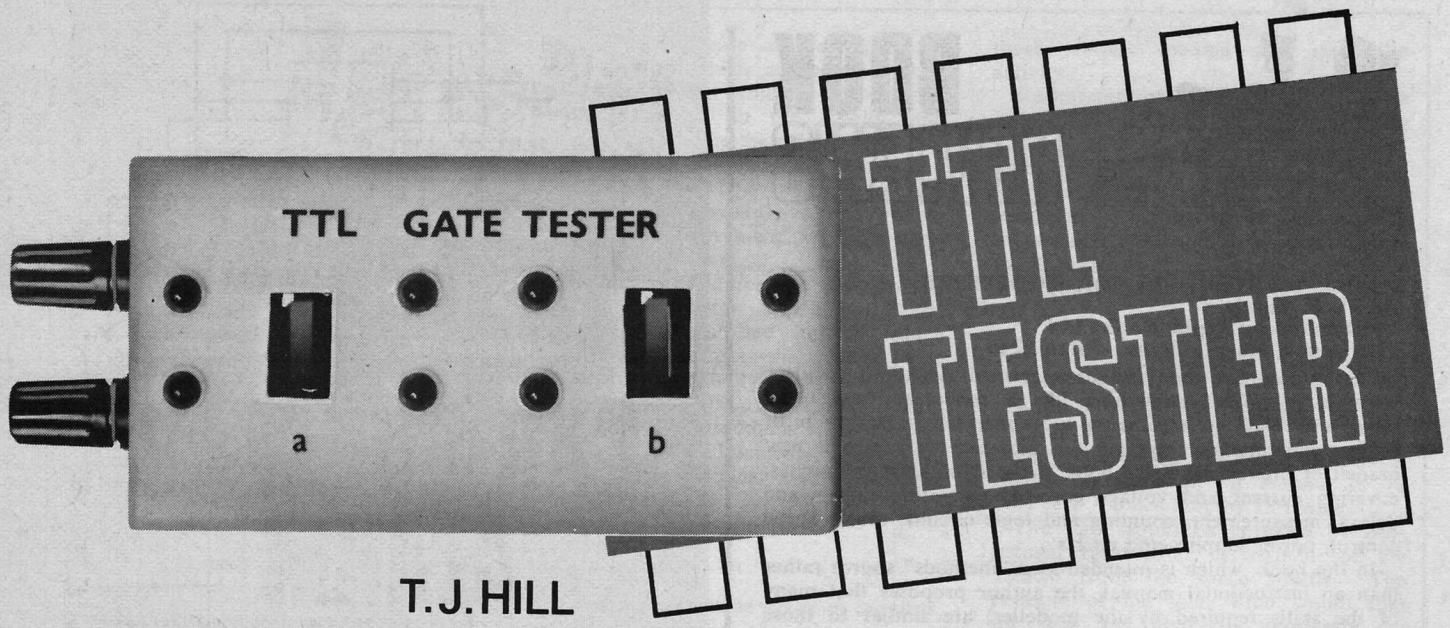


T.J. HILL

FOR 74 FAMILY OF QUAD-GATE PACKAGES

THIS gate tester was designed to be cheap, and to be capable of testing a wide range of simple QUAD-GATE packages. The unit works by applying to each gate in the i.c. under test, every possible combination of inputs, and monitoring the outputs with l.e.d.s.

TEST SOCKETS

There are two basic pinout configurations used in the 7400 series of quad gate packages, and these are illustrated in Fig. 1, where the 7400, and the 7401 are shown.

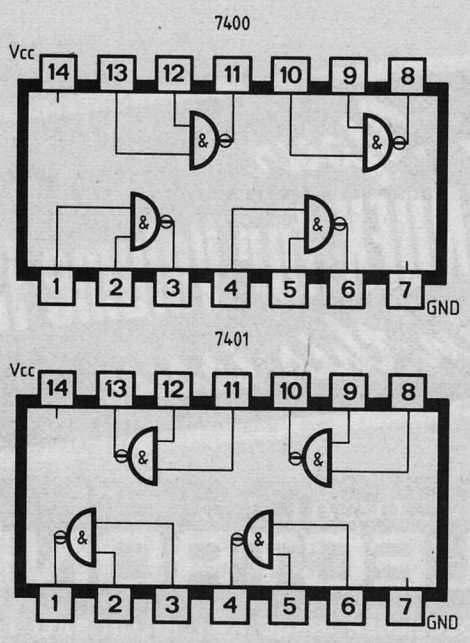


Fig. 1. Pin configurations of the 7400 and 7401

Two i.c. sockets are fitted in this tester, to accommodate each pin arrangement.

