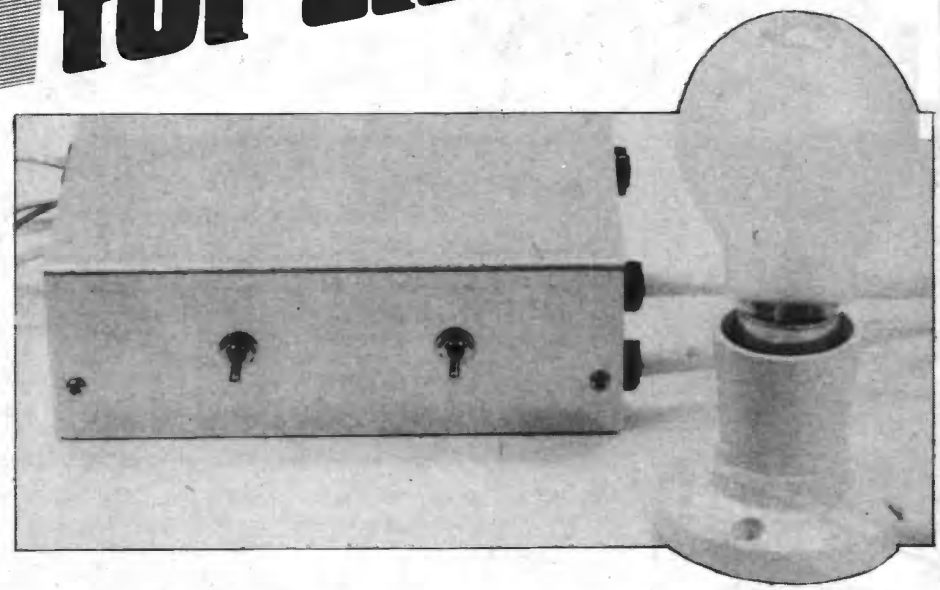
★ Attracts attention with or without noise
★ Uses existing doorbell components
★ Simple to instal

Doorbell for the Deaf

by Garfield Dean



For the hard of hearing or the deaf a doorbell is obviously useless. This circuit is an attempt to increase the chance of getting the attention of a deaf person by flashing a light or lights on and off several times in the deaf person's room(s). Also the bell can be made to ring several times for the benefit of anyone who is only hard of hearing and also for the person who pushed the bell switch.

Circuit Description

Figure 1 shows a typical doorbell system. Figure 2 shows the circuit for the doorbell for the deaf which uses all of the existing hardware. There are two 7555 timers, the first of which is in monostable mode with a period of about 2-20 seconds determined by RV1, R2 & C2. When the push switch is pressed, the output of IC1 goes high for 10 seconds and this enables IC2 to work in a stable mode (i.e. oscillate) at a rate of once every two seconds set by C3, R3, R4 & RV2. IC2 turns the relays on and off which in turn switches the bell and lights on and off about 5 or 6 times. A 5A fuse is included in the lighting circuit for safety. S2 disengages the bell relay if, for example, children are sleeping. S1 disengages the light relay if it is necessary that the lights don't flash, e.g. for a photograph. also this allows normal doorbell operation simply by turning S1 off and setting RV1 to give one ring per push. D1 prevents large back EMFs from the relays destroying the rest of the circuit.

Note that the 7555 timer has been used instead of the 555 timer, because of the long time constants involved and for the lower power consumption in standby mode (useful if the circuit is battery operated).

The P.S.U. is the easiest part of the circuit but may need the most careful looking at, depending on the existing doorbell. If you have no doorbell at present or if your doorbell power supply is not suitable (see below) then the circuit for the power supply in figure 3 will work. BR1 rectifies the 8V A.C. and this is then smoothed by C1. IC3, C4 & C5 provide extra smoothing and voltage dropping if required. D2, if fitted, prevents wrong connection by a D.C. supply. With the Maplin transformer the regulator is not used and a wire link is used in the position marked for D2 (Figure 4b).

