

 **TIME WIZARD**

MULTI CLOCK DIVIDER

BUILDING GUIDE



Shakmat
MODULAR

Table of Contents

01. Components List + Tools

02. PCB Sides

03. PCB Assembly

04_1. Diode 1N4148

04_2. Laying Resistors

04_3. Capacitors

04_4. Quartz

04_5. 78L05 Regulator

04_6. Standing Resistors

04_7. Zenner Diode

04_8. IC Sockets

04_9. Power Supply Header

04_10 Jack Connectors

04_11. Potentiometers

04_12. Jumper

04_13. Switches

04_14. LED's

01. Components List + Tools

Resistors

6,8 k Ω

X8 – Pack 1/3
X2 – Pack 2/3 for V2 kit

100 k Ω

X4 – Pack 1/3

1 M Ω

X2 – Pack 1/3

1 k Ω

X6 – Pack 1/3

22 Ω

X1 – Pack 1/3

33 k Ω

X6 – Pack 2/3 (V2 kit only)

Capacitors

22 pF

X2 – Pack 1/3
C1 + C2

100 nF

X4 – Pack 1/3
C3 \rightarrow C6

Diodes

1N4148

X1 – Pack 1/3
D1

1N4742 Zenner

X1 – Pack 1/3
D2

Quartz

16 MHz

X1 – Pack 1/3
Q1

LED's

Green LED

X6 – Pack 1/3
LED1 \rightarrow LED6

IC's

8 Pin IC Socket

X3 – Antistatic Foam
ICS2 \rightarrow ICS4

LM358 OpAmp

X3 – Antistatic Foam
on ICS2 \rightarrow ICS4

28 Pin IC Socket

X1 – Antistatic Foam
ICS1

ATMEGA328

X1 – Antistatic Foam
on ICS1

78L05

