BUFFRE

Operation Manual

Re
Rack Extension

PEFF

Introduction

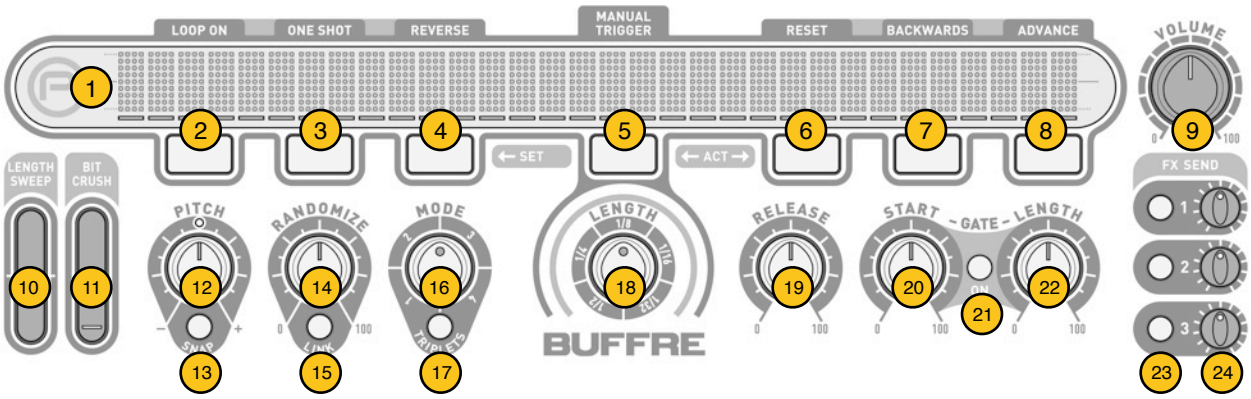
Buffre Beat Repeater is an audio looping effect that repeats and scrubs audio in sync with song tempo. Designed exclusively as a Propellerhead Reason Rack Extension, Buffre is a *performance* effect, controllable in real-time from a MIDI keyboard or control surface, and supports Reason control voltage routings for creating modular-based stutter and glitch effects.

Audio signals are continuously captured by the Buffre loop engine, and at the moment the effect is triggered, sampled audio repeats until the trigger is released. Loop duration is selected by pressing different keys on the MIDI keyboard, and adjusting the pitch wheel increases the repetition speed for accelerating 'drill' effects. The loop engine features several playback modes and can process audio segments from two measures down to a 4096th note.

Buffre features real-time *reverse* loop playback and sample rate control. Instantly add a backwards drum hit by switching to reverse mode, or adjust the pitch control to mimic the sound of a *tape stop* or *spin up*. Also, by capturing and manipulating extremely short audio loops, Buffre can synthesize *granular* audio textures.

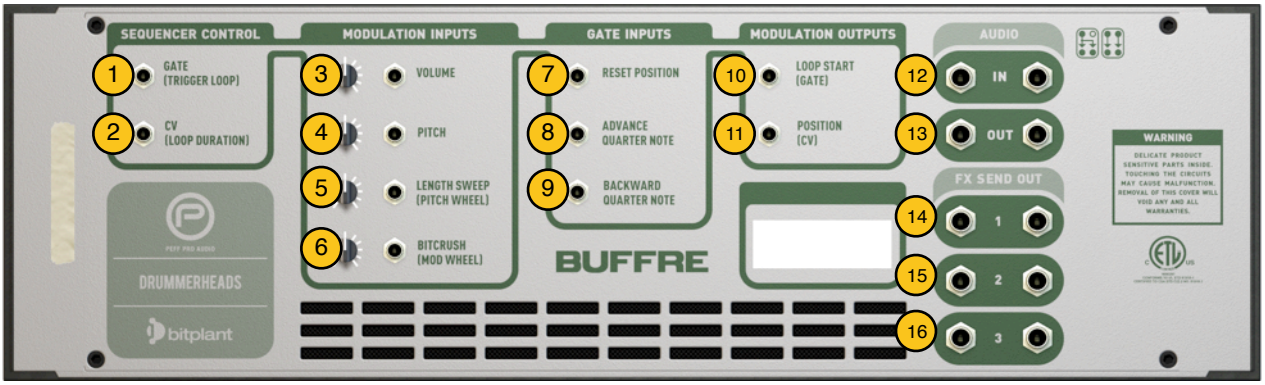
This manual is prepared to provide in depth understanding of all of the features and capabilities of Buffre.

Control Overview



#	Control	Function
1	**Main Display**	Waveform and Loop Position Indicators
2	**Loop On Button**	Enables Loop Repeat Mode
3	**One Shot Button**	Enables One Shot Mode
4	**Reverse Button**	Reverse Audio Playback Mode
5	**Manual Trigger Button**	Front Panel Effect Trigger
6	**Reset Button**	Forces Loop Position back to start point
7	**Backwards Button**	Shifts Loop Section back 1/4 note
8	**Advance Button**	Shifts Loop Section ahead 1/4 note
9	**Volume Knob**	Main Output Level Control
10	**Length Sweep Wheel**	Loop Duration Control
11	**BitCrush Wheel**	Digital Distortion Effect
12	**Pitch Knob**	Adjust the Loop Pitch / Sample Rate
13	**Snap Button**	Enables Half Step Divisions of Pitch Knob
14	**Randomize Knob**	Random Start Position Control
15	**Link**	Stereo Link Randomize control
16	**Mode Selector**	Play Back Mode Switch
17	**Triplets Button**	Enables Triplet and Dotted Divisions
18	**Length Knob**	Manual Trigger Length Control
19	**Release Knob**	Loop Smoothing Effect
20	**Start Knob**	Gate Start Position Control
21	**Gate Button**	Enables the Gate Effect
22	**Length Knob**	Controls the duration of the Gate Effect
23	**FX Send Buttons**	Enables / Disables signal routing to FX Sends
24	**FX Send Knobs**	Controls the levels to FX Sends

Rear Panel Connections

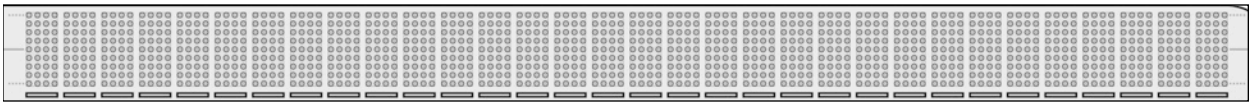


#	Connection	Function
	Sequencer Control	
1	**Gate (Trigger Loop)**	Sequencer Control Gate and CV Signals must be received as a pair to engage the loop engine. Connect to a Matrix or Thor Step Sequencer
2	**CV (Loop Duration)**	
	Modulation Inputs	
3	**Volume**	CV In - Unipolar Control for volume
4	**Pitch**	CV In - Bipolar Pitch Control
5	**Length Sweep**	CV In - Bipolar Pitch Control
6	**BitCrush CV**	CV In - Unipolar BitCrush Control
	Gate Inputs	
7	**Reset Position**	Gate In - Resets the Loop Start
8	**Advance Quarter Note**	Gate In - triggers the Advance function
9	**Backwards Quarter Note**	Gate In - triggers the Backwards function
	Modulation Outputs	
10	**Loop Start**	Gate Out - Trigger sent at the start of a loop
11	**Position**	CV - Unipolar value that corresponds to position
	Audio	
12	**Audio Inputs**	Stereo or Mono Audio Connection
13	**Audio Outputs**	Stereo Audio Output Connection
	FX Sends	
14	**FX Send 1 Outputs**	The FX Send outputs send audio signals that are currently looping. The signal level is post fader relative to the volume control
15	**FX Send 2 Outputs**	
16	**FX Send 3 Outputs**	

Main Display

The 32 Segment Display Unit provides visual feedback of audio signals and processes occurring in the loop engine. During normal operation, the waveform scrolls from right to left, indicating that incoming audio is being captured and primed for immediate looping. When looping is engaged, waveform scrolling stops and the loop position indicator lamp appears below the waveform segments*. This is the default display behavior corresponding to Past playback mode.

If Play Mode is set to Current or Current BW<->FW, The display will start scrolling from left to right, indicating that incoming audio is still being captured as the loop process is engaged.



The Visual Display. Waveform segments appears in the upper blocks, and loop position is indicated on the moving lamp below.

Beat Repeat Triggers

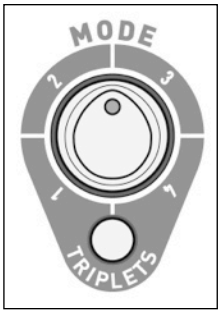
Buffre is designed to operate with a MIDI Keyboard, and this requires an associated sequencer track assigned to the device. Adding it to the INSERT FX path of a Mix Channel or Audio Track will not automatically add a track, and you will need to manually create a corresponding sequencer lane using the “Create Sequencer Track” Edit menu item.

MIDI Keyboard Trigger
Pressing a key in the range of D1 to F3 engages the beat repeat effect. Each note corresponds to a different loop length which is tied to the song document tempo settings. Pressing D1 initiates a loop with a half note duration, and the loops become progressively shorter as you play up the keyboard. The key arrangement leads with an even time division, then a dotted time division, then a triplet time division, and then returns to an even division. For example, pressing F1 triggers a quarter note loop which is four 16th steps. F#1 triggers a Dotted Eighth Note loop (three 16th steps); and pressing G1 triggers a Quarter Note Triplet loop (2/8T steps). The next key, G#1 returns to an even division of an Eight Note (two 16th steps).

Every three keys, or three half steps, the repeat duration is halved. For example, Note F1 is a 1/4 note division, move up the scale three keys to Note G#1, the division is an 1/8th note; move another three keys to Note B1, the division is a 1/16th note.