A suitable supply is:

a) D.C. 9-15V — In this case BR1, C1 and the optional regulator should not be fitted. D2 should be fitted as in figure 4b. Also links should be fitted in place of BR1 as shown in figure 4c. (Note that batteries will run down every 6 months or so, and therefore a transformer may be a better long term solution).

b) A.C. 8-12V — From a Bell Transformer (as this is built for the job). The power supply is built as if using the Maplin transformer; but make sure that

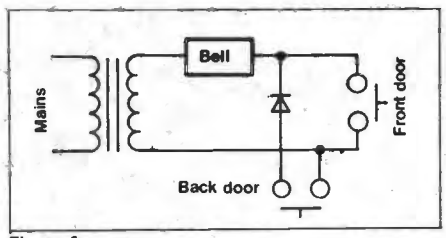


Figure 1

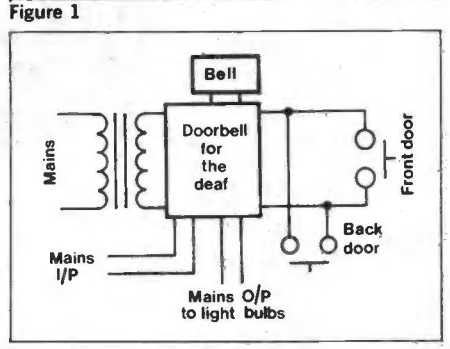


Figure 1a

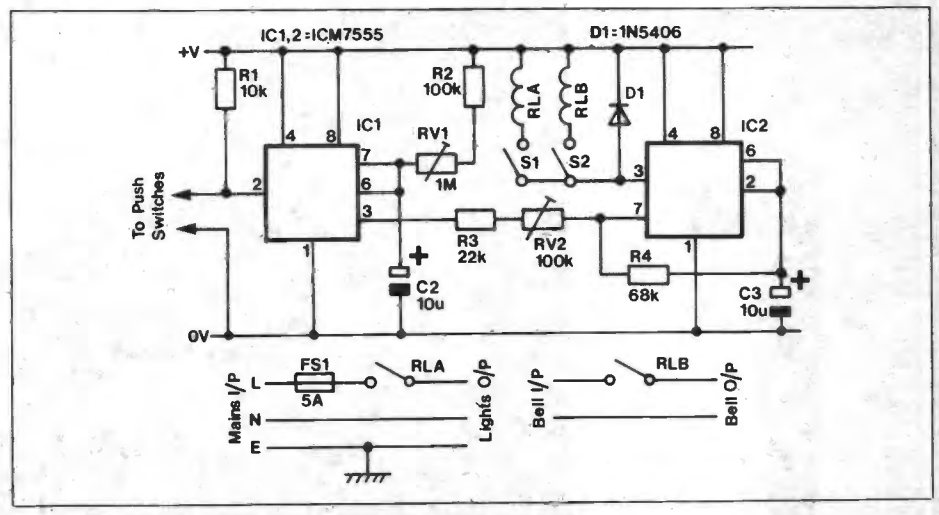


Figure 2. Circuit diagram.

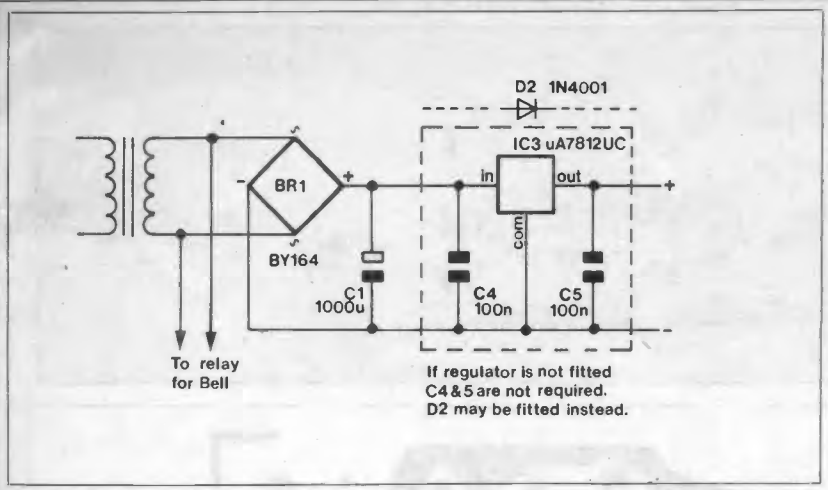


Figure 3. Power supply.

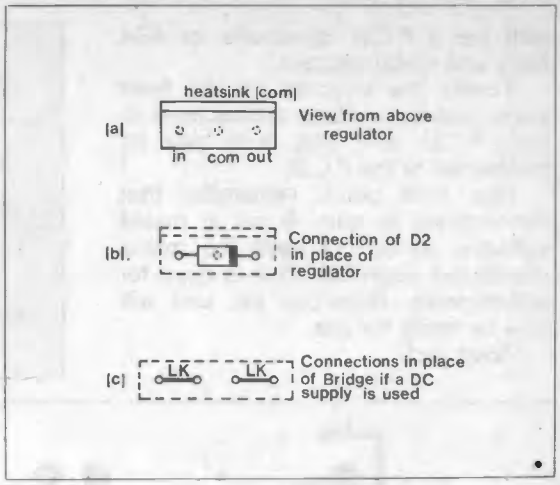


Figure 4.

the connections to the bell (via relay B) come from the pair of transformer windings that the bell was originally connected to.

c) A.C. 12-20V — From a Bell Transformer. The power supply is built as for the Maplin transformer but uses the optional regulator section. Also connections to the bell (via relay B) should come from the pair of transformer tappings that the bell was originally connected to.

