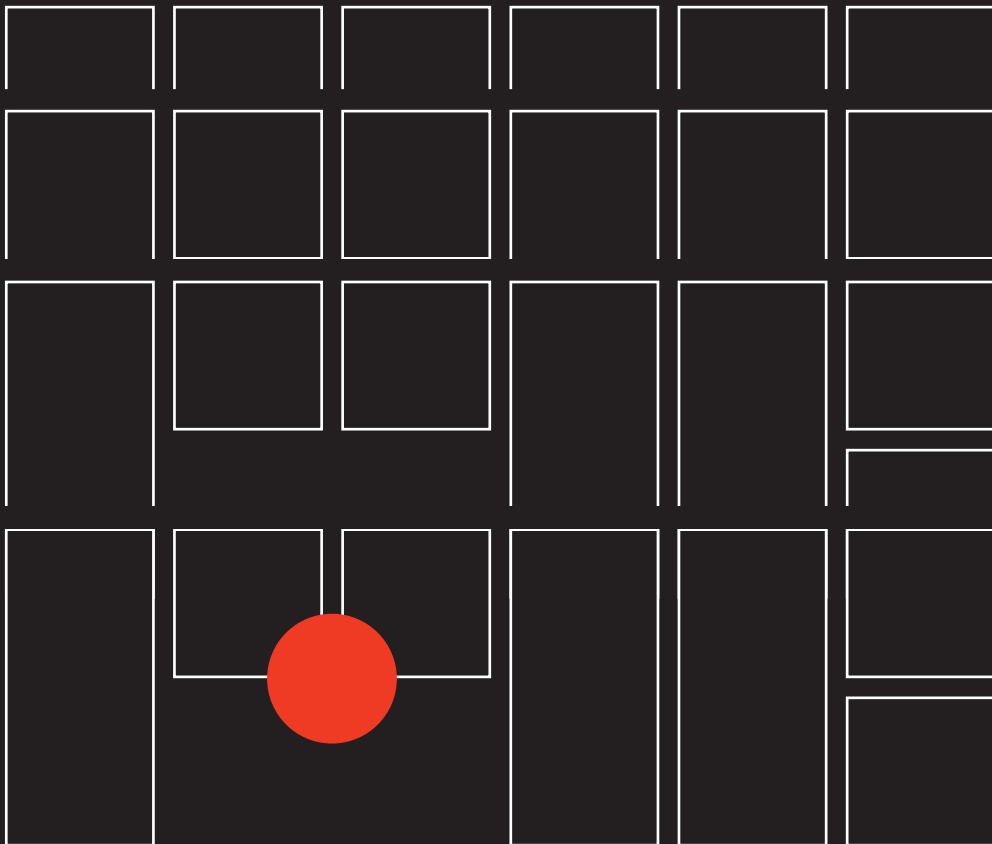
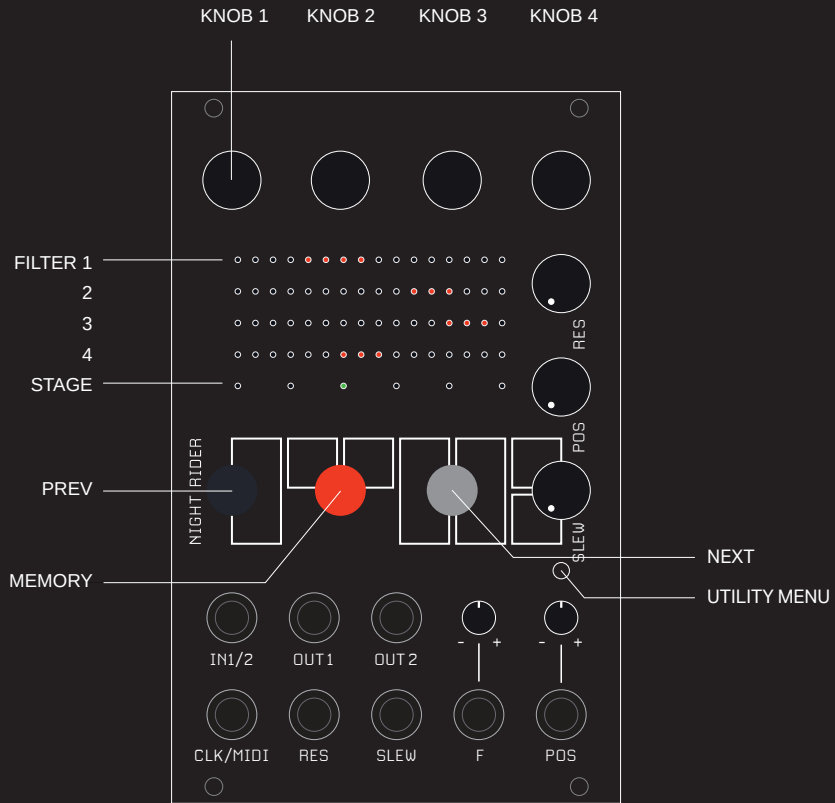


