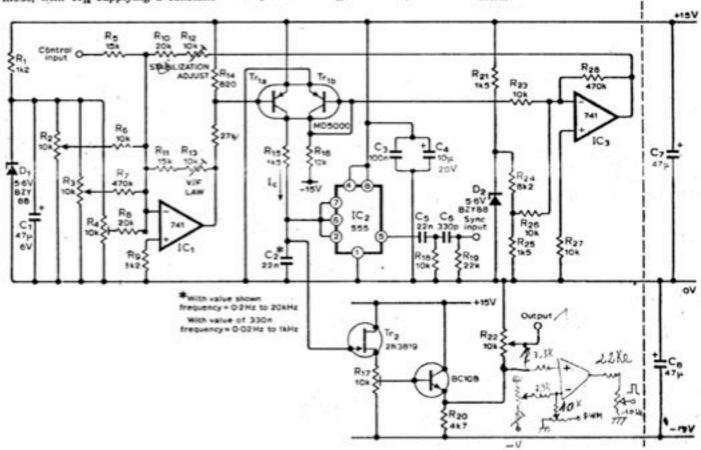
## Voltage controlled oscillator

This exponential law voltage-controlled oscillator, which produces a linear ramp output waveform, is based on a circuit idea by J. L. Bride, Wireless World June, 1976. This design is perhaps more suitable for use in sound synthesizers because it has high frequency stability and a provision for synchronization to another oscillator.

The 555 timer is used in the astable mode, with Tr<sub>1\*</sub> supplying a constant current to  $C_2$ . If the temperature rises, the  $V_{be}$  of  $Tr_{1a}$  and  $Tr_{1b}$  falls at a rate of about 2mV per deg C. The fall in  $V_{be}$  of  $Tr_{1a}$  is fed back via  $IC_3$  to  $IC_1$  and causes the applied  $V_{be}$  of  $Tr_{1a}$  to fall which keeps  $I_C$  constant. Preset  $R_{12}$  adjusts the amount of feedback, and hence the temperature stability. The circuit exhibits a maximum instability of  $\pm 0.1\%$  to  $\pm 0.2\%$  over a 24 hour period. Both  $R_{12}$  and  $R_{13}$  should be multi-turn components.

A synchronizing square wave signal may be fed in at R<sub>10</sub> with an amplitude of 5 to 10V pk. This signal is differentiated and the resulting spikes control the threshold voltage of the 555. Resistor R<sub>4</sub> sets the minimum frequency, R<sub>22</sub> sets the average output level to zero volts and R<sub>2</sub>, R<sub>3</sub> provide coarse and fine frequency controls respectively. Equivalents for the MD500 are a BFX11 or BFX36. If either of these are used, R<sub>25</sub> should be reduced to compensate for the lower V<sub>50</sub>.

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Wireless World, October 1977