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BATTERY-POWERED SUPER RL-9

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The Super RL-9 has four stages and uses small-size battery tubes. It incorporates a regenerative circuit in the intermediate-frequency stage, thus greatly increasing the sensitivity of the receiver. It is equipped with automatic volume control. The oscillator tuning circuit has a movable core, thus facilitating the reception of short waves. It can pick up any radio broadcast in the USSR throughout the whole year. Its construction is very simple. Individual coils are used, which are of simple construction but of good quality. Any coil built for contemporary "super" sets can be used. The chassis is easy to assemble.

Circuit

The circuit diagram of the Super RL-9 is appended. This set can operate on 16 - 50 meters (short wave), 200 - 550 meters (medium wave), and 750 - 2,000 meters (long wave).

Tube SB-242 is used as the frequency converter. It connects to the antenna on all three bands. Trimmers are set only in the input circuit. Fixed trimmers are used in the oscillator circuit. The short-wave coils are placed between the appropriate electrodes of the frequency converter tubes. When the long- and medium-wave-bands are used, the short-wave coils remain dead. It is equipped with inductive vernier tuning, a magnetic core which moves within the short-wave coil of the oscillator.

Tube 2K2M is the second tube and operates as the IF amplifier. The third tube is also a 2K2M, and serves as the grid detector with a regenerative circuit. This system is used because a battery diode-triode has not been developed to replace the 2K2M tubes whose screen grid is used as an anode, while the plate serves as a diode detector. This arrangement does not give the best possible results.

The grid detector has to be very sensitive. This sensitivity is greatly

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increased due to the presence of a feedback circuit. The use of the feedback circuit also permits easier operation of the first two tubes, with the result that a lower plate-supply voltage is required, and increased stability of the receiver is obtained. The feedback circuit is regulated by a variable capacitor.

Resistance R_7 in the plate circuit of the detector tube 2K2M acts as the load impedance for high frequencies. The bias voltage that is developed on the grid of the detector tube during detection is conducted through resistances R_3 and R_1 to the control grids of the mixer tube SB-242 and the first 2K2M tube. This acts to a certain degree as an automatic sensitivity regulator, and at the same time prevents overloading of the detector during the reception of strong signals. The volume control is located in the grid circuit of the output tube.

The type of output tube depends on the type of loudspeaker used, and on the volume desired. If excessive consumption of power is no objection, and the circuit contains a loudspeaker (dynamic-type) with a permanent magnet, an SO-244 tube can serve as the output tube. If a 2K2M tube is used as the output tube, the power consumption will be less with a proportionate decrease of volume.

Resistance R_{11} in the screen grid circuit of the output tube is fixed, i.e., 10,000 ohms, when using either of the above-mentioned output tubes. Bias resistance R_{14} varies, however, depending on the type of tube used. It is also possible to use a piezoelectric loudspeaker with this set.

A 2Zh2M tube can take the place of the 2K2M either as a detector tube or the output tube.

Details of Parts

All circuit coils are independent, and are wound on paper forms. Short-wave coils are wound on 17-millimeter diameter forms. Coil L_1 is wound so that each layer of the coil is superimposed on the one below. Coil L_2 is wound so that there are equal spacings between the windings. Coil L_7 is also wound with spacings between the windings. Coil L8 is wound in the spaces between the windings on coil L_7. Medium-wave coils are wound on 20-millimeter diameter forms with irregular windings.

Coils L_4, L_6, L_9, and L_{11} have additional space permitting additional windings if needed. They are wound on rings made of pressed material 1-millimeter thick. The internal diameter of the rings is 20 millimeters. The width of the ring forms plus the coils is 8 millimeters for coils L_4, L_{13} and L_9, while the width for coil L_6 is 13 millimeters. The windings are all single layer. The ends of the windings are soldered to tie lugs (flanges). These lugs are placed symmetrically around the circumference of the forms, and are attached firmly with string windings. All the coils, except the short-wave coils, are then dipped in paraffin or wax.

The two-gang variable capacitors have a maximum capacity of 500$\mu\mu$F each. The band selector has three positions, and is constructed of two S-sectional plates. The IF transformer is of the usual type which operates on 465 kilocycles. The feedback coil (L_{17}) has 40 windings, and is wound in the spaces between the windings of the grid coil L_{16}. Condenser C_{24} with solid dielectric has a capacity of 200 - 500$\mu\mu$F. The filament rheostat has a resistance of 10 ohms.

