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40p

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SINGLE CHIP COMPANDER

LED PENDANT

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LED PENDANT

FIND YOUR PARTNER IN THE DARK WITH THIS ATTRACTIVE FLASHER

WANTING TO IMPRESS upon one's women folk that electronics is not a boring useless occupation, has inspired many an electronic engineer to build egg-timers and liquid overflow indicators, etc, for their loved ones.

However, these sort of devices, appreciated though they may be, cannot be exhibited at parties and pubs where they achieve maximum admiration (sought after not only by females) so the obvious solution is electronic jewellery.

Before LEDs

Before LEDs became commonly available it was possible to build illuminated jewellery using miniature catheter bulbs. But the current drain still involved the inelegant strapping-on of bulky power supplies and the concealment of switches.

Nowadays by using LEDs and CMOS 'chips' it is possible to build a piece of self-contained jewellery that doesn't even need an on/off switch.

The LED pendant

The LED pendant, as can be seen from the cover photograph, is sufficiently small to be worn comfortably around the neck or it could be made into a badge.

The operation is as follows. Upon touching the contact plates the seven-segment LED flashes between two initials for about eight seconds and then switches off again

The pendant is not limited to those letters that the seven segment display can handle because there is nothing to stop the reader from hard-wiring LEDs into a dot pattern to produce Ms and Ks etc.

The prototype was designed to flash the initials BJ.

Mechanical construction

This project, although the circuit is not very complicated, will separate the skilful from the hamfisted As can be seen the pendant measures approximately 1½in in diameter, yet only standand components were employed.

Because one of the design aims was to keep the width to a minimum a PCB could not be used. Therefore the components were hard wired, and we do mean *hard* wired

To begin with, the front panel was cut from 16 SWG aluminium with a window for the seven-segment display and two holes below, with sufficient clearance for the heads of 8 BA cheesehead screws, filed smooth, the red perspex window and the 8 BA screws were fixed in to the front panel using epoxy resin Then the front was sanded down and polished The epoxy insulating the contacts from the aluminium and also providing mechanical anchorage

The prototype was designed with the initials BJ in mind, which was very convenient as the segments b, c, d and e remain on for the monostable period and segments a, f and g flash at 1 Hertz to complete the letter B (Fig. 1 a, b)

To illustrate the technique involved in obtaining different combinations of letters, a further circuit (Fig 1 c) was designed to accommodate the letters A, L. This requires a further transistor Q3 and resistors R9 and R10 to give an inverse function This circuit will be described in detail

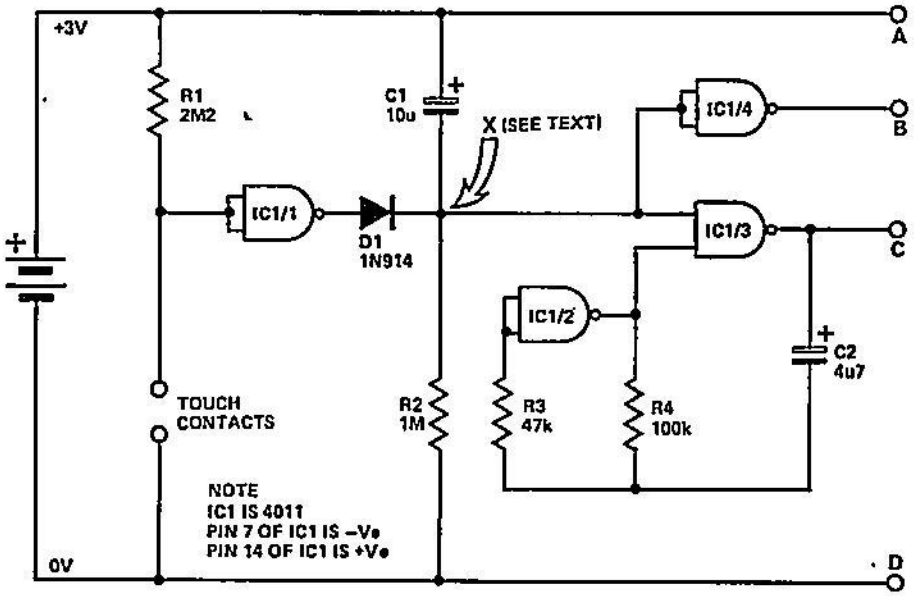
Under quiescent conditions no measurable current is drawn. When the touch plates are joined by a finger, inverter 1 discharges C1, thus point X goes high for about 8 seconds, as C1 charges down Then, via inverter 4, Q1 turns on and lights LED segments e and f. These remain on for the monostable period.

