



# Shakmat Clock O'Pawn Building Guide

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# 1. Preamble

Thank you for purchasing a Shakmat DIY kit !

We spare no effort in our kit packing process to prevent any mistakes or missing parts. In this document as well, we try hard to describe the assembly process in the most practical and comprehensive way. If by any chance there is a missing/damaged part in your kit or if you have any suggestion, feel free to contact us via [shakmat.com](http://shakmat.com).

We strongly advise you NOT to split all the bags open and mix their components. Some of them are virtually indistinguishable (like LEDs that all appear clear when inactive). We recommend you to only take the necessary component out of it's bag, or to empty the bags in separate & marked containers. For each step, next to the component graphic representation, there is a reference indicating where to find it (i.e. P1 for Pack 1, or LP for Loose Part).

Also, the assembly process will be dramatically simplified if you follow the order defined in this building guide. We tested various orders of steps before finding the most convenient, and the one presented here is the best !

## 2. Components list & necessary tools

### Pack 1

- 3x Green LEDs
- 1x Small potentiometer
- 1x 2x2 Pin header
- 2x Jumper caps
- 3x Push buttons
- 2x Small button caps
- 1x Big button cap
- 1x 78L05 IC
- 3x 15k resistors
- 1x 2x5 pin power header
- 1x 6 Pin header

### Pack 2

- 4x Mono jack connectors
- 1x Stereo jack connector
- 2x Amber LEDs
- 1x Big metal potentiometer
- 1x Potentiometer nut
- 5x Jack connector nuts
- 1x M3 nut (for securing bottom PCB)
- 2x M3 screws (for rack mounting)

### Pack 3

- 1x Top PCB
- 1x Bottom PCB

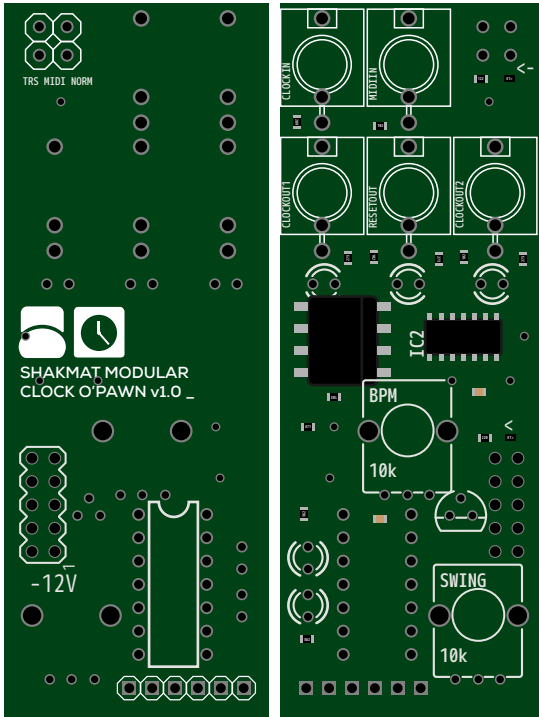
### Loose parts

- 1x Aluminum panel
- 1x Black rubber knob
- 1x 2x7 pin ic socket
- 1x ATtiny
- 1x Power cable
- 1x User manual