NIGHT RIDER  
QUAD SEQUENTIAL RESONATOR

USER MANUAL  
V1 FIRMWARE





# RYK MODULAR NIGHT RIDER USER MANUAL V1

**NIGHT RIDER** is a Quad Sequential Filter Bank, containing Four multi-model filters with stereo capability, combined with a six-stage four-channel modulation sequencer.

## OVERVIEW

There are four Filters in **NIGHT RIDER**, whose mode can be selected from several types:  
6db Band Pass, 12db Band Pass, Variable-width Band Pass [ VBPF ], All Pass [AP2 ] and two types of feedback delay filters [ KP and AP1].

The Filters are arranged in parallel, except in the case of the All Pass modes which are arranged in series.

The unique modulation sequencer unifies the control of the Filter parameters, enabling a spaghetti-free approach to formant animation fun.

The modulation sequencer is capable of being clocked, scanned, and interpolated between each stage.  
Sequencer advance is triggered by a clock input or MIDI clock input.  
By animating the filter frequencies and levels you can create some amazing 70's phaser sweeps, Daft-funk style formant vocal rasps, and far out flanging !

When adjusting the control knobs, Frequency and Level for each Filter are automatically stored into the current sequencer Stage.  
Controls for Resonance/Feedback/Bandwidth, Slew, and Sequence

interpolated Position are continuously adjustable by their dedicated knobs.  
Bi-polar Modulation inputs, and MIDI CC input also allow for modulation of these parameters.

The master Frequency input CV is 1V/Oct and can be used for melodic filtering, or tuned Pinging and KP Strumming..  
Master Frequency can also be modulated by MIDI Note On messages using the MIDI input.

User Voice Memory slots are available for storing and retrieving Filter and animation setups, and retrieving preset Formant, and Chord based Filter setups.  
An auto-save option is available to keep the current settings after power-off.

