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R-F Transistors

Their Characteristics and Applications

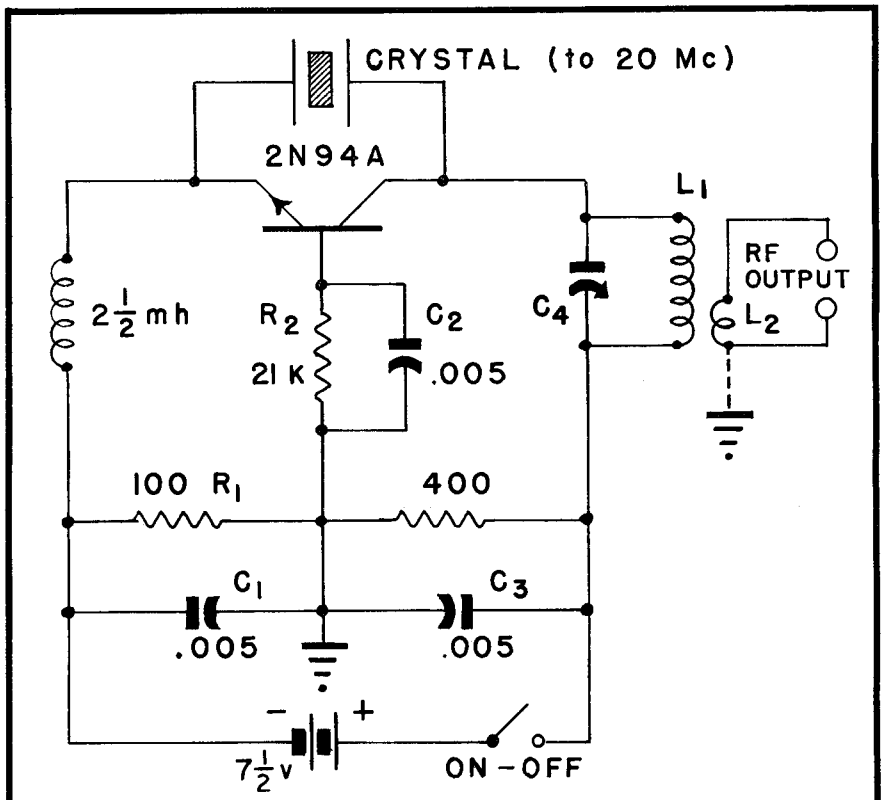
Part: 2

By the Engineering Department, Aerovox Corporation

High-Frequency Crystal Oscillator. Figure 4 shows the circuit of a general-purpose crystal oscillator for use at crystal frequencies up to 20 megacycles. This circuit was designed for the 2N94A transistor. The CK762 also will operate in this set-up but the battery terminals must be reversed for the latter type. Emitter bias is developed across resistor R_1, and collector bias across R_3.

The circuit is a ready oscillator and delivers approximately 10 milliwatts r-f output. The tuned-circuit constants, C_4 and L_1, are chosen for resonance at the crystal frequency. The low-impedance pickup coil, L_2, consists of 2 or 3 turns wound close to the lower end of L_1.

Superheterodyne Radio Broadcast Receiver. A completely-transistorized broadcast superhet receiver circuit is shown in Figure 5. In this arrangement, the original Raytheon design has been adapted for use of transistor-type i-f transformers, oscillator coil, loop antenna, and audio transformers recently made available commercially.



GENERAL-PURPOSE H-F CRYSTAL OSCILLATOR

FIGURE 4

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The receiver uses CK761 transistors in the converter and oscillator stages (V_1 and V_8, respectively), CK760's (V_2 and V_3) in the i-f channel, a CK760 (V_4) as a power-type 2nd detector, a CK721 low-frequency transistor (V_5) as the audio driver, and two CK722's (V_6 and V_7) in the pushpull class-B audio output stage. Power output is 100 milliwatts or better. A single 6-volt battery (four Size-D flashlight cells connected in series) is used, with a tap at 3 volts.

The subminiature i-f transformers (T_1, T_2, and T_3) and the oscillator coil (T_6) are slug-tuned. The main tuning control is the 2-gang 365-uufd variable capacitor. The variable capacitors, C_t, shunting each section of the tuning capacitor are the small trimmers built into the latter.

Since the i-f amplifier transistors, V_2 and V_3, are connected as common emitters, the i-f channel basically is regenerative and oscillation normally would be encountered. To circumvent this, 30-uufd neutralizing capacitors are connected between these stages, as shown. The i-f gain is better than 30 db per stage including transformer losses.

