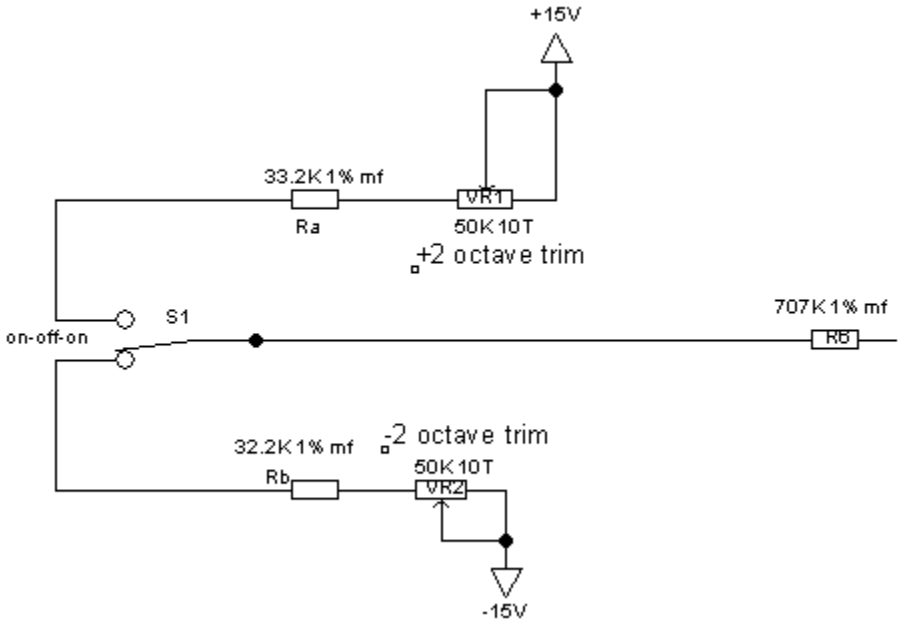
Modifications to YUSYNTH VCO

(pictures on this document © dhar2kma@yahoo.com 08/10/07)

A.- Octave switching;

Added additional components mounted on a small perforated board and soldered on top of an ON-OFF-ON toggle switch; see image below