Assembly

The tubes, etc., are mounted on a veneer chassis measuring 260 x 160 x 65 millimeters. The sides of the chassis are secured by screws or nails. The

parts are arranged in the following order: the SB-242, IF transformer T_1, 2K2M tube, IF transformer T_2, detector tube 2K2M, and the output tube which is either a 2K2M or SO-244. The antenna and ground attachments, and plugs for headphones are located on the rear panel. The front panel has several dials. The farthest to the left is the volume control, next comes the feedback dial, the center dial is for tuning, next comes the dial for vernier tuning, followed by the band switch.

All medium- and long-wave coils are located on the top of the chassis. The antenna coils are located next to the tuning condenser gang, while the oscillator coils are located on the edge. The oscillator coil is connected as follows: The one end of the L_{10} and L_{12} coils are connected to condenser C_{14}, while the other ends are connected to the band switch. Coils L_9 and L_{11} have one end connected to the switch, while the other end is attached to condensers C_{10} and C_{13}, respectively. The one end of the L_4 and L_6 coils of the input circuit are connected to the band switch, while the other end is grounded.

The upper end of the short-wave oscillator coil L_7 is connected to the variable condenser C_7, while the lower end is attached to the band switch. The upper end of coil L_8 is attached to the switch, and the lower end is connected to the oscillator anode of the tube. The upper end of the short-wave coil in the input circuit is attached to the variable condenser C_4, and the lower end is attached to the band switch. The upper end of the short-wave antenna coil L_1 is grounded, while the other end is attached to the band switch. The correct connection of the ends of the feedback circuit coil L_{17} is accomplished during the tuning of the apparatus.

It is said that this receiver will operate so well that it will be possible to hear the voice of Moscow in all parts of the Soviet Union.

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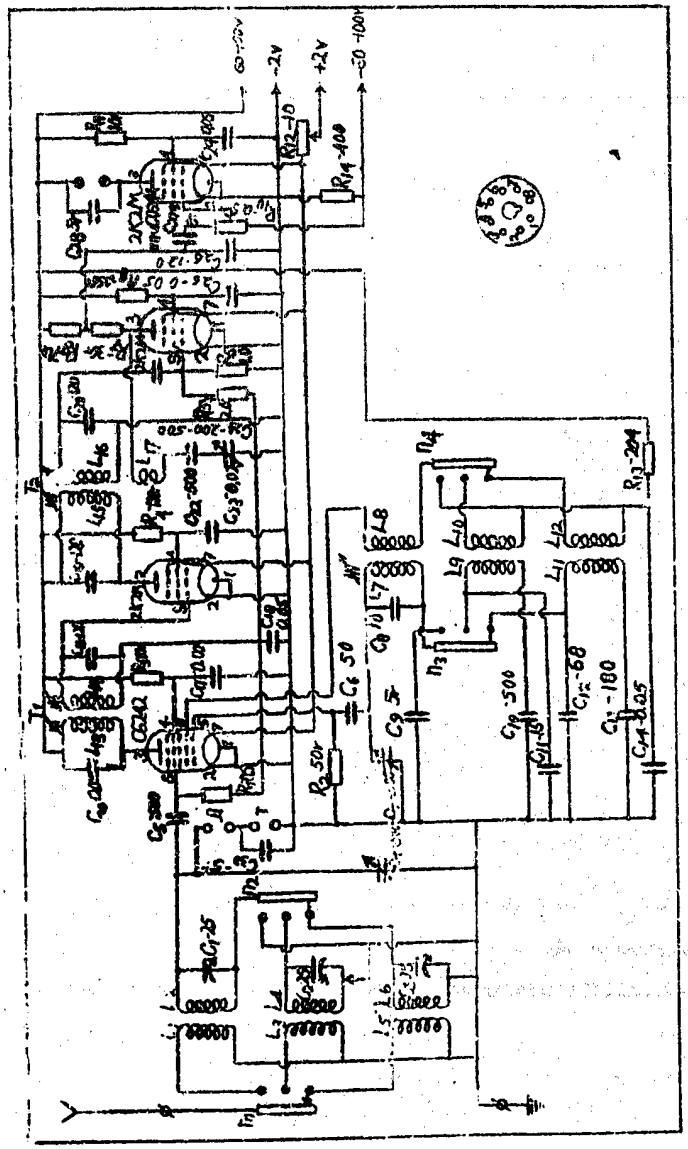

Circuit Diagram of the Super RL-9

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