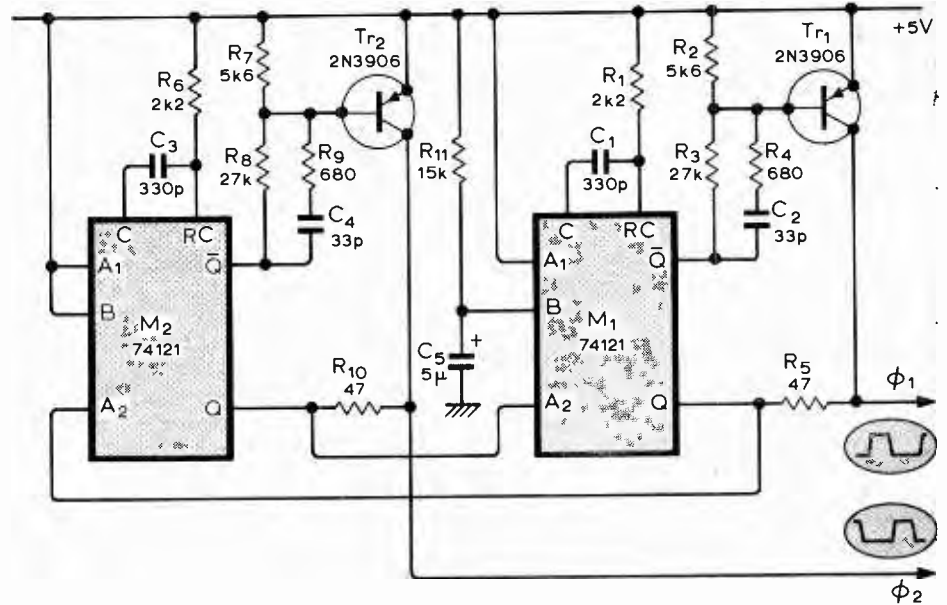


Microprocessor 5V clock generator

Many microprocessors require a clock with a full 0 to 5V swing. Standard c.m.o.s. circuits are unable to provide sufficiently fast rise and fall times and, although t.t.l. has the required speed, the high level needs forcibly pulling up to the 5V rail. The 74121 monostable has a \bar{Q} output which may drive a fast switching transistor, which in turn pulls the Q output up to 5V during a logic 1 as shown. An appropriate threshold for Tr_1 is provided by the potential divider R_2, R_3 . Capacitor C_2 ensures that the transitions are shorter than 50ns, and excessive overshoot or ringing is prevented by the damping resistors R_4 and R_5 . For the M6800 microprocessor, two non-overlapping clock phases are required with a frequency of approximately 1MHz. These waveforms may be obtained by connecting two monostables in a ring. The values shown for the timing components give approximately 500ns pulse lengths. If a single 74123 is used for M_1 and M_2 there



will be no spare A inputs to 5V, but the spare clear inputs must be tied to the supply rail. Also, R_1 and R_6 should be increased to 3k9Ω. The circuit will drive loads of 150pF and keep within Motor-

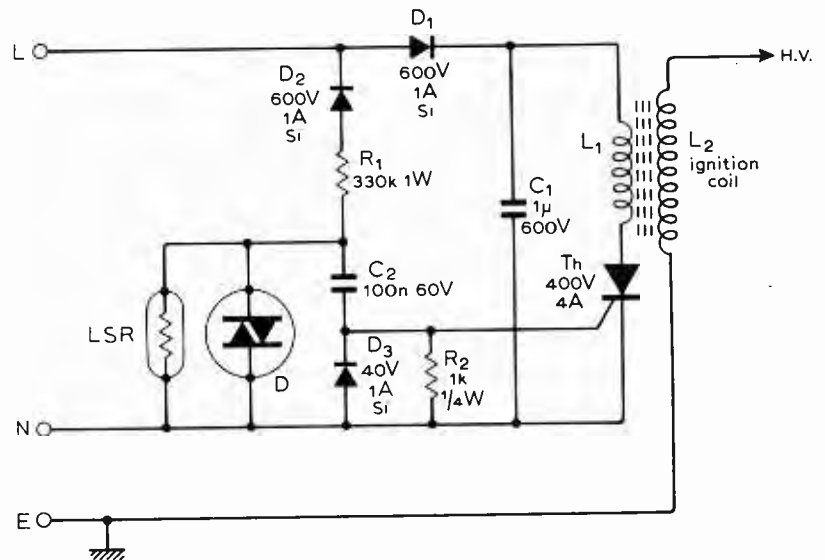
ola's specified requirements for the M6800.
 Tim Perkins,
 MRC Neurological Protheses Unit,
 London S.E.5.

Line charged h.v. pulse circuit

On the positive half cycle of the mains, C_1 charges to peak line voltage through D_1 . On the negative half cycle, C_2 is charged through D_2, D_3 and R_1 , to the peak voltage of diac D . When the diac fires at about 30V, C_2 discharges partially through the gate circuit of the thyristor. The thyristor then turns on and discharges C_1 through the primary of a car ignition coil, which generates a 20kV pulse in L_2 . This sequence repeats 50 times per second.

The light sensitive resistor prevents the circuit firing if illuminated by a light source such as the flame in an oil burner which is ignited by a h.v. spark.

A. Refsum,
 The Queen's University of Belfast.

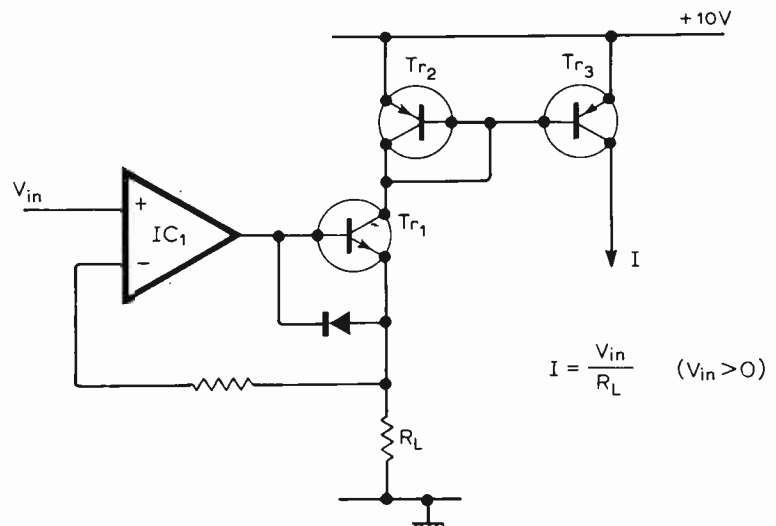


Earth referenced V to I

Circuits often require a voltage controlled current source in which a variable load is connected directly to earth. Most operational amplifier configurations produce either a current source or sink referenced to the supply rail. This circuit produces a voltage controlled current which may be injected to the earth rail via the load.

The operational amplifier and Tr_1 act as a voltage controlled current sink. The balanced tracking of the current mirror Tr_2 and Tr_3 is used to convert this sink current to a source current. The circuit has good thermal stability and a linearity to within 3% for output currents up to 3mA. This circuit also develops the full supply voltage across the load.

B. Wilson & K. Patel,
 University of Technology, Baghdad.



$$I = \frac{V_{in}}{R_L} \quad (V_{in} > 0)$$