THE CIRCUIT

Referring to Fig. 2, the 555 timer (IC1) is wired as an astable multivibrator with a frequency of about 2Hz. The output from this is fed to a 7470 flip-flop (IC2), which divides the signal by two. This, and the original oscillator signal are taken to every gate in the i.c. under test; each

COMPONENTS . . .

Resistors
R1, R2 10kΩ ¼W 5% (2 off)
R3–R10 390Ω ¼W 5% (8 off)

Capacitors
C1 47μF 10V elect
C2 22μF 10V elect

Semiconductors
D1–D8 0·2in red l.e.d.
IC1 NE555 Timer
IC2 7470

Miscellaneous
Verobox type 65-2518H
Veroboard 0·1in
Red 4mm terminal (SK1)
Black 4mm terminal (SK2)
14 pin d.i.l. sockets for test positions (2 off)

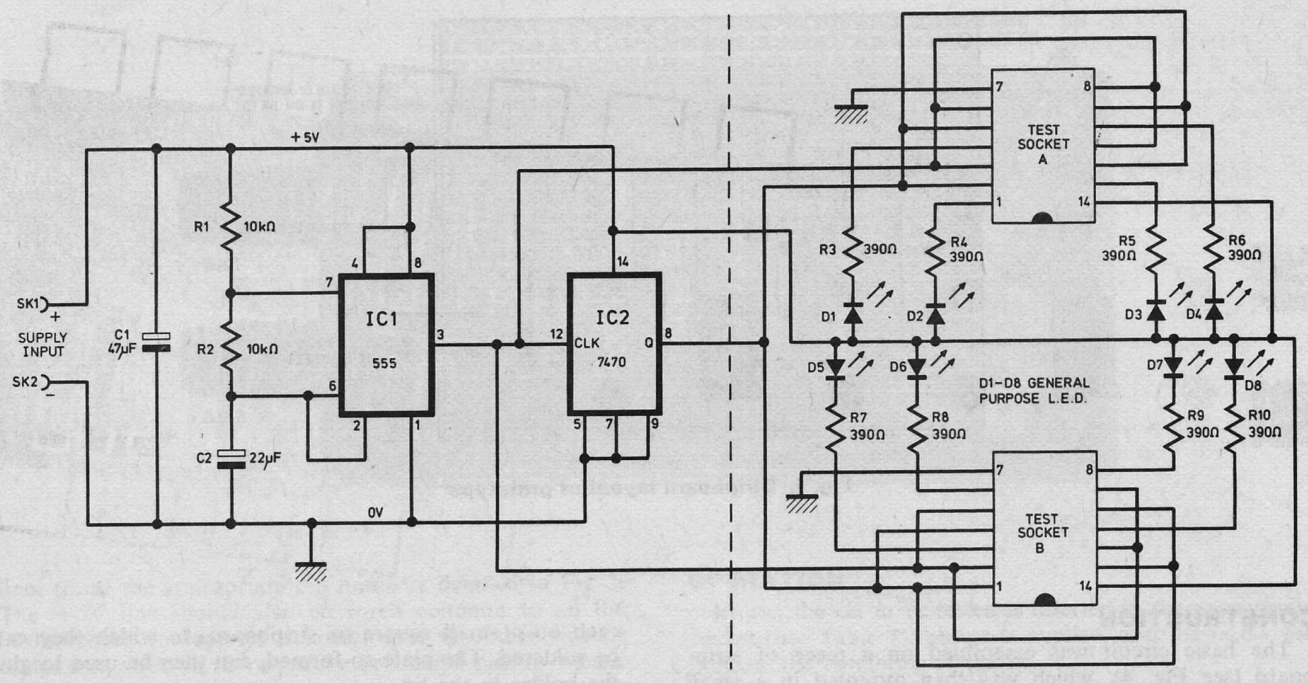


Fig. 2. Circuit diagram of the TTL tester. A capacitor of 0·01μF connected from IC1 pin 5 to ground may be found necessary for reliable operation

signal going to each of the two inputs. These input waveforms are shown in Fig. 3, and the correct output for a 7400 is shown as an example.