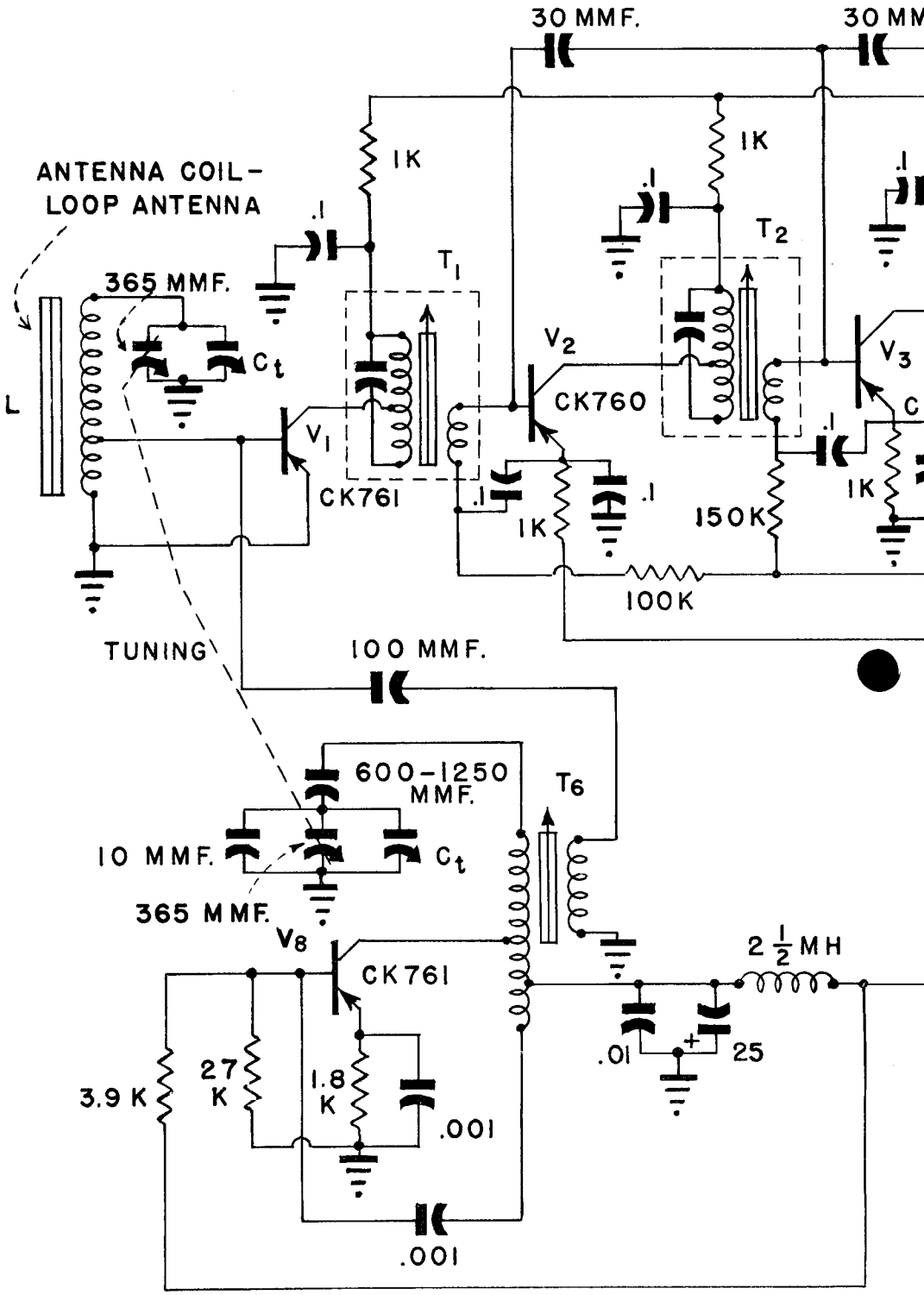
Bias for both of the i-f stages is obtained via avc action from the 2nd detector, V_4, which operates as a class-B power type.

Audio quality is improved by degenerative feedback through the 18K resistor from the secondary of T_5 to the base of V_5.

