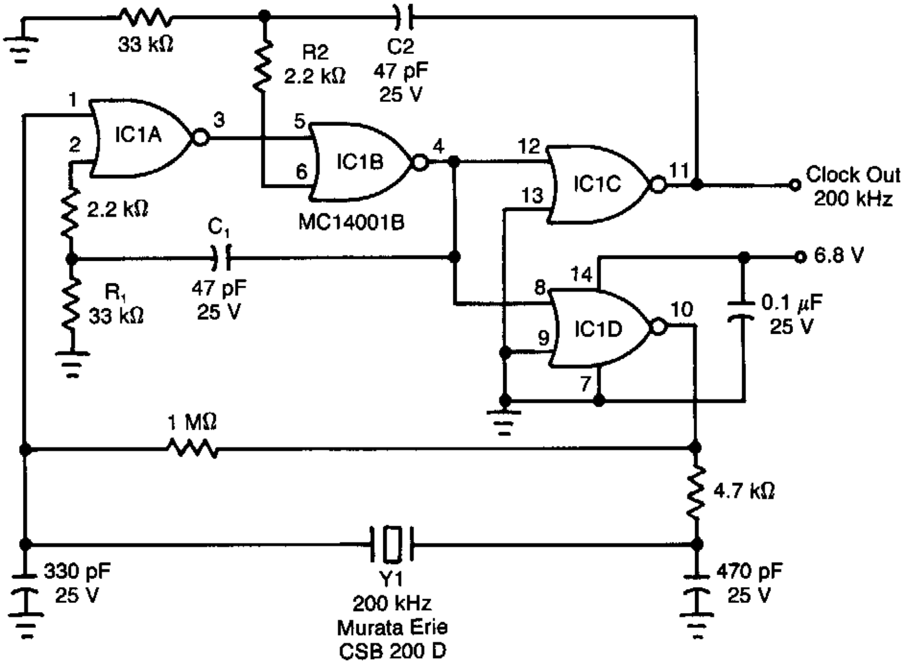
MICROPOWER CLOCK



EDN

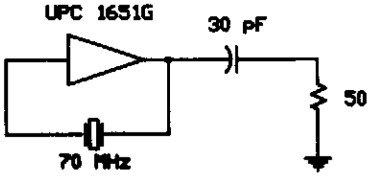
Fig. 22-1

Although ceramic resonators are a good choice for low-power, low-frequency clock sources (if you can stand their 30-ppm temperature coefficient), they have troublesome, spurious-resonance modes. This circuit rejects all but the resonator's fundamental mode. This clock circuit works from −40 to +80°C and consumes only 2.8 mW.

The rising edge of resonator Y1 toggles IC1A low. ac-coupled positive feedback from IC1D via C1 and R1 immediately confirms this state change at IC1B so that Miller loading, harmonic components, or below-minimum rise times at IC1A cannot force IC1C to relapse to its previous state. This tactic also applies to resonator Y1's falling edge because IC1C, via C2 and R2, holds IC1B high.

Choose time constants R_1C_1, and R_2C_2 to be equal and ranging from 60 to 75% of one-half of the clock's period. Ceramic capacitors (10% tolerance) with X7R dielectric work well. With these time constants, the logic will be locked and unavailable to the ceramic resonator until just before it executes a legitimate transition. IC1D and IC1C are in parallel to isolate the resonator from external loads and, more importantly, from C2.

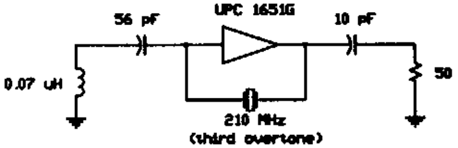
SIMPLE FUNDAMENTAL CRYSTAL OSCILLATOR



RF DESIGN *Fig. 22-2*

This simple fundamental oscillator uses a μPC1651G IC and two components. The crystal is fundamental.

