THE LYNNE 555

Ken Ruiz G4SGF/ZB2M

Introduction

The Logarithmic Yes-and-No NE555 audio oscillator is a simple yet effective piece of test gear which will not break the bank to build - about £6 with careful buying including a slow motion drive - and can be put together in a few hours or so. Logarithmic Yes-and-No because Yes, the ranges do have a logarithmic relationship to each other but No, not a logarithmic progression within the range. It will come as no surprise that the NE555 is central to this item. My wife's name is Lynne - now there's a coincidence!

An acceptable audio oscillator can be made from a single 555 in astable mode but at the price of stability. The 555 is a whole order of magnitude more stable in the monostable mode, but it won't oscillate. However two 555s in monostable mode can trigger each other to provide a more than stable enough oscillator adequate for the majority of applications. The component count is doubled as is the cost, but twice hardly anything doesn't amount to a great deal.

The oscillator provides two outputs, always 180 degrees out of phase with each other, and when DC coupled can be used to test logic circuits. The lowest frequency on mine with the componenet values given is 0.15Hz - one cycle per six seconds, three seconds high and three seconds low. The highest frequency is 130kHz.

The output waveform is square, with harmonics heard well into the HF spectrum - I lose them beyond 30MHz.

CIRCUIT

The timing components here are the sum of R1 and VR1a (R2 and VR1b) and the capacitors chosen by S4. If VR1a=VR1b, R1-R2, C5=C11 through to C10=C16, then the output frequency is given by f=0.45/RC. If the values of C are arranged to rise by a factor of ten each time, the scale on the dial can be used for all ranges, just a multiplier needs to be taken into account. If VR1 is ten times R1, we get a slight overlap between ranges. The output frequencies are always slightly lower than calculated in this circuit, presumably because of the propagation delays involved with triggering each other.

Rs5+6 serve for short circuit protection at the output. Ss2+3, by including (or not) Cs3+4 at the output serve to AC or DC couple the oscillator outputs to the circuit under test.

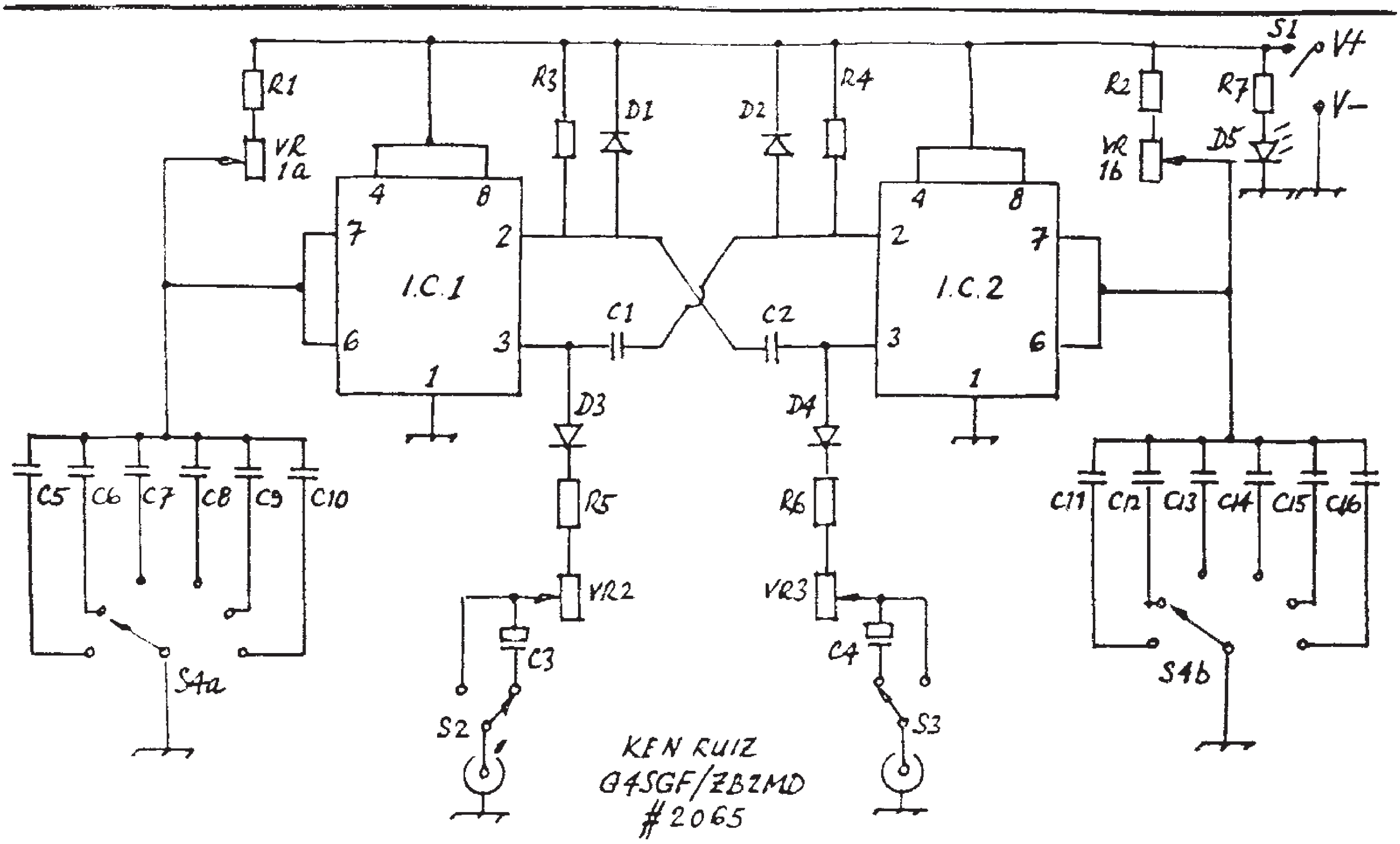
The maximum frequency that can be had from 555s in this set up is about 100kHz. Expect the reproducability of the scale-suggested frequency to fall off around here, and nothing much higher an any case.

