

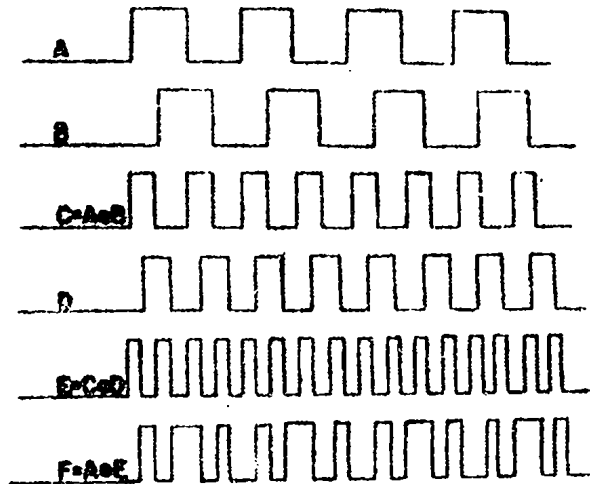
f to nf frequency multiplier

M.R. NAYAK
National Institute of Oceanography
Dona Paula
COA-403004

A method for deriving different frequencies using only Exclusive-OR gates is described in this note.

If "f" is the original frequency which is fed to an Ex-OR after a delay of Δt , we obtain "2f" as output of the gate. This acts as a "frequency doubler" (Ref: Electronic Engineer, December '76 Applied Ideas).

i.e. $f \oplus \Delta f = 2f \dots$ as in "C"
 $2f \oplus \Delta 2f = 4f \dots$ as in "E"
 $nf \oplus \Delta nf = 2nf$ where n = positive even integer.



F - nf FREQUENCY MULTIPLIER

To realise odd multiples of "f", e.g. to obtain 3f, we have to Ex-OR f with 4f.

i.e. $f \oplus 4f = 3f \dots$ as in "F"
 $3f \oplus 8f = 5f \dots$
 $f \oplus 8f = 7f$
 $kf \oplus nf = (k \oplus n)f$ where k is positive odd integer

Hence, we can obtain any multiples of original frequency f. The main limitation in this method is the delay $\Delta t > Pd$, the propagation delay of the gate.