Circuit & Design Ideas

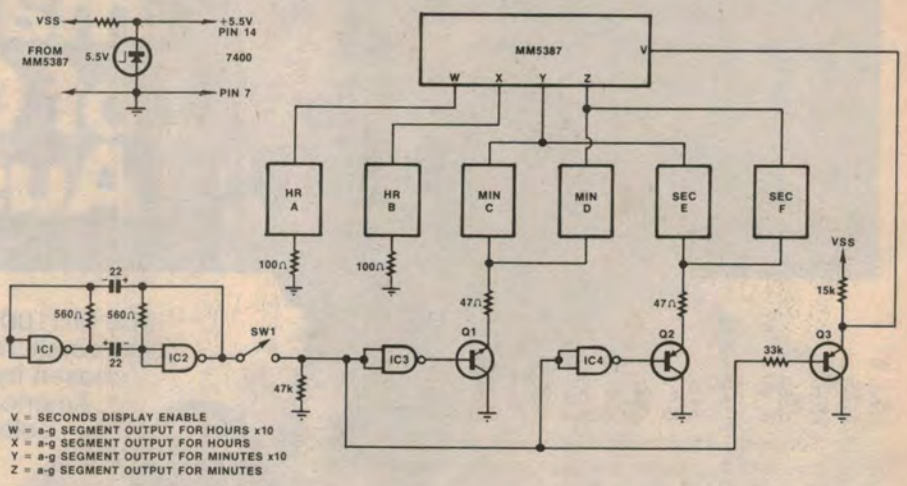
Conducted by Ian Pogson

Interesting circuit ideas and design notes selected from technical literature, reader contributions and staff jottings. As they have not necessarily been tested in our laboratory, responsibility cannot be accepted. Your contributions are welcome, and will be paid for if used.

Six digit facility for four digit clocks

Most of the digital clocks on the market today are of the four digit variety. I have a method which may interest readers who have a four digit clock and who may wish to add seconds to the already existing hours and minutes display. A simple and straightforward multiplexing method is used with a minimum number of components to reduce cost and complexity.

As shown in the diagram an MM5387 clock chip is used. The circuit is for common cathode LED display. Common anode LED display may be used with the necessary alterations. The tens of hours and hours outputs from the IC are connected as usual. The tens of minutes and minutes are connected in parallel with the tens of seconds and seconds segments, respectively. Two gates IC1 and IC2 of a quad NAND gate SN7400 were made into an oscillator, switching IC3, IC4 and Q3. IC3 and IC4 switch Q1 and Q2, respectively. Q1 and Q2 control the displaying and blanking of seconds and minutes displays. Q3 switches the seconds display.



As the oscillator operates at about 200Hz, the multiplexed displays of minutes and seconds appear to be continuous. The circuit has been fully tested and works very well. The only problem was in setting the time. SW1 has been included to cut off the six digit function, the time being set with SW1 in the Off position.

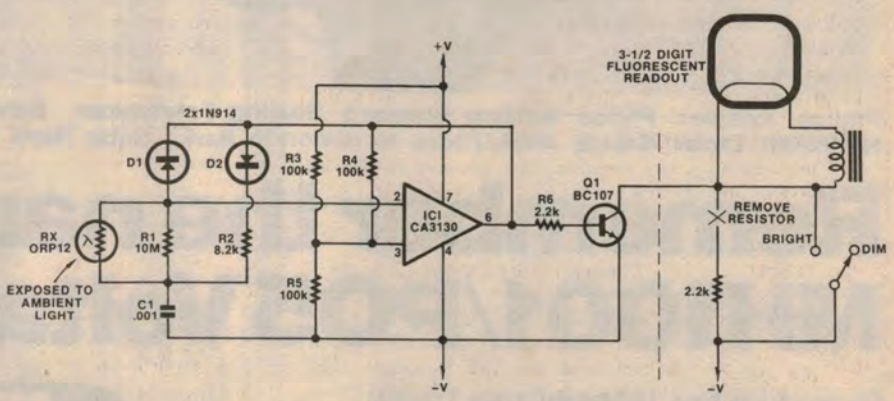
(By Mr Ratman, 154 Permatang Tengah, Balik Pulau, Penang, Malaysia.)

Autodim for fluorescent clock displays

This circuit will automatically adjust the brightness of a fluorescent clock to track the ambient light while maintaining equal output from digit to digit. The details shown apply specifically to a "Micronta" clock but the general principle should suit most fluorescent clocks.

The circuit controls the average current through all digits by rapidly turning the display on and off. This is interpreted by our eyes as a steady glow with the brightness determined by the ratio of on to off. IC1 is an oscillator with a frequency and duty cycle controlled by the level of illumination falling on RX, a light dependent resistor. Transistor TR1, and hence rhe display, is turned on for a period set by R2, C1 and off for a period determined by RX, C1. Since the resistance of RX is a function of the illumination falling on it, then so is the average current through the display.

R1 prevents the display from becoming too dim at night. A value of 10M was ideal in the prototype but this may be changed to suit individual preference.



Some clock integrated circuits provide for a control voltage (pin 23 on the MM5316) and this pin requires a positive-going pulse. To make use of this input a few changes should be made to Autodim circuit as follows:

(1) Reverse the polarity of diodes D1 and D2.

(2) Replace TR2 with a PNP type (such as a BC177) and connect the emitter to Vss.

(3) Wire the TR1 collector to the control voltage input pin in lieu of the filament.

(By Mr W. Gummerson, 13 Hindmarsh Road, Liverpool, NSW 2170.