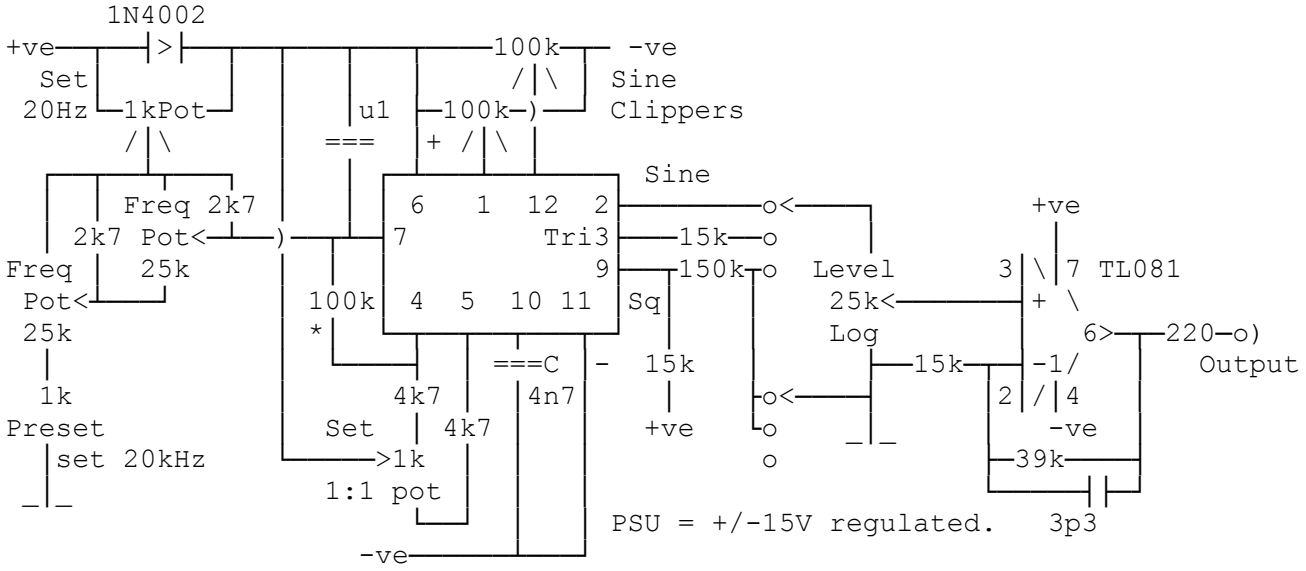
AF Waveform Generator (RS)

By G8MNY (Updated Apr 17)

(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

These devices are usually based around the ICL 8038CC or ICL 8038BC waveform generator ICs. If a frequency ratio of 1000:1 for 20Hz to 20kHz on 1 scale are used (max possible!), there can be problems with set square 1:1 ratio at the LF end. I found a simple bodge was very effective at solving this.



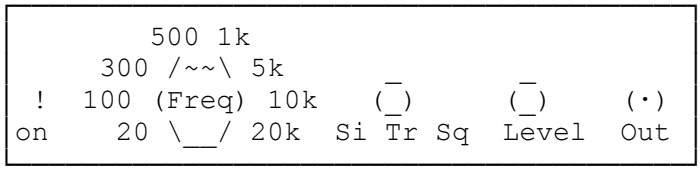
I put in 100k (* select on test for your circuit) from the frequency pot slider to pin 4 "set square". This keeps the square wave ratio very close to 1:1 over the 1000:1 frequency range, which is needed to keep the sine wave even harmonic distortion low. My circuit was on a modifed R.S. PCB.

INSIDE THE IC

The ramp currents into the cap on pin 10 are controlled by the voltage on pin 7 with up & down currents balanced by the set square current inputs on pin 4 & 5. The ramp voltage on the capacitor is buffered to become the triangle output. The charge up down level threshold toggle becomes the square wave output. The sine wave output uses triangle wave & 2 clippers, thresholds set on pin 1 & 12 to produce it.

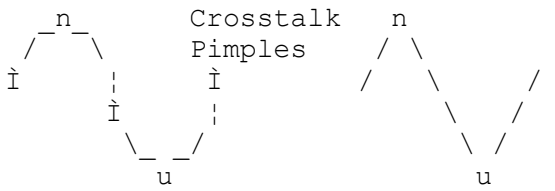
FREQUENCY SCALE

I changed the linear frequency scale (that was a decade scale) to a log scale over the 3 decades. This is done by using a ganged 25k linear pot, instead of the single 10k lin, a good near square law scale results & with 2k7 loads on each, makes a pseudo log scale resulting 700 Hz in the middle & a usable LF end. This is better than using a log pot as the are not very log actually!

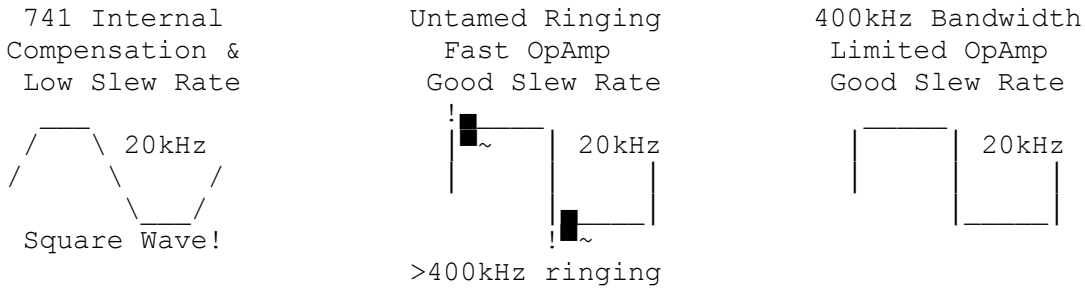


N.B. the 20Hz LF frequency setting preset is very critical & temperature sensitive as the offset of few 100mV above the +ve rail used by the IC with the +ve rail diode is used.

PIMPLES
Another problem I fixed was the pulse on top of the Sine & Triangle waveforms due to crosstalk from the large square wave edge. I used an earthing contact on a spare mode switch to short out this signal (after 150k) then the problem goes away. In the circuit all the waveforms are about the same peak level with the level pot at max.



SLEW RATES
Here the buffer OpAmp is a fast slew rate one, not the original 741. The 3.3pF on the NFB arm is another select on test, for perfect non ringing 20kHz square wave at 7V RMS (20V P-P).



SINE DISTORTION
These Waveform ICs are not the lowest of distortion, but figures as low as 0.5% (-46dB) can be achieved at 1kHz & 7V RMS, sometimes with the more stable BC IC, but for the whole 20Hz - 20kHz only about 2% (-34dB) is possable. But with some care is needed to achieve this with the 2 sine clipper preset pots & the frequency sensitive 1:1 set square pot.

The main advantage of these oscillators is their level flatness, typically ±0.01dB (1%) & no bounce of the Wien Bridge types. Also as they are DC controlled & can be used for sweeping tests locked to a scope/chart recorder etc.

Also see my bul on "Simple 1kHz AF test osc" for details on waveform structure.

Why don't U send an interesting bul?

73 de John G8MNY @ GB7CIP