

# BLACK KNIGHT

5 Band Equalizer Rack Extension



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Thank you very much for expressing your confidence in our products by purchasing one of our equalizers, Black Knight. This 2-channel high-quality equalizer was designed with our experience of both filtering capabilities in the digital realm as well as the crafting of audio for all types of users; producers, engineers and artists alike. We hope you continue to enjoy using Black Knight in your projects for now and for future.

Lab:One Recordings © 2020 ACKNOWLEDGEMENTS

Thanks to the Black Knight betatesters for helping with this product;

Lab One Alpha Team:

Juan "Synclab" Pablo, William "White Noise Bleed", Niel "BonkHead" Duran, Jani "AlterEe" Tourunen, Simon Bader @ Massive Sound Studios, Shawn "Fretless Fingers" Washington, plus all that play a part for Lab One - we truly appreciate your time, effort and innovative direction.

Thanks to Reason Studios (for Reason, the SDK and the concept of the Re)

DEDICATIONS & ACCOLADES This Re is dedicated to all the ReasonStudio Reason users & forum threaders, friends, & colleagues we have spoken to over the years. Extra thanks goes out to our studio buddies; DOS aka ORCO, PUGGY, Dj EQ, Dave Carpenter, for the support & feedback, shouts go out to all who know us @ Lab One Recordings.

For all communication feel free to contact us via our website: <http://lab-one-recordings.co.uk>

Now let's get using the Black Knight....

## Introduction

Black Knight 5 Band EQ is a dedicated rack unit, built as a Rack Extension for the Reason environment. This device has a maximum of what would be 3U space in the real world. Being a Rack Extension (Re), this gives you various options of versatility within your projects.

Black Knight v2 has had significant changes since v1, and below is a concise listing of the similarities and new additions made to v2.

V1	V2
5 separate bands	
2 filter modes per band	6 filter modes per band
Band filter mode toggle button	Band filter readout display which doubles as a drop down menu selection
Saturation mode with pre/post EQ option	Saturation mode with pre/post EQ option and two saturation models
3 EQ Modes via toggle switch: Parametric / Graphic 1 / Graphic 2	As V1 with change as a readout display with drop down menu, plus the addition of Chromatic mode
Hear EQ global function	As V1 with addition of Hear EQ per band option
Peak metering range -30dBFS to 0dBFS (3dB per LED)	Full digital view of stereo peak metering for input and output, covering full 16 bit (96db) audio range
Single view with Frequency, Resonance and Gain readouts	3 views: Classic view (studio hardware 'knobs only')  Hybrid view (knob controls with digital plot touch-screen display)  Digital view (full width digital plot touch-screen display)
Input and Output audio sockets	As v1 including 'HEAR EQ' audio outputs
Frequency, Resonance and Gain CV sockets, polarity switches and invert CV switches	As v1 with addition of Input, Output and Saturation CV sockets, polarity switches and invert CV switches
Opens Black Knight V1 patches	Can open V1 patches and can upgrade to V2 functions (additional EQ modes per band)

Black Knight is designed to be a transparent effect, meaning that if no adjustments are made on the device, the audio passing through the effect is 'clean' and has not been affected by the equalisation filters or the saturation control. This is the ideal, so that no coloration is applied to the sound.

Black Knight GUI (graphical user interface) has been redesigned to accommodate for today's standards and requirements for higher resolution displays, and have the flexibility for the user's own preference of use.

## A tour of Black Knight

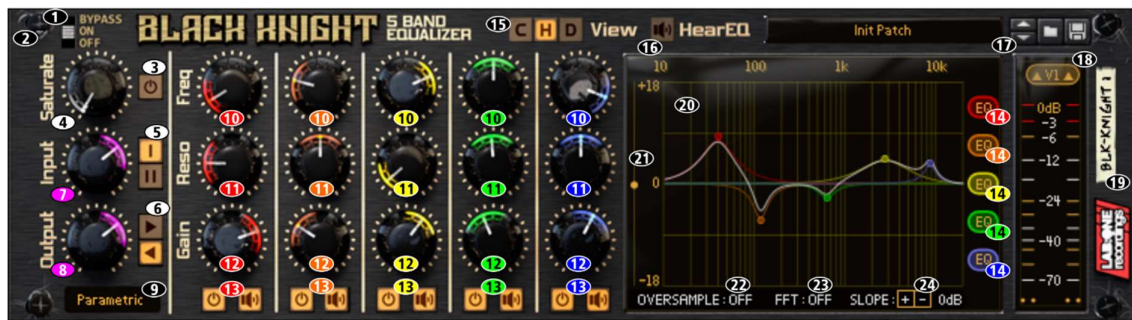
Black Knight is based on most hardware 5 Band equalizer units, with version 2 bringing the addition of digital display for equalisation curve plotting plus FFT signal response.