Constructional Details

The P.C.B. should be built up as in figure 6 by soldering in components in order of increasing height, inserting veropins into the low voltage output holes. Remember that you will only need to use some of the components listed for your type of power supply.

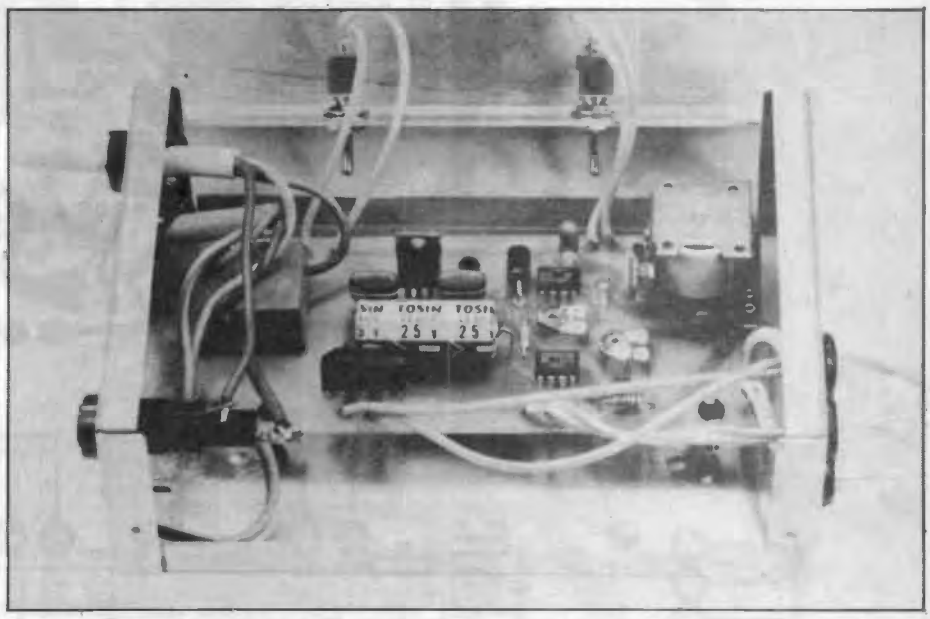
Check the P.C.B. after completion, especially for solder blobs, dry joints and correct polarity of devices; an electrolytic capacitor connected the wrong way round makes a nasty mess when it blows up. The unit is now ready for testing. Temporarily short across each of the two sets of contacts going to the switches S1 and S2.

Put RV1 and RV2 in their mid-positions and temporarily connect the input to the P.S.U. Give a trial push of the doorbell by shorting the two veropins for the bell push together. Both relays should click on and off several times. RV1 adjusts the total length of time the doorbell operates for after a bell push. RV2 adjusts the length of time between individual flashes of the lights (should these need frequent alteration then potentiometers can be used).

If the unit does not work there are 3 main things to check:

1) Is the voltage across IC1 pins 1 and 8 between 9 and 16V? If not then the power supply is at fault.
2) If the output of IC1 does not go high for 2-20 seconds when the bell is pushed, then IC1 or an associated component are at fault.
3) If the output of IC2 does not oscillate between positive and negative supply when IC1 output goes high, then IC2 or an associated component is at fault.

The P.C.B. will now be ready to be fitted into a case. For a functional unit an AB13 case can be used, but for a more attractive finished product a type 215 Verocase should look better. A suggested set of drilling details for an AB 13 case are shown in figure 5.



When drilling is complete, fit grommets and the fuse holder where marked and insert the mains wires coming from outside the unit.

Solder these wires directly to the P.C.B., along with an extra earth lead, connected to a solder tag which should be attached to the case with a 4BA bolt and shakeproof washer.

