

Tubbutec Polysex

Construction manual

Revision 1.4

For the newest version of this manual
and an instruction video please visit
<http://tubbutec.de/polysex>

Tools needed

- Solder iron
- Lead
- Side cutter
- Cable stripper
- Cordless drill
- Dremel tool or a small jigsaw
- Cutting disk for dremel
- Drills 8mm, 4mm
- Deburrer
- Center punch
- Wrench or nut driver
- Screwdriver
- Paper tape
- Drilling oil

Part list (each kit contains)

- 1 x Front panel
 - 4 x Knob
 - 3 x Potentiometer 10k
 - 1 x Potentiometer 20k
 - 4 x slide switch
 - 1 x wood screw
 - 1 x bar spacer
 - 4 x lock washer
 - 4 x nut for potentiometer shaft
 - 2 x nut M3
 - 2 x Screw M3 black
 - 8 x Screw M2 black
 - 4 x Shaft adapter
 - 30 x Cable 46 cm
 - 1 x assembled PCB
- or
- 1 x PCB
 - 19 x resistor (for values see table below)
 - 3 x capacitors
 - 1 x IC 74HCT4051
 - 1 x ICTL074
 - 1 x trimmer 5k
 - Pinheader 2x 9, 3x 3,1x 4

Mechanical assembling

Cutting openings and drilling holes

The Polysex front panel is meant to be placed on top of the Polysix synthesizer as shown in figure 1. You will have to drill and cut holes in the Polysix's case, but great accuracy is not needed, because the holes will be covered by the front panel.

1. Open the Polysix front panel. This can be done by removing the four screws on top and the four of the rear end of the bottom. The panel now opens up.
2. (optional step) Take off the Polysix front panel. If you want to do this you will have to unplug all the connectors connecting the front panel to the rest of the circuit and desolder the wires coming from the power supply on the right as well as the black ground cable connecting PCBs KLM-366 and KLM-360. This is not strictly necessary but make this easier later on.
3. Cover the space on the Polysix front panel where you are not working on with paper and fix it with some paper tape to avoid any scratches and dust on this part of the front panel. If you skipped step 2 also cover the interior of the Polysix - drilling the holes will produce some metal dust.
4. To ensure the right location of the holes, a transparent stencil is provided which can be placed on the Polysix to then mark the locations of the holes.

Take out the two screws, line up the transparent sheet with the markings and holes of the Polysix and fix it with paper tape.

Use a center punch to mark the location of the holes and cuttings which are: The four 8mm holes for the pots, two 4mm holes for the bottom screws and four cutouts for the switches. Note that the cutouts for the switches should be larger than the switches themselves.

Remove the transparent sheet, drill the holes with low RPM and use drilling oil frequently, deburr the holes after drilling.

Use the dremel tool or a jigsaw to cut the openings for the switches, it is not necessary to work with precision here since the openings will be covered by the Polysex front panel.

Installing the front panel, switches and potentiometers

Use the four black M3 screws to put the Polysex front panel into place. For the lower two screws use the two M3 nuts provided to fix them from behind.

Use the eight M2 screws to install the switches behind the front panel.

Put the potentiometers into place using a wrench or nut driver (better).

Note that the mod amount potentiometer is a 20k type while the others are 10k.

To ensure the right height of the shaft and to fix the potentiometers securely, a lock washer has to be placed between potentiometer and front

panel.

If you want to install 6.3mm knobs like the knobs provided, put the axis adapters (brass sleeves) on the potentiometer shafts, and fix the knobs with the screw on the side.



Fig. 1 - panel placement

Amount	Value	Part number(s)	Color/Marking
7	100k	R2, R5, R8, R9, R10, R11, R14	br bl bl or br
3	10k	R3, R4, R7	br bl or go
2	150k	R1, R6	br or bl or br
2	2k2	R15, R18	re re bl br br
2	4k7	R16, R17	ye pu bl br br
1	49k9	R13	ye w w re br
1	20k	R19	re bl bl re br
1	300k	R12	or bl bl or br
3	100n	C1, C2, C3	104
1	4051N	IC1	
1	TL074P	IC2	
1	5k	Trimmer	

Table 1: Part numbers, values and color codes

Electrical assembling

Depending on which option of the kit you have the PCB might already be assembled. In this case continue with step 2.