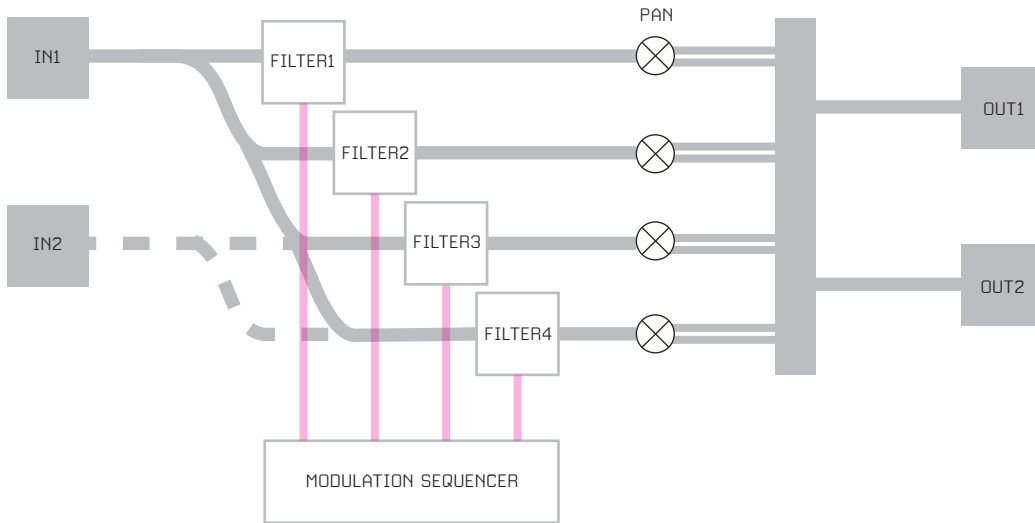
## DIMENSIONS

16 HP  
25 mm deep

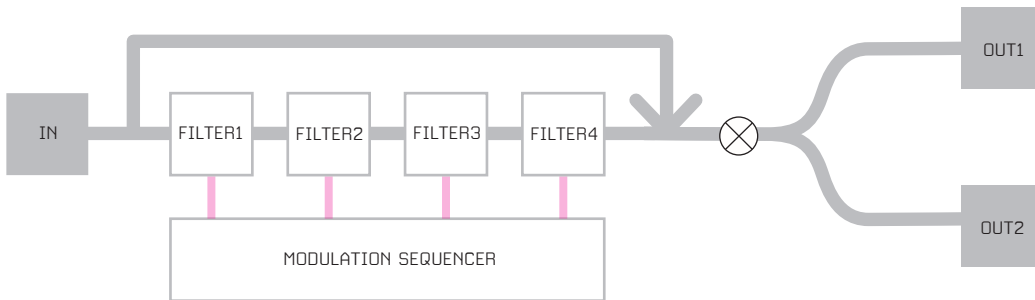
## POWER CONSUMPTION

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





NIGHT RIDER - STRUCTURE OVERVIEW



NIGHT RIDER - STRUCTURE OVERVIEW (ALL PASS FILTERS)





## MODULATION SEQUENCER

The Modulation Sequencer section of Night Rider consists of four channels, one for each filter, and six stages of animation. Each stage contains the settings for the Filter Frequencies and Filter Levels.

By animating the sequencer from one stage to another the Filter Frequencies and Levels are morphed from one value to another. Using larger values of **SLEW** creates a glide of the Frequency change [ similar to an LFO modulation of a Filter ], using lower values of **SLEW** will create more abrupt stepping changes of the Filter frequencies and Levels.

The bottom row of six Green LEDs indicate the current **STAGE POSITION** of the Modulation Sequencer. The horizontal lines of Red LEDs illustrate either the Filter Frequency or Filter Level, depending on which is selected [ See **FILTER BANKS** ].

The sequencer Stage position can be moved by using the Next  and Prev  buttons, or by clocking the sequencer with an external clock or MIDI clock via the **CLK/MIDI Input**.

The Stage position can also be moved and interpolated by the **POS KNOB**, or external CV via the **POS INPUT**.

See below for the sequencer settings available in the **SETTINGS MODE**. [ see Page5/6 ] :

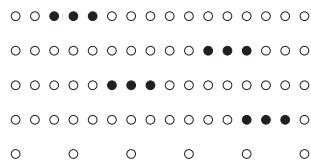
The maximum and minimum position of the sequencer Stage can be set with the **SEQUENCE RANGE** option. When using an external clock [ MIDI or analogue ] to trigger the Sequencer, it's timing can be subdivided using the **SEQUENCE CLOCK DIVISION** settings. The direction of the Sequencer advance can be adjusted using the **SEQUENCE MODE** option.

## FILTER BANKS

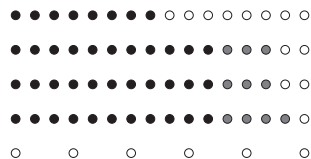
The four filter outputs are combined in parallel for all modes, except **ALL PASS [APF]** where they are combined in series. The filter inputs are all fed from IN1, if using a Mono jack for the **IN1/2 INPUT**. Otherwise using a Stereo jack; IN1 feeds filters 1&2, IN2 feeds filters 3&4.

The Filter parameters are indicated by the horizontal lines of Red LEDs across the display, the top line indicates Filter1, the next line indicates Filter2 and so on. Depending on which parameter you are editing the Red LEDs will appear differently.

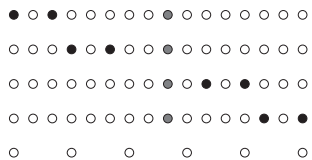
**FREQUENCY** is indicated by single dots or groups of 3-4 dots [ Variable Band Pass VBPF ].



**LEVEL** is indicated by horizontal VU style Bars.



**PAN** is indicated by groups of two dots, and a central point indicator.



Use the top row of knobs to adjust the Frequency or Level of each of the four Filters.

