

INFORMATION REPORT INFORMATION REPORT

CENTRAL INTELLIGENCE AGENCY

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|---------|-----------------------------------------------------------------|----------------|--|
| COUNTRY | USSR                                                            | REPORT         |  |
| SUBJECT | Soviet English-Language Repair Manual for the RSB-5 Transmitter |                |  |
|         | DATE DISTR.                                                     | 8 January 1964 |  |
|         | NO. PAGES                                                       | 1              |  |
|         | REFERENCES                                                      |                |  |

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| PLACE & DATE ACQ. |  |          |

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1. A 79-page, English-language, Soviet manual entitled Repair Manual of the RSB-5 Transmitter
- In addition to the text, the manual contains pull-out wiring diagrams for the power-supply panel, transmitter, low-voltage circuit, and mixer. The document was published in Prague, in 1958.
2. The RSB-5 is an airborne, high-frequency, liaison transmitter.

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COPY No.:

# Repair manual of RSB-5 transmitter

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REPAIR MANUAL OF THE

RSB - 5 TRANSMITTER.

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## I. REPAIR PROCEDURE.

Working place.

Location of defects and repairs adjustment and checking of the RSB-5 transmitter are carried out on a special working place.

The working place consists of a desk fitted with a supply panel /see Fig.1/ as well as with checking and measuring apparatus. A view of the working place for repair of the transmitter is shown in Fig. 2.

Instruments.

The following instruments are required for repair of the transmitter.

1. Type 526 or 527 heterodyne frequency meter
2. ZG-2A, ZG-2 or ZG-1 audio signal generator
3. ICH-5 or ICH-1 frequency meter
4. UM-2 or UM-1 universal bridge
5. VKS-7 or VKS-7A vacuum tube voltmeter
6. VK-2 vacuum tube voltmeter
7. EO-5 or EO-2 oscilloscope
8. MMG-1 megohmmeter
9. IM-8 modulation meter
10. IV-4, IV-3 or IV-3M outputmeter
11. Tt-1 tester
12. Artificial antenna

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## T o o l s   a n d   e q u i p m e n t .

In the course of transmitter repair use is made of the following tools and equipment:

1. Tool kit for the aircraft equipment specialist foreman and engineer.
2. Adapter for checking the operation of the 6SA7 vacuum tube /Suppl.5/
3. Tool for transmitter dial adjustment /Suppl.6/.
4. Equivalent load of the power unit /Suppl.7/

Figure 1: Supply panel wiring diagram.

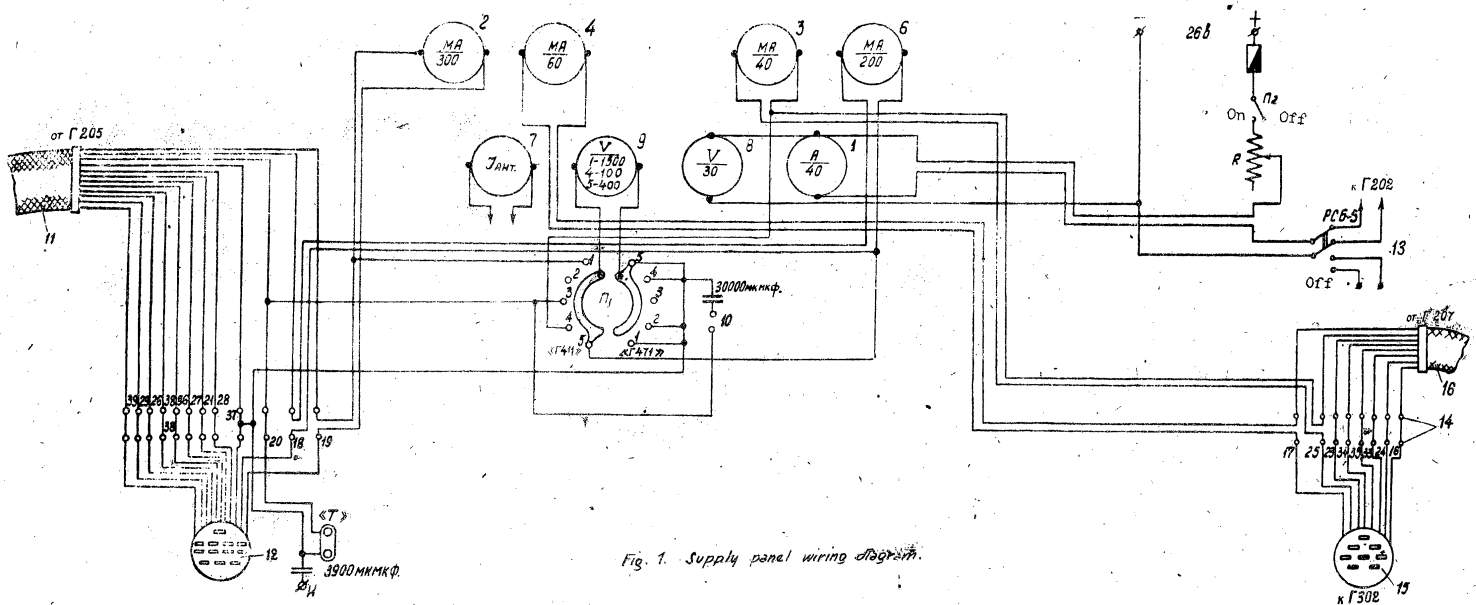
1/Ammeter 0-40A, 2/milliammeter, 0-300 mA,  
3/milliammeter 0-30 mA, 4/Milliammeter 0-60mA,  
6/ Milliammeter 0-200 mA, 7/RSB-5 Transmitter  
turning indicator, 8/Voltmeter, 0-30V, 9/Volt-  
meter, 10/terminals for connecting the IV-3,  
11/Cable from the RSB-5 transmitter power unit,  
12/Receptacle for connecting the r.f. unit  
of the RSB-5 transmitter, 13/Switch, 14/Ter-  
minal board inside the supply panel, 15/Re-  
ceptacle of the RSB-5 transmitter antenna  
tuning unit.

The reference Nos. of the individual wires cor-  
respond to those in the transmitter wiring dia-  
gram. a/ ON, b/ OFF, c/OFF

## II. PRELIMINARY OF DEFECTS OF TRANSMITTER LOCATION.

It should be noted in the course of locating defects , repairs, adjustments and inspections that there are 350 and 1000 V in the transmitter r.f. unit as well as in the power and antenna units when the transmitter is switched ON and that these voltages may be dangerous to life. R.f. vol-  
tage present in the leads and terminals of the antenna unit may cause burns /with the transmitter in operation/. For sa-

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for safety reasons the transmitter should be switched OFF in the course of assembly, inspection, vacuum tube replacement and repair.

Preliminary location of defects is carried out in the following order:

1. Inspect externally all the transmitter units for good condition of the individual components and of the assembly.
2. Make sure that the power unit is in order.
3. Check the transmitter for troublefree operation.

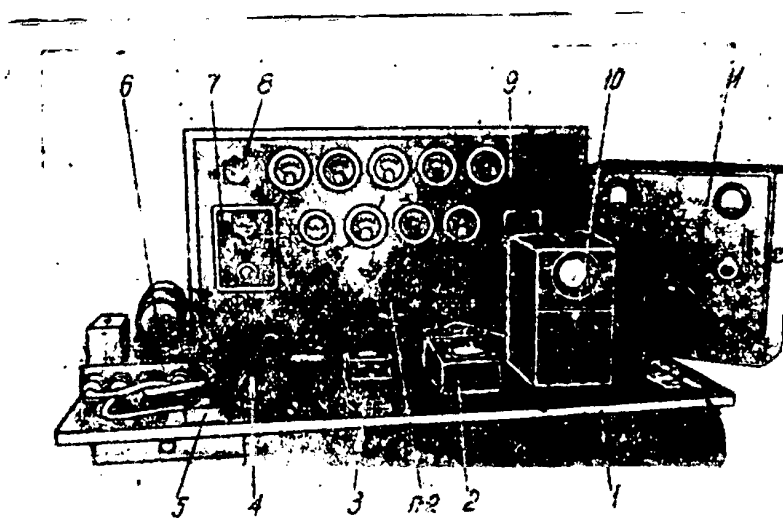


Figure 2: View of the working place for repair, adjustment and checking of the RSB-5 transmitter.

1/Desk, 2/Checked antenna tuning unit, 3/Tt-1 tester, 4/Equivalent load of the power unit, 5/RSB-5 transmitter control box, 6/Power unit, 7/IM-8 modulation depth meter, 8/Tuning indicator, 9/Supply panel, 10/Cathode ray oscilloscope, 11/Audio signal generator.

### § 1. Inspection.

Remove dust and dirt from the transmitter to be repaired by means of compressed air. Remove the bottom covers of the power and antenna units as well as the r.f. unit covers and inspect the transmitter assembly externally for good condition.

Check the following in the course of the inspection:

1. Absence of mechanical damage, traces of corrosion and damage of the lacquer coatings of the covers, chassis and other components.
2. Absence of dust, dirt and foreign matter such as pieces of solder, wire etc. inside the transmitter.
3. Absence of breaks in the flexible plate lead as well as stretched turns of the protective spirals.
4. Secure attachment of the individual elements to the chassis.
5. Absence of burned resistors in the transmitter as well as traces of electrolyte ooze from the electrolytic capacitor bodies.
6. Condition of assembly and absence of mechanical damage of resistors and capacitors.
7. Absence of traces inherent with burned or melted relay and switch contacts.
8. Absence of soldered connection damage.
9. Free motion of the mechanisms of the dials marked "FREQUENCY" and "ANTENNA ALIGNMENT"; these mechanisms should turn without jerking, seizing or rubbing against the front panel of the unit.
10. Correct functioning of the control element position setting devices.
11. Absence of bent pins and damaged connector threads as well as absence of leads not properly soldered to the connector pins.
12. Absence of pointer deformations as well as friction between the pointers and the dials or cover glasses of the indicators.

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13. Absence of mechanical damage /deformations and breaks of screening mesh and conduits/ of screened connecting cables.

§ 2. Location of defects of power unit.

Before starting to locate defects of the transmitter make sure that the power unit is in good condition. For this purpose it is necessary to check its high tension as well as tension circuits, audio signal generator and the rectifier. This is carried out with an equivalent load connected to the power unit /Suppl. 7/.

The checking procedure effected in the following order:

1. Set all the switches on the panel and on the equivalent load to their OFF positions.
2. Connect the power unit to the panel as well as to the equivalent load.
3. Switch ON the panel supply actuating switch P 2 located on the panel /Fig.2/
4. Switch ON the power unit. Set the equivalent load switch to OFF and check, by means of an ammeter located on the panel, the total current in the low tension circuits of the power unit. This current should not exceed 10A. Observing the ammeter pointer, note the moment at which the starting relay E 202 is energized. The pointer swings to approximately 2/3 of the dial at the instant of switching ON and settles at 10 A afterwards.

Step-starting relay E 201 should be energized within 1-2 seconds after the E 202 relay has been energized, shorting the R 202 resistor. "The reception-Transmission" /E 203/ should be energized simultaneously with the relay E 202.

If one of the relays is not energized, or if the current

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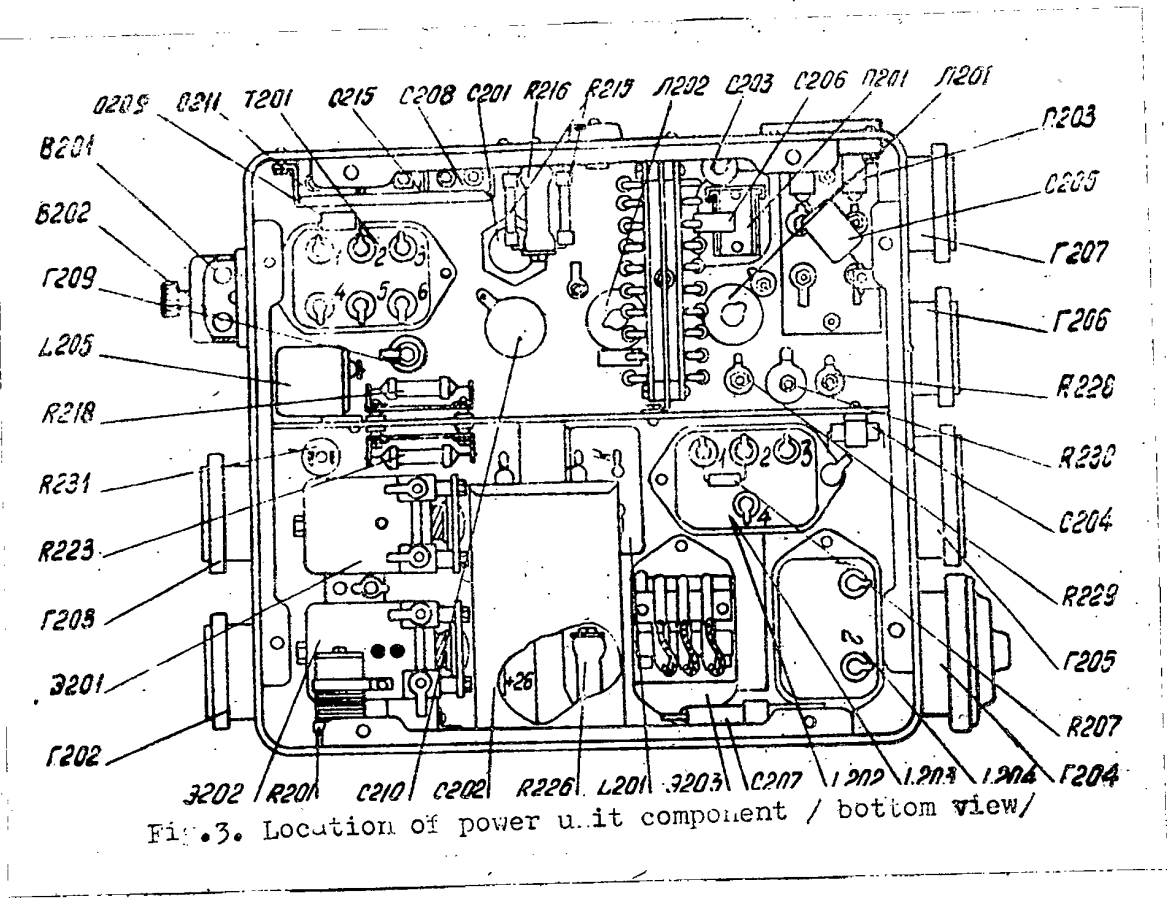


Fig. 3. Location of power unit component / bottom view/

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exceeds 10A, check the following:

1. Resistance of the relay coils /Suppl. 4/.
2. Condition of the power unit low tension circuit assembly.
3. Resistors R 227, R 201, capacitor C 204 and the resistance of choke L 201, L 202 and L 203 coils. The location of the power unit components is shown in Fig. 3.
4. Check the supply current and voltage of the plate and screengrid circuits by means of the instruments installed on the panel. The current in the 350 V circuit should be equal to 75 MA and 180 mA in the 1000 V circuit.

If the current in the 350 V commutator circuit differs excessively from 75 mA, check the following:

1. Capacitors C 201, C 203 and C 215,
2. Resistors R 229, R 230, R 223, R 224 and R 225,
3. The condition of assembly in the 350 V commutator circuit of the power unit,
4. Capacitor C 202 and the 1000 V commutator circuit.

Replace the defective resistors and capacitors according to the specification in the transmitter wiring diagram /see Suppl2/

Rewind the choke and relay coils according to the data given in Suppl. 4, if necessary. Adjust the relay, following the procedure outlined in chapter IV.

After checking the low and high tension circuits, check the rectifier and audio signal generator for proper operation. This is done in the following order:

1. Connect a wire-wound resistor 8 ohms 5 W across Nos. 23 pins and 24 of connector G-207.

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2. Check the D.C. voltage across No. 21 pin of connector G 204 and power unit chassis. This voltage should be within 220 - 300 V. If the voltage differs from the value given check the following:

The socket voltages of the L 202 vacuum tube /Table 1./.

The location of the vacuum tube socket terminals is shown in fig. 4.

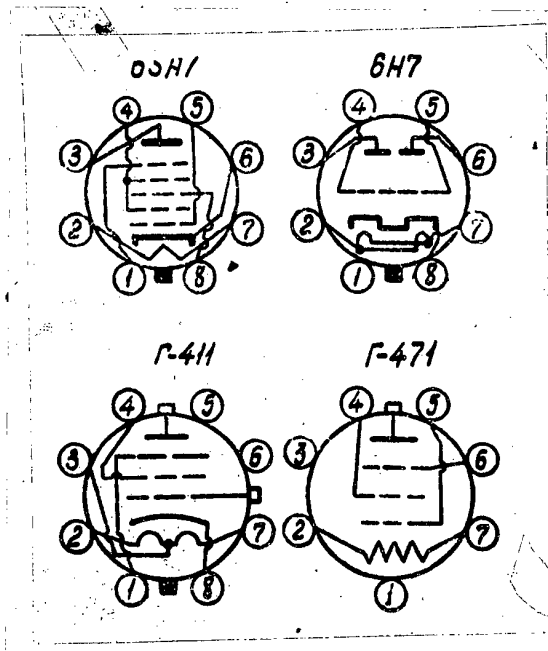


Figure 4: Location of socket terminal.

Table 1.

