by pressing the Play/Pause button will set the loop point, but continue recording the incoming audio. This is perfect for recording audio tails and drones without abrubtly cutting them off at the loop point!

Reset

The Reset button and gate input set the tape head back to the loop start point. The reset is activated when the button is released, or the gate signal goes high.
The Reset LED will blink gold each time a reset is activated. The Reset LED will also blink blue when the loop point is hit.

Reset Gate Input threshold: +0.4V
Did You Know? Reset, along with a host of other controls on Stardust, can be clock synced! Read about Clock Mode, where reset will activate on the next clock pulse at the Clock input jack.

Reverse

The Reverse button and gate input change the playback direction of the loop. The direction is reversed when the LED is blue, and white when the direction is forward.
The reverse state changes on button release, or on the rising edge of the gate input.
The reversed playback speed will match the forward playback speed set by the Varispeed encoder.

Reverse Gate Input threshold: +0.4V

Clock

The Clock gate input uses an external clock source to sync Stardust's parameters in Clock Mode. See the Clock Mode section to learn which controls are clock synced, and how they behave under an external clock.

Clock Gate Input threshold: +0.4V

Erase

-  The Erase button deletes the current buffer and stages Stardust for a new recording.
- The buffer is erased when the button is released. If the button is held for more than 2 seconds the erase will be canceled, should you change your mind!
- Did You Know? If you accidently erase your buffer, you can bring it back from the endless void of space by pressing the Undo button!

Undo

-  The Undo button removes the last recording to the buffer. This allows Stardust to re-record the previous loop layer without removing the whole loop up to that point!
- Undo is activated when the button is released. And LED animation will happen under the Varispeed encoder while the looper state saves.
- Redo: Pressing Undo a second time after undoing the latest recording will reintroduce the undone audio!
- Undo and Frippertronics: Due to the nature of the technique, Undo does not operate while Stardust is in Frippertronics Mode.

Varispeed

-  The Varispeed encoder and 1V/Oct input control the loop playback speed. Since this is a varispeed control, the playback speed and pitch are directly connected to one another.
- Turn the encoder clockwise to increase the playback speed and pitch up to 8x playback speed (+3 octaves).
- Turn the encoder counter-clockwise to decrease the playback speed and pitch to /4 playback speed (-2 octaves).
- Click the encoder button to return to x1 playback speed.
-  1V/Oct CV Input range: -5V to +5V

Inertia

-  The Inertia knob controls the amount of lag between user input and playback speed, resulting in a tape stop effect!
- The effect is off when the knob is fully to the left. As the knob is turned to the right, the amount of tape lag ranges from short, vinyl stops to drawn out motor failures (max 2 second lag).
- Did You Know? You can adjust the Inertia slope to dial in the ratio of speed decrease lag and increase lag. Head to the secondary section of the manual to learn about Inertial Slope!

Start

-  The Start knob and CV input set the loop start point within the recorded buffer.
- When the knob is fully to the left, the loop start is at the beginning of the recorded buffer. When the knob is fully to the right, the start position is at the end of the recorded buffer.

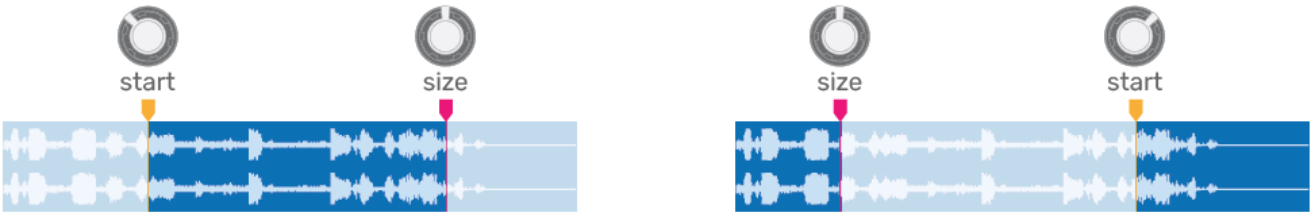
- The Start position is indicated by a blue LED animation in the galaxy LED cluster.

Start CV Input range: -5V to +5V

Size

The Size knob and CV input set the loop size relative to the loop start point. When the knob is fully to the left, the loop size is 5ms. The loop size will increase while turning the knob to the right, reaching the full buffer length when fully to the right. The loop size is indicated by a gold LED streak across the galaxy LED cluster.