*At high tempo loop cycles the display may not respond as expected due to graphics aliasing.

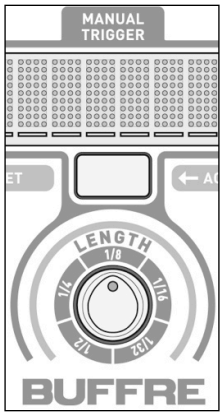
Beat Repeat Triggers (cont)



Triplets Button
When the **Triplets** button is disabled, dotted and triplet divisions are filtered out. Even loop division times are mapped to the keys which would normally trigger dotted and triplet divisions. Consult the **Keyboard Mapping chart** for information on time divisions.

CV/Gate Trigger
Buffre features sequencer control CV/Gate inputs which receive events from modular sources such as the Matrix Pattern Sequencer, Thor, or the RPG-8 Arpeggiator. Beat Repeat triggers respond to note values in the range of **D1** to **F3**, and both a Note CV and Gate trigger must be received in order to engage the loop engine.

Manual Trigger
In addition to MIDI and control voltage trigger controls, the front panel has a Manual Trigger Button which engages a loop determined by the Length Knob. These controls provide quick access to the beat repeater function. The Manual Length controls are limited to 1/2, 1/4, 1/8, 1/16, and 1/32 loop lengths .



The main purpose of the Manual Trigger and Length Controls is to provide quick access for those without a MIDI Keyboard, and also provides a remote override access point for those using a pad controller or alternative control surfaces. Also, the Manual Trigger button can be used as Combinator target which streamlines the programming of live looping effects.

Trigger Priority and Behavior
Trigger Priority is given to the last event received. This applies to all methods of triggering the beat repeater loop. Each time a Note On event is processed, the loop engine recalculates the start point. If notes are played *legato,* or if you hold down more than one key to form a chord, each successive note re-triggers the loop engine. When individual notes of the chord are released, the loop engine will refresh and start a new loop. This manner of control can lead to some interesting results, however monophonic performance typically yields the best results when controlling Buffre.

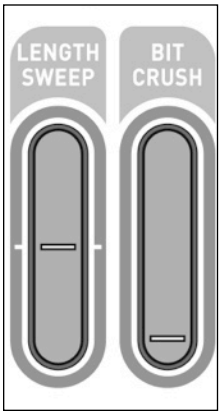
Keyboard Mapping

The following table maps the division arrangement on the MIDI keyboard. These values also apply to NOTE CV from a step sequencer device.

Key	Division Triplets On		Division Triplets OFF	
F3	1024th Note	1/1024	1024th Note	1/1024
E3	512th Triplet	1/512T		
D#3	dotted 1024th	3/1024		
D3	512th Note	1/512	512th Note	1/512
C#3	256th Triplet	1/256T		
C3	dotted 512th	3/512		
B2	256th Note	1/256	256th Note	1/256
A#2	128th Triplet	1/128T		
A2	dotted 256th	3/256		
G#2	128th Note	1/128	128th Note	1/128
G2	64th Triplet	1/64T		
F#2	dotted 128th	3/128		
F2	64th Note	**1/64**	64th Note	1/64
E2	32nd Triplet	1/32T		
D#2	dotted 64th	3/64		
D2	32nd Note	**1/32**	32nd Note	1/32
C#2	16th Triplet	1/16T		
C2	dotted 32nd	3/32		
B1	16th Note	**1/16**	16th Note	1/16
A#1	Eighth Triplet	1/8T		
A1	dotted 16th	3/32		
G#1	8th Note	**2/16**	8th Note	2/16
G1	Quarter Triplet	2/8T		
F#1	dotted 8th	**3/16**		
F1	Quarter Note	**4/16**	Quarter Note	4/16
E1	Half Triplet	4/8T		
D#1	dotted Quarter	**6/16**		
D1	Half Note	**8/16**	Half Note	8/16

Performance Controls

Length Sweep



The Length Sweep control scales the duration of audio cycled in the loop engine. When the Length Sweep parameter is increased, the duration is reduced, thus accelerating the repeat rate. When set to 100%, the loop duration is four times shorter, so if you are looping a 1/2 note segment and raise the control to 100%, the loop gradually shortens an eighth note segment. (yes, it's cool!)

Decreasing Length Sweep has the opposite effect and makes the segment longer, effectively slowing the beat repeater rate. When set to -100% the loop duration is four times longer. If you are looping a 1/4 note section and lower the Length Sweep to -100%, Buffre cycles through a full measure of audio.

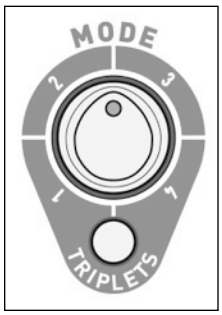
The Buffre display normally depicts a full measure of audio stored in the loop engine, however if the duration exceeds the scope of the display, you will only one measure will be visible and the buffer position indicator will stop until playback cycles back to the beginning of the loop.

Bit Crush

Bit Crush is a type of digital distortion which can be applied to audio in the Buffre loop engine. Increasing the control intensifies the amount of distortion applied. The Bit Crush Amount parameter is mapped to the mod wheel, so this effect can be scaled in as part of the performance or recorded to a note clip in the Reason Sequencer.

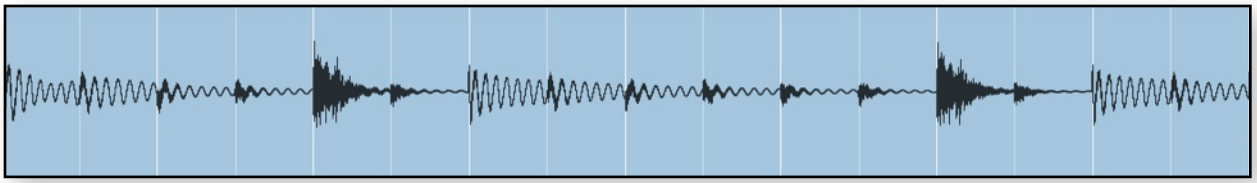
In actuality, the downsampling treatment in Buffre is a sample dump or skip. As the amount is increased, more samples are skipped, effectively reducing the sample playback rate. One minor issue that arises from this process is the fact that there are a different number of samples being dumped depending on the system sample rate. There is a difference in tonal character between 44.1kHz and 48kHz playback, however there is no difference between multiples of a base sample rate such as 48kHz to 96kHz. If you work at a lower sample rate and render at a higher sample rate, it's recommended that you either render out at the original rate, or work at a multiple of the target rate at which you plan to render.

Playback Modes



The beat repeater effect is simply the process of looping a section of audio stored in memory. Typically, the effect initiated for a short period to inject a burst of rhythmic looping audio, and then released allowing normal audio signal to continue playing. Part of this process is the capturing and storage of audio and part of the process is playback.

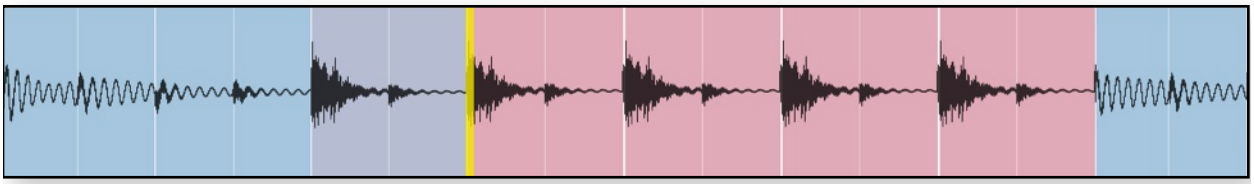
Up to two measures of audio is captured by Buffre, and the manner of storage and reproduction is dependent on the Playback Modes: Past, Past (BW<->FW), Current, or Current (BW<->FW).



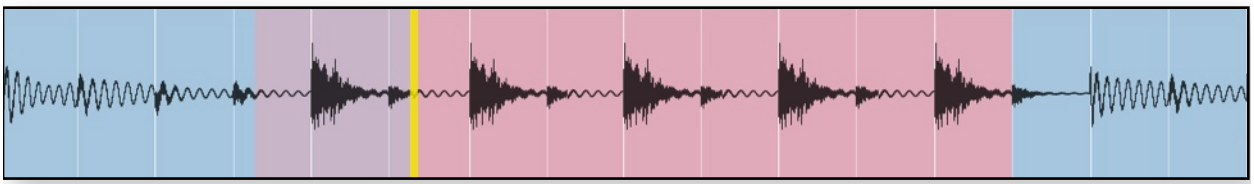
Waveform of a one-measure drum loop. The following illustrations refer to this as the baseline of an unprocessed signal.

Mode 1: Past

When Buffre is triggered in Past Playback Mode, a section of pre-sampled audio is looped, and the incoming audio signal is muted until the trigger is released. The loop duration also determines the playback start position. The image below depicts a series of 8th note segments looping after the trigger is received. The looped audio is stored, prior to receiving the trigger.

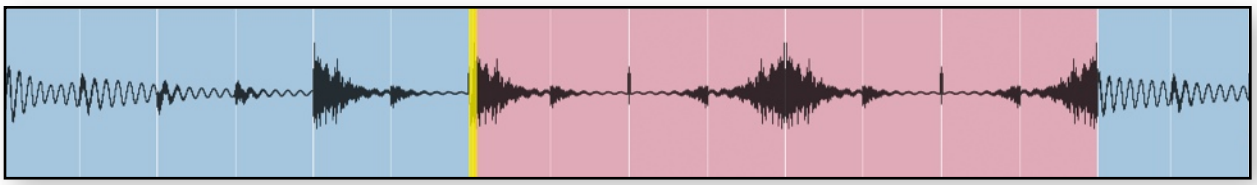


With “even” time divisions, such as Quarter or Eighth notes, Past Playback Mode is more forgiving with high latency setups or with late trigger events (this is a nice way of saying ‘bad timing’). Enabling the effect, moments after a snare hit, renders a synchronized “drum roll”.