Then fix the P.C.B. down to the case

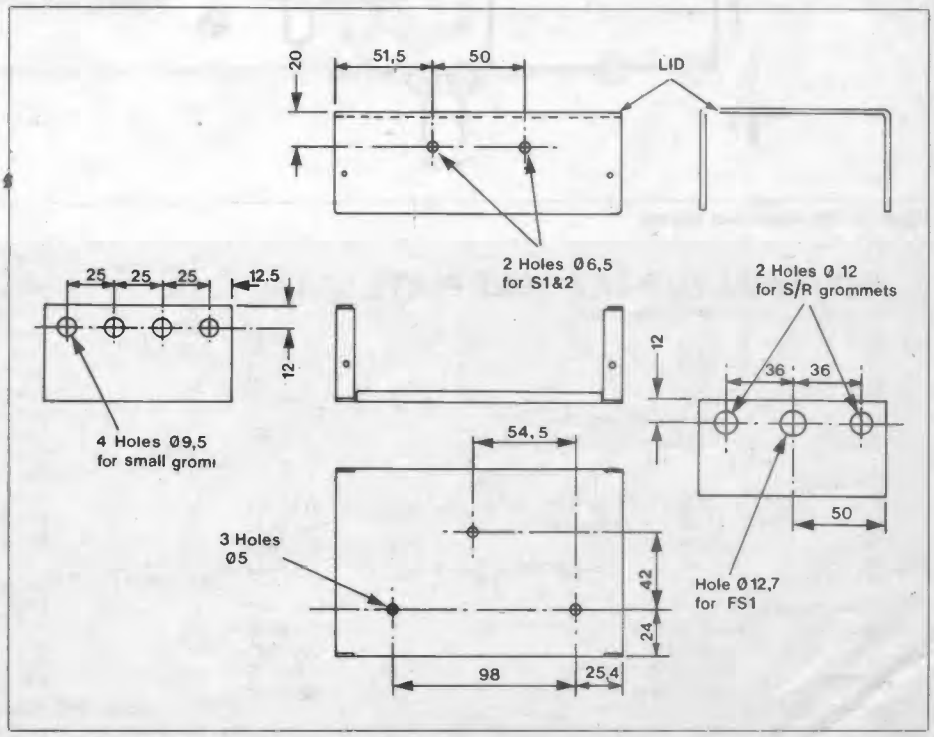


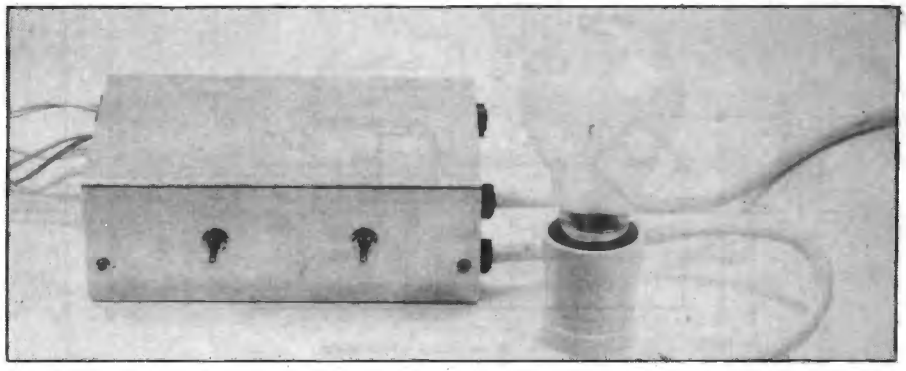
Figure 5. Drilling instructions.

with the 3 P.C.B. stand-offs, or 4BA bolts and metal spacers.

Finally the switches on the front panel and low voltage connections to bell, P.S.U. and bell push can be connected to the P.C.B.

One final point: remember that connections to relay A are at mains voltages, so do not have the mains connected when the case is open for adjustments. Hopefully the unit will now be ready for use.

Good luck!