Start, Size, and Buffer Loop Point: If the loop size extends past the recorded buffer end point due to the loop start position, the loop will continue at the beginning of the recorded buffer.



Slice

The Slice knob and CV input set the amount of splice points within the loop. The splice points are evenly distributed across the loop. Slice will also randomly repeat splices.

When the knob is fully to the left, there are no active splice points. As the knob is turned to the right, the number of splice points will increase by multiples (2, 4, 8, 16, etc.) until it is at its shortest splice length of 62ms.
When the right glaxy LEDs change to a solid color, Slice will not randomly repeat splices, but Stardust will still reference the splice amount across the rest of the module. You can read the Skip and Nova sections to learn more!

- Slice CV Input range: -5V to +5V

Skip

The Skip knob and CV input adjust the probability that a splice transformation will occur. This can be a number of transformations, which you can find listed below. Skip will add transformations previous to the current zone.

Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
· Adjusts the amount of start position offset of a slice point.	· Adjusts the chance for a randomly reversed slice.	· Adjusts the amount of micro pitch changes to a slice point.	· Introduces the probability of octave pitch jumps to a slice point.	· Slice points will jump to random semitones.	· Introduces tape lag to the random semitone jumps.

- **Skip CV Input range**: -5V to +5V

Flutter

The Flutter knob and CV input adjust the first effect assigned by the FX Mode button.
The effect is off when the knob is fully to the left, and at its maximum amount when fully to the right. See the Effect Mode section to find a full list of effects that Flutter can control!

- **Flutter CV Input range:** -5V to +5V

Hiss

The Hiss knob and CV input adjust the second effect assigned by the FX Mode button.
The effect is off when the knob is fully to the left, and at its maximum amount when fully to the right. See the Effect Mode section to find a full list of effects that Hiss can control!

- **Hiss CV Input ran**ge: -5V to +5V

Effect Mode

The Effect Mode button selects the effect currently controlled by Flutter and Hiss. All available effects run simultaneously. See the list below to learn each effect, and their controls.

Effect LED Color	Effect Mode	Flutter Control	Hiss Control
Blue	Analog Tape Emulation	Wow & Flutter amount (pitch/ amplitude modulation)	Tape hiss amount (noise & compression amount)
Green	Digital Audio Artifacts	Downsampling amount	Bitcrush amount
Gold	Reverberation	Reverb amount	Reverb time
Purple	Highpass/Lowpass Filtering	Highpass amount (dry to 12kHz)	Lowpass amount (dry to 25Hz)

Did You Know? If you are a bit lost keeping track of 8 effects controls and want a fresh start, holding the Shift button and pressing the Reset button will reset Stardust's controls to default values. This will set all effects to off! Learn more about Stardust's shift combos in the secondary section of the manual.

Freeze

The Freeze button and Gate input lock and repeat a small portion of the loop. Freeze is activated either when the button is released, or when the gate input goes high.
In freerunning clock mode, the frozen audio length is 1% of the loop length, with a minimum possible length of 62ms.

Freeze Gate Input threshold: 0.4V

Loop Mode

The Loop Mode button selects the macro recording behavior for Stardust. The active mode determines how audio will be recorded into an existing buffer.

Sound on Sound
The default loop mode on Stardust is Sound on Sound, in which newly recorded audio is added to the existing loop in its current position.

Replace
When set to the Replace loop mode, a new recording will delete and replace the old audio at its current position.

Frippertronics
Inspired by the tape recording technique pioneered by Robert Fripp, the Frippertronics loop mode decreases the old loop amplitude each time Stardust adds a new recording. The older the audio is in the loop, the further it decays into the ether.

Resample
Recordings in this mode become new recordings of their own lengths, and include any playback modifications applied to the current loop (speed, direction, slices, skips, etc.). The Undo tree is baked into the resample as well, and undo-locking is ignored. You can still revert to your pre-Resample loop by pressing the Undo button.

Shift

The Shift button, when held, sets Stardust's front panel controls to their secondary functions.
This provides access to fine tune loop controls, DSP effects signal routing, punch-in recording effects, loop file access, and more.

Shift+Mix: LED Brightness
Holding Shift and turning the Mix knob adjusts the LED brightness on Stardust. Turn the knob fully to the left to dim the LEDs to 10% brightness, and turn the knob fully to the right for 100% brightness.

