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USSR EXHIBITS AMATEUR ULTRASHORT-WAVE COMMUNICATIONS EQUIPMENT

A. Kamalyagin

A third prize in the ultrashort-wave equipment section of the Ninth All-Union Radio Exhibition was awarded to G. G. Kostandi and V. N. Komylevich, members of the Leningrad Dosarm Radio Club, for building an AM-FM club transmitter operating on the amateur ultrashort-wave band (85-87 mc). The frequency of the transmitter is crystal-controlled in both types of modulation.

In FM operation, the exciter is a multivibrator whose pulse frequency is maintained at 100 kc by a crystal. The exciter also includes the four following stages which modulate the pulses with respect to duration and convert them into FM oscillations at a center frequency of 100 kc. This is followed by the repeated frequency multiplication.

In AM operation, a total of three stages is used. The first stage is a master oscillator whose frequency is crystal controlled at 7.2 mc. Its plate circuit produces a frequency of 14.4 mc, which in turn is multiplied six times. Thus a frequency of 86.4 mc is obtained at the transmitter output side, the same as for the FM exciter. In FM operation, the circuit provides high stability of the center frequency even with high-frequency deviation occurring in modulation. The only disadvantage of this design is that it is difficult to adjust.

The AM ultrashort-wave club transmitter constructed by a group in the ultrashort-wave section of the Leningrad Radio Club, under the guidance of A. F. Ol'shevskiy operates on the push-pull principle with self-excitation using two 1D-5 tubes. In continuous operation, its power output is about 25-30 w. Plate modulation is used. The ultrashort-wave transmitter was given extensive operational tests, and good reception was obtained at distances up to 25 km.

The ultrashort-wave transmitter of the collective radio station at the Moscow Engineering Institute was built by radio amateur Yu. N. Kuz'min. This FM-AM transmitter is used for amateur radio communications on the 85-87 mc

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band. The transmitter contains the following three stages: master oscillator with a 6P3 tube, doubler with a GU-50 (P-50) tube, and power amplifiers with two GU-50s. In AM operation, the transmitter output is about 20 w. In this type of operation, modulation takes place in the pentode grid circuits of the output tubes. The amplitude modulator is a 6N6S tube.

Frequency modulation is accomplished by means of a 6Zh4 (6AC) reactance tube connected to the oscillatory circuit of the master oscillator. The microphone amplifier feeds the audio frequency voltage to the control grid of this reactance tube. This amplifier is also used to drive the modulator in AM operation.

An amateur ultrashort-wave transmitter with an output of 25 w built by V. P. Niyakiy (Dzerzhinsk, Gor'kiy Oblast) consists of three stages: master oscillator, doubler, and power amplifier. Electron coupling is used in the master oscillator (a 6C6 tube). Its grid circuit is tuned to a frequency of 21.2 mc, and the plate circuit to 42.6 mc. The frequency doubler is built around a 6P6S (6V6) tube, and the power amplifier around a GU-50 (P-50) tube. Frequency modulation is obtained by connecting a 6K3 (6SK7) reactance tube to the grid circuit. The transmitter is built in the form of two sections combined on a common chassis. The transmitter is quite small, its dimensions being 110 x 200 x 150 mm.

Kh. R. Tael and V. Yu. Kallaspaa, the supervisors of a group of radio-amateur builders in the Tallin Davaam Radio Club, were awarded a third prize in the ultrashort-wave equipment section of the Ninth All-Union Radio Exhibition for building an ultrashort-wave club transmitter. Other members of this group were Ya. Yu. Kuzma, Kh. A. Lutsuya, R. T. Aro, V. Ya. Sarv, and U. A. Velsberg.

