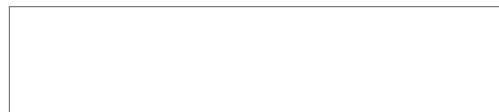


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R-250M RECEIVER

Part I: TECHNICAL DESCRIPTION

Part II: OPERATING INSTRUCTIONS

GROUP 1
Excluded from automatic
downgrading and
declassification

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U.S.S.R.,

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"P-250M" RECEIVER

Parts I and II

TECHNICAL DESCRIPTION

Part I

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I. DESTINATION

The "R-250M" receiver is destined for receiving signals of transmitting radio stations working both on the telegraph and telephone (with the amplitude modulation) regimes.

Possibility is provided for double and triplex reception during diversity reception using spaced antennas and translating operation on line.

With the accessory terminations the receiver can be used for reception of teletyping (with frequency and amplitude manipulation) ondulator recording and for phototelegraphy, and also for reception of multichannel and multiple telegraphy.

High accuracy of receiver calibration, high stability of its frequency and high sensitivity and selectivity make it possible to establish communication without search.

Possibility is provided for receiver operation with automatic frequency control (if there is a special motor and an accessory device - and AFC adapter).

Variable selectivity in the channels of intermediate and low frequencies makes the operation in conditions of different kinds of interference easier.

The receiver completely keeps its capacity for work:

- a) when changing the ambient air temperature from -10°C to $+50^{\circ}\text{C}$ (from $+14^{\circ}\text{F}$ to $+122^{\circ}\text{F}$);
- b) at the air relative humidity up to 98%;
- c) while varying the supplying a.c. mains voltage to $\pm 15\%$ and the current frequency to $\pm 2\%$.

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d) when varying the accumulator battery voltage (if the receiver is supplied by accumulators) to $\pm 10\%$.

The receiver is designed for continuous twenty-four-hour operation.

II. TECHNICAL DATA

The overall continual frequency range is within 1.5-25.5 mc/s (200-II.75 m).

The overall frequency range is divided into 12 bands with overlapping for each band:

I b	1.5 - 3.5 mc/s	VII b	13.5 - 15.5 mc/s
II b	3.5 - 5.5 "	VIII "	15.5 - 17.5 "
III b	5.5 - 7.5 "	IX "	17.5 - 19.5 "
IV "	7.5 - 9.5 "	X "	19.5 - 21.5 "
V "	9.5 - 11.5 "	XI "	21.5 - 23.5 "
VI "	11.5 - 13.5 "	XII "	23.5 - 25.5 "

Switching from one band to another is carried out by means of a drum-typeswitch. The overlapping margin on the ends of each band is not less than 50 KC/s, except the second band, the overlapping margin of which is provided by the adjacent bands.

The receiver inputs. The receiving device has the following inputs:

- 1) the antenna input of the receiver;
- 2) the second intermediate frequency input;
- 3) the input for driving the A.F.C. motor.

The input antenna circuit of the receiver is designed for operating from one of four antenna types:

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a) symmetrical antennas ending with feeder line the characteristic impedance of which is within 60 - 400 ohm;

b) asymmetrical antennas ending with feeder the characteristic impedance of which is within 60 - 400 ohm;

c) type "inclined beam" antennas with such parameters: the capacitance being within 100 - 300 pf and the active resistance about 100 ohm and whip antennas with such parameter: the capacitance is 50 pf and more.

For operation with antennas the impedance of which differs from those pointed out in "a" and "b" the trimming of the receiver input circuit is provided.

When operating with symmetrical antennas the degree of asymmetry of input stage does not exceed 10%.

Receiver Outputs

The receiver has:

a) output for operation on two pairs of low-resistance headphones of TA-56M type. Normal voltage on one pair of headphones is 1.5 V;

b) output for operation on line with characteristic impedance about 600 ohm; receiver line output power is not less than 0.5 w (the output is made on terminal-sockets on the receiver front panel and an output plug on the casing left wall);

c) automatic gain control (AGC) output intended for combined work of receivers during operation with spaced antennas (the output is on the single-wire plug on the receiver front panel and on the outputs plug on the casing left wall);

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d) high-resistance output of the second intermediate frequency (on the single-wire plug on the front panel), is carried out from the AGC amplification stage. High-resistance output voltage of the intermediate frequency is not less than 0.2 V when capacitive load is 100 pf (with the nominal sensitivity of the receiver);

e) low-resistance output of the second intermediate frequency (on the single-wire plug on the front panel) is carried out from the second amplification stage of the second intermediate frequency. Low-resistance output voltage of the intermediate frequency is not less than 25 mV when the capacitive load is 1000 pf (with the receiver nominal sensitivity);

f) detector load output intended for connection of different terminations and for combination during operation of receivers with spaced antennas (the output there is on the casing left wall).

Receiver Sensitivity

The receiver sensitivity at telegraphy reception is not worse than 0.6 mV when the signal-to-noise ratio is 3:1, pass-band at the intermediate frequency is 3 Kc/s and at the low frequency is 2.5 Kc/s, with the antenna equivalent being 100 ohm. The receiver sensitivity at telephony reception on the same conditions with the modulation frequency 1000 c/sec and modulation depth 30% is not worse than 3 mV.

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Receiver Selectivity

At the second intermediate frequency the receiver has a continuously variable pass-band from 1 to 14 Kc/s. With the pass-band control position 1, 3, 6 and 12 KC/s the frequency characteristics have got the following data:

Bandwidth 1 Kc/s - while rejected two times is 0.7 - 1.5KC/s;
when rejected 1000 times is not more
than 6.5 Kc/s;

bandwidth 3Kc/s - while rejected two times is not less than
2.5 KC/s; when rejected 1000 times is not
more than 12 Kc/s;

bandwidth 6 Kc/s - while rejected two times is not less than
5 Kc/s; when rejected 1000 times is not
more than 20 Kc/s;

bandwidth 12Kc/s - while rejected two times is not less than
11Kc/s; when rejected 1000 times is not more
than 30Kc/s;

At low frequency the receiver has four switched passbands with nominal values 8, 5, 2.5 and 0.3 Kc/s.

At operation on line with resistance 600 ohm:

bandwidth 8Kc/s - while rejected two times is limited with
frequencies not more than 80 c/sec and
not less than 7000 c/sec;

bandwidth 5Kc/s - while rejected two times is limited with
frequencies not more than 80 c/sec and not
less than 4000 c/sec and rejected 10 times -
not more than 6500 c/sec;

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bandwidth 2.5Kc/s - while rejected two times is limited with frequencies not more than 80 c/sec and not less than 2000 c/sec and when rejected 10 times - not more than 4000 c/sec;

bandwidth 0.3Kc/s - tone filter with the mean frequency 900 - 1100 c/sec, and the pass-band rejected two times is 200 - 400 c/sec; when rejected 10 times - not more than 800 c/sec.

The frequency characteristic of the complete receiver at operation on line with resistance 600 ohm, the modulation depth being 30 per cent over the range 100 - 4000 c/sec is flat within 2 times with pass-band on the intermediate frequency 12 Kc/s and on the low frequency 5 Kc/s.

For aural operation on headphones, frequency characteristic is made with progressive rise of high frequencies and is characterized with the following data while operating on one pair of headphones:

bandwidth 5 Kc/s - maximum gain is within 2000 - 5000 c/sec, lower frequency of the pass-band (at reducing 2 times) is within 600 - 1200 c/sec and upper frequency of the pass-band is within 4000 - 7000 c/sec;

bandwidth 2.5Kc/s - maximum gain is within 1500-3300 c/sec, the lower frequency of the pass-band is within 300-1000 c/sec and the upper frequency of the pass-band is within 2000-4000c/sec;

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bandwidth 0.3 Kc/s - maximum gain at frequency 300-1200c/sec, while rejected two times the pass-band is within 200-400 c/sec, when rejected ten times is not more than 800c/sec.

Rejection of sensitivity at the image frequencies of the first and second conversions is not less than 4000 times. Rejection of sensitivity of the first and second intermediate frequencies is not less than 10000 times.

Automatic Gain Control

When AGC is acting, the output voltage is increased not more than 2.4 times, input voltage being increased 10000 times (with respect to its nominal value equal to 3 mV).

Amplitude Characteristic

Receiver amplitude characteristic at operation on line with characteristic impedance about 600 ohm is practically linear up to 17 Volts and up to 4 Volts at operation on one pair of headphones.

Nonlinear Distortions

The receiver nonlinear distortions coefficient does not exceed 4 per cent at operation on line with characteristic impedance 600 ohm when maximum power 0.5 W in telephone regime, with modulation frequency 1000 c/sec and modulation depth 30 per cent, or

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under the same conditions at the work on one pair of headphones (voltage on phones is 1.5 V) does not exceed 4 per cent.

Frequency Temperature Coefficient

Frequency temperature coefficient of the receiver in the temperature interval from $+5^{\circ}\text{C}$ to $+50^{\circ}\text{C}$ ($+41^{\circ}\text{F}$ to $+122^{\circ}\text{F}$) does not exceed $15 \cdot 10^{-6}$ on the rest ones.

Frequency Stability

Frequency drift of the first, second and third oscillators of the receiver does not exceed 500 c/sec while the mains voltage is changed by $\pm 10\%$.

Total frequency drift of the receiver oscillators because of self-heating does not exceed 1000 c/sec for 2-4 hours (beginning with 30 minutes from switching on). During the following time the frequency is changed not more than by 200 c/sec for any hour of operation (on condition of constant ambient temperature, moisture and mains voltages).

Leakage of Oscillators Voltages into Antenna

Circuit

Leakage of the first, second and third receiver oscillators voltages and their harmonics, measured at the receiver input, loaded on the antenna equivalent to 100 ohm, does not exceed 10 mV.

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NOTE: The existence of 5 fixed points with the level up to 30 MV and one point with the level up to 50 MV is allowed.

Inner Combination Interference

Beats of the first and second oscillators harmonics result in inner combination interference which is heard at some points of the receiver frequencies range.

As a rule, the level of this interference is much lower than the nominal sensitivity of the receiver in the telegraphic regime.

Calibration Accuracy

Under the normal operation conditions at the temperature $20^{\circ}\text{C} \pm 5^{\circ}\text{V}$ ($68^{\circ}\text{F} \pm 9^{\circ}\text{F}$) the total error of the calibration and frequency set-up of the receiver does not exceed 1 %/s after scale correction using the inner crystal calibrator; at other temperatures from -10° to $+50^{\circ}\text{C}$ ($+14^{\circ}\text{F}$ to $+122^{\circ}\text{F}$) the error does not exceed 1.5%/s.

While correcting the scale at the point situated near the received frequency, the error of calibration can be considerably decreased comparing with the indicated values (approximately to 300 c/sec).

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Scale Device

The receiver calibration is performed directly on the reading scales. The scale device consists of a coarse tuning scale and of a fine tuning scale.

Marks are plotted on the coarse tuning scale on 0.1 mc/s and figures in 0.5 mc/s. The fine tuning scale is optical, each part of 0.1 mc/s of the coarse scale is divided into 100 divisions, i.e. the divisions are plotted in 1 Kc/s. Figures on the fine calibration scale are plotted in 10 Kc/s.

Bands indicator is matched with the coarse tuning scale.

Correction of Calibration

To diminish possible calibration errors under the influence of different destabilizing factors on the receiver (sharp changes of temperature and moisture, tubes replacement and others) the receiver is provided with the correcting system and a special crystal calibrator, the fundamental frequency of which is 100 Kc/s (vacuum crystal is placed in thermostat).

Correction of calibration is carried out by means of:

- a) trimming capacitor in the second oscillator circuit - "электрический корректор" ("electrical corrector");
- b) displacement of optical scale sight frame - "корректор шкалы" ("scale corrector");
- c) the first oscillator trimming capacitor (Correction of the first oscillator crystals frequency).

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The Receiver Controls

The following details belong to the receiver controls:

- 1) the main tuning knob with two stages of deceleration 1:5 and 1:45;
- 2) band selector;
- 3) the first and second intermediate frequencies gain control knob;
- 4) low frequency gain control knob;
- 5) control knob of intermediate frequency pass-band;
- 6) knob with a vernier control to the third oscillator frequency;
- 7) low frequency pass-band switch;
- 8) switch for checking the main tubes currents, supply voltage output voltage level of audio frequency, and for tuning indicator and thermostat operation indicator;
- 9) knob for the input circuit alignment;
- 10) antennas switch;
- 11) switch of AGC time contact;
- 12) mains tumbler switch;
- 13) switch of kind of operation;
- 14) tumbler switch of crystal calibrator for the first oscillator frequency correction;
- 15) tumbler switch of crystal calibrator for the second oscillator frequency correction;
- 16) the second oscillator frequency electrical corrector (with the slot);
- 17) mechanical corrector of the scale (with the slot);

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- 18) the third oscillator frequency electrical collector (with the slot);
- 19) gain margin control (with the slot);
- 20) the first oscillator frequency electrical corrector;
- 21) the crystal calibrator frequency electrical corrector;
- 22) half-duplex operation switch tumbler;
- 23) the second intermediate frequency input switch tumbler;
- 24) the A.F.C. motor switching-in knob;

The Receiver Tubes

The total number of receiver electronic tubes is 19, from which: 10 tubes - 6K3, 3 tubes - 6X4, 3 tubes - 6A7, 2 tubes - 6X6C, 1 tube - 6H6C.

To stabilize plate voltage of the second oscillator tubes a gas stabilizer CT-3C is applied.

The Receiver Voltage Supply System

The fundamental receiver supply source is the alternating current mains, the voltage being either 127 or 220 V and frequency 50 c/sec.

For supply from the mains the set of the receiver contains a rectifier.

A vibropack of BH-I4-I2M type is included into the supply devices set by means of which the entire supply of the receiver

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from the emergency sources (the 12 V battery) is carried out.
It is added by a special order.

Power Data of the Receiver

Normal plate voltage is 160 V, Normal heat voltage is 12.6 V.
With the normal supply voltages the current consumption by
the receiver does not exceed 120 ma for anode and 6 A for heater.
The consumed mains power does not exceed 130 VA.

Overall Dimensions of the Receiver and its
Weight

Overall dimensions of the receiver with the closed cover
without dampers but including the projecting parts are: width -
670 mm (26 3/8 inches); height - 450 mm (17 23/32 inches); depth -
420 mm (18 57/64 inches); its dimensions with dampers are 670mm x
x520mm x 540mm (26 3/8 " x 20 15/32" x 21 17/64").

The receiver weight in the working set (with tubes and dampers) does not exceed 95 kg (209,25 lbs).

Vibropack BH-I4-I2M

The BH-I4-I2M vibropack (Fig.55) serves to convert direct
voltage 12V into direct voltage 145 V. Supply source of the vibro-
pack may be storage battery with voltage 12 V, capacity not less
than 100 a.h. or direct current main 12 V.

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The vibropack data:

Supply voltage is 12 ± 1.5 V

Output voltage is 145 ± 10 V

Load current is 100 ma

1. is not lower than 65%

Output power is 15 W

Overall dimensions of the vibropack :

Width is 115 mm (4 17/32")

Length is 210 mm (8 17/64")

Height is 160 mm (6 19/64 ")

Weight BH-I4-I2M with spare vibrator is 4.7 kg (10.35 lbs)

The type of the vibrator is BC-12 (hermetic), minimum life-time is not less than 500 hours.

III. SET COMPONENTS

The following components are included into the receiver device set:

- a) receiver with the working set of tubes;
- b) rectifier with the working set of tubes;
- c) vibropack of BH-I4-I2M type (delivered at special agreement with the customer);
- d) spare and accessory equipment;
- e) documentation.

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IV. PRINCIPLE OF OPERATION x)

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Receiver is a superheterodyne with double frequency conversion on all bands, besides the first one. On the first band the receiver has one frequency conversion as in this case the first intermediate frequency range is the range of the received frequency

The peculiarity of this receiver circuit consists in using crystal control of the first oscillator at operation on the continual range of received frequencies. This makes it possible to ensure in the receiver rather high frequency stability and calibration accuracy because in this case the highest frequency receiver oscillators are crystal controlled.

The essence of the superheterodyne method of radio reception with the crystal control of the first oscillator is as follows: the whole range of the superheterodyne received frequencies is divided in such a way that on all bands an equal number of kilocycles is overlapped (in the case in question it is 2000 Kc/s). For each band one invariable frequency of the first oscillator (which is switched simultaneously with the band change) is established, and it is crystal controlled.

In consequence of it the intermediate frequency after the first conversion (the difference between the received frequencies and the first oscillator fixed frequency) is not constant, as usual, but variable according to the change of the received frequency (in the case in question the first intermediate frequency change is by 2000 Kc/s).

x) See basic diagram

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Since the equal number of kilocycles is overlapped on all bands (according to the condition of their division), the change of the first intermediate frequency will be equal on all bands. Choosing the first crystal controlled oscillator frequencies so that the frequency on one band differs from the frequency of another band by the value of overlapping on frequency (in our case it is 2000 Kc/s), we shall get change limits of the first intermediate frequency for all bands which will be equal not only in overlapping but also in their absolute value. So the amplifier of the first intermediate frequency is a range one (in this case it is with frequency change limits from 1500 to 3500 Kc/s).

The second receiver oscillator is made as a range one in order the intermediate frequency (which is the difference between the second oscillator frequency and the first intermediate frequency) after the second conversion should be constant (in the case in question it is 215 Kc/s).

The next part of the superheterodyne receiver circuit is made as usual.

Input Stage

The input circuit of the receiver is a singletuned-circuit preselector connected before the grid of the first tube. The receiver input is designed for operation from four antenna types.

A simplified diagram of the receiver input circuit at operation from asymmetrical antennas is shown in Fig.10, the one during operation from symmetrical antennas is shown in Fig.11, and the

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one during operation from open or rod antennas is shown on Fig.12. Switching from one antenna type to another is possible by means of the switch (it.5). When operating with symmetrical and asymmetrical antenna types an inductive coupling of antenna network with circuit is used for creation of input balance a balance-to-unbalance (balun) transformer is set, when operating with rod or open antennas it is a capacitive one.

For leakage of static charges which are formed on symmetrical antennas and cause interference, the resistors (it.3 and 4) are provided at the receiver input.

By means of trimmer (it.18) the preselector circuit has got an alignment in small limits. The alignment ensures matching the receiver input at the operation with different antennas. If the antenna has purely active parameters (R within 60-400 ohm), input alignment at operation is usually not needed.

To protect input circuits from overvoltage by high frequency signals (in the case of operating near a powerful transmitter) a neon discharger is connected parallel to the preselector circuit (it.19). With voltage increase on the circuit up to ignition threshold of the discharger, that is approximately up to 50 V, a glow discharge appears in the neon lamp; the discharger conductance shunts the circuit, removing the possibility of further voltage increase on the input circuit and in the subsequent circuits.

Main circuit elements of the preselector are: inductance coil, variable capacitor and padding capacitor (besides the first band where the necessary overlapping is carried out with the main variable capacitor).

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For example, for the third band the main circuit elements are: circuit coil and antenna coupling coil (it.12), variable capacitor (it.17a), padding capacitors (it.14).

Circuits (circuit coils, coupling coils, padding capacitors and so on) are changed in bands (see basic diagram).

The receiver set contains a special radar-proof filter suppressing the frequencies VHF and UHF ranges. In the case of radar interference the filter is to be connected to the receiver input. Fig.14 shows the circuit of the filter. Fig.13 shows the connection of the radar-proof filter to the receiver.

Radio Frequency Amplifier

After the preselector the received signals of high frequency are amplified with two radio frequency stages. The first stage operates on 6X4 tube, the second one is on the 6X3 tube.

The stages are designed with the transformer circuit. An inductive-capacitive coupling, which improves the stage gain constancy within the band, is applied to some bands (from the first to the fifth inclusive).

A simplified circuit of the first stage of the radio frequency amplifier is shown in Fig.15.

The main elements of amplifier stages circuits are: circuit coils, plate coils, variable capacitor and padding capacitors. For instance, the main elements of the first amplification stage circuit for the third band are: plate and circuit coils (it.79), variable capacitor (it.17 G), coupling capacitor (it.80), padding capacitor (it.82).

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The First Mixer

After the two-stage amplifier the received high frequency signals are fed to the grid of the first mixer designed on the 6A7 tube. The basic diagram of the first mixer is shown in Fig. 16. The mixer plate circuit is loaded on the first intermediate frequency circuit (transformer connection) which operates in the continually-changing frequency range within 1.5 - 3.5 mc/s.

At operation on the first band the first mixer becomes an amplifier (the first oscillator is switched off), and only one frequency conversion is used on this band. The main elements of the first mixer plate circuit are: coil (it.286) and variable capacitor (it.17 P).

The First Oscillator

The receiver first oscillator (type 6B4 tube) operates with crystal without tuned circuit as is shown in Figs. 17, 18 and 19. The first oscillator does not operate on the first band and with that the control grid is "earthed". Two crystals are used on the second band: on frequency 2.02 mc/s (it.240) and on frequency 1.98 mc/s (it.239). Crystals operate in turn: on one part of the scale operates the crystal 2.02 mc/s, on the second one operates 1.98 mc/s.

The using of two crystals makes possible to exclude the affected zone of the band in the receiver, which could appear while using one crystal on frequency 2 mc/s. In this case crystal fre-

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quency would coincide with the frequency of the first intermediate frequency which changes continuously from 1.5 to 3.5 mc/s (and consequently passes through tuning on 2 mc/s).

The crystal commutation system on the second band coupled with tuning capacitor is designed in such a way that at operation on one crystal the scale ends with the received frequency 4 mc/s, and at operation on the other one it begins with four mc/s (the frequency margin near each point 4 mc/s is not less than 20 Kc/s).

Coarse tuning scale and optical scale have a marked non-operating area in which crystal switching takes place. The switching occurs by means of two contacts set in a free section of the lower unit of the variable capacitors. The crystals of the second band are installed in the same place.

The first oscillator basic diagram on the II band is shown in Fig. 18.

On the third band the first oscillator frequency is 4 mc/s, on the IV band - 6 mc/s, on the V - 8 mc/s, on the VI - 10 mc/s, on the VII - 12 mc/s, on the VIII - 14 mc/s (crystal 7 mc/s - the second harmonic is used), on the IX - 16 mc/s (crystal 8 mc/s - the second harmonic is used), on the X - 18 mc/s (crystal 9 mc/s - the second harmonic is used), XI - 20 mc/s (crystal 10 mc/s - the second harmonic is used), and on the XII band the first oscillator frequency is 22 mc/s (crystal 11 mc/s - the second harmonic is used).

The basic diagram of the first oscillator at operation on the III band is shown in Fig. 17. At operation on the X band it is shown in Fig. 19.

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Thus, the difference between the frequency of the received signal at any point of any band and the first oscillator frequency results in frequency within 1.5 - 3.5 mc/s, that is the first intermediate frequency.

Altogether 12 crystals are used in the first oscillator of the receiver.

For the first oscillator frequency correction (when the tube change, considerable fluctuations of the ambient temperature, crystal "ageing" and so on) the circuit is provided with special trimming capacitors by means of which the oscillator frequency can be changed within certain limits (200 - 1000 c/sec.). For each band a separate trimmer is used, besides the II band where there is only one trimmer for 2 crystals.

The First Intermediate Frequency Amplifier

The receiver first intermediate frequency changes within 1.5 - 3.5 mc/s.

The first intermediate frequency amplifier has one stage on 6K3 tube (it.300).

The basic diagram of the first intermediate frequency amplifier is shown in Fig.20.

Plate load of the stage is a double-circuit tuned filter the main elements of which are two inductance coils (it.307 and 317) and two variable capacitors (it.17 A and 17e).

Coupling between filter circuits is internal and external capacitive; it is correspondingly carried out with capacitors

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(it.312,313 and 314). Coupling system between the circuits on this stage is adjusted in such a way that stage amplification decreases with intermediate frequency increase, and thus compensation of gain increase in other receiver stages is achieved.

Together with the first converter circuit three tuned circuits operate in the intermediate frequency channel.

As it was already pointed out, amplifier stage of the first intermediate frequency operates on the first band as an amplifier of the received frequency. Thus at this band the total number of circuits, tuned to the received frequency, equals to six.

The Second Mixer

The second mixer operates on the 6A7 tube. A simplified basic diagram of the second mixer is shown in Fig.21. The plate load of the mixer is the selective multisection filter tuned to the second intermediate frequency, that is to 21.5 Kc/s. To diminish the combination frequencies which are due to the harmonic beats of the first and second oscillators, the mixer plate circuit includes filter consisting of choke (it.322), and capacitor (it.323).

On the first band the second mixer is the first mixer, and on this band the receiver operates with one frequency conversion.

The Second Oscillator

The receiver second oscillator operates in a continual frequency range within 1.715 - 3.715 mc/s (two tubes of 6X3 type). The basic diagram of the second oscillator is given in Fig.22.

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Thus the second intermediate frequency which is the difference of the second oscillator frequency and the first intermediate frequency is constant and equals to 215 Kc/s.

The oscillator is assembled according to the circuit with back coupling through an additional amplifying stage. Because of rather slight coupling of the tubes with oscillation circuit, this circuit is notable for good frequency stability (while the change of supply voltages and self-heating of oscillator tubes).

In order to increase frequency stability a type CP30 gas stabilizer of oscillator tubes plate voltage is employed.

Second oscillator voltage delivered to the second mixer is taken off from the grid circuit of the oscillator amplifying tube from resistor (it.340) through the capacitor (it.328).

The main elements of the second oscillator circuit are: circuit coil (it.349), variable capacitor (it.17g) and padding capacitor (it.315).

For calibration correction a special trimming capacitor (it. 351) is included ("электрический корректор" - "electrical corrector" the axle of which is brought out to the front panel (with the slot).

Variable capacitors of the preselector, amplifier of the first intermediate frequency and the second oscillator are united into one common capacitor unit (seven capacitors of variable capacity), the rotor plates of which are rotated by double knob of receiver tuning.

When the second intermediate frequency input is switched on, plate voltage of second oscillator is switched off (see Fig.20).

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Crystal Calibrator

The receiver calibration correction is carried out by the second oscillator circuit trimming, scale sight line displacement, and the first oscillator frequency change by means of the trimming capacitor.

For calibration correction a special crystal calibrator is installed in the receiver which operates on the type 6X4 tube in the circuit without tank. The calibrator basic diagram is shown in Fig.23. Crystal used is vacuum one with basic frequency 100Kc/s (reference points follow in 100 Kc/s).

For calibration correction harmonics from 15th to 255th are used. Harmonics voltage is fed to the tube plate of the second stage of radio frequency amplification.

In order to increase calibrator frequency stability the crystal resonator is placed into the thermostat, the temperature in which is maintained within $\pm 1^{\circ}\text{C}$ and the operating temperature $+ 60^{\circ}\text{C}$ ($+140^{\circ}\text{F}$).

The thermostat operation proceeds as follows. When the receiver is switched on, thermostat heat winding (see basic diagram, it.357), gets its supply from heat voltage of the receiver tubes.

With that mercury thermocontactor (it.356) is broken and no current is fed to the relay of heating (it.363). When some time which is necessary for temperature rise in the thermostat up to 60°C has passed, mercury thermocontactor will close supply relay circuit (relay is supplied from the rectifier on crystal diodes).

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Relay will switch off the thermostat heating winding ^{50X1-HUM} and switch on ballast resistor (it.394). Ballast resistor is necessary to keep heat voltage constancy in the receiver when the load is changed (in case of switching off the thermostat heating winding).

Thermostat is getting cold. When the thermostat is cooling down the temperature lower than 60°C , the mercury thermocontactor will be broken which causes the relay switching off. At that the thermostat heating winding gets the feed. If the mercury thermocontactor, rectifier or relay is incorrect, the process of thermostat heating is not stopped at the temperature $+60^{\circ}\text{C}$. To avoid inadmissible overheating the thermostat circuit contains a fuse thermoprotector (it.358) breaking supply circuit of heating winding if the temperature in the thermostat rises up to $80 - 85^{\circ}\text{C}$ ($176 - 185^{\circ}\text{F}$).

High stability and accuracy of frequency is secured by using in the calibrator a thermostat and crystal with small frequency temperature coefficient.

Calibrator frequency deviation after 30 minutes from the moment of the receiver switching on does not exceed 60 c/sec on the XII band (on other bands the error is proportionally less).

When the calibrator tube is replaced the frequency error does not exceed 100 c/sec on the XII band (without frequency correction. To correct the frequency of the crystal calibrator (in case of crystal "ageing", tube replacement and so on) in the circuit is provided with a special trimmer (it.367), the control of which is carried out from the casing rear wall.

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The Second Intermediate Frequency Amplifier

The receiver second intermediate frequency is 215 Kc/sec. The amplifier of the second intermediate frequency is a three-stage one.

The basic diagram of the first, the second and third stages of the second intermediate frequency amplifier are shown in Figs. 24, 25 and 26.

The first stage (type 6K3 tube) is loaded on the selective multisection filter.

The second and third stages (6K3 tube) are realized as the resonant amplifiers with transformer connection of tank in the plate circuit. The coupling of the plate coil and the tank is inductive-capacitive one.

Variable selectivity in the receiver is achieved by means of continual change of pass-band in two selective multisection filters connected in the plate circuits of the second mixer and the first amplification stage of the second intermediate frequency.

Each selective multisection filter includes four circuits coupled one with another by means of external capacitive coupling; filters outputs are loaded with resistors.

When the pass-band changes, coupling capacitors values and filter load resistors change accordingly.

As the filter with external capacitive coupling gives band expansion to one side of the mean frequency of pass-band (when capacitive coupling is increased), the circuit capacitances change in the receiver simultaneously with coupling capacitances values

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change; the results in constancy of pass-band mean frequency.

Filter coils with fundamental capacitances are placed into special hermetic screens.

The elements of the second stage circuit of the second intermediate frequency amplifier are: coupling coil and oscillatory circuit coil (it.465), circuit capacitors (it.474 and 475), and coupling capacitor (it.459).

Circuit capacitors (it.474 and 475) form a capacitive divider from which low-resistance output of the second intermediate frequency is realized.

The third stage amplifier circuit has coupling coil and circuit coil (it.492), circuit capacitor (it.705), and coupling capacitor (it.478).

An additional gain control "gain Margin" - "запас усиления" is carried out by means of voltage change on the screening grids of the three tubes of the second intermediate frequency amplifier.

The second and the third amplification stages of the second intermediate frequency practically have no influence upon the resulting receiver selectivity and fulfil only the necessary amplification of the second intermediate frequency.

D e t e c t o r

After the second intermediate frequency amplifier the second intermediate frequency voltage is fed to the diode detector (one diode of the type 6X6C tube is used).

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The basic diagram of the detector is shown in Fig.27.

The second half of the diode is used for heat voltage measurement (see section "Current and Voltages Control").

The load of detector is the resistor (it.483). From this resistor audio frequency voltage is taken off and it is fed to the grid of the low frequency amplifier first stage. This is carried out through the intermediate frequency filter consisting of two high frequency chokes (it.484 and 485) and capacitors (it.486 and 487). Voltage rectified with detector which can be used for addition of operation of several receivers is fed to the output plug situated on the belt wall of the receiver casing (detector output).

Audio Frequency Amplifier

Audio frequency amplifier is the three-stage one and has the following pass-bands: 8, 5, 2.5 and 0.3 Kc/sec.

In order to get pass-bands 5, 2.5 and 0.3 Kc/sec different low frequency filters are switched on the plate circuit of the tube of the amplifier first stage.

The fundamental filter elements are four chokes (it.562, 563, 564 and 565) and fixed capacitors. On bands 5 and 2.5 Kc/sec the filter consists of three sections of Π -type. Capacitance values are changed with overswitching from the band 5 Kc/sec to the band 2.5 Kc/sec.

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A simplified diagram of the audio frequency amplifier first stage for bands 5 and 2.5 Kc/s is shown in Fig.28. With the over-switching to the band 0.3 Kc/s the filter circuit acquires the view shown in Fig.29.

With the setting of the pass-band 8 Kc/s the low frequency filter is switched off, the amplifier first stage has the view shown in Fig.30.

The second stage of the audio frequency is a resistive amplifier on the 6X3 tube. This stage secures getting of the necessary voltage of audio frequency for the receiver output stage operation.

Frequency characteristic of this stage does not practically influence the resulting frequency characteristic of the whole amplifier. Tube operating regime is chosen from the condition of getting minimum distortions.

Negative back coupling voltage taken off from an output transformer special winding is fed to the second stage tube cathode. A basic diagram of the second stage is shown in Fig.31.

The third stage (the output one) of the audio frequency amplifier is designed for operation:

- a) on one pair of low-resistance headphones of T8-56M type with normal voltage 1.5 V on them;
- b) on line with characteristic impedance 600 ohm with output power 0.5 W.

Tube operating regime is chosen so that the output stage amplitude characteristic at operation on one pair of headphones is practically linear up to 4 V, and at operation on line - up to 17V.

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The audio frequency output stage is made on 6HG6 tube with transformer in the plate circuit. A special winding (see Fig.32) on the output transformer is utilized for the negative coupling.

To diminish the supply mains alternating-current hum level (which is due to the voltage leakage from the tube cathode heater into cathode circuit) in the first A.F.A. stage a special bias is realized between the cathode and heater for hum locking.

Locking bias is a certain direct current voltage between the tube heater and the cathode.

In the circuit of the A.F. first stage bias voltage develops on the resistor (it.708).

The Third Oscillator

6A7 tube which performs the functions of oscillator and detector is employed for continuous waves telegraphy reception by the beat method.

The basic diagram of the third oscillator at operation with the resonant circuit is shown in Fig.33, and at operation with crystal - in Fig.34.

The third oscillator resonant circuit includes the variable capacitor (it.517) which gives possibility to change oscillator frequency by ± 5 Kc/sec.

Beat tone frequency can be determined by the scale matched with the knob of the third oscillator variable capacitor which is situated on the receiver front panel.

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For oscillator scale correction trimming circuit (it.616) is used. Control of this circuit is carried out from the receiver front panel with the set.

Circuit correction is used also for getting beat tone up to 10 Kc/s. For this purpose zero beats are adjusted by means of the circuit corrector, when the beat tone scale is in +5 or -5 Kc/s position.

To avoid the third oscillator frequency leakage on the receiver audio frequency input a filter is placed on the converter plate circuit.

In order to diminish the a.c. hum caused by the third oscillator, 6A7 tube cathode possesses a certain positive potential in relation to the filament due to voltage drop on resistors (it. 698 and 699), when tube cathode current passes through them, which is analogous to the effect of resistor (it.703) in the audio frequency amplifier.

The possibility of the third oscillator operation on crystal ($f = 215$ Kc/s) in the receiver practically excludes the third oscillator frequency error at the calibration correction of the whole receiver (frequency correction of the second and first oscillators and gives possibility to carry out the third oscillator scale correction when it operates without crystal stabilization.

The switching on of the third oscillator is carried out by means of switch of kind of operation (it.507).

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Automatic Gain Control

The receiver automatic gain control system (AGC) is delayed and amplified.

Fig. 35 shows the AGC basic diagram, regulated tubes are give
The control voltage is applied to the control grids of five tubes of the following stages: the second stage of radio frequency amplification (6K3 tube), the first mixer (6A7), the first intermediate frequency amplification stage, the first and the second amplification stages of the second intermediate frequency (6K3 tubes).

The amplification stage is realized on the 6K3 tube with the tank directly connected to the plate circuit. The main tank details are coil (it.535) and capacitor (it.534).

The second intermediate frequency voltage is taken off the tank through the coupling coil, then the voltage is rectified with the crystal diode and is delivered to the tuning indicator.

The AGC amplification stage is at the same time an output stage of the intermediate frequency (high-resistance output).

The latter is carried out by means of voltage delivering from the amplification stage plate circuit (through the capacitor (it.526) on the intermediate frequency high-resistance output plug (it.525).

AGC detector operates with rectified voltage doubling on the 6X6C tube. Doubling takes place as follows: charge of capacitor (it.539) occurs through the diode at the moment of the positive

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half-wave of the voltage entering the AGC detector input, The left diode is cut-off and the rectified voltage on the load (it.544) is absent. At the moment of the negative half-way, double voltage is applied to the left diode, and thus voltage value rectified by AGC detector and developing on the resistor is doubled. This secures normal AGC operation at relatively small intermediate frequency voltages on the amplification stage tank.

"Delay" is carried out in the AGC detector cathode circuit by means of applying positive voltage to the diode cathode. This voltage appears on the divider consisting of resistor (it.543 and 542). Thus the receiver AGC system is with amplification and delay.

The rectified AGC voltage is supplied to the control grids of the regulated tubes through the time constant system.

The latter consists of resistor (it.719) and capacitors (it.552 and 553). Over switching of these capacitors gives change of the time constant of the AGC system (0.05 sec., 0.1 sec and 1 sec.).

For addition of AGC operation of several receivers (during the reception with spaced antennas), from AGC detector load the voltage is brought out on a special plug (it.547) which is on the receiver front panel.

AGC operation is switched off by means of a switch of time constant, with that the resistors (it.136, 302, 292, 424 and 456) are earthed.

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Manual Gain Controls

Manual gain control on the intermediate frequency is carried out by means of a potentiometer (it.352) in the cathodes circuit of the amplifier tubes of the first intermediate frequency and of three amplification stages of the second intermediate frequency.

The basic diagram of the gain control on the intermediate and low frequencies is shown in Figs. 36 and 37 accordingly.

An additional gain control - "запас усиления", "gain margin" is achieved by voltage change on the tubes screen grids of three amplification stages of the second intermediate frequency.

Gain control by low frequency is carried out by means of a potentiometer (it.554) in the grid circuit of the low frequency amplifier first tube.

Control Measurements Device

For control of supply voltages (plate and heat ones) and main tubes currents the receiver front panel is provided with a meter. With the normal values of voltages and tubes currents the meter pointer should be within the scale red sector (with the setting of the gain control knob on the intermediate frequency on maximum gain position, gain control knob on low frequency in the minimum gain position and with the crystal calibrator switched off)

NOTE: While checking the tubes currents of the three amplification stages of the second intermediate frequency the meter pointer may overstep the limits of the scale

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red sector (which depends on the amplification margin control potentiometer position).

Through the control switch (it.553) the receiver control meter is connected to the shunt resistors included into the control tubes supply circuits (or into the circuits of additional resistor when the voltage is being measured).

The example of it is given in Fig.33 where switch position is shown. At the checking current of the third stage tube of audio frequency amplification, At heat control one of the 6X5C tube diodes (it.488) is used as a half-wave rectifier. This rectifier polarity, additional resistor (it.490) and a pulsation smoothing capacitor (it.489) are selected on such a way that the meter readings are equal at the tubes heat supply of the receiver with an alternating current as well as with the direct one.

Besides the control of tube currents and supply voltages the meter is used for the level control of audio frequency output voltage, as receiver tuning indicator and the crystal calibrator thermostat operation indicator.

For level control of the output voltage, the meter (through the control switch) is connected to the rectifier performed as a bridge circuit on crystal diodes. The rectifier is supplied from the line windings of the receiver output transformer.

For operation of the control meter as tuning indicator, the control switch is set in a definite position. With that the device will get the second intermediate frequency rectified voltage which

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is taken off the AGC amplifier, the voltage being rectified by the crystal diode.

Tuning indicator determines signal existence on the pass-band. It is not recommended to use it for signal set in the middle of the pass-band which is rather difficult because of the flat top of the frequency characteristic of the second intermediate frequency channel. For setting carrier frequency in the middle of the pass-band one should use zero beats method at the third oscillator operation on crystal.

When the switch is set in the position " ТЕРМОСТАТ " "thermostat", the meter is an indicator of switching on and off the heat winding of the crystal calibrator thermostat.

Supply Circuits

Plate (160 V) and heat (12.6 V) voltages are fed to the supply connector placed on the receiver casing. Through the system of transfer blocks the voltage is fed to the common "on-off" switch of receiver supply (it.658).

Supply mains leads as well as the plate and heat voltages are connected to the receiver supply connector. These loads are closed with the receiver supply switching on.

Thus switching "on" and "off" of the rectifier is realized directly on receiver.

Plate voltage circuit contains a fuse (it.659) after which voltage is fed to the receiver tubes.

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Heat circuits of the receiver tubes are connected in series in twos except the calibrator tube which has a separate additional resistor (it.364). As heat current of 6HG6 type tube is bigger than that of 6K3 tube, resistor is placed in parallel to heat of the tubes (it.555). They make equal the current in series circuit of this tube and secure their normal heat.

Chokes (it.672, 676 and 678) of additional filtrations are set in the tubes heat circuits of radio frequency amplifier of the first and the second oscillators and of the first converter. Lighting of the receiver coarse and optical scales is carried out from the receiver heat circuit. In series with lighting lamp of the coarse scale additional resistor (it.675) is connected which reduce voltage on the lighting lamps to increase their lifetime.

Supply of the thermostat heat winding (it. 357) and germanium rectifier (it.727, 728, 729 and 730) is also carried out from the receiver heat circuit).

A filter consisting of high frequency choke (it. 335) is provided for supply nets of relay and heater for protection from spreading of high frequency interference the source of which is switching relay of calibrator thermostat.

Filter consisting of high frequency choke (it. 335) is provided for supply nets of relay and heater for protection from spreading of high frequency interference the source of which is switching relay of calibrator thermostat.

Supply of the Rectifier (it. 727, 728, 729 and 730) is also carried out from the receiver heat circuit).

Supply of the calibrator thermostat (it. 357) is also carried out from the receiver heat circuit).

The receiver supply set includes a rectifier.

The rectifier operates as the full-wave rectifier circuit

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(it.11) and a smoother consisting of chokes (it.14 and 17) and capacitors (it. 12, 15, 18).

For receiver supply, rectifier gives normal voltage of plate 160 ± 10 V and tubes heat 13 ± 0.5 V (on the receiver input).

Supply voltage of heat and plate circuits of the receiver is led out on the supply plug. (it.22).

Besides, one pole ends of the mains voltage are, connected to the plug in parallel with the switch of the mains voltage (Fig.3). These ends become short-circuited when the supply is switched on at the receiver.

At the rectifier input a mains filter is included consisting of chokes (it.4 and 5) and capacitors (it.6 and 7). The rectifier connector (it.1) serves for connecting to the mains, by means of the switch (it.9) it is possible to supply the rectifier from mains with 127 and 220 V voltage.

Vibropack

As an emergency source of supply the set of the receiver supply device includes a vibropack of BH-14-12M type (see the basic diagram of the vibropack).

For vibropack supply it is possible to use storage battery or direct current mains the voltage of which is 12 V. When the vibropack operates for the receiver it gives voltage 145 ± 10 V.

For vibropack connection to the receiver a seven-pin plug (it. 26) is used, to which the ends of the receiver heat and plate voltages as well as the circuit ends of the vibropack supply are con-

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ected. The latter makes it possible to switch on the vibropack directly on the receiver. The BI-14-12M vibropack belongs to type of vibratory synchronous converters of electric energy, operation of which taken place in the following manner: direct current supply ing the device is converted into the pulsating current by means of periodical closing and opening of two pairs of contacts I-VIII and VII-VIII, connected to primary winding of a transformer (refer to the basic diagram), and induces alternating e.m.f. into the secondary winding of a transformer. The value e.m.f. induced in this case is defined by transformation coefficient value. The secondary winding of the transformer is connected by one end to the moving contacts of the vibrator IV and with the second end it is connected to the middle point of the storage capacitors (it. 1 and 2).