Pushing any of the knobs once will toggle between Frequency and Level.

A triple click on any of the knobs will allow you to adjust the Pan position of each Filter in the stereo field, push once again to return to Frequency/Level adjustment. [ If you are using just one Mono output, then please select "1" in the **OUT** option of the **UTILITY SETTINGS MENU** [See Page 10]

The Frequency ranges from rumble [ far left ] to wispy [ far right ].  
The Level ranges from silent [ far left ] to very-full-on [ far right ].

The last 5 brighter LEDs of the Level Bar indicate that the filter will likely enter a zone of saturation clipping. [ nice distortion ]  
For clean distortion free sound, we recommended setting the Levels lower than the 5 clipping LEDs indication.

Please note, the nature of Band Pass Filters [ **BPF** ] is to allow a limited range of harmonics through. This naturally results in a loss of signal level compared to the un-filtered signal.  
Please adjust the Level controls to compensate for this.

When higher values of Resonance or Feedback are set with the **RES CONTROL** or **RES CV INPUT**, the signal may suddenly become much louder when the filter aligns with a strong harmonic in the original signal. If this leads to unwanted saturation distortion, please lower the

Level of the filter.

When the Modulation Sequencer is at rest [ not animating ], or you are in **STAGE EDIT MODE**, or the current stage is indicated by a bright Solid Green LED, then the adjustments of the knobs will update the currently audible Filter bank..

If the Stage position is at an interpolated position between two stages [ indicated by two dimmed Green LEDs ] the filter adjustments will affect the dominant stage [ Brighter of the two Green LEDs ].  
Please note, in this case, the audible output and frequency display will be the interpolated value between the stages.  
To edit and hear a particular stage, simply use the **NEXT** or **PREV** buttons to select the desired stage. [ see below ].

## CONTROLS



Used normally the Grey button steps forwards through the Modulation Sequence.

By pushing and holding the Grey button whilst turning one of the top row knobs, adjustment of all the Filter Frequencies or Levels as one group is possible.



Used normally the black button steps backwards through the Modulation Sequence.

Push and hold for a second, and it will enable the **STAGE EDIT MODE** [ see below ] Push and hold the button whilst turning any of the top row knobs to enable the **SETTINGS MODE**. [ see below ]



## STAGE EDIT MODE

This mode [ indicated by a lone Flashing Green LED ] allows for editing of an individual Sequence Stage, even when the Modulation Sequencer is in action.

The Stage indicated in this mode will not necessarily be audible, depending on where the current sequencer play position is. Use the **NEXT** or **PREV** button to move forward or backward through the Stages, the mode will exit if there is no activity with the Filter knobs after a few seconds, or can be cancelled by pushing the Red button.

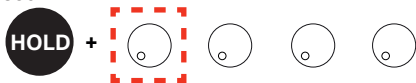
## SETTINGS MODE

Pushing and holding the Black button whilst turning one of the top row knobs, enables the Settings Mode, where adjustments of the **FILTER TYPE** and **SEQUENCER SETTINGS** are possible.

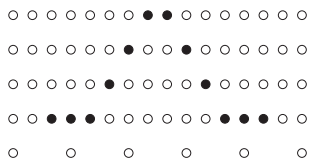
Whilst turning one of the knobs, the Red LED display will change to indicate one of the four Settings Mode functions.

## KNOB 1

**FILTER TYPE** - Select which filter model is used

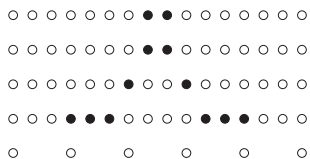


6db BPF



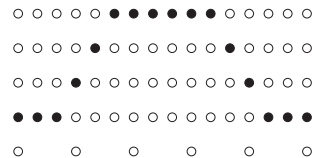
A Band Pass filter with variable resonance. Higher resonance settings can be used to Ping the filter. Try this with a pulse or click applied to the audio input for creating bongo or wooden xylophone type sounds. All of the Band Pass filters are great for creating vocal formant types sounds [ see tips and tricks at the end of the manual ]

12dB BPF



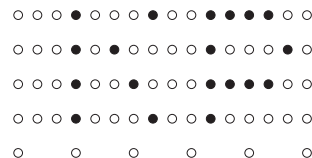
A steeper slope Band Pass filter with variable resonance, that sounds much narrower. Higher resonance settings can be used to Ping the filter.

