

 **KNIGHT'S GALLOP**
ALGO-RHYTHMIC GENERATOR

BUILDING GUIDE



Shakmat
MODULAR

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01. Components List + Tools

Resistors

6,8 k Ω

X4 – Pack 1/5

33 k Ω

X2 – Pack 1/5

22 Ω

X1 – Pack 1/5

100 k Ω

X6 – Pack 2/5

1 M Ω

X2 – Pack 2/5

18 k Ω

X1 – Pack 2/5

1 k Ω

X2 – Pack 3/5

3.6 k Ω

X3 – Pack 3/5

Capacitors

22 pF

X2 – Pack 2/5

100 nF

X1 – Pack 1/5

Diodes

1N4148

X1 – Pack 1/5

1N4742 Zenner

X1 – Pack 2/5

Quartz

16 MHz

X1 – Pack 2/5

LED's

White LED

X1 – Pack 1/5

Amber LED

X7 – Pack 2/5

Green LED

X2 – Pack 3/5

IC's

8 Pin IC Socket

X1 – Plastic Tubbing

LM358 OpAmp

X1 – Plastic Tubbing

28 Pin IC Socket

X1 – Plastic Tubbing

ATMEGA328

X1 – Plastic Tubbing

78L05

X1 – Pack 1/5

Miscellaneous

2x5 pin Power Header

X1 – Pack 3/5

8 pin Male Header

X1 – Pack 3/5

Jack Connectors

X6 – Pack 3/5

Jack Knurled Nuts

X6 – Pack 4/5

Potentiometers

X2 – Pack 4/5

Potentiometers Nuts

X2 – Pack 4/5

Push Buttons

X4 – Pack 3/5

Push Buttons Caps

X4 – Pack 3/5

M3 Panel Nut

X1 – Pack 4/5

M3 Screws

X2 – Pack 4/5

Chroma Caps Knobs

X2

Top PCB (big)

X1 – Pack 5/5

Bottom PCB (small)

X1 – Pack 5/5

Aluminum Panel

X1

Power ribbon Cable

X1

Tools

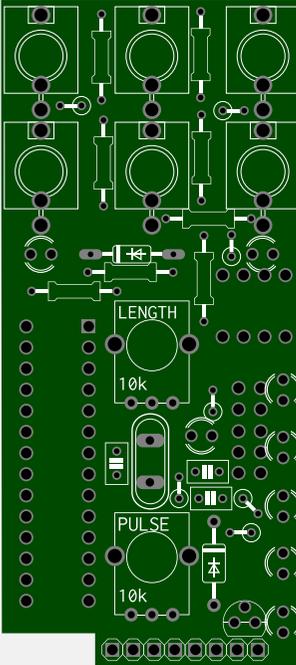
Soldering Iron

Solder

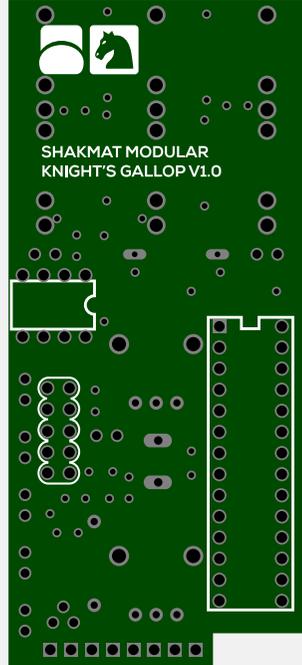
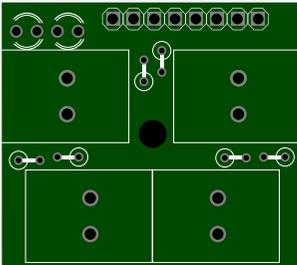
Cutting Pliers