Thus the vibrator contacts I-VIII-VII included in the low voltage circuit are quick-acting switches by turn connecting the transformer primary winding sections to the supply source. The vibrator contacts III-IV-V in synchronism with the contacts I-VIII-VII connect the secondary transformer winding to the storage capacitors of energy.

Consequently, contacts at the high voltage circuit act as mechanical rectifiers. Voltage at each of energy storage capacitors is equal to voltage at the transformer secondary winding. To supply the receiver plate circuits voltage is taken from two storage capacitors (it. 1 and 2), connected in series.

The type EC-12 vibrator is applied in the vibropack BI-14-12M.

As it is shown in the diagram, the excitation winding of the vibrator is connected to the battery terminals "HEDC" - "plus" and "MHYC" - "minus" through the starting contacts VI and IX.

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In non-operating condition of the vibrator the starting contacts VI and IX are closed and the contacts I-VIII-VII and III-IV-V are opened.

At the moment of supply being switched on, excitation current flowing through the winding results in a magnetic field, which strives to attract the armature to the core, to open the starting contacts VI and IX, and to close the contacts X-VIII and III-IV.

When the vibrator armature is being displaced towards the core closing of the contacts I-VIII will occur, and the contacts III-IV will be closed too, but with some delay. The transformer primary winding one half is connected to the supply source, and through the winding the current will flow.

Induced e.m.f. in the secondary winding will charge the storage capacitor (it.2) at the closing of the contacts III-IV. When the vibrator armature is displaced the contacts VI-IX will be opened, i.e. the vibrator excitation circuit will be broken. At this moment the armature striving to the primary position will pass through the point of primary position (because of its inertia) till the contacts VIII and VII and IV-V meet. At closing of the contacts VIII and VII the second transformer primary winding half is connected to the supply source and through the winding the current will flow into direction opposite to the current in the first half of the winding.

E.m.f. (of the opposite polarity) induced in the secondary winding will charge the second storage capacitor (it.1), when the contacts IV-V are closed.

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Then the process will be repeated because the starting contacts VI and IX become closed.

The contact closing and opening takes place with the frequency of about 100 c/sec.

To protect from overvoltage in the transformer windings and to exclude noxious sparking on the vibrator contacts, it is applied in the vibropack a spark extinguishing circuit consisting of the capacitor (it.16) and of the resistor (it.17) on the vibrator working contacts and the capacitor (it.9) and of the resistor (it.10) on starting contacts.

V. CONSTRUCTION

General Data

The receiver set is packed in two boxes.

The box No.1 contains the receiver in casing with dampers. Overall dimensions of the box No.1 are: 650 x 990 x 640; its weight 130 kg (25 19/32" x 38 31/32" x 25 13/54"; 296.3 lbs). The box No.2 contains: a rectifier a box with spare parts (tubes, pieces, spare optical scale, tools), cable kit, documentation bag, telephones, type BH-14-12M vibropack, (which is supplied by a special agreement). Overall dimensions of the box No.2 are: 560 x 740 x 400; its weight is 57kg (22 3/64" x 29 9/64" x 15 3/4"; 125.5 lbs).

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Receiver

The receiver consists of two units situated one under another in one common metallic casing (Fig.3).

The receiver lower unit, which is the unit of the high and the first intermediate frequencies, is assembled on a rigid cast silicon bed (Fig.4).

To the right there is situated a bands switch of a drumtype (it.1), in compartments of which high frequency circuits cells and the oscillator crystals are available.

In the central part of the bed 4 tubes are situated: radio frequency amplifier (it.2 and 3), the first mixer (it.4) and the first oscillator (it.5). The lower part of the bed is divided into sections in which switch contact system, mounting wires and stages pieces (Fig.5), are arranged. From beneath the compartment is shut with a common bottom.

The calibrator (it.6) and an assembly of capacitors unit, consisting of quadruple and triplex capacitors units of variable capacity (it.7), are situated to the left of the tubes.

Capacitors Units of Variable Capacity

To achieve high stability on operation and little temperature coefficient, the units are assembled in massive silicon-cast bodies. Rotor and stator sections are fixed on grinding ceramic axles. By means of bushings the rotor axle is fastened in ball bearings.

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One of the bearings is fixed rigidly to the unit body; and the second one is fastened through a flexible diaphragm compensating the difference in the length change of the rotor axle and the unit body under the temperature conditions change. In the same way fixing axles of stator sections are fastened rigidly only to one side; on the other side they are pressed with a spring from above. With that the single value of rotor and stator displacement under temperature fluctuations is kept.

Rotor and stator sections are assembled from aluminium plates their thickness being 0.7 mm (0.0275 inches). The gap between the plates which is 0.7 mm is secured by calibrated aluminium washers. Plates and washers are fitted in turn on duralumin bushings and tightened with a nut.

Rotor sections are tightened with brass nuts having a special groove for coupling with current collecting bronze spring.

Contact outputs from rotor and stator sections are situated on ceramic strips fastened on the unit body side wall.

Temperature coefficient of capacity unit is $25-30 \times 10^{-6}$.

Rotor of capacitor units are connected with a pair of cylindrical gapless gears (transmission 1:1).

Circuits coils of the first intermediate frequency and the trimming capacitors are situated in the upper part of the capacitors unit body. On the left wall of the capacitors unit body two silumin cast cells are situated: into the first cell the amplification stage of the first intermediate frequency and the second mixer are mounted (it.9), in the second one - the second oscillator (it.10).

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To the left side from behind on the bed two transit blocks on 12 and 10, contact blades are mounted. The receiver casing contains four transit blocks with sockets which connect the lower unit with the upper one. While inserting the high frequency unit into the casing, the blades are cutting into blocks sockets situated on the casing wall (Fig.6, blocks 1 and 2).

On the front of the bed a vernier mechanism with two stages of deceleration (1:5 and 1:45) is fixed. To avoid possible gap of the transmission gapless gears are applied in the vernier.

The vernier is connected with a rotor axle of the capacitors lower unit by means of a flexible clutch.

To the right of the vernier mechanism the motor of automatic frequency control (it, 8) is installed on the bed. The A.F.C. motor is connected through the reducer with deceleration $996 \times 5 = 4980$ with the vernier mechanism of capacitors unit by means of a friction coupling.

Engagement and disengagement of the friction coupling is carried out with a special handle situated on the front unit panel (A.F.C. switching).

NOTE: Motor is sometimes mounted by customer's special order

From behind on the rotor axle of the upper capacitors unit, a glass disk is fitted on a special mounting; it contains a micro-photoscale with two rows of figures. One row of figures is an optical scale for the second band; the second row of figures, shifted in relation to the first one by 20 Kc/s, is an optical scale for the rest eleven bands.

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Receiver Optical System

By means of an optical system the scale is projected on the screen (frosted glass), situated on the front panel.

The principle of the system operation is the following: dispersed luminous flux of the lighting lamp (1) is concentrated by condenser system (2) on a small part of the microphotoscale (3). By means of an objective (4) this part is projected on the screen (which is frosted glass) (7) (Fig.39).

Projecting mirrors (5,6) are employed for the system normal operation and getting the biggest magnification of microphotoscale image.

Projecting mirrors are performed of glass plane parallel plates the external surface of which is plated with an aluminium layer. Aluminium layer is fixed.

The lighting lamp, the condenser system consisting of three lenses, and the projecting objective are fixed on one holder.

Polished glass plane parallel plate one of the planes of which is covered with a photosensitive layer is used as a microphotoscale. The photosensitive layer is turned to the objective.

The microphotoscale projecting screen which is situated on front panel can be displaced to the right and to the left from its middle position by means of a rack and pinion coupled with it.

Screen displacement control (mechanical corrector) is carried out by means of a pin with a slot, led to the front panel through the hole in the scale framing (inscription. "Корректор шкалы" "Scale corrector").

To fix a definite position of the scale reading graduation

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lines a stop is provided which is also performed as a pin with a slot (inscription "Сронор поправочна" - "corrector stop").

Reading scale graduation lines of the receiver all bands exactly coincide with each other. Therefore only one scale of fine reading for all bands is necessary (this scale is an electric nonius to the coarse scale). The only exception is the second band where reading graduation lines are shifted exactly by 20 Kc/s relative to the graduation lines of other bands.

Therefore the optical scale is performed with two rows of figures, and a blind is placed before the projecting screen closing the upper or the lower row of figures.

The blind movement is matched with the band switch so that the lower row of figures of the scale device is open on all bands besides the second one.

By the second band setting the blind is drawn down and the upper row of figures is open, and the lower is shut.

A number of points is visible on the optical scale of the second band corresponding to frequency 4 mc/s. These points mark the scale non-operating part of the second band in which crystal switch of the receiver first oscillator takes place.

Gap on the received frequency does not take place because one part of the second band scale ends with 4 mc/s, and the second one begins with 4 mc/s.

Frequency margin near each of these boundaries is not less than 20 Kc/s.

Let us take some examples to illustrate the setting and reading of frequency with the receiver tuning scale.

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1. The reception must be carried out on frequency 5000 Kc/s. ^{50X1-HUM}

For this purpose is necessary:

- a) to set the second band by means of the band switch;
- b) rotating the receiver tuning knob to place the indicator of coarse tuning scale against the line on the scale having the figure "5.0 mc/s";
- c) by means of the same knob to adjust the frequency more precisely using optical scale division, for which to bring in line optical scale marks with figures "00" with sight line on the frosted screen.

The receiver scale view at operation by 5000 Kc/s is in Fig.40

2. The reception should be carried out on frequency 6700 Kc/s.

For this purpose it is necessary:

- a) to set the third band with the band switch;
- b) rotating the receiver tuning knob to place the indicator of coarse tuning scale against the graduation lines corresponding to 6.7 mc/s;
- c) to more precisely adjust frequency by the optical scale division bringing the optical scale graduation lines with figures "00" in line with the reading graduation lines on the frosted screen.

The receiver scale view at operation on frequency 6700 Kc/s is shown in Fig.41.

3. The reception should be carried out on frequency 16328 Kc/s

For this purpose it is necessary:

- a) to set the eighth band with the band switch;
- b) rotating the receiver tuning knob to arrange the indicator of coarse tuning scale against the graduation lines corres-

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ponding to 16.3 mc/s;

c) to adjust more precisely frequency by optical scale division bringing in line the graduation lines corresponding to the figure 28 by optical scale with the reading graduation lines on the frosted screen.

The receiver scale view at operation on frequency 16328 Kc/s is shown in Fig.42.

The receiver scale at operation on frequency 24001 Kc/s and 23997 Kc/s is shown in Figs 43 and 44.

A double-pin plug (Fig.4 it.11) for connection at the receiver with the antenna is installed on the bed to the right side from behind on the bed.

The front panel of the high frequency unit is fixed to the base with the help of screws. In the central part of the front panel the scale of coarse tuning in common plastic framing (Fig.3) with the microphotoscale screen is situated.

Coarse Tuning Scale

Coarse tuning scale is performed as a drum of a little diameter with twelve edges. Scale engraving is plotted on the drum side edges. Scale framing is arranged so that during the rotation of the coarse scale drum only one scale of the operating band can be seen in the opening of the framing.

Scale rotation is coupled with the band switch by means of a joint device through an asterisk, a single-turn worm disc and gear. When the band switch turns by 30° (i.e. by one band), the coarse-tuning scale is also turned by 30° .

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Movement of coarse scale indicating pointer is carried out by means of a chain which is wound on the disc while the receiver tuning knob is rotating, the disc being coupled with the variable capacitor.

The scale is lighted with two lamps 13,5 V, 0,16 A situated directly under the scale framing.

Under the framing of tuning scales the main control knobs are placed: to the left it is a double vernier tuning knob; to the right it is the knob of band switch.

Bands Switch

Bands switch is a drum rotating on ball bearings. It consists of four sections (silumin casting) fastened rigidly on a common axle the sections being isolated from each other and from the axle.

On 12 edges of each section aluminium plates are situated on which circuit coils, trimmers, small circuit details and contact blocks are set. On plates of the first oscillator section crystals are installed.

All high-frequency coils are wound on the frames of high-frequency plastic, inductance tuning being carried out with a carbonyl core.

Air cylindrical trimmers on ceramic base are applied.

When the bands are changed, the drum is rotating round its axle by a corresponding angle, and the necessary band is connected to the contact system fixed on the high frequency unit bed.

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In the device the system of lifting contacts is applied.

For contact reliability a golden wire is welded to the contact surfaces.

When the transition from one band to another (an adjacent one) takes place, the drum turns by 30° . The switch of bands is carried out by means of knob rotation with subsequent pushing.

When the band switch knob is being rotated, the contact springs are being lifted by means of gears pair and then the drum is freed from the stop and has got the possibility of free rotation. When the necessary band appears on the coarse scale it is necessary to fix the drum (by pushing the switch knob), and with that the contact system is connected. Pushing may be done only when the pointer on the band switch knob is in vertical position.

In the left part of the panel the following pieces are situated (from up to down): electrical corrector of the scale (with the slot); input plug П42 (of the second intermediate frequency), tumbler of halfduplex operation switch; tumbler of the second intermediate frequency input switch; two tumblers of calibrator switch (correction of the second and the first oscillators), gain control knob on the first and second intermediate frequencies; input trimming knob, the knob of A.F.C. switch, and antenna switch knob. A block with four telephone sockets is in the right part of the panel. The upper unit of the receiver is the unit of the second intermediate frequency and output devices. It is assembled on two horizontal panels installed on the same plane on a cast frame (Fig.7).

On the back unit panel there are two circuit groups of selective multisection filters; 4 circuits on each group (Fig.7, it.1 and 2).

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Circuits of Selective Multisection Filters

Circuits of selective multisection filters are performed with the most important pieces determining stable operation of filters being hermetized.

Circuits coils are wound with litzendraht wire on carbonyl H-shaped cores. After winding the coils are dried thoroughly, then they are saturated with polystyrene varnish and dried again.

Each coil is set on a special foundation under which circuit capacitors are situated.

The whole system is fixed on aluminium sump in which glass partition insulators are pasted in.

Conductors, to the inner sides of which circuit wiring comes up pass through the insulators.

The whole circuit is covered with the aluminium screen. The screen together with the sump is pasted tightly at all seams. The filter carbine which is situated in the bottom is pasted tightly after testing and finding the filter to be hermetical.

The filter circuit is fastened on chassis by two nuts, which are screwed on screws pasted in the circuit sump.

Between the two circuit groups there is a tube of the first stage of the second intermediate frequency amplification (tube 6K3)

From below the panel (Fig.8) there are situated trimming capacitors and assembly of variable capacitors consisting of two units. Each unit contains seven capacitors by means of which continual change of the receiver passband is carried out.

Over the panel in its left side there are installed two con-

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tact blocks for 12 and 10 contact blades (Fig.7), which while inserting the unit into the casing, are cut into the corresponding sockets of contact blocks installed in the casing (Fig.6 it.4 and 3).

On the second panel situated before the panel of selective multisection filters the following pieces are placed: tubes of the second, third amplifier stages of the second intermediate frequency (tubes 6K3) with their circuits (it.3 and 4); tube (6K3) and ACC amplifier circuit (it.5); AGC detector tube (6X6C); tube (6X6C) and one of the chokes (the second one is under the panel) of the third detector filter (it.6); tube (6A7), crystal and variable capacitor (it.7 and 8) of the third oscillator (the oscillator circuit is situated from below the panel), three tubes of low frequency amplifier (two tubes 6K3 and one 6H6C), chokes of low frequency filters (it.9 and 10), output transformer (it.11), and filters of supply circuits (pos.12).

The right part of the panel contains a plate with shunt resistors (it.13), and a gas voltage stabilizer CP-3C (it.14).

From the front to the unit frame it is fastened to the front panel which concentrates all the controls of the unit. The panel contains (Fig.3) (from the left to right and from up to down): main switch tumbler, two terminals for connecting to line, fuse in the plate voltage circuit, switch knob of low frequency bands (0.3; 2.5; 5 and 8 Kc/s), control of gain margin (with the slot), zero correction element of the third oscillator meter, of currents and voltages control, control knob of low frequency gain, control knob of intermediate frequency band-width (from 1 to 14 Kc/s), control knob of continuous oscillations tone (with vernier), adjustment

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knob of kind of operation, knob of control measurement switch, adjustment knob of a time contact of AGC system, two plugs of intermediate frequency output (low-resistance and high-resistance outputs), and a plug of AGC voltage output.

For convenience of taking units out of the casing, the front panel contains handles on its right and left sides.

On the back inner wall of the casing (Fig.6) four transit blocks with sockets (pos.1, 2, 3, 4), connecting the lower unit with the upper one are installed. The left wall of the casing contains: supply plug, a plug doubling the receiver output on line and AGC output (the same plug is connected to the output of detector load and to the output for carrying out the "полудуплекс"- "halfduplex" kind of operation), and a plug of A.P.C. motor driving.

The back side of the casing has four special openings through one of which antenna plug passes while inserting the receiver lower unit into the casing. The following operations are carried out through the three remaining openings: first oscillator frequency correction, crystal calibration frequency correction and adjustment of the optical scale lighting lamp position. To protect the receiver from dust penetration, the openings are closed with special caps.

Rectifier

The receiver supply rectifier is assembled on a steel chassis (Fig.9) which is at the same time part of the rectifier casing.

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The following details are arranged on the rectifier chassis: power transformer, rectifying tube of 5U4C type, two chokes, 6 capacitors of smoothing filter and two capacitors of protecting filter in mains voltage circuit. The rectifier wiring is mainly under the chassis.

The panel of rectifier control is fixed on the stands on the front side of chassis. The panel contains (Fig.9), from left to right): tumbler of rectifier switching in, two fuses in mains voltage circuit, signal lamp and mains voltage switch (127 and 220 V).

From the front, from behind and from below the rectifier is closed with covers which form the rectifier casing. By means of screws the covers are fastened to the side walls of chassis. Dampers are set on the lower rectifier cover.

On the left side wall there are: feeding plug "CCTB" - "mains", seven-pin plug for connection of the receiver cable with "BHZOX" - "output", engagement, and for case earthing - "BOHMI" - "Earth" terminal.

Overall dimensions of the rectifier with dampers and projecting parts are: width - 390 mm (15 23/64"), height - 260mm (10 15/64"), depth - 200 mm (7 7/8").

The rectifier weight is about 20 kg (44 lbs).

V i b r o p a c k

The vibropack is mounted on the horizontal metal chassis. On the top of the chassis are situated: transformer (pos.13), operat-

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ing vibrator (pos.6), spark extinguishing circuit details (pos.16, 17), electrical filters, consisting of high-frequency chokes (pos. 7, 11, 14, 19, 21 and 23) and capacitors (pos.8, 12, 15, 18, 20, 22, 24, 25), choke of the low frequency filter (pos.4).

In the lower compartment, formed by horizontal panel (chassis and removable bottom, are placed: spare vibrator in the special clutch (pos.30), electrolytic capacitors (pos.1 and 2), capacitors of low frequency filter (pos.3 and 5), spark extinguishing capacitor of a starting contact (pos.9), spark extinguishing resistor (pos.10).

On the side wall of the chassis two plugs are available.

Two-pin plug serves for connecting supply sources (battery or direct current main). Seven-pin plug serves to deliver supply to the receiver.

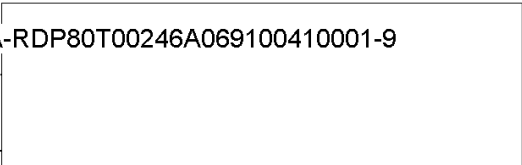
The vibropack is protected from mechanical damages with metal casing which is simultaneously a screen, excluding direct spread of high frequency interference to reception. The casing is fastened on the top with four screws to the vertical screens on chassis and to the plank on the transformer.

To conveniently replace the vibrator (without removing the casing) over the vibrator in the casing there is an opening closed with metal cover with a spring on the inner part.

The spring holds the vibrator in the panel and connects the vibrator screen to all the screening system.

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INSTRUCTIONS ON EXPLOITATION

PART II

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Receiver Installation

The receiver and rectifier are to be taken out of the packing boxes.

Rotation of all control knobs, tumblers and switches knobs is to be checked up.

At operation on the moving object the receiver and rectifier are sure to be installed on their dampers. At operation under stationary conditions dampers removal is permitted to install equipment directly on the operator's table (the rectifier may be placed under the table if protection from occasional knocking by boot is provided).

At receiver installation on the operator's table it is desirable that external lighting on the front panel should be from one side. Avoid powerful straight lighting of receiver optical scale screen for this makes difficult optical scale reading.

It is necessary to fix the receiver to the table by dampers shoes employing pass bolts. Don't apply woodscrews for they may not withstand vibration because of the receiver great weight.

If the operator's place is designed specially for this receiver, the damping system is desirable to be built in into the table cover, the receiver lower part projecting above the table 20-30mm.

In the same way the rectifier is fixed. It is desirable to place it on the left side or under the receiver nearer to the receiver supply plug.

If possible, the receiver is to be installed in such a way that there should be an access to the casing rear wall (to control the first oscillator frequency correctors).

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Connections of Antenna and Output Devices

The antenna is connected to the plug with inscriptions "A" and "3", situated on the receiver casing rear wall.

For optimum employing of each of the indicated antenna types it is necessary to set the antennas switch situated on the receiver front panel in the corresponding position (according to the engraving).

At operation with symmetrical feeder its ends are connected to the plug (to the sockets "A" and "3").

At operation with asymmetrical feeder or with coaxial cable of open and rod antennas, feeder is to be connected to the socket "A".

Headphones are connected in any socket pair on the front panel of the lower unit (the inscription " TELEFONNI HNEROUMME " low resistance telephones").

At operation on line the latter is connected to the terminals on the upper unit front panel (the inscription " ЛИННИА " "line"), or to the plug on the casing side wall.

The receiver outputs on telephones as well as on line have no contact with the receiver body.

The receiver line output load being absent (the low frequency output stage operates on idle run), the frequency characteristics of the low frequency channel are slightly changed. Therefore in those cases when the receiver operates for headphones only (telephones are of a rather little load for the output stage), or the load resistance connected to the receiver line output is much more than 600 ohm,

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the ballast resistance 600 ohm added in the receiver set is recommended to be connected to receiver line output.

Power-Supply Switching-on and Check of Capacity
for Work

To put the receiver in action it is necessary to connect the rectifier with the receiver by a supply cable. One cable end is connected with the rectifier output plug; the other end is connected with the supply connector on the left side wall of the receiver casing (the upper plug). Before connecting the rectifier in mains the voltage switch on the rectifier is to be set in the position corresponding to the nominal voltage of mains. Earthing to be connected to the terminal "Земля" - "Earth" situated on the back wall of the receiver casing. Then the receiver supply switch should be placed in the position "Вкл." - "on".

The tubes having been heated the receiver is ready for operation. At first currents and voltages should be checked by the receiver control device to make sure of capacity for work. At all positions of the currents and voltages control switch meter readings are to be within the red sector of the scale. If at some switch positions the readings go out of the red sector limits, the corresponding receiver tubes should be replaced.

NOTE: Currents and voltages control is carried out under such conditions:

- a) the band switch is in any position except I range;
- b) the intermediate frequency gain knob is in the position of maximum gain;

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- c) the audio frequency gain knob is in the position of minimum gain;
- d) the calibrator is switched off;
- e) AGC is switched off;
- f) the third oscillator is switched on.

After checking the receiver tubes voltages and currents, control of reception from either is to be performed. The receiver operates normally if by adjusting gain control knobs of intermediate and audio frequencies in the position maximum gain, loud noise is heard in the telephone and if by rotating tuning knob on all bands, station operation is heard (with antenna connected to),

NOTE: At X, XI and XII bands that is at the shortest receiver waves, few stations are usually heard at night time, and sometimes they might not be heard at all. This fact is a result of unfavourable condition of propagation of these waves at night-time.

OPERATION WITH THE RECEIVER

Telephony Reception

After supply switching on and tubes heating one should begin tuning of the receiver.

For this purpose it is necessary:

- a) to set the necessity band;
- b) to switch on AGC;
- c) high frequency control gain knob is to be set in maximum gain position;

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- d) to arrange the intermediate frequency band within 3 to 12 Kc/s;
- e) the third oscillator should be switched off;
- f) the crystal calibrator is to be switched off;
- g) audio frequency gain knob is to be preliminarily placed in maximum gain position.

The frequency of the station received is to be arranged on coarse and optical scales by the tuning knob.

Having obtained reception of a station one should adjust audio frequency gain to get desirable signal volume.

At reception of telephony without AGC all above mentioned refers to all points except "C" and "g" gain control knob of audio frequency is placed in the position of maximum gain and adjustment of necessary gain is performed by the high frequency gain regulator.

The receiver amplitude characteristic is linear up to 17 V (0.5 W for 600 ohm). That is why to achieve undistorted reception it is necessary to adjust such gain in the receiver that the line output voltage would be on the average about 5 V, the average depth of modulation being about 30 per cent. To control the line voltage the meter of the receiver should be employed by setting the control switch in the position "output level" - "уровень выхода".

Aural Reception of Telegraphy

The tonal telegraphy reception is performed in such a way as the telephony reception is.

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At reception of continuous waves telegraphy all the preparatory operations should be performed in the same order as it was done at telephony reception. In addition the third oscillator is to be switched on and should set the desirable beats tone (usually about 1 kc/s) by the knob of the third oscillator frequency control.

In the presence of great interference making reception difficult, one should operate with pass-band of intermediate frequency 1 kc/s and of audio frequency 0.3 Kc/s.

Use of Automatic Gain Control

In all normal cases of reception one should operate with AGC.

At telegraphy reception of low speeds of telegraphy AGC time constant is to be increased to 1 second. Otherwise, at transmission pauses and between the telegraphic signs (with slow operation) the receiver gain will be increased and strong noise will appear.

During searching a radio station the AGC time constant is to be not more than 0.1 second, for during searching it is difficult to detect station that is weakly audible, especially if powerful station operates on the near frequency.

Control and Correcting of Calibration

Fine calibration control should be carried out 2-4 hours after the receiver is switched on. If the control is made immediately after switching on of the receiver, the calibration error might

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be more than after the receiver is heated, but it does not exceed
I - 1.5 Kc/s.

The calibration control is performed on each band separately. The calibration reference points are multiple 100 Kc/s and are arranged on the coarse-tuning scale at each scale mark (reading graduation lines of optical scale are "00").

To control the calibration it is necessary:

To adjust the knob " ПОД РАБОТУ " - "kind of operation? -position " ТИ " - "tg".

The pass-band of intermediate frequency should be adjusted within 3-6 Kc/s and one of audio frequency is to be adjusted 5 or 2.5 Kc/s.

The gain knob of audio frequency is to be in the position of maximum gain. Gain control is to be performed with gain control knob of intermediate frequency.

NOTE: To rise accuracy of calibration control it is necessary to correct the third oscillator frequency.

For this the crystal calibrator is to be switched on by tumbler switch "I", the switch " ПОД РАБОТУ " - "kind of operation" is to be set in the position " коррекция " - "correction". Zero beats are to be set by the main tuning knob of the receiver (at any reference point). The switch " ПОД РАБОТУ " - "kind of operation" is to be switched on the position " ТИ " - "tg", and control knob of beats tone " ТОН НЕ ЗАТЫХ " - "beats tone" is to be placed in the position "0". Zero beats on the receiver outputs are to be set by means of the third oscillator circuit corrector.

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Calibration control is carried out in the following way:

The crystal calibrator should be switched on by the tumbler

I.

The control knob of the third oscillator beats tone " ТОМ НО ЗАТЯЖ" - "beats tone" is to be adjusted in the position "0", the coarse-tuning scale and optical scale are to be set at one of the reference points, with that, the fine-tuning scale is to be in the position "00".

Zero beats are to be adjusted by rotating the knob of the third oscillator " ТОМ НО ЗАТЯЖ" - "beats tone".

The tumbler of the crystal calibrator II is to be switched on without switching off the tumbler I. Tone beats frequency gives the value of calibration error. Beats tone frequency may be determined by means of frequency meter.

NOTE: With control of error on the first band the error value is found out without switching on the tumbler II (by the scale reading " ТОМ НОЗАТЯЖ." - "beats tone").

Control of the calibration error on the II band has some peculiarities and is performed in the following way:

The tumblers I and II are to be switched on.

The optical tuning scale is to be adjusted at one of the reference points (the position "00").

Zero beats are to be adjusted by rotating the third oscillator knob. In this case the scale reading " ТОМ НОЗАТЯЖ" - "beats tone" gives the error value.

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The calibration is normal if the error does not exceed 1 kc/s.

If the calibration error exceeds 1 Kc/s, or if it is necessary to raise the calibration accuracy, the receiver scale should be corrected using for this purpose the inner calibration and the correctors system of the receiver.

At first the second oscillator is corrected. For this, purpose, the tumbler of the crystal calibrator I is turned in the position " ВКЛ." - "on" and switch of the kind of operation is in the position " КОРРЕКЦИЯ " - "correction".

The receiver tuning is set at the reference point frequency which is in the high-frequency part of the scale. The receiver output zero beats are adjusted by the electrical corrector of the second oscillator frequency.

Then the receiver is returned on the lower frequency region, and zero beats are achieved at the reference point by tuning knob of the whole receiver. After this, the scale reading mark is brought in line with the reference point frequency by means of the mechanical corrector.

Correction at the end the beginning of the scale is repeated sometimes as far as zero beats will be just at the reference graduation lines of the scale "00". Calibration correcting is recommended to be performed with the scale points which are away from the ends by 500 Kc/s.

To correct the first oscillator frequencies the tumbler II should be switched on (without switching off the tumbler I), and zero beats are also set at the receiver output by rotating the capacitor " Копп. I РСТ." - "the first oscillator corrector".

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For access to the corrector the end cap on the receiver casing rear wall is unscrewed, and by means of a screwdriver the ring on the band switch drum is turned up to the right or down to the left till the openings of the ring coincide with those of the drum.

Correcting of the first oscillator frequency may be performed with the third oscillator switched on (the position "КОРРЕКЦИЯ" - "correction") as well as with that switched off (the position "III" "th").

- NOTES:
1. With correcting the first oscillator frequency on the II band, the oscillator should be switched on (the position "КОРРЕКЦИЯ" - "correction").
 2. With correcting the second oscillator on the II band it should be taken into account that the reference graduation lines of the optical scale have been shifted by -20 Mc/s in the part lower than 4 mc/s and by $+20 \text{ Mc/s}$ in the part higher than 4 mc/s , i.e. such figures will be reference graduation lines: in the first part of the scale -20 , and in the second part -20 .
 3. Correcting of the first oscillator on the II band is carried out with reference graduation lines of the scale "00".

The above described way of correction makes it possible to improve the calibration on all bands and to operate for a long time with high accuracy of the scale.

As it was already said, fine correcting of the receiver calibration is achieved at two points; i.e. at the beginning and

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at the end of the scale. At other scale points some calibration error may take place. When it is necessary, the high accuracy of calibration may be got at any scale point.

For this, a small part of the scale (where the reception is supposed to be performed) is corrected by the nearest reference point. The calibration accuracy of the rest of the scale can be considerably decreased. Therefore at transferring to the reception of other frequencies, differing from the reference point, with which correction was performed, more than by ± 50 Kc/s, it is necessary that the scale new part be corrected in the same way, or calibration of the whole scale be restored by means of correcting with two points.

If the operation condition requires the scale to be corrected on one operating band only, or if the receiver situation makes difficult an access to the first oscillator corrector, that is, the access to the casing rear wall, in these cases the displacement of the sight reading line may be done, instead of correcting the first oscillator frequency.

In this case consequence of operations is as follows: at first, as it is usually done, correcting of the second oscillator frequency is carried out (the tumbler of the calibrator I is switched on and the electrical and mechanical correctors are employed). After this, the tumbler II is switched on, and, if the first oscillator frequency is not accurate, beats tone according to the error of the first oscillator frequency appears at the scale reference graduation lines. Then zero beats with this appearing tone frequency are achieved by the main tuning knob, and after

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this the sight reading line is shifted till it coincides with the scale reference point (on the optical scale the points with the inscriptions "00").

As the receiver scale is of straight-line frequency this is equivalent to the frequency alignment of the first oscillator.

It is obvious that frequency correcting made in the above mentioned way improves the calibration on one band only.

To improve calibration on other bands a displacement of the sight reading line (which is equivalent to correction of the first oscillator frequency) is to be obligatorily done anew.

While correcting the frequency on the II band it is necessary to remember that the optical scale reference points are arranged at the graduation lines with figure 20 on the scale part lower than 4 mc/s and on the graduation lines with figure 80 in the part higher than 4 mc/s.

The receiver is provided with the possibility of correction of the crystal calibrator in case of tube change, of crystal "ageing", and so on. For this, purpose it is necessary to have the frequency standard with the accuracy not worse than $2 \cdot 10^{-7}$; correction by radio station of standard frequencies is also possible. In both cases the standard frequency is to be multiple to the calibrator frequency.

For calibrator frequency correction it is necessary: to deliver the frequency standard voltage (multiple to 100 Kc/s) to the receiver input, to set the switch of the kind of operation in "КОРРЕКЦИЯ" - "correction" position and to tune the receiver to one of the standard harmonics.

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The third oscillator is to be switched off (the "TONE" or "telephone" position), and the tumbler II of the crystal calibrator is to be switched on (the tumbler I is switched off).

If the beats tone appears at the receiver output, this fact will testify inaccuracy of the calibrator frequency. In such case, it is necessary that zero beats should be adjusted by rotating the calibrator trimmer.

In the same way the calibrator frequency correction is performed by the frequency standard radio station.

- NOTES:
1. Calibrator frequency correction should be carried out in 2-3 hours after the receiver having been switched on, and with nominal voltage of mains.
 2. To increase correction accuracy it is recommended to use the receiver most high frequency bands for standard frequency reception.

Reception with Spaced Antennas

For addition of some receivers operation (reception with spaced antennas), in case of telephony reception, AGC outputs of the receivers are to be connected in parallel with each other, and the telephony outputs (line outputs) are to be connected in series, after this the telephones are to be connected to the common output ends (sum telephonic output).

Identical AGC time constant should be set on all receivers, operating with addition.

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The way of the receivers operation addition at telephony is shown in the Fig.45 (operator addition of three receivers is carried out in the same way).

NOTE: At telephony addition it is better for the load to be connected not directly to the receivers, but through the subsidiary stages of low frequency amplification, which have grid circuits connected to outputs of different receivers, and plate circuits are united and operate on load in common (Fig.46).

This excludes reaction of the output stage of one receiver on another.

Addition of tonal telegraphy is performed by analogy with telephony addition.

Telegraphy addition at reception by the third oscillator (aural reception) is carried out in the same way as telephony addition is.

But in this case an operator is required to have some habit, for even a little difference in beats tones of two receivers tires the operator (it is necessary to match and maintain equal beats tone from both receivers).

At three receivers operation addition the work becomes more difficult for there will be no possibility of tone readjusting on one receiver (where the operator is).

Normal telegraphy addition (in the case of aural reception) is to be performed with employing tone manipulator. The diagram of addition for this case is shown in Fig.47.

Telegraphy addition while recording with ondulator is performed according to the diagram of Fig.48. In parallel with AGC outputs

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of the receivers the signal limiting system by maximum and minimum is connected to, after which the electronic relay, working for the oscillator, is installed.

It is necessary to remember that AGC output of the receiver given the voltage in relation to "земля" - "earth" with minus sign at nominal voltage of about 3 V.

The cables connecting AGC outputs of the receivers must have the capacity not more than 1000-2000 pf (especially while recording the quick-operating telephony).

Active AGC output load resistance is to be more than 1 megohm.

Attendance of the Receiver

The receiver possesses high electrical parameters and is designed for their long-time keeping.

But the receiver incorrect operation may shorten its lifetime, or deteriorate the receiver electrical and mechanical characteristics

Careful treatment of the receiver, carrying out of all requirements and rules of maintenance ensures the receiver reliable operation for a long term.

The main rules of attendance of the receiver are given below:

IT IS RECOMMENDED:

a) The receiver should be switched on 1.5 - 2 hours before the beginning of operation, if calibration high accuracy and operation high stability are required. If frequency drift equal to about 500 c/sec is permitted during the first 1.5 - 2 hours of operation, the receiver may be switched on 5-10 minutes before operation.

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At the operation interruptions of about 3-5 hours, the receiver should be switched off;

b) bands and other controls switchings are not to be performed without necessity;

c) scale calibration correction is not to be performed without necessity;

d) the receiver is not to be taken out of the casing without necessity;

e) Operators, which do not know the instruction on the receiver operation, are not to be admitted to work.

CHANGE OF THE LIGHTING LAMP AND MICROPHOTOSCALE IMAGE FOCUSING ON THE SCREEN.

When the lighting lamp of the microphotoscale is put out of action it is necessary to change it.

For this purpose it is necessary:

a) to unscrew the cover on the case back wall;

b) to turn the fixing screw of the lamp holder socket counterlockwise and to take out the burnt-out lamp;

c) to take the lamp bulb with the left hand and to insert it into the socket;

d) displacing and rotating the lamp in the socket to find for it such a position that the receiver screen should be maximum lighted. This position should be preliminarily fixed. For this purpose it is necessary to tighten the screw of socket fixing with the right hand, then by small lamp displacement to achieve sharp microphotoscale image over the whole field of the receiver screen;

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- e) to finally tighten the screw of socket fixing;
- f) to fasten the cover on the case back wall.

IT IS FORBIDDEN:

- a) during the process of operation the receiver optical scale be removed and the optical system be regulated, except the lamp of scale lighting, regulation of which is performed according to the rules of this instruction;
- b) to remove the cover from the capacitors units and to open the cells of drum switch of bands;
- c) to adjust the receiver circuits;
- d) to remove the third oscillator scale.

These operations are permitted to be performed only by skillful specialists at repair shops.

Receiver Maintenance

To preserve the receiver equipment and its electrical characteristics during operation, transportation and storage it is necessary to observe the following rules:

- a) at continuous operation, inspection of mechanisms and oiling of their frictional parts, such as vernier, bearings of band switch, gears and bearings adjusting capacitors and so on, are to be performed in each 2 months;

NOTE: The contact system of band switch is not permitted to be oiled. To oil frictional pieces of the receiver, the set contains a special nonfreezing grease.

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b) in order to remove dust, inner pieces of the receiver are recommended to be rubbed with soft rag moistened a little in benzine after each 3-4 months of continuous receiver operation;

NOTE: During rubbing of the drum switch contact system the caution is required not to damage the contacts, it is necessary to watch that hairs of rubbing rag should not be left on the contacts.

c) While rubbing and removing dust from the inner part of the receiver one should save the microphotoscale from dust and not touch the scale at the emulsion side;

d) sometimes it is permitted to wash projecting mirrors. Cleaning comes to rubbing of mirror surfaces with cotton tampon moistened in the mixture of alcohol and ether (1/4 of the rectified alcohol and 3/4 of narcosis sulphuric ether). It is necessary to warn against using suede because it contains small solid particles which can scratch the mirror aluminium surface. Cotton used for this purpose should be hygroscopic and specially degreased. Each rubbing should be carried out with a pure tampon.

It is prohibited to wash the mirror surface and optical pieces with water or other solutions;

e) at lengthy interruptions in operation (more than 2 days) the receiver front panel is to be closed by the cover, which is given in the receiver set;

f) the receiver is to be protected from water getting and sharp temperature changes;

g) transportation of receiver is permitted in packing boxes only, with rules existing for transporting valuable equipment to be observed;

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h) the receiver storage at a depot for a long time is to be carried out with observing of all rules for equipment storage at depots. In this case the receiver and all the set to it is to be in packing boxes, tightly closed.

a) Vibropack BH-14-12M Operational Regime

The BH-14-12M vibropack is designed for lengthy working conditions during its operation in accordance with the technical specifications.

The BH-14-12M life with employing of the spare vibrator is not less than 1000 hours.

To supply the vibropack a storage battery is to be applied with the capacity not less than 100 a.h. The converter operates steadily with supplying voltage within $12 \pm 15V$. If it is necessary to make longer wires at the path from accumulator to BH-14-12M, voltage drop in line with maximum load is not to be higher than 0.1 V.

It is forbidden to supply the vibropack from the current sources with great internal resistance (for instance, discharged storage battery). If it is necessary to supply from generators or from the mains through a rectifier, a circuit of buffer supplying is to be employed.

BH-14-12M may operate under conditions of moisture (95%) and a vibration of short duration.

b) Vibropack Maintenance

The vibropack should be installed in the horizontal position.

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When the vibropack is connected to the supplying source and to the load it is necessary to observe polarity of ends. In the BH-14-12M circuit electrolytic capacitors are employed; in observance of polarity in the circuit will lead to short circuit of secondary network and to the vibropack being put out of action.

Feed of current sources to the BH-14-12M and from the latter to the receiving device should not be obligatory screened. The BH-14-12M in the set with the spare vibrator is put out from the plant in the station completely set up and before operation does not require adjustment, but in order to prevent disrepairs the vibropack is periodically checked up, especially after a long storage or transportation.

The BH-14-12M operation capacity is mainly determined by state of the accumulator.

Besides of timely charge, batteries are systematically to be cleaned from oxides and salts. It should be remembered that oxidizing crosspieces connecting accumulators (under nuts) amount to the increase of internal resistance of the current source. This fact is undesirable for apparatus operation. Moreover, the increase of contact resistances in the accumulators connections will result in arising of hum, making difficult weak signals reception.

The operation order of the receiver provided with BH-14-12M does not differ from the order accepted when the receiver operates from the mains.

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RECEIVER TESTS AND MAIN DATA FOR ITS REPAIRWorking Capacity Tests

The receiver operates normally, if:

a) readings of all the tubes currents and supply voltages are by the control device within the limits of the scale red sector, when the knob of gain control at intermediate frequency is set in the maximum gain position; the knob of gain control of audio frequency are set in the position of minimum gain, the third oscillator is switched on in position. "III" - "tg", the calibrator is switched on, and AGC being set in the position "BREMENYENO" - "off".

NOTE: Band switch may be in any position, except the first band position.

b) Calibration error checked with crystal calibrator does not exceed 1 Kc/s at the temperature $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$;

c) when with setting the control knob at intermediate and audio frequencies gain in the position of maximum gain on all the receiver bands, noise is heard;

d) with the antenna being connected to the receiver, distant stations operation is heard.

NOTE: At reception from ether it should be remembered, that tumblers of the calibration I and II and of the second intermediate frequency input are to be switched off. In the contrary case, the reception will not take place, for with crystal calibrator switched on, the plate supply of the tubes of the second stage of radio frequency amplification is removed, and

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with the second intermediate frequency input being switched on, the plate supply of the tube of the first intermediate frequency amplifier is removed.

Tubes Regime Checking

If the switch of currents and voltages control does not point out the place of damage in the receiver, it is necessary to carry out complete checking of voltages and resistances of all receiver stages.

For this it is necessary to utilize the resistance and voltage cards that are enclosed to this instruction.

The checking of resistance is performed in the following way: the upper and lower receiver units should be carefully taken out of the common casing, and without connecting them with each other (and with the rectifier) by means of cables - resistance measurement should be carried out with tester TT-1 or TT-2.

