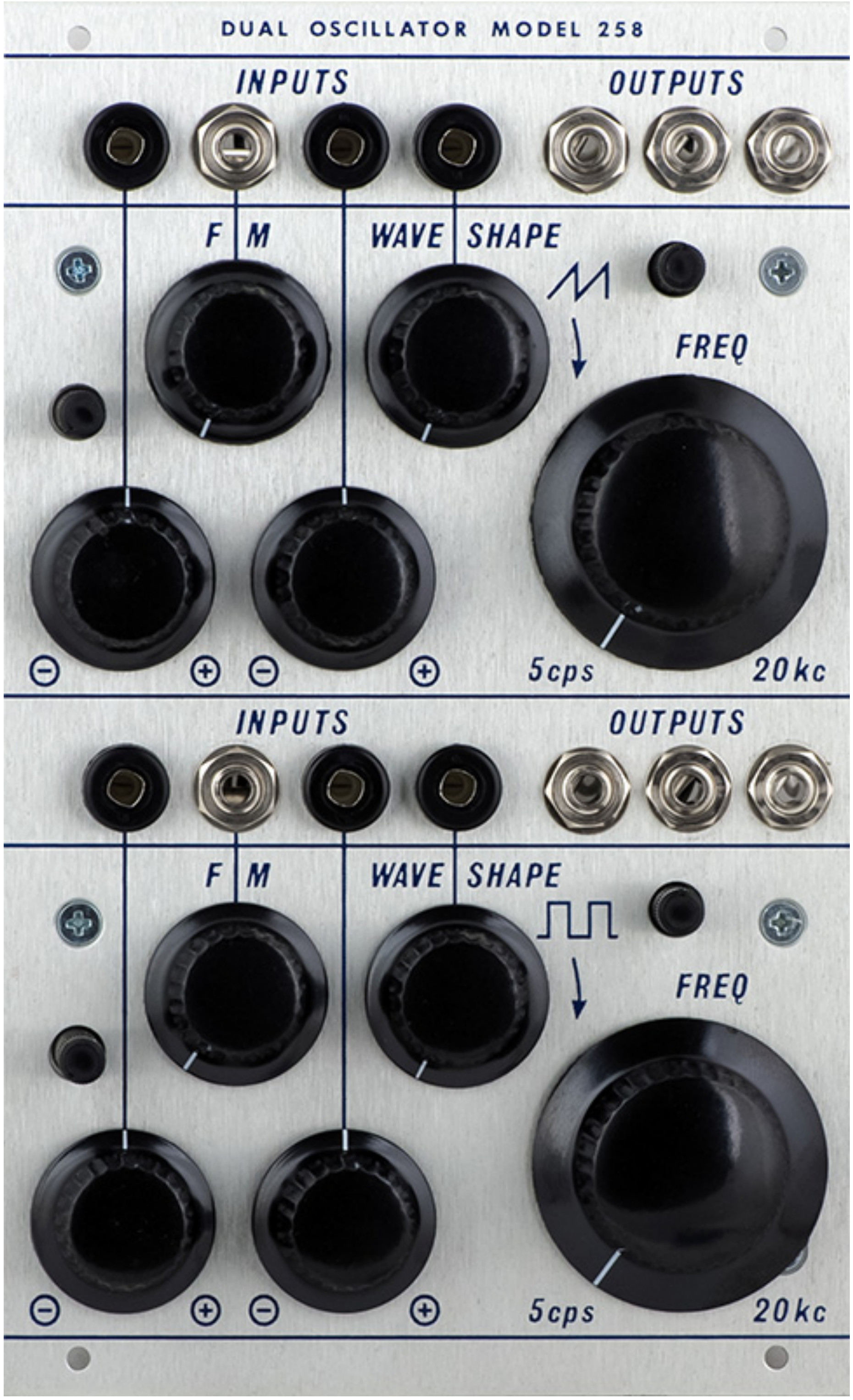
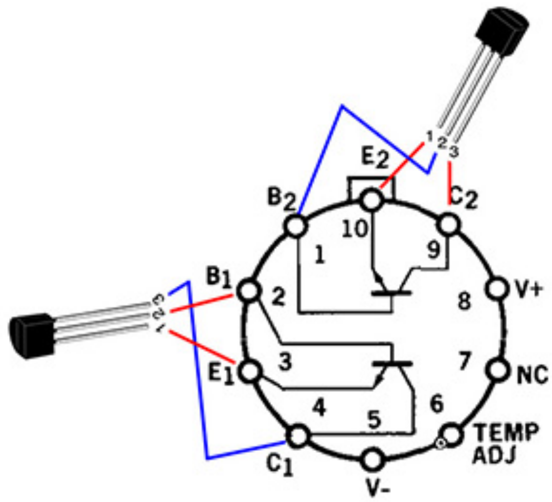
Buchla 258 Dual Oscillator Module

V2

I've repaired and calibrated a number of 258 V2 Dual Oscillator modules. Some track, some do not and I've never understood why. I decided to build one for myself and dive deeper into the circuitry. I wanted to experiment with the difference between the discrete current source and an op-amp current source.