X1 – Pack 1/3
IC2

Miscellaneous

Switches

X4 – Pack 2/3
S1 \rightarrow S4

Jack Connectors

X8 – Pack 2/3
J1 \rightarrow J8

Jack Knurled Nuts

X8 – Pack 2/3
on jack connectors

Mini Potentiometers

X6 – Pack 2/3
P1 \rightarrow P6

Jumper + Cap

X1 – Pack 1/3
JP1

Power Supply Header

X1 – Pack 1/3
PSH1

M3 Screws

X2 – Pack 2/3
on panel

PCB

X1 – Pack 3/3

Aluminum Panel

X1 – Pack 3/3

Power ribbon Cable

X1

Tools

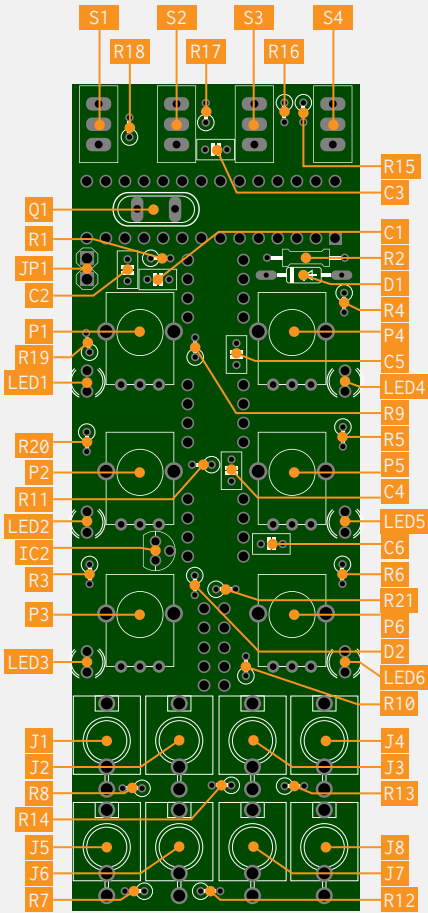
Soldering Iron

Solder

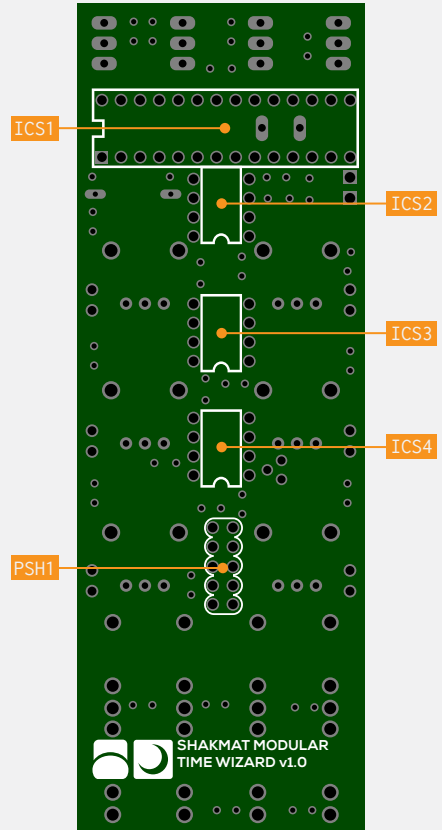
Cutting Pliers

Masking Tape

02. PCB Sides



Front

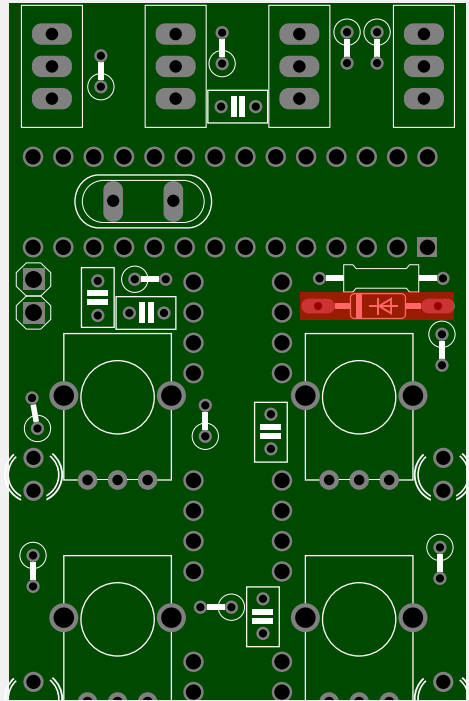
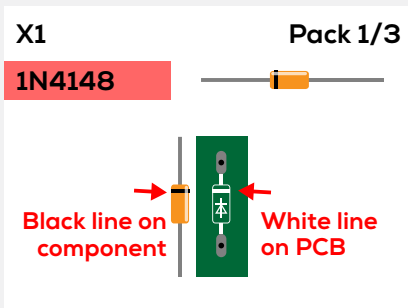


Back

03. PCB Assembly

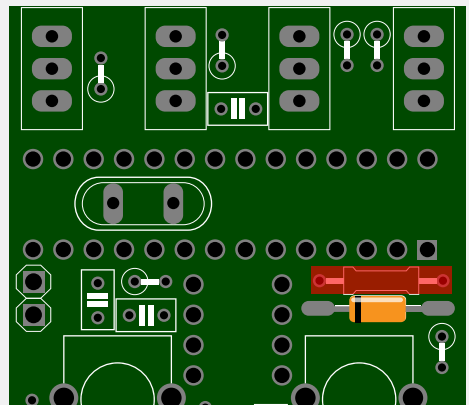
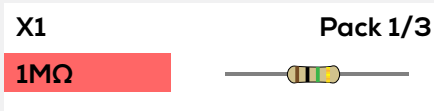
04_1. Diode 1N4148

Two different diodes are used in this build. This step 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 1MΩ Resistor

The 1MΩ resistor is the only one that lays flat with the PCB. Its place is right next to the 1N4148 diode. Resistors have no polarity, so you don't need to put them in a specific direction.