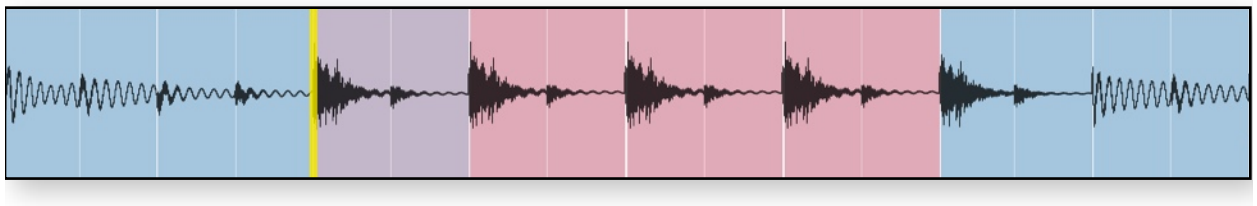


Playback Modes (cont)

Mode 2: Past FW<->BW
The FW<->BW or Palindrome Mode introduces reverse playback to the loop. When the beat repeater is triggered, playback starts from a stored memory point and plays forward to the end of the time division. Playback then reverses from the end position back to the start position, and continues to loop back and forth until the trigger is released. With both a forward and backward aspect to the effect the total loop time is twice the time division.



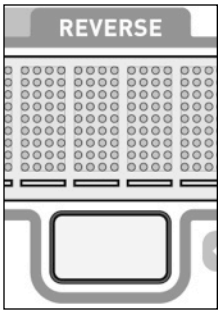
Mode 3: Current Mode
Current Mode is the most common form of the beat repeat effect that engages at the time a trigger event is received. When triggered incoming audio is stored to memory up to the end of the time division, then loops continuously until the trigger is released. To repeat the transient of a drum, the effect must be triggered in anticipation of the hit.



Mode 4: Current FW<->BW
Current Palindrome is initiated when a trigger is received. During the first segment of the time division, the output sounds exactly the same as the incoming signal, on the second segment of the time division, the audio playback is reversed.

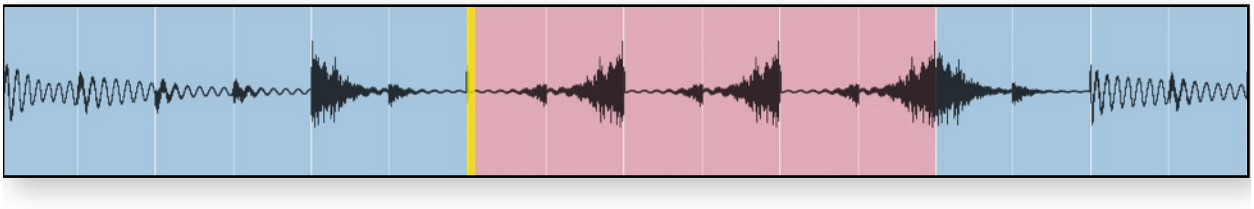
When the loop engine is triggered with a 1/16th note duration (B1) right on or before a transient, Current FW<->BW Playback simulates a vinyl scratching effect.

Reverse Mode



The Reverse Button alters the direction of loop playback. This allows for instantaneous reversing of live audio signals. The actual behavior of the reverse function varies on the Play Mode.

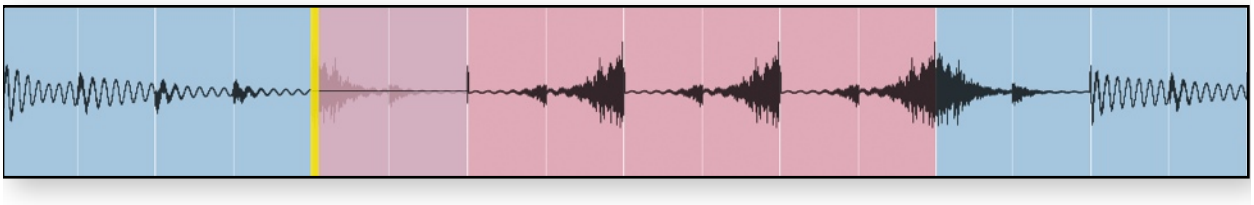
Past Mode + Reverse
In Past Mode, the effect has immediate access to pre-sampled audio, and when a trigger is received, the effect will immediately start reversing the audio playback and sound as if the loop is rewinding. The loop will continue to loop backwards until the trigger is released.



Current Mode + Reverse
Current Playback Mode fills the buffer after the effect has been triggered, so sometimes there will be a gap of silence for one cycle before the loop begins to play backwards.

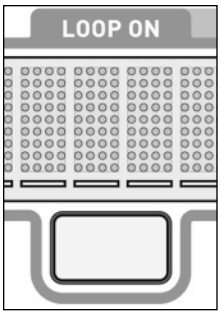
Reverse Mode (cont)

On occasion there will be some leftover data in sample memory, and when a trigger is received, that portion of data will be played in reverse as the memory fills with incoming audio information.



Reverse + FW<->BW
When Reverse is enabled and playback is set to either current or past palindrome modes, the initial direction is reversed. This effectively changes the playback direction from Backwards to Fowards (BW<->FW).

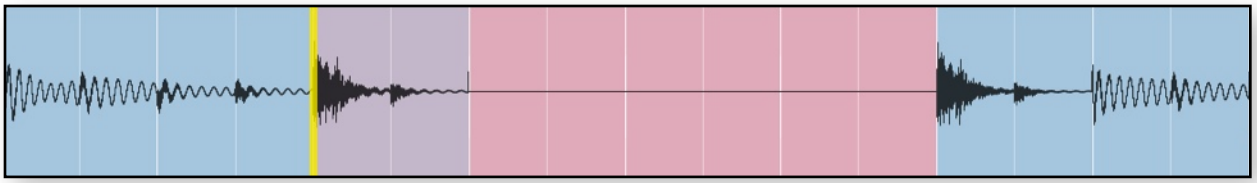
Loop On



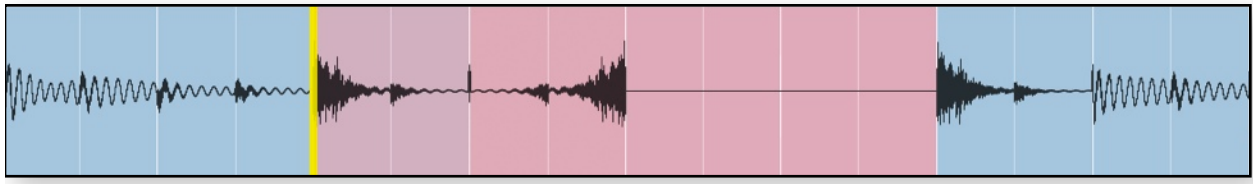
On occasion you may need to restrain the beat repeat effect and limit playback to only one cycle, and there are two different controls which limit loop cycling. These are the *Loop On* and *One Shot* controls.

Loop On
For normal repetitive beat repeat effects, the Loop On button must be enabled. When the button is disabled, the repeater effect will playback one cycle then cease all playback until the trigger is released. When the trigger is released, the incoming audio passes through normally. Switching the button on again, while holding the trigger, resumes normal loop playback.

Current + Loop On Disabled
When in Current Playback Mode, Buffre simply becomes a triggered gate. The incoming audio passes through for the duration of the loop trigger, and at the end of the loop, playback stops.



Current (FW<->BW) + Loop On Disabled
With Buffre is set in either of the pendulum (FW<->BW) modes, playback will cycle through both the forward and backwards phases of the cycle then stop until the trigger is released.

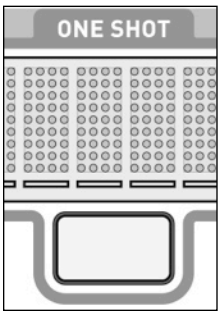


Loop On (cont)

Loop On Disabled with the beat repeater engaged
Loop On can be disabled while a repeater loop is already engaged, allowing you to end and silence the audio signal. If the Loop On button is disabled during the first cycle of the loop, playback continues until the end of the cycle, and then stops. If the repeat effect has gone through one or more loop cycles, audio will immediately stop if the button is switched off. If you continue to hold the trigger and switch the button on again, playback continues at the point where it stopped.

This feature can be used in conjunction with the Reset, Backwards Quarter, and Advance Quarter buttons and control voltage inputs. Pressing the Reset Button will retrigger and override playback start position allowing you to create time distortion effects. This is covered in more detail in the **Position Actions** section.

