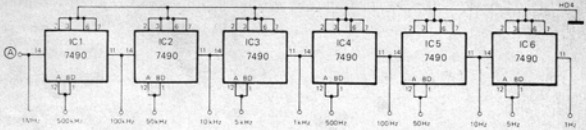
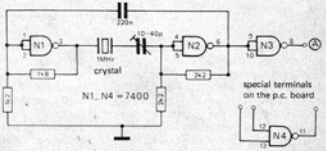
# 12

# universal frequency reference



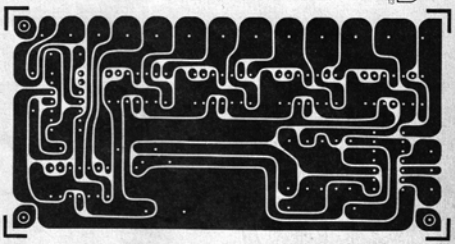



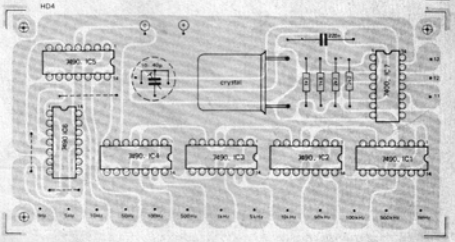

This circuit claims nothing in the way of originality, but is simply a useful, general-purpose board that can be used in many frequency and time measuring applications. It is particularly suitable for use as a gate pulse generator in frequency counters.

The heart of the system is a 1 MHz crystal oscillator based on two NAND-gates. The output of this oscillator is buffered by a third NAND-gate and the frequency is then divided down by a series of 7490 decade counters. These consist of a divide-by-2 stage followed by a divide-by-5 stage, which means that in addition to dividing the reference frequency down to 1 Hz in decades, outputs of 500 kHz down to 5 Hz are also available. These outputs are particularly useful where gate pulses for frequency counters are required. For example, the 5 Hz output will provide positive pulses of 100 ms width, so if the frequency of a 10 MHz signal were being measured a gate pulse this long would let through 1,000,000 cycles of the signal to the counter, giving a display of 1000000. On the other hand, for period measurements the 1 Hz to 1 MHz outputs are more useful. For example, when measuring a one second period, 1,000,000 cycles of the 1 MHz output can be counted, giving a display of 1000000.

The p.c. board layout is quite compact and well laid out. The outputs are available along the lower edge of the board in the diagram. There is one spare NAND-gate in the package used for the oscillator, and this may be used as the gate in frequency counter applications. The connections to it are brought out at the top right corner of the board.

The oscillator frequency may be trimmed to exactly 1 MHz by the trimmer capacitor. The best method of doing this is to use an oscilloscope to compare the 100 kHz output with the 200 kHz Droitwich transmissions, using






Lissajous figures. The trimmer should, of course, be adjusted until the

Lissajous figure apparently ceases to rotate.

# 13

W. Ferdinand

# afterburner

When starting a car journey after dark it is useful to have a device which will keep the interior lighting on for a while after the doors have been closed, and so make it easier for the occupants to fasten safety belts and insert the ignition key. This can be done with the simple time-switch circuit shown.