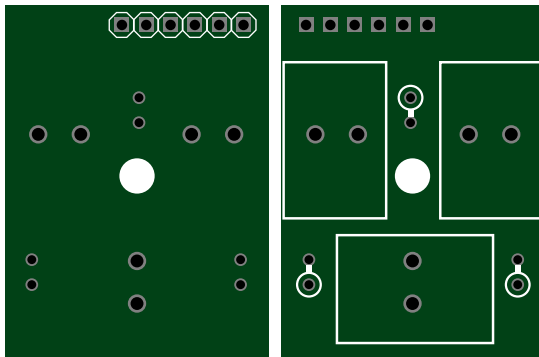
### Necessary tools

- Soldering iron
- Solder
- Cutting pliers
- Masking tape

### 3. PCB details



**Main PCB**  
Back & front



**Bottom PCB**  
Back & front

## 4. Main PCB assembly

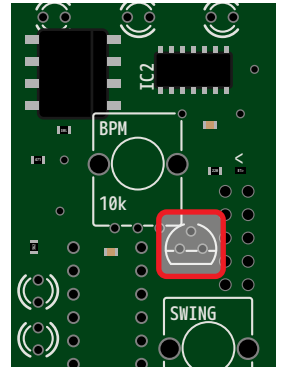
### 4.1 Front side

#### 4.1.1 78L05 IC

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

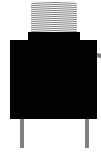


P1

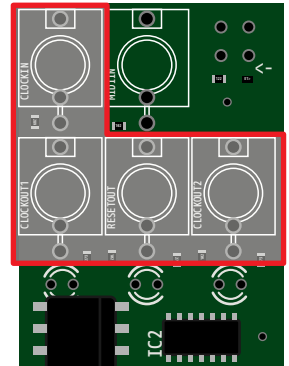


#### 4.1.2.a Mono jack connectors (x4)

There are 5 jack connectors in total. They all have to sit flush with the PCB, so be sure to push them all the way through before soldering. We start with the four mono ones (black).



P1

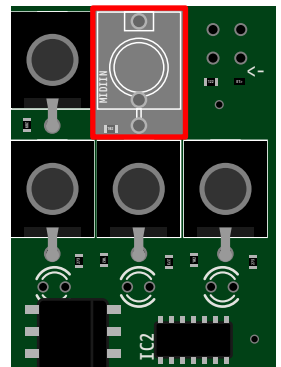


#### 4.1.2.b Stereo jack connector

Solder the last jack connector, the green one. Again it has to sit flush with the PCB, so be sure to push it all the way through before soldering.

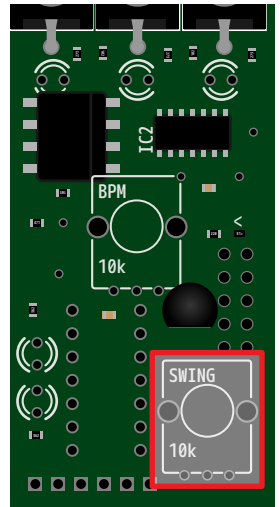
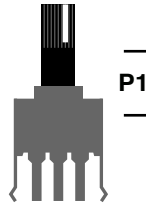


P1



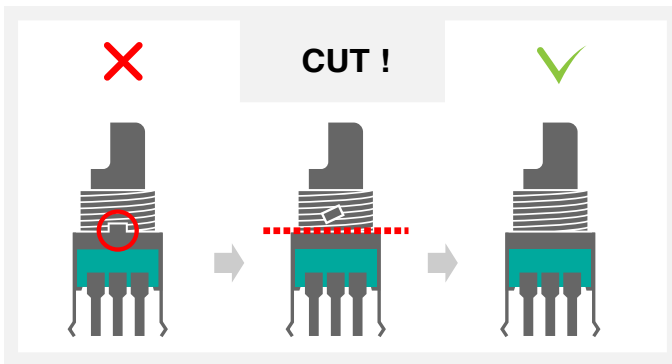
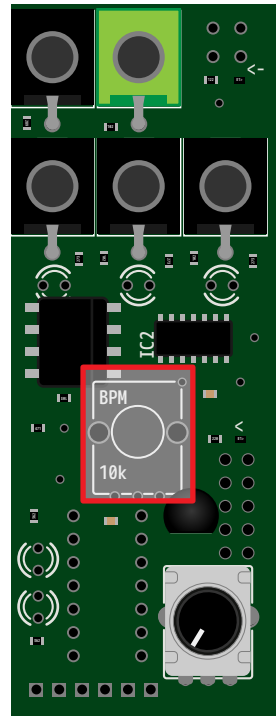
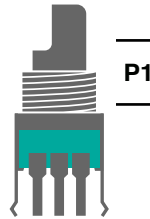
### 4.1.3 Small potentiometer

Place and solder the potentiometer. Be sure that it's fully pushed inside the PCB holes and that it lays perpendicular to it.



