

## Patch matrix buffering

Hello

Thank you very much and congratulations for purchasing the buffers PCB kit for EMS Synthi A / AKS / VCS3.

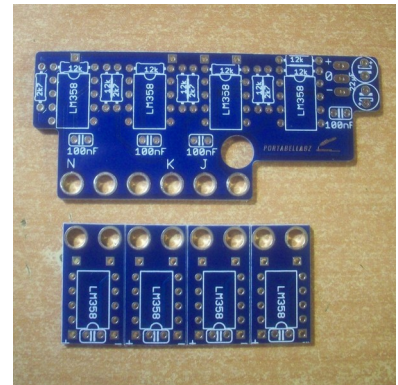
From the factory, the matrix is not buffered.

For example, if you scale a CV to control oscillator 1 and you then want to patch the same CV source to oscillator 2, normally oscillator 1 will go out of tune when you insert the pin into the row.

The row buffer will prevent this and keep a stable pitch regardless of the number of pins present in the row.

If you now decide to add an extra modulation from another source, normally the oscillator scaling will go out when you insert the pin into the column

The column buffer will prevent this and keep a stable scaling regardless of the number of pins present in the column.



Buffering the matrix entirely is not needed. This will also affect the Synthi's behaviour and character and might cause some problems.

But buffering a few rows and columns only is useful to keep stable voltage where it's needed : oscillators and filter frequency destinations, input channels, joystick, oscillator 3.

These PCBs are a modular and easy to install solution. They mount directly to the matrix and need no other support or screw or hole.

No pin resistor value modification is needed.

The mod is 100% reversible.

The PCBs fit both Seaelectro and Ghelmetti 621 matrices.

Each small PCB for rows is able to buffer 2 adjacent rows and can be used for 1 only if desired.

The large PCB for columns offers up to 4 buffers directly connected to the oscillator and filter frequency columns. Each buffer is independent, so you can use all 4, or 3, or 2 or even 1 only to match your own needs.

### Disclaimer

**The modification is at your own risk and I assume no liability for personal injury or damage to equipment or loss of use caused directly or indirectly by the use of this kit and installation procedure.**

**If in doubt, don't do it.**

## BOM

### Columns PCB

- 4 x LM358
- 4 x 100nF ceramic cap
- 2 x 22 $\mu$ F electrolytic cap
- 4 x 2k7 1% resistor
- 8 x 12k 1% resistor

### Rows PCB (each)

- 1 x LM358
- 1 x 100nF ceramic cap

1M or 2M5 3362 type trimpot (optional - see the Joystick note below)

## Installation

The installation should be performed by qualified people only.

### Columns PCB

1. Populate the PCBs. Mount the electrolytic caps horizontally.  
In some Synthi A's the boards come near to the matrix, check the available room inbetween if you plan to socket the LM358's, it might not be enough.  
Solder the +/0/- power cables to the rear of the PCB, with enough length to easily reach the power rails and ground (orange is +12V, blue is -9V).
2. Open the Synthi A or VCS3 to access the rear of the matrix. In the Synthi A, you'll need to remove boards A and B.
3. Unsolder the wires from the I, J, K, N columns. If you don't want to buffer a frequency column, simply leave the connection as is.
4. Solder these wires to the corresponding pads located on top of the columns PCB. If the Synthi A or VCS3 has a prestopatch, the wires connected to it will need an extension, this can be done with a piece of wire soldered to the wire's end and insulated with heatshrink.
5. Mount the PCB to the matrix's lugs, do not solder it or barely, just what's needed to ensure good contact, so you'll can remove it easily in case something's wrong. Solder it properly only after checking all is good working.
6. Connect the power cables to the appropriate rails.

### Rows PCBs

1. Populate the PCBs.  
In some Synthi A's the boards come near to the matrix, check the available room inbetween if you plan to socket the LM358's, it might not be enough.
2. Unsolder the wires from the rows you want to buffer.
3. Solder these wires to the corresponding pads located near the LM358's pins 4 and 5, each PCB is good for 2 rows. If you don't want to buffer a row, simply leave the connection as is. Only a half of the LM358 can be used.
4. Mount the PCBs to the matrix's lugs, do not solder it or barely, just what's needed to ensure good contact, so you'll can remove it easily in case something's wrong. Solder it properly only after checking all is good working.
5. Connect the power pads located accross the cap to the corresponding pads on the columns buffer PCB, or to another power source if the columns PCB is not used (orange is +12V, blue is -9V). + is near the LM358's pin 8, - near pin 1.

### Joystick

With buffers, the joystick range is increased. If you prefer to keep the range similar to what you're used to, use the row buffer PCB with 2 emplacements for trimpots type 3362. Connect the pad in the bottom right corner to ground.

For use with an EMS sequencer connected to matrix row 16 (KS, TKS, Universal Sequencer) this trimpot is needed otherwise you will no longer be able to scale the sequencer CV properly, even with the pitch spread set to 0 the intervals will remain too large for equally tempered scale. Set the trimpot to get tempered scale with the sequence pitchspread wheel around 4.