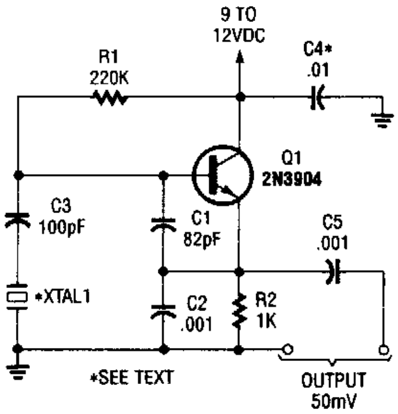
SIMPLE THIRD-OVERTONE OSCILLATOR



RF DESIGN *Fig. 22-3*

Using a 210-MHz third overtone crystal, this circuit operates directly at the crystal frequency, with 210-MHz output and no multiplier stages.

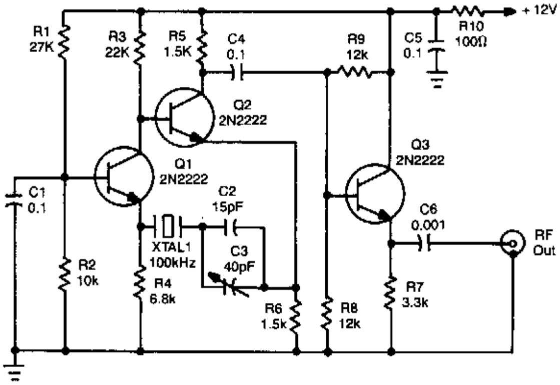
COLPITTS 1-to 20-MHz CRYSTAL OSCILLATOR



This is a simple Colpitts crystal oscillator for 1 to 20 MHz, can be easily made from junk-box parts (provided that a crystal is handy).

POPULAR ELECTRONICS *Fig. 22-4*

100-kHz CRYSTAL CALIBRATOR

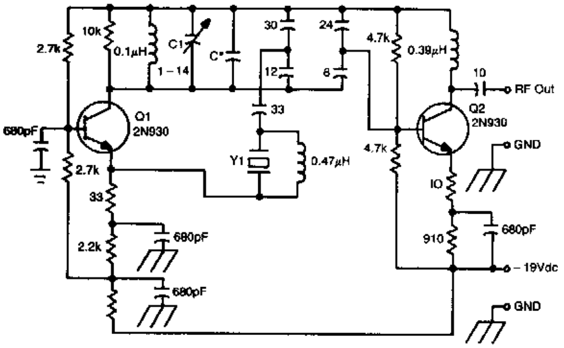


POPULAR ELECTRONICS

Fig. 22-5

Using a 12-V supply, this crystal calibrator should prove a useful accessory for a SW receiver. Q1 and Q2 form an oscillator and Q3 is a buffer amp.

100-MHz OVERTONE OSCILLATOR

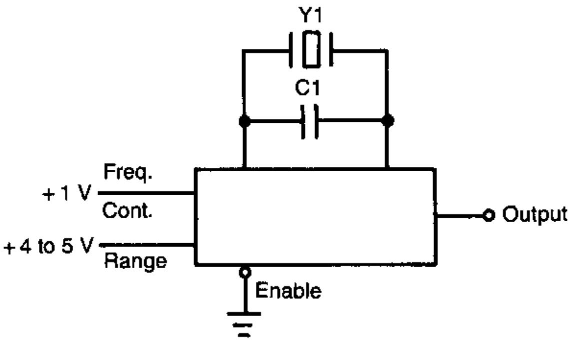


73 AMATEUR RADIO

Fig. 22-6

This oscillator circuit uses a 5th overtone crystal in the 85-to-106 MHz range. Y1 is the crystal. The circuit was originally used to frequency control a microwave oscillator.

VOLTAGE-CONTROLLED CRYSTAL OSCILLATOR



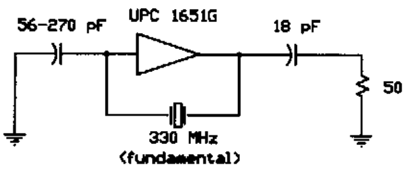
Notes:

1. For frequencies ≤ 1 MHz, C1 = 5 to 15 pF.
   For frequencies ≥ 1 MHz, C1 can be eliminated.
2. IC is SN74S124 for f_{max} of 60 MHz.
   IC is SN74LS124 for f_{max} of 35 MHz.

