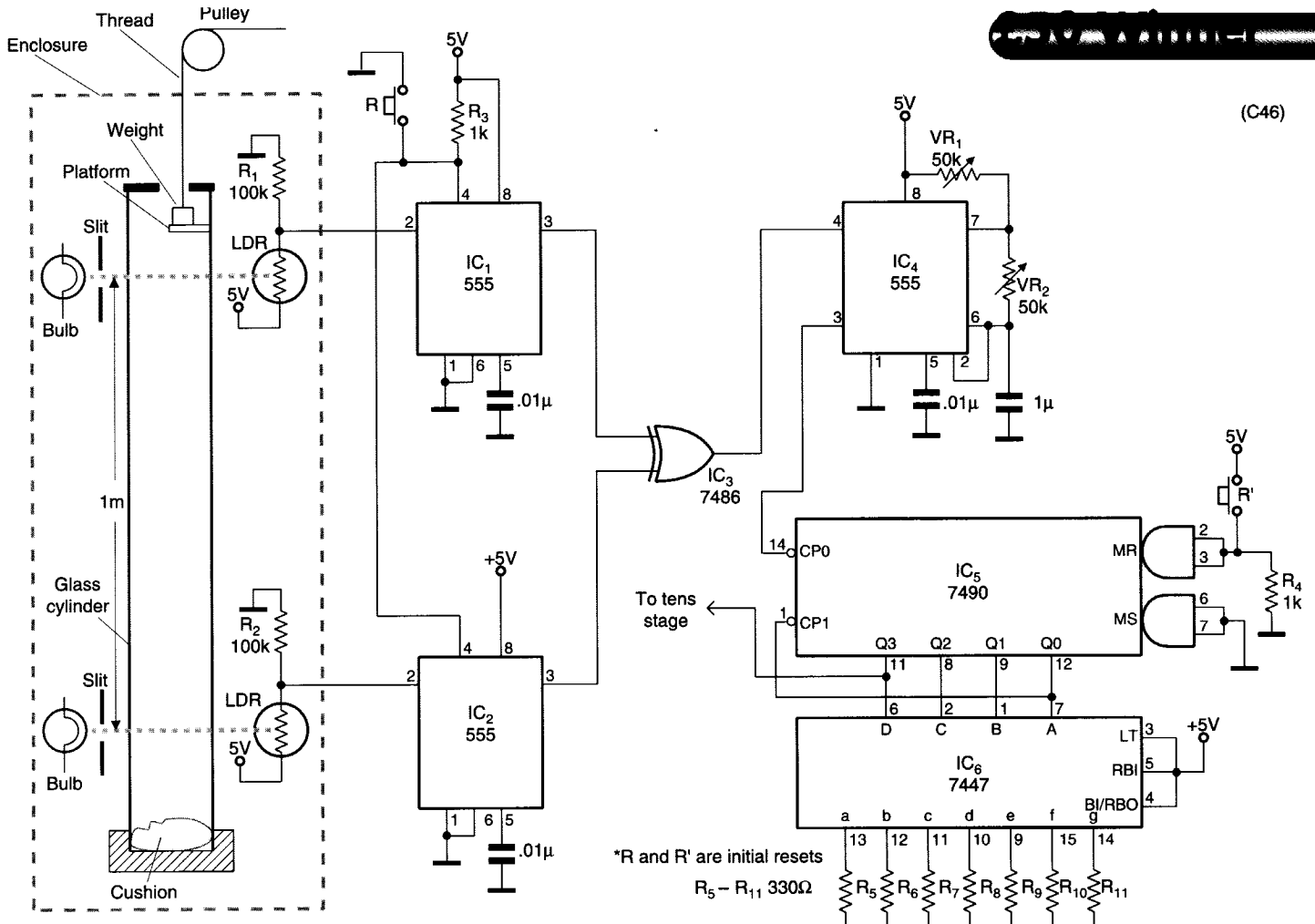
(C46)



Measuring acceleration due to gravity by a falling weight.

Measuring g

This is a method of measuring the g of a falling body. A glass cylinder of just over 1m in height is closed at both ends and provided with a cushion at the bottom. Spaced at a vertical distance of exactly 1m are bulbs, slits and light-dependent resistors. These detect the passing of the falling body, which is initially kept in place by a removable platform and further retained by a thread when the platform is taken out.

Signals from the ldrs trigger bistable flip-flops in the *555* timers. The outputs of these are exclusive-ored to reset an astable flip-flop in the third *555*, IC_4, so that these 50ms pulses are produced during the time the body is falling. The number of pulses produced is counted, passed to a decoder-driver, and displayed.

Distance (s), time of fall (t) and initial velocity, which is zero (u) are now known.

$$s=ut+gt^3/2,$$

$$g=2(s+ut)/t^2$$

Over a 1m fall, the counter displays 9 pulses of 50ms each, so the period is 450ms.

Acceleration due to gravity is therefore 9.877 m/s^2. ■

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Need an extra isolated low-voltage supply?

For one-offs, prototypes and experiments it is often possible to add an extra mains transformer secondary by threading wire round the transformer's outer insulation – but only where the mains transformer isn't being run to its limits.

Better decoupling for through-hole boards

When designing a through-hole prototype board, forget drilling holes for 100nF decoupling capacitors.

Just run the power rail tracks closer to each other on the under side of the board and drop a surface-mount capacitor on. That way you have less drilling to do, capacitance can be added very easily if you find out you need more, and capacitor lead inductance is eliminated. No special tools are needed.

To apply the capacitor, tin the copper where the capacitor is going to sit then wipe a little resin to the tinning. Hold the capacitor in position with a suitable piece of plastic or wood then touch each capacitor electrode with a hot, cleaned, tinned and fluxed iron. Bigger, cheaper SM capacitors are best here. **Tips like this could earn you between £10 and £50 – Ed.**