The outputs, drive l.e.d.s. D1 to D8, causing them to illuminate when the signal generated by the gate under test is low, thus allowing open collector type gate to be tested with this system.

Testing a 7400, it can be seen from Fig. 3 that the output l.e.d.s should be on for one quarter of the total waveform period. This, and the relationships for other quad gate packages, can be seen in Table 1.

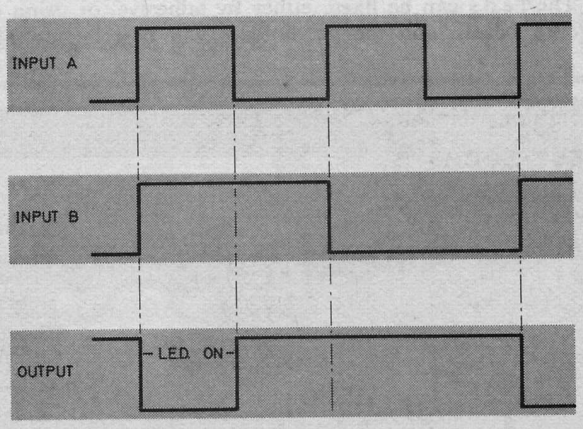


Fig. 3. Test waveforms applied to each gate. The correct output for a 7400 is shown

Table 1. Output l.e.d. illumination times for correctly operating gates. Ten 74 series quad gate packages are shown

Package type	Test socket	l.e.d. duty cycle
7400	B	25%
7401	A	25%
7402	A	75%
7403	B	25%
7408	B	75%
7409	B	75%
7428	A	75%
7432	B	25%
7433	A	75%
7438	B	25%