One Shot Mode

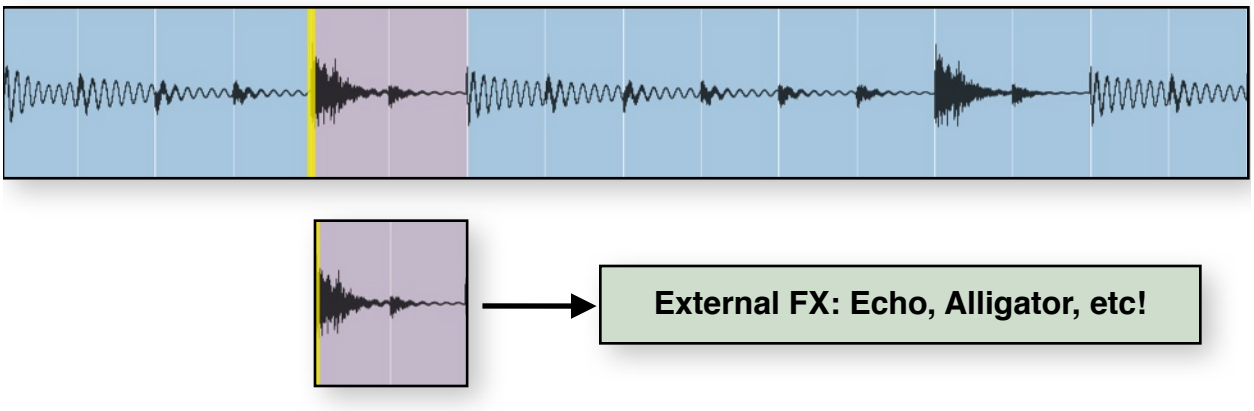


Another method of limiting loop playback is achieved by enabling Buffre One Shot Mode. While similar to disabling Loop On, the One-Shot Mode button differs in terms of controls and response. With One Shot Mode enabled, the trigger needs only to be touched momentarily to engage the loop engine. At the end of the playback cycle, incoming audio passes through normally.

One Shot Mode is more suited for performance configurations where you only need to tap the trigger and move on. For example, set Buffre to Past Playback with Reverse, and then click on the Manual Trigger button to engage a one shot reverse sweep.

Current + One Shot

It's important to note that you will hear no effect when One Shot Mode is enabled in Current Playback Mode. When triggered under these conditions, a segment of audio passes directly to the main and FX Send outputs. If you're only monitoring the main outputs, you will hear no audible difference, however when used in conjunction with the FX Sends, this is very useful for sending audio bursts to other devices.

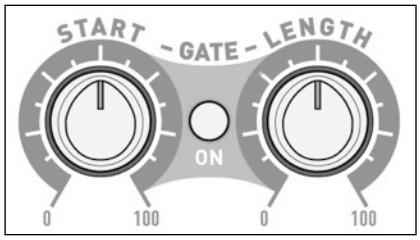


With this configuration, Buffre can be used as momentary FX gate control. Refer to the example, **Triggered FX Sends**.

Gate

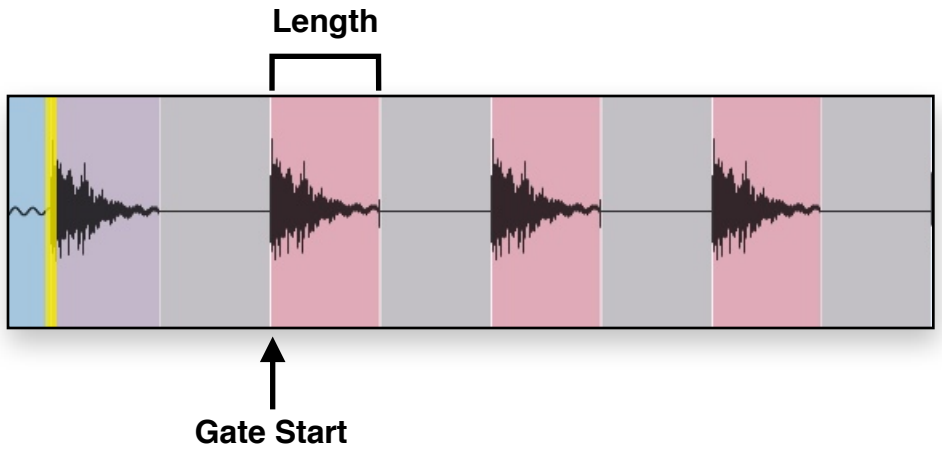
Loop playback can be modified with the built-in gate functions. Using the Gate functions, you can close the playback window to a fraction of the loop length and also alter which segment of the loop you want to hear. When Buffre is looping a segment of audio, you will only hear the portion defined by the gate parameters: The Gate On button and the Gate Start and Gate Length Knobs.

Gate On
The Gate On button enables or disables the effect.

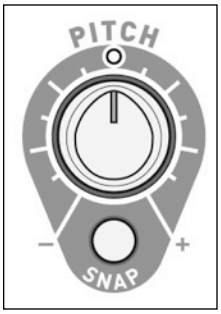


Gate Start
The Gate Start parameter sets the position where audio is rendered from the loop. This ranges from 0%, the start of the loop to 100%, the end of the loop. By default Gate Start is set to 0%.

Gate Length
The Gate Length determines the duration the gate stays open as a fraction of the loop segment. The default setting is 100% or the entire loop length.



Pitch Control



Audio being looped by Buffre normally plays back so that repeated events sound identical to the original audio signal. Playback speed, or more accurately, playback sample rate can be manipulated by using the Pitch Knob or Keyboard Transpose controls. Because manipulation of the sample rate directly alters both pitch and time, this process will alter the looping cycle speed, and looping loses synchronization with the song document tempo.

The Pitch Knob scales the sample rate between -4 Octaves and + 4 Octaves. This translates to 16 times slower than original speed up to 16 times faster than original playback speed. Pitch can be adjusted in real-time to simulate the effect of a tape stop. This works particularly well with a 1/2 note or longer playback loop.

Pitch (Cents)
The default setting for the Pitch knob is a percentage mode where the sample rate is altered freely between -4800 cents and +4800 cents. A lamp indicator at the 12:00 o'clock position directly above the knob will illuminate when the value is anything but zero. As you move the knob away and back towards 0, the knob position will snap at the vertical point and the lamp will go off. The scaling is non-linear and non-symmetrical by design. If you prefer a linear scale, switch to Pitch Step mode by pressing the SNAP button.

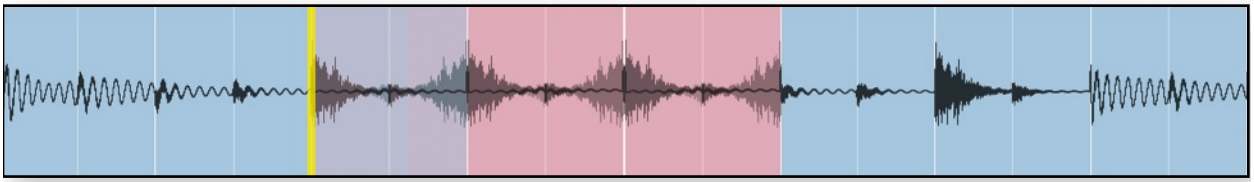
Pitch (Half Steps)
When the Pitch Snap Button is enabled, the Pitch control knob changes to a stepped scale that alters the setting in half step, or 100 cent, increments. The 12:00 o'clock position is zero. Adjusting the knob counterclockwise will decrease the pitch and playback speed in half step increments down to -48 half steps or 4 Octaves. Adjusting the knob clockwise from zero will increase the pitch in half step increments up to +48 or 4 Octaves.

Keyboard Pitch Control
The loop engine sample rate can also be altered via MIDI by pressing a key in the two octave range between C-1 and C1. C0 sets the playback pitch to normal. Playback speed/pitch increases in half steps for one octave up to C1, and decreases in half steps from C0 down to C-1.

When a Keyboard Pitch Transpose message is received, the Pitch Control knob is defeated while the transpose key is held down. When the key is released, Buffre resumes looping at the amount set by the Pitch Knob.

Release Control

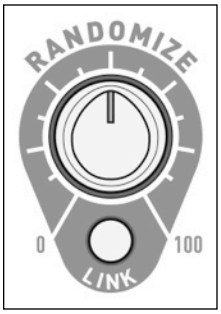
The Buffre Release knob controls the amount of a sweeping reverse layer added to the playback of looping audio. This creates a smoothing effect of the loop window as the reversed audio increases in loudness as the cycle nears the end of the loop and returns to the beginning of the loop.



When using the Release feature, timing does become an issue. The process is most apparent when a trigger is right on the transient of a drum or percussion hit. If the trigger is early or late, the reversed audio will be rendered by the audio in the gap preceding the transient. When triggered simultaneously with a transient drum hit, the reversed audio creates a smeared transition.

Release is also useful when you start working with capturing granular elements in the 1/128th note divisions and smaller. This process can modify the harmonics of extremely short looping segments.

Randomize

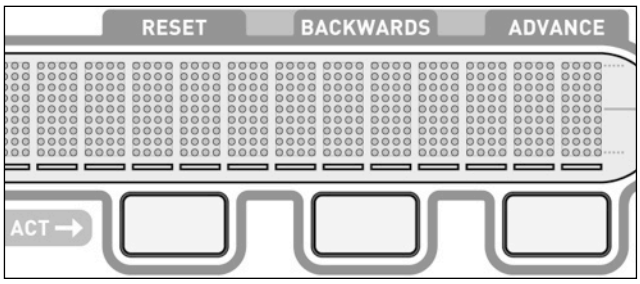


The Randomize Knob controls a playback modulation that randomly alters the start point of the loop, creating a slight shuddering movement of the processed loop. The Right Channel and Left Channel start points are modulated separately which creates a stereo widening effect. This feature is particularly useful for transforming granular hits to create stereo textures.

Enabling the “Link” button assigns the identical random modulation to both the left and right channels, keeping the variation equal for both sides of the signal. The start point and looping characteristics are randomized, but there is no stereo separation.

Position Actions

Three buttons comprise the playback action controls: Reset, Backwards Quarter and Advance Quarter Buttons. Pressing one of these buttons shifts the looping segment. If the loop engine is not engaged by a trigger, these buttons have no effect.



Backwards Quarter
Pressing the Backwards Quarter Button shifts the playback loop segment backwards by a quarter note. You can continue to shift the playback segment until you reach the beginning of the audio stored in memory. When you shift the segment backwards, the display will scroll to update the loop section. When a loop is triggered, the segment starts at the zero position, and you will not be able to shift backwards.

