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_{1a} 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 ±0.1% to ±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_{19} 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_4 sets the minimum frequency, R_{22} sets the average output level to zero volts, and R_2, R_3 provide coarse and fine frequency controls respectively. Equivalents for the MD500 are a BFX11 or BFX36. If either of these are used, R_{25} should be reduced to compensate for the lower V_{be}.

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