Socket voltages of the speech amplifier and audio signal generator vacuum tubes measured on the chassis.

| Stage                                     | Tube type | Socket voltage V |     |      |      |      |     |      |   | When checked with tester |
|-------------------------------------------|-----------|------------------|-----|------|------|------|-----|------|---|--------------------------|
|                                           |           | 1                | 2   | 3    | 4    | 5    | 6   | 7    | 8 |                          |
| Audio signal generator and rectifier L202 | 6N7       | 0                | 5,4 | -152 | -152 | -8   | 300 | 11   | 0 | Tt-1                     |
|                                           |           | 0                | 5,6 | -165 | -165 | -8,8 | 320 | 11,6 | 0 | VK-2 VTVM                |
| Speech ampl. /L 201/                      | 6N7       | 0                | 0   | 96   | 3,4  | -8   | 300 | 5,8  | 0 | Tt-1                     |
|                                           |           | 0                | 0   | 275  | -4,2 | -8   | 320 | 5,9  | 0 | VK-2 VTVM                |

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2. Resistance of T 201 transformer windings /Table 2/,
3. Resistors R 215, R 216, R 217, R 218, R 214 and R 228,
4. Capacitors C 210 and C 209,
5. Condition of the assembly.

Replace defective resistors and capacitors. Rewind defective windings of the T 201 transformer according to the data given in Table 2.

T a b l e ' ' 2 ' '

T 201 Transformer Winding Data

| Item<br>No. | Technical parameters                                   | Winding     |         |         |
|-------------|--------------------------------------------------------|-------------|---------|---------|
|             |                                                        | 1 - 2       | 3 - 4   | 6 - 5   |
| 1           | Wire type                                              | PEL-1       | PEL-1   | PEL-1   |
| 2           | Wire diameter                                          | mm 0,15     | 0,1     | 0,1     |
| 3           | Number of turns                                        | 1300        | 1300    | 1300    |
| 4           | Resistance                                             | ohm 105-125 | 310-350 | 45-55   |
| 5           | Test voltage between the winding and the body          | V 2000      | 2000    | -       |
| 6           | Inductance                                             | Henry 2-2,4 | 1,9-2,3 | 0,8-0,9 |
| 7           | Insulation resistance between the winding and the body | megohm 100  | 100     | 100     |

§ 3. Checking of overall performance of transmitter.

1. Connect the transmitter /r.f. unit, power unit and antenna tuning unit/ to the panel and to the artificial antenna.
2. Set the "Reception-Transmission" and "TONE-VOICE" switches located on the control panel to "Reception" and "Voice" respectively
3. Set the P 107 switch /Current check/ of the unit position "E III".
4. Loosen the lock nuts of the unit adjustment knob.

5. Set the P 103 switch to amplification /pull the knob out/.
6. Check the operation of the transmitter. The test marked frequencies as well as the positions of the controls "Antenna adjustment", "Coupling coarse", "Coupling fine" and of the "PR-PS" switch when tuning the transmitter to the individual frequencies are given in Table 3.

T a b l e 3.

Control knob positions in the course of alignment  
of the transmitter with the artificial antenna.

| Item No. | Freq. kc | Coupling -coarse | Coupling -fine | Variometer | Switch PR-PS | N o t e            |
|----------|----------|------------------|----------------|------------|--------------|--------------------|
| 1        | 2150     | 4                | 96             | 85         | PS           | Amplification      |
| 2        | 2900     | 4                | 65             | 50         | PS           |                    |
| 3        | 3600     | 4                | 15             | 35         | PS           |                    |
| 4        | 4300     | 2                | 22             | 30         | PS           | Frequency doubling |
| 5        | 5800     | 2                | 6              | 20         | PS           |                    |
| 6        | 7200     | 1                | 20             | 10         | PS           |                    |
| 7        | 3600     | 4                | 65             | 35         | PS           | Amplification      |
| 8        | 4800     | 4                | 15             | 25         | PS           |                    |
| 9        | 6000     | 3                | 10             | 180        | PS           |                    |
| 10       | 7200     | 2                | 10             | 14         | PS           | Frequency doubling |
| 11       | 9600     | 1                | 5              | 8          | PR           |                    |
| 12       | 12000    | 1                | 40             | 10         | PR           |                    |

7. Connect the TL-3 telephone plug to the "T" socket on the panel.
8. Switch ON the unit depressing the toggle of P 102 switch to its extreme left position.
9. Adjust the output circuit so as to obtain maximum reading of the indicator I301, connected to the antenna tuning unit. Turn the variometer 5-8 turns to the left or right from its position given in the table.

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10. Set the switch P 301 of the antenna tuning unit to position "10" when tuning to 2150 kc or to position "20" when tuning to 3600 kc.
11. Adjust the set frequency of the unit by turning the knob marked "Frequency" slightly to the left or right, so as to obtain zero beat in the headphones.  
Connect an insulated wire 0,5 - 1 m long to the terminal "C" of the antenna tuning unit and place it round the r.f. unit if the beat frequency signal heard in the headphones is weak.  
Shift the transmitter dial scale corresponding to the frequency of 2150 kc by means of actuating the knob marked "Frequency" to determine the zero beat; the dial scale should be shifted with respect to the gauge line of the sight by a maximum of one third of the distance between the adjacent dial graduations.
12. Set the unit P 102 cut in switch to its extreme right position. Adjust the set unit frequency by means of the zero beat in the headphones.
13. Set the antenna tuning unit switch P 301 to "OFF".
14. Note the reading of the instrument marked "Current" check" with the switch P 102 set to its extreme right position. /the instrument is located on the front panel of the unit/. The pointer of the instrument /I 101/ should be within the limits marked by means of a green sector on the instrument dial with the switch set to the position E III. Proceed as follows if the pointer is out of the green sector:  
1st case. Operation with the series connected output circuit /PS-PR switch set to PS/:

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- 1/If the pointer does not reach the green sector /low driving voltage/ the coupling between the L 103 vacuum tube and the output stage should be increased as follows:
  - a/Turn the knob "Antenna adjustment" to the right but not more than one fifth of a turn /increase inductance/,
  - b/Adjust the transmitter actuating the knob "Coupling-fine" so as to obtain maximum reading of the indicator I 301.

Check the tuning indicator and its circuits if the indicator "Current check" shows a reading, the artificial antenna ammeter indicates antenna current and the tuning indicator indicates zero.

The procedure for checking the tuning indicator and its circuit is given in chapter III § 3.

- c/Repeat operations outlined in a/ and b/ as long as the pointer of the indicator "Current check" is not in the centre of the green sector of the dial in the course of tuning for maximum current.
- 2/ Turn the above mentioned controls in the reverse direction, otherwise following the procedure, outlined in a/, b/ and c/ if the pointer passes the green dial sector /high driving voltage/.
- 3/ Turn the "Coupling-coarse" knob by one graduation to the right or left, provided that the knob "Coupling-fine" has reached one of its limit positions /maximum capacity  $110^\circ$  or  $0^\circ$  minimum capacity/. Turn the knobs "Coupling-coarse" and "Coupling-fine" with the transmitter switched OFF. Tuning of the output stage with the knob "Coupling-coarse" in its new position is accomplished by means of the knob "Coupling-fine" after setting the switch P 102 to position "N" /to the left/. Set the switch P 102 to its right position as soon as the stage adjustment is finished and adjust optimum stage operation following the procedure outlined in 1 a/, b/ and c/. The knob "Coupling-fine" should be adjusted each time to a position corresponding exactly to the maximum reading of the tuning indicator with the pointer of the "Current check" indicator pointing at the centre of the green dial sector.

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2nd case: Operation with the parallel connected output circuit /PR-PS switch set to PR/:

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- 1/ Adjust the pointer of the indicator to the centre of the green dial sector, turning the "antenna adjustment" knob to the left or turning the "Coupling-fine" knob to the right if the pointer is not in the required position. It should be noted in the course of the output stage adjustment that due to the wide limits within which the output stage capacity and inductance can be changed, it is possible to tune this stage to the harmonic of the set frequency. For this purpose be sure that the positions of the knobs "Coupling-coarse", "Coupling-fine" and "Antenna adjustment" correspond to those given in table 3.

15. Set the switches "PRD-PRM", "TLG-TLF" and "100% - 25%", located on the control box, to "PRD", "TLG" and "100%" respectively.
16. Depress the key and check the current by means of the instrument installed in the artificial antenna.
17. Calculate the power output of the transmitter dissipated in the artificial antenna, using the formula  $P = I^2 R$  where  $I$  is the current following through the artificial antenna and  $R$  is the equivalent resistance of the artificial antenna at the given frequency /Table 4/.

T a b l e 4.

| Parameters of the artificial antenna supplied<br>by the manufacturer for the RSB-5 transmitter. |      |      |       |             |         |         |     |
|-------------------------------------------------------------------------------------------------|------|------|-------|-------------|---------|---------|-----|
| Frequency                                                                                       | 2150 | 4000 | 6000  | 8000        | 9000    | 11000   |     |
| kc                                                                                              | 3000 | 5000 | 7000  | 8600        | 10000   | 12000   |     |
| Equivalent<br>resistance<br>ohms                                                                | 6    | 5    | 4,3,4 | 3,5 4,4 3,7 | 5,0 4,7 | 6,7 6,2 | 9,0 |

Note : Artificial antennas for RSB-5 radio transmitters are made in the manufacturer's factory and are supplied in

the transmitter overhaul kit. It is forbidden to make 50X1  
artificial antennas for the RSB-5 transmitters in repair  
shops. The power output of the transmitter should not be  
less than the value given in the technical requirements  
/Supl.3/.

Radio transmitters the power output of which complies with  
the values given in the technical requirements are sub-  
jected to checks of the remaining parameters included in  
the technical requirements /Supl.3/. The test procedures  
involved in checking the transmitters for compliance with  
the technical requirements are outlined in chapter V.  
Radio transmitters the parameters of which are found to  
be within the limits of the technical requirements are  
approved for further service. Radio transmitters whose  
parameters are found to be outside the limits given in the  
technical requirements are subjected to stage by stage  
location of defects and adjustment.

### III. STAGE BY STAGE LOCATION OF DEFECTS OF TRANSMITTER

#### § 1. Location of defects of R.f. unit.

The location of defects of each of the r.f. units should  
be accomplished in the following order:

1. Connect the power unit to the panel, to the r.f. unit and  
to the control box. Connect a wire-wound resistor 8 ohms ,  
5 W across pins Nos. 23 and 34 of connector G 207, instal-  
led on the power unit.
2. Connect the artificial antenna to both the terminal "B"  
and to the r.f. unit chassis.
3. Set the "TLF-TLG" and "PRD-PRM" switches located on the  
control panel to "TLG" and "PRM" respectively.
4. Set the switch P 107 marked "Current check" to "E III".
5. Set the band switch to amplification /pull the button of  
the switch out/.
6. Tune the transmitter to 2150 kc actuating the knob marked

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"Frequency" when checking the first r.f. unit, and to 3600 kc when checking the second unit r.f.

7. Set the controls marked "Antenna adjustment", "Coupling-coarse", "Coupling-fine" as well as the "PS-PR", switch to the positions given in table 3.
8. Depress the P 102 key to the left, check the low tension circuit current and the function of the E 103, E 101, and E 102 relays.

The low tension circuit current should not exceed 15 A.

If the current differs from the given value or if one of the relays does not operate, check the following:

- 1/ The resistance of the relay coils and the condition of the relay contacts.
- 2/ Resistance R 108.
- 3/ Capacitors C 123 and C 122.
- 4/ Contacts of the P 102 switch.
9. Set the switch P 1 installed on the panel to G 411 and check the plate supply voltage of the L 101 and L 102 vacuum tubes. This voltage should be within 315 and 360 V.  
Set the switch P 1 to "G 471" and check the plate voltage of the L 103 vacuum tube. This voltage should be within 900 and 1100 V.

If the voltages differ from the given values check the following:

- 1/Capacitors C 109, C 107, C 114, C 117 and C 116 in the plate circuit of the L 101 and L 102 vacuum tubes. The location of the components on the chassis is shown in fig. 5.
- 2/Capacitor C 121 in the L 103 vacuum tube plate circuit, resistors R 103, R 107 and coils L 102, L 105 and L 106.

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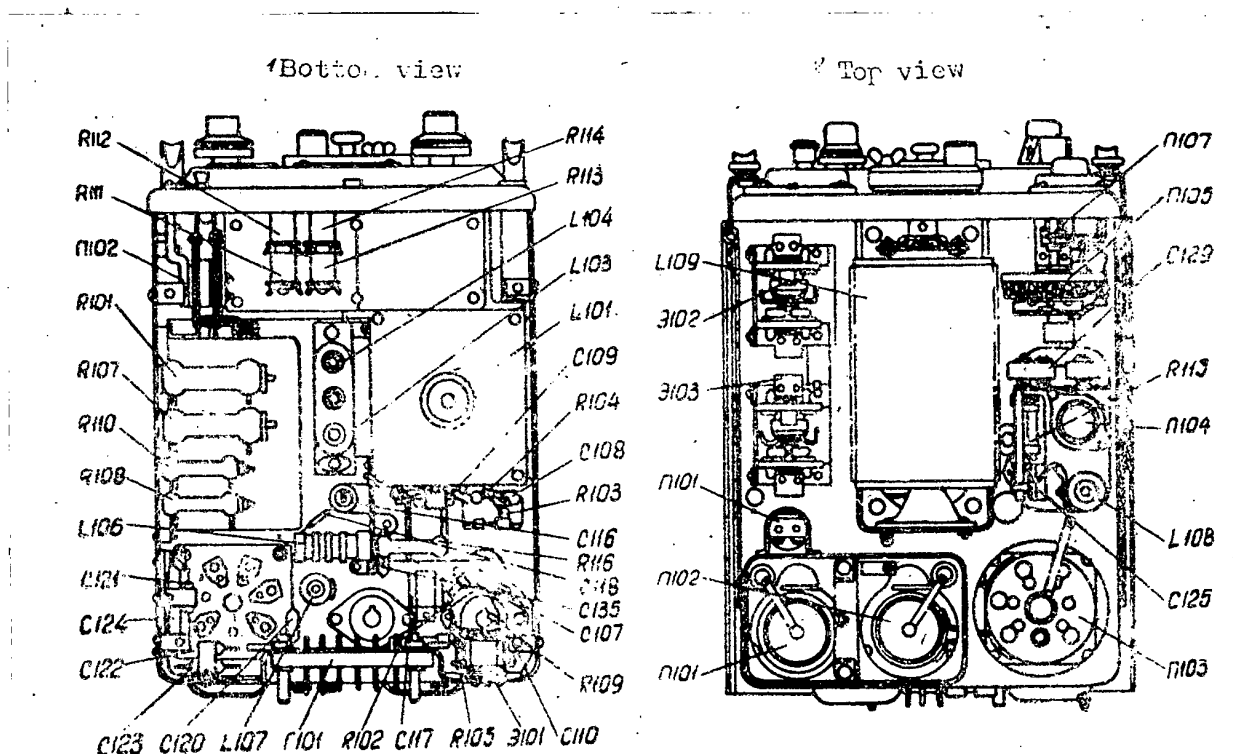


Figure 5: Location of the components in the r.f. units  
/top and bottom view/  
a/bottom view, b/top view

Replace the defective resistors and capacitors in accordance with both the specification and the wiring diagram of the transmitter. Rewind defective relay coils. Clean contacts which are burned or showing traces of oxidation.

10. Adjust supply voltage to 26 V.
11. Adjust the output circuit so as to obtain the maximum reading of the ammeter installed in the artificial antenna, turning the knob marked "Antenna adjustment" 5-8 turns to the right or left.
12. Depress the P.102 key to the right.  
The pointer of the I 101 indicator should then be within the green sector marked on the dial.
13. Set the switches to "PRD-PRM", "TLF-TLG" and 100% - 25% "PRD", "TLG" and 100% respectively.

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14. Check the current and note the artificial antenna ammeter reading.
15. Calculate the power output of the transmitter dissipated in the artificial antenna, making use of the formula  $P = I^2 R$  where  $I$  is the current following through the artificial antenna and  $R$  is the resistance of the artificial antenna at the frequency set in accordance with Table 4. The power output of the transmitter should not be less than the value given in the technical requirements /Suppl.3/. Check the transmitters the power output of which is less than the value given in the technical requirements as well as those the power output of which is zero, following the procedure outlined in 16. Check the control grid voltage of the L 103 vacuum tube, using a VKS-7 voltmeter. This control grid voltage should be within the limits given in Table 5.

Table 5.

A.C. voltages at the control grid of the output stage  
at 100% power output.

| Item No. | Unit No.  | Mode of operation  | Frequency kc | Control grid voltage of L 103 vacuum tube V |
|----------|-----------|--------------------|--------------|---------------------------------------------|
| 1        | No.1 Unit | Amplification      | 2150         | 115 - 130                                   |
|          |           |                    | 3000         | 115 - 130                                   |
|          |           | Frequency doubling | 4300         | 115 - 130                                   |
|          |           |                    | 6000         | 115 - 130                                   |
| 2        | No.2 Unit | Amplification      | 4300         | 115 - 130                                   |
|          |           |                    | 6000         | 115 - 130                                   |
|          |           | Frequency doubling | 8600         | 115 - 130                                   |

If there no voltage at the control grid of the L 103 vacuum tube, or if it is lower than the value corresponding to the

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given frequency, check the master oscillator. If the voltage, <sup>50X1</sup> corresponds to the values given in Table 5 and the power output value is lower than that given in the technical requirements, check the output stage.

Table 6.