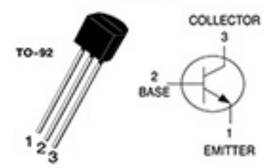


I used tape and reel 2N3904s for the differential pair. I epoxied them together and soldered them in place of the uA726. I was going to use a 150R SMT tempco for R33 and R89 mounted on top of the pair but decided to change resistor values so I could use a 1K axial tempco instead because of the better specifications.

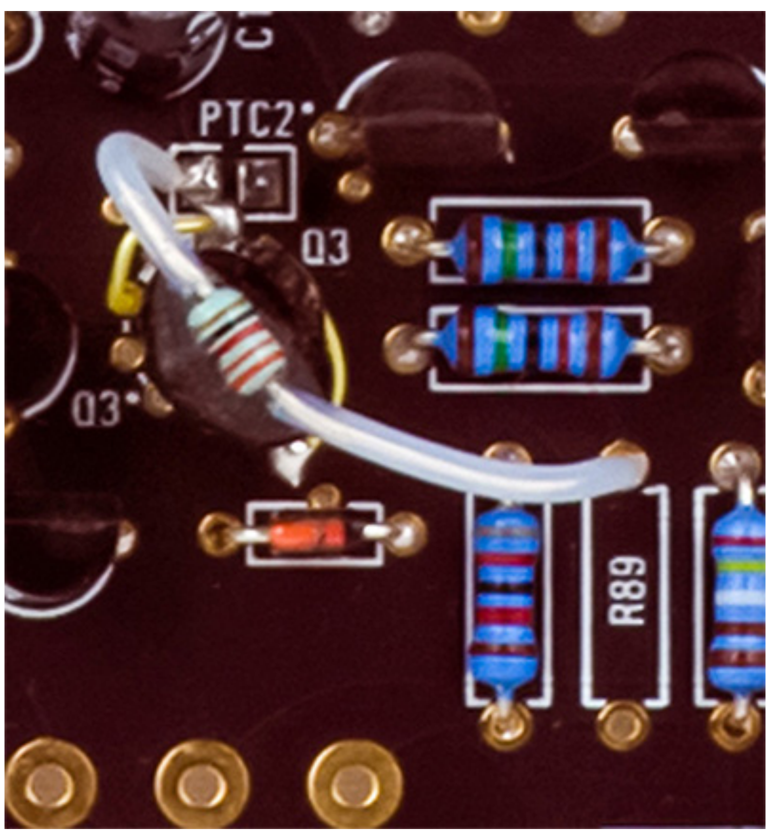


uA726 top view

2N3904



Find continuity to locate tab.
  Pins 3 and 10 will be connected
  Either pin 1 or 2 will be grounded
From this locate the tab pin 10
Red = bend pins to fit
Blue = bend pin back and connect with wire to pad



With the high frequency trim (Linearity) removed I was able to get 6 octaves of range at 1V/Oct CV. I was surprised I didn't need a high frequency trim. The discrete current source didn't seem to be an issue either. I experimented with an op-amp current source but it didn't change things appreciably.

258 V2 Modifications

VCO 1

1. Change R9 from 60K4 to 100K.
2. Change R19 from 4K99 to 49K9.
3. Change R22 from 270K to 220K
4. R33 and PTC1 are in parallel. Do not install either and wire a 1K tempco epoxied on top of the expo pair. Wire to the appropriate R33 and PTC1 pads.
5. Do not install TR2, R11, R15 or R18. This removes the high frequency trim.