### 4.1.4 Big potentiometer

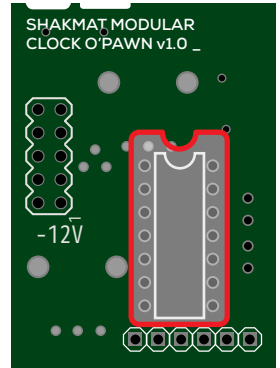
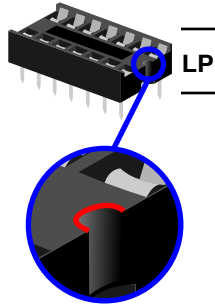
Time to mount the big potentiometer. First you'll have to remove a little piece of it as shown in the following picture. Then, you can place and solder it.



## 4.2 Back side

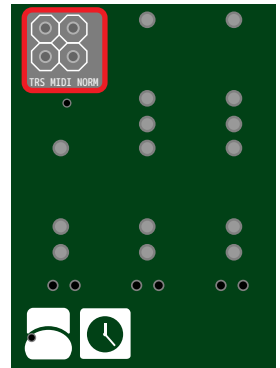
### 4.2.1 IC Socket

Flip the PCB around, we're going to solder the IC socket. Be attentive to it's orientation. The red lines on the magnified picture shows the indentation that has to match the indentation on the PCB silkscreen.



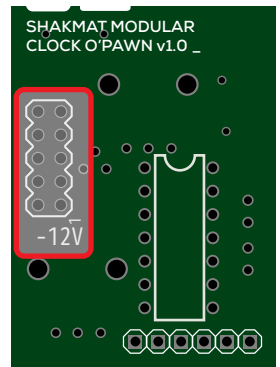
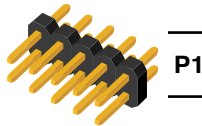
### 4.2.2 Small header (2x2 pins)

Solder the small 2x2 pin header which will later receive caps for MIDI standard selection. We recommend you to solder only one pin and check the alignment, correct it if necessary, and then solder the remaining pins.



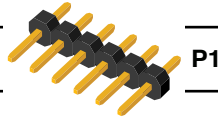
### 4.2.3 Power header (2x5 pins)

Solder the big 2x5 pin header which is the power connector for the ribbon cable. Be sure to lay it flat on the PCB and solder it perpendicularly. We recommend you to solder only one pin and check the alignment, correct it if necessary, and then solder the remaining pins.

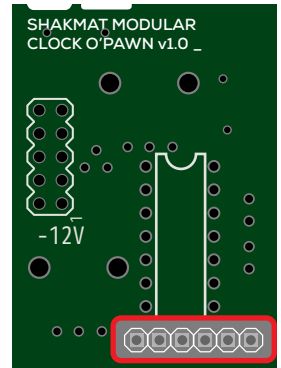




## 4.2.4 Header (1x6 pins)



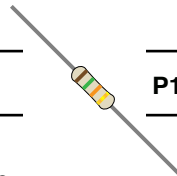
The single row 6 pin header assembles the two PCBs together. For now we are taking care of the short legged side of the header. Be careful with this piece as it has to lay flat on the PCB and perfectly straight. We recommend you to place the header and solder only one leg, then verify the alignment (and correct if necessary) before soldering the remaining legs.