L 101 Vacuum tube socket voltages measured on the chassis with transmitter switched to RT transmission and operated at 100% power output.

| Unit No. | Operation mode | Frequency kc | Vacuum tube socket voltages V |                   |                                            |                           |                                                                |                               | Instrument type required |
|----------|----------------|--------------|-------------------------------|-------------------|--------------------------------------------|---------------------------|----------------------------------------------------------------|-------------------------------|--------------------------|
|          |                |              | Suppressor grid voltage       | Screen grid volt. | AC control grid volt. checked by the VKS-7 | D.C. control grid voltage | L102 buffer stage A.C. control grid volt. checked by the VKS-7 | Instrument D.C. plate voltage |                          |
| 1        | Amplification  | 2150         | 5,0                           | 68                | 8,2                                        | -6,8                      | 21                                                             | 200                           | Tt-1                     |
|          |                |              | 6,0                           | 68                |                                            | -12                       |                                                                | 220                           | VK-2                     |
|          |                | 3100         | 5,2                           | 70                | 13,0                                       | -10                       | 36                                                             | 195                           | Tt-1                     |
|          |                |              | 5,0                           | 72                |                                            | -19                       |                                                                | 240                           | VK-2                     |
|          | Freq. doubling | 4300         | 5,4                           | 66                | 8,0                                        | -10                       | 18                                                             | 200                           | Tt-1                     |
|          |                |              | 6,0                           | 66                |                                            | -12                       |                                                                | 210                           | VK-2                     |
| 2        | Amplification  | 3600         | 6,5                           | 62                | 7,2                                        | -10                       | 20                                                             | 160                           | Tt-1                     |
|          |                |              | 7,8                           | 66                |                                            | -11                       |                                                                | 220                           | VK-2                     |
|          |                | 6000         | 6,0                           | 62                | 7,2                                        | -9                        | 18                                                             | 120                           | Tt-1                     |
|          |                |              | 7,5                           | 66                |                                            | -11                       |                                                                | 230                           | VK-2                     |
|          | Freq. doubling | 7200         | 7,8                           | 71                | 6,5                                        | -10                       | 21                                                             | 125                           | Tt-1                     |
|          |                |              | 6,0                           | 65                |                                            | -12                       |                                                                | 240                           | VK-2                     |
|          |                | 12000        | 6,0                           | 70                | 9,0                                        | -6,5                      | 24                                                             | 120                           | Tt-1                     |
|          |                |              | 6,9                           | 72                |                                            | -13                       |                                                                | 260                           | VK-2                     |

Location of defects of master oscillator.

Check the control grid voltages of both the L 101 master oscillator vacuum tube and the L 102 vacuum tube using a VKS-7 voltmeter. If the voltage value is lower than that given in Table 6 or if it is zero, check the following:

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1. The socket voltages of the L 101 vacuum tube /Table 6/.
2. Resistors R 101, R 111, R 102, R 103, R 105, R 104 and R 109.

3. Capacitors C 109, C 107, C 106, C 108, C 105 and C 110.  
Unsolder the lead connecting the E 101 relay to the chassis, unscrew the two relay attaching screws, remove the relay and if necessary replace capacitor C 107.

4. Contacts of the E 101 relay.

5. Capacitors C 104, C 103, C 102 and C 101.

6. Soldered connections on the L 101 and L 102 coils.

Replace defective resistors and capacitors and recheck the master oscillator for correct functioning.

If all the above mentioned components are in good conditions and the master oscillator fails to oscillate, replace resistor R 101 /25000 ohms/ by a resistor having 10000 ohms.

Check the r.f. voltage at the control grid of vacuum tube L 103 if the master oscillator oscillates and if the r.f. voltage at the control grid of the L 102 vacuum tube is within the limits given in Table 6. The control grid voltage of the L 103 vacuum tube should be within 115 - 130 V. Look for defects of the buffer stage if there is no r.f. voltage at the control grid of vacuum tube L 103, or if this voltage is lower than that specified.

#### Location of defects of buffer stage.

Check the control grid voltages of the L 102 and L 103 vacuum tubes operating as amplifiers first and frequency doublers second, using a VKS-7 voltmeter.

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If these voltages are equal to zero or their respective values are lower than those given, check the following:

1. The socket voltages of the L 102 vacuum tube /Table 7/.
2. Resistors R 106, R 116, R 112, R 107.
3. Capacitors C 114, C 115, C 111, C 135, C 116, C 113, C 112, and C 118.
4. Resistance of the L 105 choke.
5. Contacts of the P 103 switch.

Replace the defective L 105 choke, resistors and capacitors.

When replacing the C 114 capacitor it is necessary to unscrew the L 102 tube holder and to remove the tube.

Unsolder the leads of the resistor R 115 marked with black and yellow stripes when replacing the L 105 choke. Unsolder at the L 105 choke the leads marked with four black stripes as well as the lead passing to the control grid of the L 103 vacuum tube. Unscrew the ~~three~~ screws attaching the panel with R 115, L 105, C 119 and C 114, remove the panel and replace choke L 105.

Re-check the stage after repairing all the defects. Start to ascertain defects of the output stage as soon as it has been found that the buffer stage is operating properly.

Carry out the procedures outlined in the paragraph s checking with the location of defects of the output stage if the master oscillator and the buffer stage are operating properly and if the r.f. voltage at the L 103 control grid is found to be within the limits but if there is no current passing through the artificial antenna.

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T a b l e 7 .

L 102 Vacuum tube socket voltages measured on the  
chassis with transmitter switched to RT transmission  
and operating at 100% power output.

| Unit<br>No. | Ope-<br>rati-<br>on mo-<br>de | Fre-<br>quen-<br>cy kc | Vacuum tube socket voltages V   |                           |                                       |                          | Instrument<br>type<br>required |
|-------------|-------------------------------|------------------------|---------------------------------|---------------------------|---------------------------------------|--------------------------|--------------------------------|
|             |                               |                        | Suppre-<br>sor<br>grid<br>volt. | Screen<br>grid<br>voltage | D.C.con-<br>trol<br>grid vol-<br>tage | D.C.<br>plate<br>voltage |                                |
| 1           | Amplifi-<br>cation            | 2150                   | 24                              | 170                       | -                                     | 320                      | Tt-1                           |
|             |                               |                        | 24                              | 170                       | -28                                   | 340                      | Vk-2                           |
|             |                               | 3100                   | 24                              | 170                       | -                                     | 320                      | Tt-1                           |
|             |                               |                        | 24                              | 170                       | -28                                   | 340                      | Vk-2                           |
|             | Freq.<br>doubling             | 4300                   | 23                              | 220                       | -25                                   | 320                      | Vk-2                           |
|             | Amplifi-<br>cation            | 3600                   | 23                              | 185                       | -                                     | 320                      | Tt-1                           |
|             |                               |                        | 23                              | 185                       | -31                                   | 320                      | Vk-2                           |
|             |                               | 6000                   | 22                              | 155                       | -                                     | 320                      | Tt-1                           |
|             |                               |                        | 23                              | 180                       | -32                                   | 320                      | Vk-2                           |
| 2           | Freq.<br>doubling             | 7200                   | 24                              | 210                       | -                                     | 340                      | Tt-1                           |
|             |                               |                        | 24                              | 220                       | -34                                   | 340                      | Vk-2                           |
|             |                               | 12000                  | 24                              | 210                       | -                                     | 330                      | Tt-1                           |
|             |                               |                        | 24                              | 220                       | -34                                   | 340                      | Vk-2                           |
|             | Amplifi-<br>cation            | 3600                   | 23                              | 185                       | -                                     | 320                      | Tt-1                           |
|             |                               |                        | 23                              | 185                       | -31                                   | 320                      | Vk-2                           |

Location of defects of output stage.

The location of defects is effected in the following order:

1. Check the socket voltages of the L 103 vacuum tube /Table 8/
2. Check the resistors R 110, R 113, R 217, R 218, R 219, R 220 and R 221 /in the power unit/, capacitors C 124, C 128, C 119, C 121, C 125, C 126, C 127, C 129, C 131 and C 132, the contacts of the E 102 and E 103 relays as well as the contacts of the P 102, P 104, P 105 and "PS-PR" switches.
3. The L 106 and L 109 chokes.

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§ 2. Location of defects of modulator.

The location of defects of the modulator is effected in the following order:

1. Switch ON both the audio signal generator and the power unit.
2. Apply a 0,4 V 1000 cycle signal from the audio signal generator through a 50 ohm resistor to the socket "L" of the power unit.
3. Set the P 201 switch installed on the power unit successively to position "1", "2", and "3".
4. Check the A.C. voltage across pin No. 36 of connector G 204 and the chassis using an IV-4 or VKS-7A instrument. This voltage should be between 82-98 V with the switch in position "1", 55-65 V with the switch set to position "2" and 27-33 V when switched to "3".

If the voltage across pin No. 36 and the chassis is zero or if its value differs from the given values with the switch in position "1", check the following:

- 1/The socket voltages of the L 201 vacuum tube /see Table 1/.
- 2/The contacts of the automatic cut-off switch P 203 as well as of the switch P 201.
- 3/Resistors R 202, R 203, R 204, R 205, R 206, R 208, R 209, R 210, R 211, R 212, R 213, R 207 and R 227.
- 4/Capacitors C 206, C 207, C 208, C 205 and C 204.
- 5/Chokes L 201, L 202, L 203 and L 204.

Replace defective resistors and capacitors. Rewind defective windings of the chokes according to the data given in Suppl. 4.

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T a b l e 8 .

L 103 vacuum tube socket voltages measured on the chassis with transmitter switched to RT transmission and operated at 100% power output.

| Unit No | Operation mode     | Frequency kc | Vacuum tube socket voltages V  |                         |                            |                  | Instrument type required |
|---------|--------------------|--------------|--------------------------------|-------------------------|----------------------------|------------------|--------------------------|
|         |                    |              | Supres-<br>sor grid<br>voltage | Screen<br>grid<br>volt. | Control<br>grid<br>voltage | Plate<br>voltage |                          |
| 1       | Amplifi-<br>cation | 2150         | -78                            | 280                     | -                          | 900              | Tt-1                     |
|         |                    |              | -88                            | 290                     | -72                        | 980              | Vk-2                     |
|         |                    | 3100         | -80                            | 300                     | -                          | 900              | Tt-1                     |
|         |                    |              | -90                            | 300                     | -65                        | 1000             | Vk-2                     |
|         | Freq.<br>doubling  | 4300         | -70                            | 280                     | -                          | 900              | Tt-1                     |
|         |                    |              | -80                            | 280                     | -58                        | 960              | Vk-2                     |
| 2       | Amplifi-<br>cation | 3600         | -65                            | 265                     | -                          | 900              | Tt-1                     |
|         |                    |              | -78                            | 285                     | -63                        | 940              | Vk-2                     |
|         |                    | 6000         | -68                            | 280                     | -                          | 920              | Tt-1                     |
|         |                    |              | -78                            | 285                     | -60                        | 950              | Vk-2                     |
|         | Freq.<br>doubling  | 7200         | -75                            | 290                     | -                          | 920              | Tt-1                     |
|         |                    |              | -86                            | 300                     | -60                        | 1000             | Vk-2                     |
|         |                    | 12000        | -78                            | 290                     | -                          | 920              | Tt-1                     |
|         |                    |              | -86                            | 305                     | -54                        | 1000             | Vk-2                     |

### § 3. Location of defects of antenna tuning unit.

Location of defects of the tuning indicator circuit.

1. Connect the power unit to the r.f. unit , to the antenna tuning unit, to the artificial antenna and to the panel.
2. Set the switch P 301 of the antenna tuning unit to "OFF".
3. Switch ON the radio transmitter and check the current of the low tension circuit as well as the voltage of the "350 V" circuit. If the current exceeds 31 A, check the following:

1/Relays E 301 and 302.

2/Resistors R 304, R 303, R 302 and R 301.

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3/Capacitors C 303 and C 304.

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4/The condition of the circuit assembly in the low tension circuits and in the antenna tuning unit.

Check the resistance between the individual socket terminals of the vacuum tubes L 301 and L 305 and the chassis if the voltage of the "+350 V" circuit decreases sharply when switching 6N the transmitter /Table 9/.

Repair all the defects detected in both the high and the low tension circuits of the antenna tuning unit.  
Set the switch "TLF-TLG" to "TLF".

Tune the radio transmitter to one of the frequencies given in Table 3. The pointer of the indicator I 301 should swing to 3-6 graduation in the course of the tuning process.

If the indicator does not operate, or if its reading is smaller than the given values, check the following:

- 1/The condition of the indicator I 301.
- 2/The socket voltages of the vacuum tube L 301 /Table 10/.
- 3/Resistor R 115 and capacitor C 131 /in the r.f. unit/.
- 4/Resistors R 321, R 301, R 302, R 324 and R 326.
- 5/Capacitors C 330, C 323, C 304, C 303 and C 320.

Replace the defective resistors and capacitors.

When replacing these components /Fig.6/ follow the procedure outlined below:

1. Unscrew the two set screws of the antenna tuning unit P 301 switch.
2. Remove the knob of the switch P 301.
3. Unscrew the four screws attaching the chassis of the crystal calibrator.
4. Remove the crystal calibrator chassis from the antenna tuning unit.
5. Replace defective components.

Select the resistors R 326 and R 324 so that the indicator I 301

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/Suppl.1/ reading within 3 - 6 graduations in the course of tuning. Having ascertained that the indicator is functioning properly, start looking for defects of the side tone circuit.

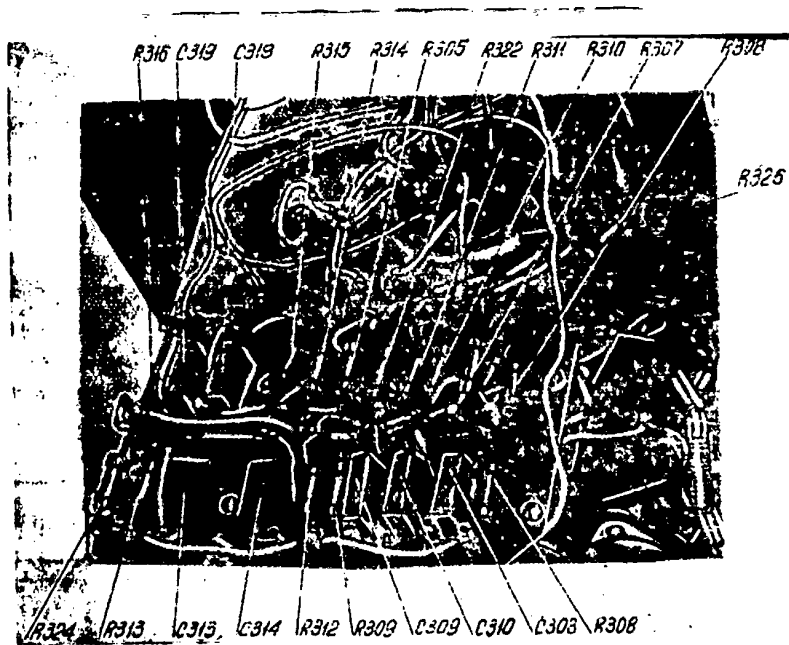


Fig. 1. Location of components on the crystal oscillator chassis / bottom view.

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T a b l e 9.

Mean vacuum tube socket resistance values  
measured on the transmitter chassis.

| Item No. | Stage                                      | Tube type | Socket terminal No. |     |   |         |        |      |      |        | Plate  | Control grid |
|----------|--------------------------------------------|-----------|---------------------|-----|---|---------|--------|------|------|--------|--------|--------------|
|          |                                            |           | 1                   | 2   | 3 | 4       | 5      | 6    | 7    | 8      |        |              |
| 1        | Master oscill.                             | G411      | -                   | 3   | - | 33000   | -      | -    | 59   | 500    | 17000  | 10000        |
|          |                                            |           | ohms                |     |   | ohms    |        |      | ohms | ohms   | ohms   | ohms         |
| 2        | Buffer stage                               | G411      | -                   | 58  | - | 17000   | -      | -    | 30   | 500    | 150000 | 98000        |
|          |                                            |           | ohms                |     |   | ohms    |        |      | ohms | ohms   | ohms   | ohms         |
| 3        | Power amplifier L 103                      | G471      | -                   | -   | - | 150000  | -      | -    | -    | -      | -      | -            |
|          |                                            |           |                     |     |   | ohms    |        |      |      |        |        |              |
| 4        | Rectifier L 104                            | 6SA7      | -                   | 0   | 0 | 33000   | 33000  | -    | 20   | 33000  | -      | -            |
|          |                                            |           |                     |     |   | ohms    | ohms   |      | ohms | ohms   |        |              |
| 5        | Modulator L 201                            | 6N7       | 0                   | 0   | 2 | 120     | 2000   | 750  | -    | 0      | -      | -            |
|          |                                            |           |                     |     |   | Megohms | ohms   | ohms |      |        |        |              |
| 6        | Audio signal generator and rectifier L 102 | 6N7       | 0                   | 0   | 0 | 50000   | 200    | 180  | -    | 0      | -      | -            |
|          |                                            |           |                     |     |   | 50000   | ohms   | ohms | ohms | ohms   |        |              |
| 7        | A.f. amplifier L 305                       | 6N7       | 0                   | 180 | - | 500000  | -      | -    | -    | 0      | -      | -            |
|          |                                            |           |                     |     |   | 500000  | ohms   |      |      |        |        |              |
| 8        | 1000 kc X-tal oscillator L 301             | 6N7       | 0                   | -   | - | -       | 33000  | -    | -    | -      | -      | -            |
|          |                                            |           |                     |     |   |         | ohms   |      |      |        |        |              |
| 9        | 200 kc X-tal oscillator L 302              | 6SA7      | 0                   | -   | - | -       | 43000  | -    | -    | 100000 | -      | -            |
|          |                                            |           |                     |     |   | 180     | ohms   |      |      | ohms   |        |              |
| 10       | 40 kc X-tal oscillator L 303               | 6SA7      | 0                   | -   | - | -       | 45000  | -    | -    | 150000 | -      | -            |
|          |                                            |           |                     |     |   |         | ohms   |      |      | ohms   |        |              |
| 11       | 20-10 kc X-tal oscillator L 304            | 6SA7      | 0                   | 0   | - | -       | 160000 | -    | -    | 95000  | -      | -            |
|          |                                            |           |                     |     |   |         | ohms   |      |      | ohms   |        |              |

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Table 10.50X1

Socket voltages of the antenna tuning unit vacuum tubes measured on the transmitter chassis.

| Item No | Stage                          | Tube type | Vacuum tube socket voltages V |      |    |     |     |     |     | P 301 switch position |
|---------|--------------------------------|-----------|-------------------------------|------|----|-----|-----|-----|-----|-----------------------|
|         |                                |           | 1                             | 2    | 3  | 4   | 5   | 6   | 7   |                       |
| 1       | 1000 kc X-tal oscillator L 301 | 6SA7      | 0                             | 12,5 | 26 | 130 | -30 | 7,5 | 7,5 | -3 "Kor"              |
| 2       | 200 kc oscillator L 302        | 6SA7      | 0                             | 25   | 50 | 76  | -5  | 6,5 | 19  | -3,4 "40 kc"          |
| 3       | 40kc oscillator L 303          | 6SA7      | 0                             | 19   | 21 | 74  | -2  | 6,8 | 13  | -3,4 "40kc"           |
| 4       | 20-10kc oscillat. L 304        | 6SA7      | 0                             | 0    | 60 | 75  | 0,5 | 7   | 7   | -3,5 "20-10kc"        |
| 5       | A.f.amplifier L 305            | 6N        | 0                             | 25   | 15 | 0,6 | -2  | 160 | 19  | 0 "OFF"               |

Note: The measurement should be carried out with the aid of the VK-2 vacuum tube voltmeter.