Checking is performed from the side of wiring to measure the resistance between every leg of socket and the receiver body. The normal values of resistance are indicated in resistance card (Fig. 49. and 50).

Divergence of the measured resistances in comparison with the card data more than by 20% indicates the disrepair in the circuit being checked.

The voltage measurement are to be performed after resistances have been checked up. For this purpose, the upper and lower

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units of the receiver are to be placed on the table, as shown in Fig. 53 and 54. After that, the panels should be connected with each other and with the rectifier by means of special transitional cables which are included in the receiver set.

Connecting is to be carried out according to the engraving, made on each cable and panel connectors.

The pan in the lower unit and the compartments covers of the second oscillator and the second mixer are to be opened, and in the upper unit the screen should be removed from the units of selective multisection filter capacitors. Thus there will be an access to the tube of the first stage of the second intermediate frequency amplification from the side of the wiring. The receiver supply is to be switched on, and with tubes inserted measuring of the voltage is to be performed by means of the tester TT-1 or TT-2 between each leg of the socket and the receiver body.

Divergence of the voltage that have been measured in comparison with the card data (refer to Fig. 51 and 52) more than by 20 per cent indicates the disrepair of the circuit, which has been checked.

The Tubes Installation in the Receiver

The screws fastening the front panels of the upper and lower units are to be unscrewed, and the receiver taken out of the casing.

The tubes should be inserted in the panels according to the inscriptions that can be found by each panel. Tubes fixators are to be tightly fastened.

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TO INSTALL THE LIGHTING LAMPS OF THE COARSE-TUNING SCALE
IT IS NECESSARY:

- To remove the scale framing from the receiver;
- to turn loose the screws fastening the lamps sockets, to turn the lamp sockets so that it might be convenient to insert the lamps;
- to screw up the lamps;
- to tighten the screws fastening the lamp - sockets, arranging the lamps so that the most quantity of light might get on all the scale.

MAIN LABORATORY TESTS (AS REPAIR SHOPS)

Calibration Accuracy Check-Up

To check the calibration accuracy it is necessary to use frequency standard giving the accuracy not less than $5 \cdot 10^{-6}$.

To check the accuracy of crystal calibrator frequency, the standard accuracy is to be not less than $2 \cdot 10^{-7}$.

Receiver Sensitivity Check-Up

To check up the receiver sensitivity the voltage of high frequency from the standard generator is to be delivered to the antenna plug through the active resistance 100 ohm.

The switch of antennas type is to be set in the middle position.

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The receiver output is to be loaded with one pair of low-resistance telephones in parallel with them the output meter is to be connected to (the copper oxide voltmeter) with the inner resistance of about 20,000 ohm.

The gain control knob of audio frequency is to be placed in the position corresponding to maximum gain. AGC and the crystal calibrator are to be switched off. The bands are to be adjusted: at intermediate frequency - 3 Kc/s, at audio frequency - 2.5 Kc/s.

Telegraphic Sensitivity Measurement

The third oscillator is to be switched on and beats tone of about 1000 c/sec is to be adjusted.

At the output meter the receiver noise voltage 0.5 V is to be adjusted with gain control at intermediate frequency.

If the receiver has normal sensitivity, then at delivering high frequency voltage 0.6 μ V from the standard generator, on the receiver output the voltage will be not less than 1.5 V.

Telephonic Sensitivity Measurement

The third oscillator is to be switched off. At delivering to the input the signal of high frequency 3 μ V without modulation, the noise voltage on telephones 0.5 V is to be adjusted.

If the receiver has normal telephonic sensitivity, then at switching on the modulation in the standard-generator (modulation frequency 1000 c/sec and modulation depth 50%) the receiver out-

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put voltage will be not less than 1.5 V.

Repair

Small repair, that is, replacement of fixed capacitors and non-wire-wound resistors that have gone out of action, may be carried out at the place of operation by skilled repairers.

Replacement of potentiometers, switches, repair of circuits and their trimming should be carried out at repair shop.

General data to detect damages occurring in the receiver and in the rectifier are given in the Table.

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Defect indications	Cause of defect	Method of Detection	Method of elimination
1	2	3	4
The receiver operates badly or does not operate at all.	One of the tubes is put out of action	Tubes currents are to be checked with the meter	A damaged tube is to be replaced
One of the bands does not operate	a)The first oscillator does not work b)There is a damage in the circuit of the given band	a)The tube of the first oscillator is to be checked up by current If the oscillator is in disrepair tube current with the drum switched on and that switched off would be equal. b)Wiring of high frequency circuits (in the drum) of the given band is to be checked up. Short circuit is possible in the tank (the trimmer is to be checked up)	A part in disrepair is to be changed, short circuit is to be eliminated A part in disrepair is to be changed, short circuit is to be eliminated.

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	1	2	3	4
3. At the calibrator switching on, its operation is not found out	a)The crystal calibrator tube not work b) there is a damage in one of the tumblers of switching on the calibrator		a)The tube is to be replaced b)It is necessary to check up the supply voltage on jacks of the calibrator tube socket	A tube in disrepair is to be replaced If there is no plate voltage on the tube, the tumbler is to be changed
4. By rotating the knob of gain control at intermediate frequency the signal (or noise)loudness at the receiver output does not change	There is a damage in the gain regulator at intermediate frequency		The potentiometer of gain control at intermediate frequency is to be checked up	The potentiometer is to be replaced
5. The knob of gain control at audio frequency does not regulate loudness, and signals on the output are heard weakly	A damage in the potentiometer of gain control at audio frequency or in circuits, connected with it.		The potentiometer of gain control at audio frequency is to be checked up. The circuits, connected with gain control are to be checked up.	The potentiometer is to be replaced.

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	1	2	3	4
6.	Audibility disappears at intermediate frequency pass-band control	Short-circuit of one of the variable capacitors of pass-band control	The capacitors of intermediate frequency pass-band control are to be checked up.	Short circuit is to be eliminated.
7.	The receiver operates normally, but control of currents and voltages deviates in some positions from the normal values, or currents of some tubes are absent at all.	A damage in the control switch (absence of contact), or in its circuits.	Shunt resistors in the circuits of corresponding tubes are to be checked up.	Disrepair in the switch is to be eliminated. Shunt resistors in disrepair are to be replaced.
8.	There are no readings of the meter with switch set in the position "thermostat" (when the receiver supply is from the alternating current mains), or the meter does not give the reading "OCTUBA-HNE" "cooling during all the time	a) Damage of a thermocontact in the thermostat b) The supply rectifier of the thermostat relay is put out of action	a) The thermoprotector and thermocontact are to be checked up b) The thermoprotector and voltage of the supply rectifier of the thermostat relay is to be checked up.	a) The thermocontact is to be changed. b) The crystal diodes in disrepair are to be changed.

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1	1	2	3	4
---	---	---	---	---

of the receiver operation (when supplying with the direct current takes place).

9. When the rectifier is switched on and there are no plate and heat voltages, the signal lamp does not burn.

The mains fuse of the rectifier has been burnt out

The fuse is to be taken out and checked up

A new fuse is to be set.

10. The rectifier does not give plate voltage, heat voltage is present.

The kenotron (tube 5U4C) has been burnt out

The kenotron is to be taken out and checked up

A kenotron in disrepair is to be changed

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Possible Disrepairs in the BH-14-I2M Vibropack
Circuit

Signs of disrepair	Causes of disrepair and method of its detection	Method of disrepair Elimination
1. The vibropack does not operate	a) Break or voltage drop in supply voltage circuit. Voltage is to be checked up with voltmeter.	Nominal voltage is to be supplied.
	b) Disrepair in the vibrator	b) The vibrator is to be changed with the spare one
	c) Polarity of ends is not observed, when connecting supply voltage. Polarity is to be checked up.	c) Supply voltage should be correctly connected to with observing of polarity.
2. The vibropack operates badly	a) There is a bad contact in places of accumulators connection to	a) The contact is to be cleaned
	b) After lengthy exploitation the vibrator operates badly (with sparking) and is near to be put out of action	b) The vibrator is to be changed with the spare one
	c) Oscillations of high voltage under load have a character of throws	c) The vibrator is to be changed with the spare one
3. The vibropack does not give output voltage 145V.	The disrepair is in the circuit details.	The vibropack should be sent for repair

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Lubrication

For a certain period of time lubrication is consumed in the receiver and it is necessary to restore it periodically.

The restoring of lubricator is performed with the help of the grease " MATH-20I " GOST 6267-52 and there are three different types of lubrication:

I. Lubrication of Easily Accessible Parts

This lubrication is performed not less than once in three months.

Lubrication Order

Unscrew the screws fixing high-frequency unit (the lower unit) to the receiver casing, take it out of the casing and perform lubrication of the following details:

Band Switch:

- a) the big spring and the spring of sectors;
- b) the tooth of the big gear wheel;
- c) the outer working surface of the steel-fixing disc.

Details Situated on the Front Panel

- a) the spring fitted on the electrical corrector axis;
- b) cam, asterisk and gear wheel of reductor;
- c) cardan shaft ends;
- d) chain spring and shaft ends of coarse-scale drum;
- e) guiding axes of pointer holder;
- f) spring pin of leading roller;

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g) unscrew two screws fixing the framing. Remove it.

Lubricate the teeth of gage and scale corrector gear wheel.

Capacitors Unit:

a) leading pin of shackle connecting capacitors unit with leading roller on the front panel.

Unscrew the sump fastening screws, remove the sump and:

- a) lubricate the friction parts of band switch lever;
- b) lubricate the pressing roller bearings;
- c) lubricate the teeth of vernier gear wheels;
- d) lubricate the band switch shaft ends.

II. Lubrication of not Easily Accessible Parts

This lubrication is performed not less than once a year.

Lubrication order of high frequency unit.

Take the high frequency unit out of the receiver casing.

Unscrew the sump fastening screws, remove the knobs and perform the lubrication of the following details:

a) clear and pack the grease of the rear bearing of band switch into both sides;

b) clear and pack the grease into both sides of the rear bearing of the pressing roller and if possible into the front one;

c) lubricate all axes from which the knobs are removed.

Remove the covers of lower and upper capacitors units, perform grease packing into bearings and carefully lubricate the

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springs of crystals switch. It is forbidden to bend away the springs of crystals switch and its disassembling.

Lubrication Order of Intermediate Frequency Unit

Unscrew the screws fastening the intermediate frequency unit to the receiver casing and take out the unit. Remove all knobs. Turn the unit over. Unscrew the fastening screws of band unit screen, remove this screen and lubricate:

- a) axes ends and teeth of bevel and spur gear wheels of band unit;
- b) through the opening in the supporting bracket the surface touching the axis;
- c) all axes from which the knobs are removed.

III. Lubrication Performed Once in Three Years

Lubrication Order

Take the high-frequency unit out of the receiving casing; unscrew the screws fastening the sump; remove all knobs; unsolder the wires ends which join the front panel and the frame; unscrew the screws fastening the front panel and the frame, carefully remove the panel from the frame removing cardan shaft and unsoldering the telephone block ends:

- a) remove the coarse scale drum chain on front panel wring out and unscrew the screw of yoke situated on the axis of leading roller and remove it.

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Remove the loading roller and lubricate its bushing and axle on which it rotates.

Unscrew the screws and remove the little rollers of coarse scale mechanism, lubricate axes on which they rotate;

b) unscrew four screws and remove the coarse scale drum from the front panel. Lubricate the drum axes ends and asterisk;

c) lubricate the ends of cardan shaft and bushings in which the shaft rotates, before reinstalling the front panel on the frame;

d) unscrew the screws fixing the bearings ball races of circuits unit on the frame and remove the circuit unit from the frame.

Clear and pack the grease into the bearings.

Lubricate the ends of circuits unit shaft.

Simultaneously lubricate roller and axis of band switch lever and the little axis with gear wheel driving the great gear wheel of band switch;

e) unscrew the screws fastening vernier and the receiver frame and remove the vernier.

Perform the lubrication of all teeth of vernier gear wheels, all its axes and pack, if possible the grease into all the bearings;

f) unscrew the catch cap-screw and lubricate the spring and catch of band switch. Simultaneously lubricate the rack frame of band switch lever.

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NOTE: It is strictly forbidden to lubricate the golden contacts of circuits unit and crystal switch.

BH-14-12M Vibropack Disassembling and
Assembling

The vibropack disassembling one should make in exceptional cases, i.e. when disrepair which was revealed, cannot be removed without opening the vibropack.

It is the vibrator that may be worn out in BH-14-12M. If a disrepair is revealed in the vibrator it is necessary to unscrew one screw, fastening together the vibrator screen with the vibropack casing, and to open the cover in the casing.

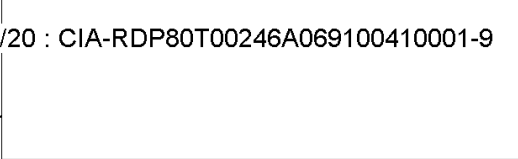
One should take the vibrator out of the vibropack, slightly shaking it by the wire shackle. Three screws fastening together the bottom and the bed are to be unscrewed, the bottom is removed, the spare vibrator is taken out from the clutch and installed instead of the vibrator that has been put out of action.

If the disrepair is discovered inside of the BH-14-12M, supply is necessary to be disconnected and the vibropack opened.

The Vibropack Disassembling is performed in the following consequence:

- a) three screw fastening together the bottom and the BH-14-12M bed are to be unscrewed and the bottom removed;
- b) four screws, fastening together the casing with the vertical unit and the transformer, are to be unscrewed;

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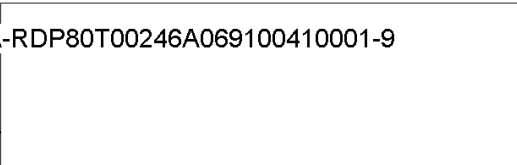
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c) one should take away the casing, to remove the disre-
pair and to start vibropack assembling.

The Vibropack Assembling is performed as follows:

- a) cover the casing;
- b) Four screws, fastening the casing and the vertical unit
and transformer are to be screwed;
- c) re-install the bottom on its place and screw the three
screws, fastening the bottom and the bed.

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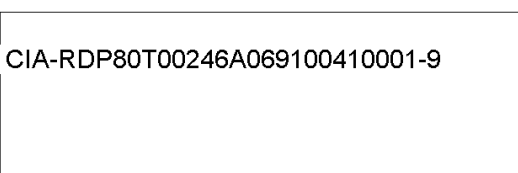
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CENTRAL INTELLIGENCE AGENCY

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COUNTRY USSR

REPORT

SUBJECT Soviet Technical Manuals on the R-250M Short-Wave Telegraph/Telephone Receiver

DATE DISTR. 18 October 1963

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NO. PAGES 1

REFERENCES

DATE OF INFO.

PLACE & DATE ACQ

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1.

English-language Soviet manuals

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Attachment A: R-250M Receiver - Part I: Technical Description; Part II: Operating Instructions, 98 pages;

Attachment B: Type R-250M First Class Short-Wave Receiver: Appendix to the Description and Instructions, 168 pages.

2. The R-250M receives telegraph and telephone signals; it can also be adapted for reception of teletype and phototelegraphy, as well as multichannel and multiple telegraphy. The frequency range is 1.5 to 25.5 Mc/s (200 to 11.75 M) and is divided into 12 frequency bands.

3. No publishing data appear in the manuals, but the R-250M is in current use.

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Distribution of Attachments for Retention: (Direct Distribution):

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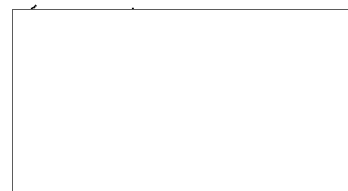
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**TYPE R-250M FIRST CLASS
SHORT WAVE RECEIVER
APPENDIX
TO THE DESCRIPTION AND INSTRUCTIONS**

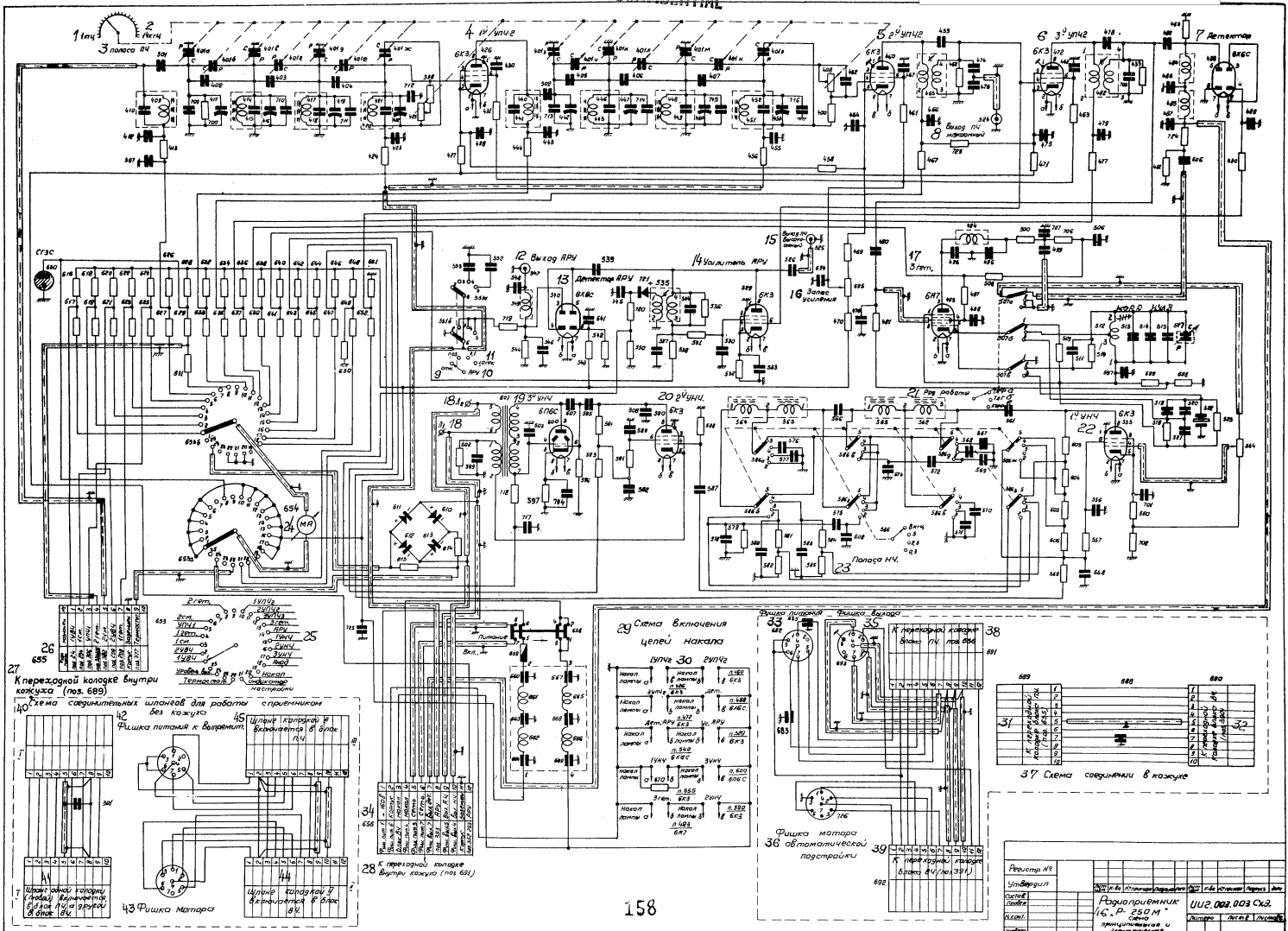


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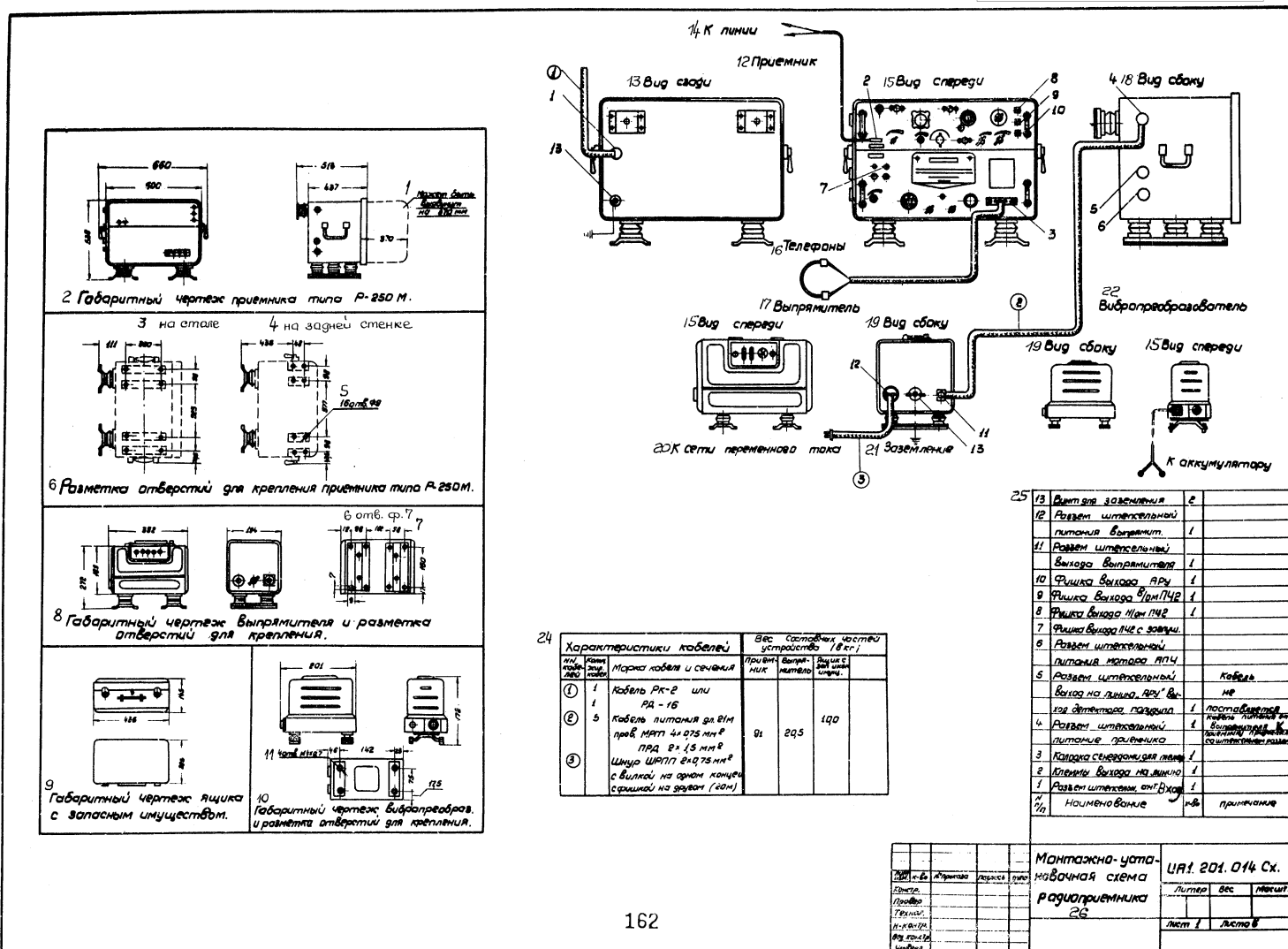
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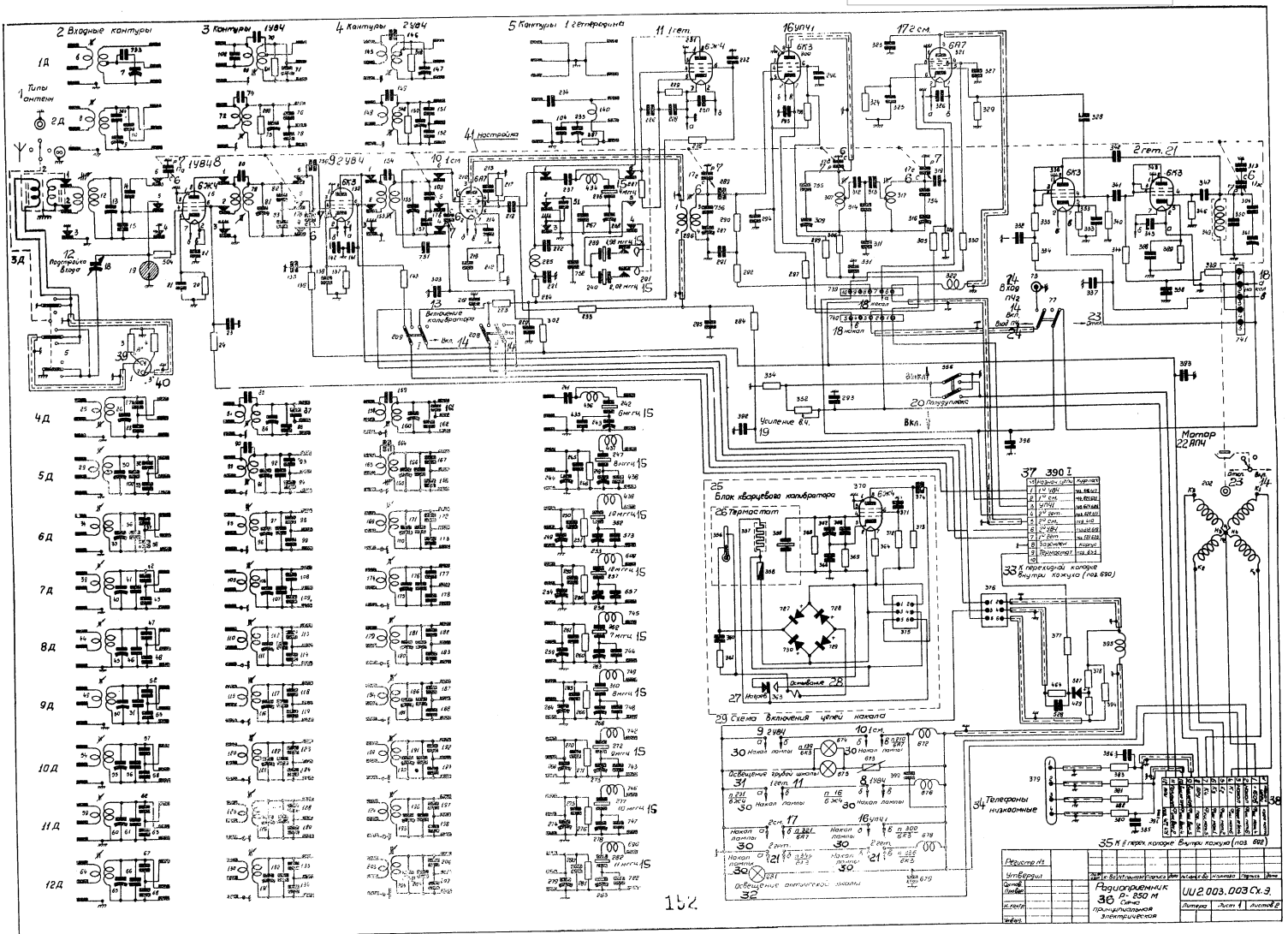
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Type "P-250-13" First Class
Short - Wave Receiver

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CONFIDENTIAL

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Translation to Figure No.1

50X1-HUM

1. To antennas
2. Input circuits
3. First high frequency amplifier
4. Second high frequency amplifier
5. First mixer
6. Amplifier of the first intermediate frequency
7. Second mixer, selective multisection filter
8. First amplifier of the second intermediate frequency
selective multisection filter
9. Second amplifier of the second intermediate frequency
10. Third amplifier of the second intermediate frequency
11. Detector
12. Second intermediate frequency input
13. Second intermediate frequency input
14. "on"
15. Intermediate frequency band width 1-14 kc/s
16. Second intermediate frequency output (low-resistance)
17. 1. Input trimming
2. Antenna switch
18. Corrector
19. Crystal calibrator
20. Intermediate frequency gain
21. First oscillator
22. Halfduplex "on"
23. 1) 2 tubes 6K3; 2) Second oscillator

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Translation No.1

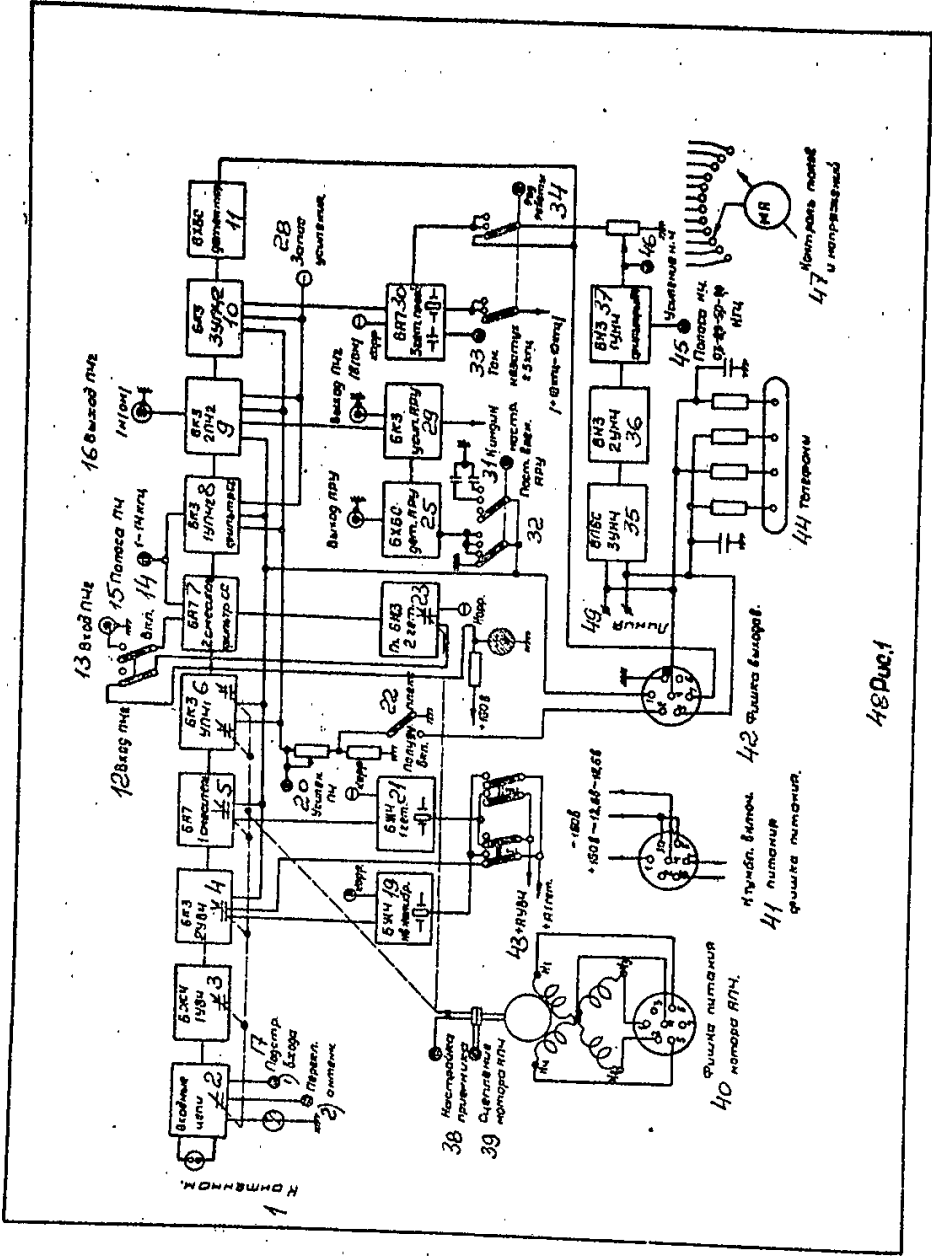
(continuation 1)

50X1-HUM

24. AGC output
25. AGC detector
26. Second intermediate frequency high-resistance output
27. Corrector
28. Gain margin
29. AGC amplifier
30. Third oscillator changer
31. To the tuning indicator
32. AGC time constant
33. Beat tone ± 5 kc/s (+ 10 kc/s - 10 kc/s)
34. Kinds of operation
35. Third audio frequency amplifier
36. Second audio frequency amplifier
37. First audio frequency amplifier; AF filters
38. Receiver tuning
39. A.F.C. motor coupling
40. Plug for A.F.C. motor feeding
41. To the tumbler for supply switching "on"
Plug for supply voltages
42. Outputs plug
43. H.T. high frequency amplifier; H.T. first oscillator
44. Head phones
45. Audio frequency band 0.3 - 2.5 - 8.0 kc/s

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50X1-HUM



CONFIDENTIAL

Translation No. 1

(Continuation 2)

50X1-HUM

46. Audio frequency gain

47. Currents and voltage check

48. Fig. 1

49. Line

a) - 160 v B= v

+ 160 v

126 v

Translation to pages 6, 7, 8, 9

50X1-HUM

Page 6:

1. Fig. 2
2. Fig. 3

Page 7:

1. Fig. 4
2. Fig. 5

Page 8:

1. Fig. 6
2. Fig. 7

Page 9:

1. Fig. 8
2. Fig. 9

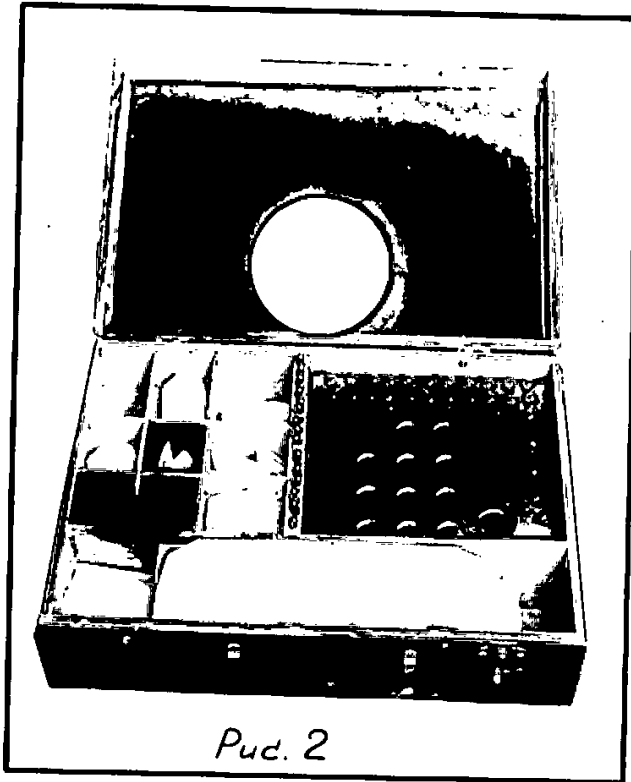
Translation to page 10

50X1-HUM

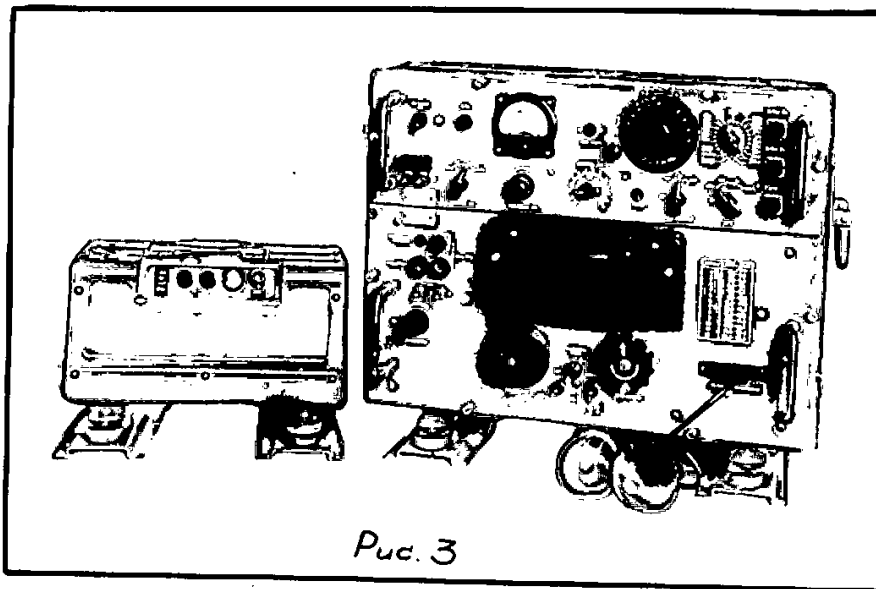
1. To the tube of the high frequency amplifier first stage
2. Input trimming
3. Fig. 10
4. Antenna
5. Ground

CONFIDENTIAL

50X1-HUM



Puc. 2



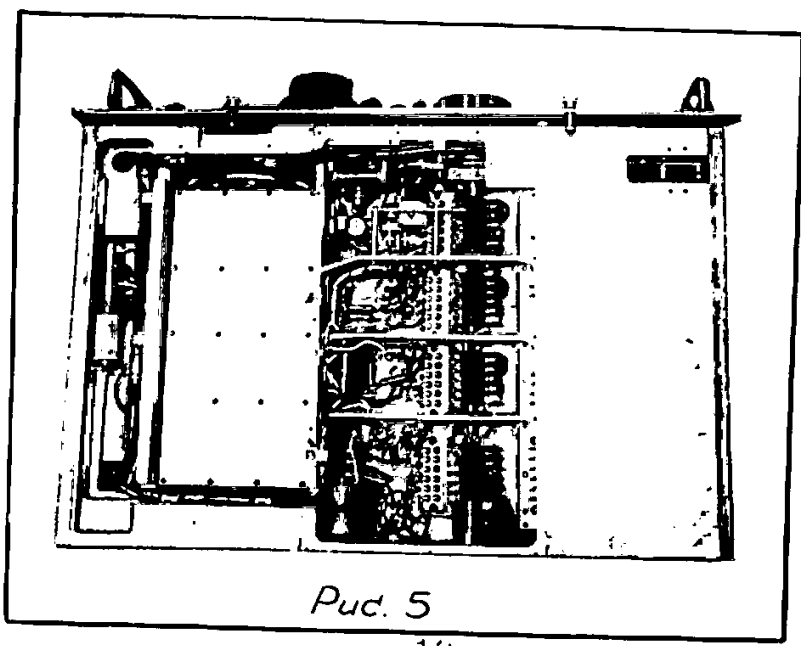
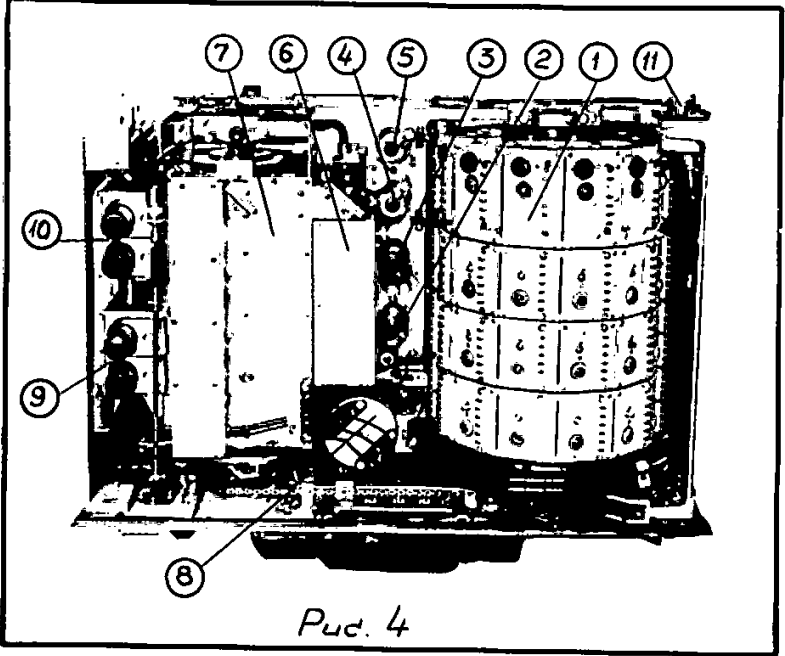
Puc. 3

CONFIDENTIAL



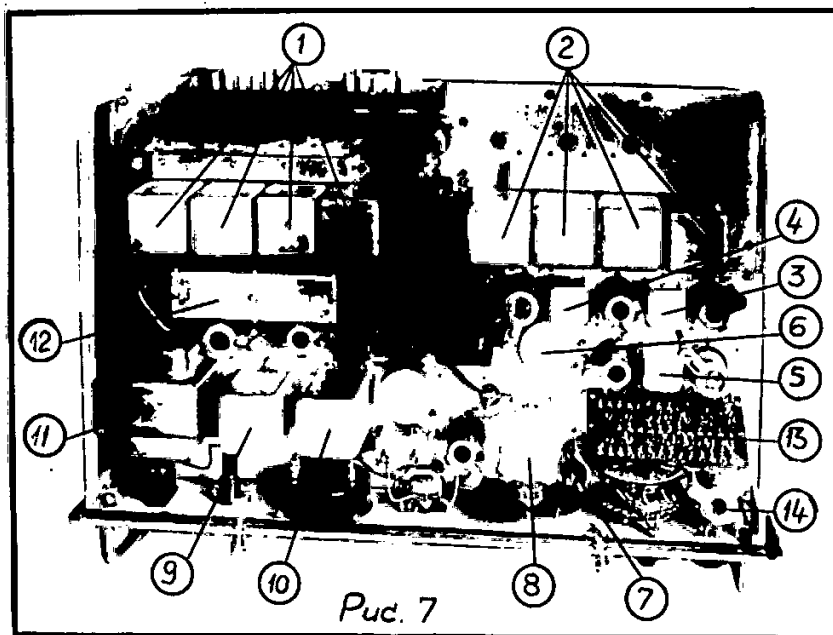
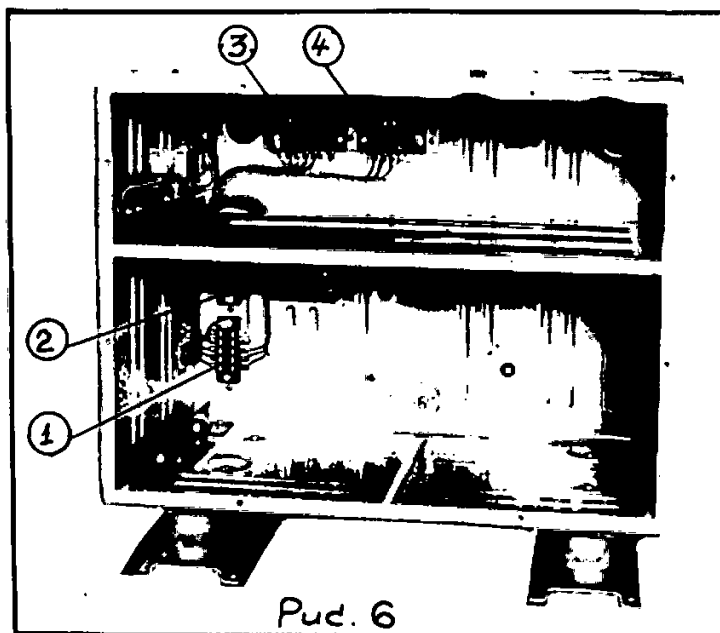
Handwritten signature or initials

50X1-HUM



CONFIDENTIAL

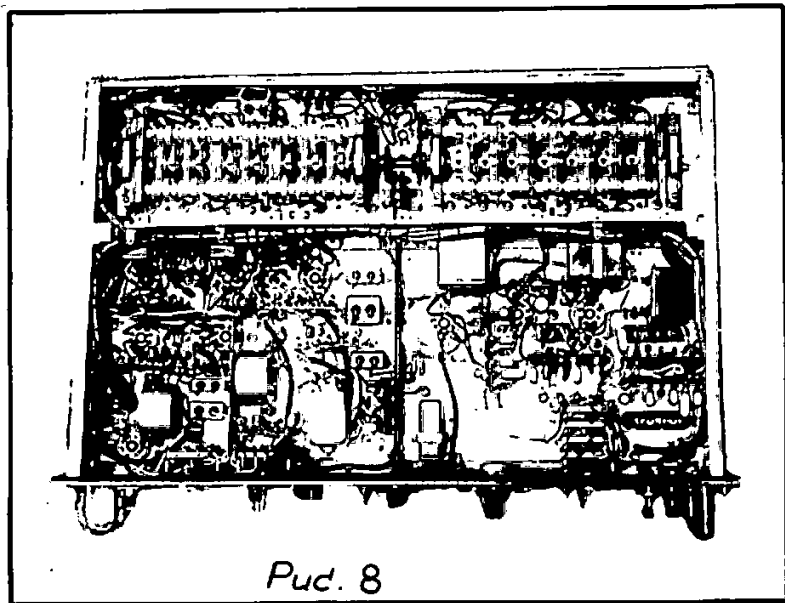
50X1-HUM



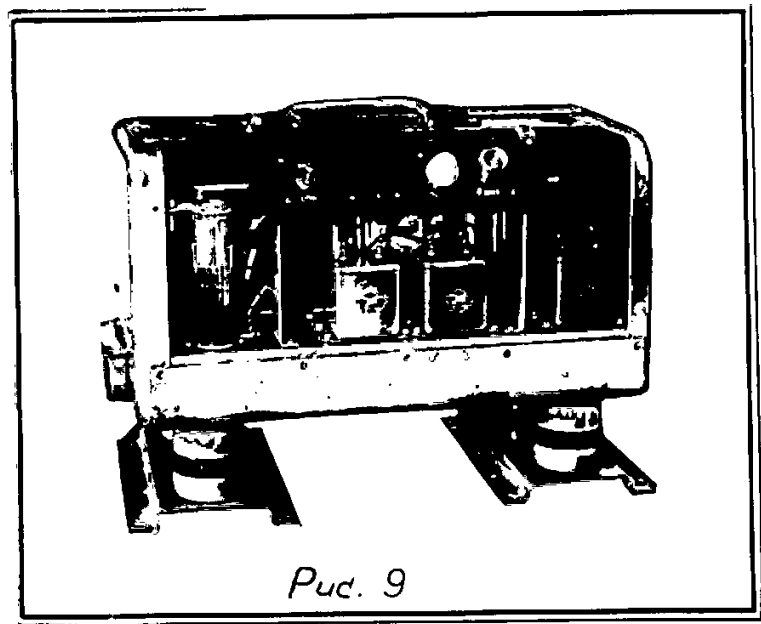
CONFIDENTIAL

CONFIDENTIAL

50X1-HUM



Puc. 8



Puc. 9

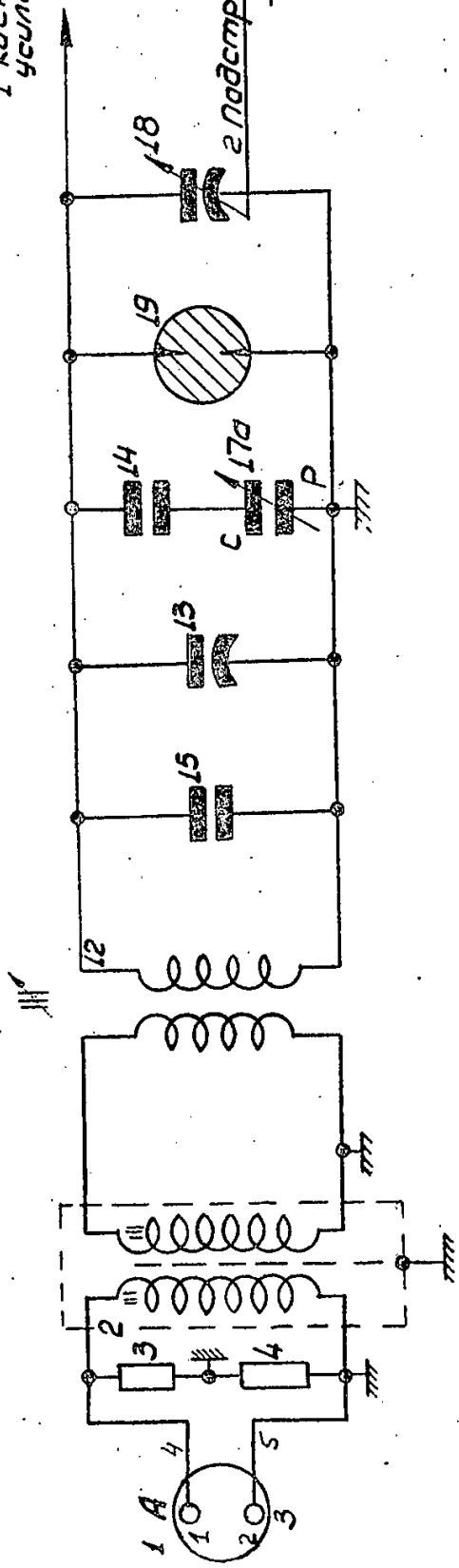
CONFIDENTIAL

- 10 -

50X1-HUM

1 К лампе
1 каскада
усилителя ВЧ

2 Подстройка
взвеса



50X1-HUM

3 Puc. 10

CONFIDENTIAL

Translation to page 11

50X1-HUM

1. To the tube of the high frequency amplifier first stage
2. Input trimming (small tuning)
3. Fig. 11
4. Antenna
5. Ground

CONFIDENTIAL

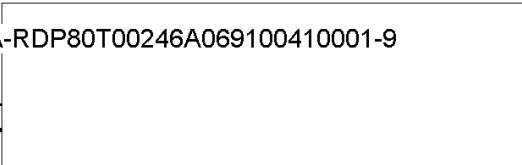
CONFIDENTIAL

Translation to page 12.

