followed strictly, the alarm will start ringing and alert everyone nearby. The alarm will continue until the stop switch S1 is pressed. And the lock will not open even if the right sequence is followed immediately thereafter This will definitely scare away any thief.

The circuit is built with four SN7400 NAND gate ICs. These TTL ICs are cheap and easily available in the market

The truth table is also shown. By using K-map, we get the logic function

$$F = A.B(C+\overline{D}) + \overline{B}.\overline{C}.\overline{D}$$

Here it is evident that there are five combinations of inputs for which output becomes '1'. That means for these combinations, the alarm will not ring.

The four SN7400 ICs may be soldered on a veroboard and connected as shown in the circuit diagram. Four input cords with jack pin on one side are needed. The jack pins should be of different colours. Switches S1a, S2a, S3a, S4a and S1b, S2b, S3b, S4b are ganged respectively. Switches S1b, S2b, S3b, S4b are in series with relay RL1 which opens the lock Different identification numbers (or letters) may be put on all the switches

The output is available at pin 3 of IC3. The SL100 transistor activates the relay as soon as it gets an input at its base. The flip-flop built by NAND gates N12 and N13, once activated, remains in the same state. Hence T1 and RL2 also remain active until switch S1 is pressed. The alarm will continue to ring and relay RL1 remains disconnected from the mains.

The power supply circuit is also shown in circuit diagram. A 230V/12V, 500mA power supply transformer and IC 7805 voltage regulator have been used to get a steady 5V DC supply. When activated, the alarm gets connected to 230V mains. Total cost of the unit is around Rs 85.

NILANJAN BHOWMIK

Automatic Brightness Control for Seven-Segment Digital Displays

Here is a circuit which exercises automatic brightness control on LED displays of digital clocks, and for that matter on

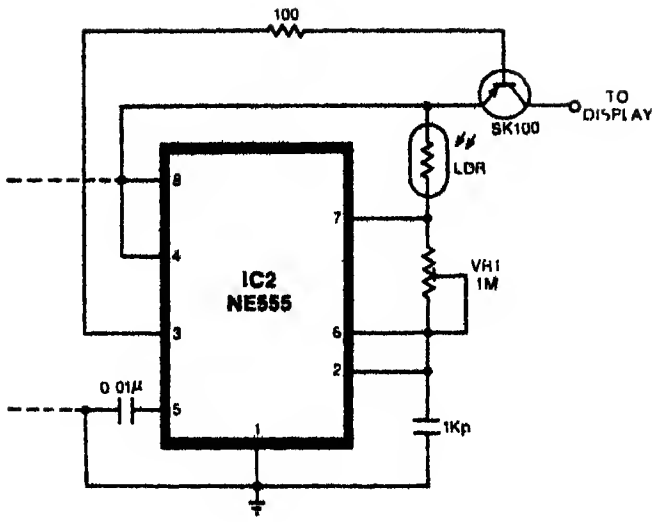


Fig. 2:

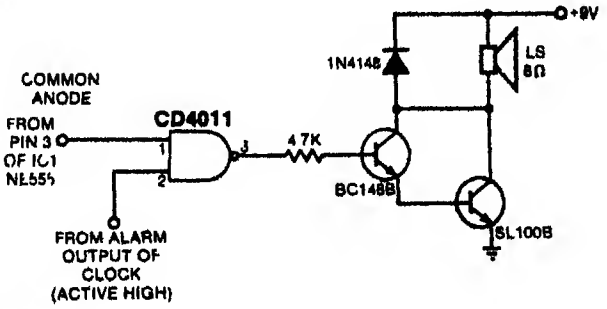


Fig. 3:

any seven-segment display unit depending on the ambient lighting conditions.

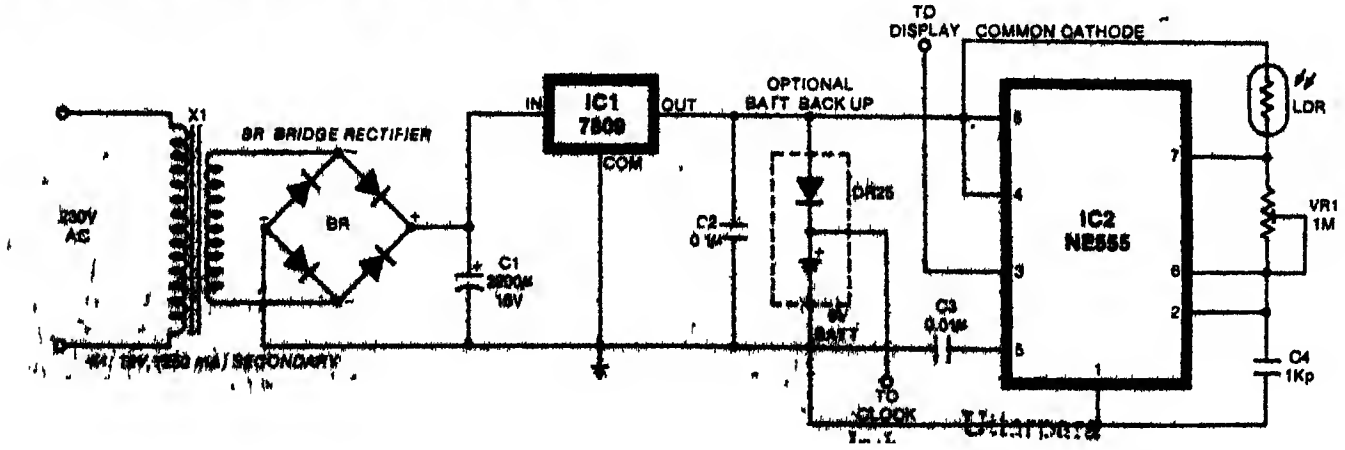
The basic principle underlying this circuit is the 'on-off control' method of regulating the voltage and hence the brightness. The relationship portraying this is given by:

$$V_{OUT} = V_{IN}\frac{T_{on}}{T_{on}+T_{off}} = VD$$

where V_{OUT}—average/DC output voltage

V_{IN} –input voltage

D --duty-cycle



T_{on} –time when $V_{OUT}=V_{IN}$

T_{off} time when $V_{OUT}=0$.

As seen from the equation above, one can control the average DC voltage and hence brightness by varying the duty cycle

To implement this idea, IC 555 as chopper and an LDR to sense the ambient light are used

The circuit in Fig 1 is for common cathode displays and that in Fig. 2 for common anode displays VR1 is trimmed for optimum display brightness under normal ambient lighting conditions

Besides brightness control, this circuit provides regulated output voltage over a wide range of input voltages

The main advantage of this unit over the conventional one is the reduction in mean display current and power dissipation in the series-pass elements of regulating units as the voltage is bucked from a fairly high voltage to the required display voltage

The circuits shown above are capable of delivering currents upto 200 mA However, this capability may be increased using higher current handling transistors in place of the existing ones

Fig 3 is an extension of the circuit It is a current driver coupled to a speaker to produce an audible clarion note when the alarm set time is executed

P. JAYAVARDHANA KRISHNAN