Masking Tape

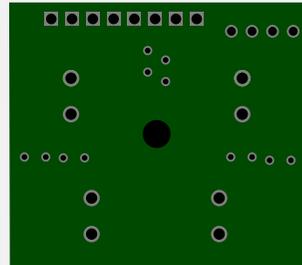
02. PCB Sides



Front



Rear



03. Important Note

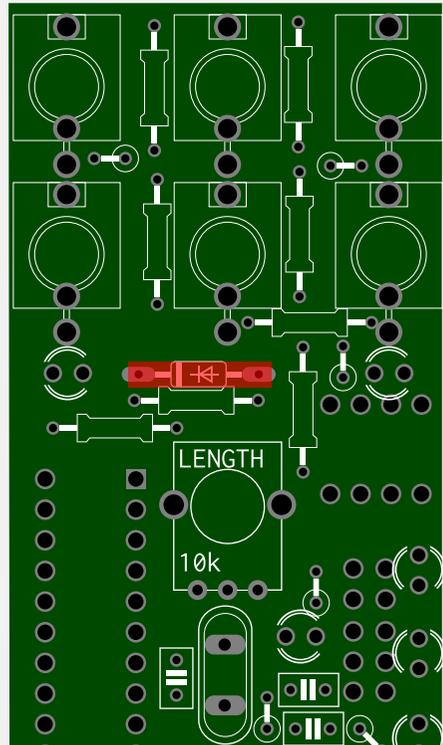
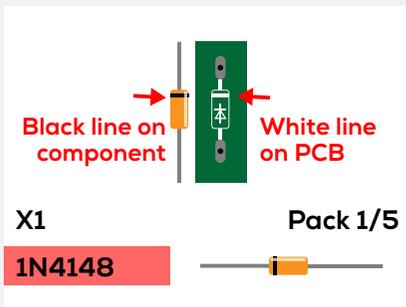
If you feel you're going to build this kit without looking at the steps, just remember that **it is very important to join the two PCB's in a strict parallel alignment**. If you don't want the final build to have hard to press buttons, please pay attention to that. We also recommend to have a look to the steps 04_9 that require unexpected cuts for the potentiometers.

Don't split the packs open & mix components, some are virtually indistinguishable (like the 3 different color LED that all appear clear when inactive). We strongly recommend to only take the component(s) you need and let the other in their corresponding pack.

04. Top PCB Assembly

04_1. Diode 1N4148

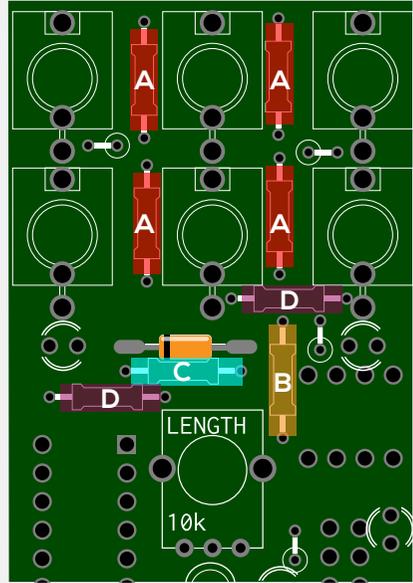
This build has two different diodes : a tiny one and a bigger one. This steps only concern the 1N4148, that's to say the tiny one. Please note that the diode orientation has to match the PCB silkscreen. The white line on the silkscreen has to match the black bar on the component, as on the following picture.



04_2. Laying Resistors

Here's a picture of the top PCB with placement of the resistors by values. There's no polarity to observe with resistors.

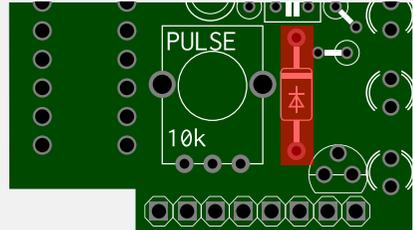
X4	Pack 1/5
6.8kΩ A	
X1	Pack 2/5
100kΩ B	
X1	Pack 2/5
1MΩ C	
X2	Pack 1/5
33kΩ D	



04_3. Zener Diode

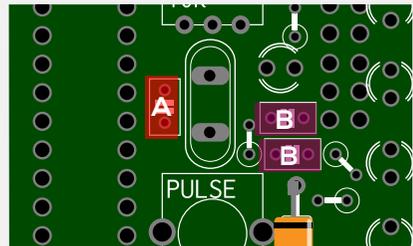
X1	Pack 2/5
Zener	

As in step 4_1, be careful to the diode polarity. You've to match the silkscreen and component black line.



