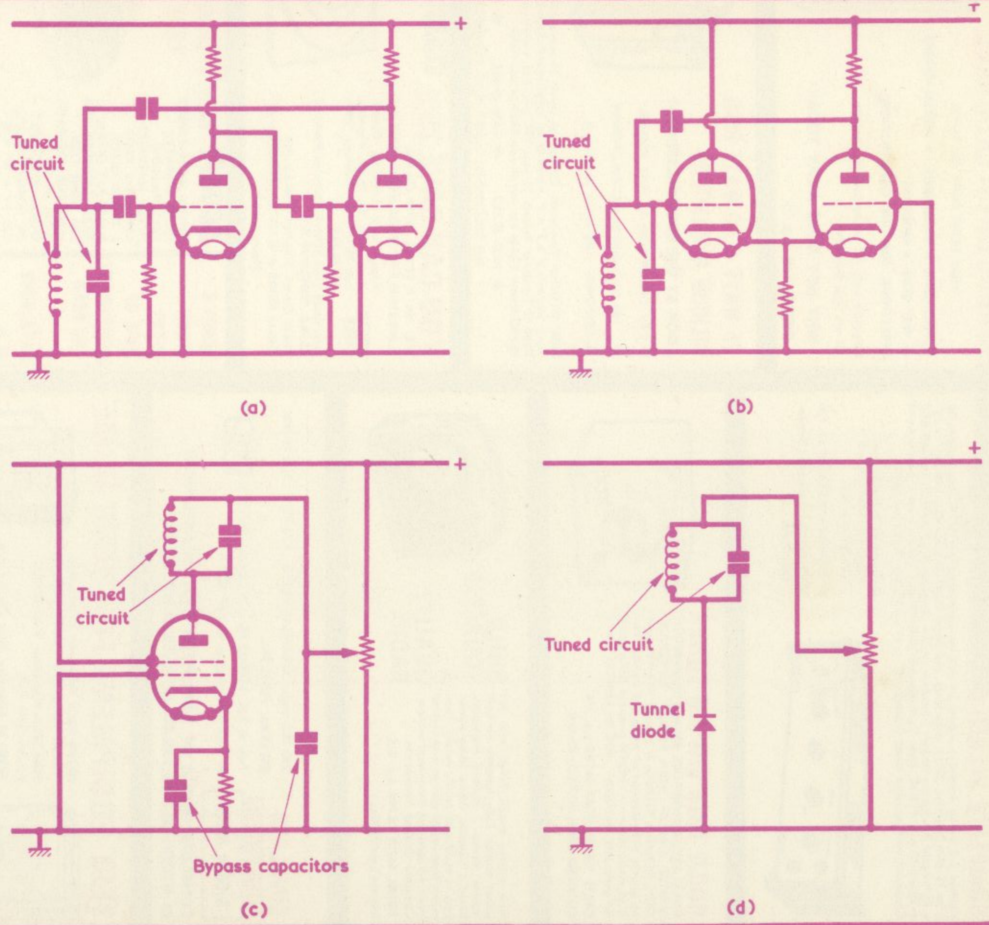
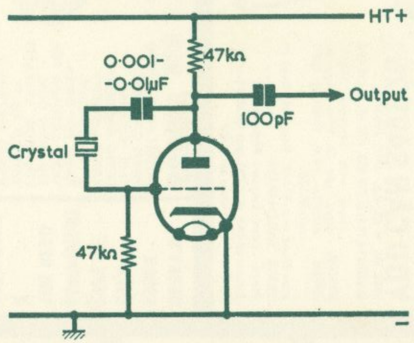
TWO-TERMINAL L.C. OSCILLATORS

The diagrams illustrate four LC oscillators which require no tap into either the inductive or capacitive half of the tuned circuit. Those shown in (a) and (b) are Franklin and cathode-coupled oscillators respectively. In both these oscillators a signal at the grid of the left-hand triode is fed back in phase from the anode of the right-hand triode. The dynatron oscillator in (c) is a negative resistance oscillator and functions due to secondary emission from the anode of a tetrode (*not* a pentode) when the anode supply potential is lower than that of the screen-grid. The tunnel diode negative resistance oscillator in (d) should have a supply potential of 1 to 1.5 volts and the potentiometer should be some 10 to 30Ω.