### Classic view

- 1) Bypass toggle
- 2) Fold / Unfold rack effect
- 3) Saturation on/off toggle
- 4) Saturation amount control (0% to 100%)
- 5) Saturation model
- 6) Saturation pre/post EQ
- 7) Input gain control (+18dB / -36dB)
- 8) Output gain control (+18dB / -36dB)
- 9) Global EQ mode (Parametric, Graphic 1, Graphic 2, Chromatic)
- 10) Band Frequency control and readout (varies based on EQ mode)
- 11) Band Resonance control and readout (0.5 to 32)
- 12) Gain control and readout (+/-18dB)
- 13) Band EQ on/off toggle and Band Hear EQ on/off toggle
- 14) EQ mode display
- 15) View mode (Classic / Hybrid / Digital)
- 16) Enable Hear EQ mode (global 'listen', use in addition to Band Hear EQ toggles)
- 17) Patch load/save buttons and display
- 18) Global meter, with unit upgrade button\*
- 19) Rack unit label

\* Black Knight comes with a v1 > v2 upgrade button, which is a 'one way' toggle switch. This allows Black Knight filter options to be expanded, so you can have 5x Low pass filters, or 2x Low Shelf filters with 2x High Shelf for tonal balancing. If you upgrade a v1 patch, you gain access to all other filters and your patch is still compatible (all parameters are cloned, only the extra filter options are 'unlocked'. However, if you are using patches from another user who only has V1 patches, then they cannot load any patches saved with Black Knight version 2. Black Knight v2 can open v1 and v2 patches.



Hybrid view

As controls listed on Classic view, with addition of:

- 14) Band filter mode (click for popup menu)
- 20) Digital display, for EQ curve plot and FFT
- 21) FFT offset control (+/-18dB trim)
- 22) Oversample on/off toggle (only available when using 44.1kHz / 48kHz soundcard settings)
- 23) FFT enable toggle (off by default)
- 24) FFT slope (-9dB to +9dB, 1000Hz centre frequency)



Digital view

As controls listed on Classic view. To display EQ handle data, click and hold on a node of choice to update the display. EQ enable and Hear EQ band toggles are on the far right of the display, by use of radio buttons. Click on the Band filter type to display popup menu.



Rear view

- 1) Input Audio sockets
- 2) Output Audio sockets
- 3) Hear EQ audio sockets
- 4) CV Input socket, Polarity toggle, Invert CV toggle, CV input trim (all respective controls have same sockets available)
- 5) Fold / unfold rack unit
- 6) Rack label

How to connect audio

To connect the Black Knight you can use Reason's own auto-connection system, and Black Knight will decide the best way to auto-wire; if you have a mono-output device (Subtractor, for example), and you wish to add a Black Knight to it, Black Knight will auto-connect the Subtractor output to the Left input, and then continue to route the Left output of Black Knight to the Left input of the mix-channel (or next device in your processing chain).

You can do any of the following to create Black Knight;

- a) Right-click (Win) / CTRL-click (Mac) on the device, select 'Create Device', choose sub-menu 'Effects', and select 'Black Knight 5 Band Equalizer' from the listing.
- b) With the device selected, use the 'Create', select 'Create Device', choose sub-menu 'Effects' and select 'Black Knight 5 Band EQ' from the listing
- c) Using the Tool Palette in Reason (F8), select 'Studio Effects' when in the 'Devices' tab, and locate 'Black Knight 5 Band Equalizer' device, click on the icon and drag it to the device you wish to add it to.
- d) Using the browser on the left (press F3 to make Reason's main browser visible), and then click the submenu 'Effects' in the left to show all the rack units you have installed on your system, you can then scroll down the menu on the right to locate 'Black Knight 5 Band Equalizer', then drag and drop Black Knight into the rack on the right (make sure rack view is visible when you do this).
- e) For speed you can use the search field at the top of the F3-browser. Enter 'KNIGHT' as a search term and Black Knight should appear after a second or two, then you can drag and drop as d) above.



## Working with Black Knight

So now you know the controls, how to connect Black Knight into your signal chain and the available options for your equalizing tasks; now you want to put your new RE into action.

Depending on the task you want to do will determine the approach of what you need to do to set up Black Knight. The following walkthroughs will show you how Black Knight can be used.

First thing is to decide how you want to use Black Knight – are you wanting to colour the final mixdown, or correct an audio signal, or use Black Knight as a creative tool?

For colouration ('character' sound control), we advise using either of the Graphic equalizer modes, as this would use specific frequency settings, with freedom to adjust the resonance gain freely.

For corrective & surgical tasks, we advise using the Parametric equalizer mode, as this allows you to freely set the frequency and resonance controls as well as the gain control.

For musical tuning of frequencies, we suggest using Chromatic mode as this allow you to pick specific musical notes precisely, without the need to look up note-to-frequency charts. Be mindful though that using chromatic mode relies on your source signal being in the same octave, so you might need to adjust according by the notes you play, rather than the sources fundamental tuning.

For creative use, we advise using Parametric mode and use the CV connections for even more modulations and automations

How to use the master controls – an objective approach: Ideally you can use the master controls to aid with setting the initial input, checking the signals pre- and postfilters and EQ, and setting the final make-up level.

The way we would advise to do this is as follows

- 1) set your level using the Input Gain control, so you are getting around -9dB to -6dB if your original input signal is at unity level
- 2) Equalize / filter your audio as normal
- 3) Use the SATURATION GAIN and PRE-/POST-EQ Saturation path (optional)
- 4) Use the Output Gain control to raise / lower the final equalized signal so the final output meter level matches closely to the pre-Black Knight affected input meter.

