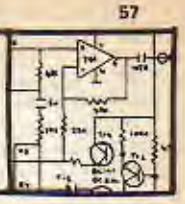
Circuit Ideas



Regulating l.e.d. outputs

Using a simple compensation circuit based on an opto-coupler, the power output of l.e.ds in series can be maintained to within ±5% of the value at 25deg. C over their full operating temperature range. Compensation is required to overcome the negative temperature coefficient of near-infrared l.e.ds which decreases the power output by 0.9% per deg. C increase. Fig. 1 maintains the output power by varying the forward current I_f through the l.e.d. string. The l.e.d. in the opto-coupler is used as a reference device and the collector-base photodiode is used as an output monitor. A CA3140 op-amp regulates I_f by maintaining a steady current through the sensor. In addition, the l.e.d. output power can be controlled by the potentiometer. The supply must provide adequate voltage for the l.e.ds, i.e. 2.4V + 1.4 times the number of l.e.ds in the string. Temperature performance will be improved if the l.e.ds are matched. Resistor R_L limits the current through the string and is determined by calculating the maximum current required and the value of Vcc above the minimum value required.

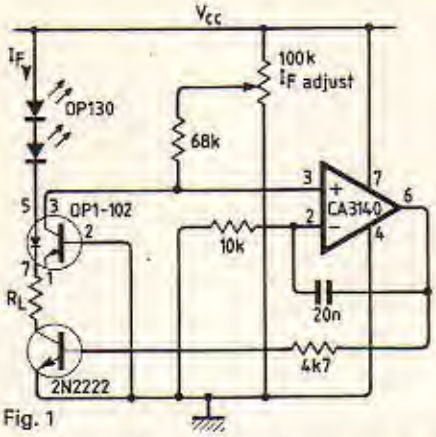


Fig. 1

If, due to a low Vcc, the l.e.ds cannot be used in a single string, several groups can be controlled as shown in Fig. 2. The transistors should be matched to provide equal I_f regulation in each string.

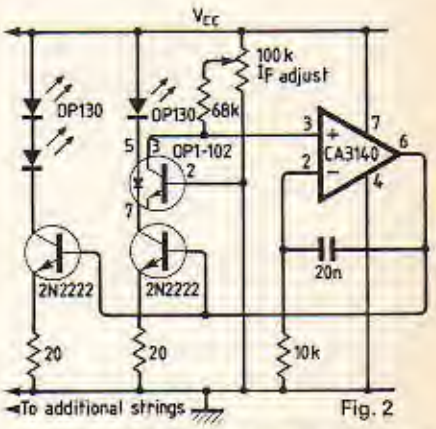


Fig. 2

Norbain Electro-Optics
Reading
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C.m.o.s. to mains interface

Mains control by c.m.o.s. logic can be safely achieved using this isolation circuit. Almost 360° conduction is assured for all a.c. voltages, and higher currents can be switched by using larger triacs.

The 555 oscillator provides a master enable input and can drive extra switching stages as shown.

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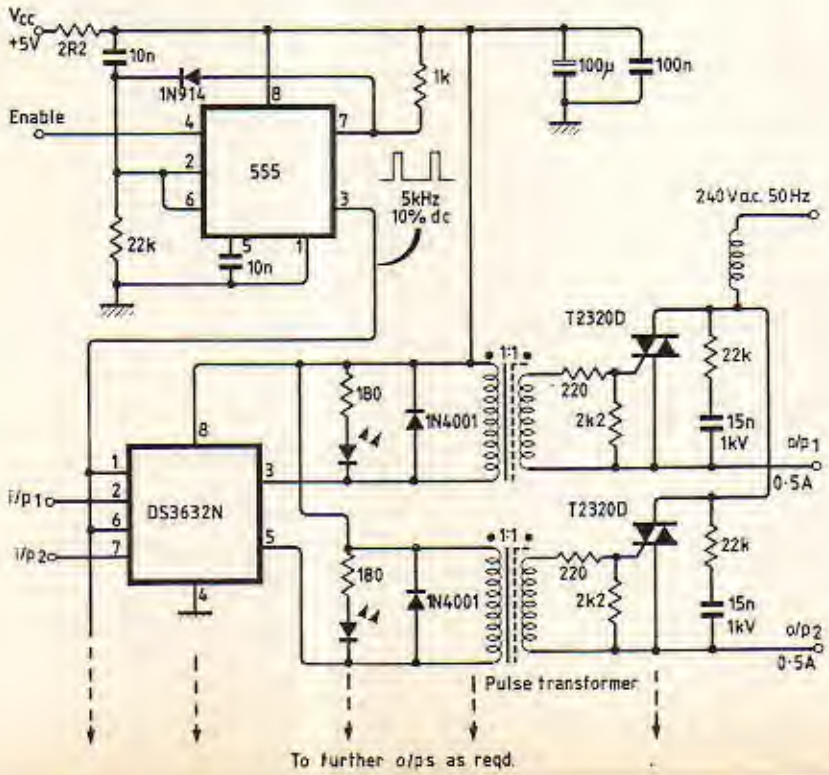

Piezoelectric-crystal driver

Because piezoelectric sounders are most efficient at their reasonant frequency, drive circuits should be adjusted to suit individual crystals. This oscillator drives a crystal and does not need to be adjusted with a pre-set control. The circuit is a non-inverting a.c. amplifier whose gain approaches the open-loop gain of the op-amp, and has positive feedback applied via the piezoelectric device. The ceramic element acts as a stable mechanical vibrator which determines the frequency of oscillation so the circuit automatically oscillates at the sounder's resonant frequency. The circuit shown requires about 3.5mA with a 10V supply.

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