Step 1: Assembling of the circuit board

You should have basic soldering skills to assemble the board, but it is not very complicated. If you are new to soldering check out one of many great soldering (video) tutorials you can find in the internet.

At first put the passive components, resistors and capacitors into the board and solder them. You can use the table below to match the part numbers to the color codes on the resistors. After soldering cut the leads using the side cutter. Next place the ICs and solder them. As a last step solder the pin headers.

Step 2: Putting the circuit board into the Polysix

There are two versions of the Polysix an old version and a new version. You can recognize the old version by an additional board mounted on top of the KLM-366 board called KLM-396A. If you have the old version please refer to fig.2(old) instead of fig.2. If you have the Kiwisix mod installed, MG and PWM signals are connected differently, see section *Kiwisix changes* below.

Remove the screw on the Polysix circuit board KLM-366 as shown in fig.2. Screw the Polysex circuit board in place using the screw and bar spacer provided in the kit. fig.2 Shows the placement of the board.

The wiring diagram shows how to wire all the necessary connections between the potentiometers, the Polysex board and the original Polysix boards. fig.2 and fig.3 show the placement of the connection points on the Polysix boards. Fig.4 shows how to wire the potentiometers and switches and how to connect them to the rest of the circuit.

Cut the wires to the right length, strip them and tin them before soldering them. It is also advisable to tin all the points you will solder the wires to, be it pin headers, potentiometer pins or IC pins.