Variable Width BPF



A Band Pass filter with variable band width [ using the **RES CONTROL**]. Depending on the width setting, this filter can have a more subtle, less extreme band pass effect.

Karplus-Strong style Comb Filter

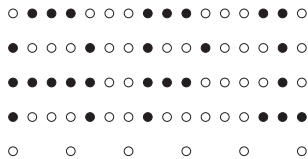


A delay-line based filter with variable feedback [ using the **RES CONTROL** ] suitable for flanging style filter effects. With high settings of feedback it is great to use



for physical modelled string sounds, by exciting the filter with short blips of noise or harmonically strong pulses.  
Beware of sharp changes in frequency, which can cause [un]desired artefacts !

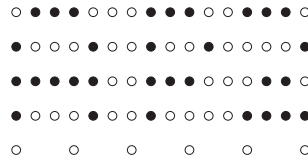
#### All Pass Filter 1 [ delay-line based ]



A delay-line based comb filter with variable mix of the dry signal [ using the **RES CONTROL**]

Increasing the mix of the dry signal creates stronger notches, which with swept filter frequencies creates phase shifting effects. Generally best used when the filter frequencies are closely spaced in the higher frequencies, and applied to an input signal strong in complex harmonics.  
Beware of sharp changes in frequency, which can cause [un]desired artefacts !

#### All Pass Filter 2 [ IIR based ]



An IIR based filter with variable mix of the dry signal [ using the **RES CONTROL**]

Increasing the mix of the dry signal creates stronger notches, which with swept filter frequencies creates phase shifting effects. Generally best used when the filter frequencies are closely spaced in the higher frequencies, and applied to an input signal strong in complex harmonics.

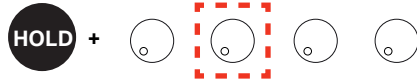
This filter is more subtle than the delay-line version, and does not suffer from pitch shift when modulated.

#### **NB:**

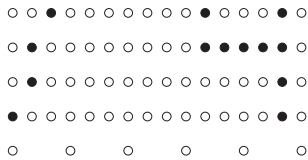
With both All Pass Filter modes the filters are cascaded in series, and setting the Level control adjust the overall level rather than individual filters.  
The Pan control is unavailable, as Out1 and Out2 deliver subtracted dry and additive dry mixes with the filtered signal respectively.





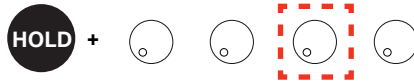


**KNOB 2  
SEQUENCE CLOCK DIVISION**

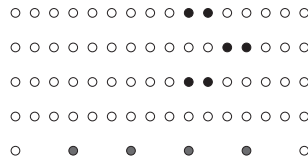


This setting allows for the subdivision of the **CLOCK INPUT** that triggers the stage advance of the Modulation sequencer. For example a setting of 4 would trigger the sequencer advance once every four clock pulses. This setting is applied to the MIDI and analogue clock inputs.

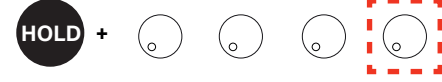
NB The **MIDI CLOCK INPUT** is pre-divided by a factor of 6 before the clock division is applied. [ MIDI clock is 24ppqn ]



**KNOB 3  
SEQUENCE RANGE**

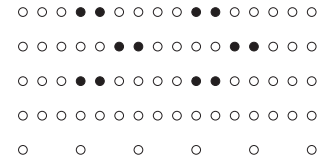


The maximum and minimum range of the sequencer stages can be set here. Push the knob to toggle between min and max settings. Minimum is indicated by a left pointing arrow, maximum is indicated by a right pointing arrow. The active range is indicated by the lit Green LEDs.



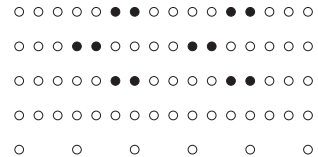
**KNOB 4  
SEQUENCE MODE**

Forwards



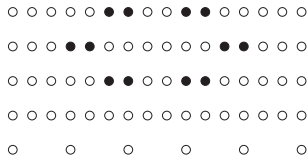
On an active clock pulse, the sequencer will advance to the right. After the maximum stage the sequence will reset to the minimum stage.

