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SYMPLESEQ MKI

dual eurorack analogue sequencer



Assembly Manual v1.0

This assembly manual applies ONLY to the DUAL EURORACK PCBs! (not the universal style)

Introduction

This manual should serve as a guide as to how to build your dual eurorack sympleSEQ kit from hexinverter.net

This guide is only for the black coloured dual eurorack PCB set. Please see the hexinverter.net project site for the "universal" style white PCB assembly guide.

If you are wondering what sympleSEQ is and what features it has, I suggest reading the User Manual over at the hexinverter.net project site **here** (click), as these things are detailed in that manual.

High quality panels are/will be available at Re:Synthesis (click) for this project as well as sometimes in the hexinverter.net shop

Technical Notes

sympleSEQ is a very minimal sequencer design. It uses entirely CMOS logic chips and thus there are no microcontrollers present in the design. It does not offer all of the features that a much more electrically complicated dual sequencer design offers, but it should please you with a great amount of playability and functionality packed into a small package.

If care is taken, it should be a nice easy build for a sequencer that would otherwise include a LOT of redundant, boring panel wiring!

Assembly

Before you get started, check over the contents of your kit against the Bill of Materials found on the hexinverter.net project site to make sure everything is there. There are a lot of parts! If anything is amiss, please email me immediately and we will sort it out:

hex[at]hexinverter.net

Logic Board

The logic board contains the majority of the active circuitry in symple-SEQ. We will assemble it first.



Step 1: Diodes

Install the diodes in the logic board, being careful to observe correct polarity.



Step 2: Resistors

Install the resistors in the logic board. If you bought a kit from me, the resistors should have their values marked on the cut-tape packaging.



Step 3: IC Sockets

Install the IC sockets in the board (being careful to line the notch up with the markings on the board). I like to seat them all in their place at once, then take something flat like a large book and sit it on top of the sockets. I then flip the entire arrangement over and can solder all of the IC sockets at once without any of them falling out.



Step 4: IC Bypass Capacitors

Install the 0.1uF ceramic capacitors in their places around the ICs on the board. These should have "104" marked on them.



Step 5: Voltage Regulators

Install the 78L05 and 78L10 regulators in their places on the board. Be careful not to solder these for too long. They can be damaged from excessive heat. I recommend taking turns for each regulator, soldering only one leg of them in at a time. This will mean there is some time for the device to cool between each joint.



Step 6: Headers

Break four sections of three conductors off of the .1" male 40pin breakaway header and solder them into the "LEVEL JUMPERS" area of the PCB along with the eurorack power header at the bottom right. Make sure to install the jumper selectors on the Level Jumpers after soldering them in.



Step 7: Electrolytic Capacitors

Install the three 47uF electrolytic capacitors, being careful to observe polarity.



Control Board

The control board is where things get a little tricky! The control board houses all of the control surface parts for sympleSEQ Dual Eurorack.



Step 1: Preparation

Unfortunately, the potentiometers used in this design require you to cut the shafts to the proper length for the knobs we are using. Thankfully I have selected a potentiometer that has a nice soft plastic used for the shaft that happens to cut very easily with a pair of standard wire cutters like pictured below. You do not have to be incredibly perfect here, as the lower (flat) edge of the potentiometer shaft stops the d-shaft knob when it is pushed on during final assembly, and the knob will look and feel perfect on the potentiometer so long as it reaches this point and stops at it. How ugly the shaft looks underneath the knob of course does not matter. The rule I use when cutting shafts is to cut ~50% of the shaft length after the flat edge off. I recommend cutting one to length and testing your cut by pushing the knob on and inspecting it for perfect seating. Then you will have a good idea of how to cut the other 17 potentiometers' shafts.

I have done this for hundreds of these potentiometers now, and it works great as these are VERY nice feeling, high quality potentiometers when used with these knobs.



Next, take the two 40pin headers and clip them down to 34 pins each (being careful not to bite off too much material/pins). These headers will connect the logic and control boards together in Step 3. Connect the two headers together like pictured once you have done this. I would have included them already at 34pins, but, this number does not seem to be readily available from suppliers.



Step 2: Diodes/Resistors

Solder in the diodes and resistors, being careful to install them the right way. All of the resistors are 10k. These are the current-limiting resistors for the LEDs, so, you may want to adjust them to change the brightness of the LEDs by testing your chosen LEDs with a ~12V source.



Step 3: Inter-board Connect Headers

Connect the control and logic boards together using the two sets of 34 pin headers you prepared earlier. Situate the boards together with the headers installed and flip the board over with the control board facing down. Now "tack" each corner in place and inspect to make sure everything is aligned straight. I recommend flipping the assembly over and tacking the other side in place so that everything is aligned straight before soldering all of the pins of the headers.

