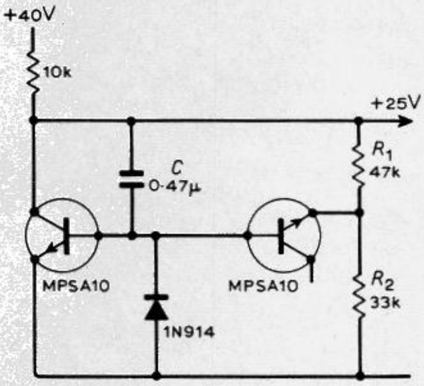
Circuit Ideas

Active zener with slow run up

The active zener circuit ('High-performance Low-cost "Active Zener" Regulators', Joachim Preis, Oct, 1969) can be combined with the slow run up circuit of P. Lacey (*Circuit Ideas* May 1971) with one transistor doing both functions.



The active zener can operate with very low current, provided that R_1 and R_2 are large and the load current is low. This makes it possible to use a low, non-electrolytic capacitor as the timing capacitor C.

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Low distortion f.m. demodulator

A t.t.l. one-shot monostable may be used as a high-linearity f.m. demodulator by connecting it in the circuit shown. Due to the constant width of the output pulse the duty cycle, and hence the voltage at the output of the integrator network R_1C_1, are directly proportional to the i.f. Capacitor C_2 is chosen to give a pulse width of 47ns, (the period of one half-cycle at 10.7MHz), this value giving optimum linearity, and as the i.c. includes a Schmitt trigger on the input the circuit need not be driven from a limiter. A demodulator of this type produces high-level noise output in the absence of a proper signal due to random triggering of the one-shot by noise and thus a mute circuit is mandatory. Muting is achieved here by feeding the inhibit terminals of the Schmitt trigger from the collector of the half-wave rectifier stage Tr_1. R_1 and C_1 also serve as de-emphasis components and therefore the load impedance should be kept as large as possible in order to avoid degradation of the frequency response. Harmonic distortion at ± 75kHz deviation is less than 0.5%.

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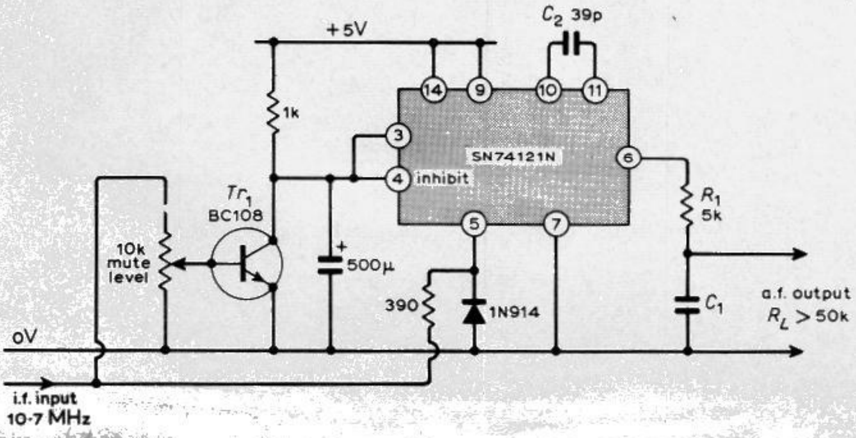

Zero marking of a.c. waveforms

It was found that in certain conditions the current of a simple experimental d.c. motor could be negative for part of a revolution. It was easy to show this using a c.r.o. which had a d.c. amplifier — if a double-beam c.r.o. is available, one trace can be used to indicate zero level. However, when conditions for negative current were being investigated, it was more convenient to mark the waveform of armature current to show the points at which it passed through zero. This could be done by using two diodes as shown in Fig. 1. Current through R_1, a low-value resistor, develops a voltage proportional to the armature current. Because of the voltage drop across a conducting diode, the relation between the voltage applied to Y_1 and that applied to Y_2 is as shown in Fig. 2. If the voltage under examination becomes very large in relation to the voltage drop across a conducting diode, the 'flats' tend to disappear. If the voltage is less, at positive or negative maxima,

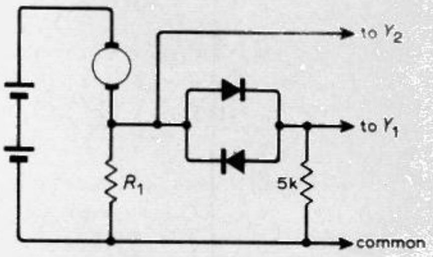

Fig. 1.

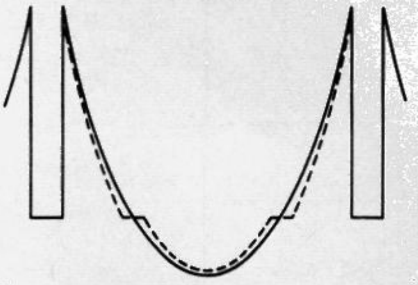

Fig. 2.

than the forward diode voltage drop, the output is zero for the respective period. It should be possible to choose R_1 so that it lies between the two limits corresponding to these conditions.

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Constant-current battery charger

The circuit consists of a rectified and smoothed d.c. supply of about 20V, which is applied in series with a constant-current regulator to the battery. The current is derived from switched resistors, R_1 to R_5, held at a constant voltage by the zener diode and transistors Tr_1 and Tr_2 which form a Darlington pair. Germanium power transistors such as OC28, OC35, OC36, 2N1021, or similar types are used.

The unit which is used for charging batteries up to 12V has several advantages over conventional battery chargers in that the output terminals may be accidentally short-circuited without damage to components. Also, an ammeter is not necessary, since the current is determined by the selection of switched resistors,