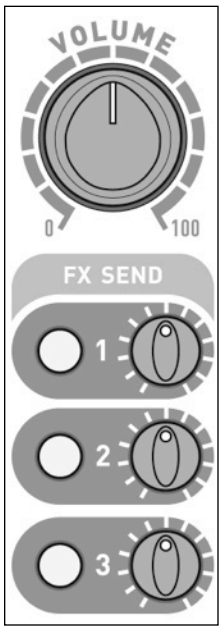
Advance Quarter
Pressing the Advance Quarter button shifts the playback loop segment forward by a quarter note. You can press the Advance Quarter button several times until you reach the end of the audio stored in memory, and the waveform segments will shift to correspond to the section of audio being looped.

Reset
Pressing the Reset button immediately forces the loop to restart at the beginning of the loop cycle.

Loop On Disabled
As previously described, when the Loop On button is disabled, audio stops playback when the loop reaches the end of the cycle. If a loop is held in memory, pressing the Reset button will restart the loop for another cycle. When Buffre is in Current Play Mode mode with Loop On Disabled, the device acts as a sampler which then allows you to play the sample by pressing the Reset Button or triggering Reset with a Gate Trigger.

Position Gate Inputs
These controls can also be triggered by Gate signals connected to the input sockets on the back panel of Buffre.

Output Level Controls



The Volume and FX Send controls scale the output signal levels of Buffre. Unlike typical Reason device designs where unity gain (0 dB) is established at a setting of 100 or 75% of the control scale, Buffre sets unity gain* to the 12 o'clock position.

From center clockwise, the output level is scaled from 0 dB to +6 dB, and from the center counter clockwise, output level is scaled from 0 dB to -inf dB (silence). This makes it more flexible to create crossfader effects either with control voltages or with combinator modulation routings.

Volume
The Volume knob controls the output level directed to the main audio outputs. Both audio processed in the loop engine and the input signal gain are adjusted by this control.

FX Send Controls
Buffre has three stereo auxiliary FX sends which feed the output of loop engine only, so the input signal is never directed to the FX Send sockets. While the effect is not engaged, no signal passes to the FX Send outputs.

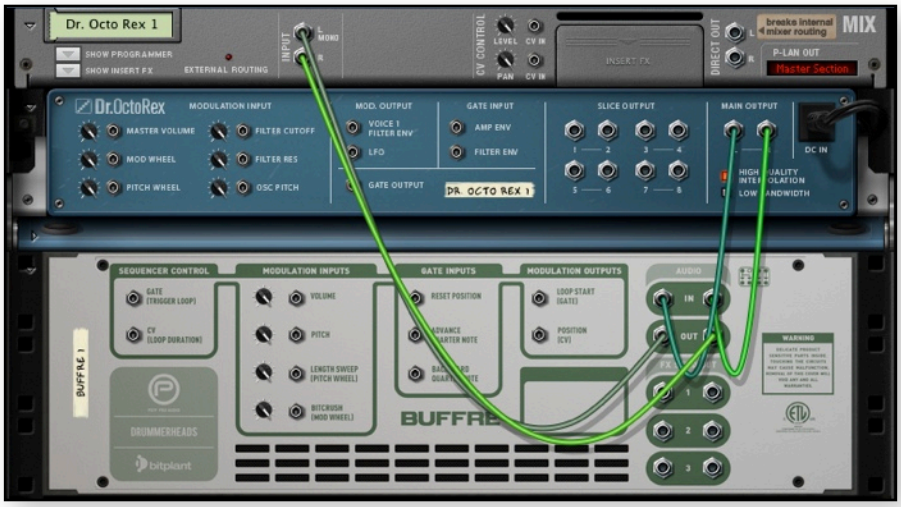
The FX Send Knob scales the levels directed to each corresponding output socket. This control is a "post fader" value, which means that it is also scaled by the Volume control. Each FX Send routing also has a control button that acts as mute switch.

**Unity Gain* or *0 dB* means that there is no change in signal level.

Drum Loop Beat Repeater

The main purpose of Buffre is to apply beat repeater effects to Reason drum and percussion sources such as a Kong Drum Designer, Dr.OctoRex or Redrum Drum Computer. The signal from a drum source is routed through Buffre into a Reason Mix Channel device. The example below describes how to configure this setup:

1. In an empty song session, create a Dr.OctoREX Loop Player, and load a Rex Loop or Dr.OctoREX drum patch.
2. Make sure the Dr.OctoREX is selected (you will see a solid line surrounding the device).
3. From the Create Menu \ Creative FX submenu, Select “Buffre Beat Repeater”. This will add the device to the rack and automatically cable it as an insert effect between the Dr.OctoREX and the MIX Channel device.
4. Press Play on the Sequencer Transport and as the loop plays, start pressing keys on your MIDI keyboard in the range of D-1 to F4 to engage the beat repeater effect.



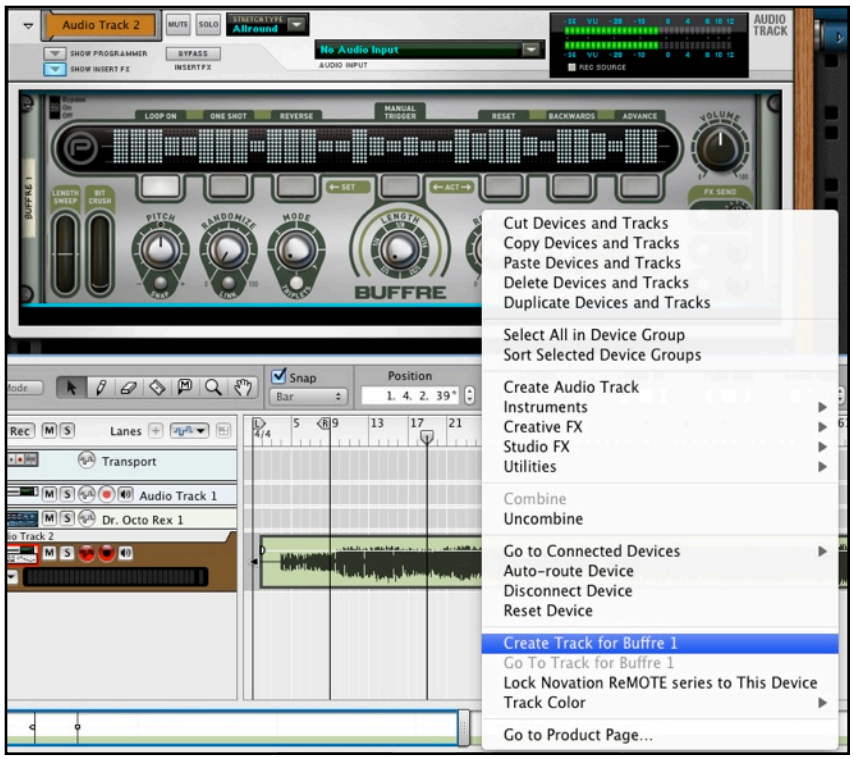
For those new to the concept of Beat Repeaters or those having difficulty getting ideal results, try the following recommended settings:

1. Set MODE (Play Mode) to position 3, “Play Mode: Current”. The loop will repeat from the moment Buffre is triggered.
2. Disable the “TRIPLETS” button. This sets Buffre to only loop in even segments: 8 steps, 4 steps, 2 steps, 1 step, etc. This mode is ideal for works in 4/4 or 2/4 time signatures.

Audio Track Beat Repeater

The beat repeater effect can also be applied to Audio Tracks, such as vocals or other melodic parts. While there are several ways to accomplish this in Reason and Reason Essentials, the most common approach is to use Buffre as an insert effect and nest the device in the Audio Track Sub Rack. The example below describes the process of implementing Buffre as an Insert Effect on an Audio Track device, and configuring MIDI Keyboard control:

1. In an empty song session, create an Audio Track device, and import an audio file. If you do not have an audio file, you may also import a REX loop to the audio track.
2. On the Audio Track device, press the “SHOW INSERT FX” button to expand the insert effect section.
3. From the Create Menu \ Creative FX submenu, Select “Buffre Beat Repeater.” This will add the device to the rack and automatically cable it as an insert effect.
4. Click on the BuffRe device to select it, and right click to open the contextual menu. From the contextual Menu, select the “Create Track for BuffRe” item. This adds a sequencer track tied to BuffRe and routes MIDI directly to the device.
5. Press Play on the Sequencer Transport and as the loop plays, start pressing keys on your MIDI keyboard in the range of D-1 to F4 to engage the beat repeater effect.



Buffre Loop Start CV

Buffre features a Gate CV trigger output that can be used to trigger other devices that receive Gate inputs such as the Redrum Drum Computer or Kong Drum Designer. This allows you to layer rhythmic elements in time with looping audio. The following example project illustrates how to set up this configuration to use Buffre as a repeating drum trigger. For this example, the Buffre is only used as a Gate CV generator; audio will not be processed through the device.

1. In an empty song session, create a Kong Drum Designer.
2. Click on the Kong Patch Browser, and load the patch “Kong Kit.Kong” from the Factory Sound Bank / Kong Patches directory.
3. Hold down the Shift Key to bypass autorouting and add a Buffre Beat Repeater from the Create Menu \ Creative Effects sub menu.
4. Hit TAB to view the rear of the rack.
5. Connect Buffre’s Modulation Output “Loop Start” socket to Kong Drum 3 Gate In socket.
6. Hit TAB to return to the front rack panel.
7. On Reason’s Sequencer, verify that the focus is set to the track “Buffre 1”, and start playing keys in the range of D1 to F3. You will see the position locator scroll and will hear a hi hat being triggered at the beginning of each loop cycle.

As you trigger the Kong Hi Hat from Buffre, try playing legato notes. You will notice that the divisions tend to become less accurate. Releasing a Key before pressing another key renders more accurate divisions. This also applies to beat repeat triggers.