04_3. Capacitors

Just like the resistors, there's no polarity to observe here. What's important is not to mixup the two different capacitors. The 22pF has 220 printed on it and the 100nF has 104.

Once you're done soldering, cut the component's legs that stick out from the backside of PCB. This cutting job has to be done for every component that has an excess of legs sticking out of the solder.

X4

100nF 1



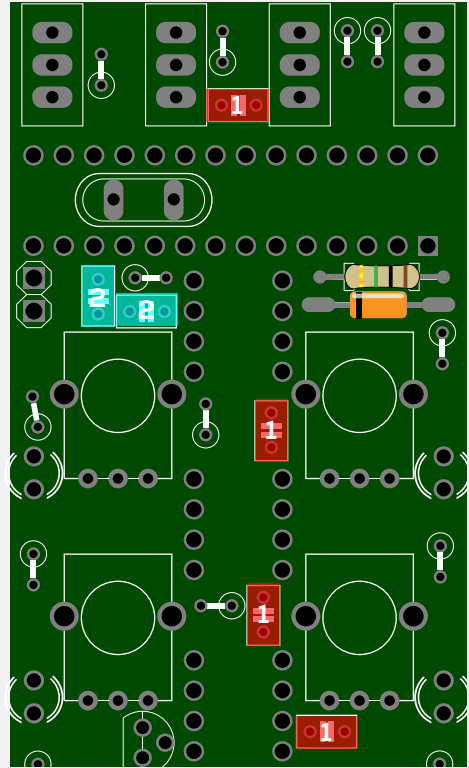
Pack 1/3

X2

22pF 2



Pack 1/3

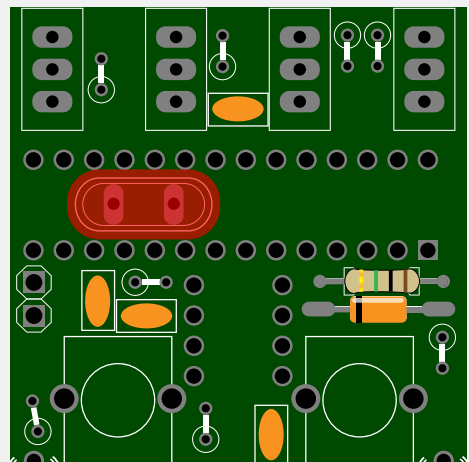
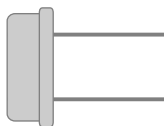


04_4. Quartz

No polarity for the quartz neither. But you need to solder it as flush to the PCB as you can and carefully cut the excess legs once you're done. Be attentive to this step cause the quartz is placed inside the Atmeg IC zone but on the other side of the PCB.

X1 Pack 1/3

16 MHz

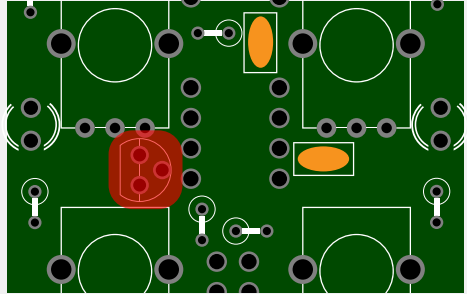


04_5. 78L05 Regulator

Bend the middle leg of the 78L05. Then place it on the PCB, its flat side has to correspond to the flat side of the silkscreen.

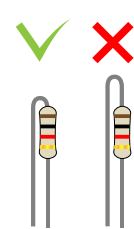
X1 Pack 1/3

78L05



04_6. Standing Resistors

Only one leg of the resistors has to be bent before soldering. Bend the leg as close as possible to the resistor. You also need to be careful with the four resistors that are next to the switches. Make sure that none of the legs get in contact with the switches body.



