.: Note about various pcb kludges :.

Brief:

A few of the printed circuit boards in their current revisions have “kludges”: little alterations to the board to fix minor issues or alter the circuit behavior. These are typically achieved by small cuts to the circuit board traces and/or small wires soldered between circuit nodes. Future circuit board revisions could incorporate these fixes into the schematic capture and/or pcb layout for a permanent solution. This document outlines the various kludges in the current revision.

Common to all VCOs:

A small value capacitor of between 10pF to 47pF is installed in parallel to R38 on the CEM3340 VCO boards to suppress a spike on the rising edge of the sawtooth wave. The exact value is chosen empirically. An 0805 package ceramic capacitor is placed on top of the existing 0805 resistor.

R16 on the CEM3340 VCO boards is changed to 51k to increase the base frequency so that they can easily be trimmed to hit C1 (32.703Hz) as their lowest octave.

Dual-range VCO:

The dual-range VCO has a small kludge to allow for an extra CV input. This extra input is connected to the VCO/LFO range switch, which injects a negative control voltage to the VCO to achieve low frequency mode. The VCO core pcb has enough 1v/oct inputs, but the third one is tied to ground on the VCO carrier board because it is not typically needed. Two small cuts are made on the pcb front, and three small cuts on the pcb rear, to unground the third 1v/oct input. A jumper wire is installed from the range switch to the now-ungrounded 1v/oct input node on the pcb.

Additionally, R1 on the CEM3340 VCO board is changed to 68k to set the desired low frequency point.

Five-pulser waveshaper:

The power entry header on the five-pulser waveshaper pcb is reversed in the current revision. This is corrected by cutting the +/-12 volt input traces and re-routing them with jumper wires.

Additionally, the trace which carries the manual pulse-width control signal is also shorted to ground through a misplaced via. The trace is cut and re-routed to jump over this short.

Sub-octave waveshaper:

The power entry header on the sub-octave waveshaper pcb is reversed in the current revision. This is corrected by cutting the +/-12 volt input traces and re-routing them with jumper wires.

Additionally, the input to the second flip-flop has been re-routed from the opamp-to-CD40106 pulse conditioner, to the Q_{bar} output of the first flip-flop. This cleans up the second sub-octave a little bit. A future pcb revision could eliminate the second opamp-to-CD40106 pulse conditioner, and save some parts.

Small value capacitors have been placed in parallel with R7, R18, R23, and R33 to reduce the amplitude of spikes caused by the sub-octave circuitry. These are in the range or 22pF to 100pF, and were chosen empirically.

Modulation source:

The LFO timing cap C3 has an 0805 footprint on the current pcb revision. This is an inconvenient footprint for a 220nF capacitor. It is hard to find a good quality 220nF capacitor that is affordable in an 0805 package. On the pcb, a through hole film cap is kludged on by soldering its leads directly to the opamp U2B inverting-input and output pins.

VCF carrier board:

A 25k ohm potentiometer was used for the feedback control RV8, as 10k pots in the correct footprint were out of stock everywhere when this was built. To compensate for the different value pot, R18 has been changed to 33k.

CEM3320 LPF plug-in board:

The power pins to the TL072 are reversed on the pcb. This is corrected by trace cutting and re-routing.

Dual MS20 VCF:

The positions of the manual cutoff controls and the CV input attenuators are swapped on the pcb. This is corrected by bending the output legs of the potentiometers up and soldering jumper wires to the appropriate holes in the pcb.

Dual ADSR:

The DAC outputs from the STM32 breakout board were not routed to the opamp filter inputs on the mother board. These connections were made by jumper wires going from the STM32 breakout board to the mother board.

Also, several of the ADC inputs from the potentiometers were routed to the wrong pins. These were fixed by cutting the traces and running jumper wires on the bottom of the mother board pcb.