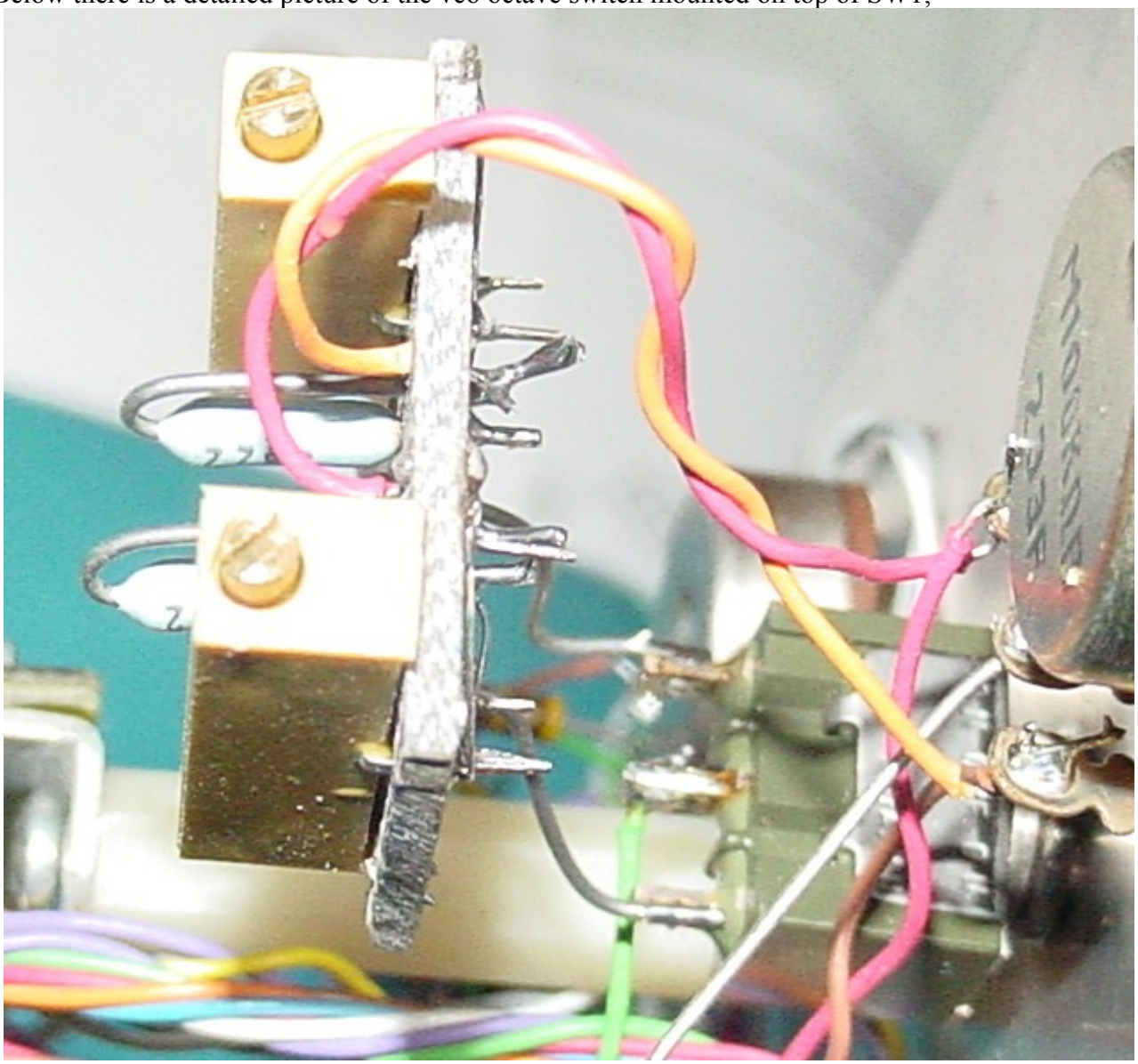

VR1 and VR2 are the OCTAVE trimmers, to adjust those, first calibrate “V/OCTAVE SCALE” trim T2 and “HF TRIM” T3. Next, set S1 to MIDDLE position (make sure you are using the proper SW asl labeled, it has 3 positions LEFTMOST, CENTER and RIGHTMOST and a good example is the FUTURLEC Part Number SPDT101 search their website)

Tune the VCO to 220 Hertz or whatever pitch you feel comfortable, then flip sw1 to the '+2 octaves' and adjust VR1 to 880 Hz. Next set the sw to '0' position ( middle) and tune the VCO to 440 Hz, now flip the switch to the '-2 octaves' position and adjust VR2 to 110 Hz. Verify and retune as needed. Observe that R6 was changed from 3M3 to 707K 1% metal film. Ra and Rb should be also metal film type. The values are what I had on hand, more common values should be Ra and Rb=33K 1% mf and R6= 680K1 % (futurlec p/n R033KMF for Ra and Rb and R680KMF for R6)

NOTE: in my VCO I installed this switch such that the toggle is set horizontally and flipped to the left it shifts my VCO -2 octaves, center is '0' (no shift) and flipped to the right shifts the vco +2 octaves.

Also, I'm using Futurlec http://www.futurlec.com/index.shtml as a reference, you can get your components wherever fits your hearth.

Below there is a detailed picture of the vco octave switch mounted on top of SW1;



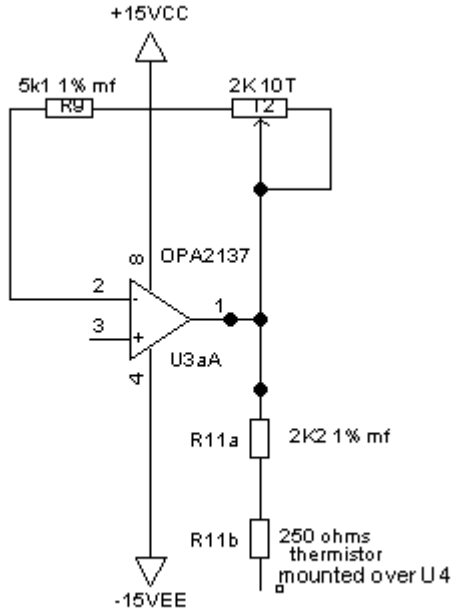
as you see; the components are mounted on a small board and this one is in turn mounted over SW1 using  Ra and Rb excess leads. Notice that the middle pin of the switch is connected to the green lead going to the FINE TUNE  input hole and in turn to R6.