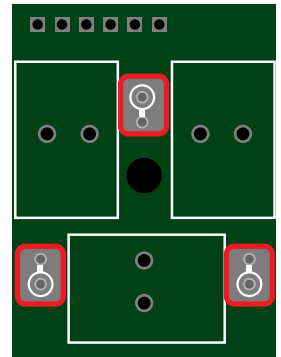
# 5. Bottom PCB assembly

## 5.1 Front side

### 5.1.1 15k resistors (x3)



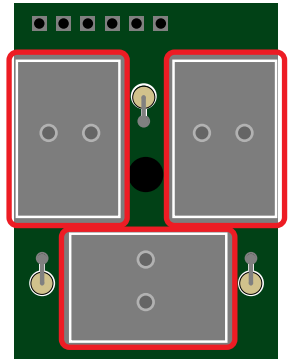
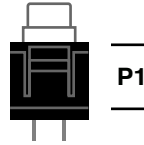
Now, take the smaller PCB and continue. We're going to solder the three 15k resistors. Be attentive to their position. No specific orientation is needed for resistors.



When a resistor is mounted straight up to the PCB, only one of its legs has to be bent. Be careful not to bend the leg to far from the resistor body, this can lead to short-circuits with the aluminum front panel.



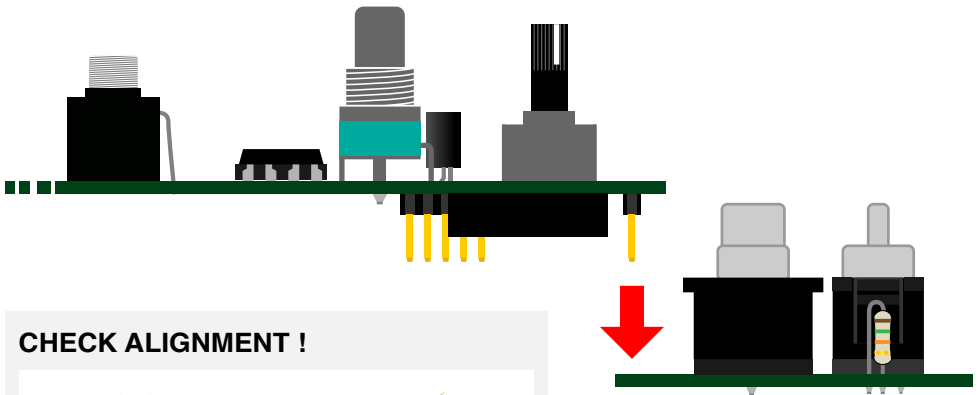
## 5.1.2 Push buttons (x3)



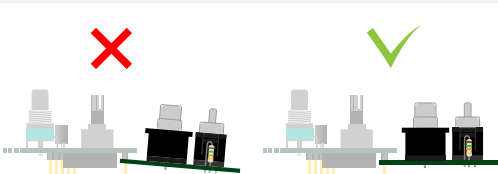
The buttons are easy to place & solder but they need to be thoroughly pushed against the PCB. Before soldering, we recommend to place the four buttons, then flip the PCB and press it against your table in order to ensure that every button is well placed. Be sure to lay them perpendicularly to the PCB.

## 6. Main & bottom PCB assembly

We will now assemble the two PCBs via the 6 pin header. Be careful that the header you're soldering is well passed through all the PCB holes and that the two PCBs are perfectly horizontal. If there is a gap between the header and the PCBs, 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 five other pins.



