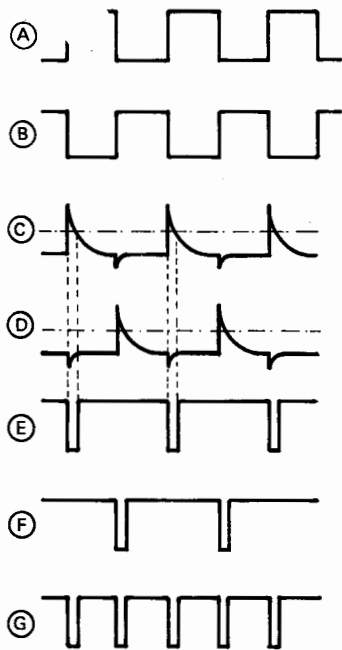


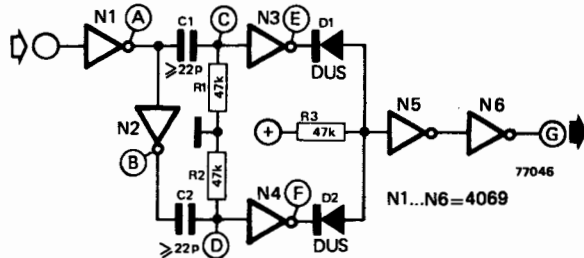
41

frequency doubler using 4069

A.M. Boschaert



Using a single 4069 hex inverter IC, a frequency doubler can be constructed to give an output pulse train whose frequency is twice that of a squarewave input signal. The signal is applied to the input of N1. It should be a squarewave with a duty-cycle



and 'squared up' by N3 and N4 to give waveforms E and F. These are then combined in a NOR gate consisting of D1, D2, R3 and N5, and finally inverted by N6 to give the output waveform G, which has a frequency twice that of the input signal.

The circuit will operate over a wide frequency range. The upper frequency restriction is imposed by the fact that the width of the negative-going pulses E and F must be greater than the minimum pulse width that N3 and N4 will reliably transmit. Assuming that waveforms E and F have the minimum possible pulse width, as the frequency of the input signal increases the duty-cycle of