B.- Use of a ntc thermistor instead of the TEMPCO

There's no way I can get a TEMPCO these days, they're either too expensive (for me) or simply hard to find... There are other means to compensate the VCO for the thermal drift, among those there's a good chance of success using NTC thermistors. I got a couple of Keystone Thermometrics 'Linear Sensing Thermistors' as they were described then on the manufacturer's catalog from DIGIKEY P/N KC001G-ND Thermistor Glass Encapsulated 250 ohm about 8 Years ago ...but... they are not listed there anymore...

This note is just as reference only. I do have a small quantity of older thermistors and I intent to play with them with my next VCO, I will let you know what the results are.

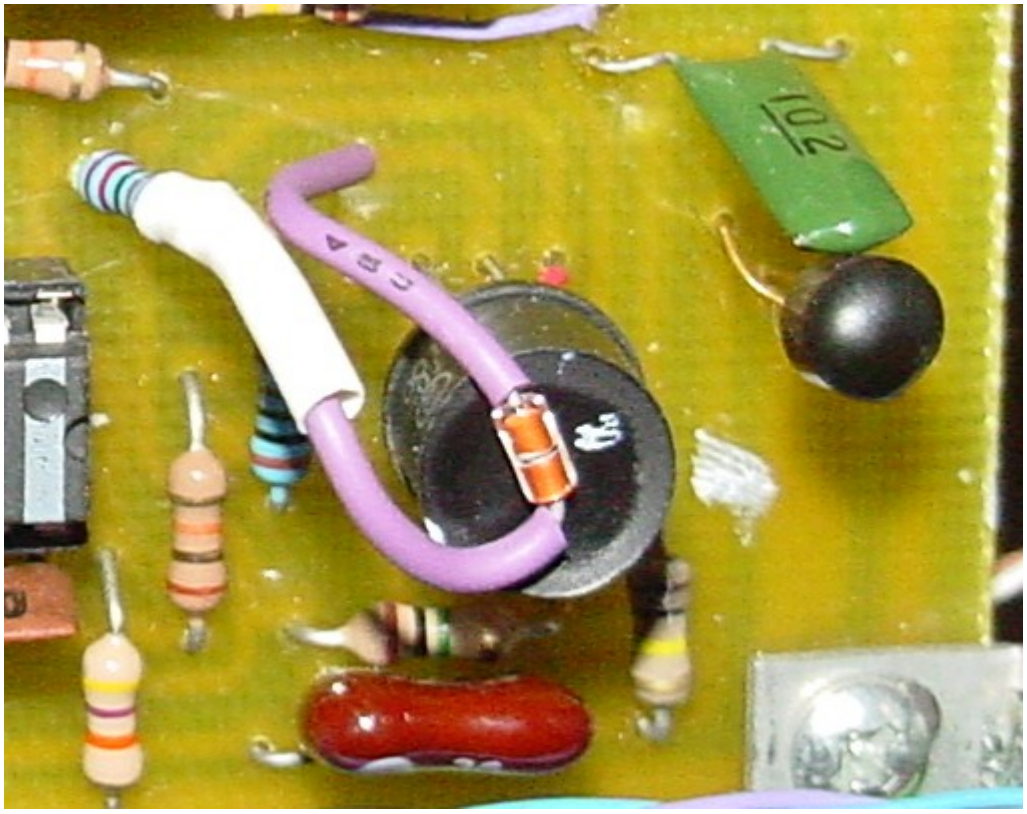
Below there is the schematic with the value changes as used on this VCO;




I have redrawn the affected components around U3A, not shown is R12 where a 1K 1% mf resistor was used instead of the missing TEMPCO. The new R11 is actually composed of a fixed resistor R11a and R11b the thermistor itself and this last one is mounted right on top of U4 the dual matched pair with a small amount of heat transferring compound. The VCO now has a fairy good and repetitive stability.

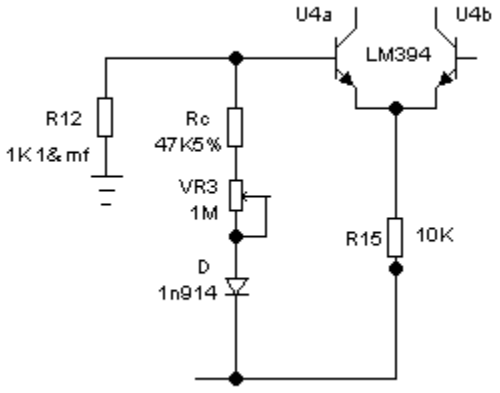
Took me then several days to figure out the adecuate values, in other words, the NTC value and the ohmic resistance at 25 degrees celcius plus the scaling resistor R11a in this case. To get you an idea, the TC is about -3.34 at 25 deg C and gives a reading of 250 ohms. Together R11a and R11b forms a resistor that exhibits a NTC of about -0.34 ppm/deg C which is close enough for me.
This compensating mechanism works just as well as a “normal” TEMPCO scheme, if the ambient temperature increases, the resistance decreases and 'reduces' the attenuating factor created with r11a+R11b in series with R12 (now a 1K 1% resistor) this in turns translates a s a slight increase in the control voltage present at the base of the fist transistor hence compensating the thermal variations just