#### Location of defects of side tone circuit.

1. Switch ON the radio transmitter and tune it to any frequency in the band.
2. Set the "TLF-TLG" and "100% - 25%" switches to "TLF" and "100%" respectively. Set the antenna tuning unit switch to OFF.
3. Connect a TA-3 headset to the sockets "T" on the panel and connect a VKS-7 /or IV-4/ voltmeter in parallel to the headset.
4. Voltmeter should indicate a value between 20 - 30 V with a load and steady sound applied to the throat microphone. If there is no tone in the headphones, or if the voltage

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is less than 20 V, check the following:

- 1/The socket voltages of the L 305 vacuum tube /Table 10/
- 2/Resistors R 318, R 317, R 320, R 319, R 325, R 223, R 224 and R 225 /in the power unit/.
- 3/Capacitors C 320, C 329, C 325, C 134 and C 211 /in the power unit/.
- 4/Set the "TLG-TLF" switch to "TLG". A 600 - 1100 cps tone should be heard in the headphones. If this is not the case, check the following:
  - a/Capacitor C 213 /in the power unit/.
  - b/Resistor R 222.

Replace defective capacitors and resistors. After rectifying ascertained defects and making sure that the side tone circuit is operating properly, check the crystal calibrator, for proper operation. Take the following steps for this purpose:

- 1/ Switch ON the transmitter by means of the switch P 102 and tune it to a frequency which is a multiple of 1000 kc /3000, 4000, 5000 kc etc./
- 2/ Set the switch P 301 to "KOR".
- 3/ Listen to the beat frequency signal resulting from the set transmitter frequency and the 1000 kc oscillator frequency in the headphones, turning the knob "Frequency" in both directions from its set position. Start with locating defects of the 1000 kc if the zero beat is heard.

Location of defects of 1000 kc oscillator.

Check the following in the course of locating defects of the crystal oscillator /1000 kc oscillator/:

1. The crystal, by replacing it /the location of the crystal calibrator circuits is shown in Fig. 7.
  2. The socket voltages of the vacuum tube L 301 /Table 10/
- The socket voltages of the vacuum tube L 301 are checked with the aid of an adapter /Suppl.5/.

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3. Capacitors C 301, C 302, C 303, C 326, C 305. 50X1
4. Resistors R 321, R 303, R 304, R 323.
5. The contacts of the switch P 301.

Replace defective capacitors and resistors. Adjustment of the 1000 kc oscillator should be carried out after rectifier all defects.

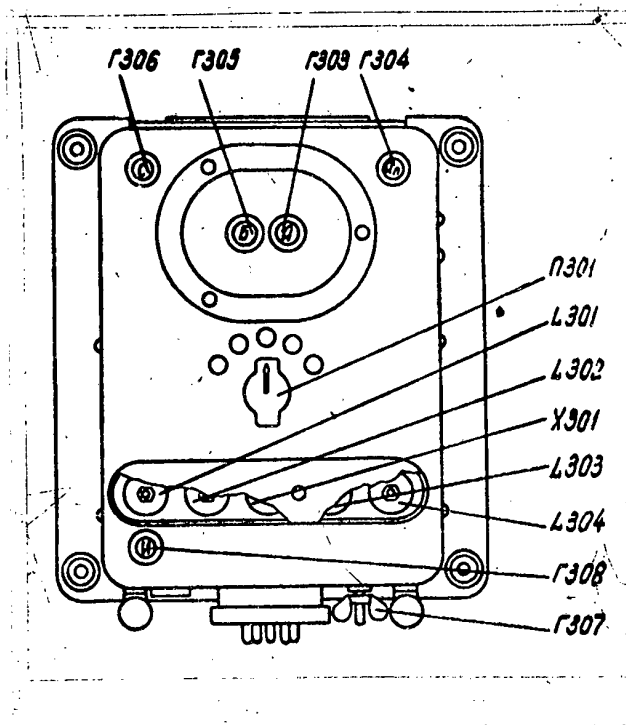


Figure 7: Location of the crystal and of the crystal calibrator tuned circuits.

#### Location of defects of 200 kc oscillator.

1. Set a frequency of the unit dial which is a multiple of 200 kc /3200, 3400, 5200 kc etc./
2. Set the switch P 301 to "40".
3. Remove the vacuum tube L 303 from its socket /40 kc oscillator/, short circuit its pins Nos.3 and 4 by means of a lead and put vacuum tube in place.
4. Depressing the toggle of the switch P 102 to the left, switch ON the radio transmitter.
5. Listen to the beat frequency signal in the headphones,

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turning the knob "Frequency" in both directions from its set position.

6. Check the r.f. unit for calibration accuracy /see chapter V. § 5/ and the crystal calibrator for correct adjustment in the zero beat is obtained at a frequency other than the set frequency. The r.f. unit calibration procedure is given in chapter IV. § 2.
7. If the zero beat is not heard, check the following:
  - 1/The socket voltages of the vacuum tube L 302 /Table 10/.
  - 2/Resistors R 306, R 307 and R 308,
  - 3/Capacitors C 306, C 308, C 310 and C 307.
  - 4/The resistance of the inductor L 307.
  - 5/The contact of the switch P 301.

Replace defective capacitors and resistors.

Make sure that the 200 kc oscillator is operating properly and check the 40, 20 and 10 kc oscillators after removing the lead short circuiting pins Nos. 3 and 4 of the L 303 vacuum tube.

Location of defects in the 40 kc, 20 kc and 10 kc oscillator circuits.

1. Set a frequency of the unit dial the last digits of which are divisible by 40 kc /e.g. 6340, 6380, 6420 kc etc/
2. Remove the vacuum tube L 304 /20 and 10 kc oscillator/ from its socket and connect pins Nos. 3 and 4 by means of a suitable lead. Put the vacuum tube in place again.
3. Depress the toggle of the switch P 102 to the left and adjust the radio transmitter.
4. Listen to the beat frequency signal in the headphones, turning the knob "Frequency" in both directions from its set position.
5. Check the calibration of the r.f. unit for accuracy and the

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crystal calibrator for correct adjustment if the zero beat is not heard at the set frequency.

6. If no beat frequency signal is heard in the headphones, check the following:

- 1/The socket voltages of the vacuum tube L 303 /Table 10/
- 2/Resistors R 309, R 310, R 311 and R 312.
- 3/Capacitors C 309, C 312, C 314, C 328 and C 311.
- 4/Resistance of the inductor L 302.

Replace defective resistors and capacitors.

As soon as it is ascertained that the 40 kc oscillator is operating properly, start looking for defects in the 20 and 10 kc oscillator circuits. The lead shorting the pins Nos. 3 and 4 of the vacuum tube L 304 should be removed before hand. Location of defects in the 20 and 10 kc oscillator circuits is accomplished by following the procedures outlined for the 1000, 200 and 40 kc oscillators. The switch P 301 is set in the individual cases to a position corresponding to the oscillator /20 and 10 kc/. In <sup>the</sup> case of failure of the 20 and 10 kc oscillator, check the following:

- 1/ The socket voltages of the vacuum tube L 304 /Table 10/
- 2/ Resistors R 313, R 314, R 315 and R 316.
- 3/ Capacitors C 313, C 317, C 318, C 319, C 315 and C 316.
- 4/ The resistance of the inductors L 303 and L 304.
- 5/ The contacts of the switch P 301.

Replace the defective resistors and capacitors and check the 20 and 10 kc oscillator once more.

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## IV. TRANSMITTER ADJUSTMENT.

§ 1. Relay adjustment.

The starting relay E 202 and the step-start relay E 201 should be adjusted in the following order:

1. Assemble a test circuit /Fig.8/
2. Unsolder the end of the relay winding.
3. Remove the relay from the mounting panel on the power unit chassis.
4. Adjust the supply voltage of the relay E 202 within 4,5 - 5,5 V and within 15 - 18 V for the relay E 201.
5. Positive double action of the relay should be obtained by means of adjustment of the relay set screw.

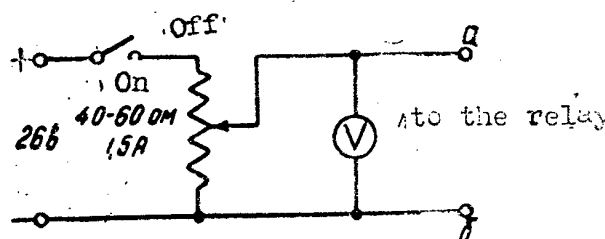


Figure 8: Relay adjustment circuit .

1/OFF, 2/ON, 3/to the relay.

6. Adjust the relay cut-in voltage within 4,5 - 5,5 V for the relay E 202 and within 15 - 18 V for the relay E 201 depressing or stretching its spring.
7. Secure the relay armature and apply a cellulose lacquer coating to the screw joints after the adjustment of the relays E 202 and E 201 is finished.

Adjust the relay E 301 in the following manner:

- 1/Unsolder the lead ends from the relay E 301.
- 2/Remove the relay from the antenna tuning unit chassis.
- 3/Connect lead "a" terminated with a test point to the left

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terminal of the relay coi

Connected lead "b" terminated with a test point to the left terminal of the relay coil E 301. 50X1

- 4/Adjust relay supply voltage within 16 - 18 V.
- 5/Adjust smooth travel of the relay armature with the aid of the screws located at the side of the relay.
- 6/Adjust the relay cut-in voltage within 16 - 18 V by means of shifting the relay core.

Secure the relay core and apply a coating of cellulose lacquer to the lock nuts after the adjustment is finished.

The adjustment of the relay E 102 switching the antenna tuning unit to the r.f. unit as well as the adjustment of the relay E 103 switching the circuit from series to parallel connection differs in no respect from the adjustment of the relay E 301.

Adjustment of the receiver input cut-off relay E 302 should be carried out in the following order:

1. Unsolder the leads from the relay E 302.
2. Remove the relay from the antenna tuning unit chassis.
3. Connect the test point of lead "a" to the left terminal of the coil of the E 302 relay.
4. Connect the test point of lead "b" to the right terminal of the coil of the E 302 relay.
5. Adjust the relay supply voltage within 12 - 14 V.
6. Adjust the relay cut-in voltage within 12 - 14 V by means of shifting the relay core.
7. Adjust the relay armature travel within 0,4 - 0,6 mm by means of bending the plate limiting the armature travel. Adjust the gap between the armature and the bracket equal to 0,2 mm.

In the course of this adjustment the armature should move freely without seizing. Secure the relay core and apply a cellulose lacquer coating to the lock nuts.

Adjustment of the relay E 101, switching ON the r.f. unit, is in no respect different from the adjustment of the relay E 302.

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## § 2. Calibration adjustment of the r.f. units.

Calibration adjustment of the r.f. units should be accomplished at the test frequencies given in Table 11 with the stage operating in the amplification mode.

Table 11.

Test frequencies for calibration adjustment  
of the r.f. units.

| Unit No. | Test frequency kc | Permissible error frequency set without the aid of X-tal calibrator | Permissible error frequency set with the aid of X-tal calibrator | Method of operation |
|----------|-------------------|---------------------------------------------------------------------|------------------------------------------------------------------|---------------------|
|          |                   | kc                                                                  | kc                                                               |                     |
| 1        | 2150              | 1,930                                                               | 0,430                                                            | Amplification       |
|          | 2250              | 2,000                                                               | 0,450                                                            |                     |
|          | 2820              | 2,580                                                               | 0,570                                                            |                     |
|          | 3000              | 2,700                                                               | 0,600                                                            |                     |
|          | 3600              | 3,240                                                               | 0,720                                                            |                     |
| 2        | 3600              | 3,20                                                                | 0,72                                                             | Amplification       |
|          | 4000              | 3,60                                                                | 0,80                                                             |                     |
|          | 4800              | 4,30                                                                | 0,96                                                             |                     |
|          | 5000              | 4,50                                                                | 1,00                                                             |                     |
|          | 6000              | 5,40                                                                | 1,20                                                             |                     |

The adjustment is effected in the following order:

1. Switch ON the transmitter and allow a period of 5 minutes for it to warm up.
2. Switch ON the type 526 heterodyne frequency meter and allow a period of 10 to 15 minutes for it to warm up. Tune the frequency meter to 3000 kc.
3. Tune the transmitter to 3000 kc according to the frequency unit dial.
4. Set the switch P 301 of the antenna tuning unit to "OFF".
5. Locate the antenna of the heterodyne frequency meter near the master oscillator.

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6. Switch ON the transmitter by means of depressing the toggle of the switch P 102 to the left.
7. Determine with the aid of the heterodyne frequency meter the set radio transmitter frequency.
8. Calculate the calibration error of the transmitter from the frequency set on the dial of the unit and from the frequency reading of the heterodyne frequency meter.  
The calibration error of the transmitter should not exceed the limits /Table 11/. The calibration should be adjusted, following the procedures outlined in p. 9 to 13.  
Check the transmitters, the calibration error of which is within the permissible limits, at all the other frequencies given in table 11.
9. Align the gauge line of the r.f. unit sight with the dial graduation corresponding to the frequency of 3000 kc.
10. Tune the heterodyne frequency meter to 3000 kc.
11. Open the cover designated "KOR" on the front panel of the unit. Turn the adjustment capacitor C 103 carefully to the right and left, using a screw driver, and adjust it to a position resulting in the zero beat in the headphones connected to sockets "T" of the heterodyne frequency meter.
12. Close the cover designated "KOR" on the front panel of the unit. Check the calibration accuracy of the transmitter at the remaining frequencies given in Table 11.  
Carry out the calibration adjustment following the procedure given below if the calibration accuracy, adjusted by means of the adjustment capacitor C 103, is out of the limits at the other frequencies within the transmitter band.
13. Align the gauge line of No.1 r.f. unit sight with the dial graduation corresponding to 3600 kc.

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14. Tune the heterodyne frequency meter to 3.600 kc
15. Remove the shield from the variable capacitor C 101 of the master oscillator located in the r.f. unit. Turn the rotor of the adjustment capacitor C 102 to a position resulting in the zero beat at 3600 kc using a special tool /Suppl.6/
16. Align accurately the gauge line of the r.f. unit sight with the dial graduation corresponding to 2150 kc .
17. Tune the heterodyne frequency meter to 2150 kc.
18. Adjust inductor L 101 core to a position resulting in the zero beat in the headphones, turning it carefully by means of a screw-driver.
19. Check the calibration accuracy of the transmitter at the remaining frequencies given in table 11. Adjust the calibration at these frequencies if necessary, following the procedure outlined below.
  - 1/Tune both the transmitter and the heterodyne frequency meter to 3000 kc. Adjust the zero beat in the headphones, bending with extreme care the small outer plates of the C 101 capacitor stator.
  - 2/Check the calibration accuracy of the transmitter at 2320 and 2250 kc, applying the same method.
20. The calibration adjustment of No.2 unit operating in the 3,6 - 12 mc band as well as the adjustment procedure are exactly the same at those applied in the case of No.1 unit operating in the 2,15 - 7,2 mc band.
21. Check the calibration accuracy of the transmitter following the procedure outlined in 1 to 8 and repeat the adjustment, if necessary.

Align the buffer stage with the master oscillator frequency after the calibration adjustment of the master oscillator is finished.

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§ 3. Alignment of the buffer stage and master oscillator frequency.

Alignment of the buffer stage and master oscillator frequency is accomplished with the buffer stage switched to frequency doubling /Table 12/.

T a b l e 12.

Alignment frequencies of the buffer stage and master oscillator.

| Unit No. | Operation mode     | F r e q u e n c i e s |      |      |
|----------|--------------------|-----------------------|------|------|
|          |                    | kc                    | kc   | kc   |
| 1        | Frequency doubling | 7200                  | 4300 | 6000 |
|          | Amplification      |                       | 2800 |      |
| 2        | Frequency doubling | 12000                 | 7200 | 9000 |
|          | Amplification      |                       | 4800 |      |

The adjustment is effected as follows:

1. Connect the transmitter to the panel and to the artificial antenna.
2. Switch ON the transmitter, depressing the toggle of the P 102 switch to the left.
3. Tune the master oscillator to 7200 kc with the aid of the heterodyne frequency meter.
4. Turning the rotor of the adjustment capacitor C 113, adjust it to a position resulting in minimum plate current of vacuum tube L 102 and in maximum control grid current of the vacuum tube L 103.
5. Tune the master oscillator to 4300 kc with the aid of the heterodyne frequency meter.

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6. Tune the buffer stage to 4300 kc by means of turning the core of the inductor L 103.
7. Check the buffer stage adjustment first at 7200 kc and then at 4300 kc. Repeat the adjustment of the stage, if necessary.
8. Secure the core of the inductor L 103, applying a cellulose lacquer coating.
9. Tune the master oscillator to 6000 kc with the aid of the heterodyne frequency meter.
10. Adjust the buffer stage to 6000 kc by bending the small outer plates of the capacitor stator C 112.
11. Switch the transmitter to amplification mode and tune the master oscillator to 2800 kc.
12. Adjust the buffer stage to 2800 kc, turning the core of the inductor L 104.
13. Check the buffer stage adjustment at 600 kc and 2800 kc. Repeat the adjustment, if necessary.
14. Secure the core of the inductor L 104 applying a cellulose lacquer coating.