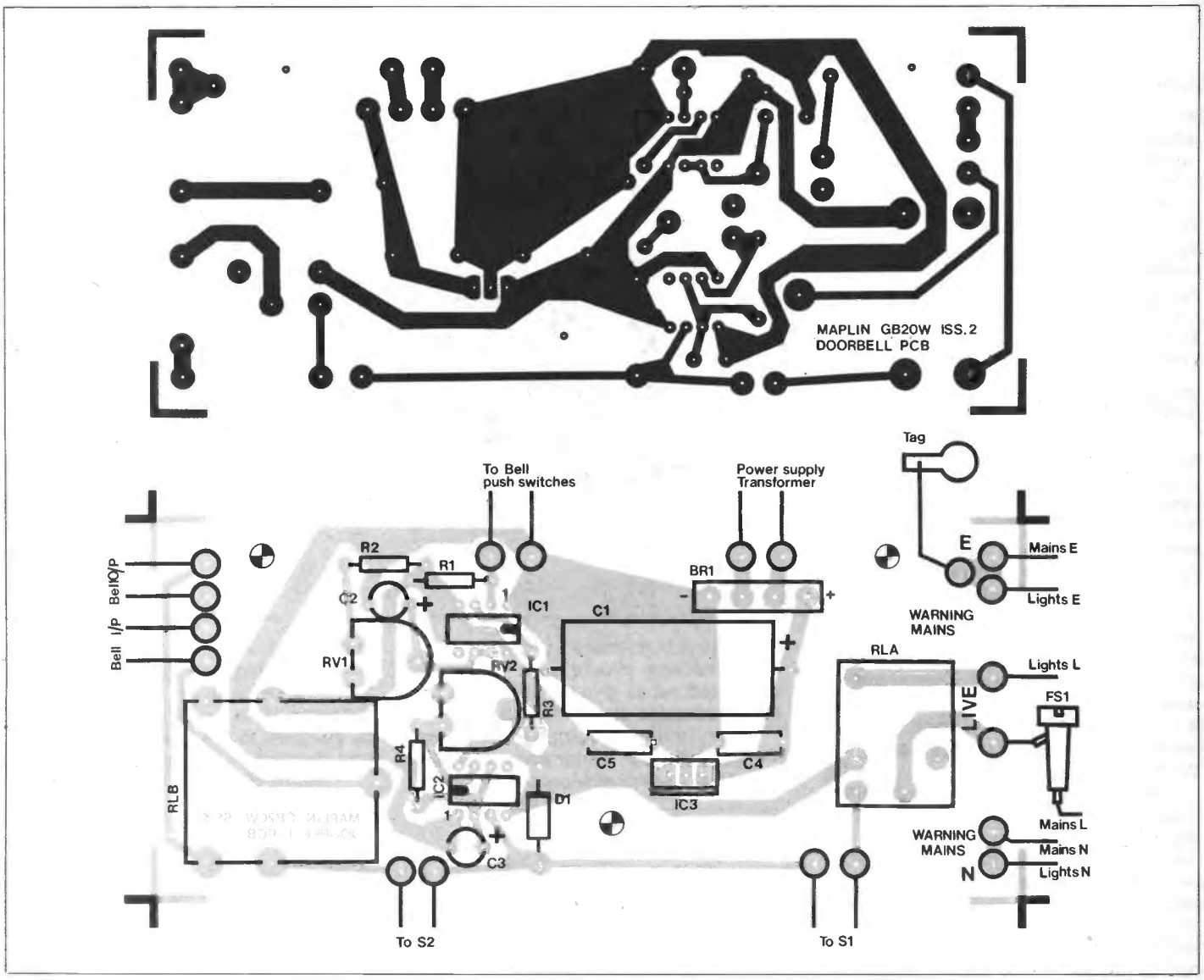


Figure 6. PCB layout and overlay.

DOORBELL FOR THE DEAF PARTS LIST

Resistors — All 0.4W 1% Metal Film			
R1	10k		(M10K)
R2	100K		(M100K)
R3	22k		(M22K)
R4	68k		(M68K)
RV1	1M Hor-sub min Preset		(WR64U)
RV2	100K Hor-sub min Preset		(WR61R)
Capacitors			
C1	1000uF 25V Axial Electrolytic		(FB83E)
C3	10uF 25V Tantalum		(WW69A)
*C4,5	100nF Polyester	2 off	(BX76H)
C2	22uF 16V PC Electrolytic		(FF06G)
Semiconductors			
D1	1N5406		(QL85G)
*D2	1N4001		(QL73Q)
IC1,2	ICM7555	2 off	(YH63T)
*IC3	uA7812UC		(QL32K)

Miscellaneous			
S1,2	Sub-min Toggle A	2 off	(FH00A)
RLA	10A Mains Relay		(YX97F)
RLB	Open Relay 6V		(FX23A)
FS1	Fuse 5A 20mm		(WR07H)
	Safefuseholder 20		(RX96E)
	Grommet small	4 off	(FW59P)
	SR Grommet 6W-1	2 off	(LR49D)
	Stand-off Short	3 off	(FW16S)
*BR1	BY164		(QF43W)
	Doorbell PCB		(GB20W)
	Case AB13		(LF14Q)
	Mains Cable	As reqd	(XR03D)
	Veropin 2141	1 pkt	(FL21X)

If there is no existing doorbell, suitable components are:—

Bell	(FL38R)
Bell Transformer	(FL37S)
Bell Push	(FQ08J)
Bell Push + Nameplate	(FQ09K)
Wire to bell push	(XR39N)

Note components marked * may or may not be used, see text.