04_4. Capacitors

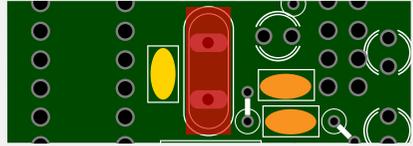
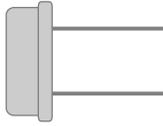
X1	Pack 1/5
100nF A	
X2	Pack 2/5
22pF B	



04_5. Quartz

X1 Pack 2/5

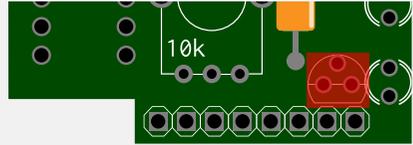
16 MHz



04_6. 78L05 Regulator

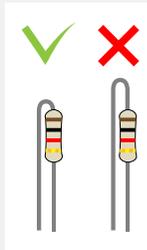
X1 Pack 1/5

78L05



04_7. Standing Resistors

Only one leg of the resistors have to be bent before soldering. Don't bend the leg too high or it will cause short-circuit with the panel.



X2 Pack 3/5

1k Ω

A



OR

X1 Pack 2/5

100k Ω

D



X1 Pack 2/5

1M Ω

B



X1 Pack 2/5

18k Ω

E



X1 Pack 1/5

22 Ω

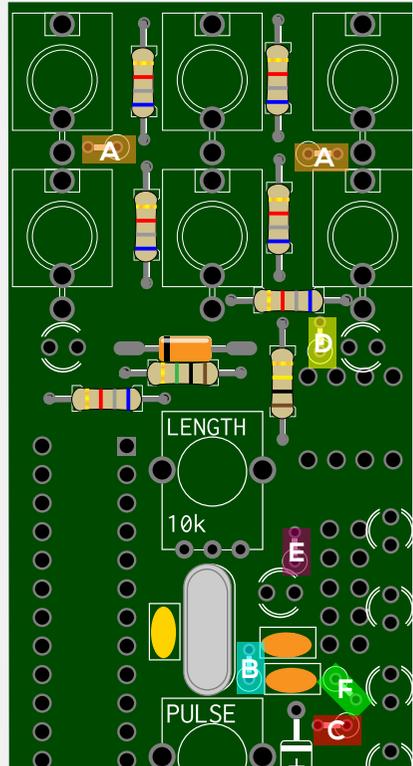
C



X1 Pack 3/5

3.6k Ω

F

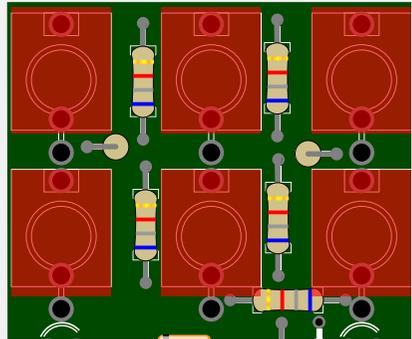


04_8. Jack Connectors

There are 6 jack connectors, that have to sit tight and flush with the PCB. Be sure to push them all the way through before soldering.

X6 Pack 3/5

Jack

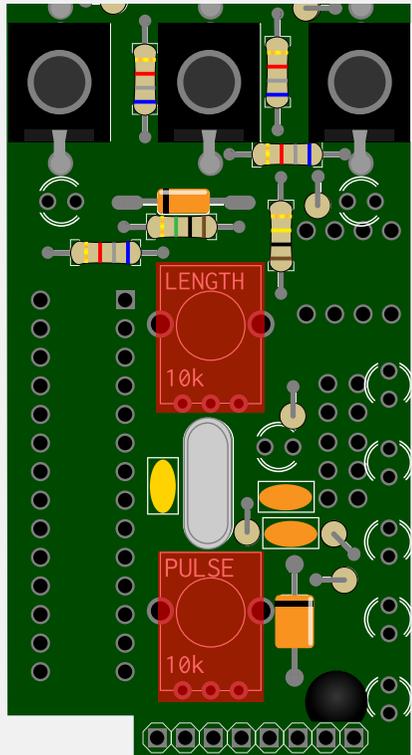
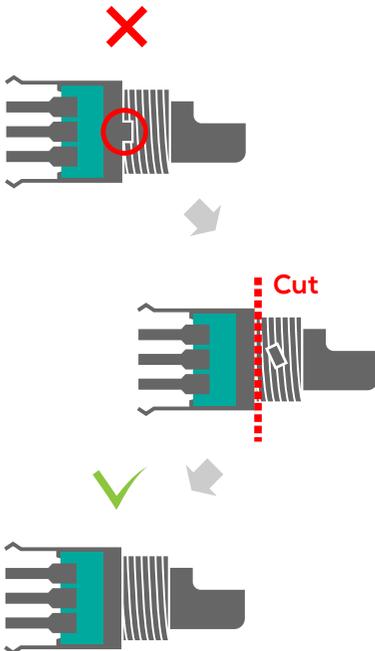


04_9. Potentiometers

First you'll have to remove a little piece on the potentiometer as shown in the picture. Then, you can place and solder them.