Alignment of the 2nd unit buffer stage with the master oscillator frequency is accomplished following the same procedure as applied in the case of the 1st unit. This adjustment is carried out at the frequencies given in Table 12.

#### § 4. Adjustment of the transmitter crystal calibrator.

1. Connect the transmitter to the panel and to the artificial antenna.
2. Check the accuracy of the frequency setting, carried out

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with respect the dial graduations, tuning the transmitter<sup>50X1</sup> to different frequencies with the aid of the crystal calibrators.

3. Carry out crystal calibrator oscillator adjustment if the antenna tuning unit switch is set to "40", "20" and "10" and noise is heard in the headphones with the zero beat at another setting of the r.f. unit dial than that corresponding to the test frequency.

Adjustment of the crystal calibrator oscillators is carried out with the aid of an equivalent load of the power unit replacing the r.f. unit.

The adjustment is carried out in the following order:

- 1/ Correct the frequency of the 1000 kc oscillator.
- 2/ Adjust the 200 kc oscillator.
- 3/ Adjust the 40 kc oscillator.
- 4/ Adjust the 20 kc oscillator.
- 5/ Adjust the 10 kc oscillator.

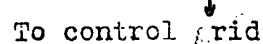
Correction of the 1000 kc oscillator frequency.

1. Assemble the circuit shown in Fig. 9.
2. Set the switch of the antenna tuning unit to "KOR".
3. Switch ON the supply of the transmitter, oscilloscope and heterodyne frequency meter.
4. Tune the heterodyne frequency meter to 2000 kc and apply its output voltage to one pair of the oscilloscope deflection plates.
5. Apply the signal from the control grid of the 1000 kc oscillator vacuum tube to the other pair of the oscilloscope deflection plates. An image should then appear on the CRT screen resembling the figure eight /Fig.10/. Turn the rotor of the C 302 adjustment capacitor so as to get the

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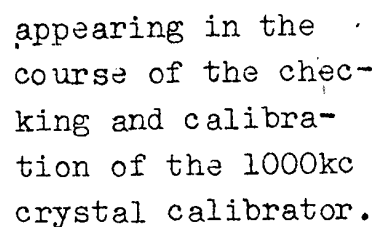


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Figure 10: CRO screen image



oscillators.

1. Assemble the circuit shown in Fig.11.

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tuning unit and plug an adapter with the vacuum tube 6SA7  
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in its place /Suppl.5/.

4. Switch on the supply of the transmitter, the cathode ray oscilloscope and the audio signal generator.

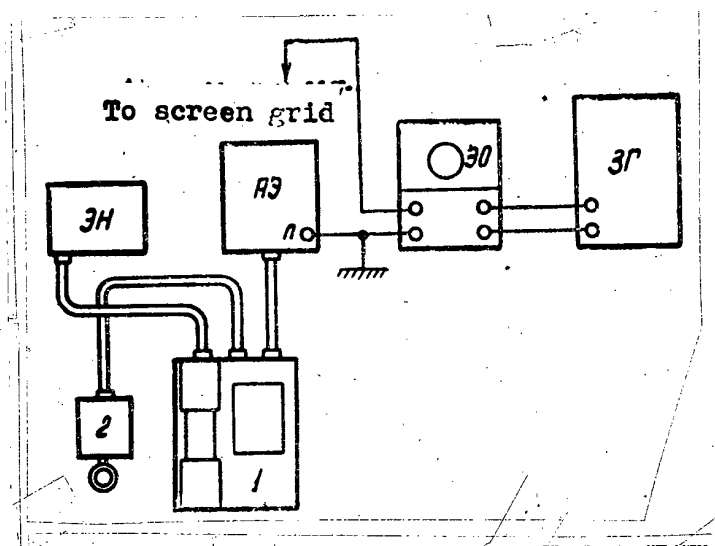


Figure 11: Block diagram of the instruments required for adjustment of the 200, 40, 20 and 10 kc oscillators of the crystal calibrator.

1/Power unit, 2/Control box, AE/Antenna tuning unit, EO/Cathode ray oscilloscope, ZG/Audio signal generator, EN/Equivalent load of the power unit.

5. Apply a signal from the screen grid of the 200 kc oscillator vacuum tube to one pair of the oscilloscope deflection plates.
6. Set the frequency of the audio signal generator to 20 kc and apply its output signal to the other pair of the oscilloscope deflection plates.
7. Turn the audio signal generator scale both directions from the position fixing the 20 kc frequency so as to obtain on the oscilloscope screen an image similar in shape to that shown in fig. 12,4.
8. Turn the inductor L 301 core anti-clockwise till oscilla-

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tion failure, indicated by the image disappearing from the screen, or fully anti-clockwise if there is no oscillation failure.

9. Turn the core clockwise, counting the number of half turns /this number should not be less than 12/ to oscillation failure, or to the extreme clockwise position if there is no oscillation failure.
10. Turn the core anti-clockwise to half the number of half turns required for shifting the core from one of its extreme positions to the other, i.e. set the core to the centre of the synchronisation range.
11. Secure the core by means of a lock nut and apply a coating of cellulose lacquer to the screw joints.

Adjustment of the 40, 20 and 10 kc oscillators is carried out in the same way as that of the 200 kc oscillator. The images obtained on the oscilloscope screen in the course of the adjustment of the individual oscillators are shown in Fig. 12.

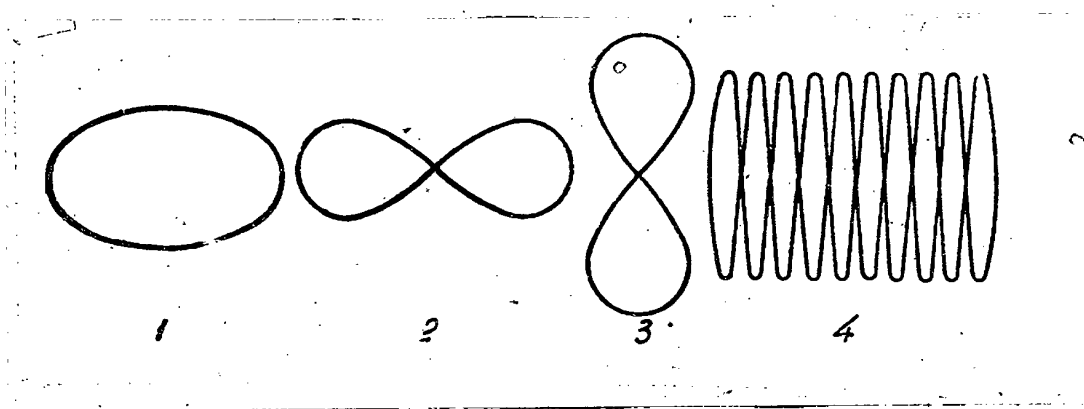


Figure 12: Images appearing on the CRO screen in the course of the 200, 40, 20 and 10 kc oscillator adjustment of the crystal calibrator.

- |                                                                   |   |   |   |
|-------------------------------------------------------------------|---|---|---|
| 1/CRO screen image in the course of the 20 kc oscillator adjustm. |   |   |   |
| 2/CRO screen image in the course of the 10 kc                     | - | " | - |
| 3/CRO screen image in the course of the 40 kc                     | - | " | - |
| 4/CRO screen image in the course of the 200 kc                    | - | " | - |

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40, 20 and 10 kc oscillator adjustment data are given in Table 13.

T a b l e 13.

Adjustment data of the 40, 20 and 10 kc  
oscillators.

| Item No. | Oscillator checked | Vacuum tube Ref. Symbol | Oscillator frequency kc | Heterodyne frequency meter frequency kc | Audio signal generator frequency kc | Switch position | Adjusted circuit |
|----------|--------------------|-------------------------|-------------------------|-----------------------------------------|-------------------------------------|-----------------|------------------|
| 1        | 1000 kc osc.       | L 301                   | 1000                    | 2000                                    | -                                   | "KOR"           | C 302            |
| 2        | 200 kc osc.        | L 302                   | 200                     | -                                       | 20                                  | 40              | L 301            |
| 3        | 40 kc osc.         | L 303                   | 40                      | -                                       | 20                                  | 40              | L 302            |
| 4        | 20 kc osc.         | L 304                   | 20                      | -                                       | 20                                  | 20              | L 303            |
| 5        | 10 kc osc.         | L 304                   | 10                      | -                                       | 20                                  | 10              | L 304            |

#### V. CHECKING OF THE TRANSMITTER AFTER REPAIR!

The following parameters of the radio transmitters should be checked after the repair:

1. Resistance to vibration
2. External appearance and condition of the assembly.
3. Operation of the transmitter and current drawn by the low tension circuits.
4. Power output dissipated in the artificial antenna.
5. Calibration accuracy.
6. Modulation depth.
7. Transmitter and crystal calibrator beat frequency signal amplitude.
8. Side tone signal amplitude.
9. Throat microphone supply voltage.
10. Modulator gain.

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§ 1. Checking of vibration resistance.

The transmitter is checked for resistance to vibration on a vibration table set to vibrate at 20 cps with an amplitude of 0,1 mm for 15 minutes. The transmitter signal is received during the checking process with transmitter switched to ET as well as to CW transmission and operating at power outputs of 100% and 25%.

There should be no cracks, operation failures, interruptions or disappearing of the signal.

§ 2. Inspection of the external appearance and of the assembly condition.

Inspection of the external appearance and of the assembly condition is accomplished following the procedure outlined in chapter II § 1.

§ 3. Checking of transmitter operation and current drawn by the low tension circuits.

Checking of the radio transmitter operation should be effected in the following order:

1. Connect the transmitter to the panel and to the artificial antenna.
2. Adjust the supply voltage to 26 V.
3. Switch ON the transmitter and tune it to the first of the frequencies given in Table 14, with the transmitter switched to CW transmission and operating at 25% power output.
4. Set the "100% - 25%" switch to "100%" and depress the key. The pointer of the tuning indicator should swing to the right and indicate between 5 - 6 graduations of its dial.

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5. Set the "TLF-TLG" switch to "TLF".
6. Tune the transmitter so as to obtain the maximum tuning indicator reading.
7. Plug throat microphone leads into the sockets "L" on the power unit and apply a steady loud sound "A". The pointer of the tuning indicator should then swing to the right.
8. Repeat the procedure outlined in 3 to 7 tuning the transmitter to each of the frequencies given in Table 14.
9. Check the current drawn by the low tension circuits with the transmitter switched to CW transmission and operating at 100% power output after checking of the correct operation of the transmitter is completed.

The current drawn should not exceed 31 A.

Table 14.

Transmitter operation test frequencies.

| Unit No. | Operation mode     | Transmitter operation test frequencies kc |       |
|----------|--------------------|-------------------------------------------|-------|
| 1        | Amplification      | 2150                                      | 3000  |
|          | Frequency doubling | 5000                                      | 7000  |
| 2        | Amplification      | 3000                                      | 6000  |
|          | Frequency doubling | 7000                                      | 12000 |

§ 4. Checking of the power output dissipated in the artificial antenna.

Checking of the power output dissipated in the artificial antenna should be carried out at the frequencies given in Table 14. The checking procedure is carried out in the following order:

1. Assemble the circuit shown in Fig. 13.

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2. Switch ON the audio signal generator.
3. Apply a 1000 kc 0,65 V signal from the audio signal generator to the sockets "L" located on the power unit.
4. Adjust the transmitter supply voltage to 26 V.
5. Tune the transmitter, operating at 100 % power output and switched to RT transmission, to 2150 kc.
6. Calculate the power output dissipated in the artificial antenna using the formula  $P = I^2 R$  where I is the current, read on the artificial antenna indicator and R is the resistance of the artificial antenna at 2150 kc /see Table 4/.
7. Set the "100% - 25%" switch to "25%".
8. Repeat the procedure outlined in 6.

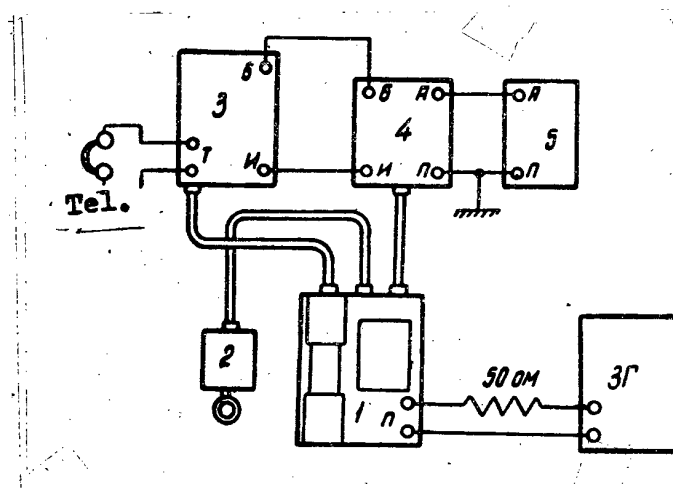


Figure 13: Block diagram of the instruments required for checking of the power output check.

1/Power unit, 2/Control box, 3/R.f. unit,  
4/Antenna tuning unit, 5/Artificial antenna,  
ZG/Audio signal generator.

9. Determine the power output dissipated in the artificial antenna at the remaining frequencies given in table 14, following the procedure outlined in 5 to 7.
10. Switch OFF the audio signal generator and disconnect it from the circuit.

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11. Check the power output dissipated in the artificial antenna in CW transmission, repeating the procedure outlined in 5 to 9 /with the key depressed/.

The power output dissipated in the artificial antenna should not be less than the value given in the technical requirements /Suppl.3/

### § 5. Checking of calibration accuracy.

Checking of the calibration accuracy is carried out at the frequencies given in Table 15.

The checking procedure is carried out in the following order:

1. Assemble the circuit shown in Fig. 14.
2. Switch ON the transmitter and tune it to 2150 kc.
3. Apply the beat frequency signal from socket "T", located on the pedestal of the r.f. unit, to one pair of the cathode ray oscilloscope deflection plates.

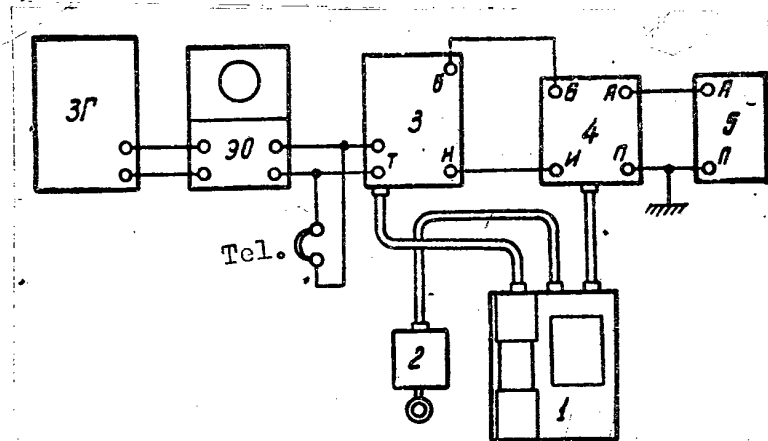


Figure 14: Block diagram of the instruments required for checking of transmitter calibration and frequency adjustment.

1/Power unit, 2/Transmitter control box, 3/R.f. unit, 4/Antenna tuning unit, 5/Artificial antenna, EO/Cathode ray oscilloscope, ZG/Audio frequency generator.

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4. Apply an audio frequency signal from the audio signal generator to the second pair of cathode ray oscilloscope deflection plates.
5. Tune the audio signal generator, changing its frequency to a frequency at which the image shown in Fig. 15 appears on the cathode ray oscilloscope screen.

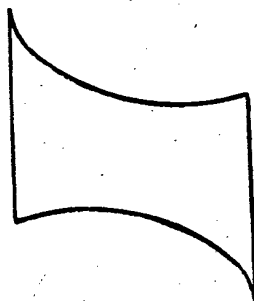


Figure 15: CRO screen image appearing in the course of the transmitter frequency adjustment and checking of calibration error.

6. Read the frequency set on the audio signal generator dial. This frequency should not exceed 2,00 kc.
7. Check the calibration of the transmitter at the remaining frequencies given in Table 15.

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Table 15.

## Transmitter calibration accuracy test frequencies.

| Test<br>frequen-<br>cy kc | Permissible error                                               |                                                           | Operation<br>mode     |
|---------------------------|-----------------------------------------------------------------|-----------------------------------------------------------|-----------------------|
|                           | Frequency set<br>without the aid<br>of X-tal cali-<br>brator kc | Frequency set<br>with the aid<br>X-tal calibra-<br>tor kc |                       |
| 2150                      | 2,00                                                            | 0,40                                                      | Amplification         |
| 2250                      | 2,00                                                            | 0,50                                                      |                       |
| 2870                      | 2,60                                                            | 0,60                                                      |                       |
| 3000                      | 2,70                                                            | 0,60                                                      |                       |
| 3600                      | 3,30                                                            | 0,70                                                      |                       |
| 4300                      | 3,90                                                            | 0,90                                                      | Frequency<br>doubling |
| 5000                      | 4,50                                                            | 1,00                                                      |                       |
| 6000                      | 5,40                                                            | 1,20                                                      |                       |
| 7000                      | 6,30                                                            | 1,40                                                      |                       |
| 7200                      | 6,40                                                            | 1,50                                                      |                       |
| 3600                      | 3,20                                                            | 0,70                                                      | Amplification         |
| 4000                      | 3,80                                                            | 0,80                                                      |                       |
| 4800                      | 4,30                                                            | 0,96                                                      |                       |
| 5000                      | 4,50                                                            | 1,00                                                      |                       |
| 6000                      | 5,40                                                            | 1,20                                                      |                       |
| 7200                      | 6,40                                                            | 1,44                                                      | Frequency<br>doubling |
| 8000                      | 7,20                                                            | 1,60                                                      |                       |
| 9000                      | 8,10                                                            | 1,80                                                      |                       |
| 10000                     | 9,00                                                            | 2,00                                                      |                       |
| 12000                     | 10,80                                                           | 2,40                                                      |                       |

## § 6. Checking of modulation depth.

Checking of the modulation depth is carried out with the aid of the IM-8 modulation depth meter and following both Table 15 and the diagram shown in fig.16.