Live Sampling Buffre

After some experimentation with Buffre, you will come to see that it has amazing creative properties for sound manipulation and sound design, especially when you start working with loop segments that are in the range of 1/128th notes to 1/1024th notes. This is the realm of granular synthesis where looped audio takes on a new character. Experimenting with these types of tones often leads to new ideas, and it is important to have a way to quickly capture and save ideas. Buffre's FX sends were designed to provide an access point for resampling, and the example below demonstrates how to configure this setup and start building a palette of lo-fi bitcrush drum tones.

1. In an empty song session, create a Dr.OctoREX and load a few drum loops.
2. From the Create Menu \ Creative FX submenu, Select "Buffre Beat Repeater" to add the device as an insert effect between Dr.OctoREX and the Mix Channel.
3. Press the TAB key to flip to the rear of the rack.
4. Locate the Sampling Input on the Audio I/O device, and disconnect the cables coming from Audio Input 1/2 (default settings).
5. Connect Buffre FX Send 1 Outputs to the Audio I/O Sampling Inputs. Then hit TAB to flip back to the front of the rack.
6. Create a ReDrum Drum Computer and from the contextual menu, Select "Reset Device" to clear all preloaded settings.
7. On Drum Channel 1, set drum on events on steps 1, 9, and 15.
8. Press Play on the Transport, and the OctoREX loops should begin to play.
9. Set Buffre to Play Mode 3 - Current, Pitch to about -1100 cents, and set the Bitcrush amount to 35%. Then, Enable One-Shot mode and set the Manual Trigger Length to an 1/8th Note.
10. Press the Buffre Manual Trigger button to audition how the loop sound is affected. It should sound glitchy and lofi like an old console video game. You will also notice that when Buffre is triggered, a signal appears at the Sampling Input.
11. On Redrum Channel 1, press the "Start Sampling" button and a mini recorder window will appear.
12. Press the Manual Trigger Button on Buffre and quickly release it. On the Live Sampling window, press the stop button. Reason's sampler automatically adjusts for recorded silence, so the new glitchy drum tone will play in time with the new loop.
13. Continue this process on the remaining Redrum Channels with different Buffre settings like high pitch loops, pendulum loops and reverse hits.

To migrate your new samples and drum patterns, use the edit menu functions to copy the entire Redrum instrument from one Reason song session to another.

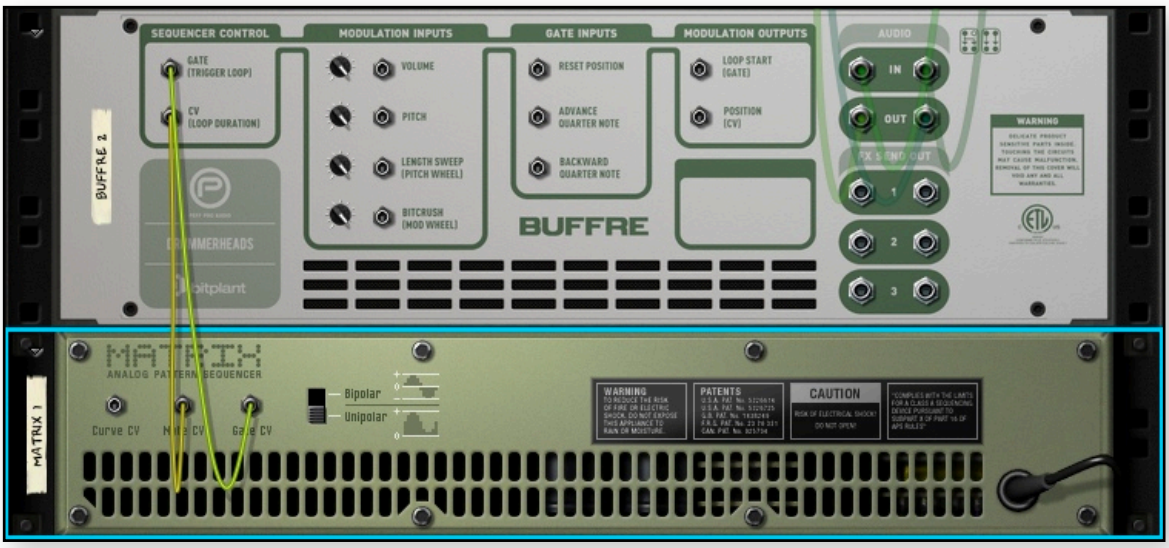
Live Sampling Buffre (cont.)

Buffre FX Send Outputs connected to the Reason Sampling Inputs. When the loop engine is engaged, audio from the FX Send outputs is directed to the sampling inputs allowing you to capture looped, distorted, or reversed audio snippets created in Buffre.

Pattern Sequencing Buffre

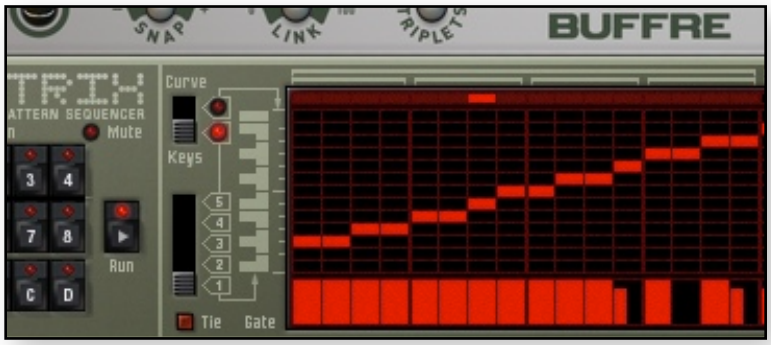
Buffre is designed to take advantage of the modular routing system in Propellerhead Reason, allowing you to automate the triggering process with any of the step sequencing devices. Like Reason's instrument devices, Buffre requires both a NOTE CV and GATE connection from a sequencer. The CV/Gate inputs only respond to events in the Range of D1 to F3, and the example below demonstrates how to automate Buffre with a Matrix Pattern Sequencer.

1. In an empty song session, create a Dr.OctoREX and load a Recycle Drum Loop.
2. From the Create Menu \ Creative FX submenu, Select "Buffre Beat Repeater". Buffre will automatically be inserted between Dr.OctoREX and the Mix Channel.
3. On Buffre's panel, set the Play Mode to 3: Current. and Disable Triplets Mode.
4. Click on the Buffre Rack Ear to select it. You will see a bounding box appear around the device, then from the Create Menu \ Utilities submenu, select "Matrix Pattern Sequencer".
5. Press the TAB key to flip the rack and confirm the autorouting connections from the Matrix Pattern Sequencer to Buffre. There should be a cable for Note CV and one for Gate CV.
6. Flip the rack back to front view and navigate to the Matrix programmer.
7. Hold the Shift Key and Click on the Matrix Gate Segments for steps 1 to 3, 5 to 7, 9 to 11, and 13 to 15. This will create four quarter note steps in the Matrix.
8. Set the Matrix Octave slider to Octave 1 and set the value of the first 16 segments to B1. B1 corresponds to a 1/16 note. A handy trick is to enable the Matrix Line tool by holding down the shift key. Click on the first B1 segment then drag to the last B1 segment.
9. Press the Play Button on the Transport Bar and listen to how Buffre chops up the loop into four 1/16th note rolls.
10. Try changing the note values to any setting between D1 and F3.

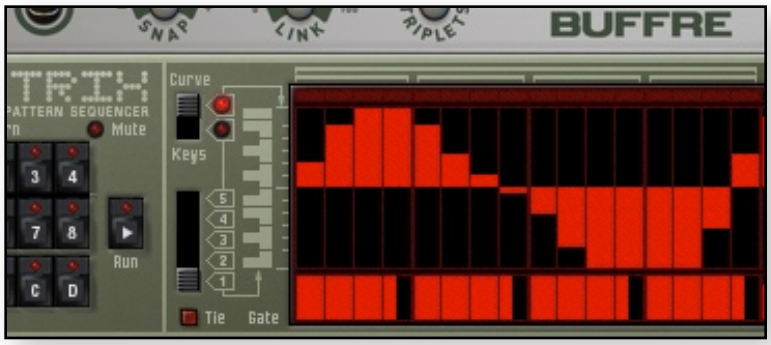


Pattern Sequencing Buffre (cont)

Buffre only responds to the first Note CV received. In the illustration below, the Matrix Pattern sequencer plays a scale from D1 to G#1 while the gate value is sustained for 12 steps. For the duration of the 12 steps, Buffre will only play a half note loop of eight steps. This corresponds to the first Note CV value received, D1.



11. Continue with the configuration created before with Buffre triggering four 1/16th note loops.
12. Hit the TAB key to view the rear of the rack.
13. Connect the Matrix Curve CV output to the Buffre Length CV (Pitch Wheel) Input. Leave the CV trim setting to the default of 127.
14. Set the Matrix Curve CV to Bipolar mode, then hit TAB again to navigate to the front of the rack.
15. Switch the Matrix to Curve Edit mode and draw a sine-like modulation waveform on the programmer display.
16. Press Play on the Transport and you will hear the Matrix Curve CV change the loop duration, causing the loop segments to speed up and slow down as they are triggered. Experiment with different curve settings and different gate patterns to create some interesting acceleration loop effects.

