Data Bender

Contents

Description

Data Bender is a circuit bent digital audio buffer. It is inspired by the ways in which audio equipment can fail. The sounds of skipping CDs, software bugs, and defective tape machine playback are all accessible. The 96kHz, 24-bit audio buffer can hold over a minute of stereo audio, providing a sonic canvas capable of infinite surprises and discovery.

- Circuit bent digital audio buffer
- Skipping CDs, software bugs, old tape machine, scratched records
- 96kHz sampling rate, 24-bit depth for high fidelity audio with over a minute of stereo sampling time
- Stereo IO

Specifications

Depth: 28mm

Width: 14HP
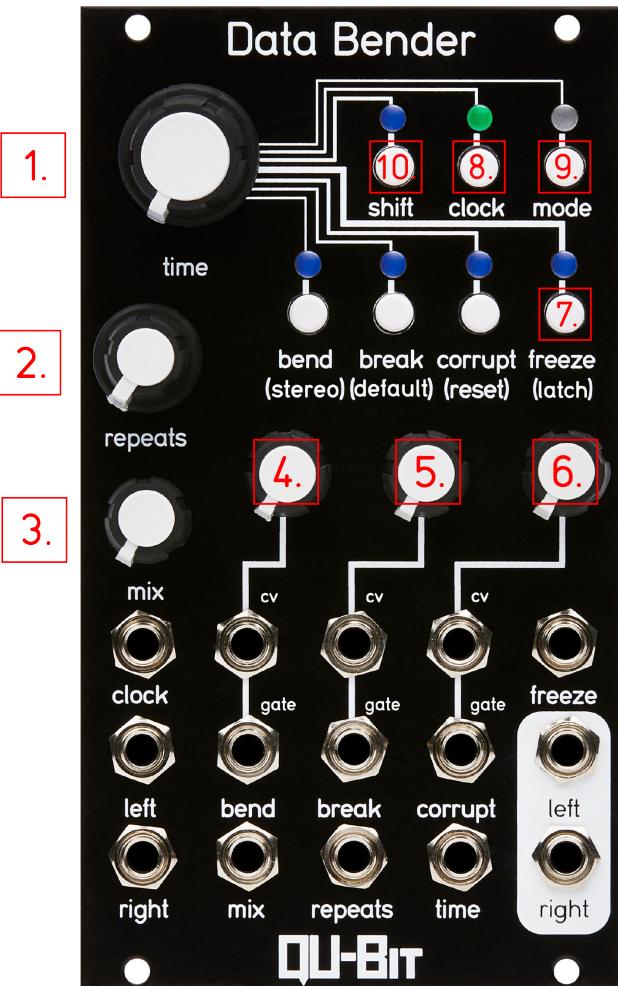
Current Consumption:

- +12V: 58mA
- -12V: 60mA
- +5V: 0mA

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 the power distribution board of your case, 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

Marked Diagram

Core Control Overview

1. Time

Time sets the sample period for incoming audio to be processed.

This is the rate at which a new audio buffer is acquired for processing and manipulation.

Switch between Internal and External Clock modes by pressing the clock button.

The buffer space located outside of the current section set by time is written to in the background so that some fairly recent audio is always in the buffer when time is changed. This can bring back sounds from up to a minute ago in unexpected and interesting ways.

CV responds to -5V to +5V and adds to the knob position.

Internal Clock Mode

In this mode the clock LED will blink blue at the clock rate.

The Time knob will be a smooth changing value from 16 seconds at the bottom of the knob to 80Hz at the top of the knob.

External Clock Mode

In this mode the clock LED will blink white at the clock rate.

The Time Knob acts as a divide/multiply control with the following changes to the clock:

- Divide by 16 (4 bars)
- Divide by 8 (2 bars)
- Divide by 4 (1 bar)
- Divide by 2
- Clock Matches Input
- Multiply by 2 (Eighth Notes)
- Multiply by 3 (Eight Note Triplets)
- Multiply by 4 (Sixteenth Notes)
- Multiply by 8 (32nd Notes)

When the knob/CV move into a new division or multiplication, the Clock LED will briefly illuminate gold.