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Table 16.

## Transmitter modulation depth test frequencies.

| Unit No. | Operation mode     | Modulation depth test frequency kc | IM-8 coupling coil required for the check | Note                                        |
|----------|--------------------|------------------------------------|-------------------------------------------|---------------------------------------------|
| 1        | Amplification      | 2150, 2670<br>3600                 | No. 3                                     | Check at 100% power output RT transmission  |
|          | Frequency doubling | 4300, 6000<br>7200                 | Nos. 3 and 4                              |                                             |
| 2        | Amplification      | 3600, 4800,<br>6000                | No. 4                                     | Check at 100% power output, RT transmission |
|          | Frequency doubling | 7200, 9000,<br>12000               | No. 4                                     |                                             |

The checking procedure should be carried out in the following order:

1. Switch ON the modulation depth meter. Connect a coupling coil of the corresponding range to the modulation depth meter.
2. Switch ON the transmitter and tune it to 2150 kc.
3. Switch ON the audio signal generator.
4. Apply a 1.0 V 1000 cps signal from the audio signal generator through a 50 ohms resistor to the socket "L" of the power unit.
5. Determine the modulation factor.
6. Check the modulation factor, tuning the transmitter to the remaining frequencies given in Table 16. The modulation factor should not be less than 90 - 100%.

§ 7. Checking of the transmitter and crystal calibrator beat frequency signal amplitude.

The checking procedure is carried out following Table 17

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and Figure 17. Proceed in the following order:

- 1. Connect the VKS-7 or IV-4 voltmeter and a ICc-5 frequency meter to the sockets "T" on the panel.
- 2. Adjust the transmitter supply voltage to 26 V.
- 3. Tune the transmitter to 2150 kc according to the zero beat of the transmitter and crystal calibrator signals.
- 4. Adjust the beat frequency of the transmitter and crystal calibrator to  $\pm$  100 cps, according to the ICc-5 frequency meter reading, changing the transmitter frequency.
- 5. Read the beat frequency signal amplitude of the transmitter and crystal calibrator on the VKS-7 voltmeter.

The beat frequency signal amplitude under the given conditions of the checking procedure should not be less than 15 V. Check the beat frequency signal amplitude at the remaining frequencies given in Table 17, repeating the procedure outlined in 4 and 5.

Table 17

Frequencies at which the transmitter and crystal calibrator beat frequency signal amplitude is checked.

| Unit No. | Operation mode                   | Test frequencies at which the beat frequency signal amplitude is checked kc | Note                                       |
|----------|----------------------------------|-----------------------------------------------------------------------------|--------------------------------------------|
| 1        | Amplifikation Frequency doubling | 2150, 2870, 3600 4300 6000, 7200                                            | Check at 100% power output RT transmission |
| 2        | Amplifikation Frequency doubling | 3600, 4800, 6000 7200, 9000, 12000                                          | Check at 100% power output RT transmission |

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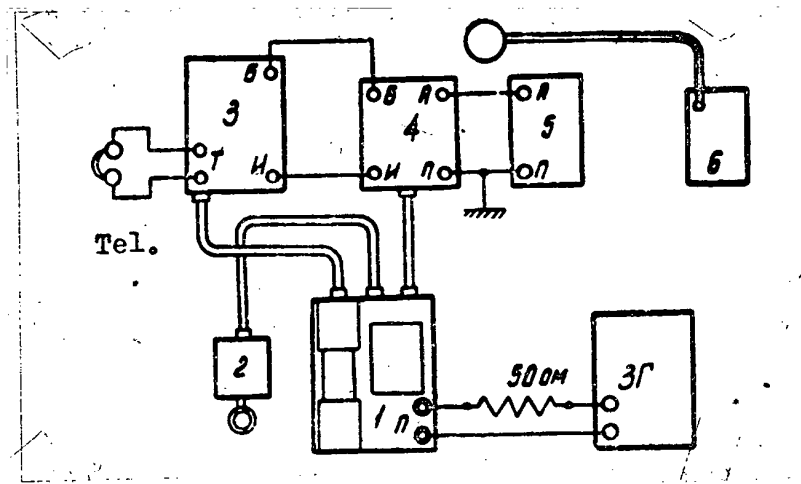


Figure 16: Block diagram of the circuit for checking of the modulation depth.

1/Power unit, 2/Transmitter control box, 3/R.f. unit, 4/Antenna tuning unit, 5/Artificial antenna, 6/IM-8 modulation depth meter, ZG/Audio signal generator.

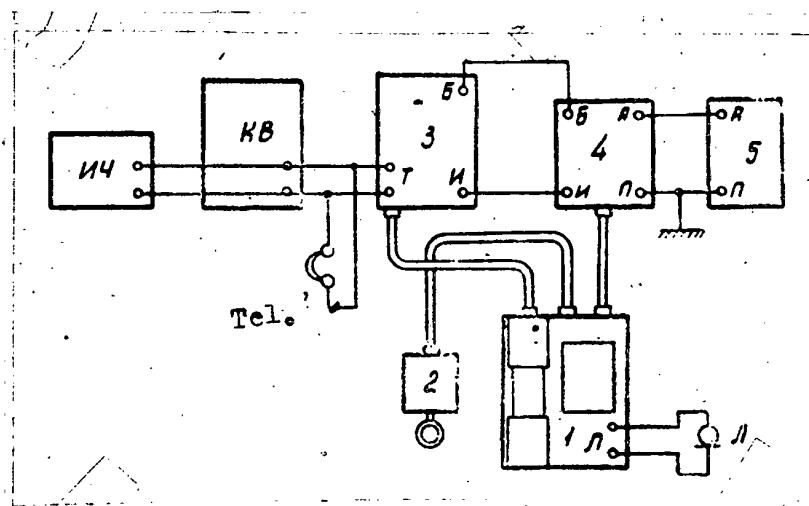


Figure 17: Block diagram of the circuit for checking the beat frequency signal amplitude of the transmitter and crystal calibrator.

1/Power unit, 2/Control box, 3/R.f. unit, 4/Antenna tuning unit, 5/Artificial antenna, KV/VKS-7 vacuum tube voltmeter, ICh/ICh-1 frequency meter.

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### § 8. Checking of side tone signal amplitude.

Checking of the side tone signal amplitude is carried out at the frequencies given in Table 18 with the aid of the circuit shown in Fig. 18. The checking procedure is carried out in the following order:

1. Connect a VKS-7 voltmeter to the socket "T" on the panel.
2. Tune the transmitter operating at 100% power output, RT transmission, to 2150 kc. .

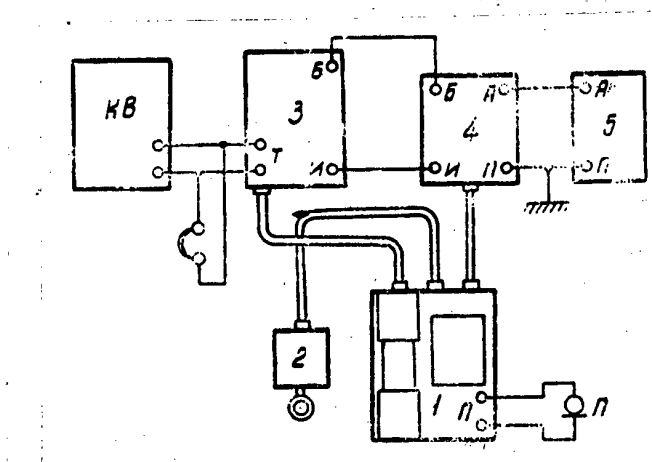


Figure 19: Block diagram of the circuit for checking the side tone signal amplitude.

1/Power unit, 2/Control box, 3/R.f. unit,  
4/Antenna tuning unit, 5/Artificial antenna,  
KV/VKS-7 vacuum tube voltmeter,

3. Set the antenna tuning unit switch to "OFF".
4. Check the noise amplitude of the transmitter. It should be within 2 - 3 V.
5. Apply a loud sound "A" to the throat microphone and check the side tone signal amplitude, using a VKS-7 voltmeter. The side tone signal amplitude under the given conditions should be within 20 - 30 V.

Check the side tone signal amplitude at the remaining fre-

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quencies given in Table 18, repeating the procedure outlined in 2 to 6.

T a b l e 18.

Side tone signal amplitude test frequencies.

| Unit No. | Operation mode     | Side tone signal amplitude test frequencies kc |      |
|----------|--------------------|------------------------------------------------|------|
| 1        | Amplification      | 2150                                           | 3600 |
|          | Frequency doubling | 4300                                           | 7200 |

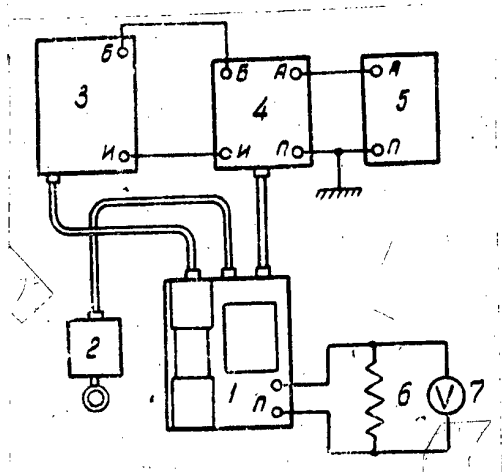


Figure 19: Block diagram of the circuit for checking the throat microphone supply.

1/Power unit, 2/Transmitter control box, 3/R.f. unit, 4/Antenna tuning unit, 5/Artificial antenna, 6/Equivalent resistance of the throat microphone, 7/Voltmeter.

### § 9. Checking of throat microphone supply voltage.

Checking of the throat microphone supply voltage is carried out with the aid of the circuit shown in Fig. 19.

Proceed in the following order:

1. Switch ON the transmitter and adjust its supply voltage to 26 V.
2. Check the throat microphone supply voltage value across an equivalent resistance equal to 150 ohms using a D.C.

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voltmeter. The throat microphone supply voltage should be within 3.5 - 5 V.

§ 10. Checking of modulator gain.

Checking of the modulator gain is carried out with the aid of the circuit shown in Fig. 19.

Proceed in the following order:

1. Switch ON the transmitter and tune it to 2870 kc.
2. Switch ON the audio signal generator.
3. Apply a 0.4 V 1000 cps signal from the audio signal generator through a 50 ohms resistor to the socket "L" of the power unit.
4. Check the A.C. voltage across the pin No. 36 of the terminal plate 204 and the chassis, setting successively the switch P 201 on the power unit to the positions "1", "2", and "3". This voltage should be within 82 - 98 V when switched to "1", within 55 - 65 V with the switch in position "2" and within 27 - 33 V with the switch in position "3".

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Supplement 2.

## Specification to the RSB-5 transmitter wiring diagram

| Referen-<br>ce sym-<br>bol | Designation                            | Electrical<br>data                                                                                          | Function                                                                                        |
|----------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 1                          | 2                                      | 3                                                                                                           | 4                                                                                               |
|                            |                                        | R.f. unit                                                                                                   |                                                                                                 |
| C 101                      | Capacitor; variable;<br>air-dielectric | 15 mmF min.<br>65 mmF max.                                                                                  | Driver circuit capa-<br>citor                                                                   |
| C 102                      | Capacitor; variable<br>air-dielectric  | 5 mmF max                                                                                                   | Driver adjustment<br>circuit                                                                    |
| C 103                      | d t t o                                | 2 mmF max.                                                                                                  | Circuit correction<br>capacitor                                                                 |
| C 104                      | Capacitor; fixed<br>ceramic-dielectric | 2 mmF                                                                                                       | Driver circuit ther-<br>mal compensation                                                        |
| C 105                      | d t t o                                | 40 mmF<br>6-20 Mc unit in the driver tube<br>50 mmF in all control grid circuit<br>the remain-<br>ing units | Coupling capacitor<br>in the driver tube<br>control grid circuit                                |
| C 106                      | d t t o                                | 20 mmF                                                                                                      | Driver circuit con-<br>trol grid blocking<br>capacitor                                          |
| C 107                      | d t t o                                | 30 mmF                                                                                                      | Driver screen grid<br>blocking capacitor<br>when switched to<br>crystal controlled<br>operation |
| C 109                      | Capacitor; fixed<br>mica-dielectric    | 3900 mmF $\pm$ 10%<br>500 V                                                                                 | Negative feedback<br>coil blocking capa-<br>citor; driver plate<br>circuit                      |
| C 108                      | d t t o                                | 3900 MMF $\pm$ 10%<br>500 V                                                                                 | Driver screen grid<br>blocking capacitor;<br>oscillation mode                                   |
| C 110                      | d t t o                                | 3900 mmF $\pm$ 10%<br>500 V                                                                                 | Driver suppressor grid<br>blocking capacitor                                                    |
| C 111                      | Capacitor; fixed<br>ceramic dielectric | 30 mmF in the<br>6-20 Mc unit<br>50 mmF in all<br>the remaining<br>units                                    | Coupling capacitor<br>in the amplifier-fre-<br>quency doubler control<br>grid circuit           |
| C 112                      | Capacitor; variable<br>air-dielectric  | 15 mmF min.<br>120 mmF max.                                                                                 | Capacitor in the<br>amplifier-frequency<br>doubler circuit                                      |
| C 113                      | Capacitor; variable<br>air-dielectric  | 4 mmF max.                                                                                                  | Adjustment of the ampli-<br>fier-frequency doubler<br>circuit                                   |

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| 1     | 2                                       | 3                                                                        | 4                                                                                                                         |
|-------|-----------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| C 114 | Capacitor; fixed;<br>mica-dielectric    | 3900 mmF $\pm$ 10%<br>500 V                                              | Amplifier frequency<br>doubler plate cir-<br>cuit coil blocking<br>capacitor                                              |
| C 115 | d t t o                                 | 3900 mmF $\pm$ 10%<br>500 V                                              | Amplifier-frequency<br>doubler suppressor<br>grid blocking capa-<br>citor                                                 |
| C 116 | d t t o                                 | 150 mmF $\pm$ 10%<br>1000 V                                              | Amplifier frequency<br>doubler plate cir-<br>cuit coupling capa-<br>citor                                                 |
| C 117 | Capacitor; fixed<br>mica-dielectric     | 3900 mmF $\pm$ 10%<br>500 V                                              | Amplifier-frequency<br>doubler screen grid<br>blocking capacitor                                                          |
| C 118 | Capacitor; ceramic<br>dielectric; fixed | 30 mmF                                                                   | Output stage tube<br>control grid coupl-<br>ing capacitor                                                                 |
| C 119 | Capacitor; fixed;<br>mica dielectric    | 3900 mmF $\pm$ 10%<br>500 V                                              | Output stage grid coil<br>blocking capacitor                                                                              |
| C 120 | d t t o                                 | 1000 mmF $\pm$ 10%<br>1000 V                                             | Output stage suppres-<br>sor grid blocking ca-<br>pacitor                                                                 |
| C 121 | d t t o                                 | 3900 mmF $\pm$ 10%<br>500 V                                              | Output stage screen<br>grid blocking capa-<br>citor                                                                       |
| C 122 | Capacitor; fixed<br>mica-dielectric     | 3900 mmF $\pm$ 10%<br>500 V                                              | Output stage heater<br>circuit blocking ca-<br>pacitor                                                                    |
| C 123 | d t t o                                 | 3900 mmF $\pm$ 10%<br>500 V                                              | Output stage heater<br>filament blocking<br>capacitor                                                                     |
| C 124 | d t t o                                 | 3300 mmF $\pm$ 10%<br>2000 V                                             | Output stage plate<br>circuit coil blocking<br>capacitor                                                                  |
| C 125 | d t t o                                 | 3300 mmF $\pm$ 10%<br>2000 V                                             | Output stage plate<br>circuit coupling capa-<br>citor                                                                     |
| C 126 | Capacitor; variable;<br>air-dielectric  | 40 mmF min.<br>200 mmF max.                                              | Output stage "coupling<br>fine" capacitor                                                                                 |
| C 127 | Capacitor; fixed<br>ceramic-dielectric  | 2 x 67 mmF                                                               | Output stage "coupling<br>fine" circuit capaci-<br>tor,,connected when<br>switched to the dial<br>with larger graduations |
| C 128 | d t t o                                 | 25 mmF in the<br>6-20 Mc unit<br>76 mmF in all<br>the remaining<br>units | Output stage "coupling<br>coarse" circuit capa-<br>citor                                                                  |