X1

Pack 1/3

1M Ω

1

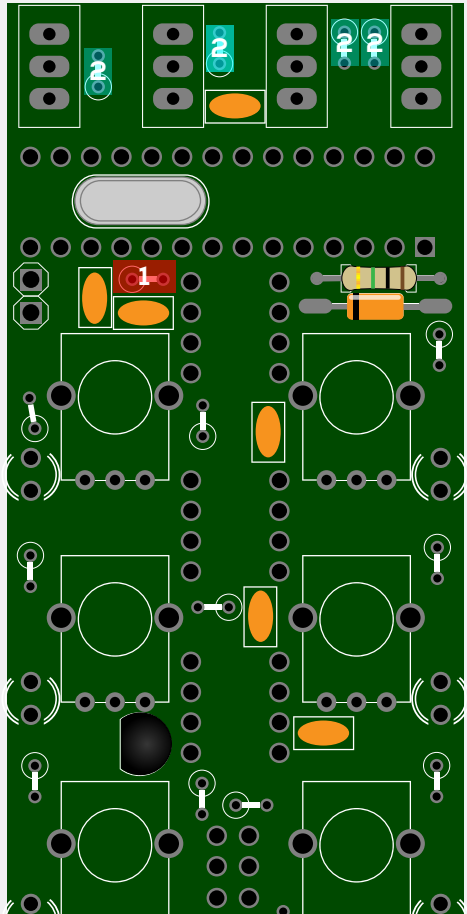


X4

Pack 1/3

100k Ω

2



04_6. Standing Resistors (suite)