Shift+Record: Punch-In Record Mode
Holding Shift and pressing the Record button will cycle through Stardust's different record engaging and disengaging behaviors.

None

Indicated by a blue LED. Recording is manual engaged and disengaged either by button press or gate signal.

Immediate Full
Indicated by a green LED. Recording will begin once manually engaged. The recording will automatically end once the loop hits its start point, or a loop reset is triggered.

Queued Full
Indicated by a gold LED. Activating record will queue a new recording to begin at the next loop point. The Record LED will illuminate gold while queued and turn red when it hits the loop point. The recording will end once a full loop occurs, or a reset is triggered. A queued recording can be canceled before it starts by pressing the Record button or sending its gate input a signal.

Shift+Play: File Import
Holding Shift and pressing the Play button will load a .wav file from the Stardust USB drive into the buffer. Load your own loops and samples into Stardust with this awesome feature!

File Format

- Name/Extension: loop.wav
- Resolution: 16-bit
- Sample-rate: 48kHz
- Imaging: Stereo

Shift+Reset: Reset To Default Settings
Holding Shift and pressing the Reset button will reset all of Stardust's modes and effect settings to their default states. The default states on Stardust are:

- Loop Mode: Sound on Sound
- Effects: Off
- Effect Mode: Tape Emulation
- Clock Mode: Unclocked
- Record Punch-In Mode: None

Shift+Reverse: Clock Mode Toggle
Holding Shift and pressing the Reverse button will toggle Clock Mode on and off. While holding Shift, the Reverse LED is green when Clock Mode is active, and blue when Clock Mode is inactive
When Clock mode is active, Stardust's front panel controls will adhere to the external clock rate. Affected controls include:

- Slice
- Skip
- Record
- Reset
- Freeze

Shift+Varispeed Turn: Octave Jumps
Holding Shift and turning the Varispeed encoder jumps the playback speed up and down by octaves, relative to the current playback speed.

Shift+Varispeed Click: Varispeed Range
Holding Shift and pressing the Varispeed encoder will cycle through the Varispeed range options. See the list below for the available options:

- Blue: Semitones
- Green: Unquantized
- Gold: Octaves & Fifths
- Purple: Octaves Only

Shift+Effect Mode: Pre/Post Effect Chain

- Holding Shift and pressing the Effect Mode button toggles whether or not Stardust's onboard effects are applied to the dry signal.
- The effects are applied only to the wet signal when the LED is blue. The effects are applied to the dry signal when the LED is green.

Shift+Inertia: Inertial Slope

- Holding Shift and turning the Inertia knob will adjust the envelope peak on Inertia. The nominal position is center on the knob.
- If the knob is turned fully to the left, Inertia will only affect playback speed when decreasing, or when the loop is paused.
- If the knob is turned fully to the right, Inertia will only affect playback speed when increasing, or when the loop is played.

Shift+Freeze: Loop Export
Holding Shift and pressing the Freeze button will export the current recording and undo buffer as a single loop.wav file to the USB Drive. The file is formatted as a 16-bit, 48kHz stereo .wav file, which can be reimported into Stardust.

Shift+Loop Mode: Firmware Update
Holding Shift and pressing the Loop Mode button causes Stardust to perform a firmware update. When activated, Stardust looks for a new .bin file that does not match its current firmware version, and uses it to update the module.

USB Drive

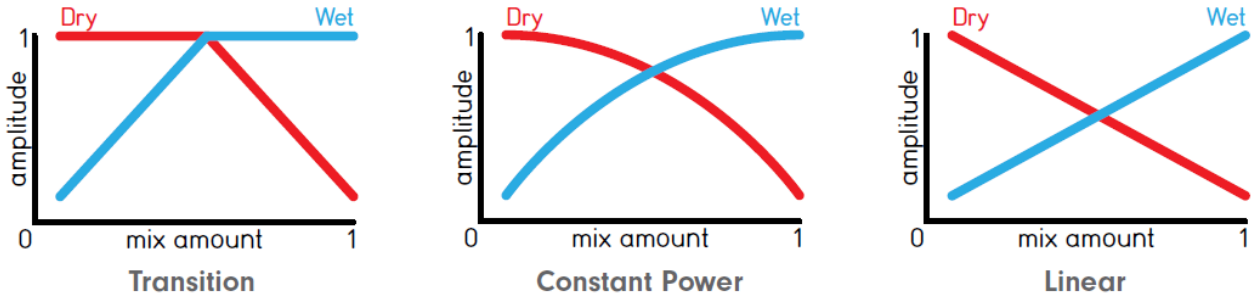
Stardust's USB drive is used to update firmware, apply configurable settings via Narwhal, import and export loop.wav files, and carries a digital version of the manual!
The USB Drive is 1GB and formatted for FAT32.