VALPEY-FISHER

Fig. 22-7

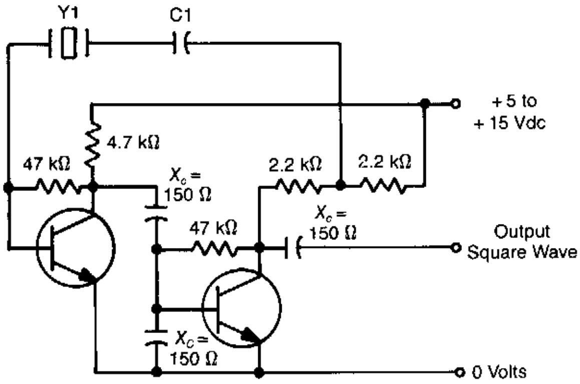
330-MHz CRYSTAL OSCILLATOR



RF DESIGN *Fig. 22-8*

A μPC 1651G IC operates in the fundamental mode with an experimental crystal at 330 MHz. The 56-to-270 pF capacitor is not critical; about +1-dBm RF output is available.

10-to 80-MHz OSCILLATOR

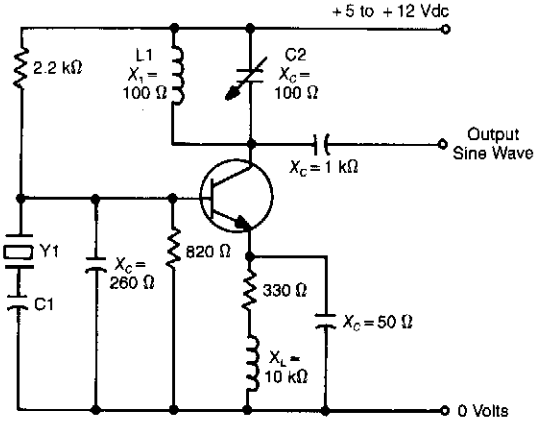


VALPEY-FISHER *Fig. 22-9*

Notes:

1. Y1 is "AT" cut, fundamental, or overtone crystal.
2. Tune L1 and C2 to operating frequency.

10-to 150-kHz OSCILLATOR

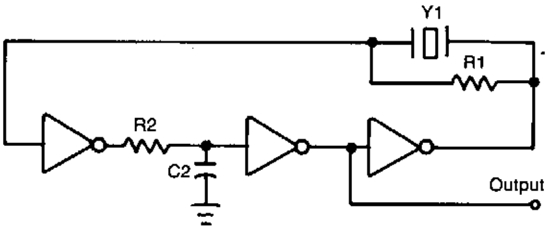


VALPEY-FISHER *Fig. 22-10*

Note:

Y1 is "H", "NT," or "E" cut

1-to 4-MHz CMOS OSCILLATOR

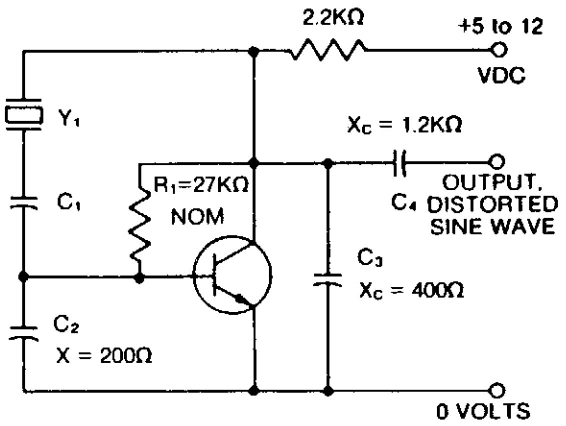


VALPEY-FISHER *Fig. 22-11*

Notes:

1. 1 MΩ < R_1 < 5 MΩ
2. Select R_2 and C_2 to prevent spurious frequency.
3. ICs are 74C04 or equivalent.