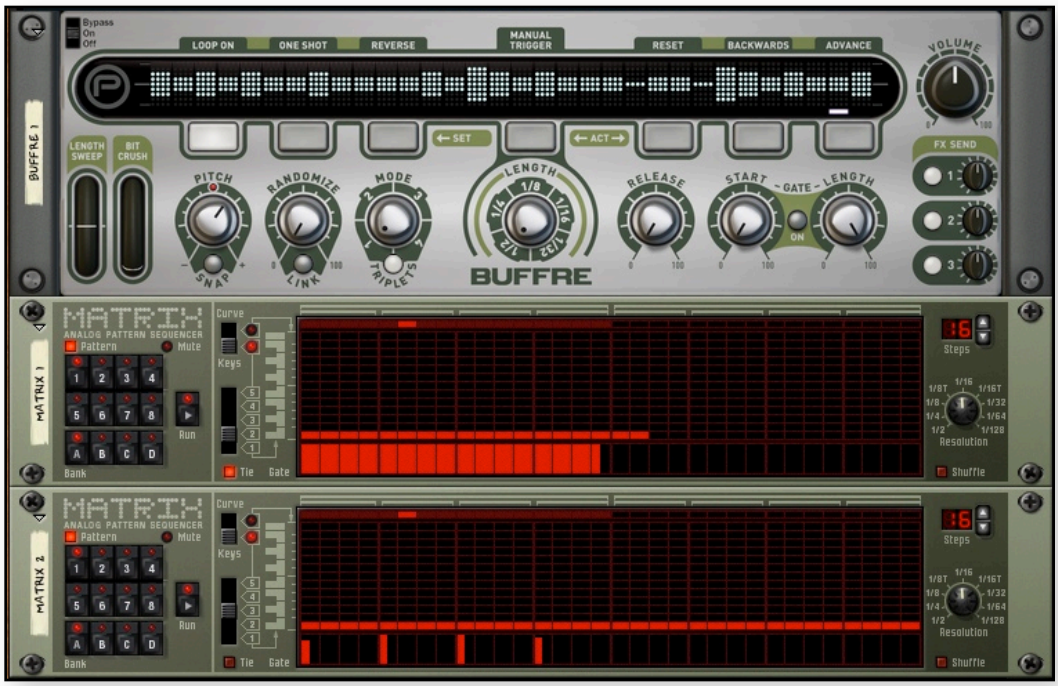


Glitch Rhythm Machine

Buffre is useful for creating more experimental sounds, especially when using very short and fast loop segments. Because Buffre functions like a real-time audio sampler, small audio clips can become the source for completely new tones. The following example demonstrates a method of manipulating audio "grains" in a rhythmic manner using Buffre and Matrix Pattern Sequencers to automate looping and "Advance Position" functions.

1. In an empty song session, create a Dr.OctoREX Loop Player, and open the loop or patch browser.
2. Navigate to the Reason Factory Sound Bank \ Dr Rex Percussion Loops \ - Keith LeBlanc (KLB) \ Rubber Perc directory, and load the loop "Prc04_Rubber_156_KLB.rx2"
3. Create a Buffre Beat Repeater, and verify that it's inserted between the Dr.OctoREX outputs and the Mix Channel device inputs.
4. Create a Matrix Pattern Sequencer and verify that it's connected to the Buffre Sequencer CV and Gate input sockets.
5. On 'Matrix 1' set the Octave slider to 2 and set all of the note values to C2 (the bottom row), and press the TIE button and convert the gate events to tied notes from Step 1 to Step 15. Leave Step 16 a normal gate event.

Now press play on the Sequencer Transport. You will hear Buffre capturing and looping a short audio grain at the beginning of each measure.

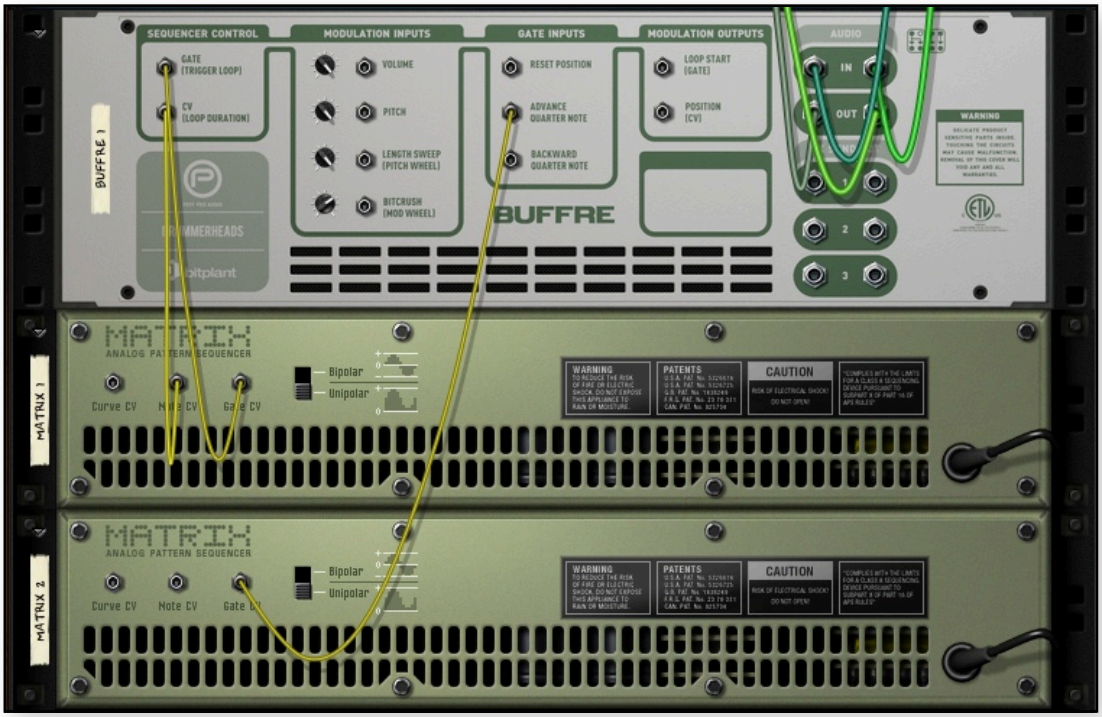


Glitch Rhythm Machine (cont)

Continue from the previous example with the following changes:

6. Set the Buffre Pitch amount to about 2400 cents.
7. Create a second Matrix Pattern Sequencer. Hit the TAB key to view the rear of the rack and connect the 'Matrix 2' Gate output to the Buffre 1 'Advance Quarter Note' input.
8. TAB back to the front of the rack, and edit the sequencer gate events. Program gate events on step 1, step 5, step 9 and step 13. All other gate steps should be off. (see image on previous page).
9. Press Play on the Sequencer Transport to hear the glitching rhythmic loop that changes on each beat.

As the loop plays, try adjust the Pitch parameter, Length Sweep, Randomize and Release. Add some glitching by adjusting the Bit Crush wheel. If you have the Propellerheads Pulsar Dual LFO device, try modulating these parameters with control voltage connections. Also, try setting different "Advance" gate triggers to change the resampling pattern.



Beat Repeater on a Session

Beat Repeater effects applied to an entire song session are often a highly desired effect to create transitions and dramatic “DJ” effects. The recommended approach to applying beat repeater effects globally to a track is to work with an unmastered stereo mixdown in a new Reason song session file. This may seem like an extra workflow stage, but having committed to a mix will allow you more flexibility in applying final arrangement effects like beat repeats and stutters. In some cases, it is more convenient to apply Buffre to the mix in your working session file, and it is recommended that you place the device ahead of your mastering chain. The beat repeater effects will alter the levels of your mix, so the final compression and mastering stages will help govern the signal level to prevent clipping.

1. In your Reason Song Session, Bypass Autorouting and Create a Buffre Beat Repeater. Reposition Buffre so that it sits directly under the Master Section Device.
2. Click on the Show Insert FX Button on the Master Section to expand subrack containing your mastering chain. Hit the TAB key to view the rear of the rack.
3. Position the cursor over the Insert FX “To Device” sockets to find the first device in the mastering chain. Buffre should be connected at this point in the signal path. Make a note of the target device before the next step (MClass EQ, Compressor, etc.)
4. Disconnect the cables from the Insert FX “To Device” sockets, and then connect these sockets to the Buffer Audio In sockets.
5. Connect the Buffre Audio Outputs to the first device in the mastering configuration signal path (MClass EQ, Compressor, etc.)
6. Hit the TAB key to view the front rack panel. Now you can Run the track and trigger Buffre from a MIDI Keyboard.