2. Repeats

Repeats divides the primary buffer into smaller subsections of audio.

These will be heard as repeated pieces of the recorded audio buffer.

Several parameters within the module will control which section of the buffer is repeating as well as modify this control itself.

The higher the knob is increased the more divisions of the buffer are created, and the "faster" the apparent audio will come out.

With the control all the way down the primary buffer will not be subdivided.

CV responds to -5V to +5V and adds to the knob position.

3. Mix

This controls the balance between the live input, and the audio buffer being processed.

CV responds to -5V to +5V and adds to the knob position.

6. Corrupt - Decimate / Dropout / Destroy

Pressing the Corrupt button will step through the various corruption modes.

The knob controls a variable range for each control.

CV responds to -5V to +5V and adds to the knob position.

Decimate

LED Color: Blue

Controls variable amounts of bit-crushing and downsampling.

Dropout

LED Color: Green

Controls the occurance of random audio dropouts.

There are less, but longer dropouts on the left side of the knob, and more, but shorter dropouts on the right side of the knob.

Destroy

LED Color: Gold

Controls an amount of Soft saturation and hard clipping applied to the signal.

The first half of the knob softly saturates, and the second half introduces absolute devastation.

Caution: this gets loud if using with signals that aren't modular level to begin with

7. Freeze

When enabled, no new audio will be recorded into the audio buffer, and whatever is there will stay there until Freeze is deactivated.

When Freeze is in its default latching mode (blue in the shift-edit menu) the freeze effect will activate on the next clock beat to ensure everything stays in sync.

When Freeze is in the momentary mode (green in the shift-edit menu) the freeze effect engages and disengages instantly.

When the Mix control is fully dry, engaging freeze will instantly set the mix to be fully wet. This allows for exciting performative gestures, and the queueing up of specific data bending actions, while letting the rest of your audio pass through unaffected until freeze is enabled.

All changes to Time, Repeats, Bend, and Break are not destructive. So feel free to mangle away without fear of losing your precious buffer.

Extending the time control down below where it was when the signal was frozen will introduce artifacts of old data from the last time the buffer was that size. Expect discontinuities, and fragments of your sonic history when twisting the time knob while frozen.

8. Clock

When activated, the clock input will be used as the source for the Time control, and the Time Knob/CV will control the divisions/multiplications of the clock that new audio will be recorded at.

While the module is in Internal clock mode the LED will blink blue at the rate of the internal clock.

While the module is in External clock mode the LED will blink white at the rate set by the external clock, and the multiply divide setting (based on the Time control).

If the module has not received an external clock for at least four beats (one measure) at the last recorded clock rate, the LED will illuminate a DIM white to indicate that there is no clock source present.

While there is no clock source, the clock will continue to run at the last rate until a new clock pulse is detected.

9. Mode

Selects between Macro mode (Blue) and Micro mode (Green).

These modes are described below, and change the way the Bend and Break controls work.

10. Shift

Used for Secondary functions, and additional features. When held, the controls listed below will perform their secondary actions.

Illuminates Blue when held.

- SHIFT + Time Knob - Glitch Windowing
- SHIFT + Bend Button - Stereo Behavior
- SHIFT + Break Button - Restore Settings
- SHIFT + Corrupt Button - Corrupt Jack as Reset Input
- SHIFT + Freeze Button - Freeze Behavior
- SHIFT + Clock Button - Gate Behaviors

Audio Inputs

Stereo Inputs

Expect a Modular Level signal, but will work with line level signals (However, certain things may make these very loud on the outputs after saturation, etc.)

The left input is normalled to the right input when nothing is connected.

Audio Outputs

Stereo Outputs

Modular Level signals, roughly in a range between input level and 14Vpp when using a lot of Corruption, etc.

Macro Mode

Macro mode is a set of 3 controls that have automated parameters based on the clock settings.