150-to 30 000-kHz OSCILLATOR



Notes:

1. Y1 is "AT", "CT", "DT", "NT", "SL", or "E" cut.
2. C1, C2, and C3 in series should equal the load capacity of crystal.
3. Adjust R1 for 1/2 supply voltage at collector of transistor.

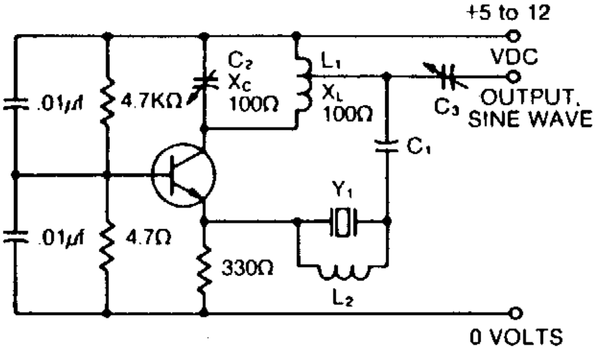
VALPEY-FISHER

Fig. 22-12

C1 capacitor in series with the crystal may be used to adjust the output frequency of the oscillator. The value can range between 20 pF and 0.01 µF, or it can be a trimmer capacitor.

X values are approximate and can vary for most circuits and frequencies; this is also true for resistance values. Adequate power supply decoupling is required; local decoupling capacitors near the oscillator are recommended.

50-to 150-MHz OSCILLATOR



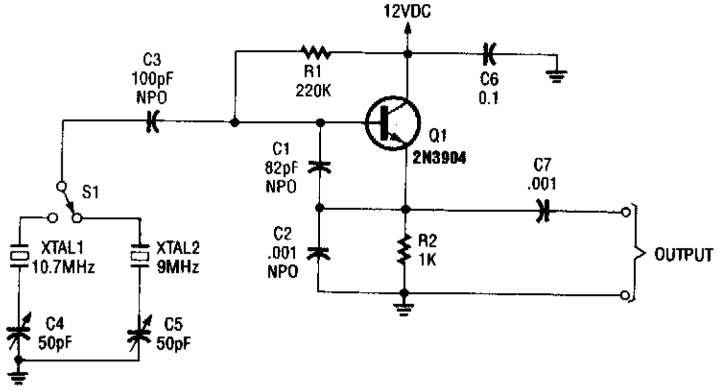
VALPEY-FISHER

Fig. 22-13

Notes:

1. Y1 is "AT" cut, overtone crystal.
2. Tune L1 and C2 to operating frequency.
3. L2 and shunt capacitance (C0) of crystal (approximately 6 pF) should resonate to the output frequency of the oscillator (L2 = 0.5µH at 90 MHz). This is necessary in order to tune out effect of C0 of the crystal.
4. C3 is varied to match output.

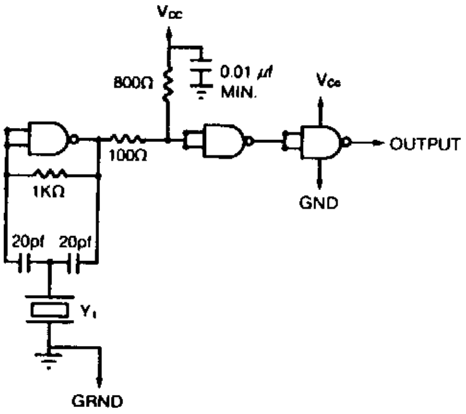
TWO-FREQUENCY COLPITTS OSCILLATOR



POPULAR ELECTRONICS *Fig. 22-14*

Using switched crystals, this oscillator is intended for receiver alignment purposes.

