Model Electronic Railway Group
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John Down [M001]

TWINKLING GAS LAMPS.

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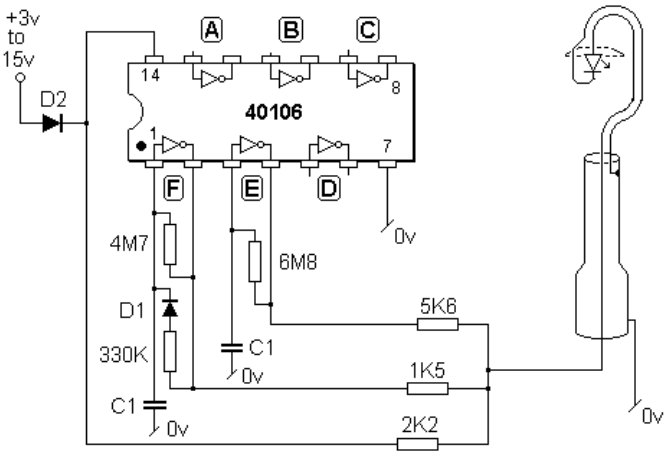
Do you remember gas lamps? I do. The modern observer, on the basis of the current crop of model railways, could justifiably conclude that the only type of gas lamp that ever existed was the Victorian four-sided lantern. Further reinforcement is afforded to the modern shopper by his or her observation in the local shopping arcade. For me, however, a lamp that caught the spirit of railways in the fifties to a far greater extent was the ubiquitous Sugg type lamp. You know the type; it had a sort of conical glass globe under a wide brimmed hat. I believe that they were manufactured by the Sugg Company of Crawley though it is difficult to imagine that they alone were responsible for the wide variety that could be found. The smaller ones had a single mantle within the globe, but many had two, and really large models had as many as five. On the GWR they were often suspended by elaborate 'harps' or 'half harps ' decorated in true Swindon fashion with iron scrolls. In my part of South Wales where railways had been inherited from the Monmouthshire Rly. and Canal Coy, the wide brimmed hats were supported on both sides and were noticeably wider. When I lived in Sussex the Southern Railway supported their green Suggs on elegant swan necks atop delicious barley-sugar posts, even in electric territory. I spent many evenings under their slightly surreal white-green light listening to the contented hiss and occasional soft 'pop' as the mantle slightly changed its burning pattern.

I suppose I had better get on before I get carried away. For a while now I have established a reasonable technique for manufacturing Sugg lamps from filed-down LEDs and Peco axle washers (for the wide brimmed hat, see!). I have used yellow LEDs with clear encapsulation and despite the obviously incorrect hue they seem to capture the spirit of the prototype quite well. On a recent visit to a show at Kidlington I was rather taken by a layout on which every so often its gas lamps gave a slight 'wink' in exactly the same way as the prototype did when it 'popped'. To some extent the effect was a little spoilt by the fact that every lamp winked in unison... It was however enough to set me thinking, and what I came up with is probably quite my silliest circuit to date, and anyone who builds it is probably as daft as I am!

The circuit centres around my favourite CM0S chip, the 40106 hex. Schmitt trigger. This contains six independant inverters with Schmitt triggering. This means that the output snaps from one state to the other (i.e., High to Low, or vice versa) however slowly the input changes from Low to High (or v.v.) Connecting the output to the input with a fairly high value resistor makes the inverter into an oscillator producing a square wave output, the frequency of which is determined by the resistance and the capacitance to the 0v supply.

One chip will drive three lamps independently. The circuit is arranged such that each LED has three sources of current. First a standing current is fed from positive via the 2K2 resistor. One of the inverters is connected as a square wave oscillator of period about 5 to 10 seconds, and this also supplies current via the 5K6 resistor. The second inverter is arranged by means of the diode to have an output which is anything but square, and is in fact a pulsed waveform of mark-space ratio about 10 to 1 and a period approaching ten seconds. This means that the current it supplies to the LED via the 1K5 resistor is continuous except when the output is briefly low. This gives the winking effect and the combination of all three gives a satisfyingly random effect. Each inverter runs at a differing frequency so that the LED pops and flares just like the prototype. Diode D2 in the supply protects the chip against inadvertent polarity reversal.



[cont. over]

For added daftness. a third inverter could be configured as an oscillator if you want an even more random effect but since this would tie up three of the six inverters in the chip only two lamps per chip can be operated. Both the three feed resistors and the timing resistors can be varied within wide limits to give just the effect you wish. Lastly note that any inverter inputs not used must be tied (i.e., connected to) to ground (0v).

Notes by Technical Bulletin Editor.

The initial design of Issue 1 called for 1mF capacitors, but these are fairly expensive, and a bargain source of 1m5 capacitors as supplied in the kits issued to members in 1993, and subsequently sold at Scaleforum '95 and the Warley Show a fortnight later, has dried up.

Cheap electrolytics may not work; since they may leak away all the already small current fed back by the megohm value resistors, but the 2m2 values supplied in the current (1996) kits have been tested and found to be OK.

The schematic in this Issue has been redrawn with the inverters built on pins 1 to 4 as opposed to pins 3 to 6 shown in earlier Issues. This is of no consequence since all the inverters are identical and the change has been made to conform to the schematic and other illustrations in A11/2.

See Technical Bulletin A11/2 Issue 4 for the current (1996) kit instructions which are specially extended to help beginners in electronics.

For the record, Issue I of Tech. Bull. showed the 470K and 6M8 resistors exchanged in error. The higher value should be directly across the in/out pins and the lower in series with the diode. This was corrected in Issue 2, which also showed the oscillator resistors reduced in value by approximately 50% to compensate for the use of the 1m5 capacitors mentioned above in place of the 1m0 caps. of the Issue I schematic. The oscillator frequencies should therefore have remained of the same order as determined by the product of the 'R' and 'C' values.