50X1-HUM

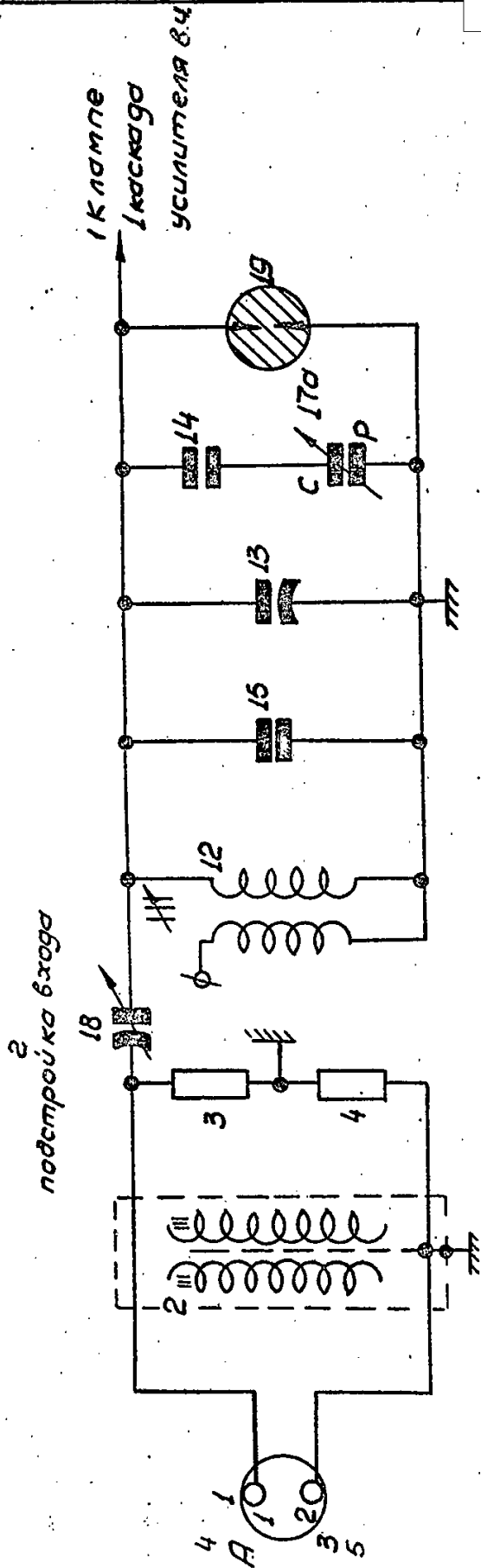
1. To the tube of the high frequency amplifier
first stage
2. Input trimming
3. Fig. 12
4. Antenna
5. Ground

CONFIDENTIAL



-12-

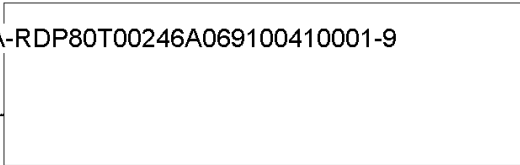
50X1-HUM



3 PUC. 12

19

CONFIDENTIAL



Translation to page 13.

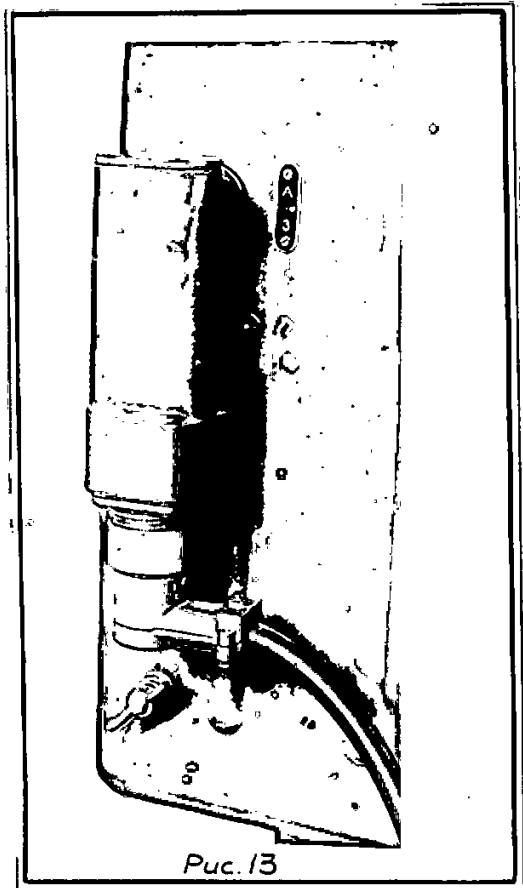
50X1-HUM

1. Page 13

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~~CONFIDENTIAL~~

50X1-HUM



~~CONFIDENTIAL~~

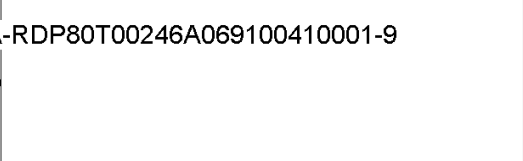
CONFIDENTIAL

Translation to page 14

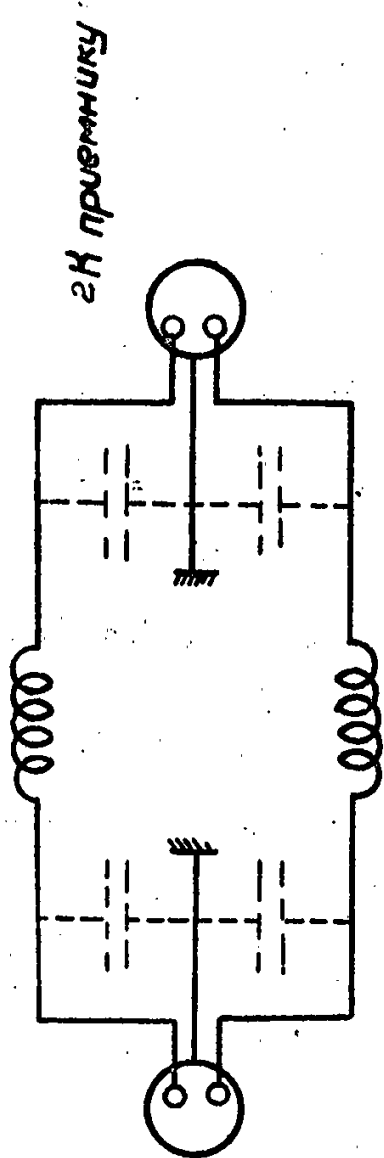
50X1-HUM

1. To the antenna
2. To the receiver
3. Fig. 14

CONFIDENTIAL



50X1-HUM



1 К антенне

3 Рис. 14

Translation to page 15.

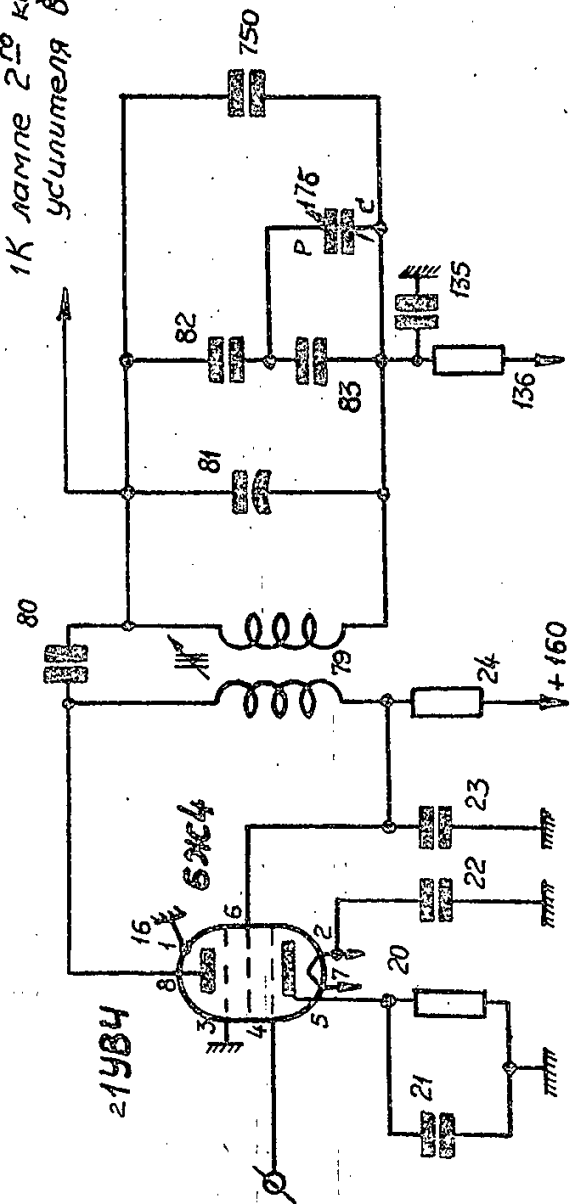
50X1-HUM

1. To the tube of the high frequency amplifier
second stage
2. First high frequency amplifier
3. Fig. 15
4. To transit block (pos. 390)
5. To block (pos. 391)

-15-

50X1-HUM

1К лампе 2^{го} каскада
усилителя В.Ч.



5К колодке / поз. 39 /

4К переходной
колодке / поз. 390 /

Рис. 15

CONFIDENTIAL

Translation to page 16

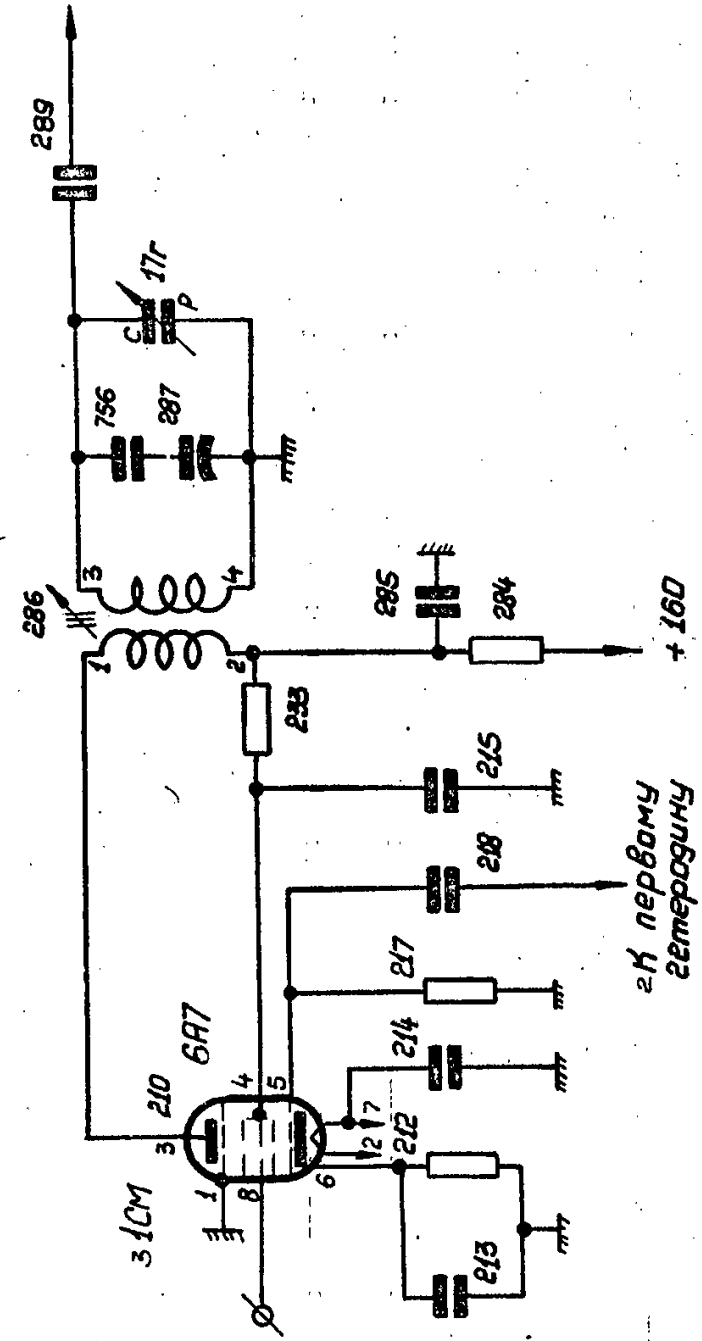
50X1-HUM

1. To the first intermediate frequency amplifier tube
2. To the first oscillator
3. First mixer
4. Fig. 16

CONFIDENTIAL

50X1-HUM

1K лампе
усилителя
первой п.ч.



Битовому
передачу

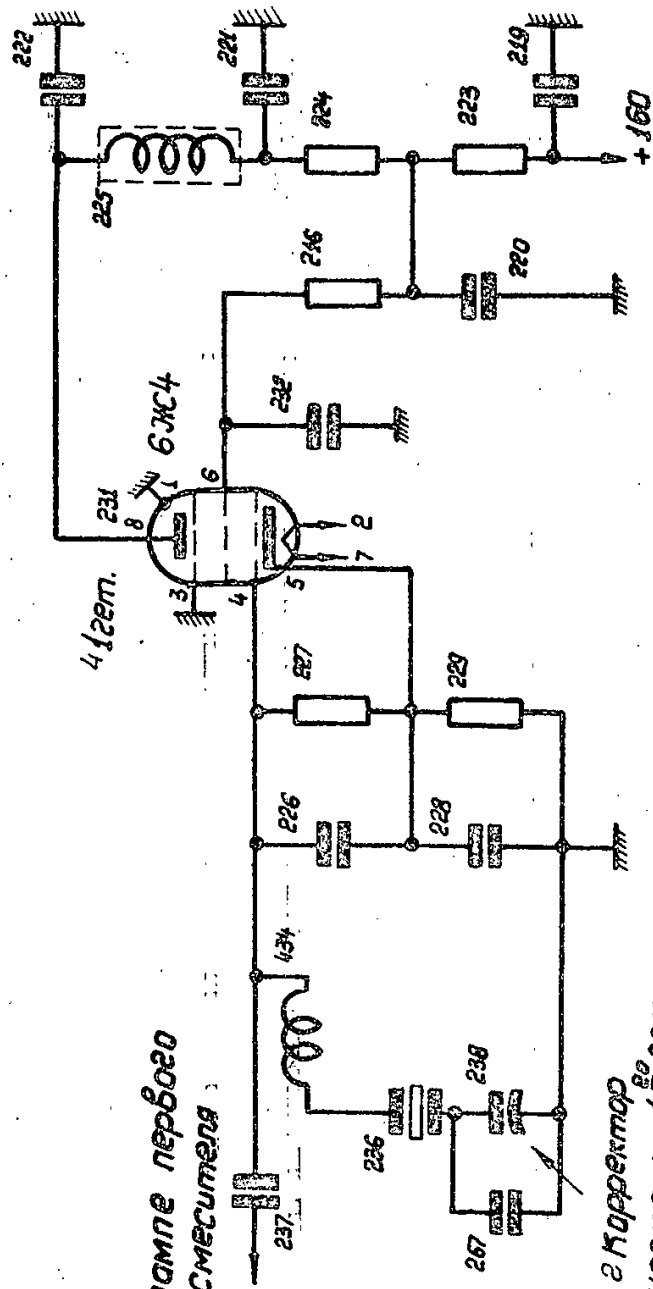
Рис. 16

Translation to page 17

50X1-HUM

1. To the first mixer tube
2. First oscillator frequency corrector
3. Fig. 17
4. First oscillator

50X1-HUM



1К лампе первого смесителя

2 Корректор частоты 1^{го} ст.

3 Рис. 17.

CONFIDENTIAL

Translation to page 18

50X1-HUM

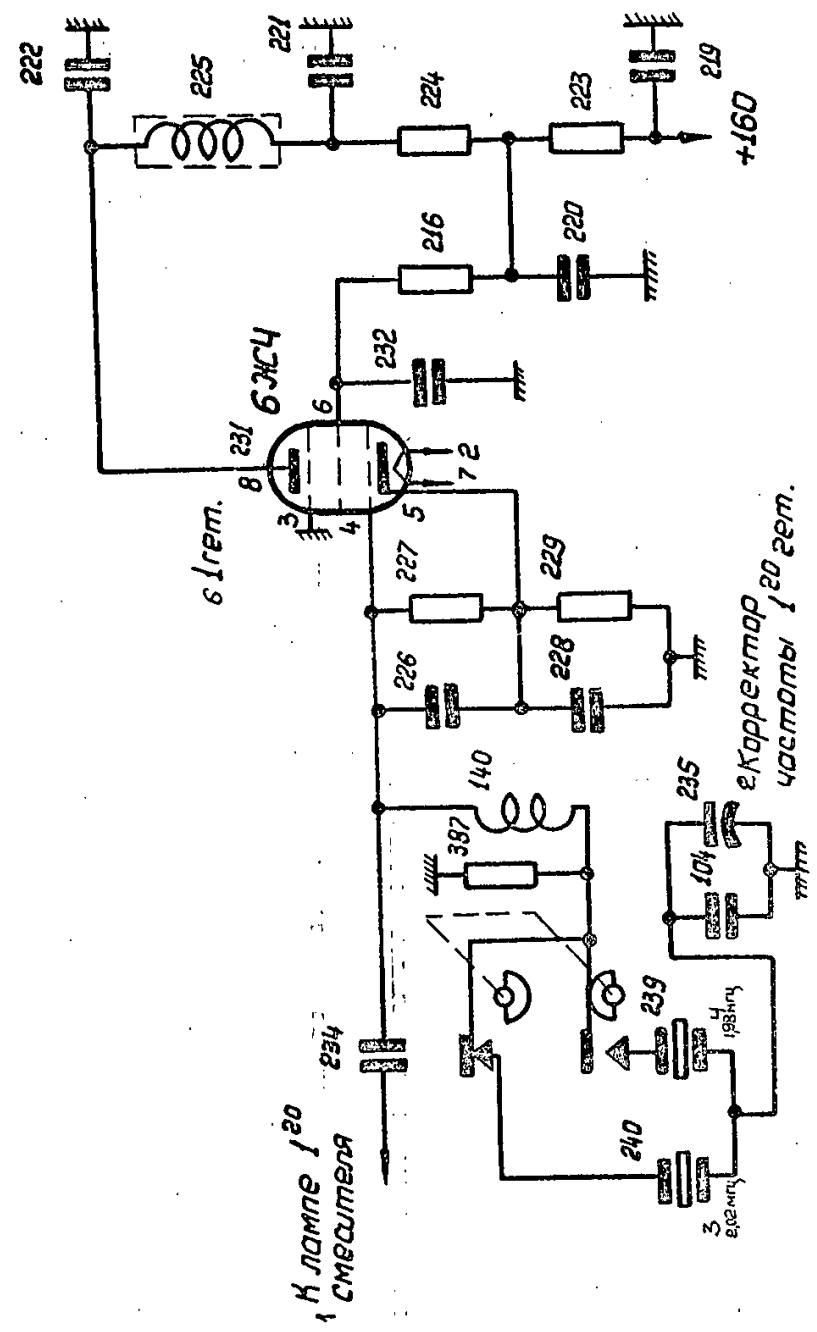
1. To the first mixer tube
2. First oscillator frequency corrector
3. 2.02 mc/s
4. 1.98 mc/s
5. Fig. 18
6. First oscillator

CONFIDENTIAL

CONFIDENTIAL

- 18 -

50X1-HUM



6ЖС4

6 лам.

1 лампе 120 смесителя

ε корректор частоты 120 Гц

5 Puc. 18

31

CONFIDENTIAL

CONFIDENTIAL

Translation to page 19

50X1-HUM

1. To the first mixer tube
2. First oscillator frequency corrector
3. 9 mc/s
4. Fig. 19
5. First oscillator (tube ~~6B4~~)

CONFIDENTIAL

CONFIDENTIAL

50X1-HUM

К лампе 120
1 смесителя

1 rem.
5 6Ж4

2 корректор частоты
120 rem.

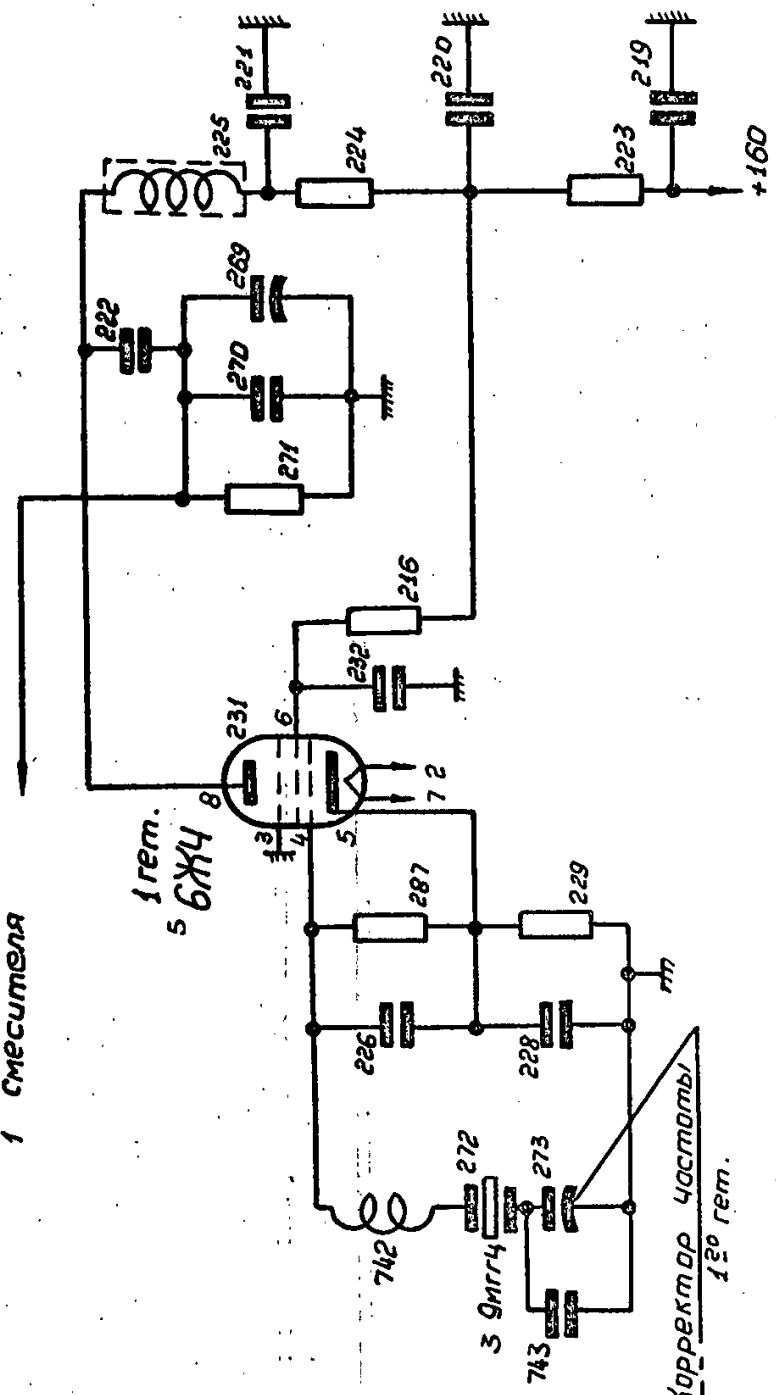


Рис. 19

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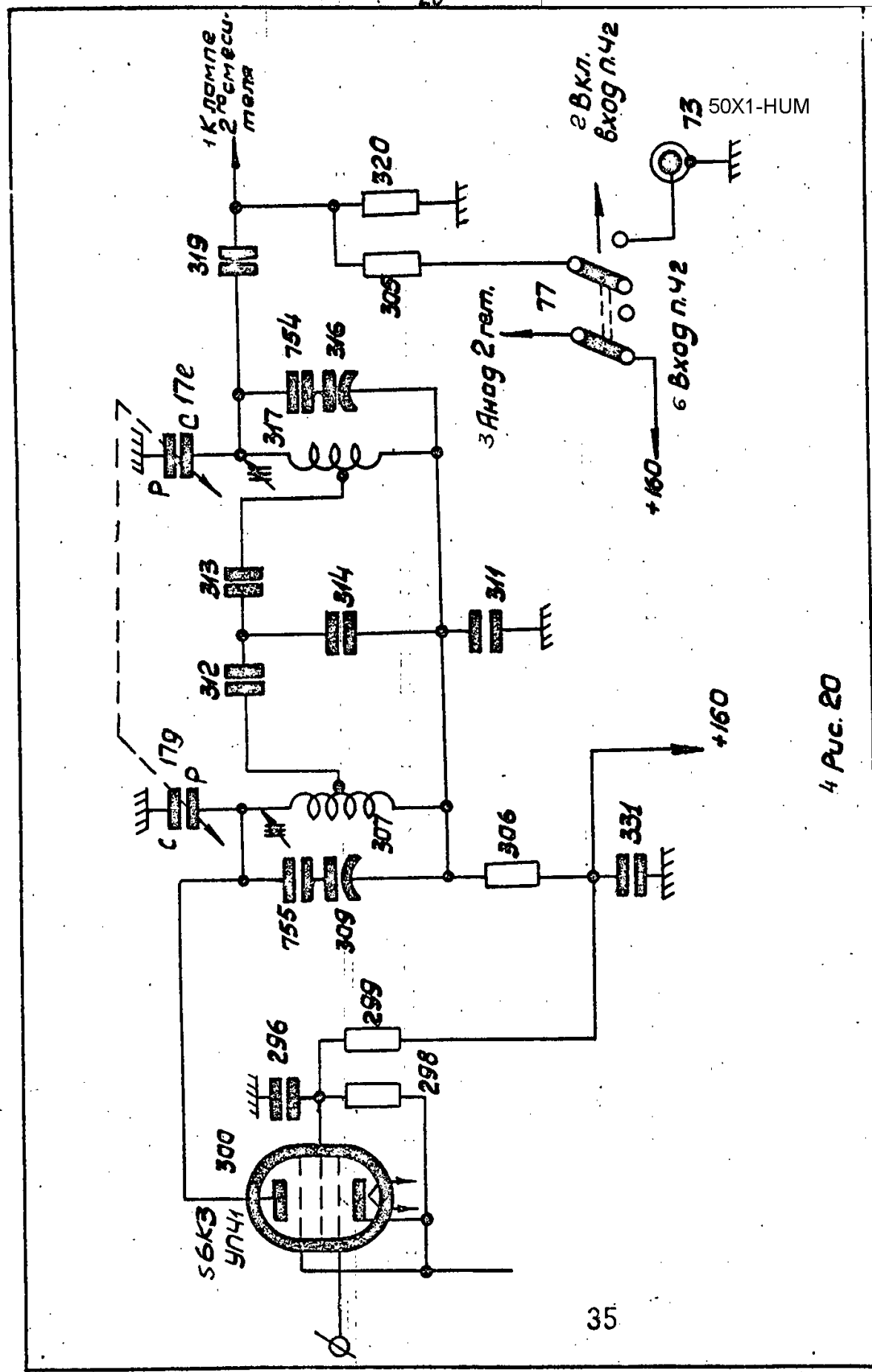
Translation to page 20

50X1-HUM

1. To the second mixer tube
2. Second intermediate frequency input "on"
3. Second oscillator plate
4. Fig. 20
5. First intermediate frequency amplifier (tube 6K3)
6. Second intermediate frequency input

CONFIDENTIAL

-20-



35

4 Pyc. 20

CONFIDENTIAL

Translation to page 21

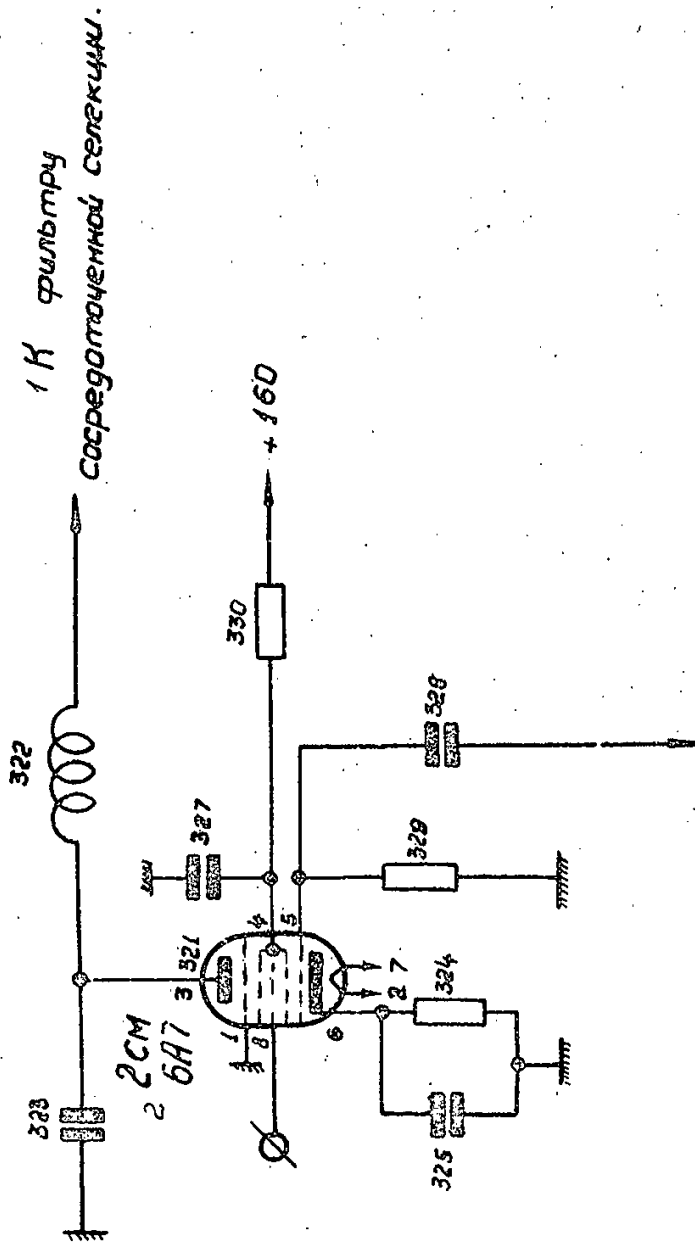
50X1-HUM

1. To the selective multisection filter
2. Second mixer
3. To the second oscillator
4. Fig. 21

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CONFIDENTIAL

50X1-HUM



3 КО 2 МУ гетеродину

4 РИС. 21

CONFIDENTIAL

CONFIDENTIAL

Translation to page 22

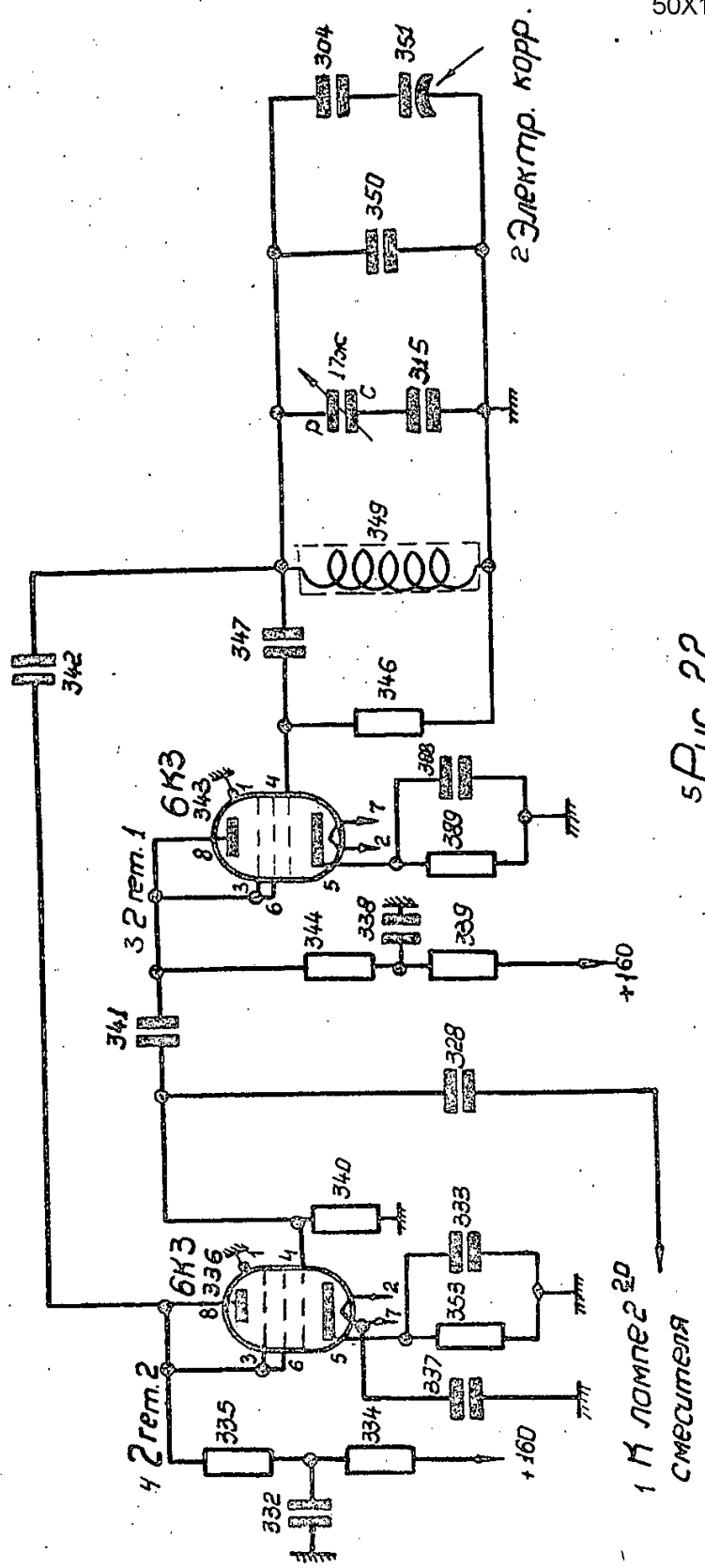
50X1-HUM

1. To the second mixer tube
2. Electric corrector
3. Second oscillator (tube 1)
4. Second oscillator (tube 2)
5. Fig. 22

CONFIDENTIAL

CONFIDENTIAL

50X1-HUM



Электр. корр.

с Рис. 22

1 к лампе 2 20 смесителя

39

CONFIDENTIAL

CONFIDENTIAL

Translation to page 23

50X1-HUM

1. To the tube of the high frequency amplifier
second stage
2. Calibrator frequency corrector
3. Fig. 23

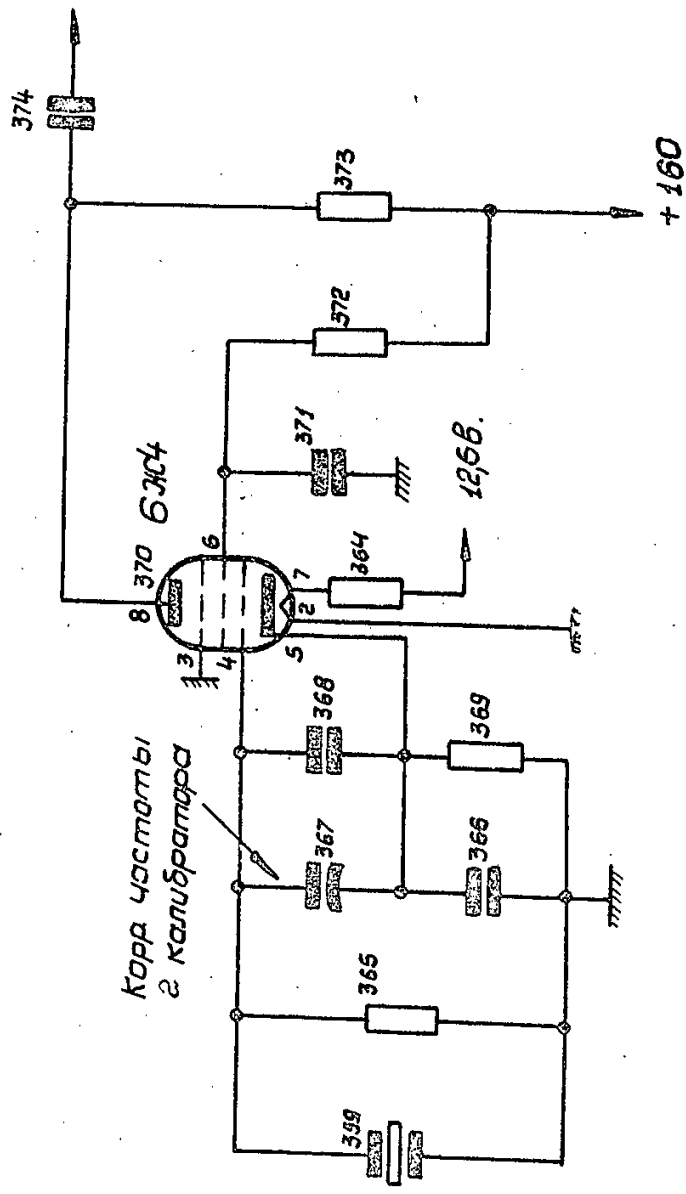
140

CONFIDENTIAL

CONFIDENTIAL

50X1-HUM

1 К лампе 220В
каскада УБЧ.