1-to 20-MHz TTL OSCILLATOR

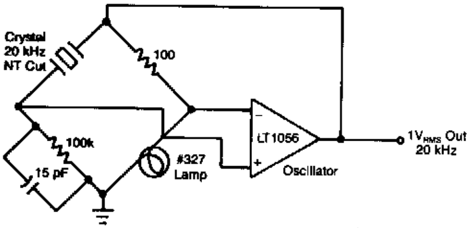


Notes:

1. Y1 is "AT" cut fundamental crystal.
2. ICs are 7400/7404.

VALPEY-FISHER *Fig. 22-15*

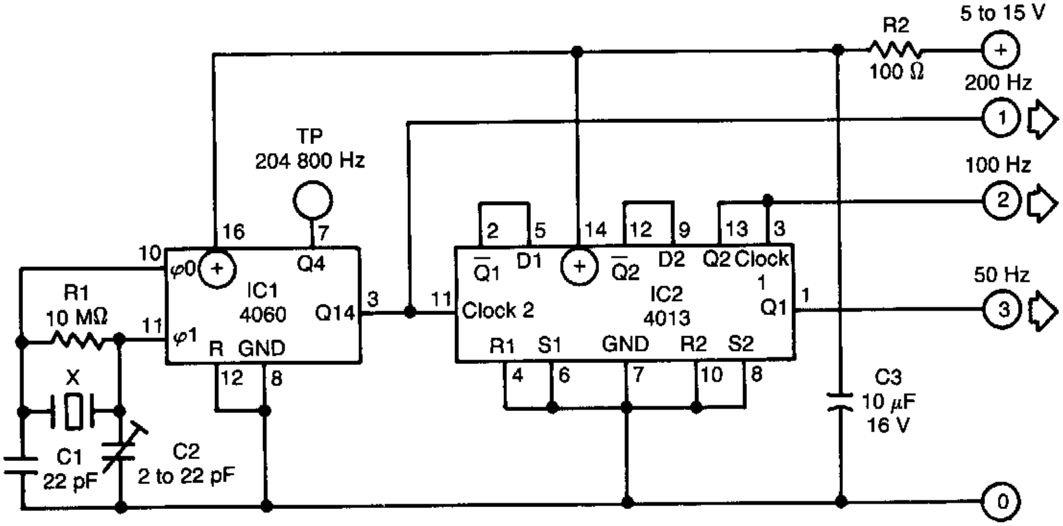
CRYSTAL-CONTROLLED BRIDGE OSCILLATOR



This crystal-controlled oscillator uses the current variations in a small lamp to stabilize amplitude variations.

EDN *Fig. 22-16*

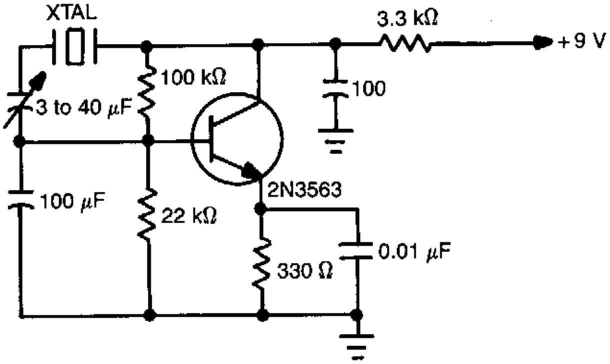
ECONOMICAL CRYSTAL TIME BASE



ELEKTOR ELECTRONICS *Fig. 22-17*

The above time base circuit will provide 50-, 100-, or 200-Hz signals from an inexpensive crystal cut for 3.276 8 MHz, a common crystal used for microprocesser works. It requires a power supply of 5 to 15 V at 0.05 to 2.5 mA.

CRYSTAL OSCILLATOR



WILLIAM SHEETS *Fig. 22-18*

This simple circuit will oscillate with a wide range of crystals. Connect several different types of crystal holders in parallel to improve versatility. The 3-to 40-pF capacitor adjusts crystal frequency over a small range for setting to standard-frequency transmissions when the unit is used as a crystal calibrator.