as a 'regular' TEMPCO ' circuit would. Below is a picture of the mounted thermistor in series with R11a right below the white heatshrink tubing is R12;




C.- HIFREQ TRACK mod

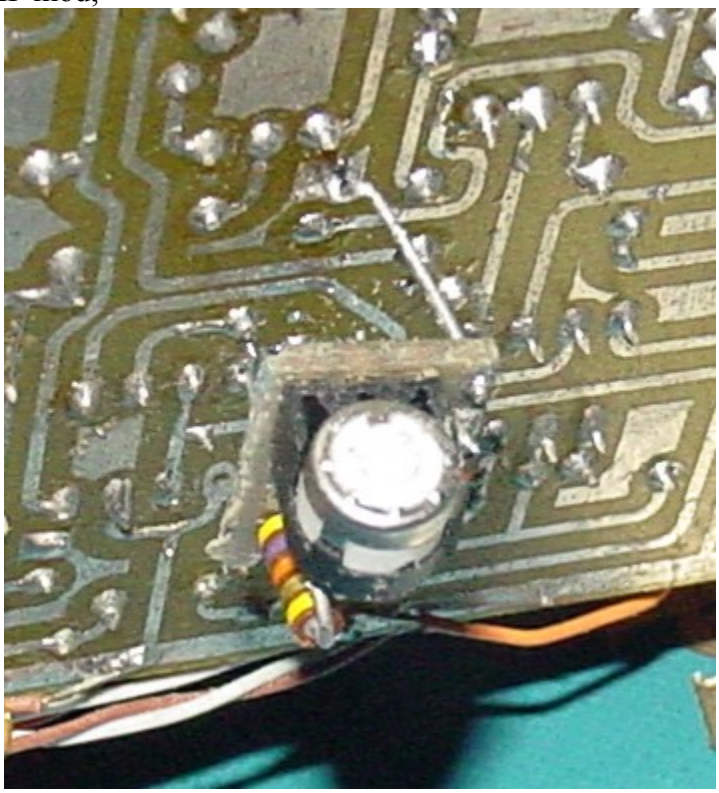
I was not able to align the HF TRACK T3 to an adequate response, in fact, I noticed it actually worsened the high end when I increased the resistance at T3, could have been something else on the circuit but I lost patience and modified the circuit as follows, removed T2 and ran a small jumper in place shorting across where T2 was and added a small per board with the following additional components, see schematic below;




added Rc, VR3 and a 1N914 Diode as shown, calibration was done as follows; set VR3 to it's mid-range and tune the VCO at 220 Hz with octave sw in '0' position ( no shift) insert 2 volts one of the

V/OCVT IN jacks and adjust VR3 for an output of 880 Hz, may not need any trimming at this time, now flip OCTAVE SW to +2 Octaves and adjust VR3 to read 3520 Hz. Repeat a couple of times and then verify your vco is in tune at least to 7040 Hz. Mine came up just in tune above 11 KHz.

Here's a picture of the HF mod;