корр частоты
в калибратора

3 Puc. 23.

141

CONFIDENTIAL

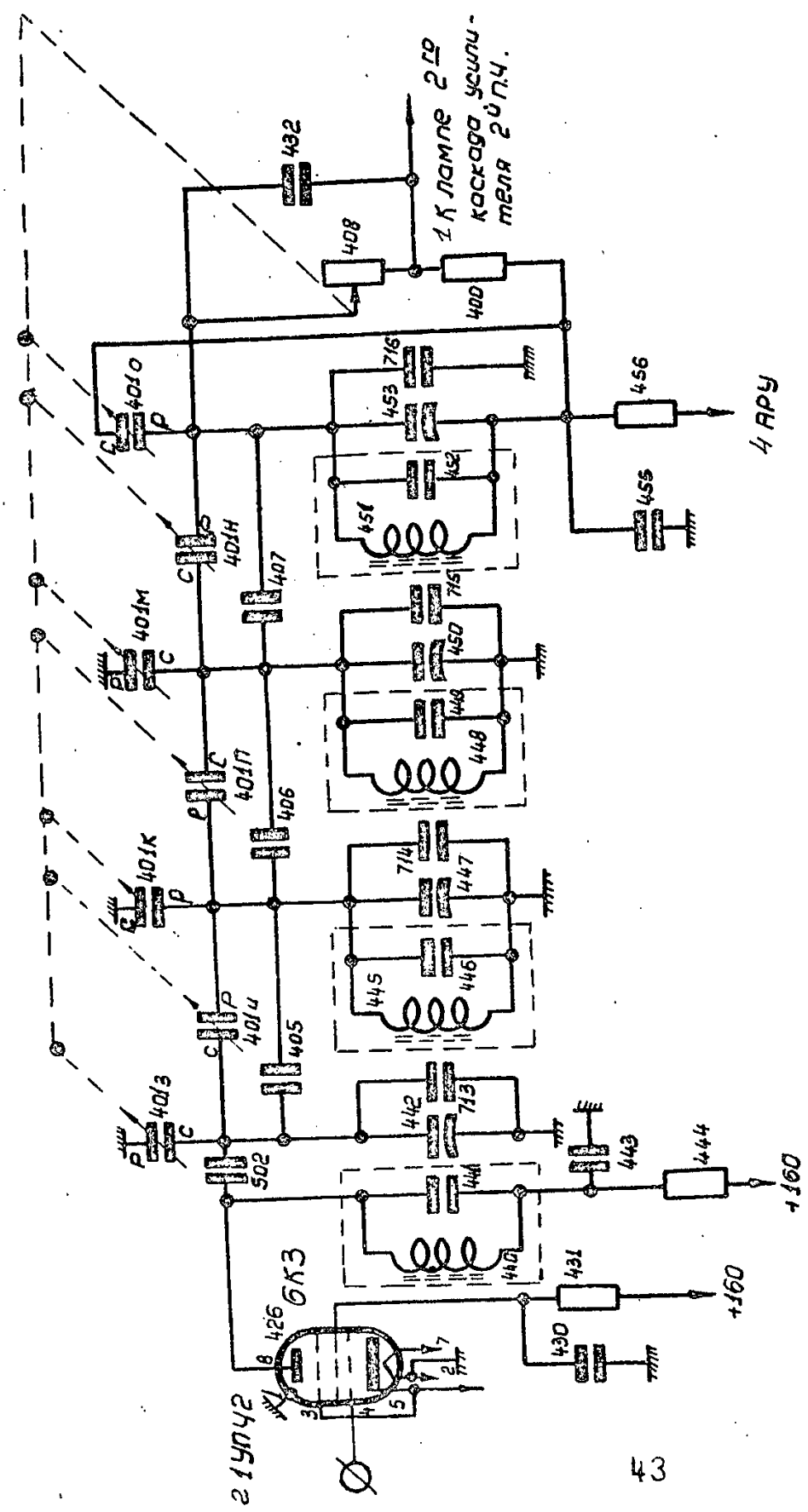
Translation to page 24

50X1-HUM

1. To the tube of the second intermediate frequency amplifier second stage
2. The second intermediate frequency first amplifier
3. Fig. 24
4. AGC

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50X1-HUM



3 РИС. 24.

43

CONFIDENTIAL

CONFIDENTIAL

Translation to page 25

50X1-HUM

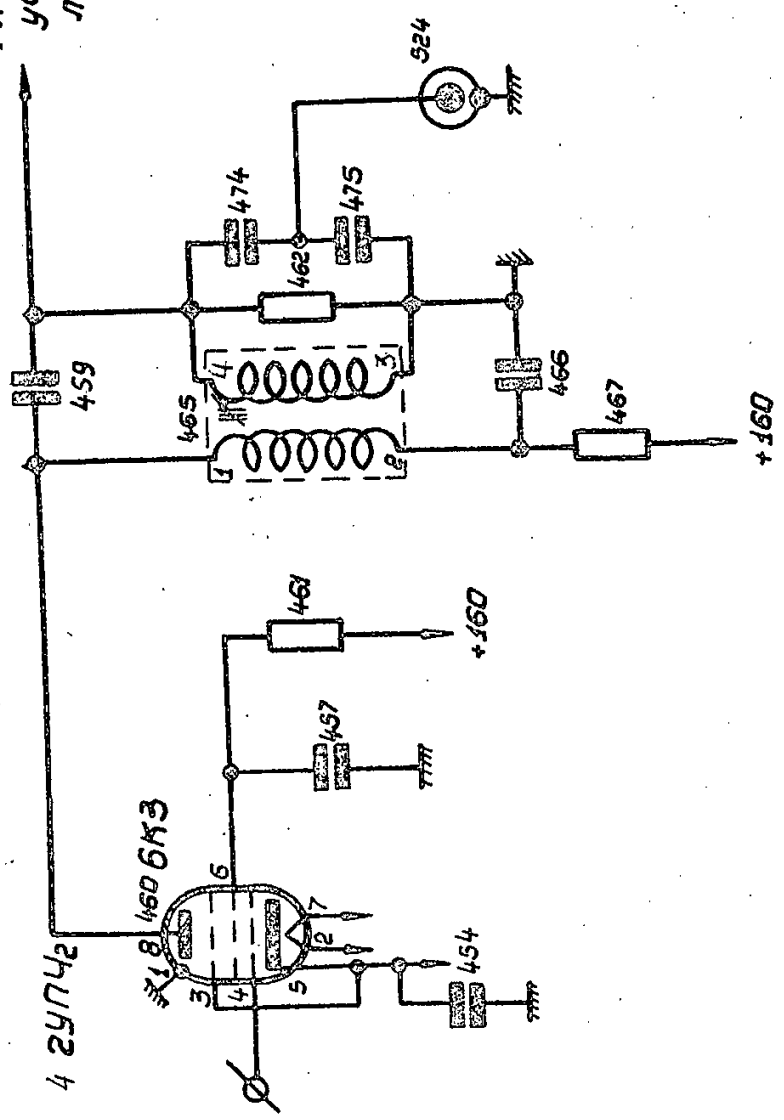
1. To the tube of the second intermediate frequency amplifier third stage
2. To the AGC amplifier tube
3. Intermediate frequency low-resistance output
4. Second amplifier of the second intermediate frequency
5. Fig. 25

CONFIDENTIAL

50X1-HUM

1 И лампе 3^й коаксового
усилителя 2^й п.ч. 2К
лампе усилителя АРУ.

3 Выход п.ч.
микрометра



5 Рuc. 25.

Translation to page 26

50X1-HUM

1. To the detector
2. To the third oscillator-changer
3. Second intermediate frequency third-amplifier
4. Fig. 26
5. To the manual gain control (MGC) potentiometer

50X1-HUM

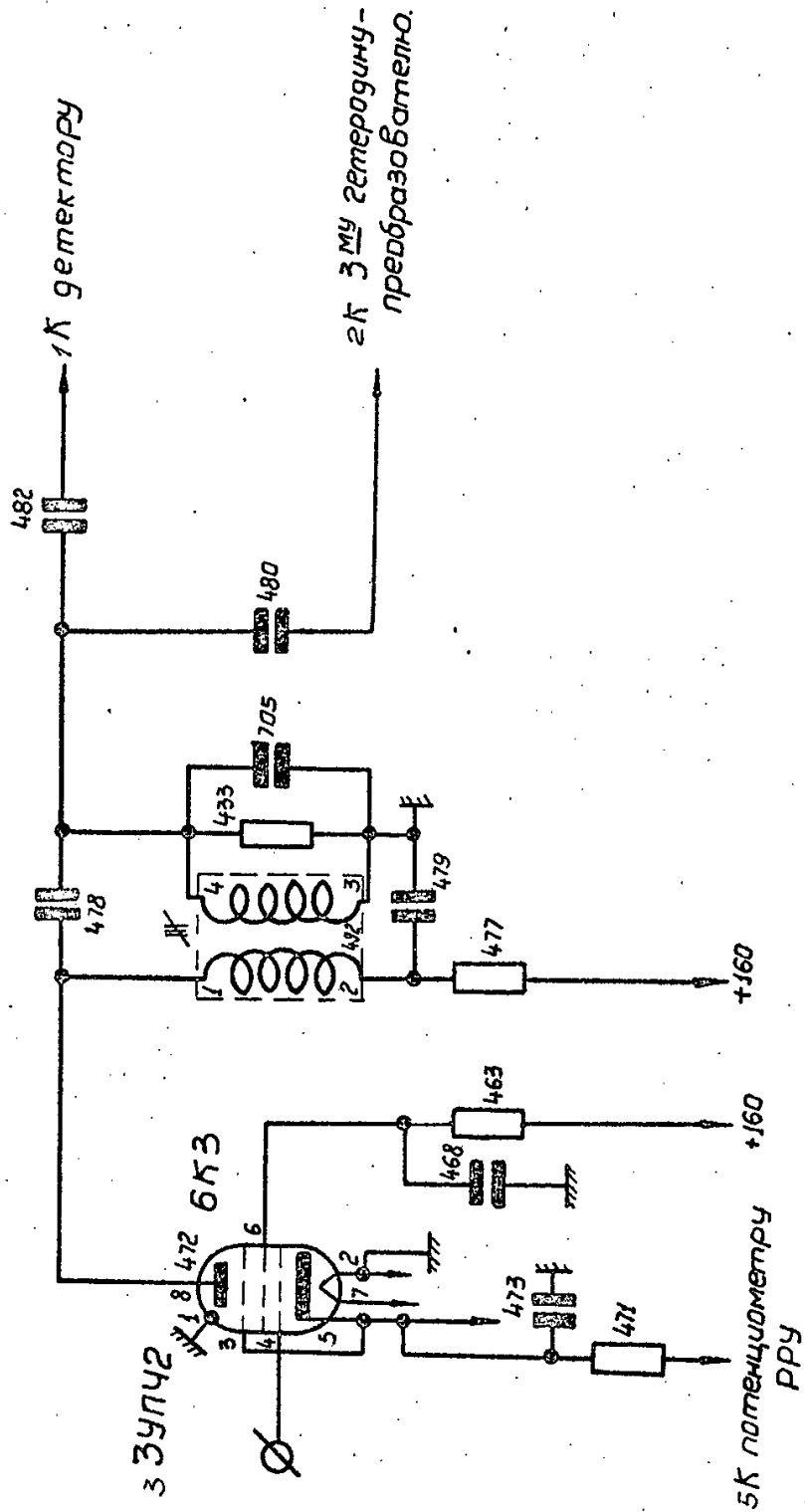


Рис. 26

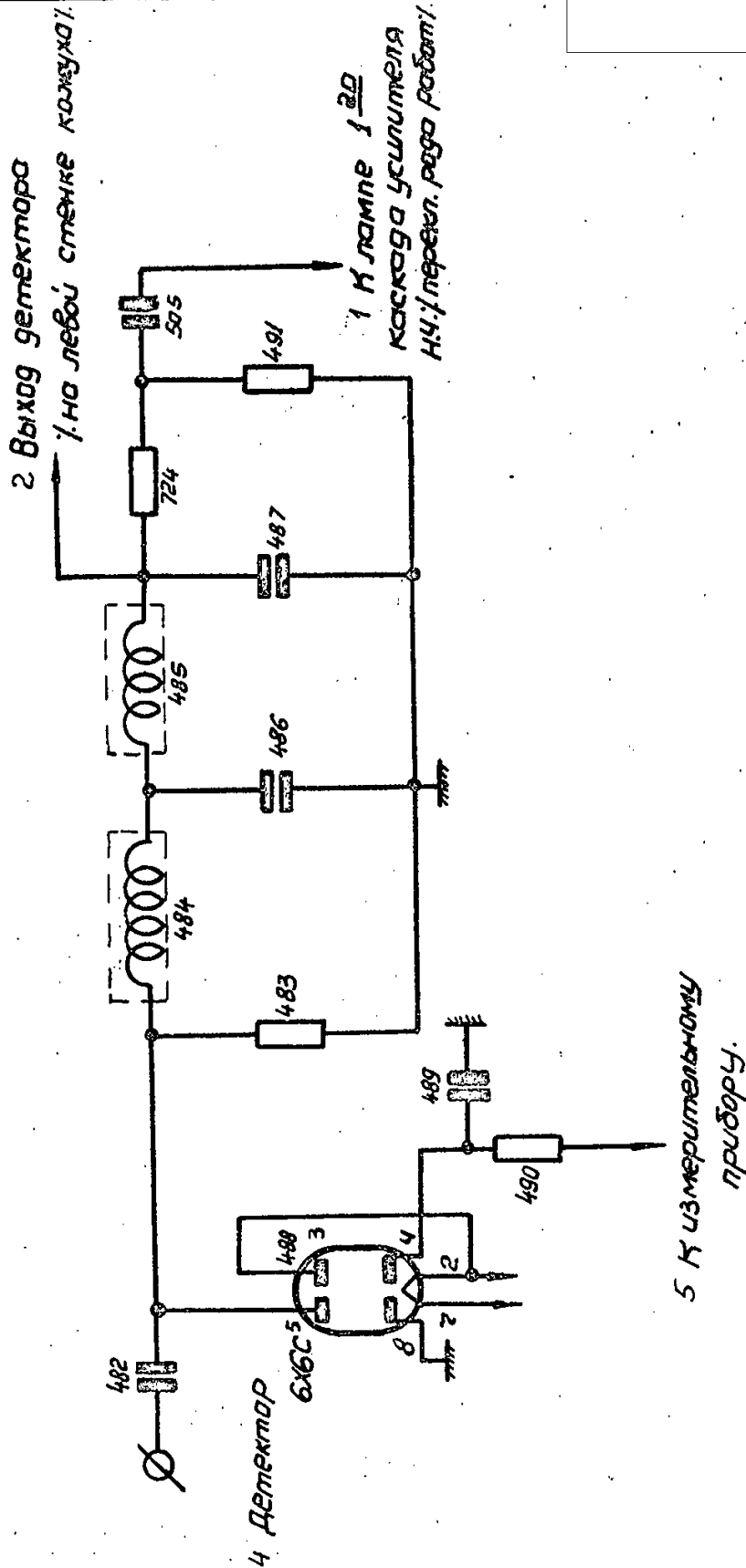
Translation to page 27

50X1-HUM

1. To the tube of the audio frequency amplifier
first stage (switch of kind of operation)
2. Detector output (on the casing left wall)
3. Fig. 27
4. Detector
5. To the meter

CONFIDENTIAL

50X1-HUM



3 Рис. 27

45

CONFIDENTIAL

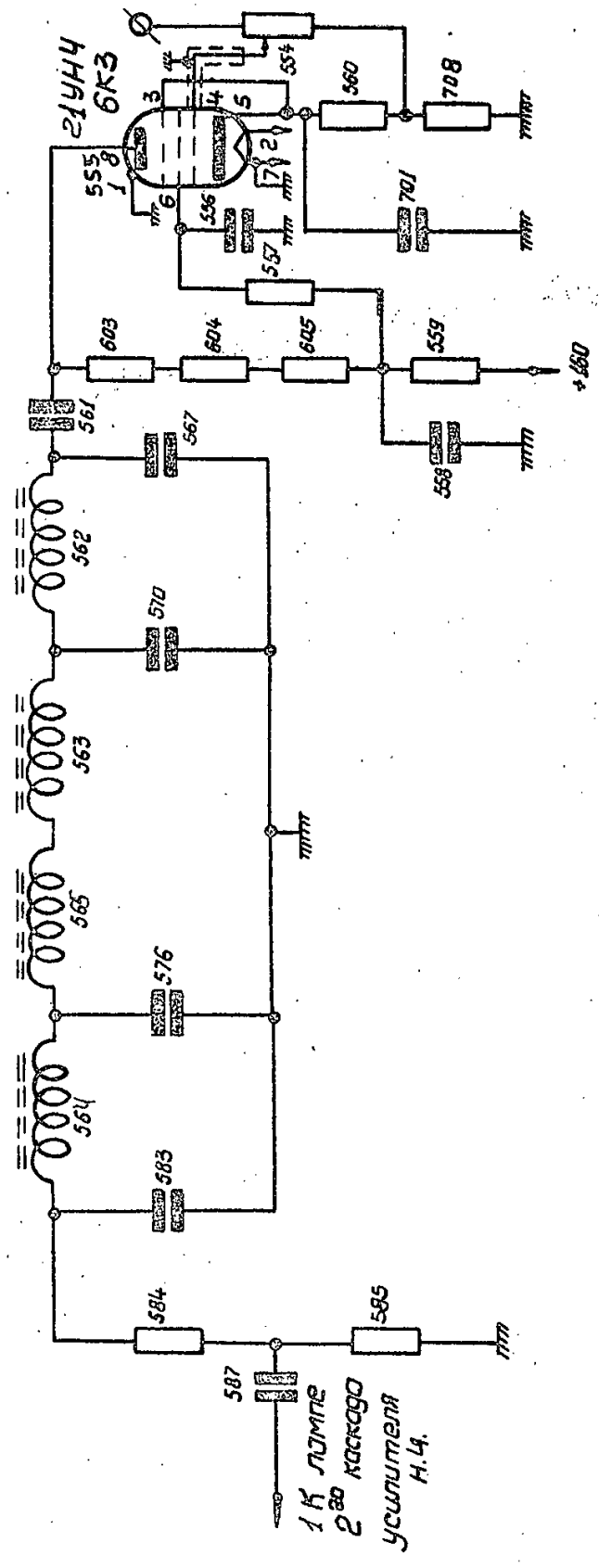
Translation to page 28

50X1-HUM

1. To the tube of the audio frequency amplifier
second stage
2. First audio frequency amplifier
3. Fig. 28

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50X1-HUM

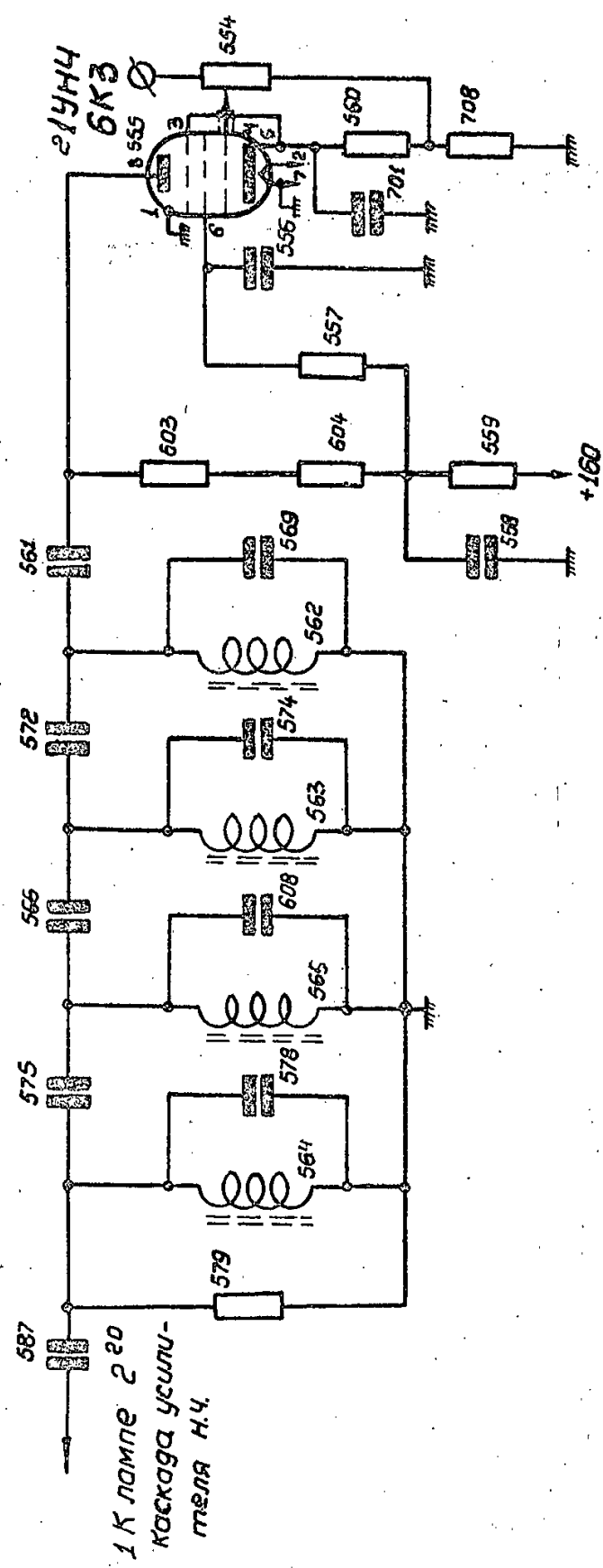


1 К ЛУМНЕ
 2⁸⁰ КАСКОГО
 УСЛУМЕНА
 Н.Л.

3 Руч. 28

CONFIDENTIAL

50X1-HUM



3 Рис. 29

CONFIDENTIAL

Transition to page 30

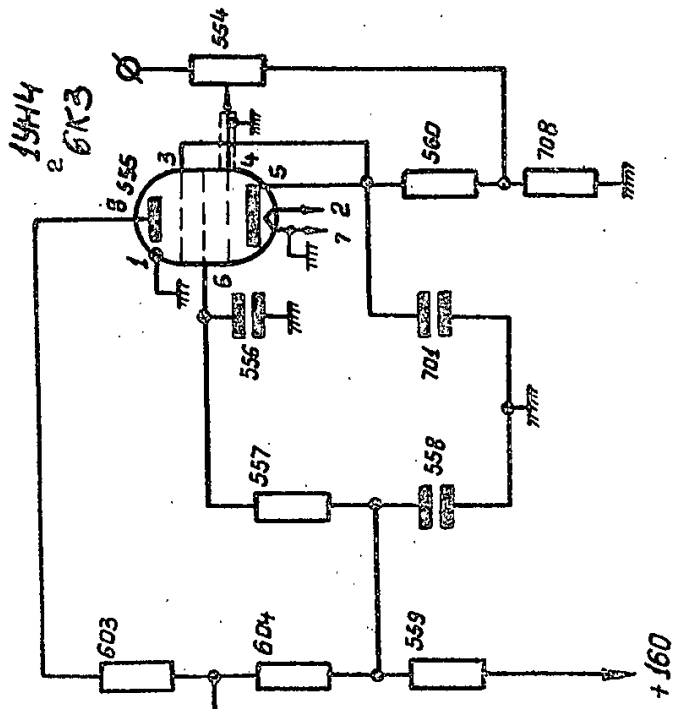
50X1-HUM

1. To the tube of the audio frequency amplifier
second stage
2. First audio frequency amplifier
3. Fig. 30

CONFIDENTIAL

40-

50X1-HUM



19H4
2 6K3

1 лампе 220 вольт
1 усилитель Н.Л.

3 PUC. 30

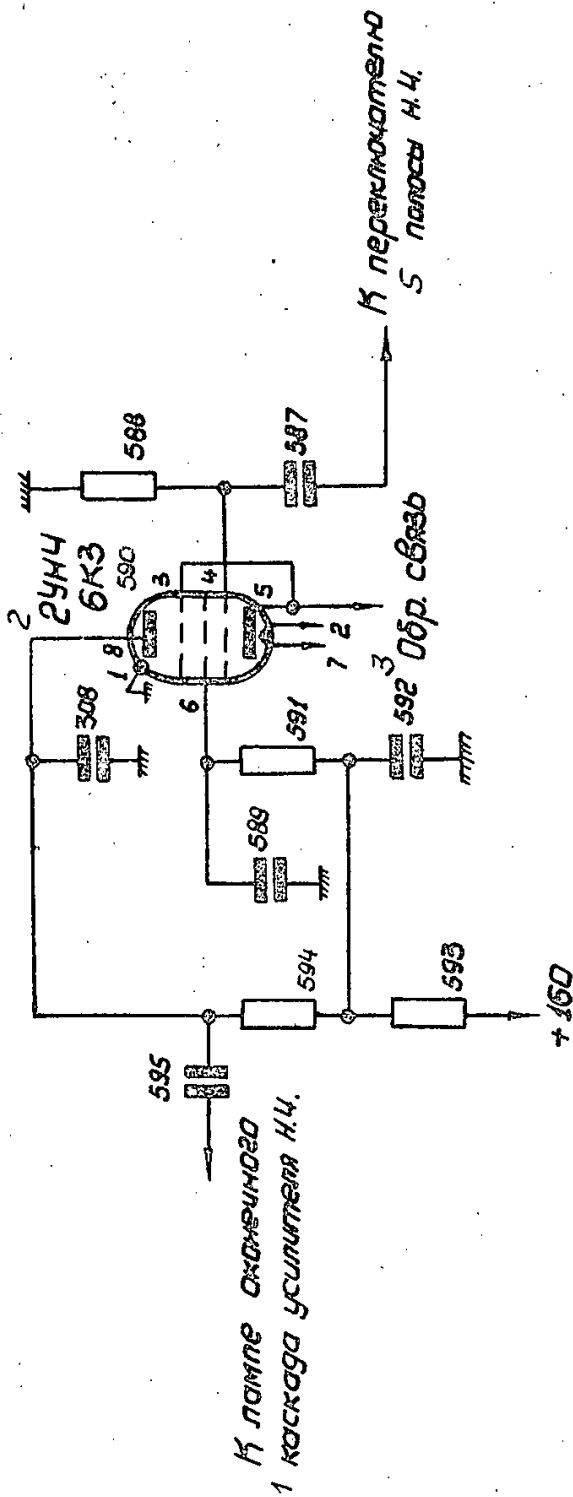
Translation to page 31

50X1-HUM

1. To the tube of the audio frequency amplifier
output stage
2. Second audio frequency amplifier
3. Back coupling
4. Fig. 31
5. To the switch of AF band-width

- 34 -

50X1-HUM



4 Рис. 31

CONFIDENTIAL

Translation to page 32

50X1-HUM

1. Output to the line
2. Third audio frequency amplifier
3. Negative back coupling (to the second audio frequency amplifier)
4. Low-resistance head phones
5. Fig. 32
6. To the second audio frequency amplifier

CONFIDENTIAL

CONFIDENTIAL

translation to page 33

50X1-HUM

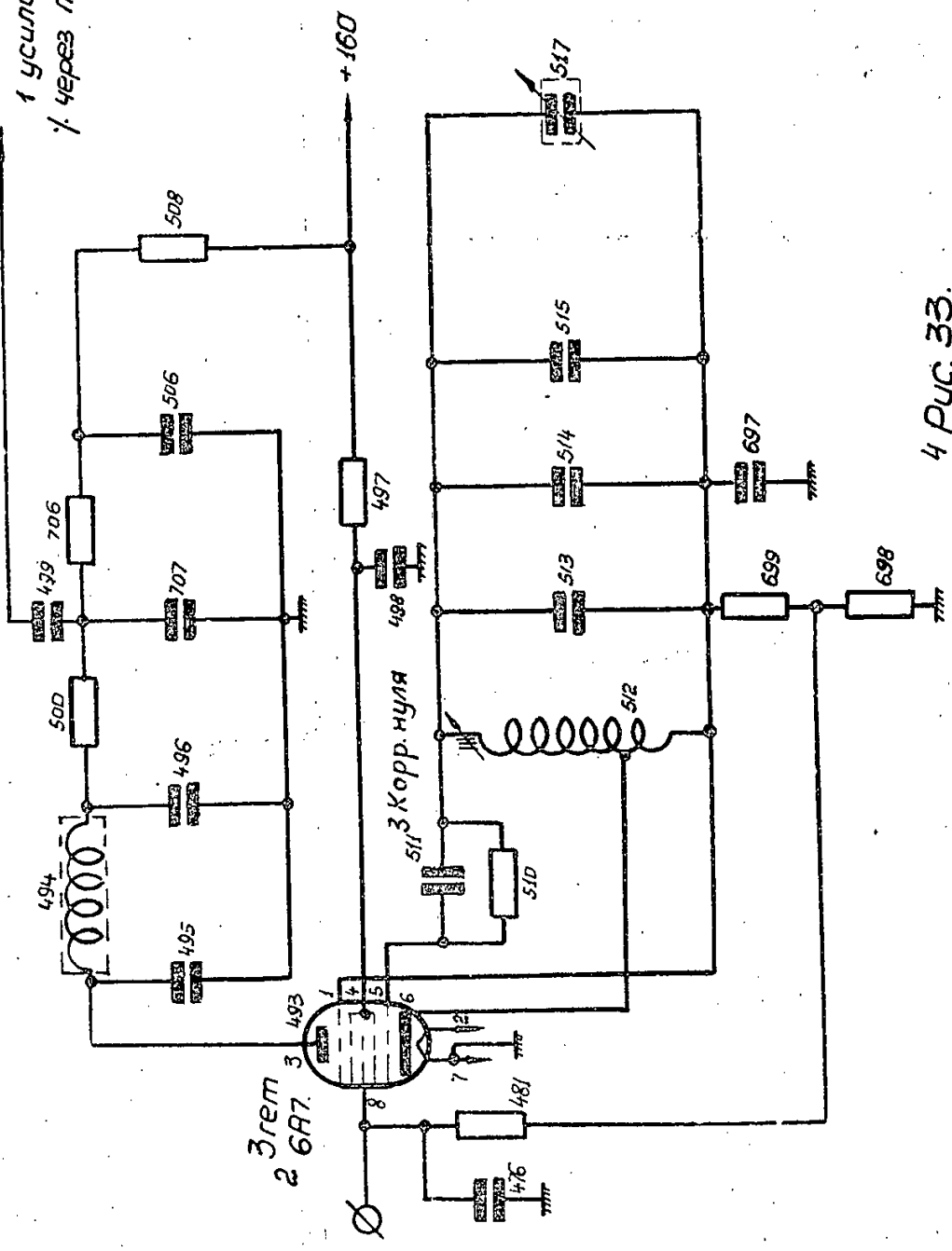
1. To the tube of the audio frequency amplifier
first stage (through the switch of kinds of operation)
2. Third oscillator
3. Zero corrector
4. Fig. 33

CONFIDENTIAL

-33-

50X1-HUM

К лампе 1^{го} класса
1 усилителя н.ч.
/ через переключатель работ./



4 рис. 33.

61

CONFIDENTIAL

Translation to page 34

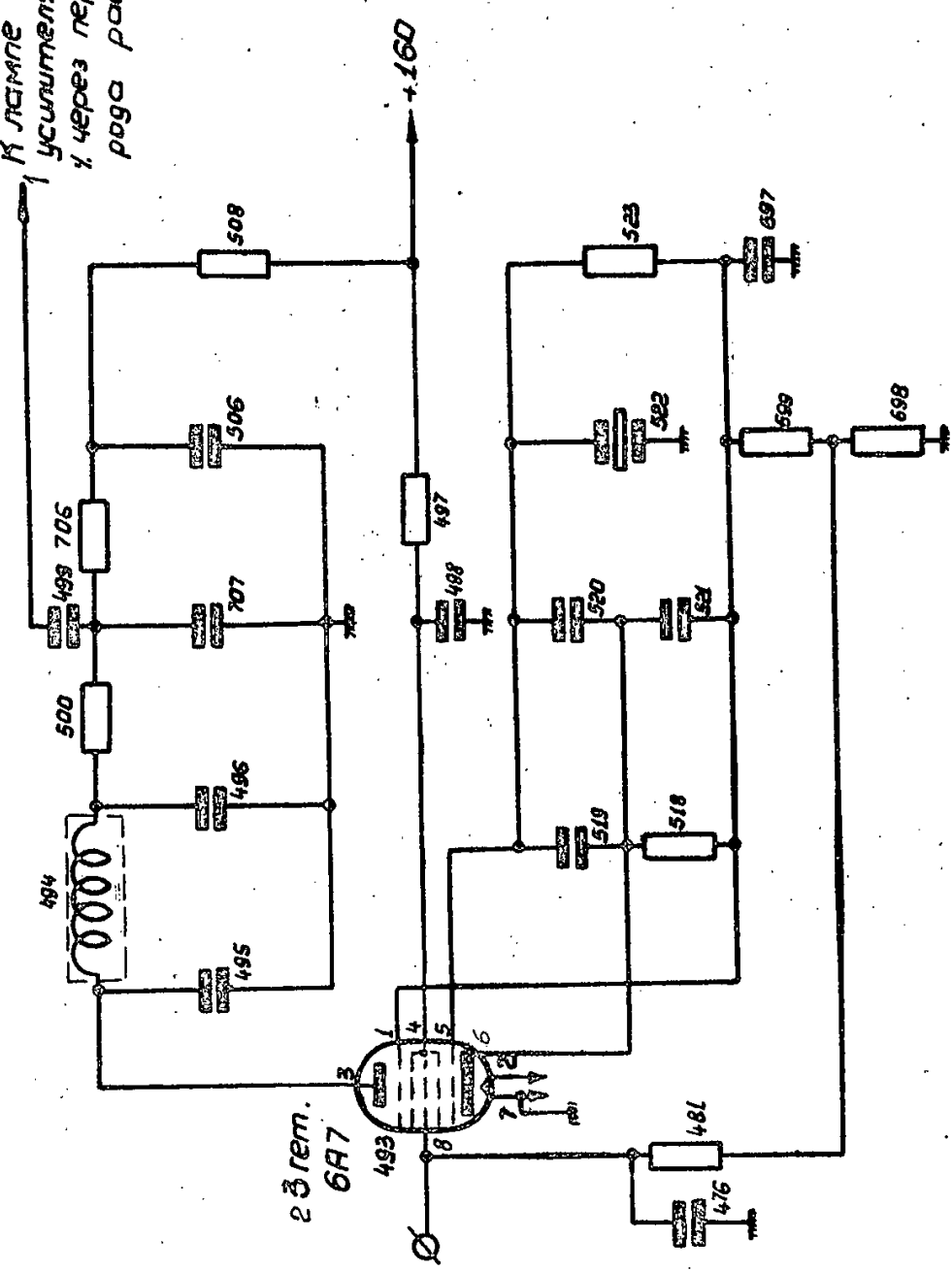
50X1-HUM

1. To the tube of the audio frequency amplifier
first stage (through the switch of kinds of operation)
2. Third oscillator
3. Fig. 34

CONFIDENTIAL

50X1-HUM

К лампе 1^{2D} коского
усилителя Н.Ч.
через переключ.
рога работи.



3 PUC. 34

CONFIDENTIAL

Translation to page 35

50X1-HUM

1. Second high frequency amplifier
2. The first mixer
3. The first intermediate frequency amplifier
4. Second intermediate frequency first amplifier
5. Second intermediate frequency second amplifier
6. AGC output
7. Second intermediate frequency output

(high-resistance)
8. Second intermediate frequency input (from the second intermediate frequency second amplifier)
9. To the tuning indicator
10. Fig. 35

CONFIDENTIAL

CONFIDENTIAL

36

50X1-HUM

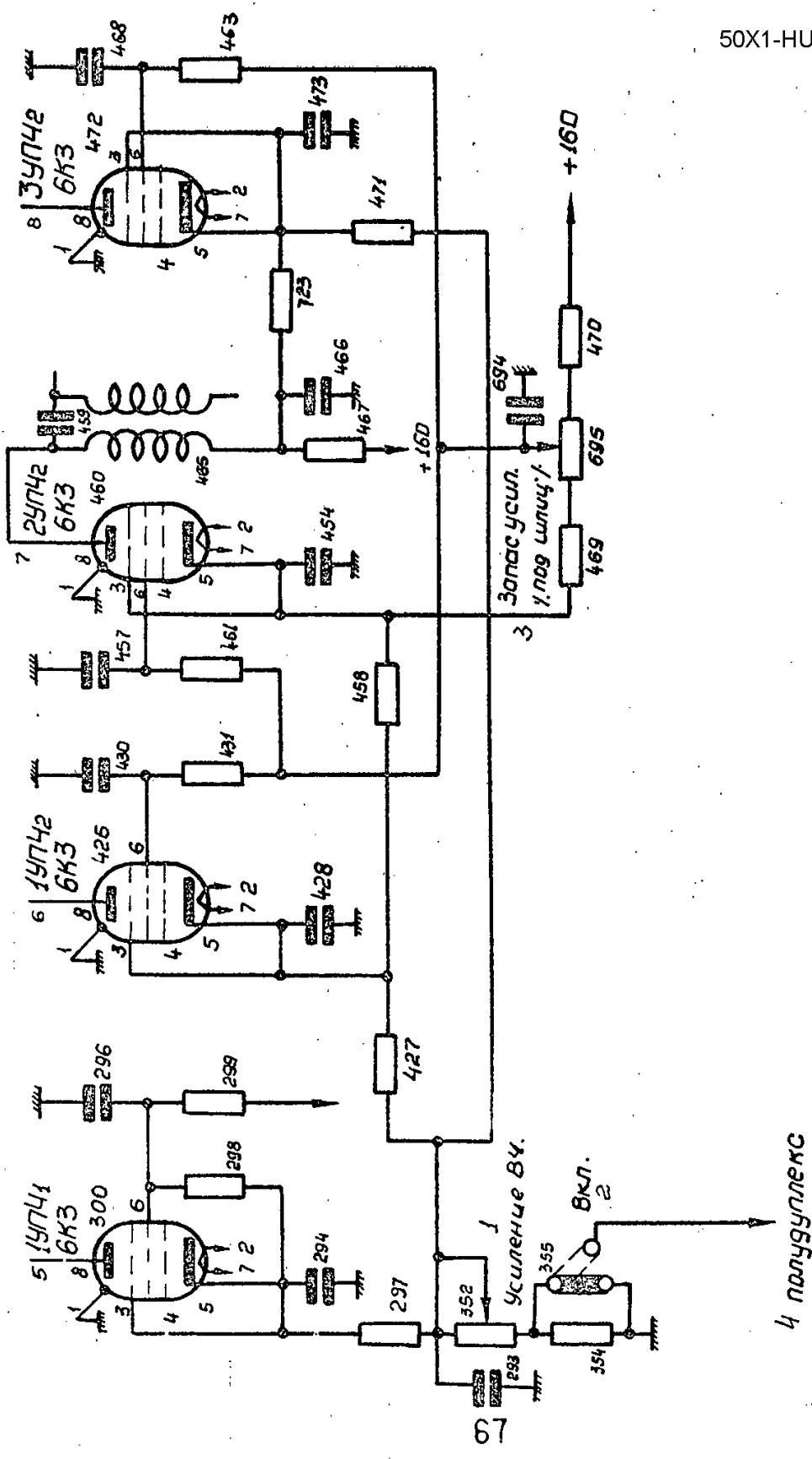


Рис. 36

CONFIDENTIAL

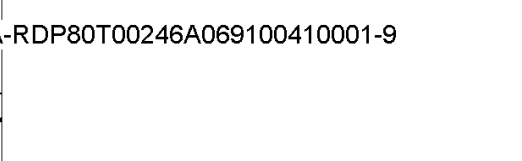
CONFIDENTIAL

Translation to page 37

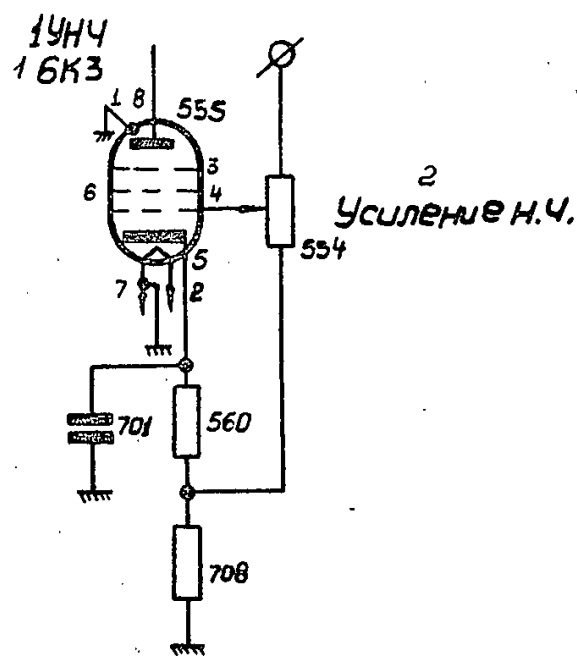
50X1-HUM

1. First audio frequency amplifier
2. Audio frequency gain
3. Fig. 37

CONFIDENTIAL



50X1-HUM



3 РИС. 37.