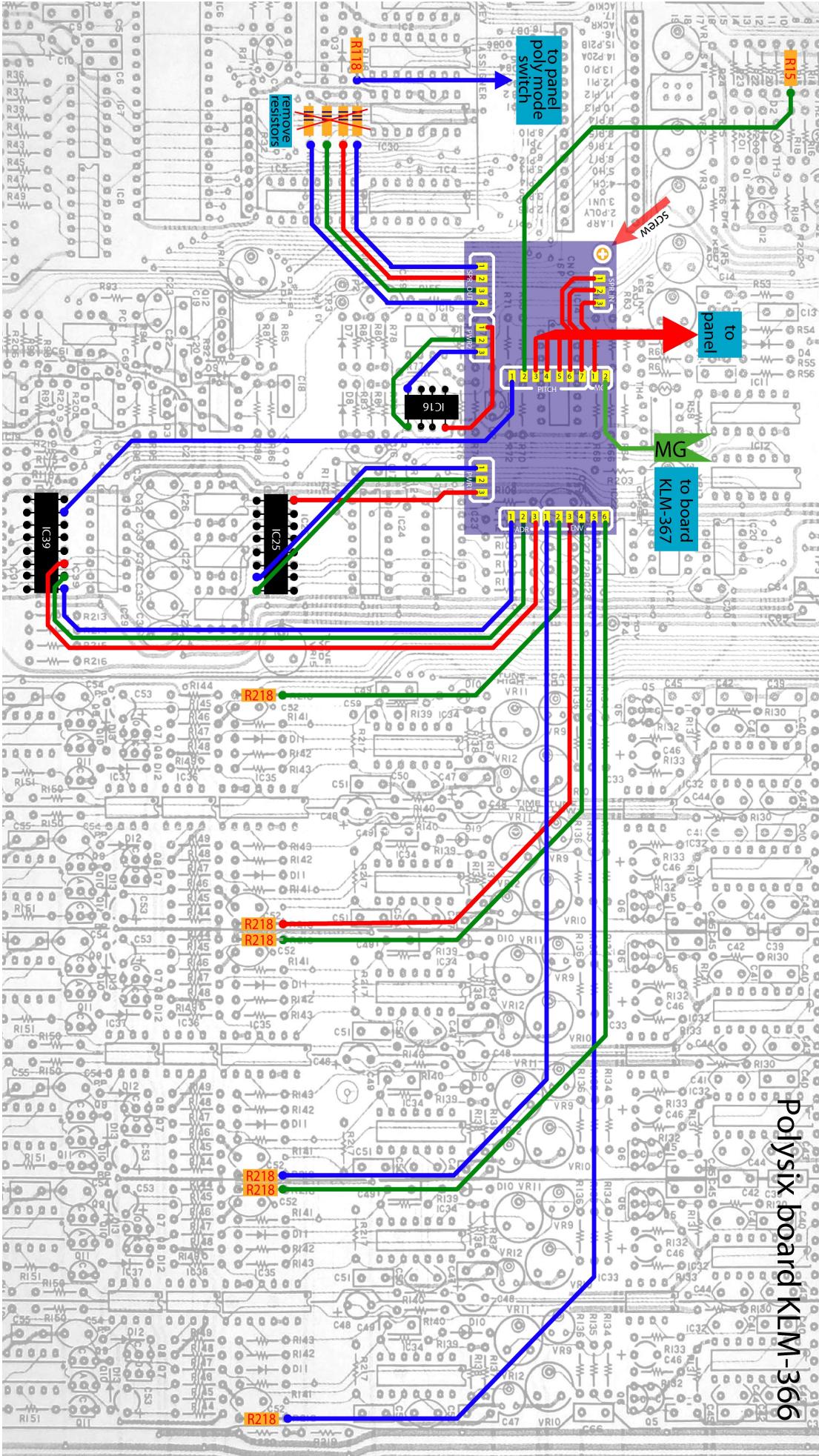


Fig. 2 – Wiring

Polysix board KLM-366 old version

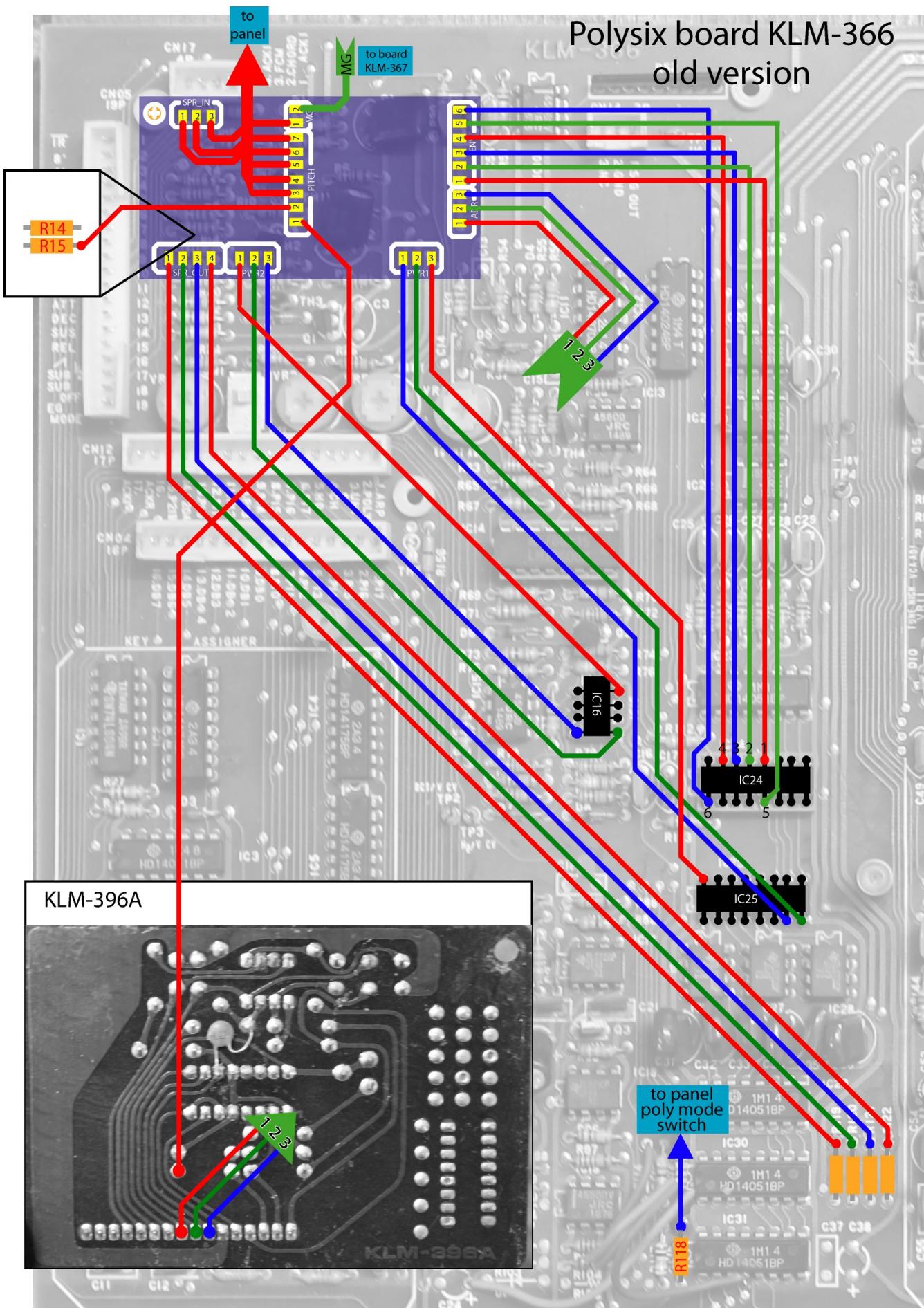


fig.2(old) - Wiring

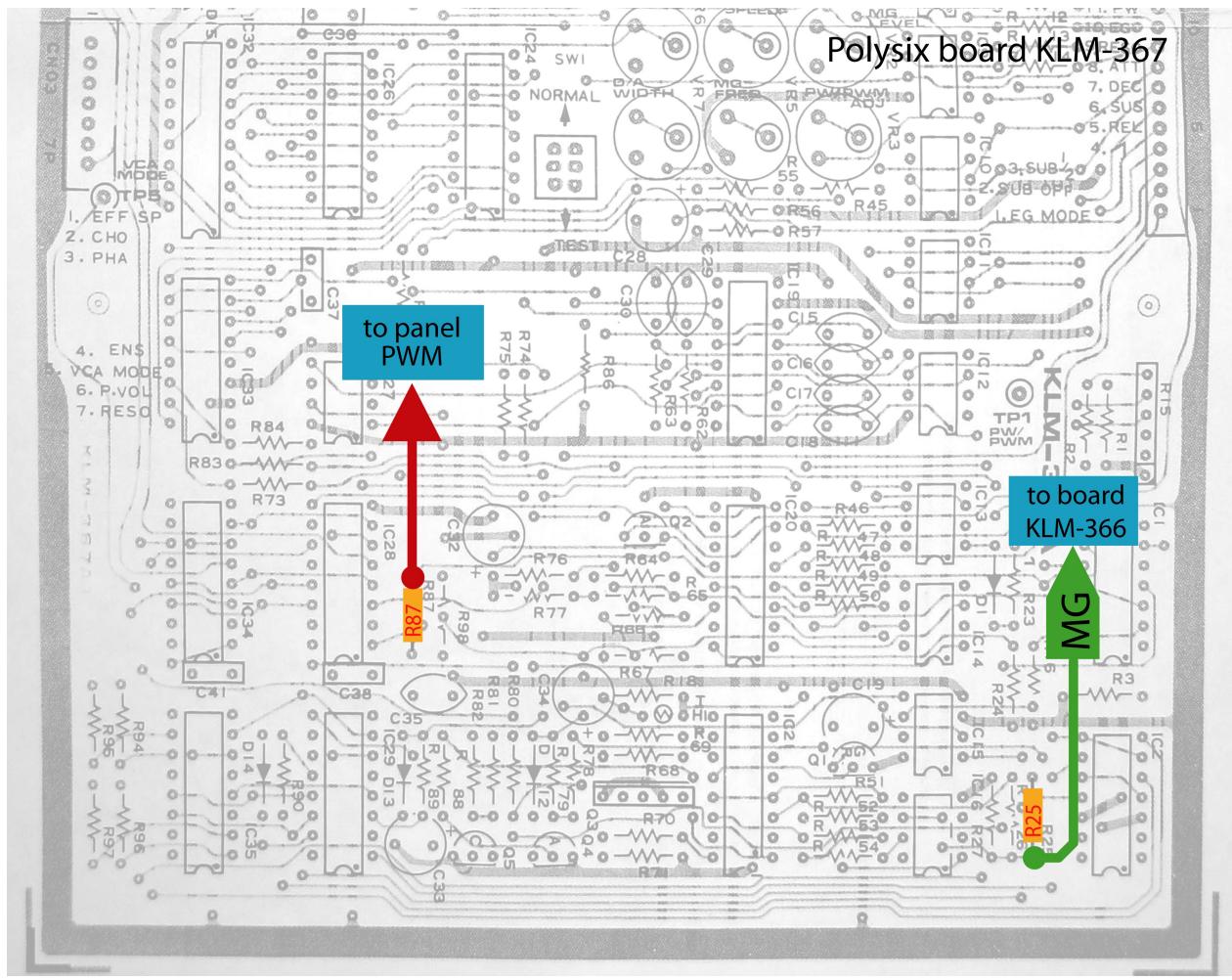


Fig. 3 - Wiring

Potentiometer and switch wiring -- View from behind when lid is opened

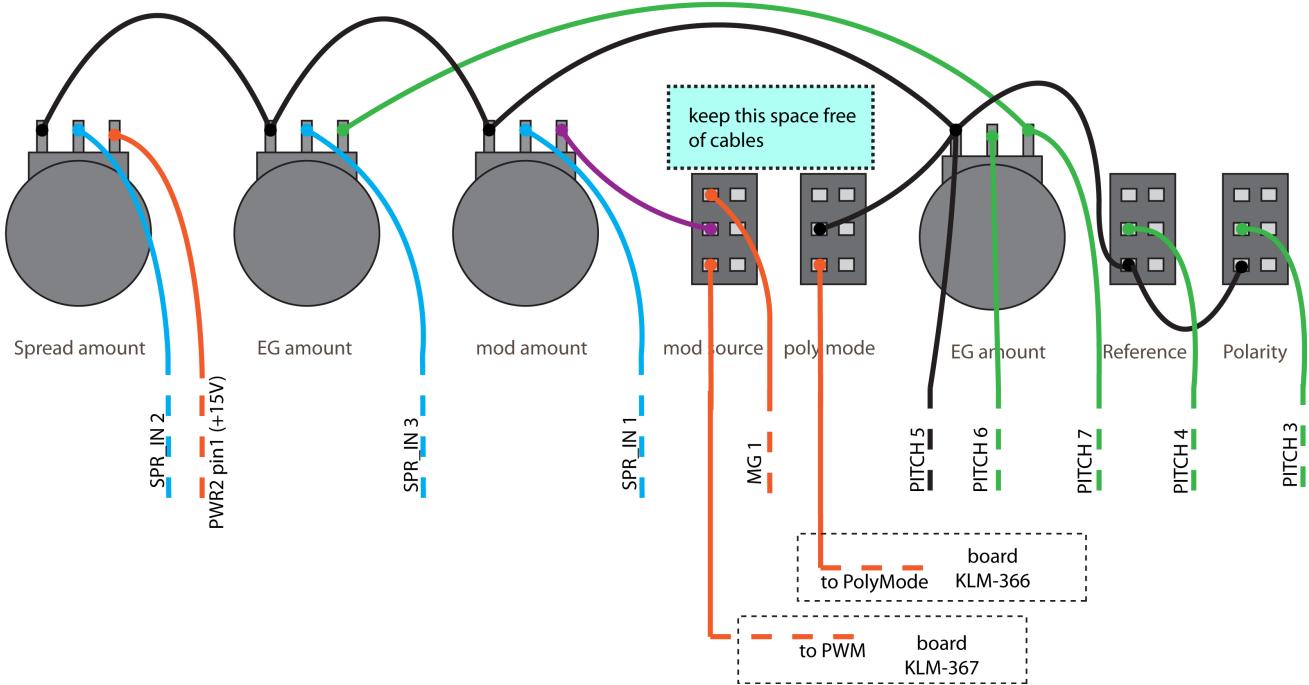
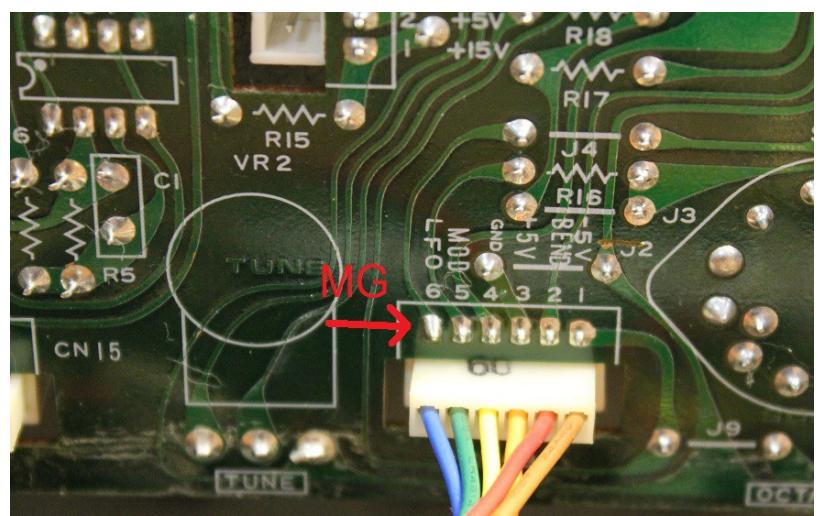
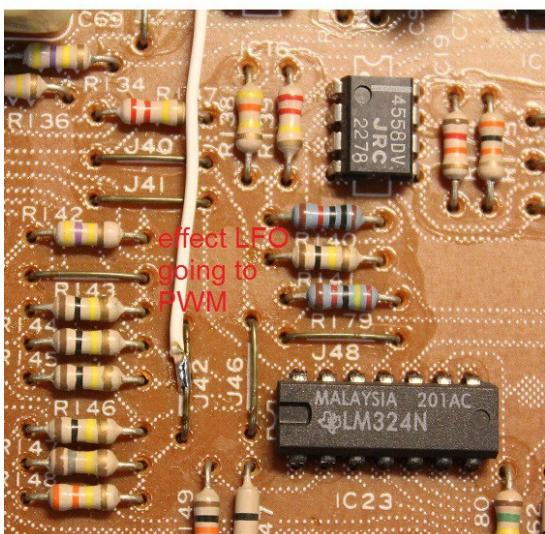


Fig. 4 - panel wiring

Kiwisix changes

The Kiwisix does not provide the same MG and PWM signals as the original Polysix. There are however other modulations sources present in the Polysix. The effect section delivers a triangular LFO with a frequency of about 0.1Hz to 7Hz. You can set its frequency using the SPEED/INTENSITY knob. There is also a square LFO with the frequency of the MG section.

If your Polysix has a Kiwisix mod, the MG and PWM connections on board KLM-367 are replaced as follows: The PWM wire connects to jumper J42 on the effects board KLM-368 and the MG connection to the point labeled 'LFO' on the back-panel (see images).



Calibration

As a last step calibration may be needed. There is one trimmer on the Polysex PCB for that purpose.

Set the trimmer to the middle position, set all the Polysex controls to 0 and the reference switch to sustain level.

Set attack, decay and release to 0 and sustain to 10.

Turn on the Polysix, hit a key and press the hold button.

Now set the Polysix Pitch EG Amount to 10. The pitch should not change. If it does turn the trimmer slowly until there is no pitch change.

Changelog:

v1.4

Added Kiwisix information

v1.3

Improved diagram for front panel wiring and added missing 15V connection.

v1.2

Added circuit diagram for old version Polysix