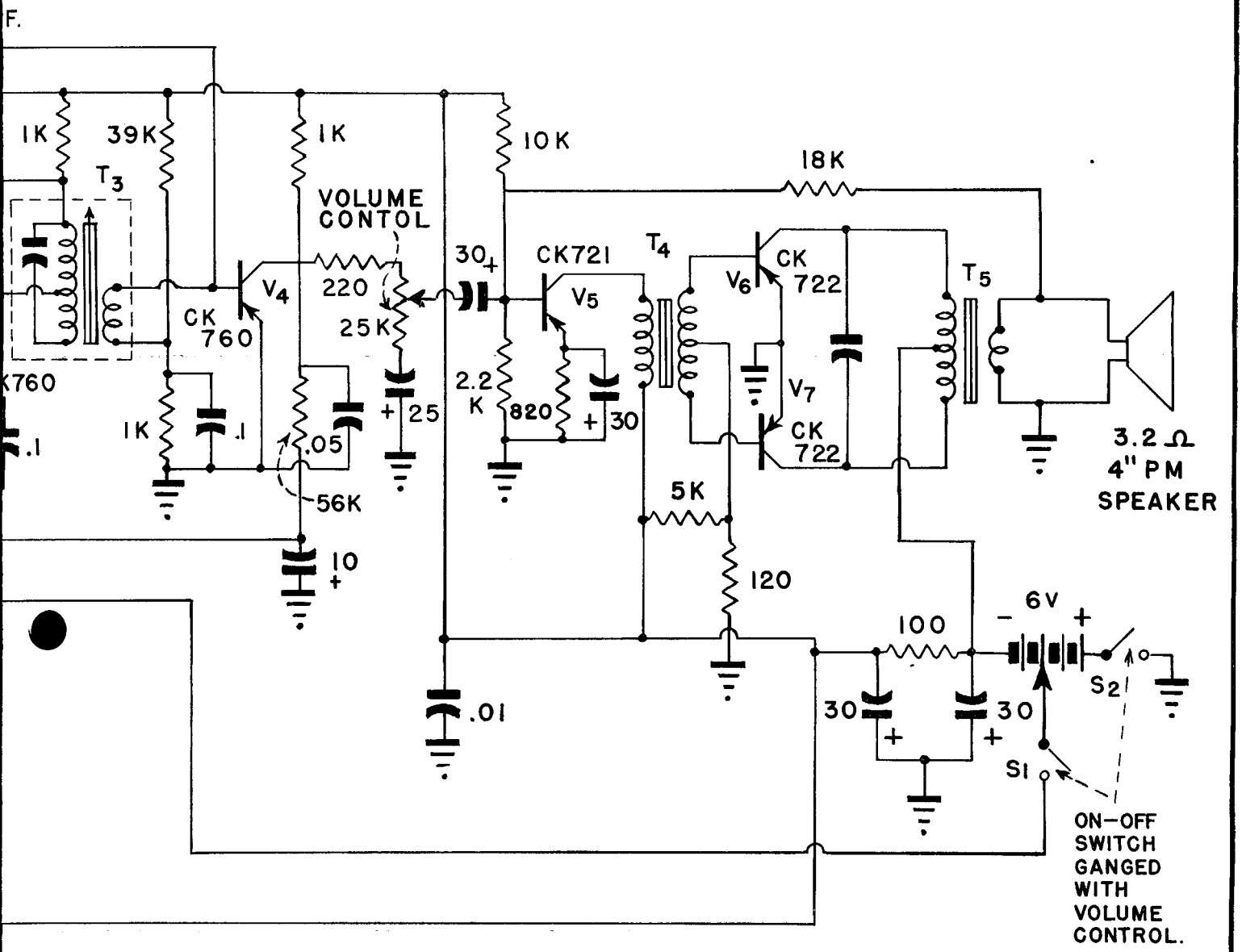
Additional Applications

There are many possible, practical applications of high-frequency transistors for which there is not room for discussion here.

Such applications include high-speed flip-flops and other electronic switches and multivibrators, video amplifiers, signal monitors and meters especially the heterodyne type, beat-frequency oscillators, portable short-range transmitters, radio control transmitters and receivers, regenerative and superregenerative receivers, pulse forming circuits, and clipping circuits.



COMPLETELY – TRANSISTORI



CAPACITANCE IN MFD., RESISTANCE IN OHMS – UNLESS OTHERWISE LABELLED.

L. TRANSISTOR LOOP ANTENNA – J. W. MILLER NO. 2000.

T_1, T_2, T_3. 455 Kc TRANSISTOR I. F. TRANSFORMER – J. W. MILLER NO. 2041.

T_4. TRANSISTOR CLASS–B DRIVER TRANSFORMER – TRIAD T–41X.

T_5. TRANSISTOR CLASS–B OUTPUT TRANSFORMER – TRIAD TY–47X.

T_6. 455 Kc TRANSISTOR OSCILLATOR COIL – J. W. MILLER NO. 2020.

ZED SUPERHETERODYNE BROADCAST RECEIVER

FIGURE 5