This radio station is intended for operation on the amateur ultrashort-wave band (85-87 mc). Amplitude modulation is used in the transmitter but provisions have been made for use of frequency modulation in the future. The rf section of the transmitter is made up of four stages. The master oscillator, using a 6C5 tube in an ordinary Hartley oscillator circuit with autotransformer coupling and parallel feed, oscillates at a frequency of about 21.5 mc. The following stage is a doubler (also using a 6C5 tube), from the plate of which the second harmonic, i. e., a frequency of 43 mc, is taken. The third stage is a doubler using a G-807 tube. The output stage of the transmitter is the power amplifier using two RD12TF tubes in push-pull.

The modulator of the transmitter contains three stages. The input side of the modulator can be connected to a microphone or to another external audio-frequency source. Its first stage with a 6Zh8 (6SK7) tube is a resistance-coupled voltage amplifier. The second stage is a 6N7 tube used as a phase inverter. The output stage of the modulator consists of two RL12P15 tubes in push-pull.

Three rectifiers provide the power for the transmitter. The first is a 6X5 full-wave rectifier and supplies 100 v dc for negative bias of the control grids of the transmitter output tubes. The second rectifier uses the same type of connection with two 5T5S (5U4G) kenotrons. It supplies 150 v for the plates and screen grids of all stages of the transmitter and the stages of the modulator presampler. The third rectifier uses two type 372A gas rectifiers connected for full-wave rectification, and supplies 800 v for the plate of the modulator output stage.

The receiver of the station is composed of four stages using 6C5 tubes. The first stage is a superregenerative detector and the other stages serve to amplify the audio frequency. The receiver is supplied from a separate rectifier. Structurally, the station consists of four separate racks combined on a common frame.

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B. G. Karpov, member of the Leningrad Dosarm Radio Club was awarded a second prize at the Ninth All-Union Radio Exhibition for a number of designs for ultrashort-wave transceivers. These included a miniature ultrashort-wave radio station which can be used for communication with a similar station at distances up to 1 km. This transceiver contains only two miniature tubes (2P1P). The first tube operates as superregenerative detector when receiving, and as a shf oscillator when transmitting. The second tube operates as a low-frequency amplifier when receiving, and as a modulator when transmitting. The radio station is powered by either dry batteries or a vibrator power pack. The total weight of the transceiver is less than 1.5 kg.

Radio amateur designers F. A. Sidorov and Yu. A. Mikhaylov (Leningrad Dosarm Radio Club) exhibited a portable ultrashort-wave station for radio spot reporting. It is a two-stage transmitter for the 85-87 mc band, designed to fit into the case of a field-telephone set, and uses a whip antenna consisting of steel strips. The first stage of the transmitter, the rf oscillator, is an electron-coupled SO-257 and permits operation on a fixed frequency. The second stage is the amplitude-modulation stage operating on a transformer-coupled SO-241 tube. The power supply for the portable station is obtained from 2NK10 alkaline storage batteries. The heater voltage for the tubes is supplied directly from the batteries, and the plate voltage is produced with a synchronous vibrator power pack. The portable station provides positive transmission at distance up to 1 km.

A portable ultrashort-wave AM radio station built by V. A. Shirokikh (Tatar Republican Radio Club, Kazan') provides reliable radio communication within a radius of 5-6 km, using a whip antenna. The three tubes used are a 6NC5, a 6C5, and a 6F6. One of the triodes of the 6NC5 is used as superregenerative detector in receiver operation and as a shf oscillator in transmission. The other tubes amplify the audio frequency in reception, and are used for modulation in transmission. The station is composed of two boxes, one of them containing the radio station proper and the other, the rectifier and dynamic loudspeaker.

This incomplete review of the ultrashort-wave equipment shown at the Ninth All-Union Radio Exhibition gives ample evidence that many radio amateurs are becoming familiar with ultrashort-wave techniques.

One of the main shortcomings of the exhibits in this section was the comparative shortage of ultrashort-wave receiving equipment. Therefore, all Dosarm committees and radio clubs face the important task of propagandizing for the mastery of ultrashort-wave techniques by wide circles of radio amateurs. All Dosarm committees must fulfill the resolution of the All-Union Dosarm Council calling for the construction of short-wave and ultrashort-wave radio stations in every city.

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