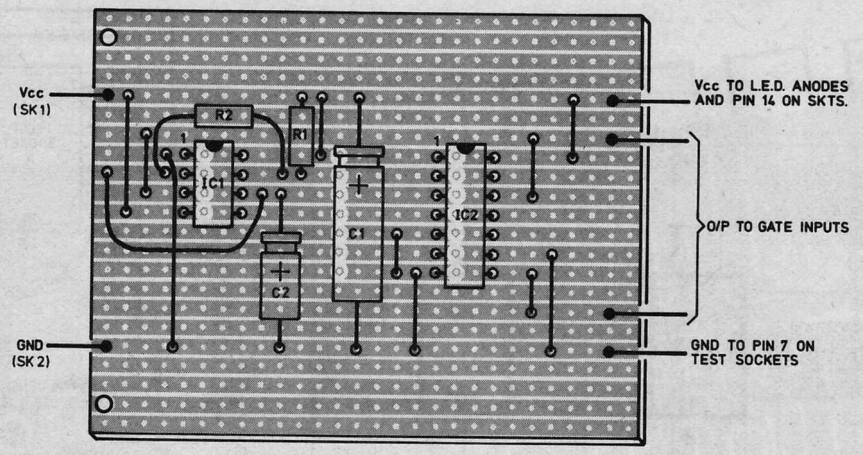


Fig. 4. Stripboard layout of prototype

CONSTRUCTION

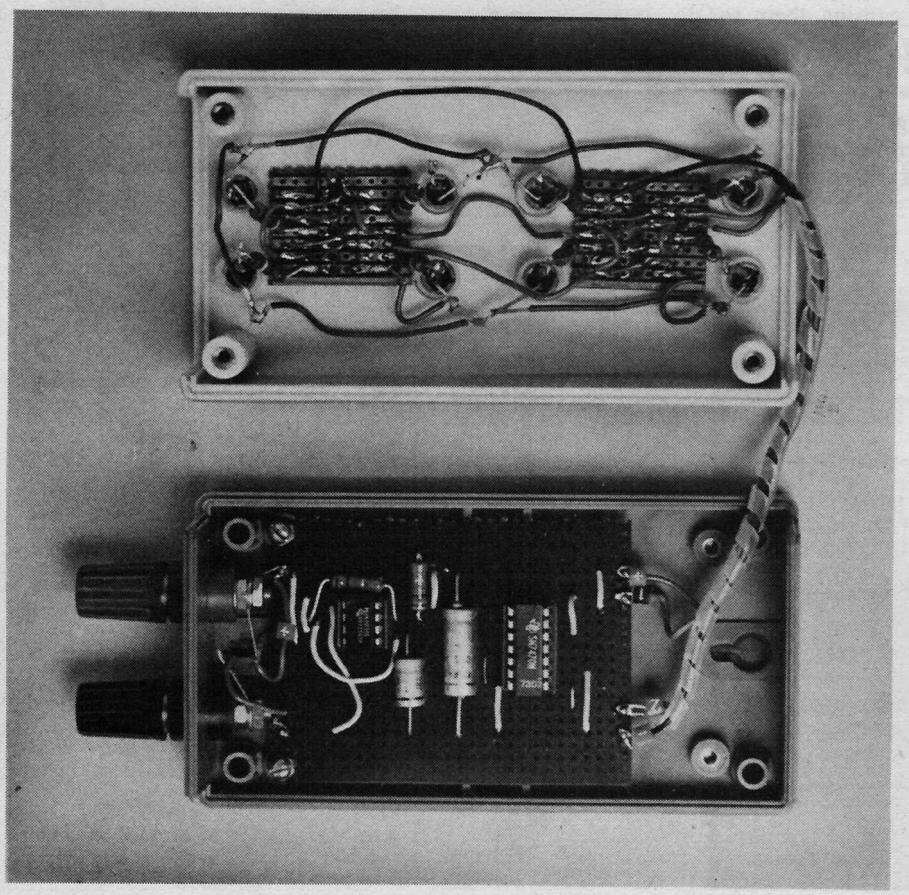
The basic circuit was assembled on a piece of stripboard (see Fig. 4), which was then mounted in a small polystyrene case, by the integral mounting pillars.

The lid of the case was cut to accommodate two 14 pin i.c. holders, and the eight l.e.d.s. Dimensions will depend upon the type of l.e.d.s preferred, and i.c. holders used, but the photographs will show the general layout involved.

The l.e.d.s can be fixed, either by adhesive, or using the proper bezels, and the i.c. holders will best be mounted each on a small square of stripboard, to which they can be soldered. The plate so formed, can then be used to glue the holder to the lid.

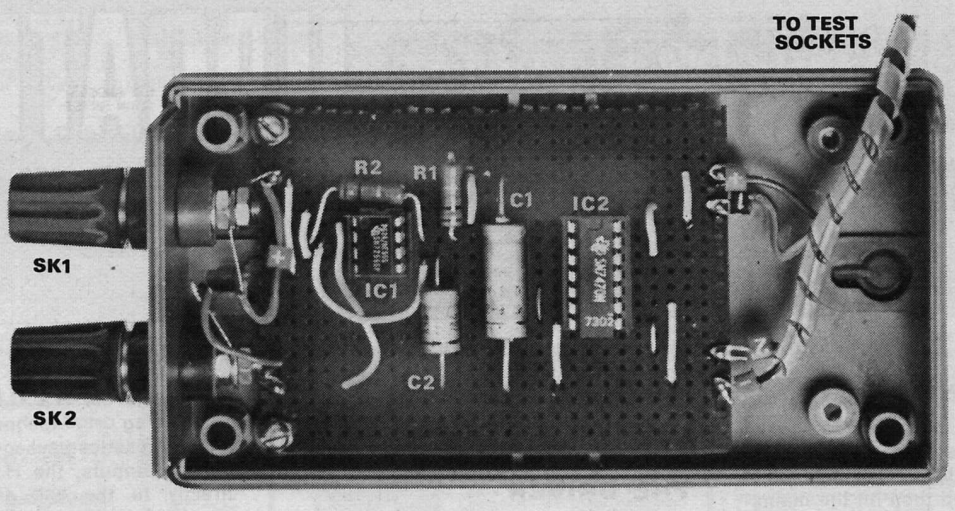
Cut holes for the two 4mm socket terminals (SK1 and SK2), and mount these. Next drill the main component board so that it can be mounted in the base of the box.