69

CONFIDENTIAL

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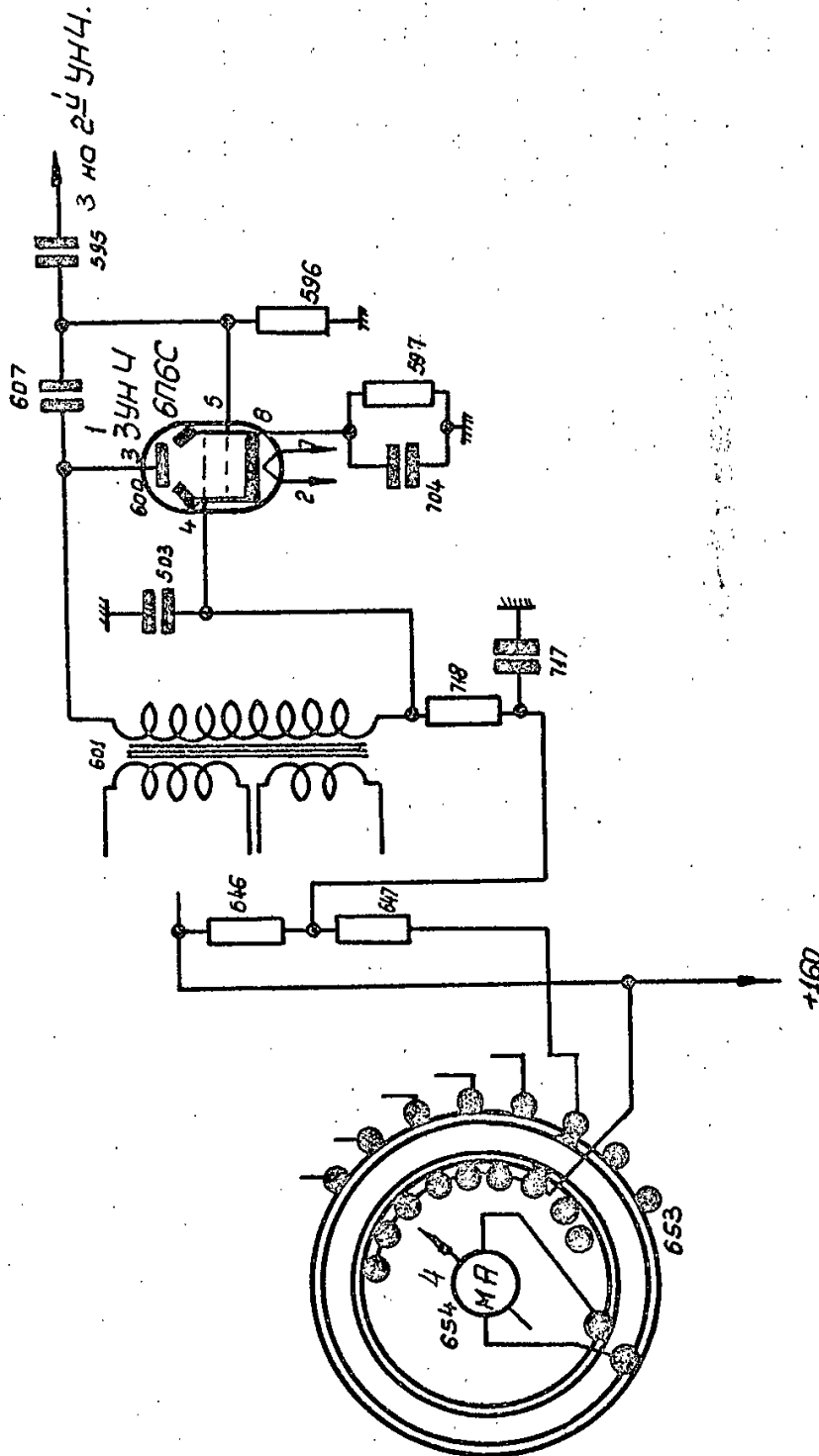
Translation to page 38

50X1-HUM

1. The third audio frequency amplifier
2. Fig. 38
3. To the second audio frequency amplifier
4. Microammeter

CONFIDENTIAL

50X1-HUM



2 Puc. 38.

CONFIDENTIAL

Translation to page 39

50X1-HUM

1. Aluminized surface
2. Frosted surface
3. Light diameter
4. Scale rotation axis
5. Scale
6. Emulsion layer
7. AB cut-open view
8. Fig. 39

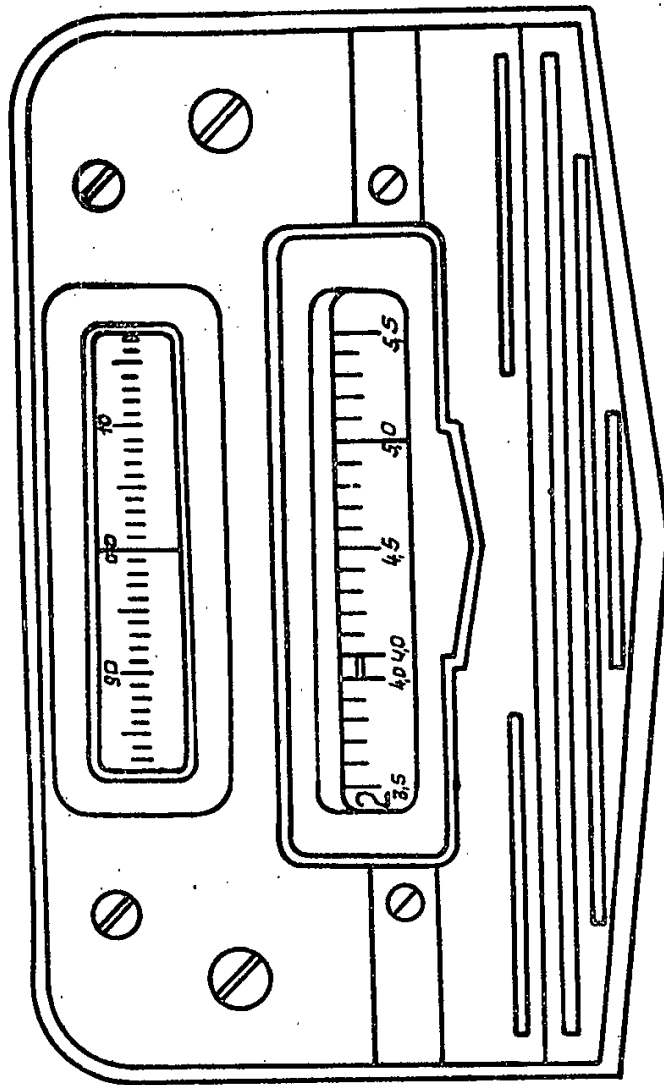
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CONFIDENTIAL

-40-

50X1-HUM

1 Приемник настроен на частоту 5000 кгц.



2 Рис. 40

CONFIDENTIAL

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Translation to page 41

50X1-HUM

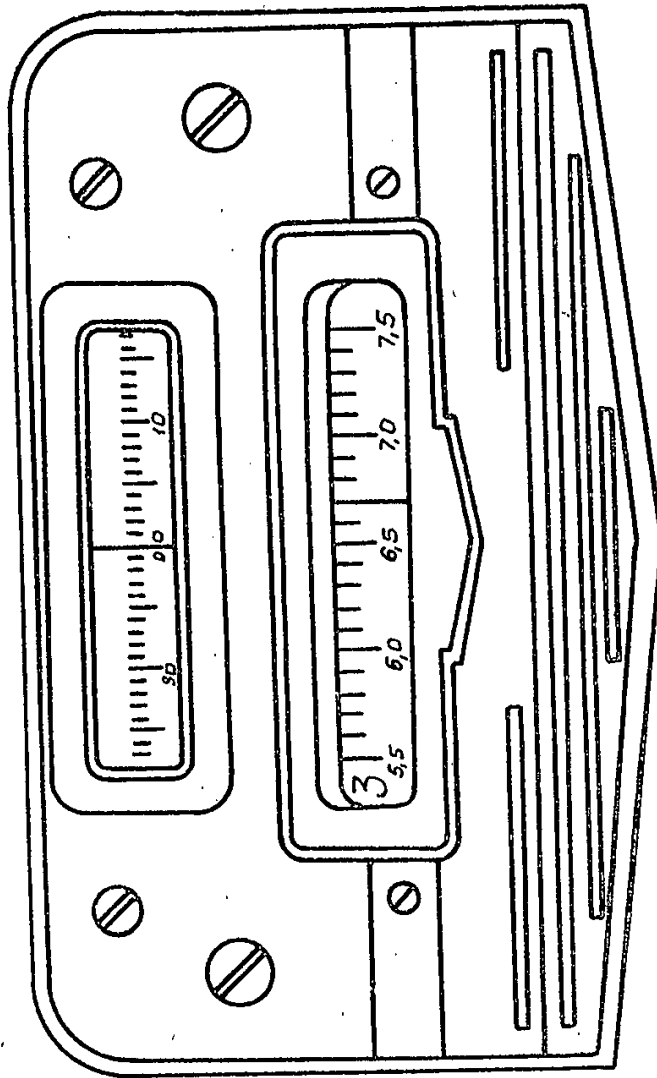
1. The receiver is tuned to the frequency of
6700 kc/s
2. Fig. 41

CONFIDENTIAL

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50X1-HUM

Приемник настроен на частоту 6700 кгц



з. Рис. 41.

CONFIDENTIAL

Translation to page 42

50X1-HUM

1. The receiver is tuned to the frequency of

16328 kc/s

2. Fig. 42

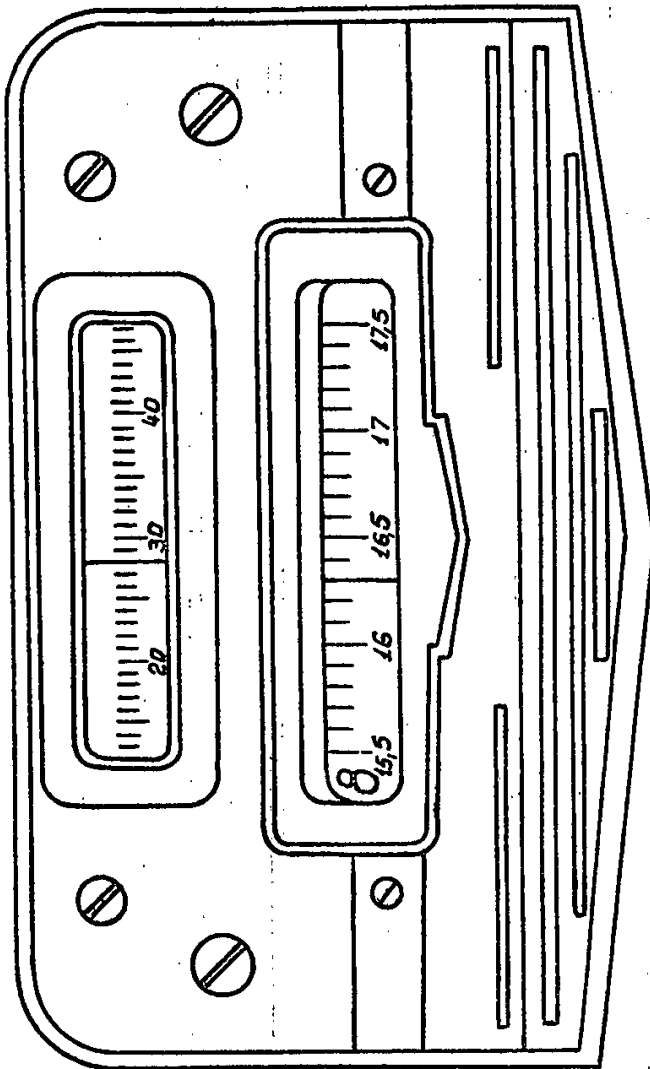
CONFIDENTIAL

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50X1-HUM

1. Приемник настроен на частоту 16328 кгц.



2. Рис. 42

CONFIDENTIAL

CONFIDENTIAL

Translation to page 43

50X1-HUM

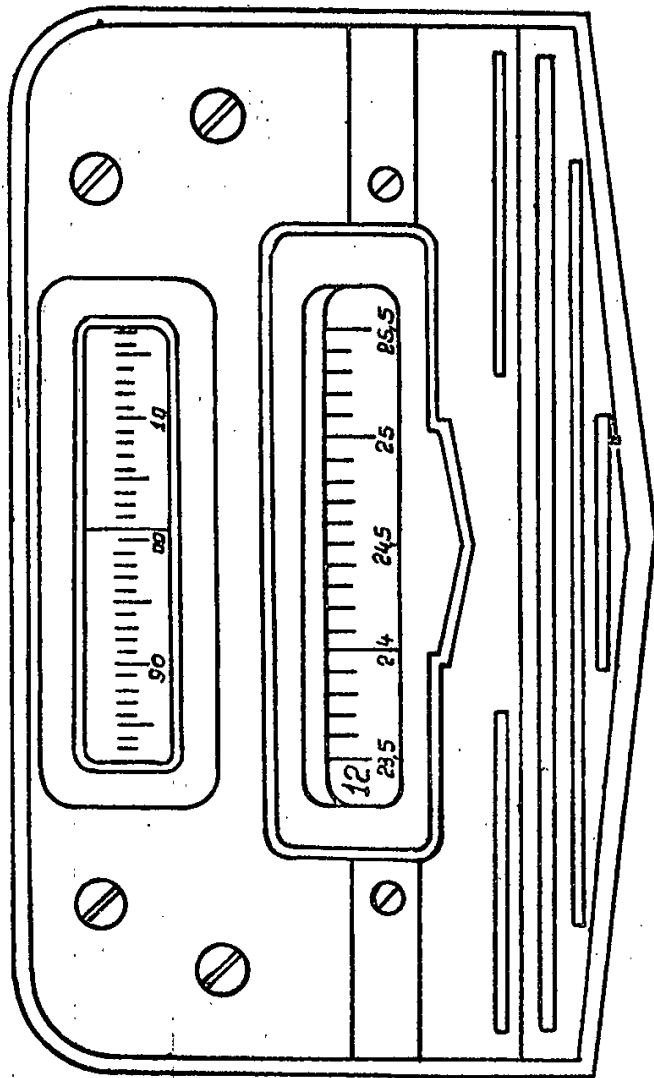
1. The receiver is tuned to the frequency of
24001 kc/s
2. Fig. 43

CONFIDENTIAL

- 43 -

50X1-HUM

1 Приемник настроен на частоту 24001 кГц.



2 Рис. 43.

CONFIDENTIAL

Translation to page 44

50X1-HUM

1. the receiver is tuned to the frequency of

23997 kc/s

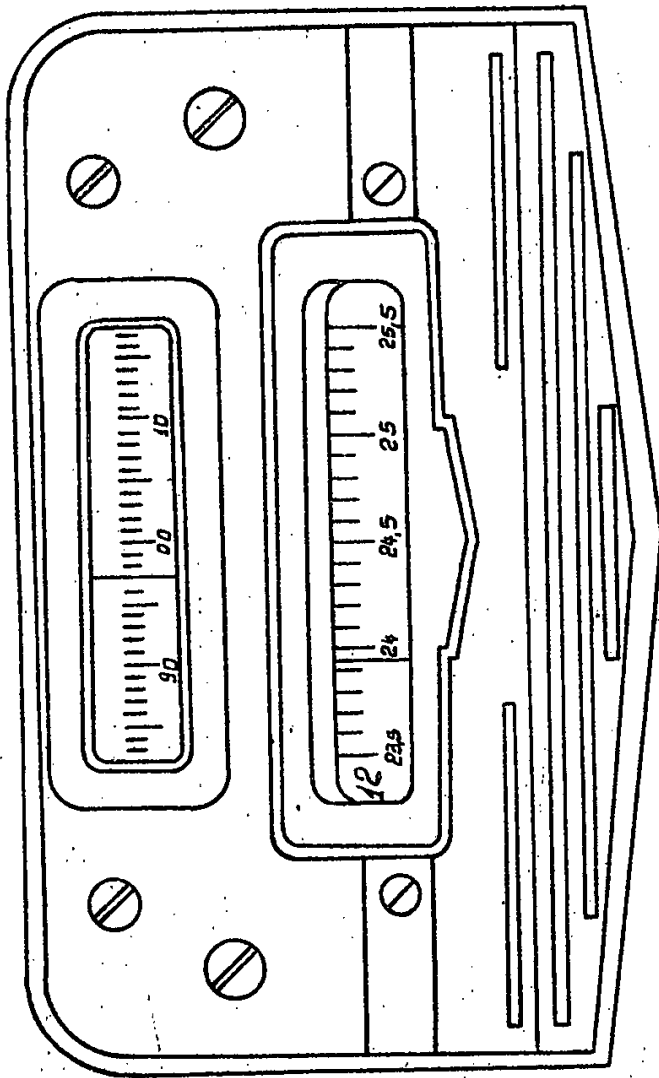
2. Fig. 44

CONFIDENTIAL

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50X1-HUM

Пръемник настроен на частоту 23997 кГц.



в РИС. 44.

CONFIDENTIAL

Translation to page 45

50X1-HUM

1. To antenna 1
2. To antenna 11
3. Summary telephonic output
 - a) line
 - b) ACC output
4. Fig. 45

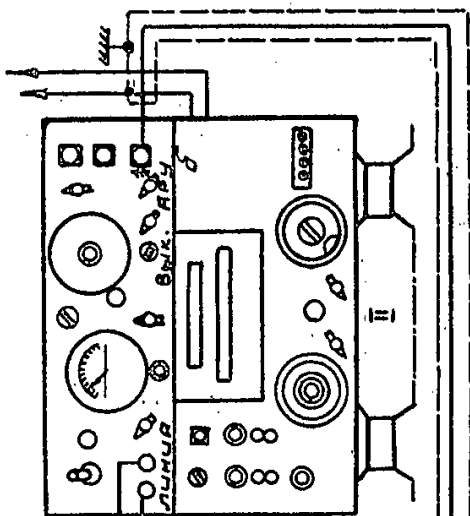
CONFIDENTIAL

CONFIDENTIAL

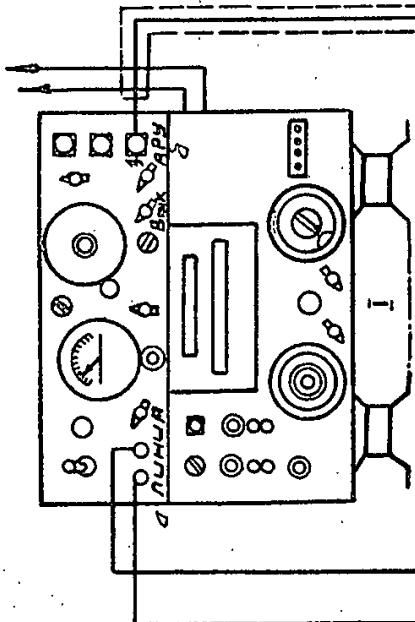
-45-

50X1-HUM

2 Комменне II



1 Комменне I



3 Суммарный телеф. выход

4 Руч 45.

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CONFIDENTIAL

Translation to page 46

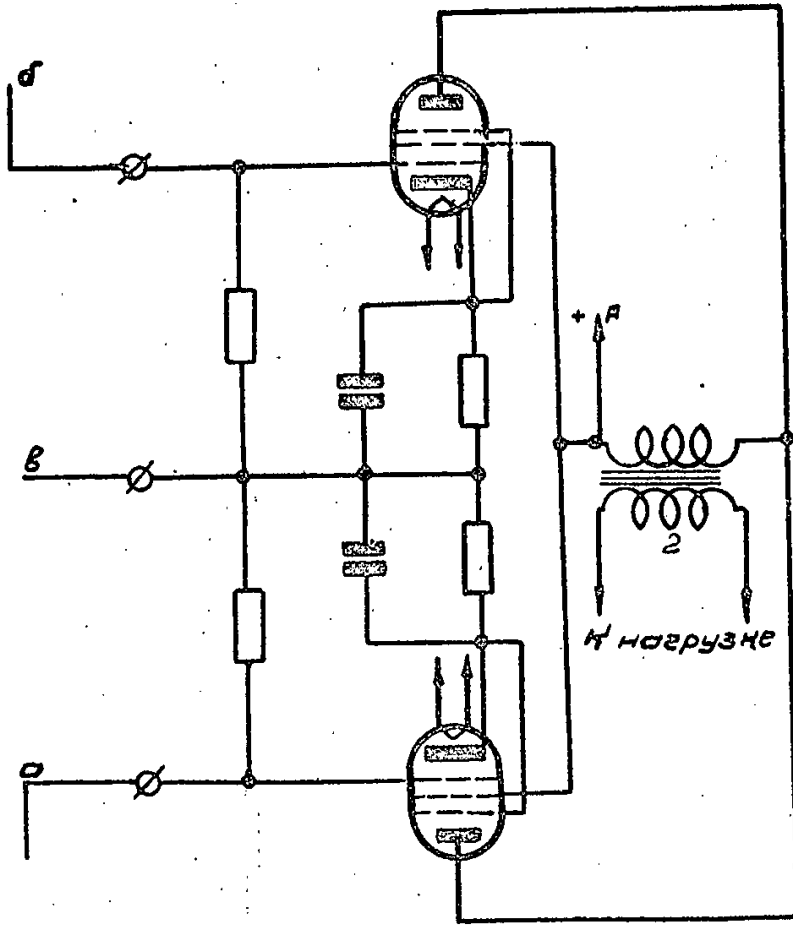
50X1-HUM

1. Receivers summary telephonic output
2. To the load
3. Fig. 46

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50X1-HUM

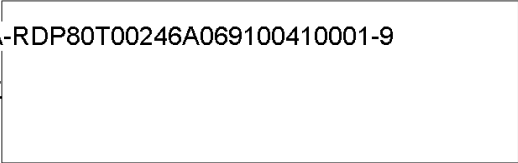
1 Суммарный телефон. выход приемников.



3 Рис 46

87

CONFIDENTIAL



translation to page 47

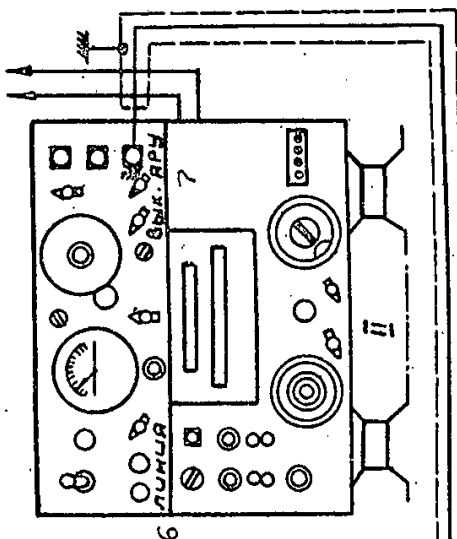
50X1-HUM

1. To the antenna I
2. To the antenna II
3. Tone-manipulator
4. Tone-generator
5. Fig. 47
6. Line
7. AGC output

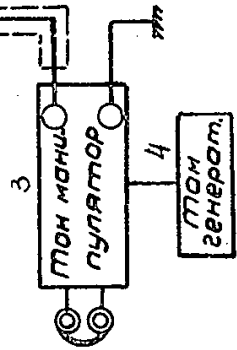
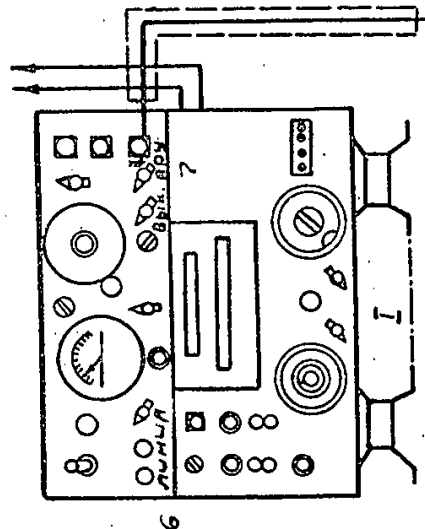
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50X1-HUM

2 К антенне II



1 К антенне I



5 Рис 47.

CONFIDENTIAL

Translation to page 48

50X1-HUM

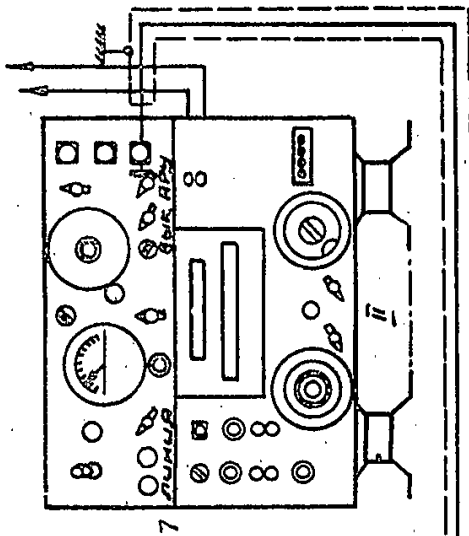
1. To the antenna I
2. To the antenna II
3. Limiter
4. Electronic relay
5. To the oscillator
6. Fig. 48
7. Line
8. AGC output

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50X1-HUM.

2к амперной



1к амперной

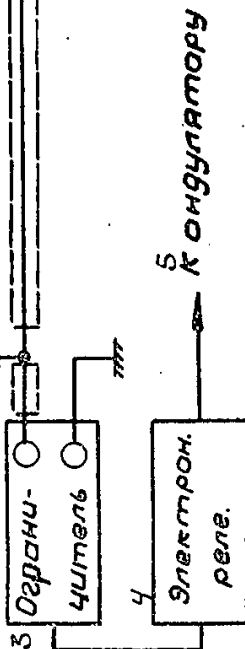
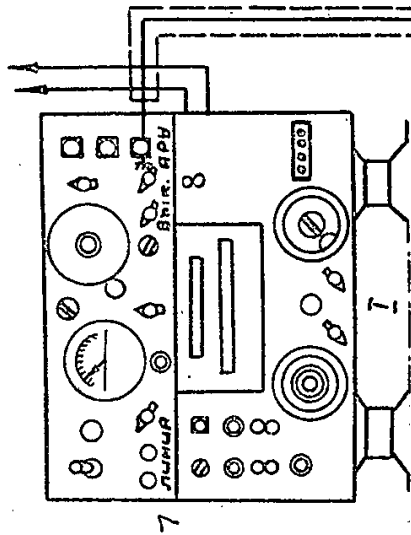


Рис. 48.

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Translation to page 49

50X1-HUM

1. Resistance card of the output devices block
(in relation to the body)
2. Second intermediate frequency first amplifier 6K3
3. Second intermediate frequency second amplifier 6K3
4. Second intermediate frequency third amplifier 6K3
5. Detector 6X6C
6. AGC detector 6X6C
7. AGC 6K3
8. First audio frequency amplifier 6K3
9. Second audio frequency amplifier 6K3
10. Third audio frequency amplifier 6H6C
11. Third oscillator 6A7
12. Audio frequency gain control knob is in maximum position
13. AGC - "off"
14. Operation kind-telegraphy reception
15. Tube view from the side of wiring
16. Fig. 49
 - a) ohm
 - b) Kohm

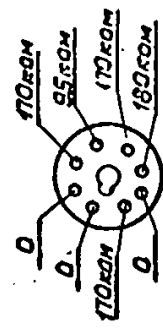
CONFIDENTIAL

CONFIDENTIAL

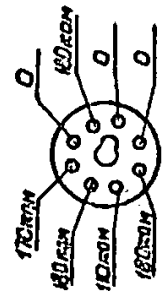
1 Диаграмма сопрягаемый блока выходных устройств.

(по отношению к корпусу)

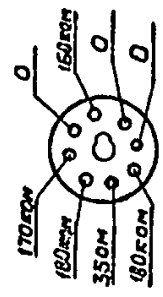
2УНЧ 6К3



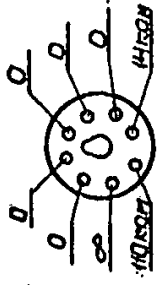
3 2УНЧ 26К3



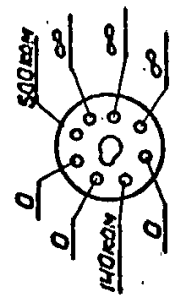
4 3УНЧ 6К3



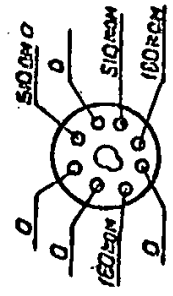
5 Дем. 6Х6С



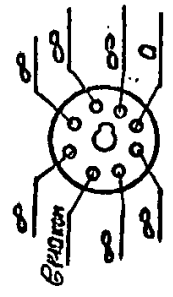
6 Дем. 7РДУ 6Х6С



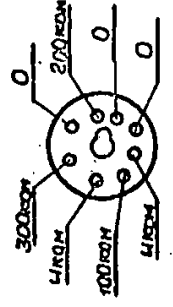
7 7РДУ 6К3



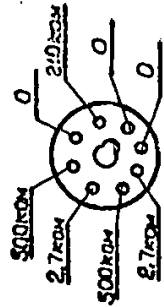
8 0Г3С



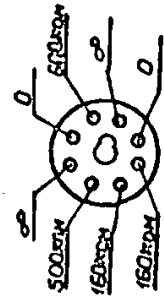
81УНЧ 6К3



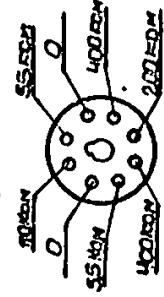
9 2УНЧ 6К3



10 3УНЧ 6П6С



11 Зем. 6А7



12 Ручка регулировки УНЧ в
положении МАКСИМУМ.
13 РДУ выключена.
14 Род работы ПЛС.
15 ВУГ на лампы со стороны
монтажа.

50X1-HUM

16 Рис 49.

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Translation to page 50

50X1-HUM

1. High frequency block resistance card
(in relation to the body)
2. First oscillator 6K4
3. First mixer 6A7
4. Calibrator 6K4
5. Second oscillator 6K3
6. Second high frequency amplifier 6K3
7. Second oscillator 6K3
8. First high frequency amplifier 6K4
9. Second mixer 6A7
10. First intermediate frequency amplifier 6K3
11. High frequency gain control knob is in maximum
position
12. Calibrator and AGC - "off"
13. Tube view from the side of wiring, with the exception
of calibrator tube
14. Resistance measurement of the calibrator at removed
tube
15. Fig. 50
 - a) ohm
 - b) Kohm
16. At I band; at other bands - 470 Kohm.

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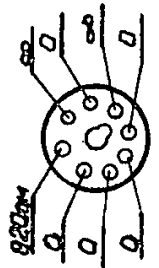
CONFIDENTIAL

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1 Диаграмма сопротивлений блока высокой частоты

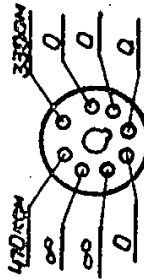
% по отношению к корпусу.

2 2еет. 6Ж4

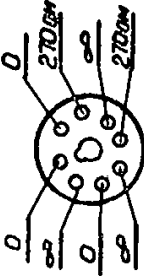


16 на I и 19 на остальных и 19 470кОм

3 1сМ 6А7



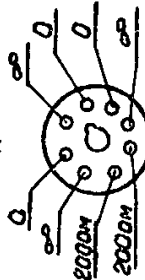
6 2У84 6К3



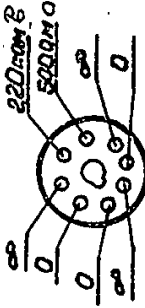
8 1У84 6Ж4



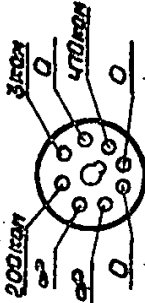
5 2еет1 6К3



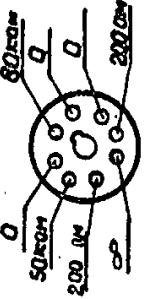
7 2еет2 6К3



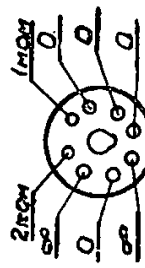
9 2сМ 6А7



10 УП41 6К3



4 Калибратор 6Ж4



11 Ручка регулировки УВЧ в положении максимум. Калибратор и АРУ выключены
13 Виг на лампы со стороны монтажа
14 Измерение сопротивлений калибратора производится при вынутых лампах.

15 Рис 50.

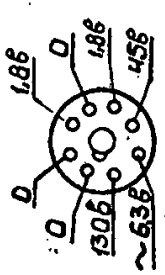
50X1-HUM

CONFIDENTIAL

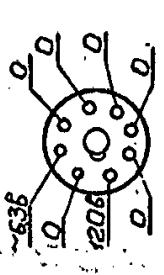
1 Диаграмма напряжений блока выходных устройств.

1. По отношению к корпусу!

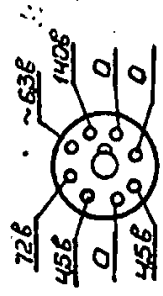
2 УНЧ 6К3



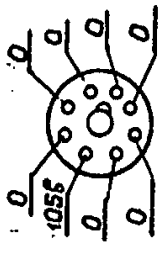
6 Dem. АРУ 6Х6С



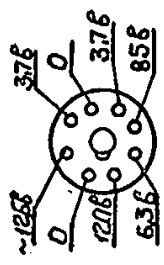
3 2УПЧ2 6К3 4ЗУПЧ2 6К3 5 Dem. 6Х6С



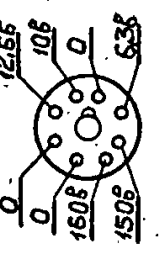
8 ГЗС



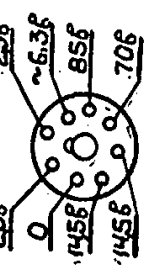
7 АРУ 6К3



10 3УНЧ 6П6С



11 3 2em. 6А7



12 Ручки регулировки УВЧ и УНЧ в положении максиму

13 Род работы - ПЛЗ

14 Калибратор и АРУ выкл.

15 Напряжения быгримите

90±10% 150±10% и ~13±0.56.168ud на лампы

со стороны монтажа.

50X1-HUM

17 Рис 51.

Translation to page 51

50X1-HUM

1. Output devices block voltage card (in relation to the body).
2. Second intermediate frequency first amplifier 6K3
3. Second intermediate frequency second amplifier 6K3
4. Second intermediate frequency third amplifier 6K3
5. Detector 6X6C
6. AGC detector 6X6C
7. AGC 6K3
8. First audio frequency amplifier 6K3
9. Second audio frequency amplifier 6K3
10. Third audio frequency amplifier 6H6C
11. Third oscillator 6A7
12. Gain control knob of the high frequency and audio frequency are in maximum position
13. Kind of operation - telegraphy reception
14. Calibrator and AGC - "off"
15. Rectifier voltage must be 150 ± 10 v and 13 ± 0.5 v
16. Tube view from the side of wiring
17. Fig. 51
 - a) B = v

Translation to page 52

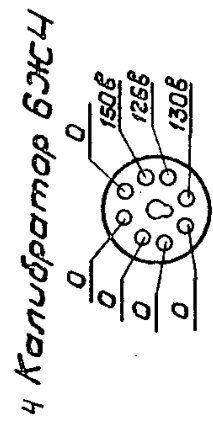
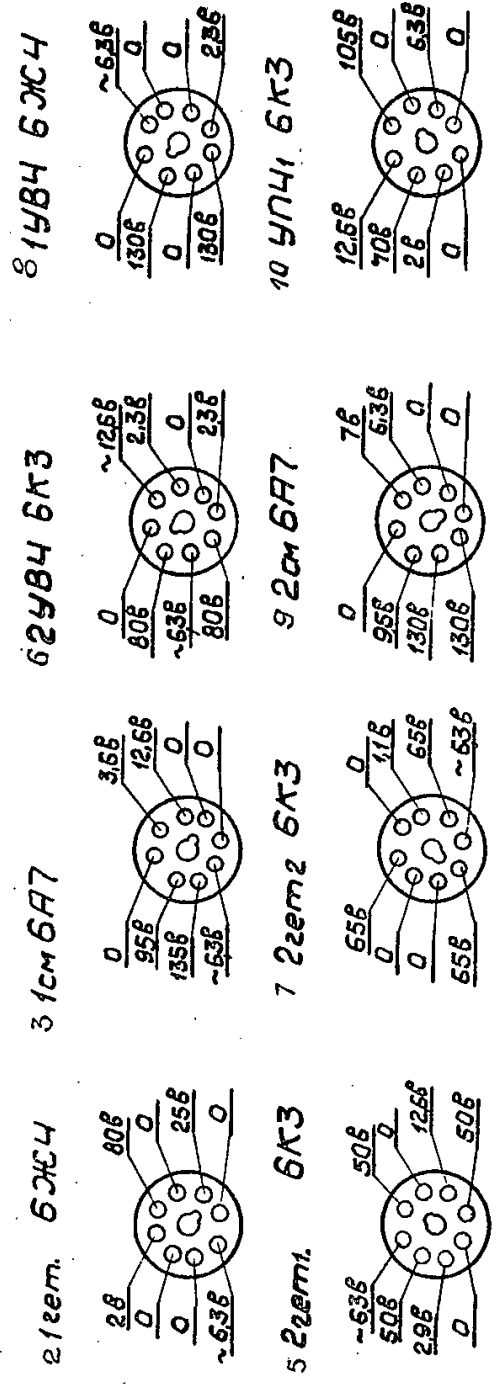
50X1-HUM

1. High frequency block voltage card (in relation to the body)
2. First oscillator 6X4
3. First mixer 6A7
4. Calibrator 6X4
5. Second oscillator₁ 6K3
6. Second high frequency amplifier 6K3
7. Second oscillator₂ 6K3
8. First high frequency amplifier 6X4
9. Second mixer 6A7
10. First intermediate frequency amplifier 6K3
11. Gain control knob of the high frequency and audio frequency are in maximum position
12. Calibrator and AGC - "off"
13. Tube view from the side of wiring except the calibrator tube
14. Calibrator voltages measurement is carried out at the removed tube and with tumbler switch "I" in "on" position
 - a) v

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50X1-HUM

1 Диаграмма напряжений блока высокой частоты
% По отношению к корпусу!



11 Ручка регулировки 14ВЧ и 5ПЧ в положении
максимум. Калибратор и АРУ выключены.
13 ВУД на лампы со стороны монтажа, за
исключением лампы калибратора.
14 Измерение напряжений калибратора
производится при вынутой лампе и отклю-
ченном тумблере „I“

15 Рис 52

08

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Translation to page 53, 54

50X1-HUM

1. Page 53

a) Fig. 53

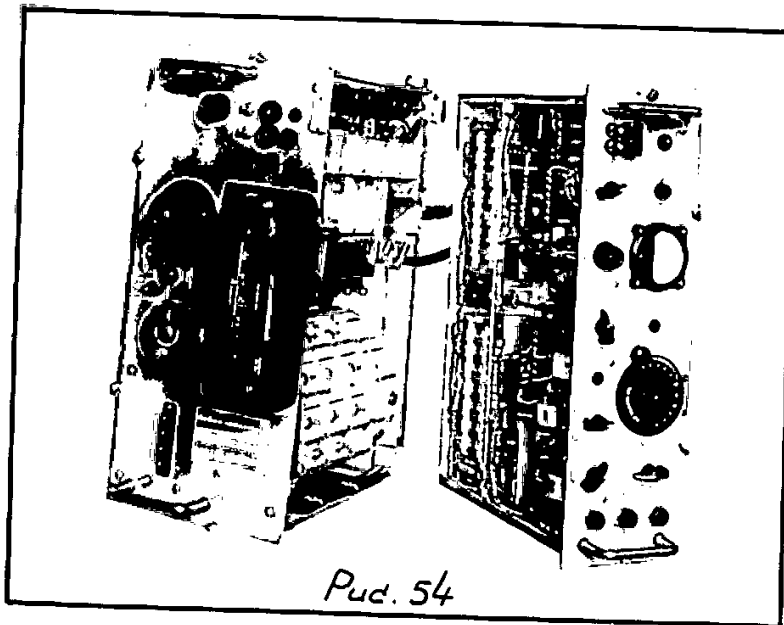
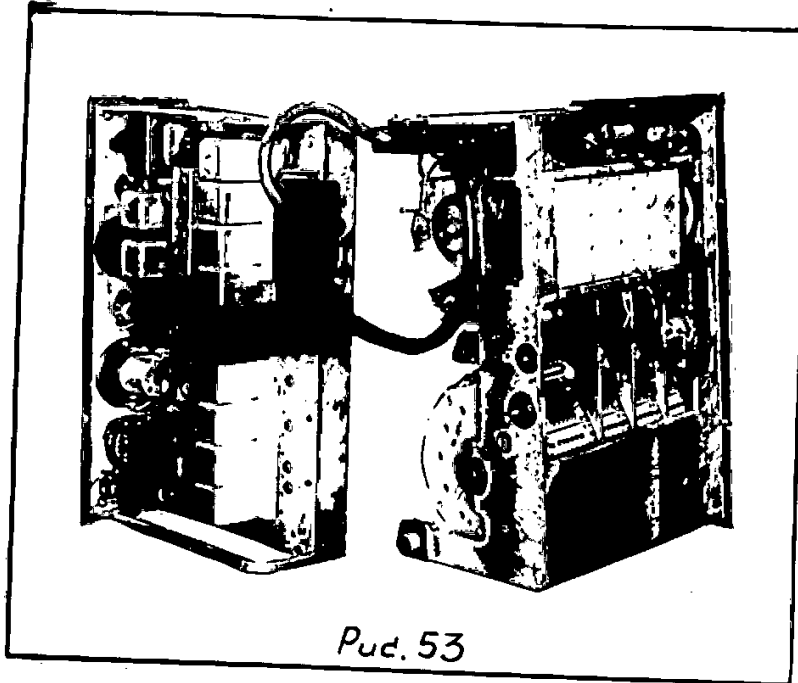
b) Fig. 54

2. Page 54

a) Fig. 55

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50X1-HUM

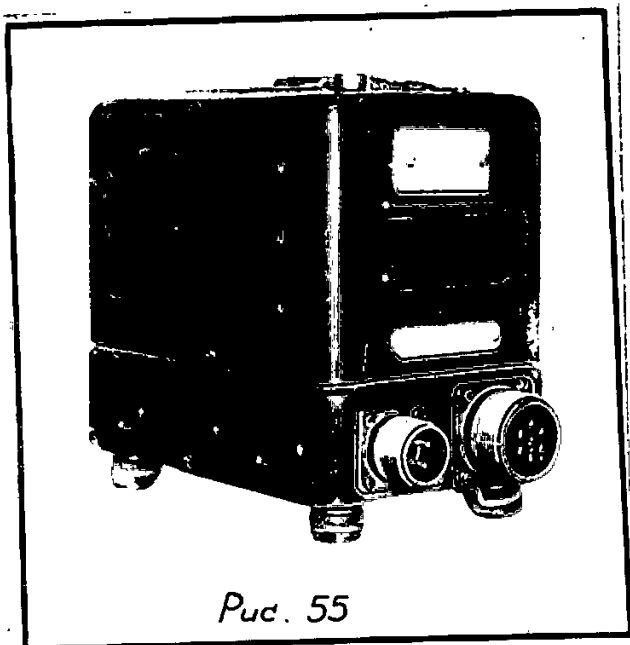


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ATTACHMENT

50X1-HUM



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TRANSLATION
to pages 55-86
List of Elements

50X1-HUM

Nos. of pos.	GOST, specifications, standard, drawing	Name of Articles and Type	Main data, rating	Qty	Remarks	Changes
1	2	3	4	5	6	7
1.	HA3.647.022	High frequency plug socket		1		
2.	HA4.737.016	Balance-to-unbalance transformer		1		
3.	GOST 7113-54	Resistor MAT-0,5-0,2-I	0,2 ohm	1		
4.	GOST 7113-54	Resistor MAT-0,5-0,2-I	0,1 ohm	1		
5.	HA3.600.006	Switch KB 1-15		1		
6.	HA5.775.087	Input circuit coil, band 1		1		
7.	HA4.652.005	Trimming capacitor 7+20pf	7 pf	1		
8.	HA5.775.028	Input circuit coil, band 2		1		
9.	HA4.652.005	Trimming capacitor 7+20pf	7 pf	1		
10.	OHO.464.004TV	Capacitor KO-1-500-M-240-M	1 pf	1	is selected at addition	KIK
11.						
12.	HA5.775.039	Input circuit, coil, band 3		1		
13.	HA4.652.005	Trimming capacitor 7+20pf	20pf	1		

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1	2	3	4	5	6
14.	OMO.464.004TV	Capacitor KC-I-500-II-130-I	130pf	1	is selected at adjustment
15.	GOST 7158-54	Capacitor KPK-I-II-10-II	10pf	1	is selected at adjustment
16.	9TY01-401-52	Electronic tube 6W4		1	
17.	MM2.034.019	Variable capacitor		1	
18.	MA4.652.016	Trimming capacitor 7+20pf	7+20pf	1	
19.	9TY-08-715-54	Gas discharger 4378 II		1	
20.	GOST 7113-54	Resistor MNT-0,5-330-II	330ohm	1	
21.	OMO.462.011TV	Capacitor K40II-2a-400-0,01+20%	10000pf	1	
22.	OMO.462.011TV	Capacitor K40II-2a-400-0,01+20%	10000pf	1	
23.	OMO.462.011TV	Capacitor K40II-2a-400-0,01+20%	10000pf	1	
24.	GOST 7113-54	Resistor MNT-I-5100-I	5100ohm	1	
25.	MA5.775.040	Input circuit coil, band 4		1	
26.	MA4.652.005	Trimming capacitor 7+20pf	7+20pf	1	
27.	GOST 7159-61	Capacitor KT-2-175-91+5%-3	91pf	1	
28.	GOST 7158-54	Capacitor KPK-I-II-5,1-I	5,1pf	1	is selected at adjustment