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| 1     | 2                                    | 3                                                                                                                  | 4                                                      |
|-------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| C 129 | Capacitor; fixed ceramic-dielectric  | 67 mmF in the 3,6-12 Mc and 6-20 Mc units<br>3x67 mmF in the 2,15-7,2 Mc units                                     | Output stage "coupling coarse" circuit capacitor       |
| C 130 | Capacitor; fixed mica-dielectric     | 510 mmF $\pm$ 10%<br>500 V                                                                                         | Indicator blocking capacitor                           |
| C 131 | Capacitor; fixed; ceramic-dielectric | 4 mmF                                                                                                              | Rectifier coupling capacitor                           |
| C 132 | Capacitor; fixed; mica-dielectric    | 3900 mmF $\pm$ 10%<br>500 V                                                                                        | Rectifier cathode blocking capacitor                   |
| C 134 | d t t o                              | 3900 mmF $\pm$ 10%<br>500 V                                                                                        | Terminal "I" blocking Capacitor                        |
| C 105 | d t t o                              | 3900 mmF $\pm$ 10%<br>500 V                                                                                        | Amplifier-frequency doubler cathode blocking capacitor |
| L 101 | Inductor                             | 75 microhenry in the 2,15 - 7,2 Mc unit<br>26 microhenry in the 3,6-12 Mc unit<br>9 microhenry in the 6-20 Mc unit | Driver circuit inductor                                |
| L 102 | Inductor                             | 60 ohms in the 2,15-7,2 Mc unit<br>30 ohms in the 3,6-12 Mc unit<br>15 ohms in the 6-20 Mc unit                    | Negative feedback inductor in the driver               |
| L 103 | d t t o                              | 10 mikrohenry in the 2,15-7,2 Mc unit<br>4 microhenry in the 3,6-12 Mc unit<br>1,1 microhenry in the 6-20 Mc unit  | Amplifier frequency doubler circuit inductor           |
| L 104 | d t t o                              | 30 microhenry in the 2,15-7,2 Mc unit<br>12 microhenry in the 3,6-12 Mc unit<br>3,3 microhenry in the 6-20 Mc unit | Amplifier-frequency doubler circuit inductor           |
| L 105 | R.f. choke                           | 5 microhenry in the 2,15-7,2 and 3,6-12 Mc units<br>100 microhenry in the 6-20 Mc unit                             | Amplifier-frequency doubler plate circuit choke        |

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|-------|---------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| 1     | 2                   | 3                                                                                                                 | 4                                                                               |
| L 106 | R.f. choke          | 100 microhenry in the 6-20 Mc unit<br>5 microhenry in the 2,15-7,2 and 3,6-12 Mc units                            | Output stage control grid circuit choke                                         |
| L 107 | d t t o             | 5 microhenry in the 2,15-7,2 and 3,6-12 Mc units                                                                  | Output stage suppressor grid choke                                              |
| L 108 | d t t o             | 0,16 microhenry in the 2,15-7,2 and 3,6-12 Mc unit<br>75 microhenry in the 6-20 Mc unit                           | Output stage plate circuit choke                                                |
| L 109 | R.f. coil with core | 70 microhenry in the 2,15-7,2 Mc unit<br>50 microhenry in the 3,6-12 Mc unit<br>20 microhenry in the 6-20 Mc unit | Output stage circuit adjustment / antenna adjustment/                           |
| R 101 | Resistor; enamelled | 10000 ohms $\pm$ 10%<br>20 W                                                                                      | Driver plate circuit voltage dropping resistor                                  |
| R 102 | Resistor /ceramic/  | 100000 ohms $\pm$ 10%<br>1 W                                                                                      | Voltage driver in the driver screen grid circuit                                |
| R 103 | d t t o             | 33000 ohms $\pm$ 10%<br>1 W                                                                                       | d t t o                                                                         |
| R 104 | d t t o             | 100000 ohms $\pm$ 10%<br>1 W                                                                                      | Driver control grid leak                                                        |
| R 105 | d t t o             | 100000 ohms $\pm$ 10%<br>0,25 W                                                                                   | Driver suppressor grid leak                                                     |
| R 106 | d t t o             | 100000 ohms $\pm$ 10%<br>0,25 W                                                                                   | Amplifier-frequency doubler control grid leak                                   |
| R 107 | Resistor; enamelled | 20000 ohms $\pm$ 10%<br>20 W                                                                                      | Amplifier-frequency doubler screen grid voltage dropping resistor               |
| R 108 | d t t o             | 20 ohms $\pm$ 10%<br>8 W                                                                                          | Voltage dropping resistor in the G-411 and 6SA7 heater circuit                  |
| R 109 | Resistor; ceramic   | 470000 ohms $\pm$ 10%<br>0,25 W                                                                                   | Resistor in cathodes of the driver and amplifier frequency doubler vacuum tubes |

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| 1     | 2                       | 3                           | 4                                                                                                |
|-------|-------------------------|-----------------------------|--------------------------------------------------------------------------------------------------|
| R 110 | Resistor;<br>enamelled  | 1000 ohms $\pm$ 10%<br>8 W  | Voltage dropping re-<br>sistor in the output<br>amplifier screen grid                            |
| R 111 | Resistor; wire<br>wound | 143 $\pm$ 3 ohms            | Driver plate circuit<br>indicator shunt                                                          |
| R 112 | d t t o                 | 45 $\pm$ 1 ohm              | Amplifier-frequency<br>doubler plate circuit<br>indicator shunt                                  |
| R 113 | d t t o                 | 45 $\pm$ 1 ohm              | Output stage screen<br>grid indicator circuit<br>shunt                                           |
| R 114 | d t t o                 | 134 $\pm$ 3 ohms            | G471 vacuum tube control<br>grid circuit indicator<br>shunt                                      |
| R 115 | Resistor;<br>ceramic    | 33000 ohms $\pm$ 10%<br>1 W | Indicator rectifier<br>plate resistor                                                            |
| R 116 | d t t o                 | 220 ohms $\pm$ 10%<br>8 W   | Cathode resistor of the<br>amplifier-frequency<br>doubler                                        |
| G 101 | Receptacle              | -                           | Supply receptacle of<br>the R.f. unit                                                            |
| G 102 | d t t o                 | -                           | Supply receptacle of the<br>R.f. unit pedestal                                                   |
| G 103 | Connector               | -                           | For connecting cables<br>from the power unit<br>to the R.f. unit pede-<br>stal                   |
| G 104 | Terminal, "B"           | -                           | Terminal for connecting<br>the antenna to the<br>R.f. unit                                       |
| G 105 | Receptacle              | -                           | Receptacle of the pe-<br>destal for connecting<br>headphones                                     |
| G 106 | Terminal "I"            | -                           | Terminal for connecting<br>the lead passing from<br>terminal "I" of the an-<br>tenna tuning unit |
| I 101 | Indicator               | -                           | Indicator for checking<br>regular operation of the<br>individual R.f. units                      |
| L 101 | Vacuum tube             | G 411                       | Driver vacuum tube                                                                               |
| L 102 | d t t o                 | G 411                       | Amplifier-frequency<br>doubler vacuum tube                                                       |
| L 103 | d t t o                 | G 471                       | Output stage vacuum tube                                                                         |
| L 104 | d t t o                 | 6SA7                        | Indicator rectifier<br>vacuum tube                                                               |

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|-------------|-----------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------|
| 1           | 2                                 | 3                           | 4                                                                                             |
| P 101       | Receptacle                        | -                           | For connecting the crystal to the screen and control grid of the driver vacuum tube           |
| P 102       | Switch                            | -                           | Switching R.f. unit to its front adjustment panel                                             |
| P 103       | dtto                              | -                           | For switching the amplifier-frequency doubler from one operation mode to the other            |
| P 104       | dtto                              | -                           | For switching of the auxiliary capacitor to the "coupling-fine" capacitor of the output stage |
| P 105       | dtto                              | -                           | Switching of "coupling coarse" capacitor of the output stage.                                 |
| P 106       | dtto                              | -                           | Switching of the output circuit from series to parallel connection and vice versa             |
| P 107       | dtto                              | -                           | Switching of the R.f. indicator circuits                                                      |
| E 101       | Relay                             | -                           | R.f. unit cut-in relay                                                                        |
| E 102       | dtto                              | -                           | Relay connecting the antenna to the R.f. unit                                                 |
| E 103       | dtto                              | -                           | Relay of the series parallel circuit                                                          |
| Power unit. |                                   |                             |                                                                                               |
| C 201       | Capacitor; electrolytic           | 10 mF $\pm$ 20%<br>450 V    | +350 V circuit blocking capacitor                                                             |
| C 202       | Capacitor; fixed; paper           | 2 mF $\pm$ 20%<br>1000 V    | +1000 V circuit blocking capacitor                                                            |
| C 203       | Capacitor; fixed; paper           | 0,05 mF $\pm$ 20%<br>400 V  | De-coupling capacitor in the first speech amplifier stage plate circuit                       |
| C 204       | Capacitor; fixed; mica-dielectric | 3900mmF $\pm$ 10%<br>500 V  | Input circuit blocking capacitor                                                              |
| C 205       | dtto                              | 1800mmF $\pm$ 10%<br>1000 V | Coupling capacitor in the first speech amplifier stage control grid                           |
| C 206       | dtto                              | 3900mmF $\pm$ 10%<br>500 V  | Coupling capacitor in the grid circuit of the 2nd speech amplifier stage                      |

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| 1     | 2                                 | 3                               | 4                                                                     |
|-------|-----------------------------------|---------------------------------|-----------------------------------------------------------------------|
|       |                                   | Power unit                      |                                                                       |
| C 207 | Capacitor; fixed; mica-dielectric | 25000 mmF $\pm$ 10%<br>1000 V   | Coupling capacitor in the suppressor grid circuit of the output stage |
| C 208 | Capacitor; fixed paper            | 0,5 mF $\pm$ 20%<br>260 V       | Blocking capacitor of the mixer potentiometer circuit                 |
| C 209 | Capacitor; fixed mica-dielectric  | 1000 mmF $\pm$ 10%<br>1000 V    | Audio signal generator circuit capacitor                              |
| C 210 | Capacitor; fixed electrolytic     | 10 mF $\pm$ 20%<br>450 V        | Rectifier filter capacitor                                            |
| C 211 | Capacitor; fixed paper            | 0,5 mF $\pm$ 20%<br>260 V       | Plate circuit capacitor of the side tone amplifier                    |
| C 213 | Capacitor; fixed; mica-dielectric | 3900 mmF $\pm$ 10%<br>500 V     | Coupling capacitor in the indicator circuit                           |
| C 215 | Capacitor; fixed; paper           | 0,5 mF $\pm$ 20%<br>260 V       | Blocking capacitor of the $\pm$ 80 V circuit                          |
| C 216 | d t t o                           | 0,25 mF $\pm$ 20%<br>260 V      | Blocking capacitor of the $\pm$ 26 V commutator circuit               |
| L 201 | R.f. choke                        | 3 henry                         | Throat microphone supply circuit choke                                |
| L 202 | d t t o                           | 0,3 henry                       | Throat microphone load choke                                          |
| L 203 | d t t o                           | 0,8 henry                       | Input circuit choke                                                   |
| L 204 | d t t o                           | 13 henry                        | Choke in the plate circuit of the 2nd speech amplifier stage          |
| L 205 | d t t o                           | 3 henry                         | Indicator circuit choke                                               |
| R 201 | Resistor; wire wound              | 0,25 ohms                       | Step-start resistor                                                   |
| R 202 | Resistor; ceramic                 | 220000 ohms $\pm$ 10%<br>0,25 W | Input sensitivity adjustment resistor                                 |
| R 203 | d t t o                           | 150000 ohms $\pm$ 10%<br>0,25 W | d t t o                                                               |
| R 204 | d t t o                           | 47000 ohms $\pm$ 10%<br>0,25 W  | Input sensitivity adjustment resistor                                 |
| R 205 | d t t o                           | 100000 ohms $\pm$ 10%<br>0,25 W | d t t o                                                               |
| R 206 | d t t o                           | 1,8 megohms $\pm$ 10%           | Decoupling resistor of the 1st speech amplifier stage                 |
| R 207 | d t t o                           | 2400 ohm $\pm$ 5%<br>0,25 W     | Speech amplifier input circuit resistor                               |
| R 208 | d t t o                           | 100000 ohms $\pm$ 10%           | 1st speech amplifier stage grid leak                                  |

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|-------|---------------------|------------------------------------------|--------------------------------------------------------------------|
| 1     | 2                   | 3                                        | 4                                                                  |
| R 209 | Resistor ceramic    | 1,8 megohm $\pm 10\%$                    | 2nd speech amplifier stage grid leak                               |
| R 210 | d t t o             | 470000 ohms $\pm 10\%$<br>0,25 W         | Negative grid bias resistor of the speech amplifier                |
| R 211 | d t t o             | 470000 ohms $\pm 10\%$<br>0,25 W         | d t t o                                                            |
| R 212 | d t t o             | 10000 ohms $\pm 10\%$                    | d t t o                                                            |
| R 213 | d t t o             | 15000 ohms $\pm 10\%$<br>0,25 W          | d t t o                                                            |
| R 214 | d t t o             | 820 ohms $\pm 10\%$<br>0,25 W            | Audio signal generator grid leak                                   |
| R 215 | d t t o             | 50000 ohms $\pm 10\%$<br>/2x100000 ohms/ | Negative grid bias resistor                                        |
| R 216 | Resistor wire wound | 3500 ohms $\pm 10\%$<br>8 W              | Negative grid bias and grid leak resistor of G 471 vacuum tube     |
| R 217 | Resistor; ceramic   | 68000 ohms $\pm 10\%$                    | Suppressor grid circuit resistor of the G 411 vacuum tube          |
| R 218 | d t t o             | 68000 ohms $\pm 10\%$<br>1 W             | d t t o                                                            |
| R 219 | d t t o             | 100000 ohms $\pm 10\%$<br>0,25 W         | G471 suppressor grid voltage divider                               |
| R 220 | d t t o             | 100000 ohms $\pm 10\%$<br>0,25 W         | d t t o                                                            |
| R 221 | d t t o             | 150000 ohms $\pm 10\%$<br>0,25 W         | d t t o                                                            |
| R 223 | d t t o             | 68000 ohms $\pm 10\%$<br>1W              | L.f.amplifier plate circuit resistor /side tone amplifier/         |
| R 224 | d t t o             | 68000 ohms $\pm 10\%$<br>1 W             | d t t o                                                            |
| R 225 | d t t o             | 100000 ohms $\pm 10\%$<br>1 W            | d t t o                                                            |
| R 226 | Resistor; enamelled | 5 ohms $\pm 10\%$<br>8 W                 | Voltage dropping resistor in the G 471 vacuum tube heater circuit  |
| R 227 | d t t o             | 35 ohms $\pm 10\%$<br>8 W                | Resistor in the throat microphone supply circuit                   |
| R 228 | d t t o             | 9 ohms $\pm 10\%$<br>8 W                 | Voltage dropping resistor in the 6NZ vacuum tube heater circuit    |
| R 229 | d t t o             | 3500 ohms $\pm 10\%$<br>8 W              | G 471 vacuum tube suppressor grid circuit voltage divider resistor |

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| 1     | 2                        | 3                           | 4     | 50X1                                                                                  |
|-------|--------------------------|-----------------------------|-------|---------------------------------------------------------------------------------------|
| R 230 | Resistor; enamelled      | 10000ohms $\pm 10\%$<br>20W | G 471 | vacuum tube suppressor grid circuit voltage divider resistor                          |
| R 231 | Resistor; wire wound     | 3,98 ohms                   |       | Shunt in the total current indicator circuit                                          |
| V 201 | Fuse                     | 1 A                         |       | Fuse in the 350 V circuit                                                             |
| V 202 | dtto                     | 1 A                         |       | Fuse in the 1000 V circ.                                                              |
| V 203 | dtto                     | 10A                         |       | Fuse +26 V circuit of the receiver                                                    |
| V 204 | dtto                     | 10 A                        |       | Fuse in the + 26V circuit of the transmitter                                          |
| G 201 | Receptacle "L"           | -                           |       | Throat microphone connection                                                          |
| G 202 | Connector                | -                           |       | Connection of the power unit cable to the aircraft electrical system                  |
| G 203 | d t t o                  | -                           |       | Connector of the power unit and receiver connecting cable                             |
| G 204 | d t t o                  | -                           |       | Connection of the power unit and No.3 R.f. unit connecting cable                      |
| G 205 | d t t o                  | -                           |       | Connection of the power unit and Nos.1 and 2 r.f. unit connecting cable               |
| G 206 | d t t o                  | -                           |       | Connection of the power unit and control panel connecting cable                       |
| G 207 | d t t o                  | -                           |       | Connection of the power unit and antenna tuning unit connecting cable                 |
| G 208 | Terminal "P"             | -                           |       | Terminal of antenna balance                                                           |
| G 209 | Terminal "S" /side tone/ | -                           |       | Connection of the radio operator's headset leads and the interphone jack box          |
| L 201 | Vacuum tube              | 6N7                         |       | Speech amplifier                                                                      |
| L 202 | d t t o                  | 6N7                         |       | Audio signal generator and rectifier                                                  |
| P 201 | Switch "1-2-3"           |                             |       | Sensitivity control of the speech amplifier input circuit                             |
| P 202 | Switch                   |                             |       | Switch of the "Reception-transmission" relay when operating with the BP-1 /DVB-5/unit |