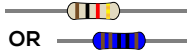
X8 Pack 1/3 X2 Pack 2/3

6.8kΩ 1 OR 6.8kΩ 1



X6 Pack 1/3

1kΩ 2 OR



X1 Pack 1/3

22Ω 3

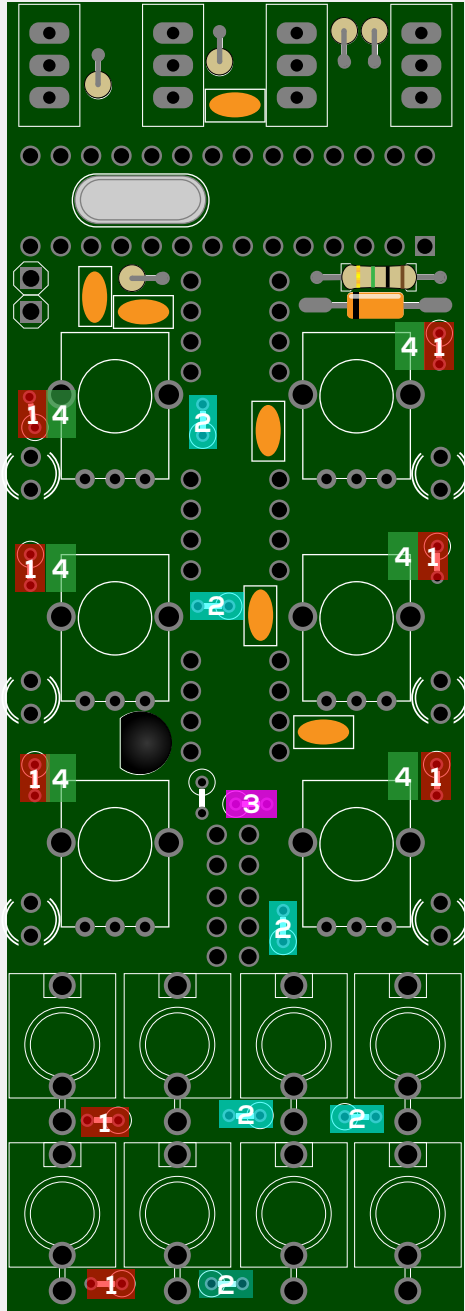


X6 Pack 2/3

33kΩ 4

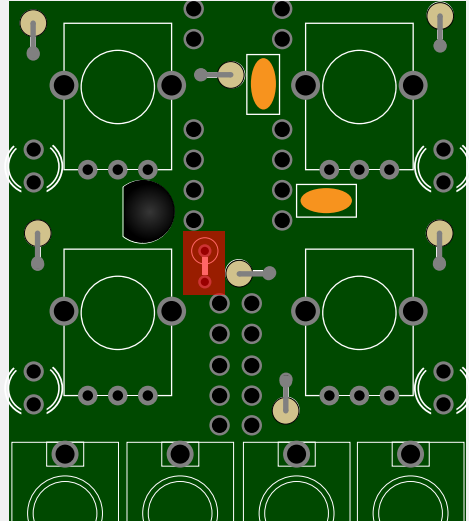
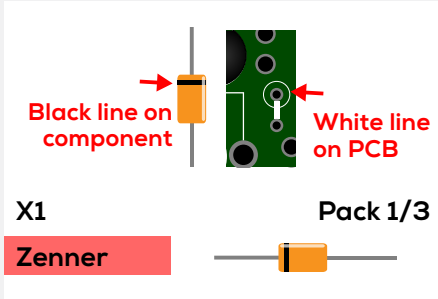


V2 KIT ONLY



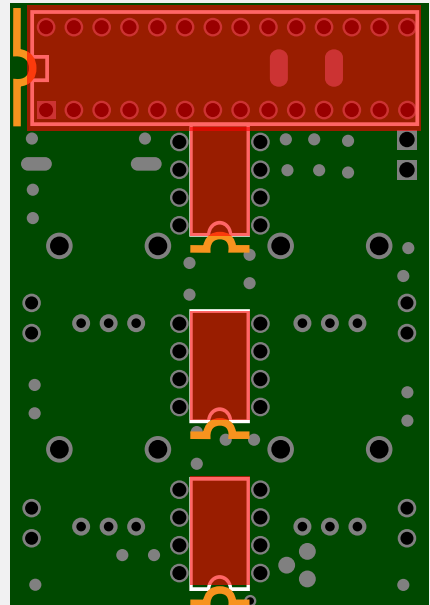
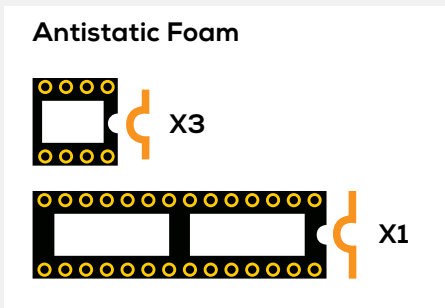
04_7. Zener Diode

As in step 4_1, you have to be careful with the diode polarity. This time, the black line on the component marks the side that needs to be inserted inside the circle on the silkscreen, like so :



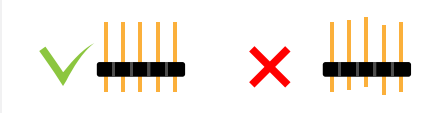
04_8. IC Sockets

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.



04_9. Power Supply Header

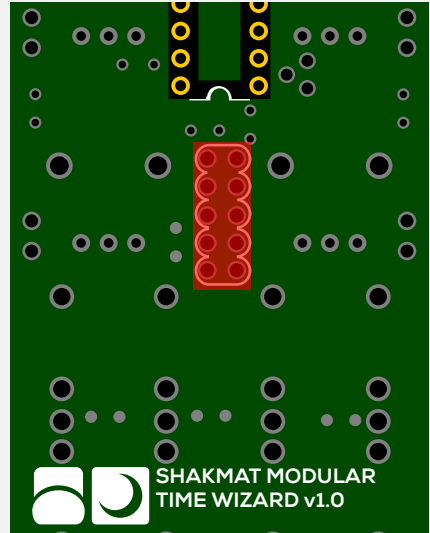
It's time to solder the power supply header. Insert the short legged side inside the PCB holes, solder one leg, check the alignment (the header has to lay flat with the PCB) and solder the remaining legs.