Set the knobs where you like them and let the Data Bender bend your data for you.

4. Bend

Bend provides manipulations that are inspired by the tape medium and its associated playback machines.

With this control you can experience the following effects: - Varispeed pitch changes - Reversed audio playback - Vinyl clicks and pops - Tape stop

Enabling/Disabling bend using the Gate or Button will toggle this control on or off.

When enabled (LED Blue), every clock division a certain manipulation of the playback speed and direction can occur.

When the knob is all the way down, the effect is disabled.

At the lowest settings, it will only have a slight chance to reverse the audio at the normal playback speed.

At the maximum settings, it can play back the audio forward or backward at various intervals, and will begin to introduce a slew to the changes in playback speeds.

5. Break

Break emulates the malfunctioning of digital audio devices such as CDs, wireless audio, and software bugs.

With this control you can experience the following effects: - Glitches and stutters similar to a scratched CD - Disjointed playhead movement - Synchronized Audio dropouts

Enabling/Disabling bend using the Gate or Button will toggle this control on or off.

When enabled (LED Blue), every clock division a certain manipulation of the number of repeats and playback position may occur.

when the knob is all the way down, the effect is disabled.

At the lowest settings, it will only have a slight chance to add additional repeats, or move to a new sub-section of the buffer

At the maximum settings, it can jump to any sub-section of the buffer, and has a high like-lihood to do so. It can also set the repeats to anywhere above where the knob is set, and add up to 90% silence to each repeat.

Micro Mode

Take control of the microcosms of destruction and failure with discrete controls for the module's parameters.

4. Bend - Playback Speed/Reverse

This control acts as playback speed going down 3 octaves and up 3 octaves

When the playback speed is forward the LED will be blue, unless it is on a specific multiple (octave) above or below the original playback speed. Then it will be cyan.

When reversing, the LED will be green unless it is on a specific multiple above or below the playback speed, then the LED will be gold.

Pressing Bend will toggle the playback to reverse.

5. Break - Traverse / Silence

Pressing the button or using a Gate will toggle between Traverse and Silence

When either the knob, CV or the Repeats setting changes the currently selected subsection, the Break LED will blip gold.

Traverse

When the LED is not illuminated the break controls subsection traversal, allowing you to select from each chunk of the active buffer.

On the far left of the knob, the first subsection will be selected.

On the far right of the knob, the last subsection (determined by Repeats) will be selected.

When Repeats is set to 1 (all the way left), this will have no effect.

Silence

When the LED is illuminated, the control acts as a duty-cycle for the amount of silence introduced.

On the far left of the knob, there will be no silence.

On the far right of the knob, 90% of the playback buffer will be replaced with silence.

Edit Functions

Glitch Windowing

Using SHIFT + TIME you can scale an amount of windowing to be applied to the individual stutters

When turning this all the way down there will be hard edges, and clicks will happen often. Great for Glitchy beats and Sound Effects.

When turning this all the way up, the glitches will be fully windowed, only reaching its full volume for a moment before fading back out. Great for Ambient Jamz.

While holding SHIFT, the shift LED will indicate the current amount of windowing.

- If the LED is off then there is no windowing applied.
- If the LED is blue, then the default minimal amount of windowing is applied.
- Beyond that, the LED will indicate from dim to bright white the amount of windowing applied.

The Restore Settings action will reset this to the default amount of windowing.

Restore Settings

While holding shift, pressing the Break button will restore all settings back to their defaults.

The LED for this button will pulsate white to indicate that it is the restore default settings function.

When pressed it will blink blue to indicate the settings have been restored to their defaults.

This sets:

- Windowing back to default windowing (2%)
- Bend disabled
- Break disabled
- Freeze disabled
- Mode to Macro Mode
- Stereo behavior to shared mode.
- Gates to Latching
- Break Jack set to primary function (not reset/sync).
- Freeze button behavior to latching mode

Gate Behaviors

While holding shift, the Clock LED will indicate whether the gates are configured as momentary or latching.