Note: when you adjust signals with EQ, you may come across biased equalization (an old yet well known observation that louder signals seem coherently 'better', but the listener is not 100% sure why). Black Knight aids with your decisions objectively, so you get the best possible sound you can without compromising of your productions, so if you find when you get a louder signal after processing with Black Knight you should utilise the final Output gain to obtain a more objective view. However, the choice is ultimately yours (go by guide, there are no hard and fast rules!)

Additionally, some users like to 'see their sound' so Black Knight comes with new digital touch screen displays, so you can move the filter node around the display. you may also use modifier keys (Alt, Shift, CTRL/Cmd) for extra functionality:

Alt+click&drag filter node = lock gain of the band (frequency adjustable, gain remains constant)

Shift+click&drag filter node = lock frequency of the band (gain adjustable, frequency remains constant)

Alt+Shift+click& drag filter node up or down = adjust band resonance, frequency and gain remain constant.

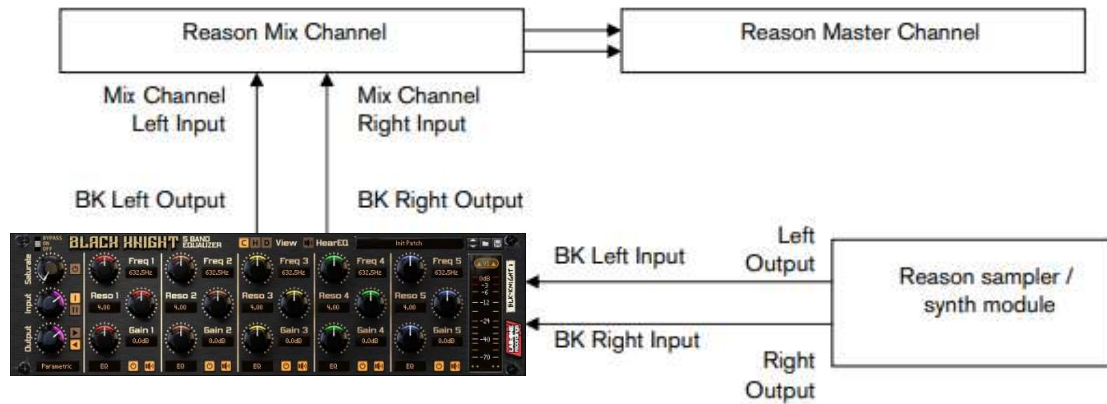
Ctrl/Cmd & click on node = reset gain to zero dB, frequency and resonance remain constant



## Possible scenarios integrating Black Knight

Black Knight is designed to be a flexible device, allowing it to be used however you see best fit. Only typical applications will be listed in this manual. You are however free to choose your own setup.

A) Using the Black Knight as an insert (mix channel setup).

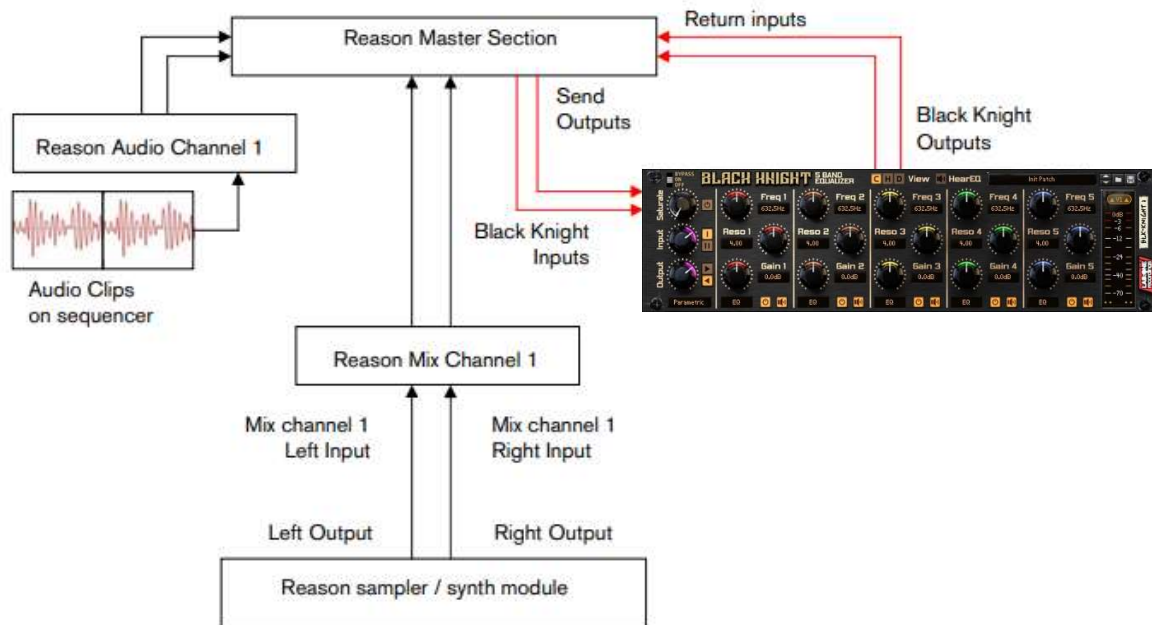


In setup (A), this would use the Black Knight as an insert effect (works within the signal chain directly, and only this signal chain). This means that whatever control you adjust on the Black Knight, it will affect the total sound coming out of the sampler / synth module.