The output from the astable (gates 2 and 3) is initially low after the beginning of the monostable period, so that Q2 is switched on. This lights segments a, b, g and c, but Q3 is switched off via Q2, so that segment d is off Thus the letter A is formed

When the astable changes over Q2 is switched off, turning Q3 on, and lighting segment d Thus with segments e and f on, the letter L is lit up

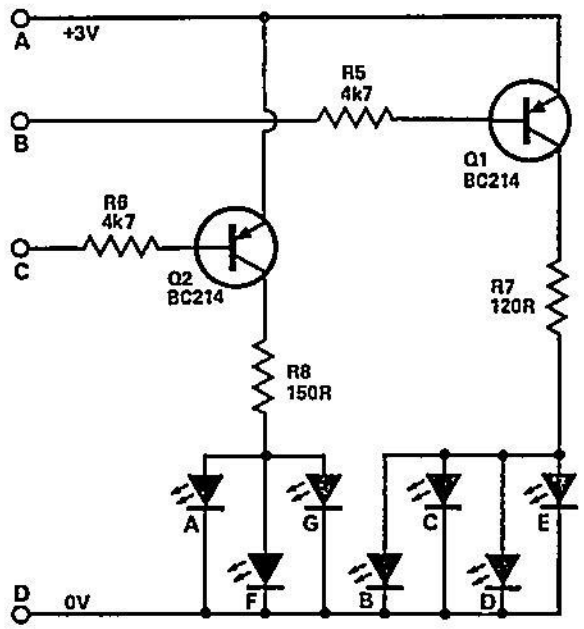
Resistors 7, 8, 11 and 12 are chosen so that all segments have the same current and thus the same intensity In this case about 2mA per segment forms a compromose between battery drain and visibility.

The batteries are mallory MS76H 1 5 volt cells and in the prototype a life of two months was typical, with approx two minutes usage a day.

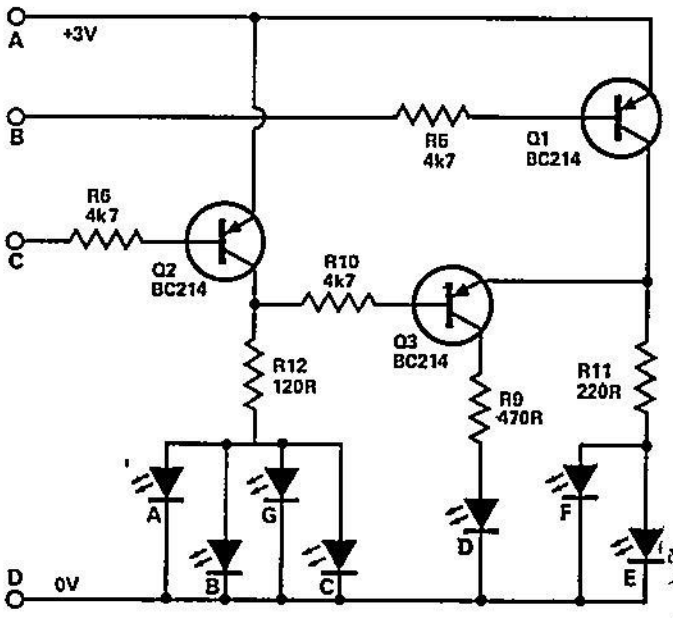


1a

Fig 1a is the monostable and astable multivibrator which is the basic circuit Fig 1b and 1c show alternative circuits for BJ and AL respectively