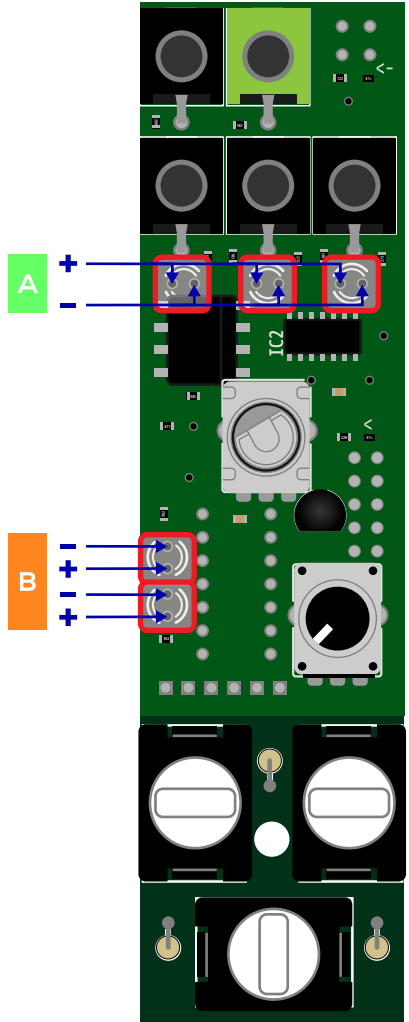
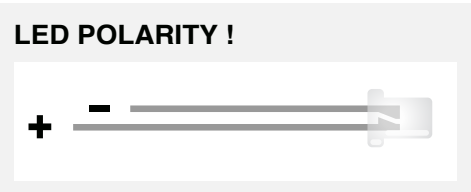
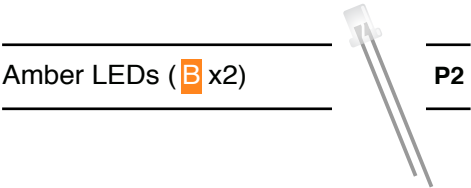
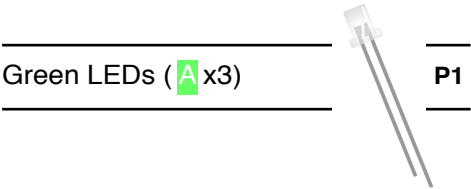
**CHECK ALIGNMENT !**



# 7. LED mounting (1)

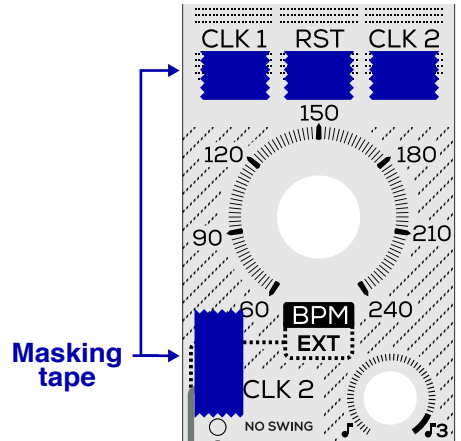
Well soldered LEDs are flush with the front panel. For this, you need to assemble front panel & PCBs. We recommend you do this by finger tightening the hex nuts on the BPM potentiometer and some jack sockets.

Be careful with the LED polarity, the long leg is the positive side. Please refer to the following picture to know which LED color goes where. Pay attention not to mix LEDs from different packs, when inactive the clear LEDs are very hard to differentiate from each other.



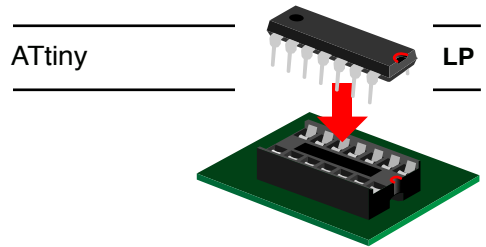
## 7. LED mounting (2)

A good way to mount the LED neatly is to use masking tape to cover the panel LEDs holes. Therefore you can place them on the PCB, assemble PCBs & panel with some nuts and push the LEDs through the panel until they sit flush and stick to the tape. Finally, you can solder them.



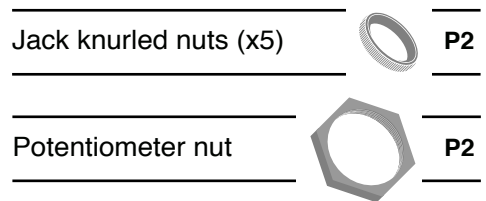
## 8. IC plugging

Plug the ATtiny IC in the 2x7 IC socket previously soldered. Make sure the indentation on the IC (shown here with the red lines) is matching the indentation on the IC socket.