NOTE: If the Black Knight is in bypass mode or has the 'INIT PATCH' preset loaded, the audio playing would sound 'clean' and unaffected. To affect the sound, begin with adjusting the Input gain if you have a low signal (or alternatively, raise the signal on the sampler / synth module). Adjust the filter knobs, band types, resonance (Q) controls and gains to taste (not compulsory). To help you, refer to Appendix 1: Frequency Band 'character' descriptions. To finalise the adjustments, use the Output gain dial to return the audio back to the same level pre-equalization. What this allows you to do is to be more subjective with your EQ'ing decisions, to see if improvements have occurred.

If you leave the level higher after equalization, the natural 'boost' in level gives a false pretence to the ear, making you believe it is better sounding (purely because of being at a slightly higher level). Remember to equalize carefully, so not to make wrong decisions too quickly (the 'louder is not always better' principle)

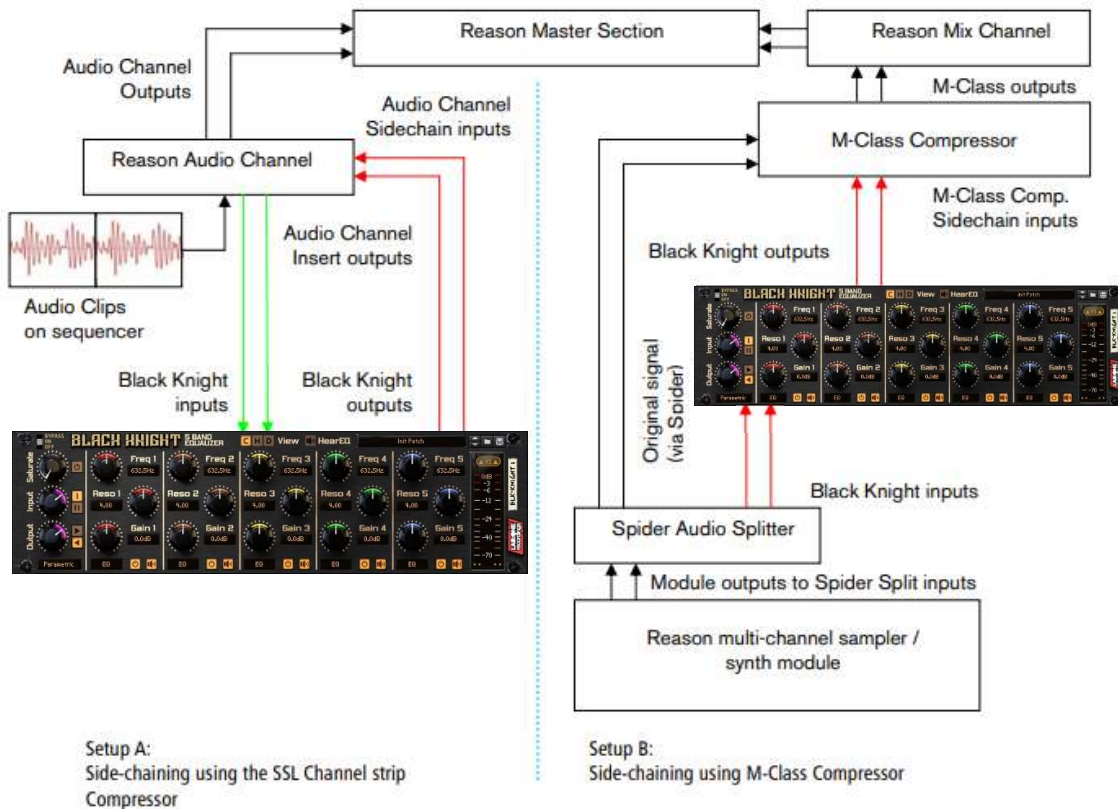
B) Using the Black Knight as a send effect (mix / audio channel setup).



In setup (B), this would use Black Knight as a send effect (works in parallel, and as a global device). This means that whatever control you adjust on Black Knight, it will affect the sound coming from the Master Section at a set amount, determined by the Send Effect dial on that specific Mix / Audio channel. This means you can have a clean sound mixed with an altered equalized sound. This is known as Parallel Processing, which may be desired in some cases.

You can adjust Black Knight as mentioned in setup (A) above, with the addition of the SEND dial located on the Main Mixer in Reason. Full left setting of the SEND dial has no effect on the sound, while full right setting of the SEND dial will send a maximum level possible to Black Knight. This means you can have one Black Knight as a send device for all your audio channels. However, latency may have a side effect of cancellation of audio (aka phasing), due to the processing time needed to perform the filtering of the Black Knight, when used as a Send effect. Black Knight has been designed so that latency is as close to zero latency as possible.

C) Using Black Knight as an insert to a side-chain (mix / audio channel setup)



Above you will see two alternative setups using Black Knight as part of a side-chain effect signal path. The method on the left utilises the Audio Channel insert sockets, to send signal from the Audio clips on the sequencer through the SSL desk channel strip. The insert sockets send the original signal to Black Knight, which then can alter the signal by using the band controls and master controls to 'exaggerate' the signal more. Reason for doing this may be to use Black Knight to help with sibilance and plosive sounds which can be found in vocal recordings. From Black Knight the outputs are then fed into the channel strips own side-chain sockets, and the 'KEY' button will become active on the SSL desk, indicating that the side-chain functionality of the compressor found on the SSL desk is in operation.

