

Ensoniq ESQm to SQ80m Conversion Guide

3rd Revision, 2/7/2020, by Shea Alterio

Note: I have tried to remove revisions 1 and 2 of this guide from as many places as I could, but certain sites (namely Scribd) are holding onto older revisions of this guide which include typos or lack some important clarifications. Please refer only to this improved version of the guide! And many thanks to **Rainer Buchty** for the original guide which inspired this one.

Wiring diagram provided on page 5.

1. Install Preparation

Note: please check your power supply for damaged looking fuses or capacitors which appear loose or broken. Please get your power supply serviced professionally if you're not confident in your ability to refurbish the power supply. Take a moment to verify that your power supply voltages are what the service manual specifies they should be.

- a. Choose what you will do with regards to the wiring of the 74LS74 first. I typically wire it all up, bend legs 10-14 together and make a big solder bridge across those pins, label the wires, and then wrap it in a little anti-static bubble wrap. Of course, what you choose to do at this step is up to you. It doesn't matter as long as it's secure and well insulated.
- b. Replace the OS ROM. I recommend replacing the battery now if it needs replacing. You are advised to leave the original wave ROMs in for now. On the SQ80m wave ROM, bend up the three pins on both sides closest to the notch and then pins 22 and 24. You can refer to the photo below:

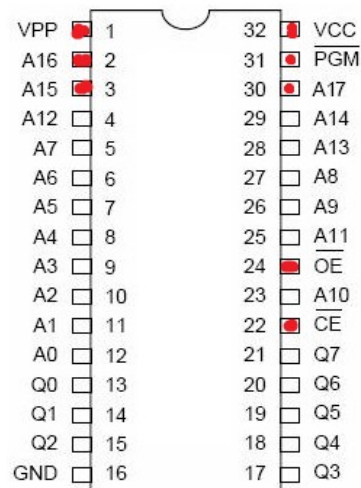


Figure 1

2. Wiring & Installing the Flip-Flop

The majority of the work is related to wiring the flip flop to various places. Your job will likely be easiest if you get the flip flop wired first and then wire that to where it needs to go. It's not crucial the wires are short as possible.

The DOC chip is labeled "5503 DOC" or "ICS1261D". It is at position U21. Each IC in the ESQm has the notch facing the front of the machine. Thus, this guide counts the pins on the DOC chip the same way as we count it on the EPROM as shown in Figure 1.

- a. Connect wires to pins 2, 3, 5, 7 and 14. These will go to the DOC, the wave ROM, and the 74LS373 (the chip between the wave ROMs and the DOC).
- b. The last four pins of the flip flop need to be shorted together. It makes most sense to make a large solder bridge across these pins, since you'll need to also attach three wires to this point, and having a big solder pool will make your life easier. (just my experience after doing several of these).
- c. Connect a wire from pin 1 to pin 10-14, and then pin 4 to 10-14 on the 74LS74. You will need to also put a wire between pins 10-14 of the 74LS74 and pin 39 of the DOC for power.
- d. Complete the wiring as follows. Don't hook up the wire from pin 5 to the wave ROM yet, since at this point you should still have the original wave ROMs still inserted.

74LS74 Flip-Flop	Destination (DOC @ U21 unless otherwise stated)
2	10 (Channel address bit 3)
3	6 (Channel address strobe)
5	N/A (Voice ROM, bit 17)
7	19 (GND)
14	39 (VCC +5v)
1, 4, 10-14	14 (74LS74 VCC)

Table 1

- e. Assuming you've left the original wave ROMs inserted to make sure everything is good, this is a good time to plug the ESQm in to power and MIDI In and play some notes. If it doesn't boot up, shut it off right away and check for bad connections or solder bridges between pins of the DOC especially. If you can play each note in two consecutive octaves and everything sounds as intended, you can move along. If you have any missing notes or doubled notes, you must stop now and inspect all wiring for shorts or bad connections.

3. Installing the Wave ROM

- a. Remove both wave ROMs and insert your 32 pin SQ80m wave ROM into either slot. The chip is larger than the socket, so leave the side with the notch hanging off. Putting electrical tape around the socket is not mandatory. Note you will be soldering a wire between pins 1 and 16 of the wave ROM.



Figure 2 - from left to right: Wave ROM, 73LS373 IC (U19), Ensoniq DOC sound IC (U21)

- b. Now it is time to wire the wave ROM according to Table 2 below. Do note that I find it easiest to bend legs 31 and 32 on the wave ROM so they touch each other, and then add a dab of solder, since those two pins will also carry a shared wire.
- c. Don't forget to add the wire between pin 1 and 16 of the Wave ROM, and the wire from Pin 5 of the 74LS74 to the Wave ROM at this time.
- d. BE ABSOLUTELY SURE THERE IS A BATTERY INSTALLED, EVEN IF IT'S OLD AND GOING TO GIVE THE LOW VOLTAGE WARNING.

Wave ROM	Destination pin (Chip, signal)
1	16 (Wave ROM, GND)
2	40 (DOC, Bank Select)
3	19 (73LS373, Sample Address 15)
22	5 (DOC, Wave ROM chip select)
24	3 (DOC, Wave ROM output enable)
30	5 (74LS74 Flip-Flop, Bit 17)
31 / 32	20 (73LS373, VCC)

Table 2

Below is the pinout of the 73LS373 as is located at U19. Please note that the notch faces upwards in this diagram, but it is facing downwards in the ESQ-m.