MIDI Quantize Combinator

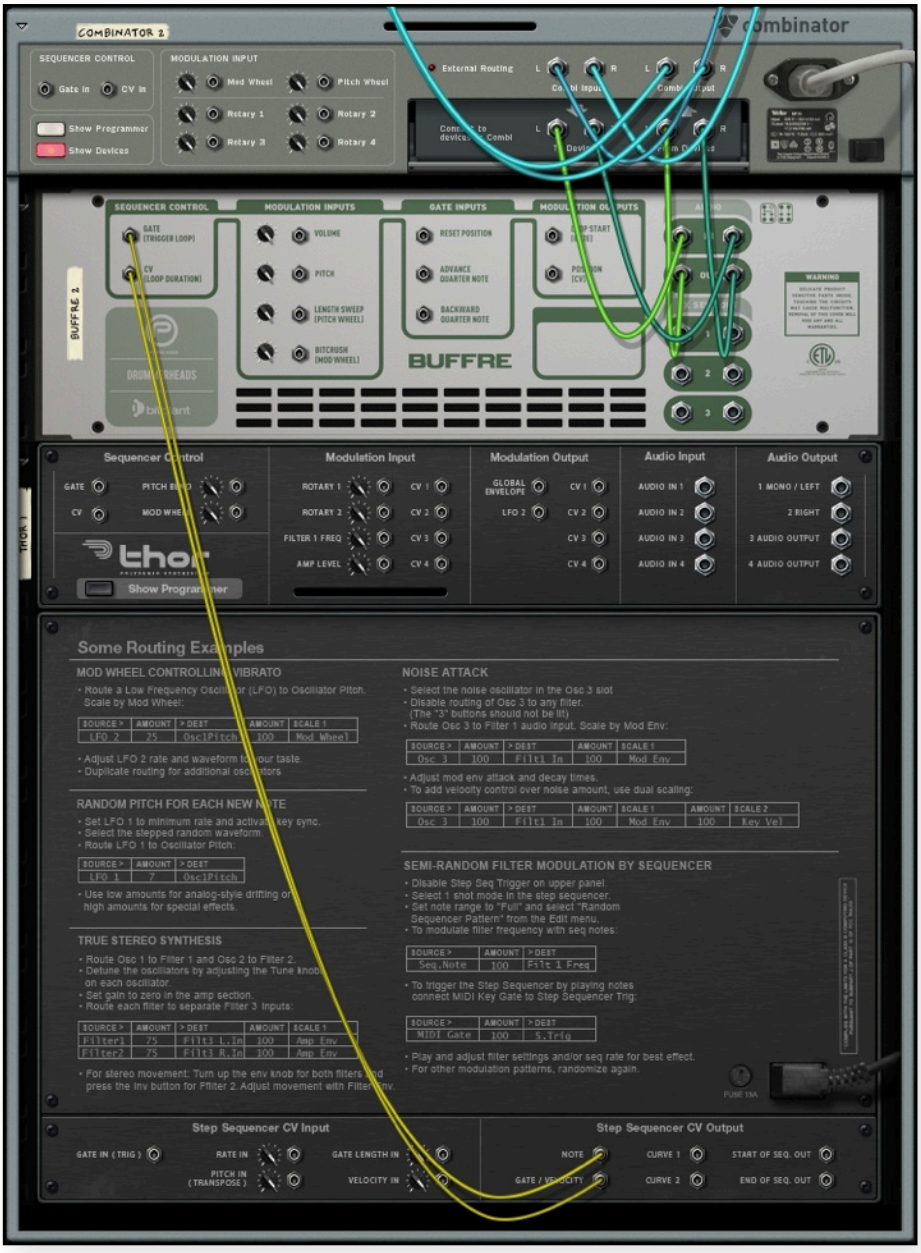
The Thor Polysonic Synthesizer Step sequencer can quantize events that trigger Buffre or other processes in Reason. When the Reason transport is running, Thor's Step Sequencer will only engage at a time division set by the sync rate value. For example, if sync rate is set to 1/1, the sequencer will start at the beginning of the next measure after the "Run" button is enabled; or if sync rate is set to 1/4, the sequence begins, in time with the transport, at the beginning of the next quarter note beat. The following example demonstrates how to configure Buffre to work with a Thor Quantizer patch.

1. Start with an empty Reason song session, and create a Dr.OctoREX Loop player.
2. On the DrOctoREX, click on the patch browser and load the following patch: Reason Factory Sound Bank / Dr Octo Rex Patches / Drums / Electronic Drums / -Bomb Squad (BSQ) / **Bomb Squad | Beats 110-121 bpm -1.drex**
3. Click on the Dr.OctoRex Device to set the focus (click on a non control area like the rack screws or the title graphics).
4. Create a Buffre Beat Repeater. Buffre should be inserted between the Dr.OctoREX outputs and the mix channel device inputs.
5. Right Click on Buffre, and on the contextual menu, select the item "Combine." Buffre will now be nested inside a combinator sub-rack.
6. Inside the Combinator sub-rack, create a Thor Polysonic Synthesizer. Only the step sequencer is used, so it's unnecessary to route audio connections.
7. Click on the Thor's "Show Programmer" button, and then reset the patch: Right Click on Thor and select, "Reset Device".
8. On the Thor Modulation Bus Routing Section, set Mod 1 Source to MIDI Key-Gate; Mod 1 Amount to 100; and Mod 1 Destination to Step Sequencer-Trig.
9. Set Mod 2 Source to MIDI Key-Note; Mod 2 Amount to 100; and Mod 2 Destination to Step Sequencer-Transpose.
10. On the Thor Step Sequencer, Set Run Mode to "Repeat"; set the Rate to 1/4; and set Steps to 1.
11. Next, set the EDIT knob to "Gate Len." and adjust the step 1 knob until the value indicates 100%.
12. Hit the TAB Key to view the rear of the rack.
13. Connect the Thor Step Sequencer Note CV output to the Buffre CV(Loop Duration) socket; and connect the Thor Step Sequencer Gate / Velocity CV output to the Buffre Gate(Trigger Loop) CV input.
14. Hit the TAB Key to return to the front of the rack, and set Buffre Mode to 3: Current Mode.
15. On the Sequencer Track List, Click on the "Combinator 1" track to select it.
16. Press Play on the Sequencer Transport, and start playing notes in the range of D1 to F3 to trigger the beat repeater.

MIDI Quantize Combinator (cont)

The MIDI Quantize Combinator patch will lock the start of beat repeat events to time divisions set on the Thor Step Sequencer. The example above is set to 1/4 notes, and you can modify the combinator to make this adjustable from a combinator Rotary control if you need variable resolution.

The keyboard response of the step sequencer is monophonic, and legato performance will not function in the same manner. When a key is hit, Buffre will continue to loop until all keys are released. Only then will you be able to re-initiate looping at a different rate.



Loop Artifacts

The nature of the beat repeater effect places the highest emphasis on timing, but this comes with a certain cost to other aspects which sometimes includes sonic quality. Buffre's loop engine does what it can to limit pops and clicks when cycling from the end point to the start point of an audio segment, but there are situations where this simply cannot be avoided.

The biggest culprits of artifacts are pure tones or bass heavy material. The worst case would be low frequency sine waves. If you find a situation where Buffre cannot process the loop without a very hard zero crossing glitch, adding a high pass filter or EQ with a low shelf cut may help.

Insert a MClass Equalizer before Buffre and shelve about -12dB around 130Hz. To compensate for the low end loss, add a second MClass Equalizer after Buffre with +12dB of gain at the same 130Hz center frequency. Naturally the program audio will be changed due to the equalization, but the tradeoff may be worth the compromise.

MIDI Controller Chart

MIDI Controller #	Buffre
Pitch Bend	Length Sweep
1	BitCrush Mod Amount
7	Volume
9	Enabled
12	Manual Trigger
13	Manual Length
14	Reverse
15	Loop Mode (Autorepeat)
16	One-Shot Mode
17	Mode Knob
18	Triplets On
19	Pitch
20	Pitch Steps
21	Pitch Snap
51	Randomize
52	Random Link
23	Release
24	Gate On
25	Gate Start
26	Gate Length
27	Reset Position
28	Position Advance
29	Position Backward
39	FX Send 1 On
40	FX Send 1 Level
41	FX Send 2 On
42	FX Send 2 Level
43	FX Send 3 On
44	FX Send 3 Level

Full MIDI implementation details have yet to be determined. These are the preliminary settings established for Buffre but are subject to change.

Remote Mapping Chart

Buffre	Remote Item
Length Sweep	*Pitch Bend*
Bit Crush Mod Amount	*Mod Wheel*
Volume	Volume
Manual Trigger	Trigger
Manual Length	Trigger Length
Reverse	Reverse
Loop Mode (Autorepeat)	Loop On
One-Shot Mode	OneShot
Mode Knob	Play Mode
Triplets On	Triplets
Pitch	Pitch
Pitch Steps	PitchSteps
Pitch Snap	Pitch Snap
Randomize	Random
Random Link	Link Random
Release	Release
Gate On	Gate Enable
Gate Start	Gate Start
Gate Length	Gate Length
Reset Position	Reset Position
Position Advance	Position Advance Quarter
Position Backward	Position Backward Quarter
FX Send 1 On	Aux1 On
FX Send 1 Level	Aux 1
FX Send 2 On	Aux2 On
FX Send 2 Level	Aux 2
FX Send 3 On	Aux3 On
FX Send 3 Level	Aux 3

Remote properties for modifying control scripts.

Remote Map Hack

Remote Item
Pitch Bend
Mod Wheel
Volume
Trigger
Trigger Length
Reverse
Loop On
OneShot
Play Mode
Triplets
Pitch
PitchSteps
Pitch Snap
Random
Link Random
Release
Gate Enable
Gate Start
Gate Length
Reset Position
Position Advance Quarter
Position Backward Quarter
Aux1 On
Aux 1
Aux2 On
Aux 2
Aux3 On
Aux 3

Code Snippet example for modifying remote maps. This is for advanced Reason users only.

```
Scope  Peff   com.peff.Buffre
//     Control Surface Item       Key    Remotable
Item   Scale  Mode

Map    CC 13         Trigger
Map    CC 14         Reverse
Map    CC 17         Play Mode
Map    CC 19         Pitch
Map    CC 20         PitchSteps
Map    CC 23         Release
Map    CC 15         OneShot
Map    CC 55         Reset Position
Map    CC 07         Volume
Map    CC 57         Position Advance Quarter
Map    CC 56         Position Backward Quarter
Map    CC 39         Aux1 On
Map    CC 40         Aux2 On
Map    CC 41         Aux3 On
```

For more information on modifying Remote maps, **Koshdukai** offers some great advice:

http://koshdukaimusicreason.blogspot.pt/2012/06/rack-extensions-remote-side-of-it.html

BUFFRE OPERATION MANUAL DRAFT 1.0.1 2012/07/11

Be Cool and Make Music!

TECHNOLOGY

Propellerhead REASON and Rack Extensions
Propellerhead Software AB, Stockholm, Sweden

PEFF - Rack Extension Design and Development
Hayden Bursk, Kurt Kurasaki, Thomas Merkle, Wolfgang Merkle

made in Sweden, Germany, and California

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