Method 2 on the right shows a similar setup, but using a Spider Audio Splitter unit to divide the original signal / sound source into two parallel pairs of signals, one set is sent to the M-Class Compressor unit audio inputs, while the second pair from the Spider is sent to the audio inputs of Black Knight, and the outputs of Black Knight are connected to the side-chain input of the M-Class Compressor. This frees the side-chain of the SSL compressor, so another sound source could be used to control the main SSL dynamics for that channel strip. Experiment with setups to your own way of working, use these as a guide, but not necessarily as the be-all-and-end-all approach.

## Alternative setups

For devices which have multiple outputs (ie NN-XT, Redrum, Thor, Spider Audio), then if required additional Black Knight's could be added as either mono-devices (only connecting left audio input & output sockets), or as stereo devices. This in turn allows you to edit specific sounds within a preset if you so wish (ie split zone instrument patches may have a bass guitar for one half of the keymap, while a synth lead is using the other half, and you wish to effect the sounds independently). See the next page for more examples of setups.

Another possible option would be to use one instance of Black Knight, and have 2 mono devices linked into it, and process both inputs in parallel, and output the two signals to two separate mixer channels. This may be desired to help use the same eqing settings on two mono devices at the same time.

Some extra notes on Band Types Black knight is equipped with 5 bands which can have their type changes between two different filtering curves (version 1), or 6 types (version 2).

The bands are all based on 12dB/Octave filters. These selectable modes are:

EQ (peak/cut equalisation)

LP (Low pass filter, attenuate frequencies above the cutoff frequency)

HP (High pass filter, attenuate frequencies below the cutoff frequency)

BP (Band pass filter, attenuate frequencies above and below the cutoff frequency, leaving the central frequency intact)

LS (Low shelf filter, attenuate frequencies below the frequency centre alike a tone level control)

HS (High shelft filter, attentuate frequencies above the frequency centre alike a tone level control)

This opens Black Knight up to the ability of integrating more possibilities of filter curves, where simply selecting the different types can drastically affect your sound or how you want to filter your audio. With Version 2 allowing similar types to work together you have even more possibilities to enhance and adjust your signal to suit.

## HEAR EQ and how it works

Black Knight has the option to listen to the effect of the EQ itself, via the HEAR EQ button, without the original content. This can be beneficial to help identify if certain instruments or sounds should be brought forward or sent to the back of the mix, in any of the signal path modes, making the sounds clearer out of context

- When you turn HEAR EQ on with all faders set to zero, you should hear no signal at all. This is because the EQ is having no effect on the final audio
- If you raise any of the gains above the zero line, you will hear portions of audio based on that specific frequency centre; this will indicate what you are ADDING to the final signal.
- If you lower any gains below the zero line, you will hear portions of audio based again on that specific frequency centre, with the difference that this will be the audio REMOVED from the final signal.

NOTE: this will invert audio frequencies whilst in HEAR EQ mode, so even though it sounds alike the original, the phase relationship with the original is an inversion. Also be aware that lowering the gain also sounds quieter than raising the gain, even though the signals sound similar when HEAR EQ is on. This is purely down to the decibel rating. To get an even balance between these two, a 'boosting' gain half the value of a 'cutting' gain will sound more even ie:

6dB Gain while HEAR EQ is active = -12dB Gain while HEAR EQ is active.

This function can be very convenient to tell what you are adding or removing, giving you more insight to what the equalisation is doing to your final signal – raising the gain informs you of what signals are being added to the final signal, while lowering the gain informs you of what you will be taking away from the final signal.

Depending on which mode you select also depends on what you may hear. For example with stereo modes, you will hear both left and right channels in sync, in left/right modes you have independent controls so left may be louder than right etc, in mid/side modes the signal you hear depends on what amount of mid information and what amount of side information exists in the original content (if no side signal then you won't hear anything when you raise / lower the controls, and if one channel is phase inverted you may not hear any mid information due to signal cancellations) HEAR EQ can also be used creatively if you so desire, especially useful for sound design.

With version 2 allowing you to isolate specific bands, this makes Black Knight's HEAR EQ function even more flexible, and with the inclusion of HEAR EQ audio sockets for further processing, Black Knight allows more possibilities with signal processing.

The different modes: Parametric, Graphic 1, Graphic 2 and Chromatic

#### PARAMETRIC MODE

In Parametric mode, Black Knight frequency and resonance controls are free from any step restriction and work within a set range for each, giving you opportunity to use Black Knight as a corrective tool. Each of the band frequency cover the audible hearing range between 20Hz to 20kHz, found on most parametric hardware units and software plugins & DAWs.

#### GRAPHIC 1 & GRAPHIC 2 MODES

In Graphic modes, Black Knight frequency and resonance controls are step-selectable, giving you some freedom to choose your required setting, and is primarily used more as a final 'colourising' of your audio, be it on an individual sound or your final mix. Each of the band frequency controls have 7 selectable frequencies, and are based on the ISO band frequencies (Graphic 1) and carefully selected 'musical' sounding frequencies (Graphic 2).