The use of close tolerance components in the frequency-determining positions will enhance the accuracy of the scale across all ranges, but don't pay for something you neither need nor want!

I set my oscillator out on a piece of veroboard, the circuit itself contained on a strip 1" x 2", and included a DC input socket to save on batteries.

SETUP

There isn't any. All that is needed is to calibrate the dial. I used a 10:1 reduction drive with dial I'd rescued from a very old broken down receiver I salvaged for hardware. I've seen similar drives on sale at rallies for £2.50. Then again, for most purposes there's no need for a calibrated output.



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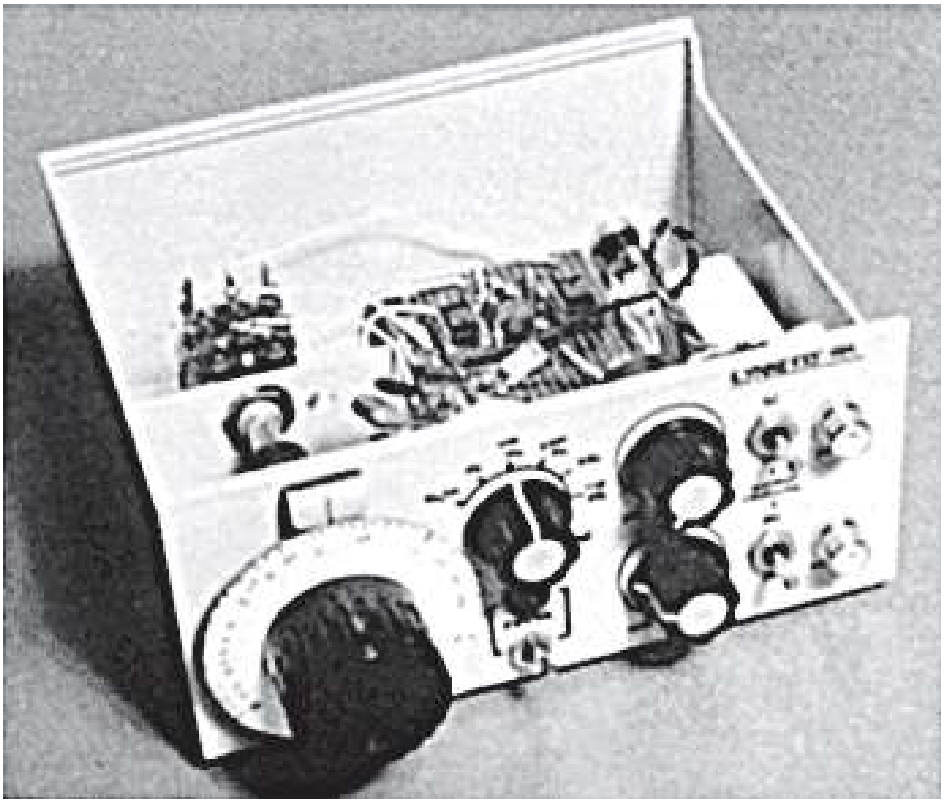

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COMPONENTS

R1,2	100K
R3,4	4K7
R5,6	100R
R7	390R
VR1	1M dual linear
VR2,3	470R linear
C1,2	10n
C3,4	100u 16V elec
C5,11	2.2u
C6,12	220n
C7,13	22n
C8,14	2.2n
C9,15	220p
C10,16	22p
D1,2,3,4	1N4148
D5	LED
IC1,2	555
S1	SPST
S2,3	SPDT
S4	2P6W

Box feet, mounting hardware, PP3 clip, DC input socket, phone sockets, knobs