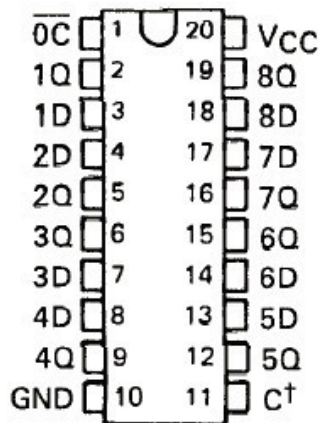


Figure 3

You are now done – double check all your work very carefully and make sure you did not miss anything. Be sure your battery is replaced if you are getting a low voltage warning when you power on the unit. Excessive use of the synth with the low voltage warning present can lead to leaking of the battery.

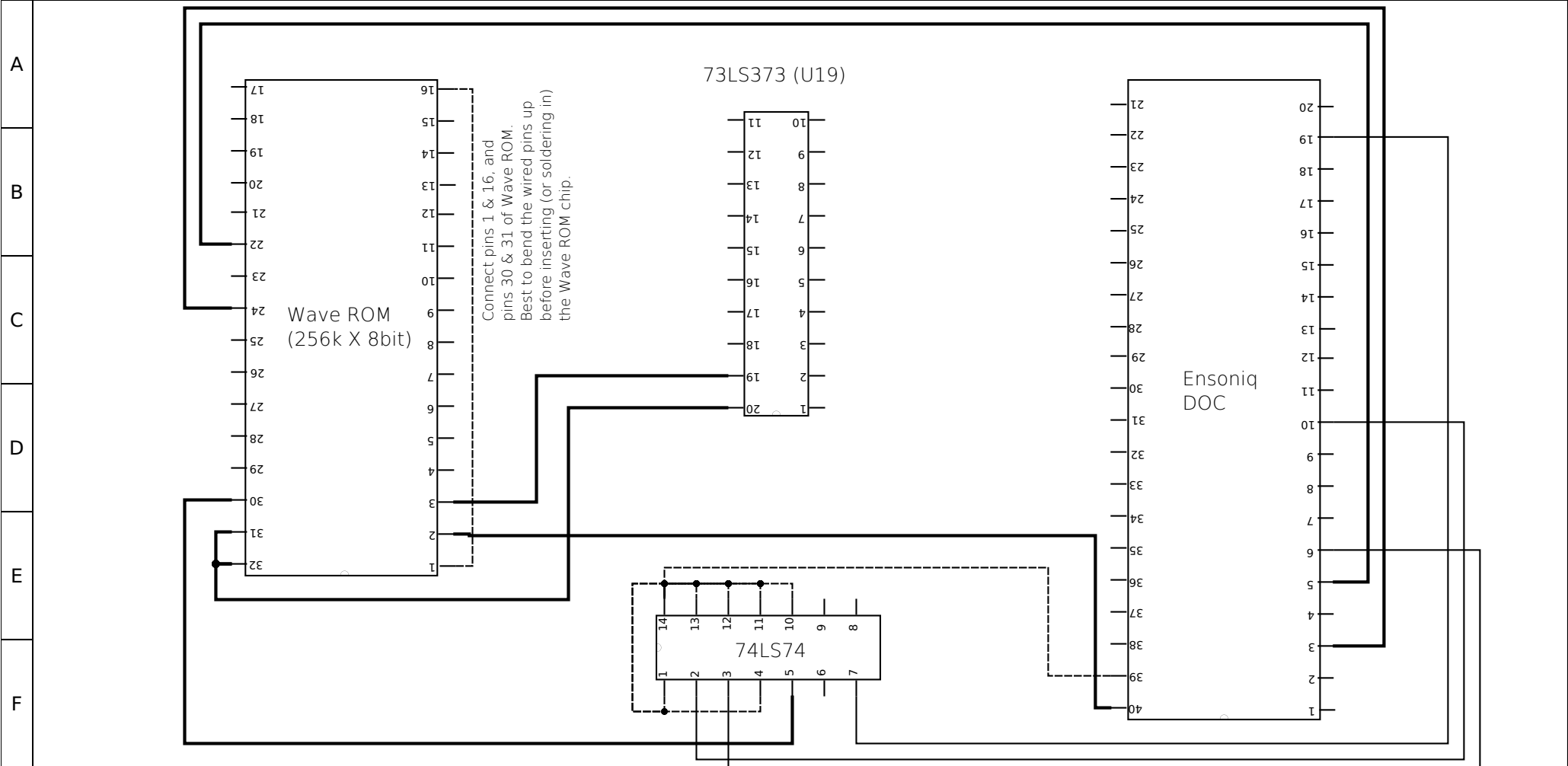
Please replace it with any 3.6/3.7V (1/2AA or 14250 size) battery with axial leads. Do not use a removable battery holder under any circumstances. Your ESQ-m will be RUINED if it comes loose while the power cable is plugged in.

If there are any unexpected issues at this point, please double check all your wiring since you tested it before changing the wave ROMs over.

Huge thanks to Rainer Buchty, who created the original guide which inspired this one.

Sources / Reference for pictures:

- 1) <http://www.buchty.net/ensoniq/files/sq80m.pdf> (Original SQ80m conversion guide)
- 2) <http://p6ers.net/mm/pc-6001/dev/flashromcard/8k.html> (27C020 pinout graphic, Figure 1)
- 3) http://www.pyroelectro.com/projects/pyro_propeller_clock_pov/74ls373_latch.html (73LS373, Figure 3)



Thick lines denote Wave ROM wiring, & can be ignored until new Wave ROM is installed in order to test the 74LS74 wiring first.

Dotted lines were used for both the daisy chained VCC on the 74LS74 flip flop, and the pins of the Wave ROM that must be shorted to each other.

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Wiring install diagram for the Ensoniq ESQ-M to SQ80-M modification

File: SQ80m Wiring Chart
Folio: 1/1