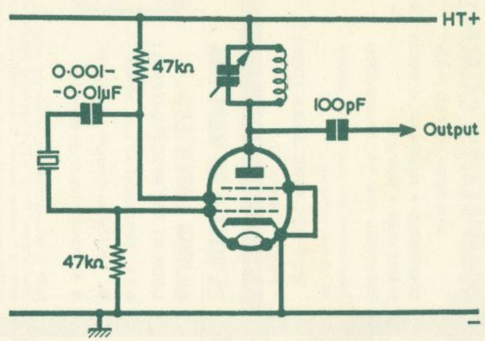


CRYSTAL OSCILLATORS

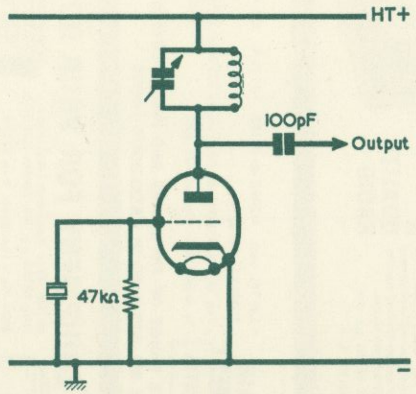
In the oscillators shown the crystal runs at, or very near, parallel resonance. The Pierce oscillator is shown in (a); if Cgk and Cak are added the circuit resolves to the Colpitts configuration. The same oscillator appears in (b) with the screen-grid as effective anode. The anode tuned circuit may be resonant at the second to fifth harmonic and output is at harmonic frequency. The oscillator in (c) is a crystal version of the tuned anode – tuned grid oscillator (see Data Sheet 42). The circuit in (d) offers a stable reference frequency with 'marker' harmonics up to 30MHz or more. The 100pF variable capacitor gives very fine control of frequency.



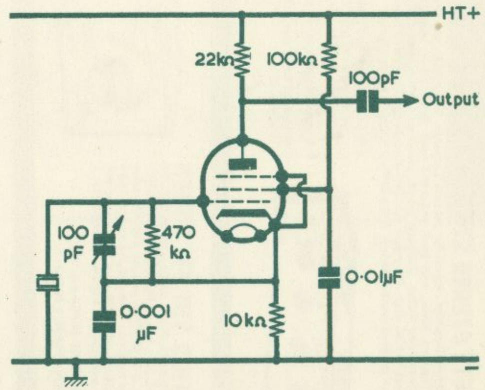
(a)



(b)



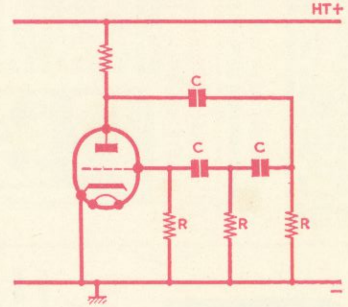
(c)



(d)

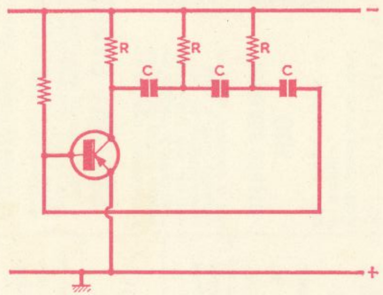
R.C. SINE WAVE OSCILLATORS

The resistance-capacitance oscillators shown produce an undistorted sine wave when valve or transistor gain is just sufficient to maintain oscillation. The phase shift oscillators of (a) and (b) have networks which produce a phase shift of 180°. Note that the anode resistor in (a) and the base resistor in (b) are outside the network; the variation in (b) is due to the low base impedance of the transistor. Neither (a) nor (b) will oscillate if voltage gain is less than 29. In (c) and (d) oscillation occurs at the frequency where phase shift is zero. The circuit in (d) shows the Wien Bridge oscillator; in this, R3 and R4 have values which slightly unbalance the bridge. In all equations F is in Herz, C in farads and R in ohms.



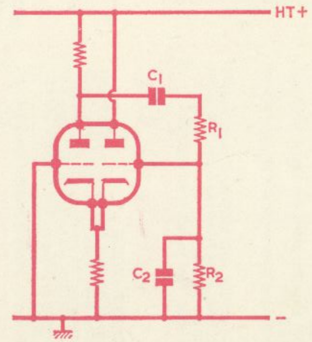
$$f_o = \frac{1}{2\pi CR\sqrt{6}}$$

(a)

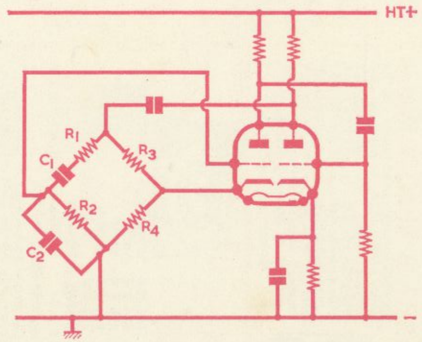


$$f_o = \frac{1}{2\pi CR\sqrt{6}}$$

(b)



$$f_o = \frac{1}{2\pi\sqrt{C_1C_2R_1R_2}}$$



$$f_o = \frac{1}{2\pi\sqrt{C_1C_2R_1R_2}}$$