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Assemble everything and tack the corners in place...



Once everything is aligned properly, solder the remaining pins...



Step 4: LEDs + Potentiometers

Install but DO NOT SOLDER the 16 LEDs into their LED board spacers. Place them into the control board, being careful to orient them correctly. Bend the legs out so they do not fall out when the board is flipped over. Also place but DO NOT SOLDER the potentiometers.



Now that you have placed the pots in the board, hold the board up and bend each of the outer potentiometer legs with a pair of pliers so that when you flip the board over to solder, the pots will not simply fall out...



DO NOT SOLDER ANYTHING YET!

Step 5: Jacks + Switches

Install but DO NOT SOLDER the jacks and toggle switches into the control PCB.

IF YOUR KIT HAS KOBICONN JACKS (TAN-COLOURED PLASTIC BODY), LEAVE THE ROUND NUT ON THE JACK WHEN YOU INSTALL THEM. THIS ROUND NUT WILL ACT LIKE A SPACER. The kits include hex nuts which you will use for the actual nut that goes on the panel :)

IF YOUR KIT HAS WQP/ERTHENVAR JACKS (BLACK/SILVER BODY), INSTALL THEM INTO THE PCB WITHOUT ANY NUT ON, AS USUAL.



DO NOT SOLDER ANYTHING YET!

Step 6: Panel Fit + Begin Soldering

Now it gets a little tricky. Place the panel over the control PCB's components just as it will be seated in the final module. I recommend taking four of the nuts for the jacks and screwing them on to hold the panel in place. Now, flip the entire assembly over, being careful not to let the panel fall off. You may need to place something as a spacer underneath the panel and work surface so that the panel does not fall down.



Solder ONE LEG ONLY of each potentiometer.

Now, flip the board over and re-heat each potentiometer joint you soldered while adjusting the potentiometer from the other side with your hands. Push the potentiometer perfectly flat against the PCB. Inspect each potentiometer after re-heating and make them as straight and uniform as possible...



Once you are happy with the potentiometers, solder ONE LEG of each jack, and adjust them as well.

Next, solder ONE LEG of each of the LEDs, being careful not to overheat them. Re-heat each leg while pressing the LED flat against the board from the panel side with your finger, adjusting them as necessary.

Solder the other leg of each LED once you are happy with their positioning.

Step 7: Toggle Switches

Prepare the toggle switches for soldering by making them flush with the panel. Finger tighten the nuts for each of the switches and push the switch against the panel as shown. NOTE: if you are using KOBICONN (tan coloured body) jacks, you might not need to lift the switch off the PCB at all. These photos are for ERTHENVAR/WQP style jacks.



Once happy with the position of the toggle switches, solder the middle leg of each toggle switch in place.

Step 8: Pushbuttons

Install the two red pushbuttons in their place. Solder ONE LEG in and then re-heat, pressing the pushbutton flat against the PCB with your finger. Once you are happy with the placement, solder the remaining three legs of each pushbutton.



Step 9: Solder it all up!

Check over the alignment of every part. Make sure that you are happy with the way everything is seated in the control board. You will NOT get it absolutely perfect. The panels have irregularities which mean that some parts will always be a bit off since there are SO many parts in this build! Once you are happy with the alignment of each part, go away for a bit, have a cup of tea and a snack and come back and CHECK AGAIN! You may have missed something and it is a good idea to take a break and go over it a second time before soldering everything in place for good.

Once you are satisfied with everything, solder all of the remaining joints on the control board! This wraps up the control board assembly. YAY!

NOTE: You can ignore the "XPAND" ports on the control board. These were placed on the board for a possible expansion module which I will NOT BE MAKING. If you want to hack it and make your own, go ahead, but otherwise, these can be ignored.

Final Assembly and Testing

Almost there! Time to wrap up assembly of your your sympleSEQ and test it!

If your kit has KOBICONN jacks, you will need to run a ground bus wire for the jack grounds, like this. Connect one end of the ground wire to a ground pad on the PCB, as shown here. If you are using ERTHENVAR/WQP jacks, you can skip this step.





Attach the logic and control boards together:



Time to install the ICs in their sockets! Bend each IC's legs in a bit on the table so that they fit nicely into the sockets. Be gentle!

Install the ICs in their sockets, double checking that each IC is aligned properly.



Now you can test your sympleSEQ out! Be sure to install the power cable correctly, following the Doepfer Eurorack standard:



Now, go to the hexinverter.net project page and download the User Manual if you do not know how to use the sequencer yet (click):

http://cv.hexinverter.net/?projects=sympleseq-v20-eurorack

Once your sympleSEQ is tested and working, carefully tighten all of the nuts down (they don't need a lot of torque at all! Be gentle!) install the knobs, and, you're done! YAY!