X1

Pack 1/3

Header

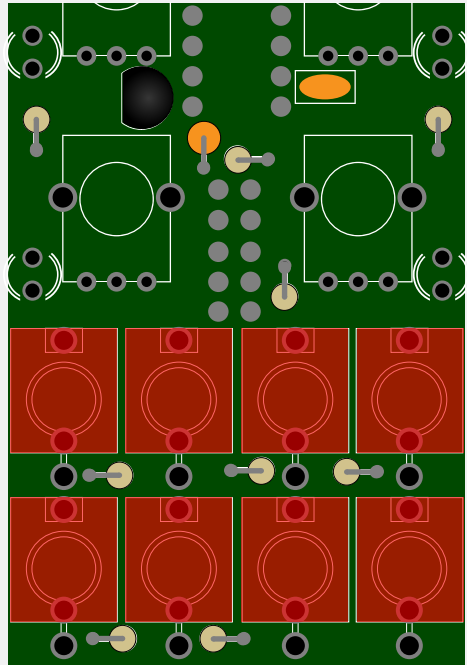


04_10. Jack Connectors

Let's flip the PCB again. There are 8 jack connectors that have to sit tight and flush with the PCB. Be sure to push them all the way through before soldering.

X8 Pack 2/3

Jack



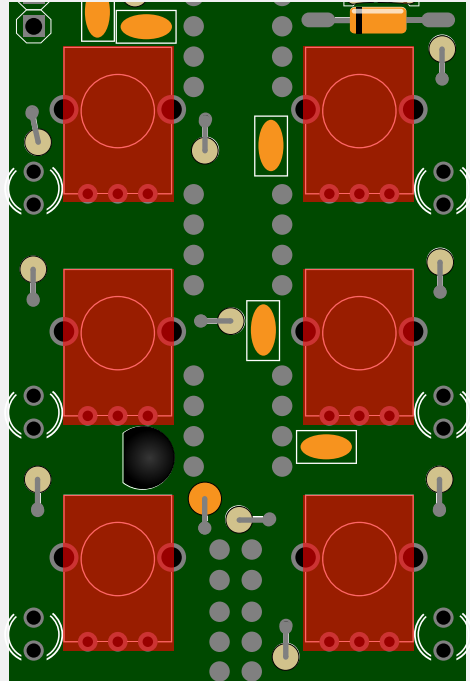
04_11. Potentiometers

Now you can place and solder the potentiometers. All the six can be done at once, just be sure that they are fully pushed inside the PCB holes and that they lay perpendicular to it.

X6

Pack 2/3

Potentiometer



04_12. Jumper

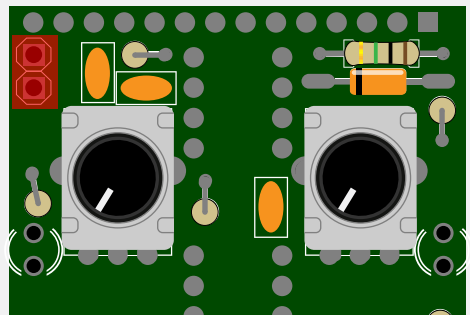
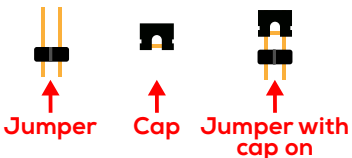
Time to solder the jumper. Place the short legged side of the jumper inside the PCB and solder. Silkscreen shows the jumper on the front side of the PCB but you might prefer to solder it on the back side for easy access.

By default, all the dividers provide trigger signals, but with the jumper cap on, **dividers 5** and **6** can produce half period gate signals.

X1

Pack 1/3

Jumper



04_13. Switches

The switches are provided with a variety of nuts and washers but only 1 of them is needed. Save the first hex nut for the final assembly. discard all the other, you don't need them.