1b



1c

PARTS LIST

RESISTORS all ⅛W 5% or smaller

R1	2M2
R2	1M
R3	47k
R4	100k
R5,6	4k7
R7	120R
R8	150R

CAPACITORS

C1	10u 6V3 tantalum
C2	4u7 16V tantalum

SEMICONDUCTORS

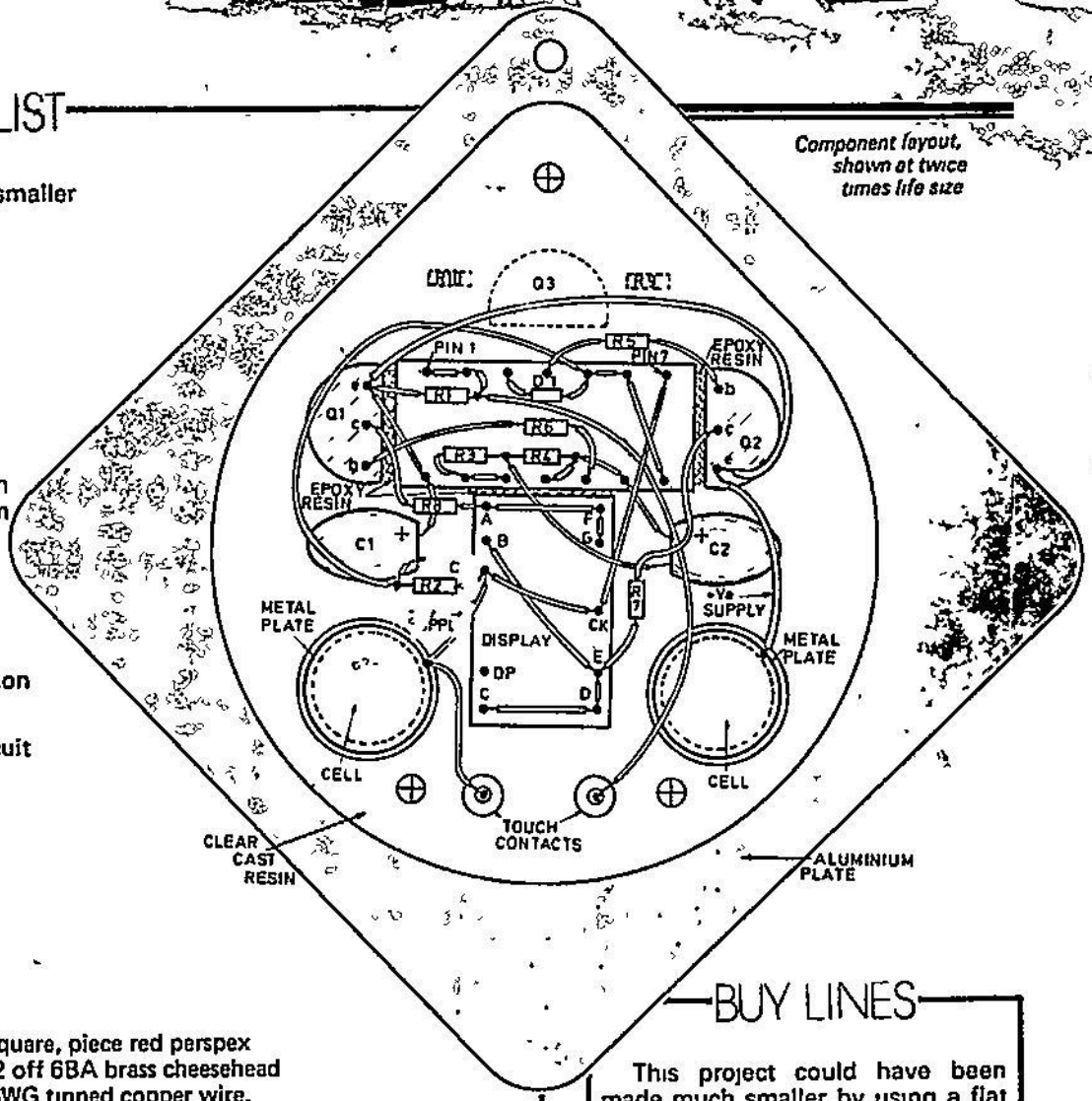
IC1	4011
D1	1N914
Q1,2	BC214
DISPLAY	7-segment common cathode type

additional components for circuit shown in fig 1C

R9	470R
R10	4k7
R11	220R
R12	120R
Q3	BC214

MISCELLANEOUS

Piece aluminium 16 SWG 2" square, piece red perspex 7/8ths" X ½". Epoxy resin, 2 off 6BA brass cheesehead bolts. 20 SWG tin plate. 30 SWG tinned copper wire. PTFE sleeving 2 off mallory MS76M.



Component layout, shown at twice times life size

BUY LINES

This project could have been made much smaller by using a flat pack version of the 4011 and miniature hearing aid type transistors, and 1/20th watt resistors. This would reduce the size to almost the display and battery dimensions But by using commonly available components a respectable size has been achieved

Twentieth watt resistors are available from Electrovalue and the display from Maplin The Mallory MS76H cells are available from chemists or photographic shops

Electronic construction

The front facia finished, the electronics can be mounted with super glue or epoxy resin having centralised the display over the window

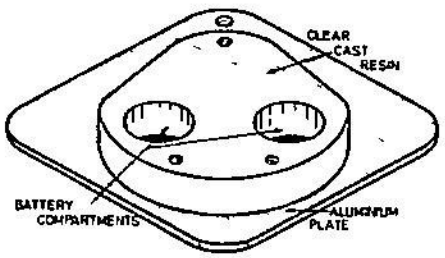
Great care must be taken in positioning the components when wiring to prevent shorts Thirty-two SWG tinned coppper wire and PTFE sleeving to suit, was used to hard wire the circuit, as in the wiring diagram Small pieces of tin plate were stuck down with double sided sticky pads for the battery contacts

The sticky pads serve a dual purpose They insulate the contacts from the front panel and also provide the tension to ensure good electrical contact

Finishing it off

When all the wiring is complete the battery compartments need to be constructed. Make up two tubes of the same external diameter as the batteries, out of cellophane and position them on the facia over the battery contacts, then pour quick set epoxy or clear cast around the tubes When the epoxy has set remove the tubes and you have two battery compartments

Make up another cellophane tube about 1½in in diameter Place this around the finished electronics and battery compartments and pour more clear cast over to cover everything to the depth of the battery compartments When this has set, a thin sheet of aluminium can be screwed down with countersunk self-tappers (This sheet forms the common connection for the two cells)



LED Pendant as seen from rear after potting. note battery compartments

Presentation

Having built the device, and given it to your loved one, all that remains is for you to reap your just rewards, preferably in dimly lit surroundings where the pulsating red glow will produce the desired effect