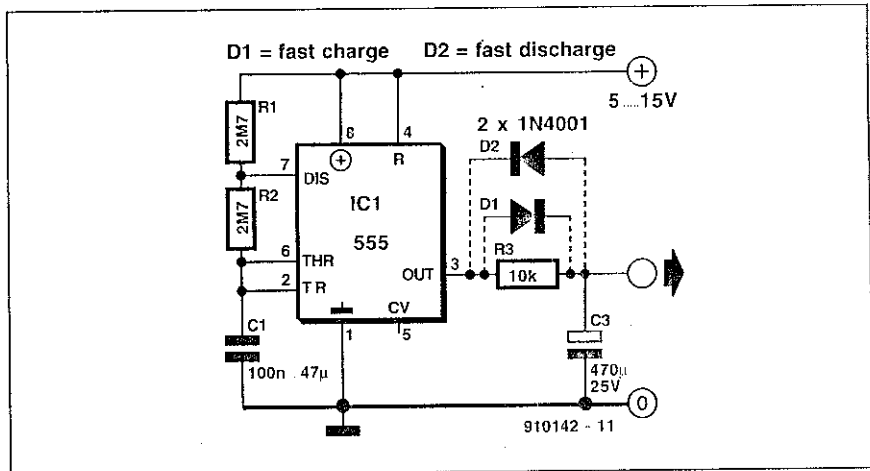


A 555-BASED RAMP GENERATOR

by R.G. Evans

WHILST developing a simple scanning receiver, a need occurred for a ramp generator to provide a varying voltage to apply to the varicap diodes fitted to the variable frequency oscillator (VCO). Referring to various literature suggested that a unijunction transistor (UJT) could be used to produce a reasonable 'sawtooth' waveform that would do the job. The circuit found provided a ramp upwards from about $\frac{1}{2}V_{cc}$ only and in this case did not provide a sufficient range of voltage (and, therefore, scan) on the receiver. Since all the UJT circuit was doing was allowing a capacitor to charge/discharge (and was, therefore, not linear anyway), thoughts turned to other methods, hopefully cheaper and more flexible.

The ubiquitous 555 integrated circuit was chosen and put to work in a circuit based on an early application note (1976!). This circuit provided a linear charge/time graph, but allowed an output voltage swing between $\frac{1}{3}V_{cc}$ and $\frac{2}{3}V_{cc}$ only. Once again this proved insufficient for the required scan range. Thinking of ways to extend this led to the design shown in Fig. 1. The 555 is connected as an astable with a mark/space ratio of 2:1 (unfortunately 1:1 can not be achieved without additional external components). The frequency of operation can be selected by the



user, but in this instance is about 0.1 Hz.

The output on pin 3 is capable of sourcing or sinking 200 mA, and switches nearly to the supply rails under no-load conditions. This alternating high and low voltage is used to charge and discharge a relatively large electrolytic capacitor via a 10-kΩ resistor. The result is a conversion of the rectangular output wave of the 555 into a waveform described by an e^{-t} function. By careful choice of the resistor and capacitor values, voltage

swings almost between the supply rails can be obtained.

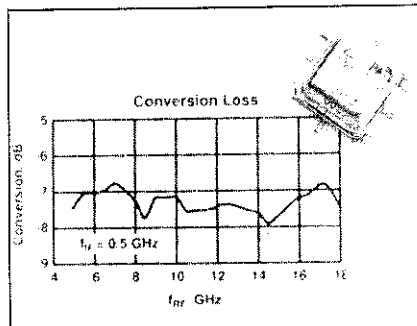
The 555-based circuit was found to provide the required voltage for the varicaps in the scanner. All this for less than the price of a suitable unijunction transistor. I hope many of you will find a use for this handy little circuit. It certainly solved my problems with the scanning receiver.

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