Configurable Settings
Stardust carries a collection of configurable settings under the hood, all accessible via Narwhal, our web-based settings app.

Nova Output

- Selects the output from the Nova CV/Gate jack.

- Nova = end of loop, and end of slice gate output
- Flare = end of loop gates
- Spark = end of slice gates
- Orbital = playback position in loop as a CV
- Mix Curve
- Selects the curve for the Mix knob.
- Options: Transition, Constant Power, Linear



- Effect CV Lock
- Choose if the Flutter and Hiss CV inputs affect the currently selected effect, or a specific effect.
- Reverb Type
- Selects the reverb timbre between Normal, Bright, and Dark.
- Erase Button Response
- Decides the button command for Erase, either the default tap, or a hold for 1 second.
- Undo Button Response
- Decides the button command for Undo, either the default tap, or a hold for 1 second.

Nova

Nova is a multifaceted signal output; a collection of interstellar discoveries found in Stardust. Use Nova to self patch Stardust, or to control other patch points in your rack! A staff favorite is using Splice and Nova to clock sync a modular patch to the Stardust loop!
Did You Know? You can change Nova's output using the Narwhal and the USB drive onboard!

Nova CV output range: 0V to +5V

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

Audio Input Left

Audio input for Stardust's left channel. The left input normals to both channels when no cable is present in Audio Input Right.
Input Range: 10Vpp AC-Coupled

Audio Input Right

- Audio input for Stardust's right channel. Input
- Range: 10Vpp AC-Coupled

Audio Output Left

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

Audio Output Right

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

The Extras

Calibration
Stardust's 1V/Oct input is calibrated upon arrival, but if you need to recalibrate your module for any reason, you can follow the steps below:

1. Hold the RECORD button at bootup to enter calibration mode. You will know you are in the mode when the button LEDs are flashing green and gold.
2. Patch 1V into the v/oct CV input.
3. Once patched, tap the LOOP button. Stardust will capture the voltage, and indicate a successful capture by turning the RESET LED green.
4. Patch 3V into the v/oct CV input.
5. Once patched, tap the LOOP button again. Stardust will capture the voltage, indicate a successful capture by turning the REVERSE LED green, then returning to normal operation.

More Than Sound

Like the explorers who've delved beyond our atmosphere, space has always inspired us to push the boundaries in our own sonic endeavors. We hope you too find a universe of sound in this module we've been dreaming up for over 5 years. And, with every Stardust ordered, we will be donating a portion of the proceeds to The Planetary Society. Co-founded by Carl Sagan, the organization is "empowering the world's citizens to advance space science and exploration." Together, we aim to contribute to the advancement of science and discovery for future generations.

Lifetime Repair Warranty

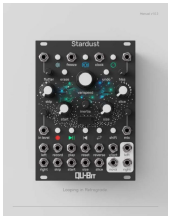
No matter how long you've owned your module, or how many people have owned it before you, our doors are open to any and all Qu-Bit modules needing repair. Regardless of circumstances, we will continue to provide physical support for our modules, with all repairs being completely free of charge.*

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
v1.0.0	Nov. 13, 2024	• Release firmware.
v1.0.1	Nov. 14, 2024	• fixed typos, and updated Narwh al section
v1.0.2	Dec. 3, 2024	• updated Clock Mode section • text
v1.0.3	Dec. 9, 2024	• added calibration procedure

Documents / Resources

	**Perfect Circuit Qu-Bit Electronix Stardust Cosmic Tape Looper** [pdf] Owner's Manual Qu-Bit Electronix Stardust Cosmic Tape Looper, Qu-Bit, Electronix Stardust Cosmic Tape Looper, Stardust Cosmic Tape Looper, Tape Looper, Looper

References

- **User Manual**