The frequencies are:

##### Graphic 1:

BAND 1: 20Hz / 25Hz / 31Hz / 40Hz / 50Hz / 63Hz / 80Hz  
BAND 2: 80Hz / 100Hz / 125Hz / 160Hz / 200Hz / 250Hz / 315Hz  
BAND 3: 315Hz / 400Hz / 500Hz / 630Hz / 800Hz / 1kHz / 1.25kHz  
BAND 4: 1.25kHz / 1.6kHz / 2kHz / 2.5kHz / 3.15kHz / 4kHz / 5kHz  
BAND 5: 5kHz / 6.3kHz / 8kHz / 10kHz / 12.5kHz / 16kHz / 20kHz

##### Graphic 2:

BAND 1: 30Hz / 40Hz / 50Hz / 100Hz / 200Hz / 300Hz / 400Hz  
BAND 2: 75Hz / 150Hz / 180Hz / 240Hz / 500Hz / 700Hz / 1kHz  
BAND 3: 350Hz / 500Hz / 1kHz / 1.5kHz / 2.5kHz / 3kHz / 4kHz  
BAND 4: 800Hz / 1.5kHz / 3kHz / 5kHz / 8kHz / 10kHz / 12kHz  
BAND 5: 2.5kHz / 5kHz / 7kHz / 10kHz / 12kHz / 15kHz / 20kHz

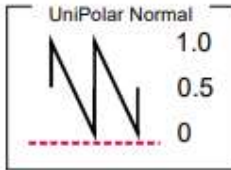
As you can see some of the frequencies overlap; allowing for more flexibility than a common graphic equalizer. In all modes, the band resonance controls have a range from 0.5 (2½ octave range) to 32 (1/22nd octave range) from very wide to needle-tight settings. This gives you total control over the recognised range of audio signals for human-hearing (20Hz – 20kHz). Also, the gain controls allow you to raise or lower the effect of the filter on the signals.

##### Chromatic:

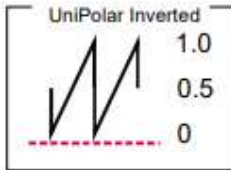
This mode (new to version 2) allows you to select frequencies in a similar way to the graphic modes, but you have a choice of 1 of 128 chromatic notes, across multiple octaves. This can be useful if you wanted to boost or cut a frequency at a specific note setting, without the need to looking up the frequency you want in a table - this can be time consuming so Black Knight's chromatic mode helps pinpoint note-to-frequency conversion for you, saving you time.

## CV inputs and controls

Black Knight has 3 CV inputs & trim knobs (to scale CV input signals) for each band of controls, plus an additional Saturation CV input and trim control. Each of the CV sockets connect to its relevant counterpart on the front of Black Knight, giving more creative use of the equalizer where the user sees best fit (labelled above each control) To use the CV inputs, simply connect a CV output from another device. Default settings for CV trim knobs are at maximum, so be aware of possible loud signals (especially if using Z-plane mod CV control and have the SCALE setting at +/-200%, and gains set to +/-18dB)



From the example on the left, we can see two CV versions, Unipolar normal and Unipolar Inverted.



NOTE. CV signal patching will remain only within Mixer / Audio Channel effect chains, or within a Combinator, and of course your template rack setups. Black Knight will not save CV input chains, but will keep CV trim scale settings within the presets.



## How to save and load presets

Black Knight comes with a collection of basic presets as a 'starting' point. Depending on your application may depend on how you wish to use Black Knight. Listed within the presets are some general application setups which may help guide you to the type of sound you want, and you may adjust them to suit accordingly.

As default, every time you create a Black Knight, either the default preset or the 'INIT PATCH' preset will load, initializing all the settings ready for you to use from scratch, 'fresh-out-of-the-box'.

To browse the bundled presets, simply use the browser up & down buttons to activate the next preset in the listing, or alternatively you can click and hold on to the preset name to show a popup windows, for faster browsing and preset selection.

To save your own presets, simply click the 'save' button located next to the preset name display, and select where to save the preset (ideally create a new folder and keep it as a favourite in the Reason browser window, for easier finding and retrieval at a later date).

The presets are saved as a .repatch name, and can only be used with that specific Rack Extension. To load alternative presets, click the 'browse patch' button to locate presets (which are not part of the bundled pack within Black Knight).

To preview the patch, simply play the sequencer with Black Knight setup so it is in use, and select the 'load patch' button, and select within the browser the specific preset. Black Knight will update whilst you are previewing, so you can hear the effect before finally committing to the chosen patch. If you cancel browsing Black Knight will reset back to its prior state before patch browsing.

## How to 'latch' your own MIDI via Remote Overriding

Reason allows the user to re-define certain controls via MIDI devices by using the Remote Override configuration. This means that a control on Black Knight can be mapped by any MIDI controller you have connected to your DAW.

Black Knight has a comprehensive list of available controls for Remote Control already, but not all controls have this 'out of the box' functionality (due to the heavy load of controls already within). You can only map one specific control to any of the available Remote 'receiving' controls on the Rack Extension – if you use a specific control and want to re-map it afterwards, you will lose the original Override. Also, custom-set Remote Override controls are only saved within each independent Reason song file.

Ideally, if you use a dedicated piece of MIDI equipment for Black Knight, a template start-up file would be a better option, so that the Remote Override template is pre-defined on each new song/project. All of the controls on Black Knight are Remote Override-able. To access the override editor, select from the 'Options' Menu 'Edit Remote Overrides'.