X2

Pack 4/5

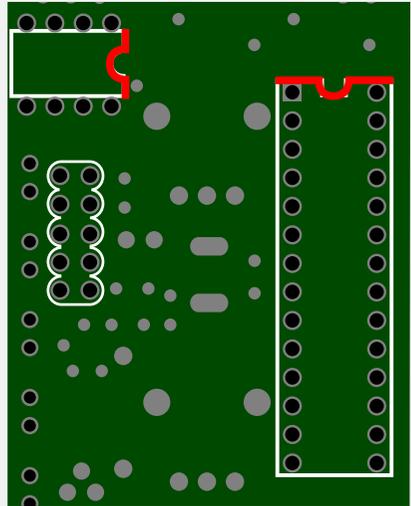
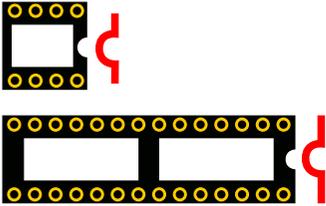


04_10. IC Sockets

Now, let's flip the PCB and continue. We're going to solder the two ICs sockets. Be attentive to their orientation. The red lines on the picture show the right position.

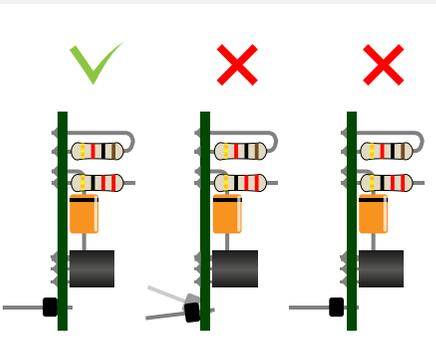
X1 (each)

Plastic Tubing
or foam



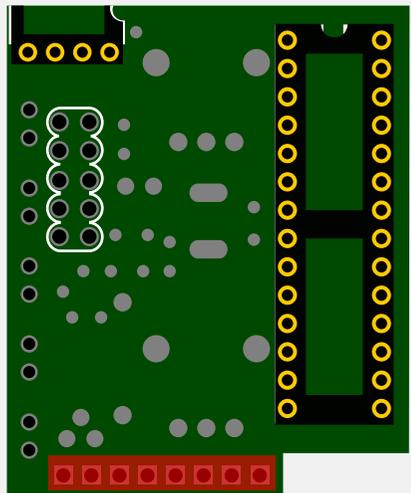
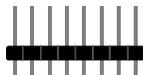
04_11. PCB Male Header

The PCB header is also mounted on the back of the top PCB. For now we are taking care of the short legs side of the header. Be very careful with this piece: it has to lay completely flat with the PCB and perfectly perpendicular. We recommend you to place the header and solder one leg then verify its alignment before soldering the seven remaining legs.



X1 Pack 3/5

Header

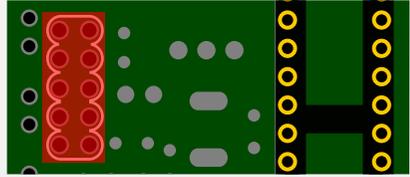


04_12. Power Supply Header

X1

Pack 3/5

Power Header



05. Bottom PCB Assembly

05_1. Standing Resistors

X2

Pack 3/5

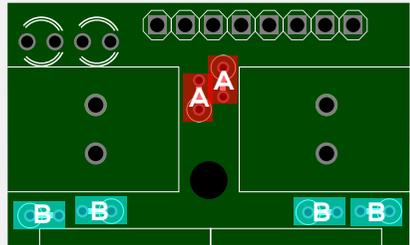
3.6kΩ A



X4

Pack 2/5

100kΩ B



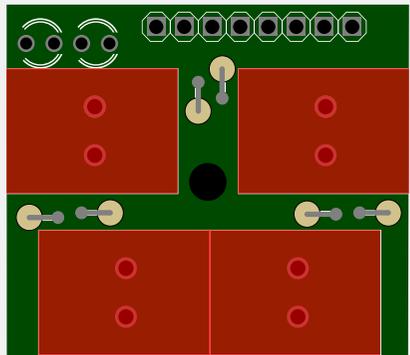
05_2. Push Buttons

The buttons are easy to plug & solder but they need to be thoroughly pushed on the PCB. Before soldering, we recommend to place the four buttons, then flip the PCB and press it against your table in order to ensure that every button is well placed.