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50X1-HUM

1	2	3	4	5	6
29.	WA5.775.041	Input circuit coil, band 5		1	
30.	WA4.652.005	Trimming capacitor 7+20pf	7+20pf	1	
31.	GOST 7158-54	Capacitor KPK-I-M-5, I-I	5,1pf	1	is se- lected at ad- justment
32.	GOST 7159-61	Capacitor KT-2a- 175-82+5/-3	82pf	1	
33.	GOST 7158-54	Capacitor KPK-I-M-6, 2-I	6,2pf	1	to set if ne- cessary
34.	WA5.775.042	Input circuit coil, band 6		1	
35.	WA4.652.005	Trimming capacitor 7+20pf	7+20pf	1	
36.	GOST 7158-54	Capacitor KPK-I-M-16-II	18pf	1	is se- lected at ad- justment
37.	GOST 7159-61	Capacitor KT-2a- 147-68+5/-3	68pf	1	
38.	GOST 7158-54	Capacitor KPK-I-M-6, 2-I	6,2pf	1	is se- lected at ad- justment
39.	WA5.775.043	Input circuit coil, band 7		1	
40.	WA4.652.005	Trimming capacitor 7+20pf	7+20pf	1	
41.	GOST 7158-54	Capacitor KPK-I-M-3, 2-I	8,2pf	1	is se- lected at ad- justment
42.	GOST 7159-61	Capacitor KT-2a- 147-51+5/-3	51pf	1	

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50X1-HUM

1	2	3	4	5	6	7
43.	GOST 7158-54	Capacitor KPK-I-M-6,2-I	6pf	1	to set if ne- cessary	
44.	NA5.775.044	Input circuit coil, band 8		1		
45.	NA4.652.005	Trimming capacitor 7*20pf	7*20pf	1		
46.	GOST 7158-54	Capacitor KPK-I-M-10-II	10pf	1	is se- lected at ad- justment	
47.	GOST 7158-54	Capacitor KPK-2-M-43-I	43pf	1		
48.	GOST 7158-54	Capacitor KPK-I-M-5,1-I	5,1pf	1	is se- lected at ad- justment	
49.	NA5.775.045	Input circuit coil, band 9		1		
50.	NA4.652.005	Trimming capacitor 7*20pf	7*20pf	1		
51.	GOST 7158-54	Capacitor KPK-I-M-8,2-I	8,2pf	1	is se- lected at ad- justment	
52.	GOST 7158-54	Capacitor KPK-2-M-43-I	43pf	1		
53.	GOST 7158-54	Capacitor KPK-I-M-10-II	10pf	1	is se- lected at ad- justment	
54.	NA5.775.046	Input circuit coil, band 10		1		
55.	NA4.652.005	Trimming capacitor 7*20pf	7*20pf	1		
56.	GOST 7158-54	Capacitor KPK-I-M-18-II	18pf	1	is se- lected at ad- justment	

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1	2	3	4	5	6	7
57.	GOST 7158-54	Capacitor R1K-2-M-43-I	43pf	1		
58.	GOST 7158-54	Capacitor R1K-1-M-10-II	10pf	1	is se- lected at ad- justment	
59.	NA5.775.047	Input circuit coil, band II		1		
60.	NA4.652.005	Trimming capacitor 7+20pf	7+20pf	1		
61.	GOST 7158-54	Capacitor R1K-1-M-27-II	27pf	1	is se- lected at ad- justment	
62.	GOST 7158-54	Capacitor R1K-1-M-36-I	36pf	1		
63.	GOST 7158-54	Capacitor R1K-1-M-6,8-I	6,8pf	1	to set if ne- cessary	
64.	NA5.775.048	Input circuit coil, range 12		1		
65.	NA4.652.005	Trimming capacitor 7+20pf	7+20pf	1		
66.	GOST 7158-54	Capacitor R1K-1-M-16-I	10pf	1	is se- lected at ad- justment	
67.	GOST 7158-54	Capacitor R1K-1-M-30-I	30pf	1		
68.	GOST 7158-54	Capacitor R1K-1-M-6,8-I	6,8pf	1	to set if neces- sary	
69.	NA5.775.243	First high frequency amplifier circuit coil, band I		1		
70.	GOST 7158-54	Capacitor R1K-1-M-10 -II	10pf	1		
71.	NA4.652.005	Trimming capacitor 7+20pf	7+20pf	1		

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										50X1-HUM							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
72.	HM5.775.244	First high frequency amplifier circuit coil, band 2															1
73.	MA3.640.002	Plug socket															1
74.	GOST 7158-54	Capacitor RPK-I-M-10-II				10pf											1
75.	MA4.652.005	Trimming capacitor 7+20pf					7+20pf										1
76.	OMO.464.004ZY	Capacitor KC-I-500-M-240-I					240pf										1
77.	BH.HRO.360.608	Tumbler switch THH-2															1
78.	GOST 7158-54	Capacitor RPK-I-M-5, I-I				5,1pf											1
																	to set if necessary
79.	HM5.775.245	First high frequency amplifier circuit coil, band 3															1
80.	GOST 7158-54	Capacitor RPK-I-M-10-II				10pf											1
81.	MA4.652.005	Trimming capacitor 7+20pf					7+20pf										1
82.	OMO.464.004ZY	Capacitor KC-I-500-M-130-I					130pf										1
																	is selected at addition RPK
83.	GOST 7158-54	Capacitor RPK-I-M-10-II				10pf											1
																	is selected at adjustment
84.	HM5.775.246	High frequency amplifier circuit coil, band 4															1
85.	GOST 7158-54	Capacitor RPK-I-M-5, I-I				5,1pf											1
86.	MA4.652.005	Trimming capacitor 7+20pf					7+20pf										1

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1	2	3	4	5	6	7
87.	GOST 7159-61	Capacitor KT-2a-175-91,57-3	91pf	1		
88.	GOST 7158-54	Capacitor KPK-I-1-15-II	15pf	1	is se- lected at ad- justment	
89.	MMB.775.247	First high frequency amplifier circuit coil, band 5		1		
90.	GOST 7158-54	Capacitor KPK-I-1-5, I-I	5,1pf	1		
91.	MM4.652.005	Trimming capacitor 7+20pf	7+20pf	1		
92.	GOST 7158-54	Capacitor KPK-I-1-15-II	15pf	1		
93.	GOST 7159-61	Capacitor KT-2a-175-82,57-3	82pf	1		
94.	GOST 7158-54	Capacitor KPK-I-1-5, I-I	5,1pf	1	is se- lected at ad- justment	
95.	MMB.775.248	First high frequency amplifier circuit coil, band 6		1		
96.	MM4.652.005	Trimming capacitor 7+20pf	7+20pf	1		
97.	GOST 7158-54	Capacitor KPK-I-1-20-I	20pf	1	is se- lected at ad- justment	
98.	GOST 7159-61	Capacitor KT-2a-175-68,57-3	68pf	1		
99.	GOST 7158-54	Capacitor KPK-I-1-15-II	15pf	1	is se- lected at ad- justment	

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1	2	3	4	5	6	7
100.	GOST 7158-54	Capacitor K1K-I-M-16-I	16pf	1	is se- lected at ad- justment	
101.						
102.	GOST 7158-54	Capacitor K1K-I-M-20-I	20pf	1		
103.						
104.	GOST 7158-54	Capacitor K1K-I-M-10-II	10pf	1	is se- lected at ad- justment	
105.	HN5.775.249	First high frequency amplifier circuit coil, band 7		1		
106.	NA4.652.005	Trimming capacitor 7*20pf	7*20pf	1		
107.	GOST 7158-54	Capacitor K1K-I-M-5, I-I	5,1pf	1	is se- lected at ad- justment	
108.	GOST 7159-51	Capacitor K2-2a-247-51,57-3	51pf	1		
109.	GOST 7158-54	Capacitor K1K-I-M-18-II	18pf	1	is se- lected at ad- justment	
110.	HN5.775.250	First high frequency amplifier circuit coil, band 8		1		
111.	NA4.652.005	Trimming capacitor 7*20pf	7*20pf	1		
112.	GOST 7158-54	Capacitor K1K-I-M-5, I-I	5,1pf	1	is se- lected at ad- justment	

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1	2	1	3	4	5	6
113.	GOST 7158-54	Capacitor KPK-2-4-47-I	47pf		1	
114.	GOST 7158-54	Capacitor KPK-1-4-20-I	20pf		1	is se- lected at ad- justment
115.	WNB.775.25I	First high frequency amplifier circuit coil, band 9			1	
116.	HA4.652.005	Trimming capacitor 7*20pf	7*20pf		1	
117.	GOST 7158-54	Capacitor KPK-1-4-15-II	15pf		1	is se- lected at ad- justment
118.	GOST 7158-54	Capacitor KPK-2-4-43-I	43pf		1	is se- lected at ad- dition
119.	GOST 7158-54	Capacitor KPK-1-4-18-II	18pf		1	is se- lected at ad- justment
120.	WNB.775.252	First high frequency amplifier circuit coil, band 10			1	
121.	HA4.652.005	Trimming capacitor 7*20pf	7*20pf		1	
122.	GOST 7158-54	Capacitor KPK-1-4-20-I	20pf		1	is se- lected at ad- justment
123.	GOST 7158-54	Capacitor KPK-2-4-43-I	43pf		1	
124.	GOST 7158-54	Capacitor KPK-1-4-30-I	30pf		1	is se- lected at ad- justment

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1	2	3	4	5	6	7
125.	HM5.775.253	First high frequency amplifier circuit coil, band 11			1	
126.	MA4.652.005	Trimming capacitor 7*20pf	7*20pf		1	
127.	GOST 7158-54	Capacitor KIK-I-4-15-II	15pf		1	is selected at adjustment
128.	GOST 7158-54	Capacitor KIK-I-4-36-I	36pf		1	
129.	GOST 7158-54	Capacitor KIK-I-4-27-II	27pf		1	is selected at adjustment
130.	HM5.775.254	First high frequency amplifier circuit coil, band 12			1	
131.	MA4.652.005	Trimming capacitor 7*20pf	7*20pf		1	
132.	GOST 7158-54	Capacitor KIK-I-4-6,8-I	6,8pf		1	is selected at adjustment
133.	GOST 7158-54	Capacitor KIK-I-4-30-I	30pf		1	
134.	GOST 7158-54	Capacitor KIK-I-4-22-II	22pf		1	is selected at adjustment
135.	OMO.462.0117	Capacitor K40II-2a-400-0,01±20%	10000pf		1	
136.	GOST 7113-54	Resistor MNT-0,5-0,1-II	0,1kohm		1	
137.	GOST 7113-54	Resistor MNT-0,5-270-II	270ohm		1	

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1	2	3	4	5	6	7
138.	0X0.462.011IV	Capacitor K40N-2a-400-0,01±20%	10000pf	1		
139.	4W01-209-54	Electronic tube 6X3		1		
140.	MA5.775.12I	First oscillator coil, band II		1		
141.	0X0.462.011IV	Capacitor K40N-2a-400-0,01±20%	10000pf	1		
142.	0X0.462.011IV	Capacitor K40N-2a-400-0,02±20%	10000pf	1		
143.	GOST 7113-54	Resistor MTP-I-10000-II	10000ohm	1		
144.						
145.	MMS.775.255	Second high frequency amplifier circuit coil, band I		1		
146.	GOST 7158-54	Capacitor RIN-I-M-10-II	10pf	1		
147.	MA4.652.005	Trimming capacitor 7±20pf	7±20pf	1		
148.	MMS.775.256	Second high frequency amplifier circuit coil, band 2		1		
149.	GOST 7158-54	Capacitor RIN-I-M-10-II	10pf	1		
150.	MA4.652.005	Trimming capacitor 7±20pf	7±20pf	1		
151.	0X0.464.004IV	Capacitor RU-I-500-I-240-I	240pf	1		
152.	GOST 7158-54	Capacitor RIN-I-M-5,I-I	5,1pf	1	to set if no- cessary	
153.	MMS.775.257	Second high frequency amplifier circuit coil, band 3		1		

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1	1	2	3	4	5	6	7
154.	GOST 7158-54	Capacitor KIK-I-M-10-II	10pf	1			
155.	MA4.652.005	Trimming capacitor 7+20pf	7+20pf	1			
156.	QHO.464.004T	Capacitor RC-I-500-1-130-I	130pf	1	is se- lected at ad- dition RIK		
157.	GOST 7158-54	Capacitor KIK-I-M-10-II	10pf	1	is se- lected at ad- justment		
158.	WNS.775.258	Second high frequency amplifier circuit coil, band 4		1			
159.	GOST 7158-54	Capacitor KIK-I-M-5, I-I	5,1pf	1			
160.	MA4.652.005	Trimming capacitor 7+20pf	7+20pf	1			
161.	GOST 7159-61	Capacitor KT-2n-175-91+5-3	91pf	1			
162.	GOST 7158-54	Capacitor KIK-I-M-15-II	15pf	1	is se- lected at ad- justment		
163.	WNS.775.259	Second high frequency amplifier circuit coil, band 5		1			
164.	GOST 7158-54	Capacitor KIK-I-M-5, I-II	5,1pf	1			
165.	MA4.652.005	Trimming capacitor 7+20pf	7+20pf	1			
166.	GOST 7158-54	Capacitor KIK-I-M-10-II	10pf	1	is se- lected at ad- justment		

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1	2	3	4	5	6	7
167.	GOST 7159-61	Capacitor KT-2a-475-82,5% ⁻³	82pf	1		
168.	GOST 7158-54	Capacitor RTK-I-4-10-II	10pf	1	is se- lected at ad- justment	
169.	MM5.775.260	Second high frequency amplifier circuit coil, band 6		1		
170.	HA4.652.005	Trimming capacitor 7*20pf	7*20pf	1		
171.	GOST 7158-54	Capacitor RTK-I-4-20-I	20pf	1		
172.	GOST 7159-61	Capacitor KT-2a-447-68,5% ⁻³	68pf	1		
173.	GOST 7158-54	Capacitor RTK-I-4-10-II	10pf	1	is se- lected at ad- justment	
174.	MM5.775.261	Second high frequency amplifier circuit coil, band 7		1		
175.	HA4.652.005	Trimming capacitor 7*20pf	7*20pf	1		
176.	GOST 7158-54	Capacitor RTK-I-4-5-I-I	5,1pf	1	is se- lected at ad- justment	
177.	GOST 7159-61	Capacitor KT-2a-447-51,5% ⁻³	51pf	1		
178.	GOST 7158-54	Capacitor RTK-I-4-15-II	15pf	1	is se- lected at ad- justment	
179.	MM5.775.262	Second high frequency amplifier circuit coil, band 8		1		

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1	2	3	4	5	6	7
180. MA4.652.005	Trimming capacitor 7+20pf		7+20pf	1		
181. GOST 7158-54	Capacitor R1K-1-M-5, I-I		5,1pf	1	is se- lected at ad- justment	
182. GOST 7158-54	Capacitor R1K-2-M-47-I		47pf	1		
183. GOST 7158-54	Capacitor R1K-1-M-20-I		20pf	1	is se- lected at ad- justment	
184. MM5.775.263	Second high frequency amplifier circuit coil, band 9			1		
185. MA4.652.005	Trimming capacitor 7+20pf		7+20pf	1		
186. GOST 7158-54	Capacitor R1K-1-M-5, I-I		5,1pf	1	is se- lected at ad- justment	
187. GOST 7158-54	Capacitor R1K-2-M-43-I		43pf	1	additio- nal R1K is se- lected	
188. GOST 7158-54	Capacitor R1K-1-M-18-II		18pf	1	is se- lected at ad- justment	
189. MM5.775.264	Second high frequency amplifier circuit coil, band 10			1		
190. MA4.652.005	Trimming capacitor 7+20pf		7+20pf	1		
191. GOST 7158-54	Capacitor R1K-1-M-13-I		13pf	1	is se- lected at ad- justment	
192. GOST 7158-54	Capacitor R1K-2-M-43-I		43pf	1		

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1	2	3	4	5	6	7
193.	GOST 7158-54	Capacitor KPK-I-II-30-I	30pf	1	is se- lected at ad- justment	
194.	HM5.775.265	Second high frequency amplifier circuit coil, band II		1		
195.	HA4.652.005	Trimming capacitor 7+20pf	7+20pf	1		
196.	GOST 7158-54	Capacitor KPK-I-II-15-II	15pf	1	is se- lected at ad- justment	
197.	GOST 7158-54	Capacitor KPK-I-II-33-I	33pf	1		
198.	GOST 7158-54	Capacitor KPK-I-II-10-I	10pf	1	is se- lected at ad- justment	
199.						
200.						
201.	HM6.618.005	Crystal switch		1		
202.	HM3.125.000	Hysteresis motor		1		
203.	HM5.775.266	Second high frequency amplifier circuit coil, band 12		1	is set by custo- mer's order	
204.	HA4.652.005	Trimming capacitor 7+20pf	7+20pf	1		
205.	GOST 7158-54	Capacitor KPK-I-II-5, I-I	5,1pf	1	is se- lected at ad- justment	
206.	GOST 7158-54	Capacitor KPK-I-II-30-I	30pf	1		
207.	GOST 7158-54	Capacitor KPK-I-II-22-II	22pf	1	is se- lected at ad- justment	

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1	2	3	4	5	6	7
208.	BH.HMO.360 608	Tumbler switch TH I-2				1
209.	BH.HMO.360 608	Tumbler switch TH I-2				1
210.	4TEV01-208-54	Electronic tube 6A7				1
211.	GOST 7113-54	Resistor MNT-0,5-47000-II	47000ohm			1
212.	GOST 7113-54	Resistor MNT-0,5-330-I	330ohm			1
213.	OKO 462.011TY	Capacitor K40H-2a-400-0,01±20%	10000pf			1
214.	OKO 462.011TY	Capacitor K40H-2a-400-0,01±20%	10000pf			1
215.	OKO 462.011TY	Capacitor K40H-2a-400-0,01±20%	10000pf			1
216.	GOST 7113-54	Resistor MNT-0,5-43000-I	43000ohm			1
217.	GOST 7113-54	Resistor MNT-I-0,47-II	0,47Mohm			1
218.	OKO 464.004TY	Capacitor EC-I-500-0-200-II	200pf			1
219.	OKO 462.011TY	Capacitor K40H-2a-400-0,01±20%	10000pf			1
220.	OKO 462.011TY	Capacitor K40H-2a-400-0,01±20%	10000pf			1
221.	OKO 462.011TY	Capacitor K40H-2a-400-0,01±5%	10000pf			1
222.	GOST 7111-54	Capacitor C1H-4-250-E-10000-I	10000pf			1
223.	GOST 7113-54	Resistor MNT-I-18000-I	18000ohm			1

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1	2	3	4	5	6	7
224.	GOST 7113-54	Resistor MHT-0,5-27000-II	27000ohm	1		
225.	HA4.775.024	High frequency coil			1	
226.	GOST 7158-54	Capacitor KPK-I-4-36-I	36pF	1		is se- lected at ad- justment
227.	GOST 7113-54	Resistor MHT-0,5-0,47-I	0,47Mohm	1		
228.	OXO 464.004IV	Capacitor EC-I-500-M-240-I	240pF	1		
229.	GOST 7113-54	Resistor MHT-0,5-820-I	820ohm	1		
230.	OXO 462.011IV	Capacitor K40N-2a-400-0,01±20%	10000pF	1		
231.	4EV-0I-40I-52	Electronic tube 6X4			1	
232.	OXO 462.011IV	Capacitor K40N-2a-400-0,01±20%	10000pF	1		
233.	GOST 7113-54	Resistor MHT-0,5-4300-I	4300ohm	1		
234.	GOST 7158-54	Capacitor KPK-I-4-15-II	15pF	1		is se- lected at ad- justment
235.	HA4.652.050	Trimming capacitor 4+40pF	4+40pF	1		
236.		Crystal 4 mc/s			1	
237.	GOST 7158-54	Capacitor KPK-I-4-15-II	15pF	1		is se- lected at ad- justment
238.	HA4.652.050	Trimming capacitor 4+40pF	4+40pF	1		

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1	2	3	4	5	6	7
239.		Crystal 1.98 mc/s		1		
240.		Crystal 2.02 mc/s		1		
241.	GOST 7158-54	Capacitor KTK-I-M-15-II	15pf	1	is se- lected at ad- justment	
242.		Crystal 6 mc/s		1		
243.	MA4.652.050	Trimming capacitor 4+40pf	4+40pf	1		
244.	MA4.652.005	Trimming capacitor 7+20pf	7+20pf	1		
245.	OEO 464.004IV	Capacitor KC-2-500-M-390-II	390pf	1	additional KTK is se- lected	
246.	GOST 7113-54	Resistor MNT-0,5-2000-I	2000ohm	1	is se- lected at ad- justment	
247.		Crystal 8 mc/s		1		
248.	MA4.652.050	Trimming capacitor 4+40pf	4+40pf	1		
249.	MA4.652.005	Trimming capacitor 7+20pf	7+20pf	1		
250.	OEO 464.004IV	Capacitor KC-I-500-M-240-I	240pf	1	is se- lected at ad- justment	
251.	GOST 7113-54	Resistor MNT-0,5-2000-I	2000ohm	1	is se- lected at ad- justment	
252.						
253.	MA4.652.050	Trimming capacitor 4+40pf	4+40pf	1		
254.	MA4.652.005	Trimming capacitor 7+20pf	7+20pf	1		

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1	2	3	4	5	6	7
255.	070 464.004TY	Capacitor KC-I-500-2-130-I	130pf	1	additional KIK is se- lected	
256.	GOST 7113-54	Resistor NNT-0,5-2000-I	2000ohm	1	is se- lected at ad- justment	
257.		Crystal 12 mc/s		1		
258.	HA4.652.050	Trimming capacitor 4+40pf	4+40pf	1		
259.	HA4.652.005	Trimming capacitor 7+20pf	7+20pf	1		
260.	GOST 7113-54	Resistor NNT-0,5-1600-I	1600ohm	1	is se- lected at ad- justment	
261.	070 464.004TY	Capacitor KC-I-500-0-100-II	100pf	1	is se- lected at ad- justment	
262.		Crystal 7 mc/s		1		
263.	HA4.652.050	Trimming capacitor 4+40pf	4+40pf	1		
264.	HA4.652.005	Trimming capacitor 7+20pf	7+20pf	1		
265.	GOST 7159-61	Capacitor KT-2a-347-62+53-3	62pf	1	is se- lected at ad- justment	
266.	GOST 7113-54	Resistor NNT-0,5-2400-I	2400ohm	1	is se- lected at ad- justment	
267.	GOST 7158-54	Capacitor KIK-I-1-5, I-I	5,1pf	1		

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1	2	3	4	5	6	7
268.	NA4.652.050	Trimming capacitor 4+40pf	4+40pf	1		
269.	NA4.652.005	Trimming capacitor 7+20pf	7+20pf	1		
270.	GOST 7158-54	Capacitor KIK-I-M-36-I	36pf	1		
271.	GOST 7113-54	Resistor MNT-0,5-2400-I	2400ohm	1		
272.		Crystal 9 mc/s		1		
273.	NA4.652.050	Trimming capacitor 4+40pf	4+40pf	1		
274.	NA4.652.005	Trimming capacitor 7+20pf	7+20pf	1		
275.	GOST 7158-54	Capacitor KIK-I-M-15-II	15pf	1	is se- lected at ad- justment	
276.	GOST 7113-54	Resistor MNT-0,5-1300-I	1300ohm	1		
277.		Crystal 10 mc/s		1		
278.	NA4.652.050	Trimming capacitor 4+40pf	4+40pf	1		
279.	NA4.652.005	Trimming capacitor 7+20pf	7+20pf	1		
280.	GOST 7158-54	Capacitor KIK-I-M-5, I-I	5,1pf	1	is se- lected at ad- justment	
281.	GOST 7113-54	Resistor MNT-0,5-2000-I	1000ohm	1		
282.		Crystal 11 mc/s		1		
283.	NA4.652.050	Trimming capacitor 4+40pf	4+40pf	1		
284.	GOST 7113-54	Resistor MNT-0,5-2700-II	2700ohm	1		

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1	2	3	4	5	6	7
452.	GJST 6119-54	Capacitor KCO-I-250-F-510-I	510pf	1		
453.	INA 652.005	Trimming capacitor 7±20pf	7±20pf	1		
454.	GJST 7112-54	Capacitor MNT-II-2-200-2-A-II	2mf	1		
455.	OEO 462.011TY	Capacitor K40II-2a-400-0,01±20%	10000pf	1		
456.	GJST 7113-54	Resistor MNT-0,5-0,1-II	0,1Kohm	1		
457.	OEO 462.011TY	Capacitor K40II-2a-400-0,01±20%	10000pf	1		
458.	GJST 6562-53	Resistor BC-0,25-1-82-II	82ohm	1		
459.	OEO 464.004TY	Capacitor KC-3-500-M-680-I	680pf	1		
460.	UTY 01-209-54	Electronic tube 6K3		1		
461.	GJST 7113-54	Resistor MNT-0,5-5100-I	5100ohm	1		
462.	GJST 7113-54	Resistor MNT-0,5-39000-II	39000ohm	1		
463.	GJST 7113-54	Resistor MNT-0,5-5100-II	5100ohm	1		
464.	GJST 7113-54	Resistor MNT-0,5-13000-I	13000ohm	1		
465.	INA 777.005	Second intermediate frequency second amplifier circuit coil		1		
466.	OEO 462.011TY	Capacitor K40II-2a-400-0,01±20%	10000pf	1		
467.	GJST 7113-54	Resistor MNT-0,5-10000-II	10000ohm	1		
468.	OEO 462.011TY	Capacitor K40II-2a-400-0,01±20%	10000pf	1		

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1	2	3	4	5	6	7
469.	GOST 7113-54	Resistor MNT-1,0-20000-I	20000ohm	1	is se- lected at ad- justment	
470.	GOST 7113-54	Resistor MNT-1,0-1000-IX	1000ohm	1	"	
471.	GOST 7113-54	Resistor MNT-0,5-320-I	820ohm	1		
472.	MTS-01-200-54	Electronic tube 6K3		1		
473.	GOST 7112-54	Capacitor MNT-II-2-200-A-2-II	2mf	1		
474.	OSO.464.004TY	Capacitor KC-I-500-0-100-II	100pf		lis selec- ted at adjust- ment	
475.	OSO 464.004TY	Capacitor KC-3-500-0-1000-I	1000pf	1		
476.	GOST 7158-54	Capacitor MNT-I-1-47-II	47pf	1		
477.	GOST 7113-54	Resistor MNT-0,5-5100-I	5100ohm	1		
478.	OSO 464.004TY	Capacitor KC-3-500-M-680-I	680pf	1		
479.	OSO 462.01ITY	Capacitor KAOH-2a-400-0,01±20%	10000pf	1		
480.	GOST 7158-54	Capacitor MNT-I-1-3,2-I	8,2pf	1		
481.	GOST 7113-54	Resistor MNT-0,5-0,1-II	0,1Mohm	1		
482.	GOST 7158-54	Capacitor MNT-I-1-SI-I	51pf	1		
483.	GOST 7113-54	Resistor MNT-0,5-22-II	0,22M	1		
484.	MTA.775.010Cn	High frequency filter choke		1		

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1	2	3	4	5	6	7
285.	030.462.011V	Capacitor K-40N-2a-400-0,01±20%	10000pf	1		
286.	MHS.777.018	First intermediate frequency amplifier circuit coil		1		
287.	MA4.652.005	Trimming capacitor 7±20pf	7±20pf	1		
288.	GOST 7113-54	Resistor MNT-0,5-4700-II	4700ohm	1	is se- lected at ad- justment	
289.	030 464.004V	Capacitor KC-I-500-0-200-I	200pf	1		
290.	GOST 7113-54	Resistor MNT-0,5-0,47-II	0,47Mohm	1		
291.	040 462.011V	Capacitor K40N-2a-400-0,01±20%	10000pf	1		
292.	GOST 7113-54	Resistor MNT-0,5-0,1-II	0,1Mohm	1		
295.	030.462.011V	Capacitor K40N-2a-400-0,01±20%	10000pf	1		
294.	030 462.011V	Capacitor K40N-2a-400-0,01±20%	10000pf	1		
295.	030 642.011V	Capacitor K40N-2a-400-0,01±20%	10000pf	1		
296.	030 462.011V	Capacitor K40N-2a-400-0,01±20%	10000pf	1		
297.	GOST 7113-54	Resistor MNT-0,5-200-I	200ohm	1		
298.	GOST 7113-54	Resistor MNT-0,5-4700-II	4700ohm	1		
299.	GOST 7113-54	Resistor MNT-0,5-30000-I	30000ohm	1		
300.	41V.01.203-54	Electronic tube 6X3		1		
301.	GOST 7158-54	Capacitor RPA-I-M-10-I	10pf	1		

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1	2	3	4	5	6	7
302.GOST 7113-54	Resistor MTR-0,5-0,1-11		0,1Mohm	1		
303.GOST 462.011 13	Capacitor M401-2a-400-0,01±20%		10000pf	1		
304.GOST 7158-54	Capacitor MTR-1-7-30-1		30pf	1	is se- lected at ad- justment	
305.GOST 7113-54	Resistor MTR-0,5-1,0-11		1Mohm	1		
306.GOST 7113-54	Resistor		10000ohm	1		
307.MIS.777.013	First intermediate frequency amplifier circuit coil			1		
308.GOST 7159-61	Capacitor KT-2a-M700-200±5%-3		200-500pf	1	is se- lected at ad- justment	
309.MA.652.005	Trimming capacitor 7-20pf		7-20pf	1		
310.	Crystal 8 mc/s			1		
311.GOST 462.011 13	Capacitor M401-2a-400-0,01±5%		10000pf	1		
312.GOST 7159-61	Capacitor MTR-2a-147-1±10%-3		1pf	1		
313.GOST 7159-61	Capacitor MTR-2a-147-1±10%-3		1pf	1		
314.GOST 7159-61	Capacitor MTR-2a-147-3,9±5%-3		3,9pf	1	is se- lected at adjustment	
315.GOST 7111-54	Capacitor MTR-3-500-5-2000-1		1800pf	1		
GOST 7158-54	Capacitor MTR-2-7-300-1		360pf	1		
GOST 7158-54	Capacitor MTR-1-7-430-1		430pf	1		

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1	2	3	4	5	6	7
316.	MAA.652.005	Trimming capacitor 7-20pf	7-20pf	1		
317.	MMS.777.018	First intermediate frequency amplifier circuit coil		1		
318.	GOST 7113-54	Resistor MNT-0,5-47000OH-II	47000ohm	1		
319.	OKO.464.004TY	Capacitor KC-I-500-0-200-I	200pf	1		
320.	GOST 7113-54	Resistor MNT-0,5-0,47-II	0,47Mohm	1		
321.	4TY.01-203-54	Electronic tube 6A7		1		
322.	MMS.750.010	Choke		1		
323.	GOST 7158-54	Capacitor R1E-I-1-12-II	12pf	1		
324.	GOST 7113-54	Resistor MNT-0,5-3000-I	3000ohm	1		
325.	OKO 462.011TY	Capacitor E40H-2a-400-0,01±20%	10000pf	1		
326.	OKO 462.011TY	Capacitor E40H-2a-400-0,01±20%	10000pf	1		
327.	OKO 462.011TY	Capacitor E40H-2a-400-0,01±5	10000pf	1		
328.	OKO 464.004TY	Capacitor KC-I-500-II-100-II	100pf	1		
329.	GOST 7113-54	Resistor MNT-0,5-0,2-I	0,2 Mohm	1		
330.	GOST 7113-54	Resistor MNT-0,5-5100-I	5100ohm	1		
331.	OKO 462.011TY	Capacitor E40H-2a-400-0,01±20%	10000pf	1		
332.	OKO 462.011TY	Capacitor E40H-2a-400-0,01±20%	10000pf	1		

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1	2	3	4	5	6	7
333.080	464.004TV	Capacitor KC-2-500-M-390-II	390pf	1		
334.00ST	7113-54	Resistor MNT-I-2000-I	2000ohm	1		
335.00ST	7113-54	Resistor MNT-I-5100-I	5100ohm	1		
336.4TYOI	200-54	Electronic tube 6K3		1		
337.080	462.011TV	Capacitor K40II-2a-400-0.01±20%	10000pf	1		
338.080	462.011TV	Capacitor K40II-2a-400-0.01±20%	10000pf	1		
339.00ST	7113-54	Resistor MNT-I-2000-I	2000ohm	1		
340.00ST	7113-54	Resistor MNT-0.5-0.22-I	0.22M	1		
341.080	464.004TV	Capacitor KC-2-500-M-300-I	300pf	1		
342.00ST	7158-54	Capacitor RPH-I-1-5.1-I	5pf	1		
343.4TY	01-200-54	Electronic tube 6K3		1		
344.00ST	7113-54	Resistor MNT-I,0-10000-I	10000ohm	1		
345.080	462.011TV	Capacitor K40II-2a-400-0.01±20%	10000pf	1		
346.00ST	7113-54	Resistor MNT-0.5-0.22-I	0.22M	1		
347.00ST	7158-54	Capacitor RPH-I-1-5.1-I	5pf	1		
348.00ST	7113-54	Resistor MNT-0.5-47000-II	47000ohm	1		
349.080	475.023	Second oscillator coil		1		
350.00ST	7158-54	Capacitor RPH-I-1-10-I	10pf	1	is se-	
					lected	
					at ad-	
					justment	

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1	2	3	4	50X1-HUM	6	7
351. MA4.652.027	Electric corrector capacitor			1		
352. MA4.635.003	Potentiometer 3000ohm	3000ohm		1		
353. GOST 7113-54	Resistor MNT-0,5-510-I	510ohm		1		
354. GOST 7113-54	Resistor MNT-I-3900-II	3900ohm		1		
355. BINHC.360.603	Tumbler switch TMI-2			1		
356. JNS.862.000	Thermocontactor			1		
357. JNS.861.000	Heat radiator			1		
358. JNS.862.001	Thermoswitch			1		
359.	Vacuumquartz 100 kc/s			1		
360. GOST 6118-52	Capacitor KBT-1-2-200-0,05-II	0,05mf		1		
361. GOST 7113-54	Resistor MNT-0,5-100-II	100ohm		1		
362.	Crystal 100 mc/s			1		
363.	Type PKM telephone relay			1		
364. MA4.638.009	Wire-wound resistor 14,5 ohm	14,5ohm		1		
365. GOST 7113-54	Resistor MNT-0,5-1,0-II	1,0ohm		1		
366. GOST 7111-54	Capacitor GK-0-500-1-2200-II	2200pf		1		
367. MA4.652.005	Trimming capacitor 7-20pf	7-20pf		1		
368. GOST 7158-54	Capacitor KTR-1-1-13-I	13pf		1		is selected at adjustment
369. GOST 7113-54	Resistor MNT-0,5-2000-I	2000ohm		1		

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1	2	3	4	5	6	7
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370.	QTSOI-4OI-52	Electronic tube 6X4			1	
371.	GOST 7111-54	Capacitor C1M-4-250-T-10000-II	10000pf		1	
372.	GOST 7113-54	Resistor MNT-0,5-47000-II	47000ohm		1	
373.	GOST 7113-54	Resistor MNT-0,5-0,27-II	0,27Mohm		1	
374.	GOST 7158-54	Capacitor K1H-I-II-5, I-I	5,1pf		1	
375.	MA3.649.006	2-contacts connector				3
376.	MA3.646.001	2-contacts connector				3
377.	GOST 7113-54	Resistor MNT-0,5-0,33-II	0,33Mohm	1		is se- lected at ad- justment
378.	GOST 7113-54	Resistor MNT-0,5-390-II	390ohm	1		is se- lected at ad- justment
379.	MA3.649.016	Telephone block with 4 jacks				1
380.	GOST 7113-54	Resistor MNT-0,5-1000-II	1000ohm		1	
381.	GOST 7113-54	Resistor MNT-0,5-1000-II	1000ohm		1	
382.	GOST 7113-54	Resistor MNT-0,5-1000-II	1000ohm		1	
383.	GOST 7113-54	Resistor MNT-0,5-1000-II	1000ohm		1	
384.	GOST 7158-54	Capacitor K1H-I-II-24-I	24pf	1		is se- lected at ad- justment
385.	MO 462.011V	Capacitor K10H-2a-400-0,01±20%	10000pf		1	
386.	MO 462.011V	Capacitor K10H-2a-400-0,01±20%	10000pf		1	

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1	2	3	4	5	6	7
387.GOST 7153-54	Resistor MRT-0,5-13000-I	13000ohm	1	is se- lected at ad- justment		
388.OMO 464.011TY	Capacitor KC-2-500-M-390-II	390pf	1			
389.GOST 7113-54	Resistor MRT-0,5-200-I	200ohm	1			
390.HMNS.660.003	Transit block for 10 contact blades		1			
391.HMNS.660.004	Transit block for 12 contact blades		1			
392.GOST 6118-52	Capacitor KBP-112-200-0,05-II	0,05mf	1			
393.GOST 6118-52	Capacitor KBP-112-200-0,05-II	0,05mf	1			
394.HM4.683.012	Wire-wound resistor	30ohm	1			
395.HM4.775.02I	High frequency filter choke		1			
396.GOST 6118-52	Capacitor KBP-112-200-0,05-II	0,05mf	1			
397.OMO 462.011TY	Capacitor K40II-2a-400-0,01±20%	10000pf	1			
398.GOST 7113-54	Resistor MRT-0,5-10000-II	10000ohm	1	is se- lected at ad- justment		
399.OMO 462.011 TY	Capacitor K40II-2a-400-0,01±20%	10000pf	1			
400.GOST 7113-54	Resistor MRT-0,5-10000-II	10000ohm	1	is se- lected at ad- justment		
401.HM2.064.020	Variable capacitor		1			
402.GOST 7159-61	Capacitor KA-2a-1147-2±5%-3	2pf	1	is se- lected at ad- justment		

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1	2	3	4	5
403.GOST 7159-61	Capacitor R1-2a-M47-2.5%-3	2pf	1	is lected at ad- justment
404.GOST 7159-61	Capacitor R1-2a-M47-2.5%-3	2pf	1	"
405.GOST 7159-61	Capacitor R1-2a-M47-2.5%-3	2pf	1	"
406.GOST 7159-61	Capacitor R1-2a-M47-2.5%-3	2pf	1	"
407.GOST 7159-61	Capacitor R1-2a-M47-2.5%-3	2pf	1	"
408.GOST 5574-60	Resistor CH-100-320rp.1.75E1Bt220z	0,22Mohm	1	"
409. WNS.779.002	Coil of selective multi- section filter circuit		1	
410.GOST 6119-54	Capacitor KCO-1-250-F-510-I	510pf	1	
411. WNA.652.005	Trimming capacitor 7-20pf	7-20pf	1	
412. ONO 462.011TY	Capacitor KAO1-2a-400-0,01-20%	10000pf	1	
413.GOST 7113-54	Resistor E1T-0,5-10000-II	10000ohm	1	
414.WNS.779.033	Coil of selective multi- section filter circuit		1	
415.GOST 6119-54	Capacitor KCO-2-500-F-1200-I	1200pf	1	
416.WNA.652.005	Trimming capacitor 7-20pf	7-20pf	1	
417.WNS.779.033	Coil of selective multi- section filter circuit		1	
418.GOST 6119-54	Capacitor KCO-2-500-F-1200-I	1200pf	1	

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1	2	3	4	5	6	7
419.	MAA.652.005	Trimming capacitor 7+20pf	7+20pf	1		
420.	MMS.779.002	Coil of selective multi- section filter circuit		1		
421.	GOST 6119-54	Capacitor KCO-I-250-I-510-I	510pf	1		
422.	MAA.652.005	Trimming capacitor 7+20pf	7+20pf	1		
423.	OFO 462.011TY	Capacitor KACH-20-400-0.01+20%	10000pf	1		
424.	GOST 7113-54	Resistor MNT-0,5-0,1-II	0,1Mohm	1		
425.	GOST 5574-60	Resistor CH-I-00-320p.1V5 IB220R	0,22Mohm	1		
426.	QTY-01-209-54	Electronic tube 6K3		1		
427.	GOST 7113-54	Resistor MNT-0,5-160-I	160ohm	1		
428.	GOST 7112-54	Capacitor MEP-II-2-200-A-2-II	2mf	1		
429.	GOST 7113-54	Resistor MNT-0,5-150-I	150ohm	1		
430.	OFO 462.011TY	Capacitor KACH-20-400-0.01+20%	10000pf	1		
431.	GOST 7113-54	Resistor MNT-0,5-5100-I	5100ohm	1		
432.	GOST 7158-54	Capacitor KNT-I-II-10-II	10pf	1	is se- lected at ad- justment	
433.	GOST 7113-54	Resistor MNT-0,5-47000-II	47000ohm	1		
434.	MAS.775.122	First oscillator coil, band 3		1		
435.	GOST 7158-54	Capacitor KNT-I-II-10-II	10pf	1	is se- lected at adjustment	

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1	2	3	4	5	6	7
436.	MA5.775.123	First oscillator coil band 4				1
437.	MA5.775.124	First oscillator coil, band 5				1
438.	GOST 7158-54	Capacitor MFK-I-11-6,8-I	5,8pf			1 is se- lected at adjust- ment
439.	MA5.775.125	First oscillator coil, band 6				1
440.	MA5.775.002	Coil of selective multi- section filter circuit				1
441.	GOST 6119-54	Capacitor KCO-I-250-P-510-I	510pf			1
442.	MA4.652.005	Trimming capacitor 7+20pf	7+20pf			1
443.	OMO 462.011TV	Capacitor KCOII-2a-400-0,01+20%	10000pf			1
444.	GOST 7113-54	Resistor MRT-0,5-10000-II	10000ohm			1
445.	MA5.779.033	Coil of selective multi- section filter circuit				1
446.	GOST 6119-54	Capacitor KCO-2-500-P-1200-I	1200pf			1
447.	MA4.652.005	Trimming capacitor 7+20pf	7+20pf			1
448.	MA5.779.033	Coil of selective multi- section filter circuit				1
449.	GOST 6119-54	Capacitor KCO-2-500-P-1200-I	1200pf			1
450.	MA4.652.005	Trimming capacitor 7+20pf	7+20pf			1
451.	MA5.779.033	Coil of selective multi- section filter circuit				1

