# Waveforms-in-quadrature generator

Phase locked loop systems used for the detection of a.m. signals require either a two-phase signal or a two-phase local oscillator, the phases being $\pi/2$ radians apart. The Signetics a.m. phase locked loop i.c. requires the signal to be split into two phases, which causes the lagging phase to be attenuated. If the system is to be tuned over a range of frequencies, the phase relationship is only correct at one frequency. However, sufficient information is present to extract the other phase from the local oscillator signal without using any time-sensitive components. In addition, it is possible to make a circuit using the same configuration of transistors that would use this principle to detect a.m. The additional element required is ½NE510 and a block diagram is shown in Fig. 1. It is not possible to make a connection to the input of the second multiplier in the p.l.l. because it is internally connected to the output of the Schmitt trigger. Therefore an external connection is used.

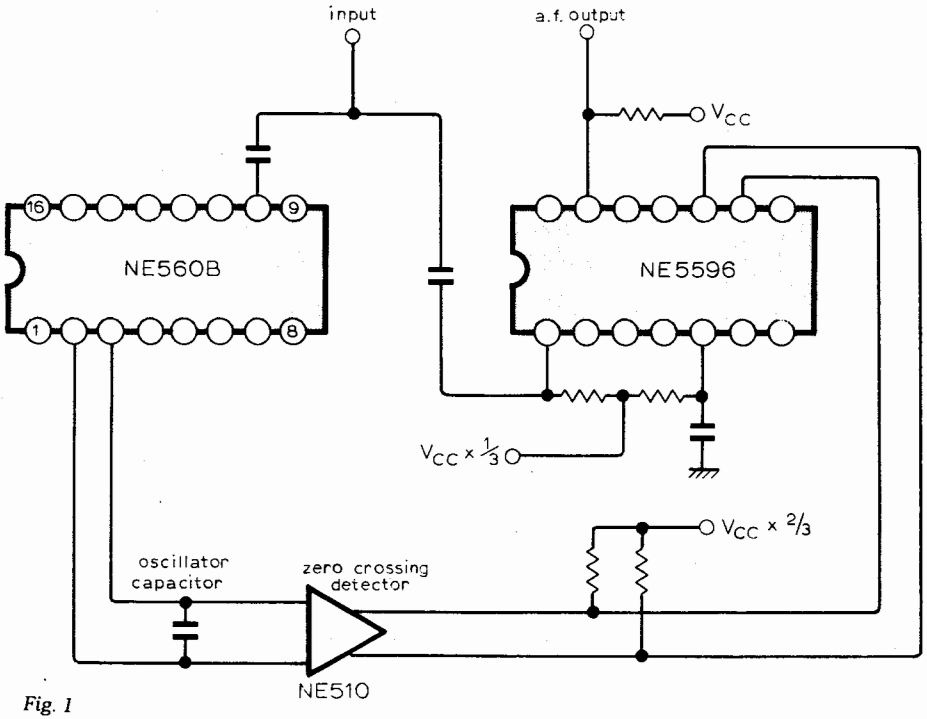
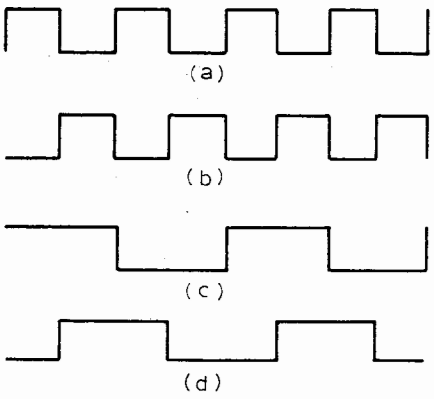



*Fig. 1*

When making a p.l.l. from scratch, t.t.l. can be used to obtain quadrature signals as shown in Fig. 2. To obtain two waveforms in quadrature, information is required at twice the repetition rate of the output. A Schmitt trigger is used to square a sinewave oscillator at twice the required frequency or as a v.c.o. Its output is inverted by the second Schmitt trigger in the i.c. Waveforms at either side of this inverter are shown in above. These waveforms are divided by two using the 7474 flip-flop. Output waveforms from the flip-flops are at half the input frequency and in quadrature. This system has only one time sensitive component which makes tuning over a large range possible. High speed circuitry such as e.c.l. can also be used to extend frequency range of the quadrature signals.



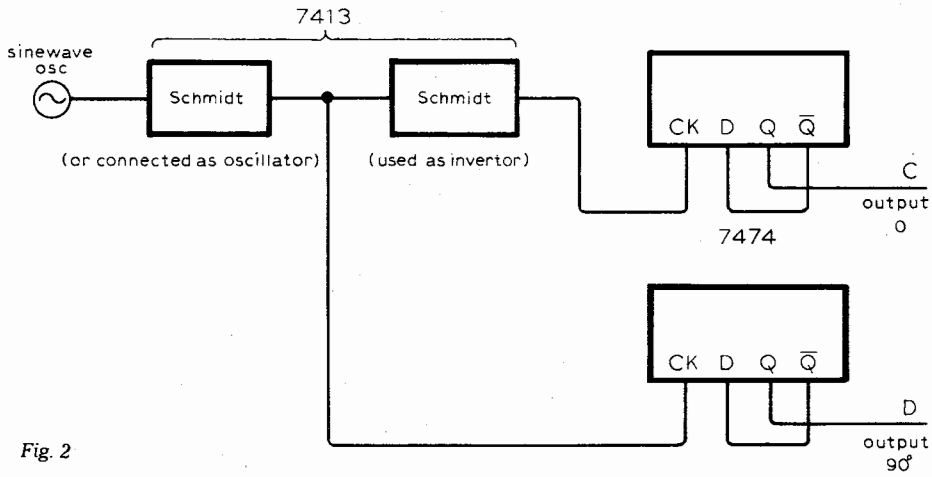




*Fig. 2*

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