X4

Pack 3/5

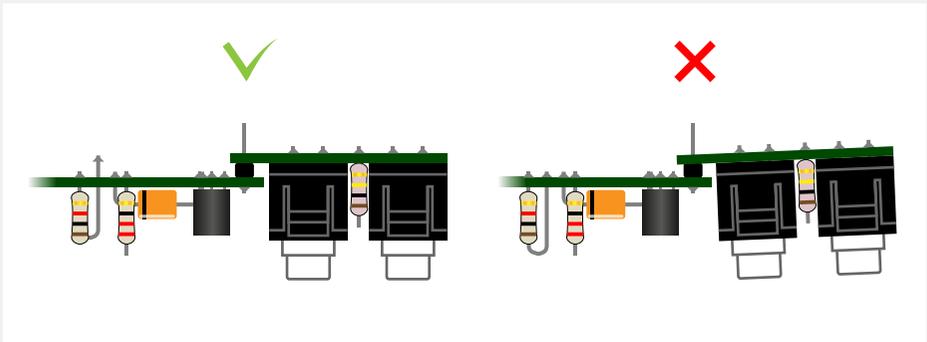
Button



06. Top & Bottom PCB's Assembly

Be very careful that the header you're soldering is well passed through all the bottom PCB holes and that the two PCB's are perfectly horizontal. If there is a gap between the header and the PCB's, or if they're not correctly aligned, the push button could be poorly placed and hard to press.

As you did before, we recommend you to only solder one pin of the header and check the alignment before soldering the seven other pins.

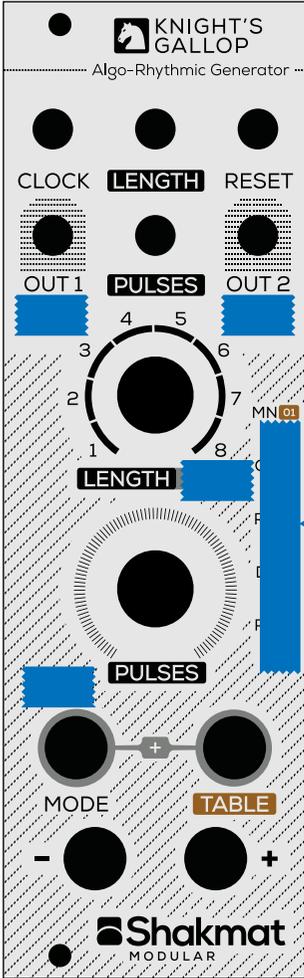


07. LED's Mounting

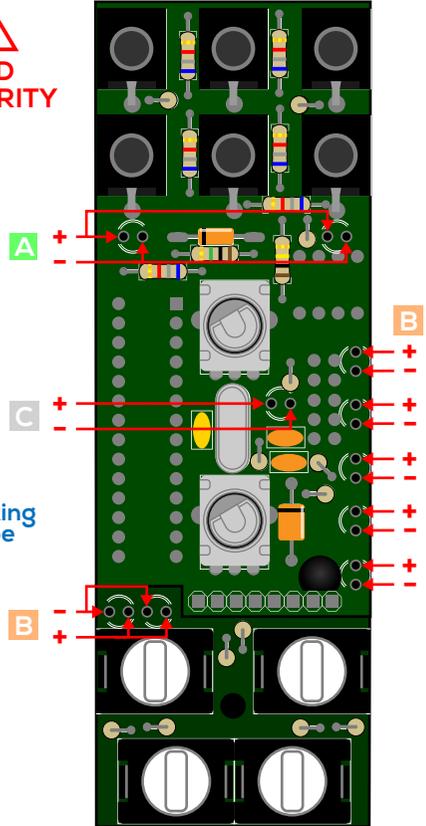
To get well soldered LED flush with the panel, you need to assemble the front panel to the PCB. We recommend you to do this by finger tightening the two hex nuts on the potentiometers.