Pressing the button while holding shift will toggle between the two options.

When the LED is blue the gates are latching (each trigger input will toggle the state of the gated controls). When the LED is green the gates are momentary (an incoming gate signal will hold the state of the button on if it is off, as long as it is held high).

Stereo Behavior

While holding shift, the Bend LED will indicate the stereo behavior of the macro-mode controls.

Pressing the Bend button will toggle between these modes:

- Blue - Unique Mode: All automatic bend/break settings will be unique for each stereo channel.
- Green - Shared Mode: All automatic bend/break settings are set the same for both stereo channels.

Corrupt As Reset

While holding shift the corrupt LED will indicate whether the corrupt Gate input jack is configured as normal (blue), or as a reset input (green).

When configured as a reset jack, the corrupt input will cause the internal or external clock to resync.

This can be useful for synchronizing with a DAW or manually restarting the buffer, and randomizing Macro mode controls when running with a slow internal clock.

In internal clock mode, this will resync the internal clock immediately, causing new audio to load into the buffer, possibly resulting in silence during certain bend/break settings. This does move the playback heads into a reset position immediately which can cause clicks.

In external clock mode, this resets the subdivision counter to align the divided clock with an external beat. This will take effect on the next.

Freeze Behavior

While holding shift, the Freeze LED will indicate the behavior of the Freeze Button.

Pressing the Freeze button while holding shift will toggle between these modes:

- Blue - Freeze button is latching, releasing the button will toggle the state between frozen and unfrozen, on the next clock cycle.
- Green - Freeze button is momentary, pressing the button engages freeze instantly, releasing the button disengages.

## Storing Settings Between Power Cycles
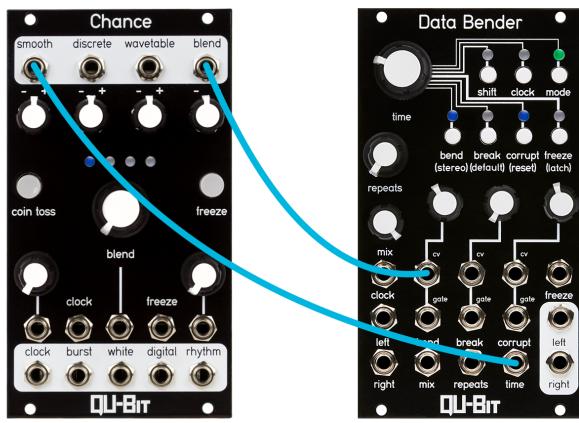
Several Settings are stored between power cycles. Settings are stored whenever the SHIFT button is released, as frequently as once every two seconds.

The following settings are stored:

- Bend state
- Break state
- Corrupt Mode
- Clock source
- Processor Mode (Micro, Macro)
- Stereo Mode (Unique, Shared)
- Windowing amount
- Latching/Momentary gate behavior
- Latching/Momentary freeze button behavior
- Corrupt as Reset behavior

Example Patches

Lo-Fi Tape Machine

Turn your Data Bender into a lo-fi tape machine with control over pitch & tape speed, pops, noise and audio dropouts.
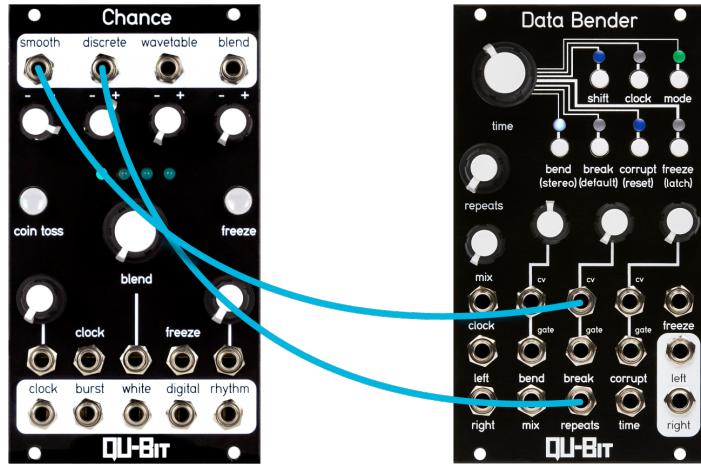
Modules: Data Bender, Modulation Source (Qu-Bit Chance)