Backwards



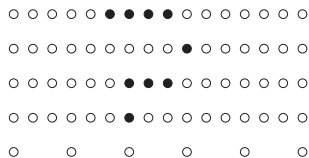
On an active clock pulse, the sequencer will advance to the left.  
After the minimum stage the sequence will reset to the maximum stage. reset to the maximum stage.

### Ping-Pong



On an active clock pulse, the sequencer will advance to the right.  
After the maximum stage the sequence will reverse and move towards the left.  
The sequence direction will continue to flip back and forth when it reaches the maximum or minimum stage.

### Random



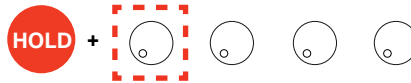
On an active clock pulse, the sequencer will

advance to a randomly chosen stage within the maximum or minimum stage range.

## MEMORY

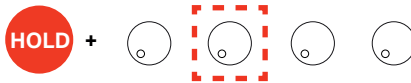
Pushing this button whilst rotating Knob 1 or Knob 2 activates the **PATCH STORAGE MODE**, where Filter banks and Modulation Sequence parameters can be Saved and Loaded.

### KNOB 1 LOAD PATCH MEMORY #1-19



Load previously stored Filter Bank, and Sequencer settings.  
Turn the knob to select the Patch Memory number, push the knob to Load.

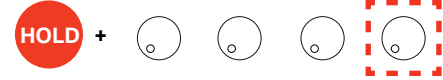
### KNOB 2 SAVE PATCH MEMORY #1-19



Save the current Filter Bank, and Sequencer settings.

Turn the knob to select the Patch Memory number, push the knob to Save.

### KNOB 4 LOAD FILTER PRESETS



Predefined single stage filter setups can be Loaded into the current stage.  
There are 13 Vocal Formants, and 13 Chords.  
Turn the knob to select the preset number, push the knob to Load the filter preset settings into the current stage.

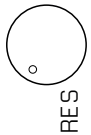
Vocal Formants [ Denoted by a **P** prefix]

- 1 - ee
- 2 - i
- 3 - ay
- 4 - e
- 5 - au
- 6 - u
- 7 - a
- 8 - aw
- 9 - oo
- 10 - ar
- 11 - er
- 12 - ir
- 13 - iir



Chords [ Denoted by a **C** prefix ]

- 1 - Major
- 2 - Minor
- 3 - Diminished
- 4 - Augmented
- 5 - Major 7th
- 6 - Minor 7th
- 7 - Dominant 7th
- 8 - Diminished 7th
- 9 - Augmented 7th
- 10 - Suspended 2nd
- 11 - Suspended 4th
- 12 - Suspended 2nd
- 13 - Suspended 4th



**RES KNOB**

Use this knob to adjust the Resonance, Band Width, or Feedback of the Filters. [ the function depends on the **FILTER TYPE** used, see Page 5/6]

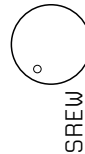
With the **6dB or 12dB BAND PASS FILTERS**, the RES control adjusts the resonance of the filters, high settings will ring and oscillate allowing the filters to be Ping-able !

Use high resonance carefully, as this can create unexpectedly loud resonance peaks, which can distort, Adjust the Level control to reduce the distortion if necessary.

With the **VARIABLE-WIDTH BAND PASS FILTER** the control adjusts the width of the filter.

When using the **KP COMB FILTER** the control adjusts the Feedback amount. Higher settings will ring, enabling the filter to be used as a Karplus-Strong physical modelled string sound when excited by a pulse of noise or sound energy.

When using either **ALL PASS FILTER** the control increases the mix of the dry signal, increasing the depth of the filter notches for more extreme phase cancellation jetting type sounds.



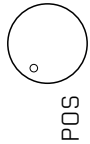
**SLEW KNOB**

This control adjusts the amount of slew [ glide ] between the modulation stages when there is a transition from one to another, either from sequencer animation or using the **PREV**, and **NEXT** buttons.

Higher settings of slew will create a smooth slow change from one Stage to another, useful when combined with a slow Clock source to create dramatic phaser type movements to a sound.

Lower settings will create more sudden transitions between sequence Stages, useful for quicker wah-wah-eeh-ahh vocal sounds or resonant acid bassline chirps.

