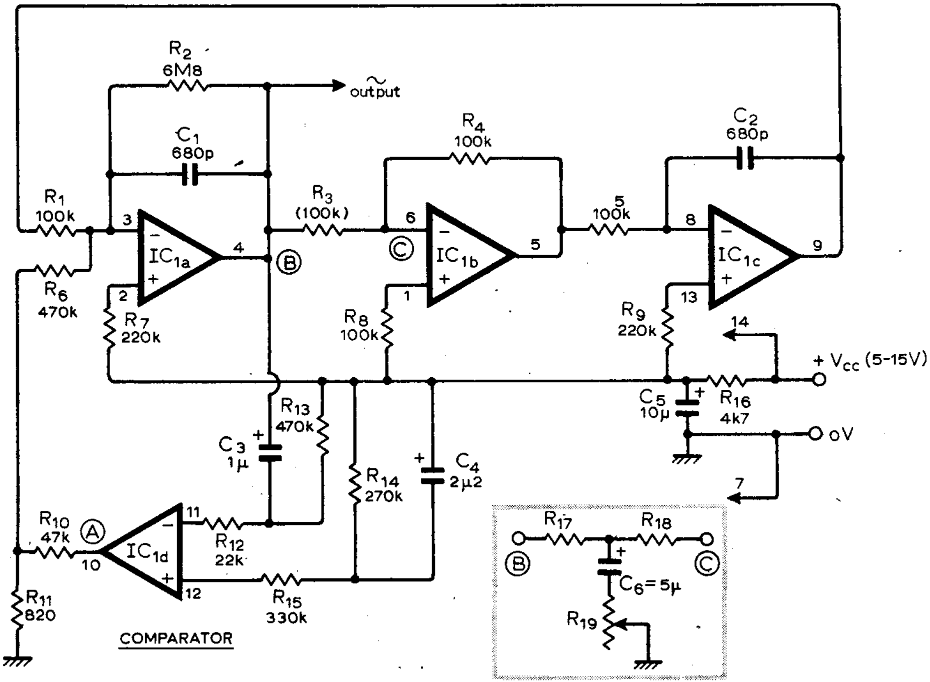
Sine oscillator uses c.d.a.

The circuit, new in realization but not in principle, produces moderately low-distortion sinewaves (typically 0.5% t.h.d.) which have negligible amplitude bounce on changing frequency. Further advantages are the ability to alter frequency with a single component and the low cost of the quad differential amplifier (LM3900N).

When the supply is switched on the comparator output initially goes to $+V_{cc}$; after about a second C_4 has charged and the output rapidly slews to 0V. This shocks the bandpass filter, formed by the two integrators IC_{1a}, IC_{1c}, and the inverting amplifier IC_{1b}, and causes it to ring. The resultant sinewave causes the comparator to produce a square wave which



R2
6M8
output
C1
680p
R4
100k
C2
680p
R1
100k
R3
(100k)
5
100k
3
6
8
IC1a
4
B
C
IC1b
5
IC1c
9
R6
470k
2
1
13
R7
220k
R8
100k
R9
220k
14
+ Vcc (5-15V)
R13
470k
C5
10µ
R16
4k7
C3
1µ
oV
R14
270k
C4
2µ2
7
R10
47k
A
11
IC1d
R12
22k
10
12
R17
R18
B
C
C6=5µ
R15
330k
R11
820
R19
COMPARATOR

is fed back into the loop to sustain oscillation. Sinewave amplitude is stabilized by virtue of the constant square wave input and is typically $0.25V_{cc}$ pk–pk, its purity being proportional to filter Q.

Frequency of oscillation (2.34kHz) and Q(62) are:

$$2\pi f = \sqrt{\frac{R_4}{C_1 R_1 C_2 R_5 R_3}} \qquad Q = \omega C_1 R_2$$

Note that owing to the internal compensation of the amplifiers significant Q-enhancement occurs at frequencies greater than a few kHz and this may lead to oscillation of the filter itself.

To vary the frequency the inset network can be used in place of R_3, the effective impedance being

$$R_{13} = R_{17} + R_{18} + \frac{R_{17} R_{18}}{R_{19}}$$

T. J. M. Rossiter,
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