The Rack will now display the specific device selected, with either pre-defined Remote control indicators (the Remote symbol), yellow Lightning bolts (over-ridden Remote controls pre-defined) or blue arrows (unassigned Remote controls) You can right-click one of the controls and select 'Edit Remote override'. This will open a new popup window, with some available options, and to show you which MIDI controller is currently set to that specific Remote Override.

This may be a better option to edit, and make use of the CHANNEL setting so you can define your own controls if you so desire. By moving one of the controls on your MIDI device (already pre-defined in Reason), you should then see MIDI activity indicator display that a MIDI message was received. Note also the control surface and the control itself on the MIDI device that was adjusted relays to the new Remote Override.

Once you are happy with the control being set, you can click 'OK' to continue with the new setting, or 'CANCEL' to abort the mapping. Also note that if you accept this mapping, the control (if already linked to another) will be fixed to the new mapping. Any previously set mappings will be 'moved' to the new mapped control. This should be used with care if you already have pre-defined Remote Override mappings.

This Remote Overriding method can be handy if you don't know how to set up your own MIDI controller to the dedicated MIDI controls mentioned in the previous chapter. For speed, you can simply double click a blue arrow, and the arrow will turn into a spinning yellow Lightning bolt, indicating that Reason is awaiting a MIDI signal to that control.

You can then adjust a MIDI control on your MIDI device, and the control will map automatically without the need to use the popup previously mentioned. Double-click each specific control you want to map to save time and to use the mapping in a faster method. All Remote Overrides can then be used to record automation within Reason, which can be fine tuned using the Sequencer and the clips (see the Reason Operating Manual for more information on how to edit & record automation) Remote templates (which are currently in use by supported manufacturers ) are currently not available for Black Knight, but may be implemented and available in the near future

## MIDI Implementation table

Below is a listing of all MIDI Control Change (CC) numbers, which can be applied to your choice of device.

MIDI CC	Control	MIDI CC	Control	MIDI CC	Control	MIDI CC	Control
4	Input Gain	12	Band 1 Active	27	Band 3 Parametric Frequency	44	V1 Band 1 type
5	Output Gain	13	Band 2 Active	28	Band 3 Graphic 1 Frequency	45	V1 Band 2 type
7	Hear EQ (Global)	14	Band 3 Active	29	Band 3 Graphic 2 Frequency	46	V1 Band 3 type
8	EQ Mode	15	Band 4 Active	60	Band 3 Chromatic note/frequency	47	V1 Band 4 type
		16	Band 5 Active	30	Band 3 Resonance	48	V1 Band 5 type
49	Saturation Amount			31	Band 3 Gain		
50	Saturation Pre/Post					53	V2 Band 1 type
51	Saturation Model	17	Band 1 Parametric Frequency	33	Band 4 Parametric Frequency	54	V2 Band 2 type
52	Saturation toggle	18	Band 1 Graphic 1 Frequency	34	Band 4 Graphic 1 Frequency	55	V2 Band 3 type
		19	Band 1 Graphic 2 Frequency	35	Band 4 Graphic 2 Frequency	56	V2 Band 4 type
		58	Band 1 Chromatic note/frequency	61	Band 4 Chromatic note/frequency	57	V2 Band 5 type
		20	Band 1 Resonance	36	Band 4 Resonance		
		21	Band 1 Gain	37	Band 4 Gain	64	Hear EQ Band 1
						67	Hear EQ Band 2
		22	Band 2 Parametric Frequency	39	Band 5 Parametric Frequency	68	Hear EQ Band 3
		23	Band 2 Graphic 1 Frequency	40	Band 5 Graphic 1 Frequency	69	Hear EQ Band 4
		24	Band 2 Graphic 2 Frequency	41	Band 5 Graphic 2 Frequency	70	Hear EQ Band 5
		59	Band 2 Chromatic note/frequency	62	Band 5 Chromatic note/frequency		
		25	Band 2 Resonance	42	Band 5 Resonance	71	Oversample
		26	Band 2 Gain	43	Band 5 Gain		

## Appendix 1: Instrument Frequency ranges

To understand EQ and its complexities you need hands-on experience, but through practice and use of Black Knight you will start to become accustomed to certain 'ranges' of the frequency spectrum.

Also, every sound that you use may sound different to someone else, even if you use the same sound – different variables come into play (amplitude, pitch, envelope, bit rate,.. etc.), so you need to keep in mind that the below listed frequency settings can be used with 'a pinch of salt'; EQing is like seasoning of your sound, it adds flavour (and can also take it away too).

### The Kick Drum

Any apparent muddiness can be rolled off around 300Hz.

Try a small boost around 5-7kHz to add some high end.

50-100Hz ~ Adds bottom to the sound

100-250Hz ~ Adds roundness

250-800Hz ~ Muddiness Area

5-8kHz ~ Adds high end presence

8-12kHz ~ Adds Hiss

### The Snare

Try a small boost around 60-120Hz if the sound is a little too wimpy.

Try boosting around 6kHz for that 'snappy' sound.

100-250Hz ~ Fills out the sound

6-8kHz ~ Adds presence

### The Hi hats, The Cymbals, The Rides & The Other High-end Percussive sounds

Any apparent muddiness can be rolled off around 300Hz.

To add some brightness try a small boost around 3kHz.

250-800Hz ~ Muddiness area

1-6kHz ~ Adds presence

6-8kHz ~ Adds clarity

8-12kHz ~ Adds brightness

### The Bass

Try boosting around 60Hz to add more body.