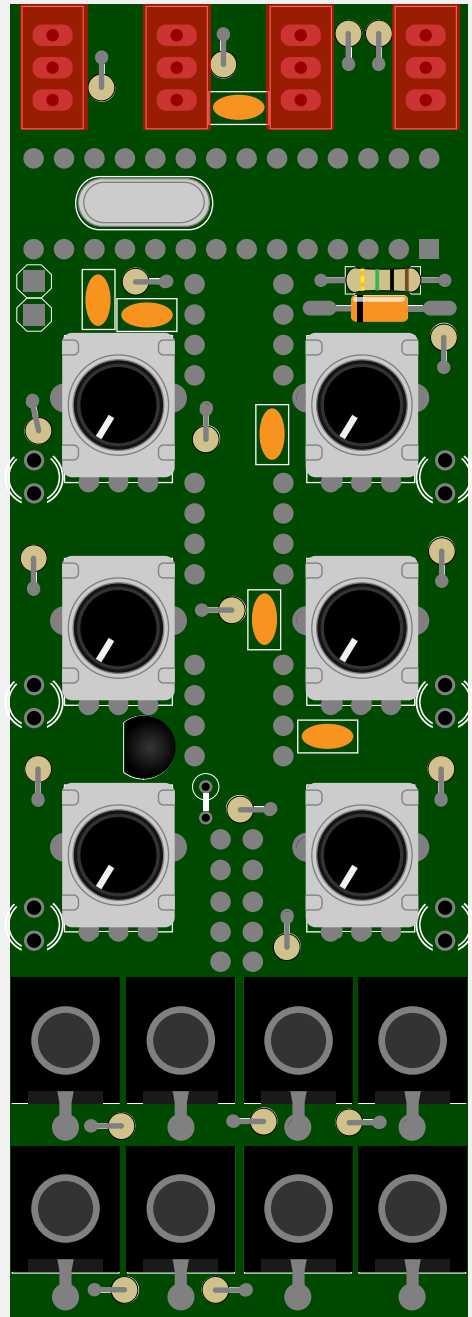
Once you've removed everything, you can place the 4 switches on the PCB. Then mount the front panel and keep it in place with two knurled nuts on jacks CLK and B6.

Finally, you can solder the switches.

X4

Pack 2/3

Switches & nuts



04_14. LED's

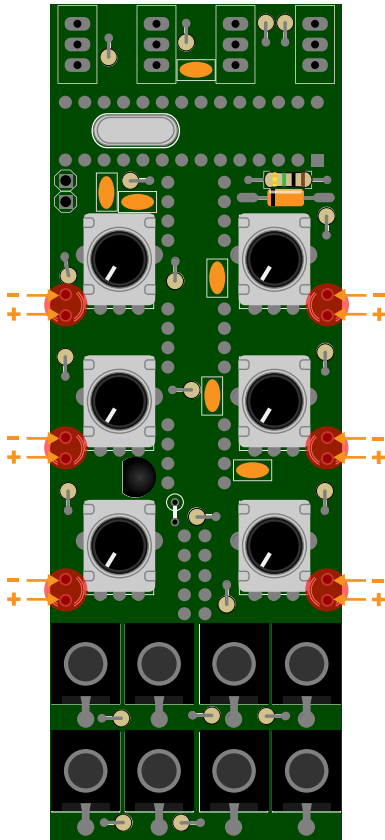
Now that the switches are in place, remove the front panel from the PCB and place the six LED's in their places. Be sure to check the polarity, a LED soldered backward will not light up.

To get the LED's well mounted, flush with the panel, you need to reassemble the front panel and PCB (by finger tightening hex nuts on CLK & B6 jacks). Stick some masking tape to cover the panel LED's holes, therefore you can push them through the panel until they sit flush and stick to the tape to solder them.