Data Bender Settings:

- Mode: Micro
- Mix: 100%
- Time: 30%
- Repeats: 0%
- Bend: ~45%
- Corrupt: ~45%
- Glitch Windowing (SHIFT-TIME): 0%

In Micro Mode, Bend acts as a live pitch and speed manipulator, with the option of reversing the buffer. Corrupt adds subtle white noise, audio dropouts, or tape saturation depending on your mode preference. By sending CV into the Bend CV IN and TIME IN, variations in pitch, speed, and tape pops lend to an organic tape experience.

CD Skip

Bring back the nostalgia of early 2000's roadtrips using Data Bender's discrete buffer control.
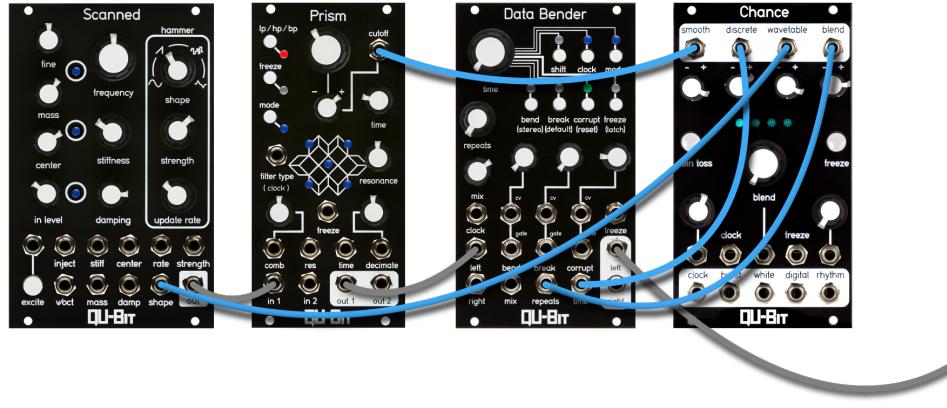
Modules: Data Bender, Modulation Source (Chance), Clock Source (if desired)

Data Bender Settings:

- Mode: Micro
- Mix: 100%
- Time: 30%
- Repeats: 0%
- Break: 0%
- Break Mode: Traverse (LED off)
- Glitch Windowing (SHIFT-TIME): 0%

In Traverse Mode, Break divides the buffer into subsections who's amount is determined by the Repeats knob. The higher the repeats, the more subsections. By sending modulation to Repeats moving the parameter from no subsections to 2 or more, break is able to sweep through the subsections. This emulates the skipping of a song due to a CD scratch. Using a Clock source to sync the scratches can turn the skip into a circular skip emulation, bringing out the best and worst of listening to old CD's.

Ghost In The Machine

Modules: Data Bender, Sound Source (Scanned, Prism), Modulation (Chance)

I'm sorry Dave, I'm afraid I can't patch that.

Data Bender Settings:

- Mode: Macro
- Mix: ~75%
- Time: 0%
- Repeats: 0%
- Clock: Internal
- Corrupt Mode: Dropout
- Corrupt: ~25%

The main voice is built with Scanned, our organic wavetable VCO, and Prism. Scanned provides the complex oscillation while Prism dials in the vocoder-esque timbres with the bandpass filter and decimator. This patch is all about chaos, for which Data Bender's Macro Mode is perfect. CV is sent from Chance to Data Bender's TIME and REPEATS CV inputs. Mix is brought up to introduce "unwanted glitches" and audio cuts using Corrupt's Dropout Mode.

To get even more out of this patch, sending random CV to Scanned's v/oct brings the ghost

out even more, or Mult Chance's outputs to all of Data Bender's CV and GATE inputs for a complete takeover!