At the minimum setting, there will be no glide between sequence Stages, creating abrupt and percussive transitions between sequence Stages, useful when sequencing frequency changes for a ping-able Filter set



## POS KNOB

This control moves the current position of the sequence, indicated by the Green LED.

If there is some Slew applied, then the Position control will interpolate between the stages as it changes.

With minium Slew applied, there will be an abrupt jump from one stage to the next as the knob is turned.

If adjusting the Frequency or Level of a Stage, when the sequence is not animating, it is a good idea to first select the Stage using the **PREV** or **NEXT** buttons, otherwise if the sequence is halfway between stages in an interpolated position, the adjustments will be hard to identify clearly.

## UTILITY BUTTON

This button activates the **UTILITY SETTINGS MENU** of the Night Rider module.

Push once to enter the menu, use top row Knob 1 to select a parameter, use Knob 4 to adjust the value of the parameter.

The parameter and its value will flash alternately.

**OUT** – Audio Output setting.

**1** [ CH1 - MONO], **1.2** [ CH1 & CH2 - stereo]

NB if you are not using both outputs, please select **"1"** in this menu.

**CH** – MIDI Channel for MIDI data.

**0** = OFF, **1-16**

NB This does not affect the MIDI Clock.

**NT** – MIDI Note messages

**ON, OF[F]**

Selects if MIDI Note messages will be received as Global Frequency offset values.

**SUN** – Brightness level of display to compensate for sunny days !

Range **1-9**

## CONNECTION JACKS

### IN1/2

This is the audio input for the Filter banks.

Inserting a Mono jack will send the audio to all four Filters.

Inserting a Stereo jack or the included Y-split cable, will send Input 1 [left] to filters 1&2, and Input 2 [right] to filters 3&4.

### OUT1 / OUT 2

These are the audio outputs of the Filter banks.

Use the Pan settings to control the mix of which Filter is sent to which output.

If you are using just one Mono output, the please select **"1"** in the **OUT** option of the **UTILITY SETTINGS MENU**.



## CLK/MIDI

This input allows a clock signal to control the Modulation Sequencer. For slower rates the clock input can be subdivided using the **SEQUENCE CLOCK DIVISION** parameter in the **SETTINGS MODE**. [ see Page 7 ]

The input also accepts a **MIDI CLOCK** source and **MIDI MESSAGES**. It is a TRS MIDI input, and the polarity can be set to Type A/B on the back of the module, using the micro slide switch labelled MIDI.

**MIDI CC MESSAGES** are mapped to the following parameters, allowing external adjustments from a MIDI controller.

CC 34 - Global frequency offset

CC 35 – Current Position of the sequence / with interpolation

CC 36 – Slew amount

CC 37 – Resonance / Bandwidth / Feedback / amount

**MIDI NOTE ON MESSAGES** can also be received and are interpreted as semitone pitch offsets to the Global frequency offset.

## RES

This input accepts a bi-polar CV for modulation of the Resonance/Band Width/Feedback of the Filters.

[ See **RES KNOB** for more details ]

## SLEW

This input accepts a bi-polar CV for modulation of the amount of slew [ glide ] between the modulation stages when there is a transition from one to another.

[ See **SLEW KNOB** for more details ]

## F

This input accepts a bi-polar CV for modulation of the **GLOBAL FREQUENCY OFFSET**.

It is paired with an anttenuverter, allowing for +/- adjustments of the modulation amount.

With the anttenuverter set to the +/- maximum position, the frequency is scaled to 1V/OCT, useful for playing pitched melodies from a keyboard or sequencer.

If there is no jack inserted, the anttenuverter acts as a Global frequency offset control.

## POS

This input accepts a bi-polar CV for modulation of the current position of the sequence, indicated by the Green LED.

It is paired with an anttenuverter, allowing for +/- adjustments of the modulation amount.

[ See **POS KNOB** for more details ]

## FIRMWARE UPDATES

The firmware for Night Rider can be updated, please check our website for any new releases:

[rykmodular.bigcartel.com/firmware-updates](http://rykmodular.bigcartel.com/firmware-updates)

Here's how to install the firmware:

Power up the module first.

On the back of the module are two micro switches, labelled "FIRM-



WARE" and "RESET".

