INGENUITY UNLIMITED

D.C. MOTOR CONTROLLER

THE circuit in Fig. 1 gives precise control of the speed of a miniature d.c. motor.

Ignoring inductive effects, the d.c. motor equation is:

$$Vm = IaRa + Eb$$

Where the back e.m.f. is exactly proportional to speed.

A dummy resistor (R3) equal to the armature resistance is used to find IaRa. The operational amplifier and TR1 produce an output of 2(IaRa) − Vc.

Therefore the voltage across the motor is:

$$Vm = IaRa - Vc$$

The control voltage is then equal in magnitude to the back e.m.f., and is proportional to motor running speed.

A control range of −0·1 volts up to −5·0 volts gives a typical speed range of 40 to 2,000 r.p.m. independent of supply voltage and load variations.

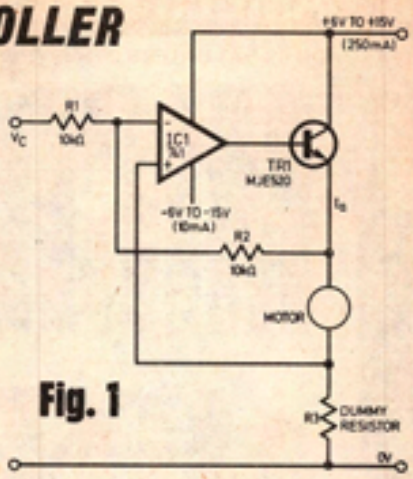

Fig. 1

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INITIAL RESET

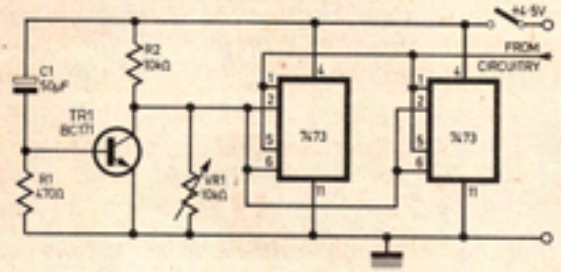

Fig. 1

THIS network operates a self-clear for logic systems when initially switched on, thus inducing a condition which would otherwise be rather improbable, due to the switch-on transient.

Master-slave flip-flops are shown as an example in Fig. 1, where the initial state will occur when all flip-flop outputs are at logical zero. The initial reset network consists of TR1 and its associated discrete components. Resistors R2 and VR1 are arranged as a potential divider, the latter being shunted by non linear load TR1, whose value depends on the voltage developed across R1. Only during the switch-on transient of the supply will C1 produce a voltage across R1, and turn on the reset transistor. The resistor VR1 was chosen to be variable to make the design less critical.

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BISTABLE TOUCH SWITCH

THE circuit of Fig. 1 can be used to control mains equipment and is not prone to spurious triggering from too light a touch or a double touch.

The device works off the induced a.c. mains field which surrounds the human body when in a building containing a.c. mains wiring. When the touch plate is touched, the stray voltage is applied to the gate of TR1, which acts as an impedance buffer. The a.c. voltage on the drain is half-wave rectified by D1 and applied to capacitor C1. The value of C1 is selected so that there is a slight delay between the plate being touched and the bistable changing state, so preventing false triggering.

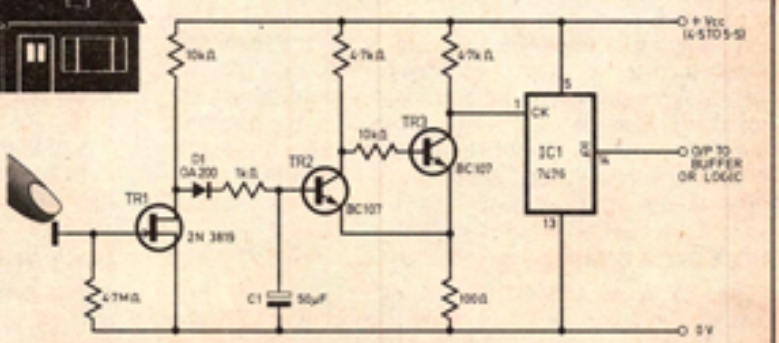

Fig. 1

The voltage across C1 is applied to a Schmitt trigger formed by TR2 and TR3. When the trigger threshold is reached the collector of TR3 will go high, triggering the bistable IC1. Output $\overline{Q}$ at pin 14 of IC1 is fed to a buffer stage driving a suitable relay.

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