

# Circuit & Design Ideas

Interesting circuit ideas from readers and technical literature. While this material has been checked as far as possible for feasibility, the circuits have not been built and tested by us. As a consequence, we cannot accept responsibility, enter into correspondence or provide constructional details.

## Wide range low distortion sweep oscillator

While integrated circuit voltage-controlled oscillators can be readily made to sweep over a wide frequency range, they are not much use at frequencies of 1MHz and above. For these higher frequencies discrete semi-conductors must be used but it is usually difficult to obtain a design which will operate over a very wide frequency range with low overall harmonic distortion.

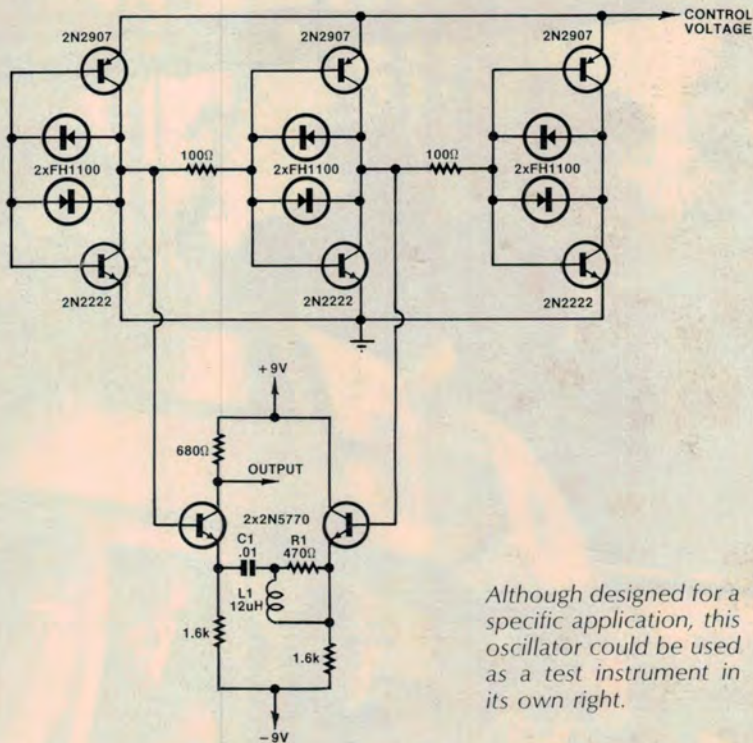
This triple inverter design meets those criteria. It will operate over the range from 300kHz to 70MHz with a control voltage of 0.5 to 2.5 volts while maintaining harmonic distortion at less than 3%.

The circuit uses three inverters, each using complementary transistors to obtain symmetrical rise and fall times and with diode clamps between base and emitters to prevent each stage from saturating and so minimise odd harmonics.

The frequency of oscillation is controlled by varying the collector current of each inverter stage and, as might be expected, the higher the control voltage, the higher the frequency of oscillation.

At the same time, the output signal amplitude does vary, as a consequence of the varying control voltage. The signal amplitude is 0.5V peak-to-peak at 3MHz, 0.7V at 10MHz and 0.8V at 15MHz.

Complementary outputs are taken from successive inverter stages and fed to a differential amplifier ( $2 \times 2N5770$ ).



*Although designed for a specific application, this oscillator could be used as a test instrument in its own right.*

This effectively cancels the third harmonics which happen to be out of phase in successive stages. The generation of fifth harmonics is limited by the bandwidth of each stage while any tendency to parasitic oscillation is prevented by the 100Ω stopper resistors. The overall result is a clean sine wave.

The differential amplifier could also be used to compensate for the increased

output amplitude at higher frequencies.

In its original application, the circuit was used in a proximity electronic access system for control and identification of personnel. The sweep oscillator was used to drive a sensing coil to search for resonances in a credit card key, in the range 3 to 30MHz.

From "Electronics" December 15, 1981.

## PCB pattern suggestion

The printed board pattern shown here is suggested as a standard arrangement when setting out boards which incorporate power supply rectifiers. It is a universal arrangement which suits either a two-diode, centre tapped transformer arrangement, or a bridge rectifier in either encapsulated form or made from individual diodes.

By adopting this universal layout experimenters and home constructors can often save money by using whatever type of transformer happens to be available in the junk box.

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