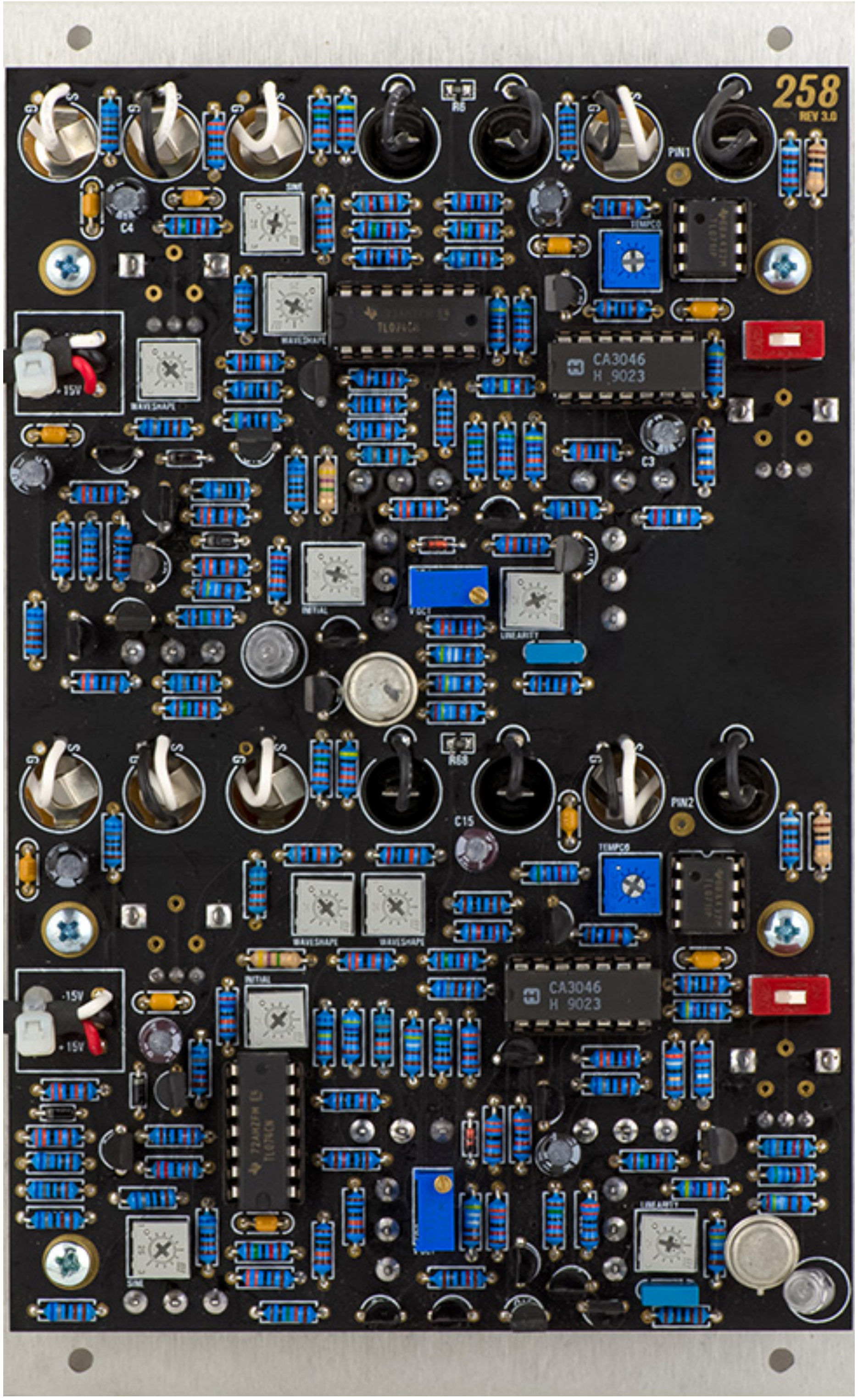
VCO2

6. Change R65 from 60K4 to 100K.
7. Change R75 from 4K99 to 49K9.
8. Change R78 from 270K to 220K
9. R89 and PTC2 are in parallel. Do not install either and wire a 1K tempco epoxied on top of the expo pair. Wire to the appropriate R89 and PTC2 pads.
10. Do not install TR8, R67, R71 or R74. This removes the high frequency trim.

