

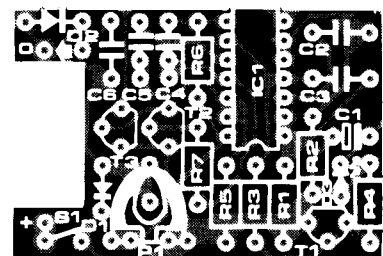
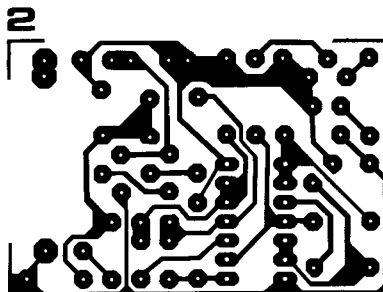
signal injector

This useful faultfinding aid, first featured in the Elektor April 1977 issue, is another of the projects for which a free printed circuit board is being offered (see details in the advertising pages of this issue). For readers who missed the original article a brief description of the circuit is repeated here.

A signal injector is a useful aid to fault tracing; by injecting a signal at various stages in a circuit, faults in the signal path are easily located.

The circuit operates as follows: two CMOS NAND gates, N3 and N4, form an astable multivibrator that oscillates at about 1 kHz. Since the squarewave produced by this circuit contains harmonics extending up to several Megahertz, the signal is useful for r.f. as well as audio testing. The output is buffered by a Darlington pair T2/T3 and the output signal level is adjustable by means of P1. The signal is coupled to the circuit under test via C6, which provides DC isolation of the injector output. Diodes D1 and D2 protect the signal injector by clamping any transients that may be coupled back through C6.

To make the signal more noticeable it is switched on and off at about 0.2 Hz by a second astable consisting of N1 and N2. This 0.2 Hz signal also turns T1 on and off, which flashes LED D3 to indicate that the circuit is functioning. The working voltage of C6 should be chosen to withstand any voltage likely to be encountered when using the signal injector. For battery-powered equipment a 63 V component will be more than adequate, but if the injector is to be used with mains-powered circuits then C6 should be uprated accordingly. D1 and D2 should also be adequately rated. If the injector is to be used with 'live-chassis' equipment such as TVs it should be housed in an insulated box, and both the output probe and ground clip should be well insulated to avoid the danger of electric shock.



Parts list for figures 1 and 2.

- Resistors:**
 R1, R2, R5, R6 = 10 M
 R3 = 100 k
 R4 = 470 Ω
 R7 = 27 k
 P1 = 1 k preset

- Capacitors:**
 C1 = 100 μ/6 V
 C2, C3 = 470 n
 C4, C5 = 100 p
 C6 = 100 n (see text)

- Semiconductors:**
 IC1 = 4011
 T1 = TUP
 T2, T3 = TUN
 D1, D2 = DUS (see text)
 D3 = LED (e.g. TIL 209 or similar)

- Miscellaneous:**
 S1 = SPST switch
 4 x 1.4 V mercury batteries

Figure 1. Circuit of the signal injector.

Figure 2. Printed circuit board and component layout for the signal injector. (EPS 9765).

1