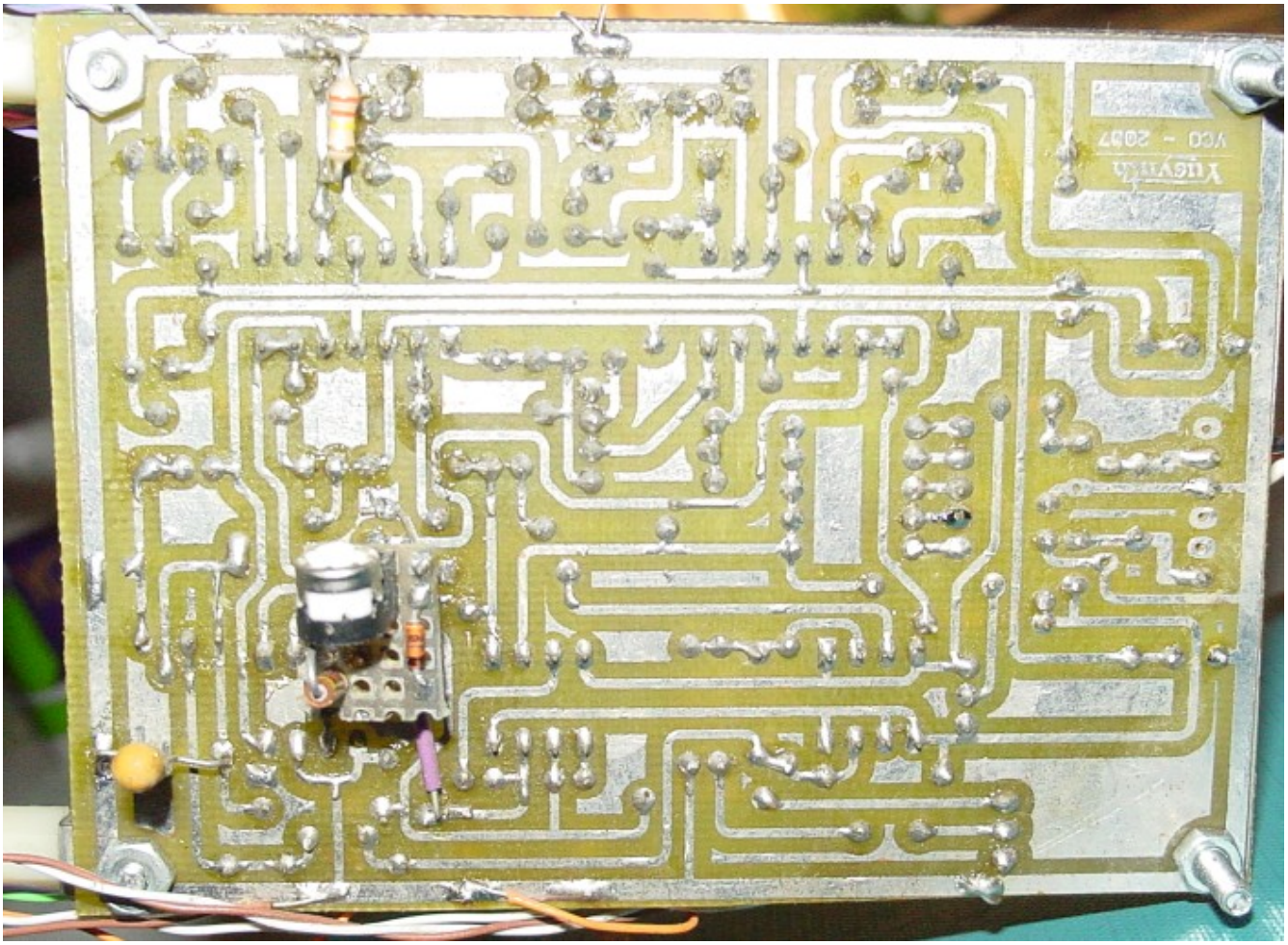


I did mount these components in a small perforated board again and using component lead clippings re soldered in such a way as to have it supported with 3 legs, two where the 'ends' of the new circuit and the third one was soldered over an uncommitted trace on the board (the top piece of wire over the right corner of the small board towards the VCO board.

E.- PW Mod

Added a 330K 5% resistor from U6c pin 10 to ground and changed R35 to 560K ohms in order to have a PW output from a narrow negative going pulse when the control pot PW POT is set to the leftmost side to a narrow positive going pulse when this pot is set to the rightmost side and a fairy symmetrical square wave in the middle setting. Also increased R34 to 470 K to compensate the amount of pulse modulation also. ( no schematic submitted )

last, added a small 15uF 16V tantalum capacitor from U7a to ground to decouple the +5V reference source. See next picture showig the bottom side of the board. Of interest is that the circuit board is home made and with no photographic process involved.



Last picture is a mugshot of the VCO front panel, the smaller knobs are not the ones I will leave mounted there, they are just temporarily.


YUSYNTH VCO
frequency
-2 oct
+2 oct
octave
pwm
INPUTS
OUTPUTS
V/OCT
cv1
pwm in
SAW
SQ/PW
V/OCT
LIN FM
sync in
SINE
TRI