

The High-Frequency Oscillator

ARRL Handbook 1946

Design considerations - Stability of the receiver is dependent chiefly upon the stability of the HF oscillator, and particular care should be given this part of the receiver. The frequency of oscillation should be insensitive to changes in voltage, loading, and mechanical shock. Thermal effects (slow change in frequency because of tube or circuit heating) should be minimized. These ends can be attained by the use of good insulating materials and circuit components, suitable electrical design, and careful mechanical construction.

In addition, the oscillator must be capable of furnishing sufficient RF voltage and power for the particular mixer circuit chosen, at all frequencies within the range of the receiver, and its harmonic output should be as low as possible to reduce spurious response.

It is desirable to make the L/C ratio in the oscillator-tuned circuit low (*high-C*), since this results in increased stability. Particular care should be taken to insure that no part of the oscillator circuit could vibrate mechanically. This calls for short leads and "solid" mechanical construction. The chassis and panel material should be heavy and rigid enough so that pressure on the tuning dial will not cause torsion and a shift in the frequency. Care in mechanical construction is well repaid by increased frequency stability.

Circuits - Several oscillator circuits are shown in Fig. 723.

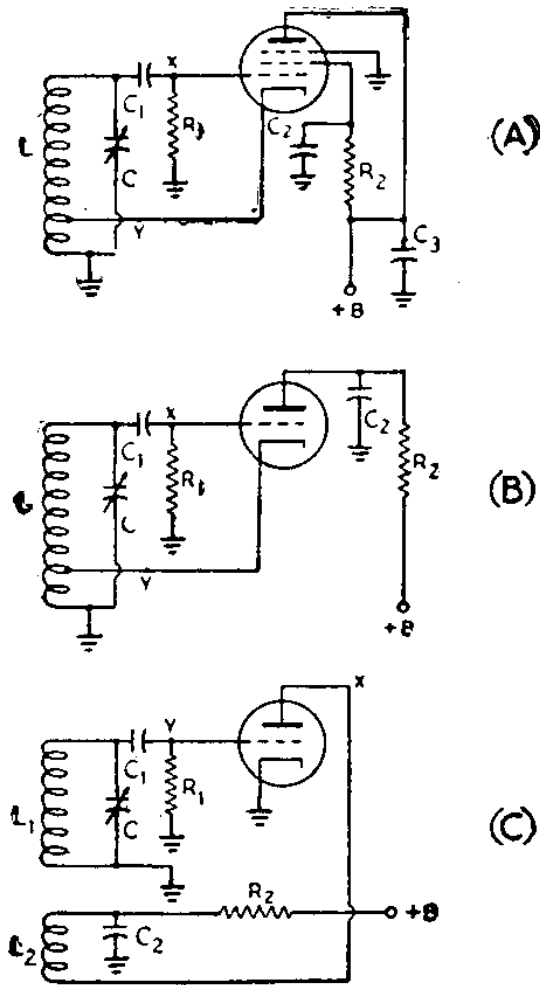


Fig. 723 — High-frequency oscillator circuits. A, screen-grid grounded-plate oscillator; B, triode grounded-plate oscillator; C, triode oscillator with tickler circuit. Coupling to the mixer may be taken from points X and Y. In A and B, coupling from Y will reduce pulling effects, but gives less voltage than from X; this type is best adapted to mixer circuits with small oscillator-voltage requirements. Typical values for components are as follows:

| | Circuit A | Circuit B | Circuit C |
|------------------|------------------|---------------------------|---------------------------|
| C ₁ — | 100 $\mu\mu$ fd. | 100 $\mu\mu$ fd. | 100 $\mu\mu$ fd. |
| C ₂ — | 0.1 μ fd. | 0.1 μ fd. | 0.1 μ fd. |
| C ₃ — | 0.1 μ fd. | | |
| R ₁ — | 50,000 ohms. | 50,000 ohms. | 50,000 ohms. |
| R ₂ — | 50,000 ohms. | 10,000 to 25,000 ohms. | 10,000 to 25,000 ohms. |

The plate-supply voltage should be 250 volts. In circuits B and C, R₂ is used to drop the supply voltage to 100–150 volts; it may be omitted if voltage is obtained from a voltage divider in the power supply (§ 8-10).

The point at which output voltage is taken for the mixer is indicated in each case by X or Y. Circuits A and B will give about the same results, and require only one coil. However, in these two circuits the cathode is above ground potential for RF, which often is a cause of hum modulation of the oscillator output at 14 MHz and higher frequencies when 6.3-volt heater tubes are used. Hum usually is not bothersome with 2.5-volt tubes, nor, of course, with tubes which are heated by direct current. The circuit of Fig. 723-C overcomes hum, since the cathode is grounded. The two-coil arrangement is advantageous in construction, since the feedback adjustment (altering the number of turns on L_2 or the coupling between L_1 and L_2) is simple mechanically.

Besides the use of a fairly high C/L ratio in the tuned circuit, it is necessary to adjust the feedback to obtain optimum results. Too much feedback will cause the oscillator to "squeg," or operate at several frequencies simultaneously; too little feedback will cause the output to be low. In the tapped-coil circuits (A, B), the feedback is increased by moving the tap toward the grid end of the coil; in C, by increasing the number of turns on L_2 or by moving L_2 closer to L_1 .

The oscillator plate voltage should be as low as is consistent with adequate output. Low plate voltage will cause reduced tube heating and thereby reduce frequency drift. The oscillator and mixer circuits should be well isolated, preferably by shielding, since coupling other than by the means intended may result in pulling.

To avoid plate-voltage changes that may cause the oscillator frequency to change, it is good practice to use a voltage-regulated plate supply employing a gaseous VR tube.