## 9. Jack & potentiometer nuts

Tighten the knurled nuts on the jack sockets & hex nut on the BPM potentiometer.



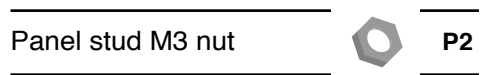
## 10. M3 panel stud nut

Place the M3 nut on the stud protruding from the bottom PCB on the back side of the panel.

This nut secures the bottom PCB

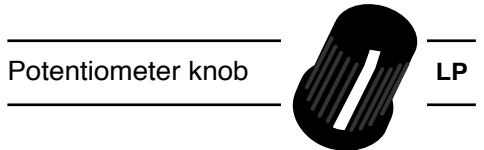
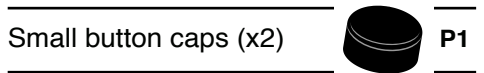
when the buttons are pressed. To prevent this nut to untighten & fall off over time, we recommend to put a small amount of nail polish on it. Some glue will also do the trick, but can be very problematic to remove if you need to unscrew this nut.

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 button caps. Just tighten it until it sits flush with the bottom PCB.



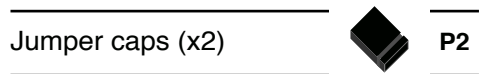
## 11. Potentiometer & button caps

Mount the three button caps. If somehow they fell a bit loose, you can glue them on the component with some gel glue, just be careful not to let glue drain down the button and destroy it ! Push the knob onto the BPM potentiometer.



## 12. Jumper caps

Place the two jumper caps on the previously soldered 2x2 pin header. Placing those horizontally or vertically determines the MIDI standard used. Please refer to the user manual.

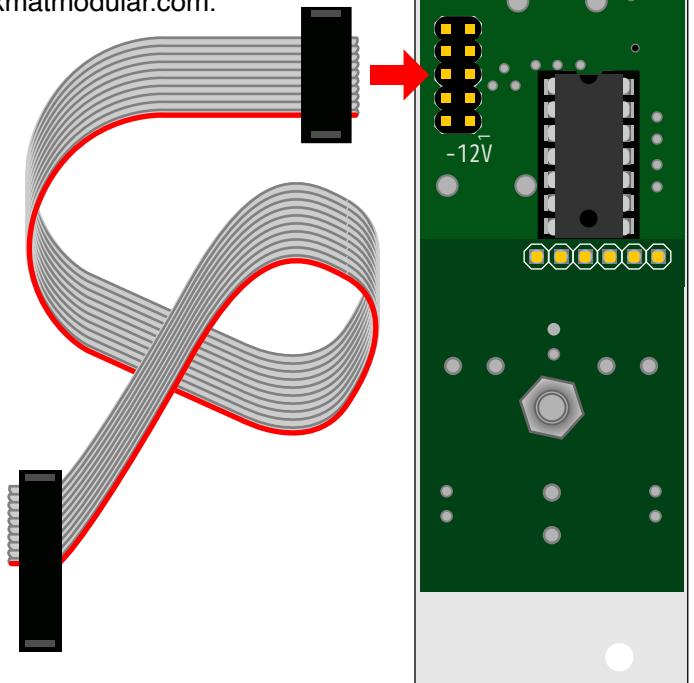


# 13. Powering & basic testing

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 don't blink if the module isn't running. So don't panic if the module seems quiet when nothing is connected to it.

To check if the module is working press the big Play/Pause button and mangle with the potentiometer, CLK1 & CLK2 LEDs should be blinking. If not, carefully check every soldering point you've made, especially the IC socket, and make another attempt.

If ever you get trouble or questions, send us an email at [support@shakmatmodular.com](mailto:support@shakmatmodular.com).



[www.shakmat.com](http://www.shakmat.com) ●

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