V3

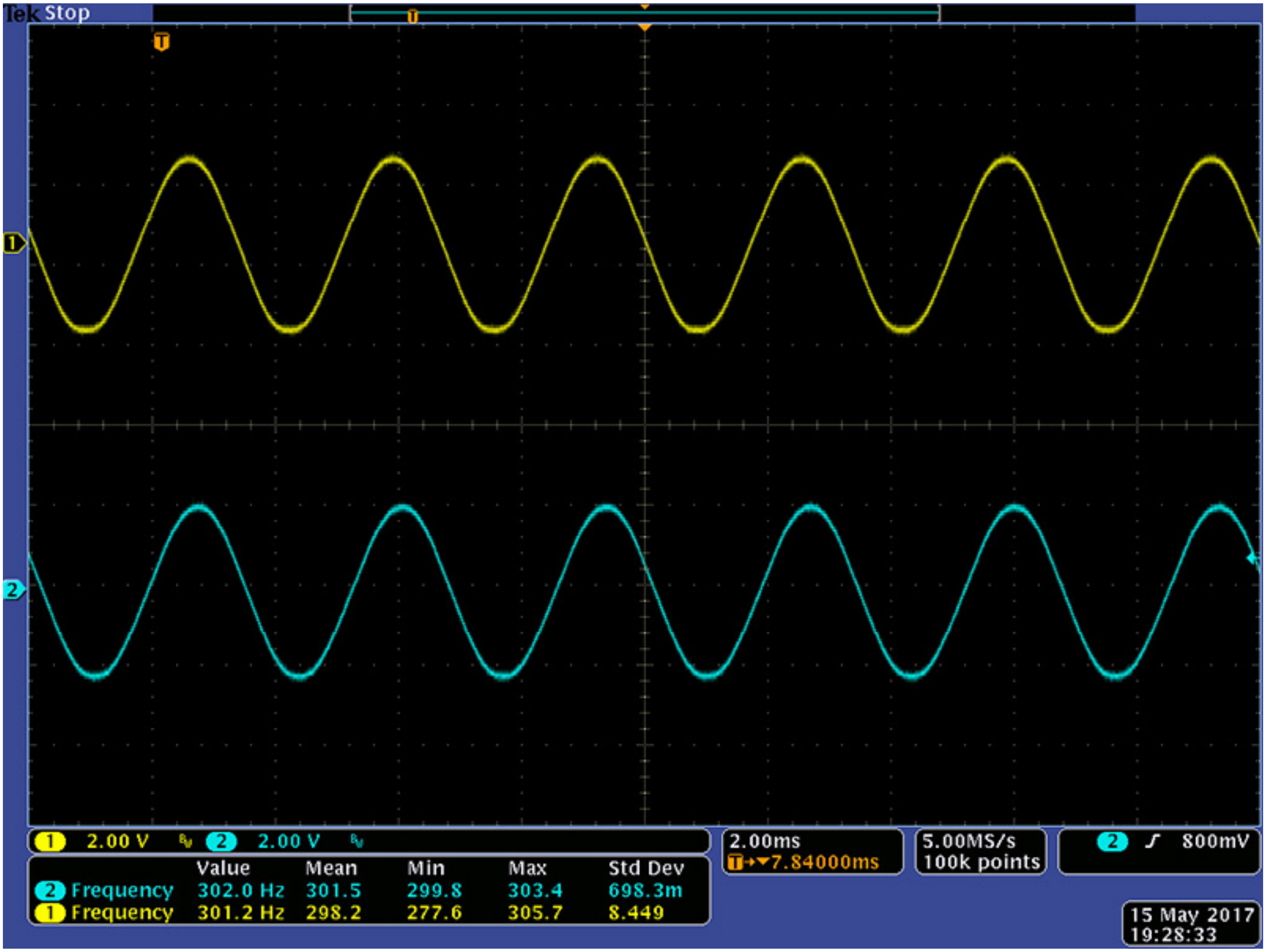
I built a Buchla 258 V3 Dual Oscillator module for someone else. They sent me a mostly complete kit of parts and I assembled and tested the module. Many of the components are sourced through Mouser but specialized parts, panel, and knobs have specific sourcing and I do not know the details.

The V3 includes a CA3046 transistor array which is used for the exponential pair along with a heater to operate at 55°C junction temperature. Each oscillator is separate on the PCB including the power supply connections. I chose to use a single Buchla edge connector with two power cables to the module.