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1	2	3	4	5	6	7
485.	MM4.775.010Cn	High frequency filter choke			1	
486.	GOST 7158-54	Capacitor MFI-1-7-51-I	51pf		1	
487.	GOST 7158-54	Capacitor MFI-1-7-51-I	51pf		1	
488.	VTY-01-220-54	Electronic tube 6X6C			1	
489.	GOST 7112-54	Capacitor MFI-1-2-200-A-I-II	1mf		1	
490.	GOST 7113-54	Resistor MFI-0,5-15000-II	15000ohm		1	is se- lected at ad- justment
491.	GOST 7113-54	Resistor MFI-0,5-0,22-II	0,22Mohm		1	
492.	MM4.777.005	Second intermediate frequency third amplifier circuit coil			1	
493.	VTY-01-208-58	Electronic tube 6A7			1	
494.	MM4.775.010Cn	High frequency filter choke			1	
495.	CLO.464.004TY	Capacitor KC-2-500-M-330-II	330pf		1	
496.	ONO.464.004TY	Capacitor KC-2-500-M-330-II	330pf		1	
497.	GOST 7113-54	Resistor MFI-0,5-47000-II	47000ohm		1	
498.	GOST 7112-54	Capacitor MFI-1-2-200-A-I-II	1mf		1	
499.	GOST 7111-54	Capacitor CIN-3-500-F-3000-I	3000pf		1	
500.	GOST 7113-54	Resistor MFI-0,5-68000-II	68000ohm		1	is se- lected at ad- justment
501.	ONO.462.011TY	Capacitor M401-26-4000-0,01±20%	10000pf		1	

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1	2	3	4	5	6	7
502.020	462.011TV	Capacitor K40H-26-400-0,0E±20%	10000pf	1		
503.020	462.023TV	Capacitor MEPO-2-300-10-II	10pf	1		
504.00ST	6562-53	Resistor BC-0,25-27-II	27ohm	1	is se- lected at ad- justment	
505.020	462.011TV	Capacitor K40H-26-400-0,0E±20%	10000pf	1		
506.020	462.023TV	Capacitor MEPO-1-300-10-II	10mf	1		a
507.0A3	600.007	Switch		1		
508.00ST	7113-54	Resistor MPT-0,5-0,1-II	0,1Mohm	1		
509.00ST	7113-54	Resistor MPT-0,5-5100-I	5100ohm	1		
510.00ST	7113-54	Resistor MPT-0,5-0,47-II	0,47Mohm	1		
511.020	464.004TV	Capacitor KC-2-500-M-300-I	300pf	1		
512.0E4	775.011	3-d oscillator circuit coil		1		
513.00ST	7158-54	Capacitor RFR-1-II-24-I	24pf	1	is se- lected at ad- justment	
514.020	464.004TV	Capacitor KC-2-500-M-300-I	300pf	1		
515.00ST	7158-54	Capacitor RFR-1-II-30-I	30pf	1		
516.						
517.0A4	652.017	Capacitor 10±68pf	10±68pf	1		
518.00ST	7113-54	Resistor MPT-0,5-1000-II	1000ohm	1		

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1	2	3	4	5	6	7
519.	GOST 7158-54	Capacitor KPR-1-1-5, I-I	5,1pf	1	is se- lected at ad- justment	
520.	GOST 7158-54	Capacitor KPR-2-1-63-II	68pf	1		
521.	GOST 7111-54	Capacitor CPI-3-500-I-1300-I	1800pf	1		
522.		Crystal 215 kc/s	215kc/s	1		
523.	GOST 7113-54	Resistor MRT-0,5-0,47-II	0,47Mohm	1		
524.	WAB.640.002	Plug jack		1		
525.	WAB.640.002	Plug jack		1		
526.	GOST 7158-54	Capacitor KPR-1-1-10-II	10pf	1		
527.	BTY 06690-56	Germanium diode 1A2B		1		
528.	OEO.462.008TY	Capacitor MPT-1-2-200-A-I-II	1 mf	1		
529.	VTY-01-209-54	Electronic tube 6K3		1		
530.	OEO.462.011TY	Capacitor K40H-2a-400-0,01±20%	10000pf	1		
531.	GOST 7113-54	Resistor MRT-0,5-22000-II	22000ohm	1		
532.	GOST 7113-54	Resistor MRT-0,5-510-II	510ohm	1		
533.	OEO.462.011TY	Capacitor K40H-2a-400-0,01±20%	10000pf	1		
534.	GOST 7158-54	Capacitor KPR-2-1-62-I	62pf	1		
535.	W14.777.005	AGC amplifier circuit coil		1		
536.	GOST 7113-54	Resistor MRT-0,5-0,1-II	0,1Mohm	1		

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1	2	3	4	5	6	7
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537.	QRO 462.011TY	Capacitor K40H-2a-400-0,01±20%	10000pf	1		
538.	GOST 7113-54	Resistor M11-0,5-5100-I	5100ohm	1		
539.	QRO 464.004TY	Capacitor KC-2-500-M-510-I	510pf	1		
540.	TYO1220-54	Electronic tube 6X5C		1		
541.	QRO 462.011TY	Capacitor K40H-2a-400-0,01±20%	10000pf	1		
542.	GOST 7113-54	Resistor M11-0,5-0,22-II	0,22Mohm	1		is se- lected at ad- justment
543.	GOST 7113-54	Resistor M11-0,5-56000-II	56000ohm	1		
544.	GOST 7113-54	Resistor M11-0,5-0,47-II	0,47Mohm	1		
545.	QRO 462.011TY	Capacitor K40H-2a-400-0,01±20%	10000pf	1		
546.	QRO 464.004TY	Capacitor KC-2-500-M-300-I	300pf	1		
547.	MA3.640.002	Plug jack		1		
548.	QRO 464.004TY	Capacitor KC-1-500-M-100-II	100pf	1		
549.	MA 775.010	High frequency filter choke		1		
550.	GOST 7113-54	Resistor M11-0,5-1000-II	1000ohm	1		is se- lected at ad- justment
551.	MA3.602.038	Switch		1		
552.	GOST 7112-54	Capacitor MSP-1-2-200-A-1-II	1mf	1		
553.	GOST 7112-54	Capacitor MSP-1-2-600-A-0,1-II	0,1mf	1		

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1	2	3	4	5	6	7
554.GOST 5574-50	Resistor	0,1Mohm	1			
	CH 10C-3.20rp IVE Ist 100E					
555.VE70I-203-54	Electronic tube 6K3			1		
556.OMO.462.023 TY	Capacitor	10mf	1			
	MBTO-2-300-10-II					
557.GOST 7113-54	Resistor	0,1Mohm	1			
	MNT-0,5-0,1-II					
558.OMO.462.023 TY	Capacitor	20mf	1			
	MBTO-2-300-20-II					
559.GOST 7113-54	Resistor	2200ohm	1			
	MNT-0,5-2200-II					
560.GOST 7113-54	Resistor	1000ohm	1			
	MNT-0,5-1000-II					
561.GOST 7112-54	Capacitor	1mf	1			
	MBT-1-2-200-A-I,0-II					
562.MN5.067.016	Coil of low frequency filter			1		
563.MN5.067.015	Coil of low frequency filter			1		
564.MN5.067.015	Coil of low frequency filter			1		
565.MN5.067.016	Coil of low frequency filter			1		
566.GOST 7111-54	Capacitor	3900pf	1			
	CM-3-500-7-3900-I					
567.OMO 464.004 TY	Capacitor	750pf	1			
	KC-3-500-M-750-I					
568.GOST 7111-54	Capacitor	2700pf	1			
	CM-3-500-F-2700-I					
569.GOST 7111-54	Capacitor	10000pf	1			
	CM-4-250-F-10000-I					
570.GOST 7111-54	Capacitor	1500pf	1			
	CM-3-500-F-1500-II					

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1	2	3	4	5	6	7
571.GOST	7111-54	Capacitor CIM-4-500-I-5600-I	5600pf	1	50X1-HUM	
572.GOST	7111-54	Capacitor CIM-3-500-I-3900-I	3900pf	1		
573.GOST	7158-54	Capacitor KPK-I-M-10-II	10pf	1	is se- lected at ad- justment	
574.GOST	6118-52	Capacitor KEP-W-200-0,02-I	20000pf	1		
575.GOST	7111-54	Capacitor CIM-3-500-I-3900-I	3900pf	1		
576.GOST	7111-54	Capacitor CIM-3-500-I-1500-I	1500pf	1		
577.GOST	7111-54	Capacitor CIM-4-500-I-5600-I	5600pf	1		
578.OMO.462.011 TY		Capacitor K40H-2a-400-0,01+20%	10000pf	1		
579.GOST	7113-54	Resistor MNT-0,5-3900-I	3900ohm	1		
580.GOST	7111-54	Capacitor CIM-3-500-I-2700-I	2700pf	1		
581.GOST	7113-54	Resistor MNT-0,5-5600-I	5600ohm	1		
582.GOST	7113-54	Resistor MNT-0,5-15000-I	15000ohm	1		
583.OMO.464.004 TY		Capacitor KC-3-500-M-750-I	750pf	1		
584.GOST	7113-54	Resistor MNT-0,5-20000-I	20000ohm	1		
585.GOST	7113-54	Resistor MNT-0,5-20000-I	20000ohm	1		
586.VA3.600.005		Switch		1		

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1	2	3	4	5	6	7
587.0EO.462.011TY	Capacitor KAOH-26-400-0,01±20%	10000pf	1			50X1-HUM
588.GOST 7113-54	Resistor MNT-0,5-0,47-II	0,47Mohm	1			
589.0EO.462.023TY	Capacitor MFTO-2-300-10-II	10mf	1			
590.4TYO1209-54	Electronic tube 6K3		1			
591.GOST 7113-54	Resistor MNT-0,5-0,47-II	0,47Mohm	1			
592.0EO.462.023 TY	Capacitor MFTO-2-300-10-II	10mf	1			
593.GOST 7113-54	Resistor MNT-0,5-30000-I	30000ohm	1			
594.GOST 7113-54	Resistor MNT-0,5-0,1-II	0,1Mohm	1			
595.GOST 6118-52	Capacitor RFP-1-200-0,05-II	0,05mf	1			
596.GOST 7113-54	Resistor MNT-0,5-0,47-II	0,47K	1			
597.GOST 7113-54	Resistor MNT-1,0-620-I	620ohm	1			
598.						
599.0EO.462.023 TY	Capacitor MFTO-2-300-20-II	20mf	1			
600.4TY-0,1-4II-54	Electronic tube 6H6C		1			
601.0EA.731,02I	Audio frequency transformer		1			
602.GOST 7113-54	Resistor MNT-0,5-3000-I	3000ohm	1			
603.GOST 7113-54	Resistor MNT-0,5-27000-II	27000ohm	1			
604.GOST 7113-54	Resistor MNT-0,5-10000-II	10000ohm	1			

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1	2	3	4	5	6	7
605.GOST	7113-54	Resistor MNT-0,5-5100-I	5100ohm	1		
606.GOST	7113-54	Resistor MNT-0,5-5600-I	5600ohm	1		
607.GOST	7158-54	Capacitor KMC-I-1-52-I	62pf	1		
608.GOST	6118-52	Capacitor RMT-1-200-0,023-I	20000pf	1		
609.MAS.775.I26		Coil oscillator I bend 7		1		
610.BTY-06690-56		Germanium diode 72B		1		
611.BTY-06690-56		Germanium diode 72B		1		
612.BTY-06690-56		Germanium diode 72B		1		
613.BTY-06690-56		Germanium diode 72B		1		
614.GOST	7113-54	Resistor MNT-I-0,1-II	0,1Mohm	1	is se-	lected at ad- justment
615.GOST	7113-54	Resistor MNT-I-320-II	820ohm	1		
616.GOST	7113-54	Resistor MNT-0,5-100-I	100ohm	1		
617.GOST	7113-54	Resistor MNT-0,5-22000-II	22000ohm	1	is se-	lected at ad- justment
618.GOST	7113-54	Resistor MNT-0,5-100-I	100ohm	1		
619.GOST	7113-54	Resistor MNT-0,5-30000-II	30000ohm	1	is se-	lected at ad- justment
620.GOST	7113-54	Resistor MNT-0,5-100-I	100ohm	1		
621.GOST	7113-54	Resistor MNT-0,5-36000-II	36000ohm	1	is selec-	ted at adjust- ment

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1	2	3	4	5	6	7
622.GOST, 7113-54	Resistor MNT-0,5-100-I		100ohm	1		
623.GOST 7113-54	Resistor MNT-0,5-10000-II		10000ohm	1	is se- lected at ad- justment	
624.GOST 7113-54	Resistor MNT-0,5-100-I		100ohm	1		
625.GOST 7113-54	Resistor MNT-0,5-33000-II		33000ohm	1	is se- lected at ad- justment	
626.GOST 7113-54	Resistor MNT-0,5-510-I		510ohm	1		
627.GOST 7113-54	Resistor MNT-0,5-2400-I		2400ohm	1	is se- lected at ad- justment	
628.GOST 7113-54	Resistor MNT-2-2400-I		2400ohm	1		
629.GOST 7113-54	Resistor MNT-0,5-100-I		100ohm	1		
630. 4TV-0,2-70I-54	Stabilivolt CT-3C			1		
631.GOST 7113-54	Resistor MNT-0,5-43000-I		43000ohm	1	is se- lected at ad- justment	
632.GOST 7113-54	Resistor MNT-0,5-100-I		100ohm	1		
633.GOST 7113-54	Resistor MNT-0,5-18000-II		18000ohm	1	is se- lected at ad- justment	
634.GOST 7113-54	Resistor MNT-0,5-100-I		100ohm	1		
635.GOST 7113-54	Resistor MNT-0,5-27000-II		27000ohm	1	is se- lected at ad- justment	

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1	2	3	4	5	6	7
636.GOST	7113-54	Resistor MNT-0.5-100-I	100ohm	1		
637.GOST	7113-54	Resistor MNT-0.5-8200-II	8200ohm	1	is se- lected at ad- justment	
638.GOST	7113-54	Resistor MNT-0.5-100-I	100ohm	1		
639.GOST	7113-54	Resistor MNT-0.5-6800-II	6800ohm	1		
640.GOST	7113-54	Resistor MNT-0.5-100-I	100ohm	1		
641.GOST	7113-54	Resistor MNT-0.5-27000-II	27000ohm	1	is se- lected at ad- justment	
642.GOST	7113-54	Resistor MNT-0.5-100-I	100ohm	1		
643.GOST	7113-54	Resistor MNT-0.5-7500-I	7500ohm	1	is se- lected at ad- justment	
644.GOST	7113-54	Resistor MNT-0.5-100-I	100ohm	1		
645.GOST	7113-54	Resistor MNT-0.5-1600-I	1600ohm	1	is se- lected at ad- justment	
646.GOST	7113-54	Resistor MNT-0.5-100-I	100ohm	1		
647.GOST	7113-54	Resistor MNT-0.5-62000-I	62000ohm	1	is se- lected at ad- justment	
648.GOST	7113-54	Resistor MNT-0.5-100-II	100ohm	1		
649.GOST	6562-53	Resistor BC-0.25-I-82-II	82ohm	1		

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1	2	3	4	5	6	7
650.GOST 7113-54	Resistor MRT-0,5-0,33-II		0,33K	1		
651.GOST 7113-54	Wire resistor MRT-0,5-100-II		100ohm	1		
652.GOST 7113-54	Resistor MRT-I-1100-I		1100ohm	1		a
653.MA3.602.032	Switch			1		
654.Catalogue4411	Microammeter M494		50μ.a	1		
655.HH13.660.003	Transit block for 10 contact blades			1		
656.HH13.660.004	Transit block for 12 contact blades			1		
657.GOST 7158-54	Capacitor K1A-1-1-16-I		15pf	1	is se- lected at ad- justment	
658.BH.H10.260.606	Tumbler switch TBI-4			1		
659.GOST 5010-53	Fuse HK 45-0,5		0,5a	1		
660.GOST 6760-53	Capacitor K1M-P-250-10-0,025-II		0,025mf	1		
661.MA4.750.037	Choke of supply filter			1		
662.MA4.750.036	Choke of supply filter			1		
663.GOST 6760-53	Capacitor K1M-P-250-10-0,025-II		0,025mf	1		
664.GOST 6760-53	Capacitor K1M-P-250-10-0,025-II		0,025mf	1		
665.MA4.750.037	Choke of supply filter			1		
666.MA4.750.037	Choke of supply filter			1		
667.GOST 6760-53	Capacitor K1M-P-250-10-0,025-II		0,025mf	1		
668.GOST 6760-53	Capacitor K1M-P-250-10-0,025-II		0,025mf	1		

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1	2	3	4	5	6	17
669.	GOST 6760-53	Capacitor RBN-P-250-10-0.025-II	0,025mf	1		
670.	JN4.683.013	Resistor 42 ohm	42 ohm	1		
671.						
672.	JN4.775.02I	High frequency choke		1		
673.	JN4.683.009	Resistor 12,5 ohm	12,5 ohm	1		
674.	TVI-3-103-A	Miniature lamp MH-16 /13,5x0,16/		1		
675.	TVI-3-103-A	Miniature lamp MH-16 /13,5x0,16/		1		
676.	JN4.775.02I	High frequency choke		1		
677.						
678.	JN4.775.02I	High frequency choke		1		
679.	GOST 6118-52	Capacitor RBT-12-200-0.05-II	0,05mf	1		
680.						
681.	TVI-3-103-A	Miniature lamp MH-16 /13,5x0,16/		1		
682.	HO1364.000	Connector MP-23-II73F3		1		
683.	GOST 6760-53	Capacitor RBN-P-500-10-0.025-II	0,025mf	1		
684.						
685.	GOST 6760-53	Capacitor RBN-P-500-10-0.025-II	0,025mf	1		
686.						
687.						
688.	GOST 6760-53	Capacitor RBN-P-500-10-0.025-II	0,025mf	1		
689.	JN7.820.00I	Transit block for 10 contact sockets		1		

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1	2	3	4	5	6	7
690.	HNW7.830.001	Transit block for 10 contact sockets			1	
691.	HNW7.830.000	Transit block for 12 contact sockets			1	
692.	HNW7.830.000	Transit block for 12 contact sockets			1	
693.	B10.364.010	Connector HP23H7319			1	
694.	QMO.462.023 TV	Capacitor MSFO-2-300-10-II	10mf		1	
695.	GOST 5574-50	Resistor CH-100-3-20rp IVA INTION	10000ohm		1	
696.	MA5.775.131	First oscillator coil, band 12			1	
697.	GOST 7112-54	Capacitor MSTH-2-200-A-2-II	2mf		1	
698.	GOST 7113-54	Resistor MNT-0.5-5100-II	5100ohm		1	
699.	GOST 7113-54	Resistor MNT-0.5-510-I	510ohm		1	
700.	GOST 7113-54	Resistor MNT-0.5-56000-II	56000ohm	2		is selected at adjustment
701.	QMO.462.023 TV	Capacitor MSFO-2-300-20-II	20mf		1	
702.						
703.						
704.	QMO.462.023 TV	Capacitor MSFO-1-300-10-II	10mf		1	
705.	QMO.464.004 TV	Capacitor KC-I-50J-M-100-II	100pf		1	is selected at adjustment

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1	2	3	4	5	6	7
706.GOST	7113-54	Resistor MPT-0,5-30000-II	30000ohm	1		
707.OMO.464.004	TV	Capacitor KC-2-500-M-510-II	1000pf	1		
708.GOST	7113-54	Resistor MPT-0,5-3000-I	3000ohm	1		
709.GOST	7158-54	Capacitor KPR-2-M-5I-I	51pf	1	is se- lected at ad- justment	
710.GOST	7158-54	Capacitor KPR-2-M-5I-I	51pf	1	is se- lected at ad- justment	
711.GOST	7158-54	Capacitor KPR-2-M-5I-I	51pf	1		
712.GOST	7158-54	Capacitor KPR-2-M-5I-I	51pf	1		
713.GOST	7158-54	Capacitor KPR-2-M-5I-I	51pf	1		
714.GOST	7158-54	Capacitor KPR-2-M-5I-I	51pf	1		
715.GOST	7158-54	Capacitor KPR-2-M-5I-I	51pf	1		
716.GOST	7158-54	Capacitor KPR-2-M-5I-I	51pf	1		
717.OMO.462.023	TV	Capacitor MPTO-2-300-10,0-II	10mf	1		
718.GOST	7113-54	Resistor MPT-0,5-100-II	100ohm	1		
719.GOST	7113-54	Resistor MPT-0,5-1,0-II	1Mohm	1		
720.GOST	7113-54	Resistor MPT-0,5-0,1-II	0,1M	1		
721.BTY.05690.56		Germanium diode 12B		1		

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1	2	3	4	5	6	7
722.GOST 7158-54	Capacitor KIT-I-11-18-II		18pf	1	is se- lected at ad- justment	
723.GOST 7113-54	Resistor MRT-1.0-30000-I		30000ohm	1		
724.GOST 7113-54	Resistor MRT-0.5-0.15-II		0.15Mohm	1		
725.ONO.462.02BTY	Capacitor MBTC-2-300-10.0-II		10mf	1		
726.BNO.364.010	Connector MP28117319			1		
727.BTY.06690.56	Germanium diode H2B			1		
728.BTY.06690.56	Germanium diode H2B			1		
729.BTY.06690-56	Germanium diode H2B			1		
730.BTY.06690.56	Germanium diode H2B			1		
731.						
732.						
733.						
734.						
735.						
736.						
737.						
738.						
739.MN3.660.046	Connector			1		
740.MN3.660.046	Connector			1		
741.MN3.660.046	Connector			1		
742.MA5.775.I29	First oscillator coil, band 10			1		
743.GOST 7158-54	Capacitor KIT-I-11-18-II		18pf	1	is se- lected at ad- justment	

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1	2	3	4	5	6	7
744.GOST	7158-54	Capacitor KPK-I-M-15-II	15pf	1		
745.WA5.75.I27		First oscillator coil, band 8		1		
746.WA5.775.I30		First oscillator coil, band II		1		
747.GOST	7158-61	Capacitor KPK-I-M-18-II	18pf	1	is se- lected at ad- justment	
748.GOST	7158-54	Capacitor KPK-I-18-II	18pf	1	is se- lected at ad- justment	
749.WA5.775.I28		First oscillator coil, band 9		1		
750.GOST	7158-54	Capacitor KPK-I-M-5,1-I	5,1pf	1	is se- lected at ad- justment	
751.GOST	7158-54	Capacitor KPK-I-M-6,8-I	6,8pf	1	is se- lected at ad- justment	
752.GOST	7158-54	Capacitor KPK-I-M-6,2-I	6,2pf	1	is se- lected at ad- justment	
753.GOST	7158-54	Capacitor KPK-I-M-10-II	10pf	1	is select- ed at ad- justment	
754.GOST	7158-54	Capacitor KPK-I-M-15-II	15pf	1	to set if necessary	
755.GOST	7158-54	Capacitor KPK-I-M-15-II	15pf	1	to set if necessary	
766.GOST	7158-54	Capacitor KPK-I-M-15-II	15pf	1	to set if necessary	

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1. Antenna types
2. Input circuits
3. Circuits of the first high-frequency amplifier
4. Circuits of the second high-frequency amplifier
5. Circuits of the first oscillator
6. Stator
7. Rotor
8. The first high-frequency amplifier
9. The second high-frequency amplifier
10. The first mixer
11. The first oscillator
12. Input small tuning
13. Calibrator switching
14. "on"
15. Mc/s
16. First intermediate frequency amplifier
17. Second mixer
18. Heat voltage
19. High-frequency gain
20. Halfduplex
21. The second oscillator
22. Receiver automatic frequency control motor
23. "off"
24. Second intermediate frequency input
25. Crystal calibrator unit

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26. Thermostat
27. Heating
28. Cooling
29. The scheme of heater circuits connections
30. Tube heater
31. Coarse scale lighting
32. Lighting of optic scale
33. To the transit block side the casing (position 690)
34. Low-resistance load phones
35. To the second transit block inside the casing (position 692)
36. Type "A-250" receiver

Basic electrical diagram

II - band

37.

No.	Circuit destination	Where comes to
1.	1-st high frequency amplifier	Positions 616-617
2.	1-st mixer	Position 620, 621
3.	first intermediate frequency amplifier	Position 624, 629
4.	2-nd oscillator	Position 629, 631
5.	2-nd mixer	Position 410
6.	2-nd high frequency amplifier	Position 618, 619
7.	1-st oscillator	Position 622, 623
8.	Ground	Body
9.	Thermostat	Position 693
10.		

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(Continuation 2)

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38.

No.	Circuit destination	Where comes to
1.	+160 v	Plug of motor 4
2.	Heater	Supply plug 5
3.	Heater	Heater from supply unit, 4
4.	K ₁	Plug of motor, 6
5.	K ₂	Plug of motor, 2
6.	K ₃	Plug of motor, 1
7.	K ₄	Plug of motor, 5
8.	ACC	Position 551
9.	Output to head phones	Output plug, 5
10.	Output to head phones	Output plug, 4
11.	Halfduplex	Output plug, 2
12.	MGC	Position 427, 471

39. Antenna

40. Ground

41. Tuning

Translation to page 83

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1. 1 kHz - 1 kc/s
2. 14 kHz - 14 kc/s
3. Intermediate frequency band width
4. Second intermediate frequency first amplifier
5. Second intermediate frequency second amplifier
6. Second intermediate frequency third amplifier
7. Detector 6X6C
8. Low-resistance intermediate frequency output
9. "off"
10. AGC
11. sec.
12. AGC output
13. AGC detector
14. AGC amplifier
15. High-resistance intermediate frequency output
16. Gain margin
17. Third oscillator
18. Line₁, line₂
19. Third audio frequency amplifier
20. Second audio frequency amplifier
21. Kinds of operation:
telephony reception,
telegraphy reception,
correction.

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Translation to page 08 (continuation of 50X1-HUM)

22. First audio frequency amplifier
23. Low frequency band width
24. Microammeter
25. 1. First high frequency amplifier
2. Second high frequency amplifier
3. First mixer
4. First oscillator
5. First intermediate frequency amplifier
6. Second mixer
8. Second oscillator
10. Second intermediate frequency first amplifier
11. Second intermediate frequency second amplifier
12. Second intermediate frequency third amplifier
13. Third oscillator
14. AGC
15. First audio frequency amplifier
16. Second audio frequency amplifier
17. Third audio frequency amplifier
18. Plate voltage
19. Heat voltage
21. Tuning indicator
22. Thermostat
24. Output level

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Translation to page 88 (continuation 2)

50X1-HUM

26.

Where comes to	Destination	No.
Position 24	High frequency first amplifier	1
Position 284	First mixer	2
Position 306	First intermediate frequency amplifier	3
Positions 334-339	Second oscillator	4
Position 322	Second mixer	5
Position 209	High frequency 2-d amplifier	6
Position 208	First oscillator	7
Body	Ground	8
Position 377	Thermostat	9

27. To the transit block inside the casing (position No. 609)

28. To the transit block inside the casing (position 691)

29. The scheme of heater circuits connecting

30. Tube heater

31. To the intermediate frequency unit transit block (position 655)

32. To the high frequency unit transit block (position 390)

33. Supply plug

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Translation to page 38 (continuation 3)

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34.

Where comes to	Destination	No.
Supply plug 1	+160v	1
Supply plug 6	Body	2
High frequency unit	Heat voltage	3
Supply plug 4	Heat voltage	4
Supply plug 5	Power net	5
Supply plug 7	Power net	6
Supply plug 7	Detector output	7
Position 393	ACC	8
Output plug 5	audio frequency output	9
Output plug 4	audio frequency output	10
Body	ground	11
Positions 357, 293	MGC	12

35. Output plug

36. Plug of the automatic tuning motor

37. Interconnections diagram in the casing

38. To the intermediate frequency unit transit block (position 656)

39. To the high frequency unit transit block (position 391)

40. Connecting cables diagram for the operation with the receiver without the casing.

41. One connector (any) of the cable is inserted into intermediate frequency unit and another connector into the high frequency unit.

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Translation to page 83 (continuation 4)

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42. (supply) plug to the rectifier
43. Plug of the motor
44. II connector of the cable is connected with the
h.f. unit
45. III connector of the cable is connected with the i.f.
unit
46. Type "P-250-M" Receiver

Basic electric diagram

Translation to page 89

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1. May be moved out to 370 mm
2. Overall-dimensions drawing of the type "P-250-M" receiver
3. On the table
4. On the rear wall
5. 15 holes with i.d. 9 mm
6. Hole placement for the type "P-250-M" receiver fastening
7. 6 holes with i.d. 7 mm
8. Rectifier overall-dimensions drawing and hole placement for fastening
9. Overall-dimensions drawing of the replacement parts box
10. Vibropack overall-dimensions drawing and hole placement for the fastening
11. 4 holes M 4x0.7
12. Receiver
13. Back view
14. To the line
15. Front view
16. Head phones
17. Rectifier
18. Side view
19. Side view
20. To the alternating current mains
21. Ground
22. Vibropack
23. To accumulator

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Translation to page 89 (continuation 1)

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24.

Cable characteristics			Weight of the equipment components (kg)		
Cable No.	Qty of cable conductors	Mark of cables and cross sections	Receiver	Rec-tifier	Box of repair details and parts included in the set
1	1	Cable PK-2 or			
	1	PK-16			
2	5	Supply cable (length 2,1m) wires MPH 4x0,75mm ² (sq,mm) MPA 2x1,5mm ² (sq,mm)	91	20,5	10,0
3		Cord MPH 2x0,75 sq,mm with a two-pin plug at one end and con- nector at the other (length 20 meters)			

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Translation to page 89 (continuation 2)

50X1-HUM

25.

13. Screw for grounding	2	
12. Plug connector for rectifier supply	1	
11. Rectifier output plug connector	1	
10. AGC output plug	1	
9. High-resistance second intermediate frequency output plug	1	
8. Low-resistance second intermediate frequency output plug	1	
7. Second intermediate frequency output plug with cover-screw	1	
6. Plug connector for A.F.C. motor feeding		
5. Plug connector to the line output AGC, detector output, halfduplex	1	Cable is not supplied
4. Plug connector, receiver supply	1	Supply cable from rectifier to the receiver is supplied with plug con- nector
3. Block with jacks for head phones	1	
2. Output terminals to the line	1	
1. Antenna input plug connector	1	

No.	Name of Articles	Q-ty	Remarks
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26.	Receiver mounting drawing		
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Translation to page 90

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1. "on"
2. "off"
- 3.

Pos. sign	GOST, standard, drawing	Name of Articles and type	Main data rating	Q-ty	Re-marks	Chad ges
1	2	3	4	5	6	7
	1. ENO.364.010	Connector DP20H29E6		1		
	2. GOST 5010-53	Fuse 45 NR-I	1A	1		
	3. GOST 5010-53	Fuse 45 NR-I	1A	1		
	4. HA4.750.087Cn	Choke		1		
	5. HA4.750.087Cn	Choke		1		
	6. GOST 6112-52	Capacitor KBT-M2-600-0,01-II		1		
	7. GOST 6112-52	Capacitor KBT-M2-600-0,01-II		1		
	8. MM3.602001 Cn	Double-pole switch		1		
	9. MM3.602001 Cn	Double-pole switch		1		
	10. MM4.705002 Cn	Power transformer		1		
	11. GOST 1830-44	Tube 5H4C		1		
	12. ONO.462023 TV	Capacitor MBPO-2-300-20-II	20mf	1		
	13. MM4.750006 Cn	Choke 3H; 0,12 A	SH.C, 12A	1		
	14. ONO.462023 TV	Capacitor MBPO-2-300-20-II	20mf	1		
	15. MM4.750006 Cn	Choke 3H, 0,12A	3H; 0,12A	1		
	16. ONO.462023 Cn	Capacitor MBPO-2-300-20-II	20mf	1		
	17. GOST 7113-54	Resistor MNT-I-0,15-II	0,15M	1		

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Translation to page 90 (continuation)

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1	2	3	4	5	6	7
18.	TY-13-103-A	Tube 6X4-26v-0.12A		1		
19.	BNC.364.010	Connector LP23H78T9		1		

4.

No.	Destination	Where comes to
6.	13 v	to the receiver
1.	+150 v	to the receiver
3.	-160 v	to the receiver
4.	13 v	to the receiver
5.	"on" rectifier	to the receiver
7.	"on" rectifier	to the receiver
2.		

5.

No.	Destination	Where comes to
1.	127/220	Mains
2.	127/220	Mains

6. Rectifier

Basic electric diagram

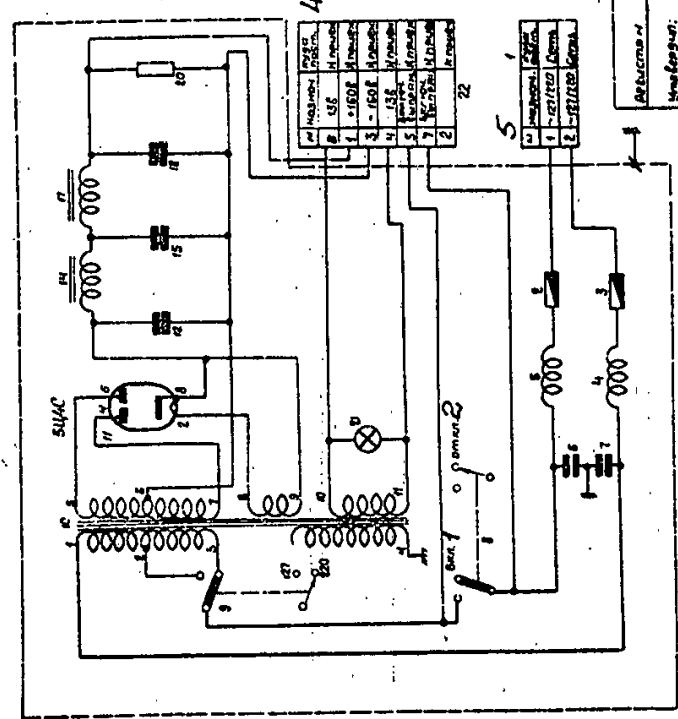
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3 Перечень элементов

№	ГОСТ	наименование	количество	замечания
1	ГОСТ 9400	Индукционная катушка	1	
2	ГОСТ 9400	Индукционная катушка	1	
3	ГОСТ 9400	Индукционная катушка	1	
4	ГОСТ 9400	Индукционная катушка	1	
5	ГОСТ 9400	Индукционная катушка	1	
6	ГОСТ 9400	Индукционная катушка	1	
7	ГОСТ 9400	Индукционная катушка	1	
8	ГОСТ 9400	Индукционная катушка	1	
9	ГОСТ 9400	Индукционная катушка	1	
10	ГОСТ 9400	Индукционная катушка	1	
11	ГОСТ 9400	Индукционная катушка	1	
12	ГОСТ 9400	Индукционная катушка	1	
13	ГОСТ 9400	Индукционная катушка	1	
14	ГОСТ 9400	Индукционная катушка	1	
15	ГОСТ 9400	Индукционная катушка	1	
16	ГОСТ 9400	Индукционная катушка	1	
17	ГОСТ 9400	Индукционная катушка	1	
18	ГОСТ 9400	Индукционная катушка	1	
19	ГОСТ 9400	Индукционная катушка	1	
20	ГОСТ 9400	Индукционная катушка	1	
21	ГОСТ 9400	Индукционная катушка	1	
22	ГОСТ 9400	Индукционная катушка	1	



№	ГОСТ	наименование	количество	замечания
1	ГОСТ 9400	Индукционная катушка	1	
2	ГОСТ 9400	Индукционная катушка	1	
3	ГОСТ 9400	Индукционная катушка	1	
4	ГОСТ 9400	Индукционная катушка	1	
5	ГОСТ 9400	Индукционная катушка	1	
6	ГОСТ 9400	Индукционная катушка	1	
7	ГОСТ 9400	Индукционная катушка	1	
8	ГОСТ 9400	Индукционная катушка	1	
9	ГОСТ 9400	Индукционная катушка	1	
10	ГОСТ 9400	Индукционная катушка	1	
11	ГОСТ 9400	Индукционная катушка	1	
12	ГОСТ 9400	Индукционная катушка	1	
13	ГОСТ 9400	Индукционная катушка	1	
14	ГОСТ 9400	Индукционная катушка	1	
15	ГОСТ 9400	Индукционная катушка	1	
16	ГОСТ 9400	Индукционная катушка	1	
17	ГОСТ 9400	Индукционная катушка	1	
18	ГОСТ 9400	Индукционная катушка	1	
19	ГОСТ 9400	Индукционная катушка	1	
20	ГОСТ 9400	Индукционная катушка	1	
21	ГОСТ 9400	Индукционная катушка	1	
22	ГОСТ 9400	Индукционная катушка	1	

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Translation to pa

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1. List of elements

No.	GOST, standard, drawing	Name of Articles and type	Main data rating	Q-ty	Re-marks	Chan-ges
1	2	3	4	5	6	7
1.	ВЭМНСС624-52	Capacitor КЭГ-1в 150/30М	30mf	1		
2.	ВЭМНСС624-52	Capacitor КЭГ-1в 150/30М	30mf	1		
3.	ВЭМНСС624-52	Capacitor КЭГ-1в 300/20М	20mf	1		
4.	ВМ4754003 Сп	Low frequency choke		1		
5.	ВЭМНСС624-52	Capacitor КЭГ-1в 300/20М	20mf	1		
6.		Vibrator, type EC-12		1		
7.	ВМ4775004 Сп	High frequency choke		1		
8.	GOST 6118-52	Capacitor КЭГ-М1-400-0,1-И	0,1mf	1		
9.	ОК0462003 ТУ	Capacitor МБТН-2-160-2-0,5-ИА	2x0,5mf	1		
10.	GOST 6562-53	Resistor BC-1,0-510-И	510ohm	1		
11.	ВМ4775004 Сп	High frequency choke		1		
12.	GOST 6118-52	Capacitor КЭГ-М1-400-0,1-И	0,1mf	1		
13.	ВМ4714001 Сп	Transformer		1		
14.	ВМ4 775004 Сп	High frequency choke		1		
15.	GOST 6118-52	Capacitor КЭГ-М1-400-0,1-И	0,1mf	1		
16.	GOST 6118-52	Capacitor КЭГ-М2-200-0,25-И	0,25mf	1		
17.	GOST 6562-53	Resistor BC-1,0-1-510-И	510ohm	1		
18.	GOST 6118-52	Capacitor КЭГ-М2-200-0,25-И	0,25 mf	1		
19.	ВМ4775005 Сп	High frequency choke		1		
20.	ОК0 462003 ТУ	Capacitor МБТН-1-160-2-0,5-ИА	2x0,5mf	1		
21.	ВМ4775005 Сп	High frequency choke		1		
22.	GOST 6118-52	Capacitor КЭГ-М1-200-0,25-И	0,25mf	1		166

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Translation to page 91 (continuation)

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1	2	3	4	5	6	7
23.	HM4775005 CH	High frequency choke				1
24.	BMHCC624-52	Capacitor KBT-16 50/100M	10mf			1
25.	BMHCC624-52	Capacitor KBT-16 50/100M	10mf			1
26.	BTO.364010	Connector BP38H7919				1
27.	BTO.364010	Connector BP20H2206				1
28.	GOST 6760-53	Capacitor KBH-P-250-10-0,025-II	0.025mf			1
29.	GOST 6760-53	Capacitor KBH-P-250-10-0,025-II	0.025mf			1

2.

No.	Destination	Where comes to
1.	+145 v	Receiver
2.		
3.	-145 v	Receiver
4.	+12 v	Receiver
5.	+12 v	Receiver
6.	-12	Receiver
7.	Switch	Receiver

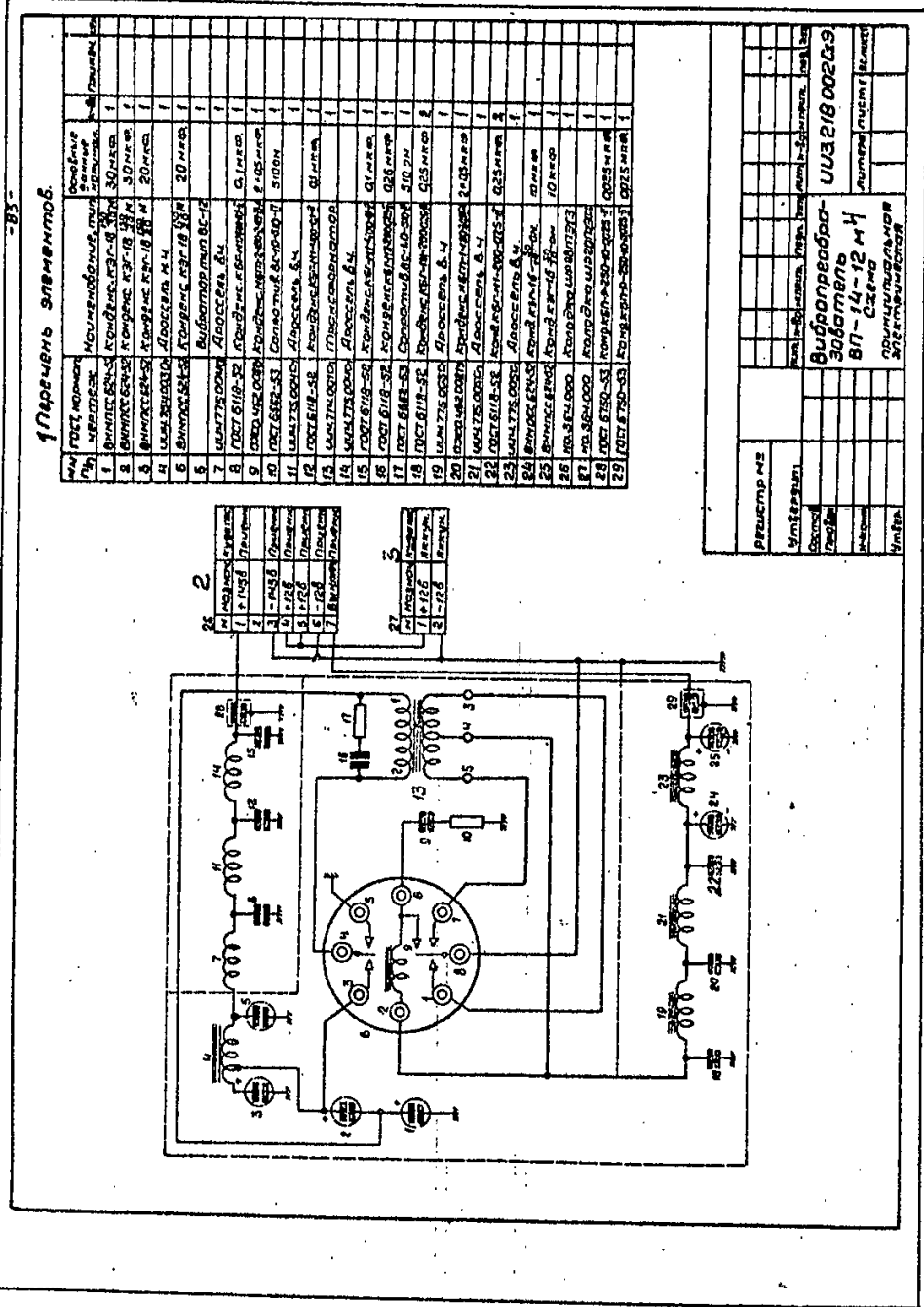
3.

No.	Destination	Where comes to
1.	+12 v	Accumulator
2.	-12 v	Accumulator

4. Type BH-14-12M vibropack

Basic electric diagram

50X1-HUM



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