Push and hold the Firmware button, then press the Reset button momentarily whilst still holding the Firmware button. Release the Firmware button.

Plug a USB B micro cable from the module to a computer. Make sure it is a high quality cable that supplies data, some micro USB cables only supply power.

Connect the cable directly to your computer, not via a USB hub. You should see a USB Disc show up on your computer named "RPI-RP2".

Copy or drag the UF2 firmware file into the "RPI-RP2" disk. If successful, the disk will 'eject' automatically, and the module will restart with the new firmware.

Have fun !

## HINTS AND TIPS

### VERY SIMPLE PHASER SETUP

Phasers work really well with audio sources that are rich in harmonics, such as chords, or sawtooth/square wave oscillators. For a simple phaser, select one of the Band Pass Filter modes, and set the **RES** control to a middle setting. Dial the frequencies of the filters to a group where they are spaced about one dot apart. Make sure the levels are all set to the same, just below the 5 LED saturation limit.

Apply a slow **SIN** or **TRI LFO** to the **F INPUT**, and adjust the attenuverter for the modulation depth.

TIP: Select Frequency mode. Hold the **NEXT** button, whilst turning one of the top row knobs to move all the frequency bands higher or lower for a preferred position.

Also try separating out the distance between the frequency bands to hear the difference in sound.

Try the same setup with one of the All Pass filters such as **AP1**, using a very slow modulation source, and the filters set to quite high frequencies.

### VOCAL FORMANT SETUP

Formant vocal sounds need an audio source that is rich in harmonics, such as sawtooth or pulse wave.

Select the first stage, using the **PREV** button.

Hold the **MEMORY** [ Red ] button, and turn the 4th top row knob to preview some of the Formant Presets [ P prefix ], when you find one you like, push the knob to load it.

Select the second stage, using the **NEXT** button, and repeat the above process, choosing a different sounding formant.

When you have loaded a few formants into different sequencer stages, select the **SEQUENCER RANGE** holding the **PREV** button and using Knob 3.

Apply a clock source to the **CLK/MIDI INPUT** to animate the transitions between the formant sounds.

Adjust the **SLEW** control to a low setting for more vocal type sounds, longer settings will create more 'waahh' type sounds.



## MARIMBA MADNESS

Set the filter mode to the 6db or 12db Band Pass filter.

Adjust the **RES CONTROL** to near maximum, but not quite.

Apply a rhythmic or medium speed very short pulses of white noise, or envelope pulse to **IN1/2**.

Adjust the levels of the filters, and you should begin to hear the filters 'excite' by the pulses, creating a resonant drum sound a bit like a woodblock or marimba.

Higher levels of **RES** will make the decay of the sound longer, lower levels will make the decay much shorter.

Try adjusting the the frequencies of the filters to hear how the groupings of the pitched resonances sound together.

You can also try loading one of the Chord Presets from the **MEMORY** [ see page 8/9 ]

TIP: It can be interesting to supply different pulses of different timings to the **IN1** and **IN2** inputs, to create more complex rhythms of different pitches.

Also you can connect a CV source to the **F INPUT** to modulate the global frequency of the sounds, such as a keyboard or sequencer.

## KARPLUS-STRONG STRINGS

The Karplus Strong delay filter [**KP**] can be used to create synthesised plucked or bowed string sounds.

Select the KP filter mode, and adjust the RES CONTROL to near maximum, but not quite.

As in the Marimba example above, apply very short pulses of white noise or harmonically rich sound to the IN1/2.

The **RES CONTROL** sets how much feedback is applied to the delay line, effectively setting the decay time of the string sound. Lower frequencies will ring longer than higher frequencies.

TIP: Try changing the envelope of the noise pulse source, a softer

attack will make the string sound more "bowed" sounding.

Also try applying a constant source of noise or harmonically rich sound to **IN1/2**, and adjusting the filter frequency bands to create a chord. You can also try loading one of the Chord Presets from the MEMORY [ see page 8/9 ]

This technique can create almost orchestral string sounding chords.

## NAME YOUR PATCH MEMORIES

1..... 2 .....

3..... 4 .....

5..... 6 .....

7..... 8 .....

9..... 10 .....

11..... 12 .....

13..... 14 .....

15..... 16 .....

17..... 18 .....

19.....



1