X6

Pack 1/3

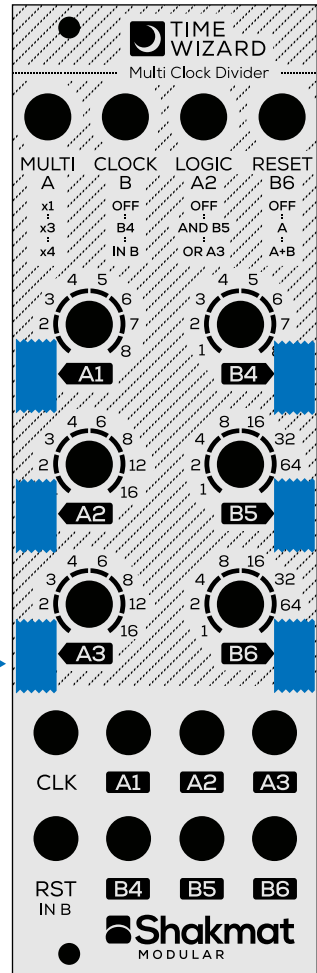
Green LED's



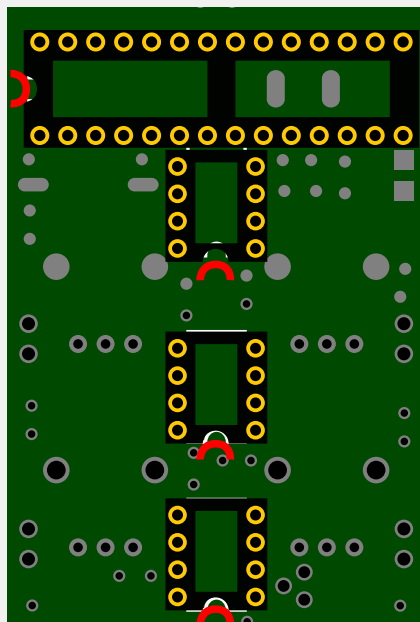
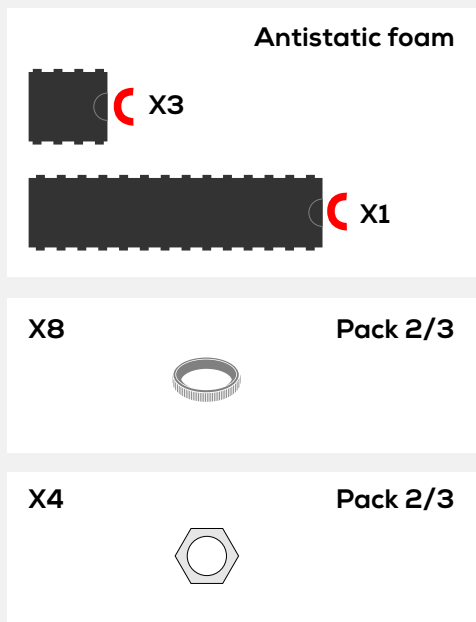
! LED POLARITY



Masking tape →

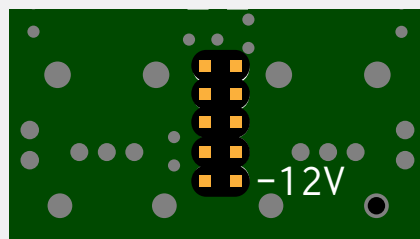


It's now time to plug the IC's in their socket. Make sure the IC orientation matches the socket orientation as on the following picture :



Place the eight knurled nuts on the jack connectors and the four hex nuts on the switches. That's it, you've finished !

Plug the power cable and make sure the red side of the ribbon cable matches the -12V on the PCB. Now let's plug the module in your system and test it. Plug a clock signal on the CLK input and set all the potentiometers to their smallest values and the switches all up. If you're all good, all the LED's should blink accordingly to the incoming clock signal.



If ever you get some troubles or questions, send us an email at support@shakmatmodular.com. To download the Time Wizard User Manual, go to our website and navigate to the support section.