

# Ideas for Experimenters

These pages are intended primarily as a source of ideas. As far as reasonably possible all material has been checked for feasibility, component availability etc, but the circuits have not necessarily been built and tested in our laboratory. Because of the nature of the information in this section we cannot enter into any correspondence about any of the circuits, nor can we produce constructional details.

## VLF ramp generator

It is always satisfying to exploit the otherwise unwanted property of a device — the reverse bias current of a leaky germanium diode, in this circuit from **G. Malloy of Whitby, UK**.

The reverse saturation current is typically a few microamps for the OA90 and is relatively constant over 2-10 V. This constant current is used to linearly charge the capacitor in the relaxation oscillator built around the 741.

When the diode becomes forward biased the capacitor is rapidly discharged by the limited output current of the op-amp. Frequencies below 0.01 Hz are possible, though measures may have to be taken to improve the linearity of the ramp.

PR1 allows some degree of dc offset of the ramp, and the source follower (Q1) reduces the loading on the capacitor, which tends to degrade the ramp's linearity. For the same reason tantalum or RBLL electros (i.e: low leakage) types should be used for large values of C1. Linearity can be further improved by the use of a FET input op-amp such as the 3140.

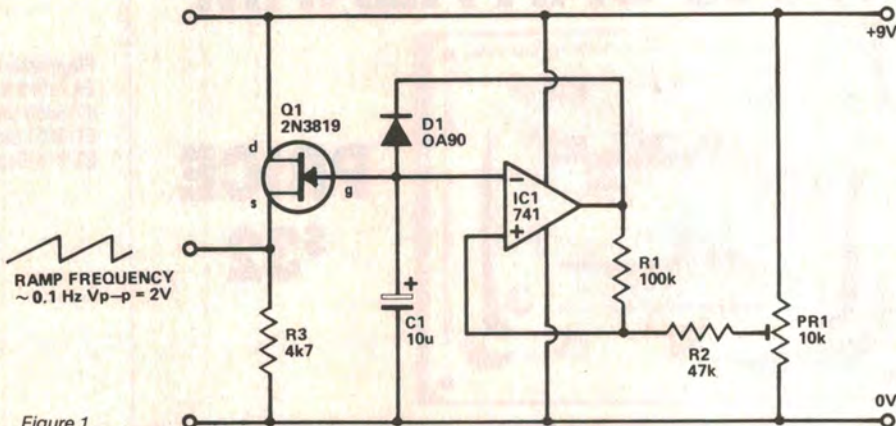


Figure 1.

The frequency can be made variable by using the FET constant current generator shown in Figure 2, which should replace the diode, D1. With RV1 at 100k the current will be about 30  $\mu$ A and roughly inversely proportional to RV1. This constant current generator needs a voltage of about 3 V to function well. This may require an increased power supply. However, the resulting linearity is excellent, especially with the suggested FET input op-amp.

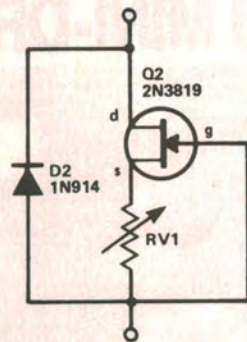


Figure 2.