A good way to do this is to use masking tape to cover the panel LED holes. Therefore you can place the LED on the PCB, assemble them with the potentiometer nuts and push LED's through the panel until they sit flush and stick to the tape. Then you can solder them.

Be careful with the LED polarity, the long leg is always the positive side. Please refer to the following picture to know which LED goes where. You also need to pay attention to not mix LED's from different packs, when inactive the clear LED's are very hard to differentiate from each other.



LED POLARITY



X2

Pack 4/5

Nuts



X2

Pack 3/5

Green A



X7

Pack 2/5

Amber B



X1

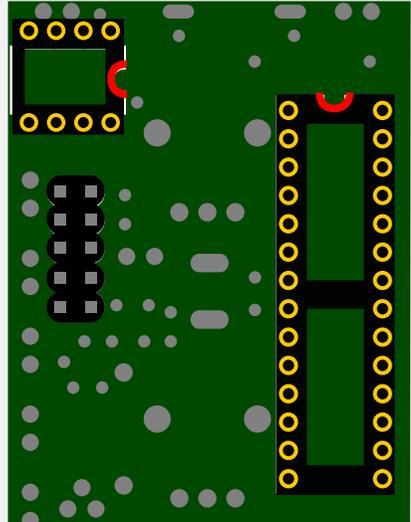
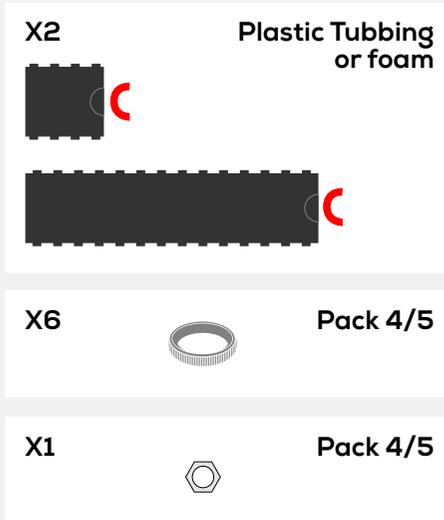
Pack 1/5

White C



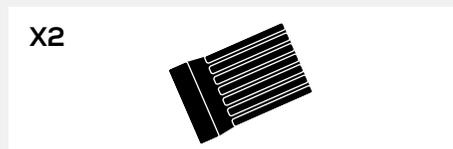
08. IC's, Nuts, Bolt & Caps

It's now time to plug the IC's in their sockets. Make sure the IC orientation matches the socket orientation as on the following picture.



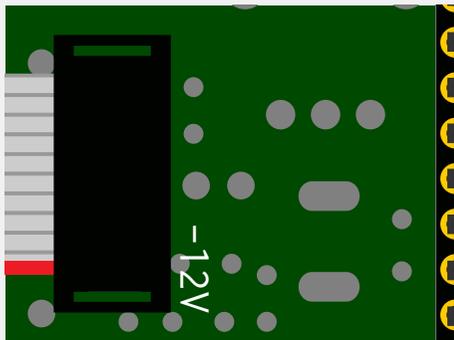
You can now place the six knurled nuts on the jack connectors and the M3 nut on the screw that is mounted on the back side of the panel. The function of this nut is to retain the bottom PCB to retreat when the buttons are pushed.

Do not screw the M3 nut to far or it will push the bottom PCB out of it's parallelism with the top PCB and interfere with the buttons caps. Just tighten it until it sits flush with the bottom PCB. To prevent this nut to move over time, we recommend you to put a small amount of nail polish on it. Some glue will also do the trick but can be very problematic to remove if you need to unscrew this nut. Finally, mount the four buttons caps and two potentiometers knobs. That's it, you've finished !



Plug the power cable and make sure the red side of the ribbon matches the -12V on the PCB.

Now let's plug the module in your system and test it. The module LEDs doesn't blink if the module isn't running. So don't panic if the modules seems quiet when nothing is connected to it.



A fast and easy way to check if the module is working is to feed the clock input with a trig gate signal and mangle with the potentiometers, both LEDs should be blinking.

If ever you get some troubles or questions, send us an email at support@shakmatmodular.com.

To download the Knight's Gallop User Manual, go to our website and navigate to the support section.