

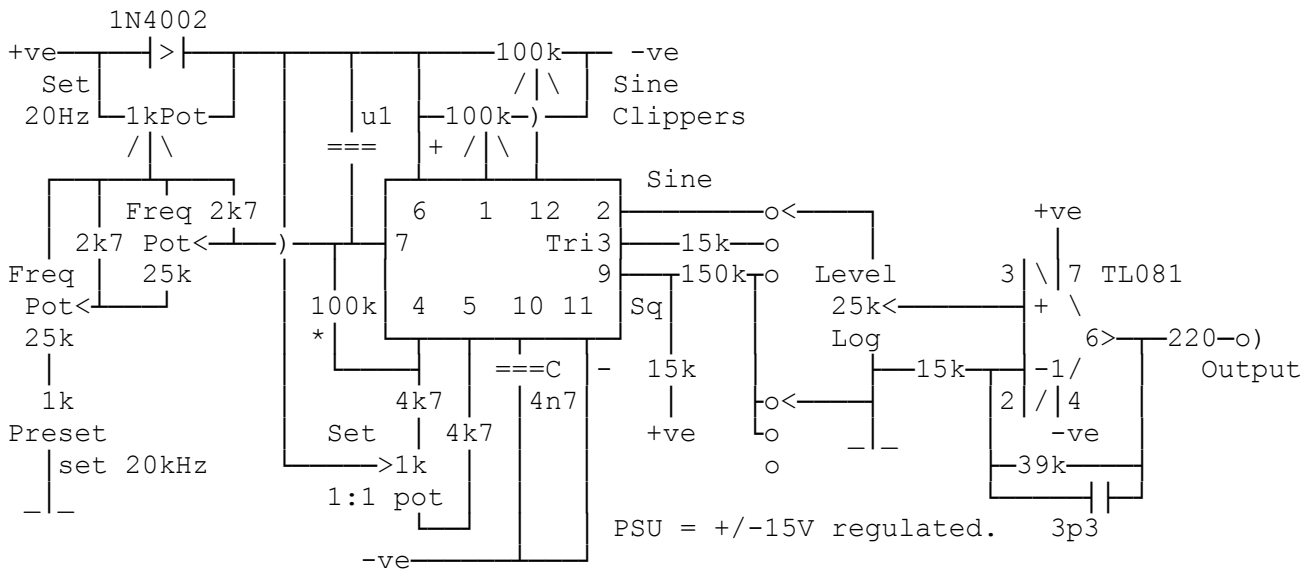
AF Waveform Generator (RS)

By G8MNY

(Updated Oct 08)

(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 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. This is a modified 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 capacitor is buffered to become the triangle output. The charge up down level threshold toggle becomes the square wave output. The triangle is also soft clipped with the 2 clippers, thresholds set on pin 1 & 12 to produce the sine wave.

FREQUENCY SCALE

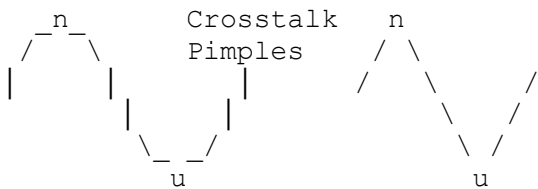
Another bodge is to change the linear frequency scale (that a decade scaled system would give) to a log scale over the 3 decades. This is done by using a ganged 25k linear pot, instead of the single 10k lin, a good near square law scale results & with 2k7 loads on each, makes a pseudo log scale resulting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

	500	1k					
	300	/	~	\	5k		
!	100	(Freq)	10k	()	()	()	()
on	20	\	/	20k	Si	Tr	Sq
					Level		Out

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

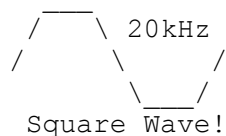
Another problem I fixed was the pulse on top of the Sine & Triangle waveforms due to the large square wave edge crosstalk. By using earthing contact on spare mode switch to short out this signal (after 150k) the problem goes away. In this circuit all the waveforms are about the same peak level with the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



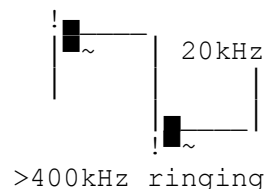
SLEW RATES

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).

741 Internal Compensation & Low Slew Rate



Untamed Ringing Fast OpAmp Good Slew Rate



400kHz Bandwidth Limited OpAmp Good Slew Rate



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, & the whole 20Hz - 20kHz only about 2% (-34dB). But 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 the like 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