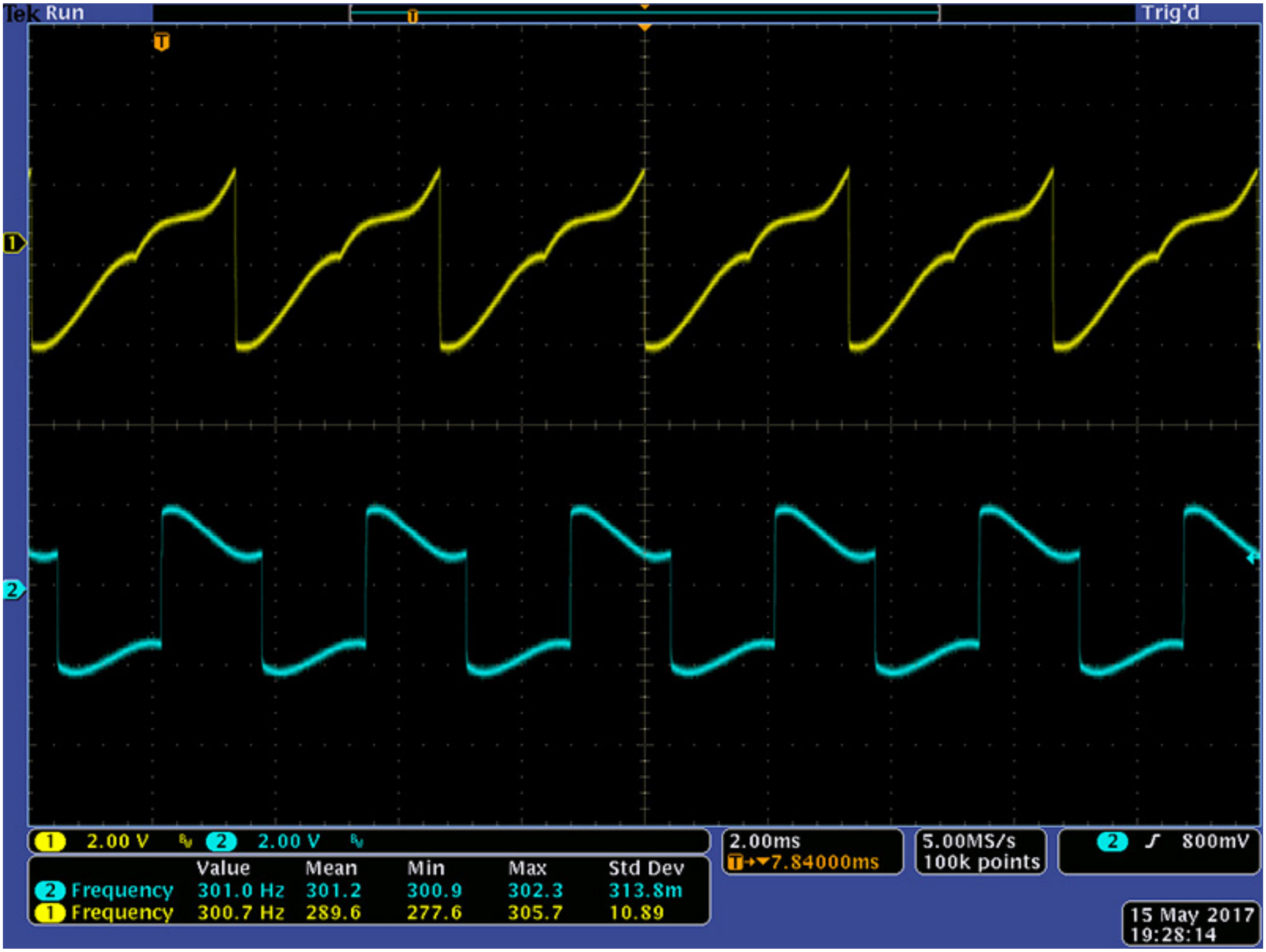


Operation

The sine waves are very clean on this oscillator.



The waveshapping is different between oscillators, one having a waveshape to a saw and the other to a square.



Calibration

Calibration is pretty straightforward on this module although the expo pairs are heated so you need to calibrate that first. Here is the calibration for the heater that I chose.

Temperature Adjustment

1. Open JP1 (or JP2) and adjust TR5 (or TR14) CCW and operate for about 10 minutes to allow 3046 to rearch room temperature.
2. Measure $V_{be(cold)}$ at Pin1 (or Pin2)
3. Subtract the room temperature in °C from 55°C to determine the temperature rise Δ T to the desired operating junction temperature of 55°C.

4. Determine the desired operating $V_{be(op)}$ by the following formula:

   $$V_{be(op)} = V_{be(cold)} - (0.002 \times \Delta T)$$

   For example, if $V_{be(cold)}$ = 0.605V and the room temperature is 23°C, then $V_{be(op)}$ = 0.541V.

5. Close JP1 (or JP2) and adjust TR5 (or TR14) until IC2 pin 2 (or IC7 pin 2) measures $V_{be(op)}$.
6. Measure Pin1 (or Pin2) and verify the voltage is $V_{be(op)}$. Note the chip has to heat to this operating temperature so you have to wait and incrementally adjust to meet this value.

   The chip operating temperature is now set to 55°C.

I had to increase R6 and R68 from 91K to 100K to be able to calibrate to 1.2V/Oct. The 1.2V calibration is through the second CV input and attenuator, and potentiometers will have some variation as to their minimum resistance. I set linearity to center, then calibrated at 1.2V for a full octave, then set the CV to 3.6V and adjusted the linearity for a full 3 octaves. Checking at 1.2V and 2.4V the frequencies were correct. Then I set the Frequency to CW, Fine to center, and adjusted the initial trimmer for 5 Hz.

back