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AN ULTRASHORT-WAVE RADIO STATION FOR REMOTE NEWS REPORTING

Yu. Mikhaylov (UA1BP)
Leningrad

This portable ultrashort-wave radio station, shown at the ninth all-Union radio exhibition, is designed to transmit on-the-scene reports from stadiums, squares, streets, buildings, and other places. It permits positive communication at distances up to one kilometer, which is sufficient for transmission to a relay point equipped with an ultrashort-wave receiver. At this point, the transmission can be recorded or relayed further to a radio broadcast station by wire. Such a radio station releases the reporter from wire communications and permits him greater freedom of movement.

This station can also be used during various competitions to transmit commands and reports of judicial boards over various ranges, in the river fleet for transmission of commands from a tugboat to a barge or float, in buildings, and other places.

The radio station uses amplitude modulation on one fixed frequency in the amateur ultrashort-wave band (85-87 Mc).

Power is supplied by two series-connected NKN-10 nickel-alkaline storage batteries with a drain of about 1.9 amp. The plate voltage of 120 is supplied by a vibrator power pack. The battery will last for several hours of continuous operation.

The antenna consists of a quarter-wave whip which is inserted into a socket located in the top of the transmitter chassis during operation.

The radio weighs 4.6 kg with batteries.

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Circuit

The schematic diagram is shown in the appended figure. Two tubes are used. Tube L1, and SO-257, is used as an electron-coupled rf oscillator. The grid circuit L1C1 is tuned to about 43 Mc with trimmer capacitor C1. Capacitor C2 and resistor R1 provide negative bias on the control grid. The voltage is applied to the tube's screen grid through resistor R3.

Circuit L5C5C6 is connected in the plate circuit of L1. This circuit removes the second harmonic generated in the screen circuit. The plate circuit is tuned with trimmer capacitor C6. Capacitor C5 prevents short-circuiting of the plate battery if the plates of capacitor C6 touch. The use of frequency doubling in the electron-coupled circuit provides adequate stability in the transmitter's operating frequencies.

To increase the oscillator power, a positive potential is applied through resistor R2 to the suppressor grid of L1.

The antenna is inductively coupled to the oscillator's output circuit with coil L3. C7 is a blocking capacitor.

Plate-screen modulation is used in the set. The required modulation index is obtained through potentiometer R4, which controls the af voltage on the control grid of L2, an SO-241 modulator. If necessary, 2K2M or 2Zh2M tubes can also be used in the modulator.

To eliminate background noise induced by the vibrator power pack, the tube filaments and microphone supply circuit are connected to the battery through a filter consisting of low-frequency choke coil Dr2 and electrolytic capacitor C15. A filter consisting of chokes Dr3 and Dr4 and capacitors C9, C10, and C11 is used to suppress high-frequency interference developed in the primary of the vibrator power pack.

Capacitors C12, C13, C14, C17, and C18 are used to eliminate sparking at the vibrator contacts. A voltage-doubling circuit is used in the rectifier.

Components

Most of the set components are homemade. The grid circuit coil of oscillator L1 is wound on a plastic or ceramic form 10 mm in diameter. It has nine turns of PEL 0.8 wire, and the winding is 14 mm long.

The tap for the cathode is made from the third turn, counting from the coil's grounded side.

Coils L2 and L3 are spaced 4 mm apart on one ceramic form 20 mm in diameter. Coil L2 has 3.5 turns of bare, silver-plated wire one millimeter in diameter, and L3 has 1.5 turns of the same wire. The winding of L2 is 15 mm in length.

A ceramic trimmer capacitor, Type KPK-1, is used as capacitor C1. Trimmer capacitor C6 with an air dielectric has a ceramic base.

The rf choke Dr1 is wound with PELShO 0.25 wire on a cylindrical form 10 mm in diameter. The winding consists of 30 turns and is 12 mm long.

All the components in the rf circuits must have low dielectric losses.

Microphone transformer Tr1 is assembled on a core 0.36 sq cm in cross section. The primary winding has 150 turns of PEL 0.2 wire and the secondary, 1,500 turns of PEL 0.07 wire.

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The core of modulation transformer Tr2 is 1.0 sq cm in cross section. Both windings have 4,500 turns of PEL 0.12 wire. The output transformer from an RSI-4 receiver can also be used as a modulation transformer.

The specifications of power pack transformer Tr3 are as follows: the core cross section is 2.6 sq cm; winding I has 144+ 144 turns of PEL 1.0 wire; and winding II has 1,500 turns of PEL 0.3 wire. Varnished cambric is inserted between the layers of the primary winding. In the secondary winding, the varnished cambric can be placed between every two or three layers. Special attention must be given to the insulation between the primary and secondary windings.

Choke Dr2 is wound on a core 0.65 sq cm in cross section. It has two windings of 75 turns each, both using PEL 0.59 double wire. The winding resistance is such that with 2.4 v on the battery terminals, there are 2 v on the tube filaments of the transmitter.

The core of choke Dr5 is the same as choke Dr2, but its winding has 4,000 turns of PEL 0.12 wire.

The rf chokes Dr3 and Dr4 are not wound on forms. They have 20 turns of PEL 1.0 wire wound turn to turn. The winding diameter is 10 mm. The turns of the coils are cemented by a solution of polystyrene in benzene for rigidity.

A vibrator designed to operate from 2.4 v is used in the transmitter. However, after a simple alteration, i.e., rewinding the vibrator coil, synchronous vibrator power packs designed for other voltages can be used.

The transmitter uses a carbon microphone with a MK-10MB button. Switch Vk1 can be of any type. The antenna socket is attached to a ceramic insulator taken from a high-voltage capacitor.

The whip antenna consists of nine flexible steel strips of various lengths 10 mm wide and 0.15 mm thick. The longest strip (760 mm) is arranged in the center, with the shorter strips on either side of it. The strips are riveted together in 12-cm intervals. Washers are used where the rivets pass through the strips. The tape from an old steel ruler can be used for the strips. The antenna can be folded and occupies very little space when the transmitter is moved.

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/Appended figure follows./

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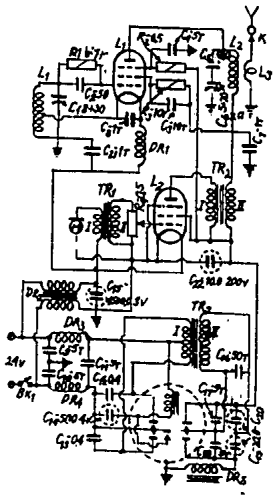

Schematic Diagram
of the Transmitter

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