A harness of four wires should be formed, to link the main board to the i.c. socket boards. This will carry the two signal lines, and the two supply lines. Wire both the i.c. socket units for +5V and 0V, and next, the two signal



In the prototype, the i.c. sockets were soldered to pieces of Veroboard which were then glued to the lid. The sockets and l.e.d.s were linked directly using the 390Ω resistors

Power is applied via the 4mm terminals, but using a larger box would allow room for operation from an internal battery. An on/off switch could be mounted in place of the terminals



lines to all the appropriate pin numbers detailed in Fig. 2. The +5V line should also be wired common to all the l.e.d.s (check for correct polarity), and the other side of each l.e.d. wired to its respective i.c. socket pin, by means of a 390Ω resistor (R3–R10).

The l.e.d.s should be wired up so that they are adjacent to the outputs they represent. The lid was lettered using dry letter transfers sprayed with laquer, and it may be advantageous to put the related pin numbers against each l.e.d.

Finally, do not forget to connect up the two 4mm terminals for the supply input.

OPERATION

In use, the i.c. to be tested is inserted in the appropriate socket (use Table 1), power is applied, and the l.e.d.s will indicate the condition of the i.c.

A gate with a faulty output stage will cause the incorrect flashing of its associated l.e.d., and a gate with a damaged input stage will possibly cause *all* the l.e.d.s to flash incorrectly. The operator can learn to interpret the meaning of the various indications.

The prototype is powered by an external supply, but since current consumption is only about 30mA average, battery operation is feasible. ★

MARKET PLACE

Items mentioned in this feature are usually available from electronic equipment and component retailers advertising in this magazine. However, where a full address is given, enquiries and orders should then be made direct to the firm concerned. All quoted prices are those at the time of going to press.

CONDUCTIVE PAINT

After five years of selling exclusively to industry, **Industrial Science Ltd.**, are now introducing one of their most successful products—Elecolit 340—into the consumer electronics market.

This is a pure, silver filled, electrically conductive acryllic paint. It exhibits excellent conductivity because of the pure silver and outstanding environmental protection due to its acryllic base and sets by solvent evaporation similar to most good lacquer systems forming a tough film with good adhesion to ceramics, glass, rubber, plastics and most plastics films.

Typical applications include r.f. shielding, printed circuit repair, use as a conductive ink, prototype circuit manufacture and one of the most interesting and unusual applications of all which is to repair the rear window demister of a car by means of painting over the existing track which may have either broken or shorted out.

Although it is air drying, conductivity can be improved by heating.

The shelf life is a minimum of 1 year in a closed container, and the operating temperature is from −60°C to +175°C.

It can be applied by painting, silk screening or roller, and if necessary it can also be thinned with a solvent to lower the viscosity.

Details of price and further information can be obtained from **Industrial Science Ltd., Leader House, Dept. P.E., 117–120 Snargate Street, Dover, Kent.**

The Elecolit 340 conductive paint from Industrial Science

Fairchild Timeband from Tempus

ALARM CLOCK

A particularly elegant digital alarm clock, the Fairchild Timeband is available from **Tempus.**

Available in white or black, and taking up little more space on your bedside table than an old-fashioned mechanical alarm clock, the Timeband offers timekeeping and alarm accurate to the second.

The readout is on large seven-segment l.e.d. displays, showing hours and minutes or, at the touch of a button, last minute digit and seconds. Indicators are provided for AM/PM, Mains Failure, and Alarm On. The alarm should be loud enough to waken the heaviest sleeper, and includes a "doze" feature which can call you up to six times in an hour.

The Timeband costs £14·95, including VAT, post, packing and insurance, from **Tempus, 19-21 Fitzroy Street, Cambridge, CB1 1EH.**