Any apparent muddiness can be rolled off around 300Hz.

If more presence is needed, boost around 6kHz.

50-100Hz ~ Adds bottom end

100-250Hz ~ Adds roundness

250-800Hz ~ Muddiness Area

800-1kHz ~ Adds beef to small speakers

1-6kHz ~ Adds presence

6-8kHz ~ Adds high-end presence

8-12kHz ~ Adds hiss

## The Vocal

This is a difficult one, as it depends on the microphone that was used to record the vocal.

Apply either cut or boost around 300hz.

Apply a very small boost around 6kHz to add some clarity.

100-250Hz ~ Adds 'up-frontness'

250-800Hz ~ Muddiness area

1-6kHz ~ Adds presence

6-8kHz ~ Adds sibilance and clarity

8-12kHz ~ Adds brightness

## The Piano

Any apparent muddiness can be rolled off around 300Hz.

Apply a very small boost around 6kHz to add some clarity.

50-100Hz ~ Adds bottom

100-250Hz ~ Adds roundness

250-1kHz ~ Muddiness area

1-6kHz ~ Adds presence

6-8kHz ~ Adds clarity

8-12kHz ~ Adds hiss

## The Electric Guitar

Again this depends on the mix and the recording.

Apply either cut or boost around 300hz, depending on the song and sound.

Try boosting around 3kHz to add some edge to the sound, or cut to add some transparency.

Try boosting around 6kHz to add presence.

Try boosting around 10kHz to add brightness.

100-250Hz ~ Adds body

250-800Hz ~ Muddiness area

1-6 kHz ~ Cuts through the mix

6-8 kHz ~ Adds clarity

8-12 kHz ~ Adds hiss

## The Acoustic Guitar

Any apparent muddiness can be rolled off between 100-300Hz.

Apply small amounts of cut around 1-3 kHz, to push the image higher.

Apply small amounts of boost around 5 kHz to add some presence.

100-250Hz ~ Adds body

6-8kHz ~ Adds clarity

8-12kHz ~ Adds brightness

## The Strings

These depend entirely on the mix and the sound used.

50-100Hz ~ Adds bottom end

100-250Hz ~ Adds body

250-800Hz ~ Muddiness area

1-6kHz ~ Sounds crunchy

6-8kHz ~ Adds clarity

8-12kHz ~ Adds brightness

## Appendix 2: EQ Tables

Below is a general guide to what specific frequencies may do to your sounds / mix.

### 50 Hz

1. Increase to add more fullness to lowest frequency instruments like foot, toms, and the bass.
2. Reduce to decrease the "boom" of the bass and will increase overtones and the recognition of bass line in the mix. This is most often used on bass lines in Rap and R&B.

### 100 Hz

1. Increase to add a harder bass sound to lowest frequency instruments.
2. Increase to add fullness to guitars, snare.
3. Increase to add warmth to piano and horns.
4. Reduce to remove boom on guitars & increase clarity.

### 200 Hz

1. Increase to add fullness to vocals.
2. Increase to add fullness to snare and guitar (harder sound).
3. Reduce to decrease muddiness of vocals or mid-range instruments.
4. Reduce to decrease gong sound of cymbals.

### 400 Hz 1.

1. Increase to add clarity to bass lines especially when speakers are at low volume.
2. Reduce to decrease "cardboard" sound of lower drums (foot and toms).
3. Reduce to decrease ambiance on cymbals.

### 800 Hz

1. Increase for clarity and "punch" of bass.
2. Reduce to remove "cheap" sound of guitars

### 1.5 KHz

1. Increase for "clarity" and "pluck" of bass.
2. Reduce to remove dullness of guitars.

### 3 KHz

1. Increase for more "pluck" of bass.
2. Increase for more attack of electric / acoustic guitar.
3. Increase for more attack on low piano parts.
4. Increase for more clarity / hardness on voice.
5. Reduce to increase breathy, soft sound on background vocals.
6. Reduce to disguise out-of-tune vocals / guitars

### 5 KHz

1. Increase for vocal presence.
2. Increase low frequency drum attack (foot/toms).
3. Increase for more "finger sound" on bass.
4. Increase attack of piano, acoustic guitar and brightness on guitars.
5. Reduce to make background parts more distant.
6. Reduce to soften "thin" guitar.

#### 7 KHz

1. Increase to add attack on low frequency drums (more metallic sound).
2. Increase to add attack to percussion instruments.
3. Increase on dull singer.
4. Increase for more "finger sound" on acoustic bass.
5. Reduce to decrease "s" sound on singers.
6. Increase to add sharpness to synthesizers, rock guitars, acoustic guitar and piano.

#### 10KHz

1. Increase to brighten vocals.
2. Increase for "light brightness" in acoustic guitar and piano.
3. Increase for hardness on cymbals.
4. Reduce to decrease "s" sound on singers.

#### 15KHz

1. Increase to brighten vocals (breath sound).
2. Increase to brighten cymbals, string instruments and flutes.
3. Increase to make sampled synthesizer sound more real.

Formant filters: Formants are a very particular sound which the human vocal tract can make, and commonly in synthesizers, vocoders and equalizers you can emulate this by using two or three formant frequencies, to give the listener the impression of a 'speaking' sound. Black Knight comes bundled with a collection of formant filter setups, ready for you to use.