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| 1                          | 2                                      | 3                            | 4                                                          |
|----------------------------|----------------------------------------|------------------------------|------------------------------------------------------------|
| P 203                      | Switch                                 |                              | External modulation switch                                 |
| T 201                      | Transformer                            |                              | Audio signal generator transformer                         |
| E 201                      | Relay                                  |                              | Stepstarting relay                                         |
| E 202                      | dtto                                   |                              | Starting relay                                             |
| E 203                      | dtto                                   |                              | "Reception-transmission" relay                             |
| <u>Antenna tuning unit</u> |                                        |                              |                                                            |
| C 301                      | Capacitor; fixed mica-dielectric       | 82 mmF $\pm 10\%$<br>500 V   | Crystal oscillator control drig blocking capacitor         |
| C 302                      | Capacitor; variable ceramic-dielectric | 8-15 mmF                     | Crystal frequency correction trimmer                       |
| C 303                      | Capacitor; fixed; mica-dielectric      | 91 mmF $\pm 5\%$<br>500 V    | Crystal oscillator screen grid blocking capacitor          |
| C 304                      | d t t o                                | 1800 mmF $\pm 10\%$<br>500 V | Mixer plate blocking capacitor                             |
| C 305                      | d t t o                                | 33 mmF $\pm 10\%$<br>500 V   | Blocking capacitor of the mixer 3rd grid                   |
| C 306                      | d t t o                                | 33 mmF $\pm 10\%$<br>500 V   | Coupling capacitor of the 200 kc oscillator grid circuit   |
| C 307                      | d t t o                                | 91 mmF $\pm 5\%$<br>500 V    | Capacitor in the 200 kc oscillator circuit                 |
| C 308                      | d t t o                                | 510 mmF $\pm 10\%$<br>500 V  | Coupling capacitor of the 200 kc oscillator grid circuit   |
| C 309                      | d t t o                                | 33 mmF $\pm 10\%$<br>500 V   | Coupling capacitor of the 40kc oscillator grid circuit     |
| C 310                      | d t t o                                | 10 mmF $\pm 10\%$<br>500 V   | Coupling capacitor in the mixer grid circuit               |
| C 311                      | d t t o                                | 510 mmF $\pm 5\%$<br>500 V   | Capacitor in the 40 kc oscillator circuit                  |
| C 312                      | d t t o                                | 510 mmF $\pm 5\%$<br>500 V   | Coupling capacitor in the 40 kc oscillator grid circuit    |
| C 313                      | d t t o                                | 10 mmF $\pm 10\%$<br>500 V   | Coupling capacitor in the 10-20 kc oscillator grid circuit |
| C 314                      | d t t o                                | 10 mmF $\pm 10\%$<br>500 V   | Coupling capacitor in the mixer grid circuit               |
| C 315                      | d t t o                                | 2400 mmF $\pm 5\%$<br>500 V  | Capacitor in the 10kc oscillator circuit                   |

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| 1     | 2                                | 3                            | 4                                                                                                                        |
|-------|----------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| C 316 | Capacitor; fixed mica-dielectric | 2000 mmF $\pm 5\%$<br>500 V  | Capacitor in the 20kc oscillator circuit                                                                                 |
| C 317 | d t t o                          | 510 mmF $\pm 10\%$<br>500 V  | Coupling capacitor in the 10-20 kc oscillator grid circuit                                                               |
| C 318 | d t t o                          | 510 mmF $\pm 10\%$<br>500 V  | 10-20 kc oscillator capacitor                                                                                            |
| C 319 | d t t o                          | 33 mmF $\pm 10\%$<br>500 V   | Mixer grid coupling capacitor                                                                                            |
| C 320 | d t t o                          | 3900 mmF $\pm 10\%$<br>500 V | Coupling capacitor connected between the mixer plate and l.f. amplifier control grid                                     |
| C 321 | d t t o                          | 3900 mmF $\pm 10\%$<br>500 V | Coupling capacitor connected between the plate of the 1st l.f. amplifier stage and grid of the 2nd l.f. amplifier stage. |
| C 322 | d t t o                          | 510 mmF $\pm 10\%$<br>500 V  | 1st l.f. amplifier stage grid circuit blocking capacitor                                                                 |
| C 323 | d t t o                          | 3900 mmF $\pm 10\%$<br>500 V | Side tone correction capacitor                                                                                           |
| C 324 | d t t o                          | 510 mmF $\pm 10\%$<br>500 V  | Coupling capacitor connected between the audio signal generator and the indicator grid                                   |
| C 325 | d t t o                          | 3900 mmF $\pm 10\%$<br>500 V | #80 V circuit blocking capacitor                                                                                         |
| C 326 | d t t o                          | 10 mmF $\pm 10\%$<br>500 V   | Coupling capacitor of the mixer grid circuit                                                                             |
| C 327 | d t t o                          | 10 mmF $\pm 10\%$<br>500 V   | Capacitor connected between the 3rd and screen grid of the 200 kc oscillator                                             |
| C 328 | d t t o                          | 82 mmF $\pm 10\%$<br>500 V   | Capacitor connected between the 3rd and screen grid of 40kc oscillator                                                   |
| C 329 | d t t o                          | 510 mmF $\pm 10\%$<br>500 V  | Blocking capacitor of the 2nd l.f. amplifier stage control grid circuit                                                  |
| C 330 | d t t o                          | 3900 mmF $\pm 10\%$<br>500 V | Terminal "I" blocking capacitor                                                                                          |
| L 301 | Inductor; variable inductance    | 7 microhenry                 | Inductor of the 200 kc oscillator tuned circuit                                                                          |
| L 302 | d t t o                          | 32 microhenry                | Inductor of the 40kc oscillator tuned circuit                                                                            |

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| 1     | 2                             | 3                            | 4                                                                              | 50X1 |
|-------|-------------------------------|------------------------------|--------------------------------------------------------------------------------|------|
| L 303 | Inductor; variable inductance | 32 microhenry                | Inductor of the 10 kc oscillator tuned circuit                                 |      |
| L 304 | d t t o                       | 32 microhenry                | Inductor of the 20 kc oscillator tuned circuit                                 |      |
| R 301 | Resistor; ceramic             | 100000 ohms<br>± 10%, 0,25 W | Voltage dropping resistor in the mixer plate circuit                           |      |
| R 302 | d t t o                       | 470000 ohms<br>± 10%, 0,25 W | d t t o                                                                        |      |
| R 303 | d t t o                       | 68000 ohms<br>± 10%, 1 W     | Voltage dropping resistor in the screen grid circuit of the crystal oscillator |      |
| R 304 | d t t o                       | 68000 ohms<br>± 10%, 1W      | Voltage dropping resistor in the screen grid circuit of the crystal oscillator |      |
| R 305 | d t t o                       | 1,8 megohms<br>± 10%, 0,25 W | Mixer 3rd grid leak                                                            |      |
| R 306 | d t t o                       | 47000 ohms<br>± 10%, 0,25 W  | Voltage dropping resistor in the 200 kc oscillator plate circuit               |      |
| R 307 | d t t o                       | 47000 ohms<br>± 10%, 0,25 W  | Control grid leak of the 200 kc oscillator                                     |      |
| R 308 | d t t o                       | 100000 ohms<br>± 10%, 0,25 W | 3rd grid leak of the 200 kc oscillator                                         |      |
| R 309 | d t t o                       | 220000 ohms<br>± 10%, 0,25 W | Voltage dropping resistor in the 40 kc oscillator plate circuit.               |      |
| R 310 | d t t o                       | 47000 ohms<br>± 10%, 0,25 W  | Grid leak of the 40 kc oscillator control grid                                 |      |
| R 311 | d t t o                       | 150000 ohms<br>± 10%, 0,25 W | 3rd grid leak of the 40kc oscillator                                           |      |
| R 312 | d t t o                       | 470000 ohms<br>± 10%, 0,25 W | De-coupling resistor of the 40 kc oscillator                                   |      |
| R 313 | d t t o                       | 22000 ohms<br>± 10%, 0,25 W  | Voltage dropping resistor in the 10-20 kc oscillator plate circuit.            |      |
| R 314 | d t t o                       | 150000 ohms<br>± 10%, 0,25 W | Grid leak of the 10-20kc oscillator control grid                               |      |
| R 315 | d t t o                       | 100000 ohms<br>± 10%, 0,25 W | Grid leak of the 3rd grid of the 10-20 kc oscillator                           |      |
| R 316 | d t t o                       | 470000 ohms<br>± 10%, 0,25 W | De-coupling resistor of the 10-20 kc oscillator                                |      |
| R 317 | d t t o                       | 470000 ohms<br>± 10%, 0,25 W | 10-20-40 kc filter resistor                                                    |      |

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| 1     | 2                          | 3                           | 4                                                                                    |
|-------|----------------------------|-----------------------------|--------------------------------------------------------------------------------------|
| R 318 | Resistor; ceramic          | 1,8 megohms<br>±10%, 0,25W  | 1st l.f. amplifier stage<br>grid leak                                                |
| R 319 | d t t o                    | 470000 ohms<br>±10%, 0,25W  | 2nd l.f. amplifier stage<br>grid leak                                                |
| R 320 | d t t o                    | 470000 ohms<br>±10%, 0,25W  | 1st l.f. amplifier stage<br>plate resistor,                                          |
| R 321 | d t t o                    | 33000 ohms<br>±10%, 0,25 W  | Crystal oscillator<br>grid leak                                                      |
| R 322 | d t t o                    | 470000 ohms<br>±10%, 0,25 W | De-coupling resistor of<br>the indicator grid                                        |
| R 323 | d t t o                    | 220000 ohms<br>±10%, 0,5 W  | Resistor in the crystal<br>calibrator screen grid<br>when switched to "KOR".         |
| R 324 | d t t o                    | 2400 ohms ±5%<br>0,25 W     | Resistor in the indica-<br>tor circuit                                               |
| R 325 | Resistor;<br>enamelled     | 5000 ohms<br>±10%, 8W       | Voltage divider resistor<br>in the +80 V circuit                                     |
| R 326 | Resistor; ceramic          | 22000 ohms -<br>±10%, 0,25W | Resistor in the indicator<br>circuit                                                 |
| G 301 | Receptacle "AI"            |                             | Indicator connection                                                                 |
| G 302 | Connector                  |                             | Connection of the power<br>unit and antenna tuning<br>unit connection cable          |
| G 303 | Terminal "A"               |                             | Connection of the air-<br>craft antenna                                              |
| G 304 | Terminal "Ap"              |                             | Connection of the recei-<br>ver antenna                                              |
| G 305 | Terminal "B"               |                             | Connection of the r.f.<br>unit antenna lead                                          |
| G 306 | Terminal "C"<br>/coupling/ |                             | Connection of the mixer<br>grid lead for increasing<br>coupling,                     |
| G 307 | Terminal "P"               |                             | Balance connection                                                                   |
| G 308 | Terminal "I"               |                             | Connection of the indica-<br>tor lead passing from ter-<br>minal "I" on the pedestal |
| I 301 | Indicator                  | Current range<br>1 mA       | Antenna tuning indicator                                                             |
| L 301 | Vacuum tube                | 6SA7                        | Crystal oscillator and<br>mixer                                                      |
| L 302 | d t t o                    | 6SA7                        | 200 kc oscillator                                                                    |
| L 303 | d t t o                    | 6SA7                        | 40 kc oscillator                                                                     |
| L 305 | d t t o                    | 6N7                         | L.f. amplifier and side<br>tone                                                      |
| P 301 | Switch                     |                             | 10-20 kc tuned circuit<br>switch                                                     |

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| 1                    | 2                          | 3                               | 4                                                               |
|----------------------|----------------------------|---------------------------------|-----------------------------------------------------------------|
| P 302                | Switch                     |                                 | Mixer control grid switch                                       |
| P 303                | dtto                       |                                 | Switch in the +80V circuit                                      |
| P 304                | dtto                       |                                 | Switch in the + 350 V circuit                                   |
| X 301                | Crystal                    | 1000 kc                         |                                                                 |
| E 301                | Relay                      |                                 | Antenna switching relay                                         |
| E 302                | dtto                       |                                 | Receiver input cut-out relay                                    |
| <u>Control panel</u> |                            |                                 |                                                                 |
| C 401                | Capacitor; fixed paper     | 0,5 mF $\pm$ 20%<br>260 V       | CW operation at 25% power output capacitor                      |
| C 402                | Capacitor; fixed paper-oil | 0,025 mF $\pm$ 20%<br>400 V     | Capacitor for decreasing modulation depth at 25% power output   |
| R 401                | Resistor; ceramic          | 200000 ohms<br>$\pm$ 5%, 0,25W  | Mixer resistor when operating in RT                             |
| R 402                | d t t o                    | 220000 ohms<br>$\pm$ 10%, 0,25W | Resistor for CW operation at 25% power output                   |
| R 403                | d t t o                    | 22000 ohms<br>$\pm$ 10%, 0,25W  | Resistor for decreasing modulation depth at 25% power output    |
| G 401                | Connector                  |                                 | Connection of the control panel and power unit connecting cable |
| P 401                | Switch                     |                                 | "Reception-transmission" switch                                 |
| P 402                | dtto                       |                                 | "Voice-tone" switch                                             |
| P 403                | dtto                       |                                 | "25%-100%" power output switch                                  |
| P 404                | Switch "1-2-3"             |                                 | Band switch                                                     |
| P 405                | Key                        |                                 |                                                                 |
| P 406                | Switching contact          |                                 | Key switching contact                                           |
| P 407                | d t t o                    |                                 | d t t o                                                         |

Note: Items marked with asterisks can be replaced in the course of adjustment of the transmitter in the factory.

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Supplement 3. 50X1

..... Technical requirements for a repaired transmitter .....

| Item No. | Checked parameter                                                                                                                                                                                        | Parameter value                                                                                                                                                                                | Note                                                                   |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 1        | 2                                                                                                                                                                                                        | 3                                                                                                                                                                                              | 4                                                                      |
| 1        | Resistance to vibration                                                                                                                                                                                  |                                                                                                                                                                                                | /See chapter 6, § 1/.                                                  |
| 2        | External appearance and assy                                                                                                                                                                             |                                                                                                                                                                                                | /See chapter 3, § 1/.                                                  |
| 3        | Function and current drawn by the low tension circuits                                                                                                                                                   | Tuning indicator, pointer should swing to 5-6 graduations with transmitter switched to CW operation 2, The current drawn by low tension circuits should not exceed 31 A.                       |                                                                        |
| 4        | Power output dissipated in the artificial antenna 1/CW operation at 100% power output: 2150 kc 12000 kc 2/100% power output RT operation 3/25% power output RT operation 4/25% power output CW operation | 50 W min. 90 W min. Not less than 20% of the rated CW operation power output Not less than 20% of the rated RT operation power output Not less than 20% of the rated CW operation power output | Power output should increase with increasing frequency within the band |
| 5        | Calibration error                                                                                                                                                                                        | 0,02% when tuning with the aid of the crystal calibrator * 0,09% when tuning without the aid of the crystal calibrator                                                                         |                                                                        |
| 6        | Transmitter modulation depth                                                                                                                                                                             | 90 - 100%                                                                                                                                                                                      |                                                                        |
| 7        | Beat frequency signal amplitude of the transmitter and X-tal calibrator at 800+ 100 cps                                                                                                                  | 15 V min.                                                                                                                                                                                      |                                                                        |

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| Item<br>No. | Checked parameter                                                                   | Parameter value | N o t e                                                                                                                                                                                               |
|-------------|-------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1           | 2                                                                                   | 3               | 4                                                                                                                                                                                                     |
| 8           | Side tone signal amplitude checked at the limit frequencies of the transmitter band | 20 - 30 V       | With a loud sound "A" applied to the throat microphone and noise level less than 2-3 V                                                                                                                |
| 9           | Throat microphone supply voltage                                                    | 3,5 - 5 V       | Checked across an equivalent load of 150 ohms                                                                                                                                                         |
| 10          | Speech amplifier gain control                                                       |                 | When switched to "1" and "3" the output voltage of the speech amplifier should increase and decrease to 40-60% respectively as compared to the output voltage obtained in position "2" of the switch. |

\* A calibration error of 0,12% is tolerated at 15% of all the r.f. unit dial graduations.

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## Supplement 4.

## Transmitter choke and relay winding parameters.

| Item No. | Title                                                      | Wiring diagr. Ref.No | Wire type | Wire dia. mm | No of turns | Winding resis- tance ohms | Induc- tance henry | Insu- lati- on re- sist. megohm | Note                          |
|----------|------------------------------------------------------------|----------------------|-----------|--------------|-------------|---------------------------|--------------------|---------------------------------|-------------------------------|
| 1        | 2                                                          | 3                    | 4         | 5            | 6           | 7                         | 8                  | 9                               | 10                            |
| 1        | L.f. choke in the indicator grid circuit                   | L 205                | PEL-1     | 0,18         | 3500        | 110-150                   | 3 henry            | 100                             |                               |
| 2        | L.f. choke in the throat microphone supply circuit         | L 201                | PEL-1     | 0,18         | 3500        | 110-150                   | 3 henry            | 100                             |                               |
| 3        | L.f. choke in the 2nd speech amplifier stage plate circuit | L 204                | PEShO     | 0,1          | 3200        | 550-800                   | 13 henry           | 100                             |                               |
| 4        | R.f. choke in the L102 vacuum tube plate circ.             | L 105                | PEShO     | 0,2          | 1000        | 75-115                    | 4,5-7 micro-henry  | 100                             |                               |
| 5        | R.f. choke in the L103 vacuum tube control grid circuit    | L 106                | PEShO     | 0,2          | 1000        | 75-115                    | 4,5-7 micro-henry  | 100                             | 2,15-7,2 and 3,6-12 mc units  |
| 6        | R.f. choke in the L103 vacuum tube suppressor grid circuit | L 107                | PEShO     | 0,2          | 1000        | 75-115                    | 4,5-7 micro-henry  | 100                             | 2,15-7,2 and 3,6-12mc units   |
| 7        | R.f. choke in the L103 vacuum tube plate circ.             | L 108                | PEShO     | 0,2          | 110         | 5,6-6,6                   | 0,18 micro-henry   | 100                             | 2,15 - 7,2 and 3,6-12mc units |
| 8        | Starting relay                                             | E202                 | PEL-1     | 0,5          | 1025        | 6-6,8                     |                    |                                 |                               |
| 9        | Step-starting relay                                        | E201                 | PEL-1     | 0,27         | 3470        | 76                        |                    |                                 |                               |
| 10       | "Reception-transmission" relay                             | E203                 | PEL-1     | 0,38         | 800         | 6                         |                    |                                 |                               |
| 11       | Series to parallel connection switching relay              | E103                 | PEL-1     | 0,15         | 2800        | 100-150                   |                    |                                 |                               |
| 12       | R.f. unit connecting relay                                 | E102                 | PEL-1     | 0,15         | 2800        | 100-150                   |                    |                                 |                               |
| 13       | R.f. unit cut-in relay                                     | E101                 | PEL-1     | 0,12         | 2500        | 135-165                   |                    |                                 |                               |

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Supplement 6.

Tool for adjustment of transmitter calibration.

A tool, a view of which is shown in fig.21, is used in the course of calibration of the master oscillator as well as in course of aligning the buffer stage with the master oscillator.

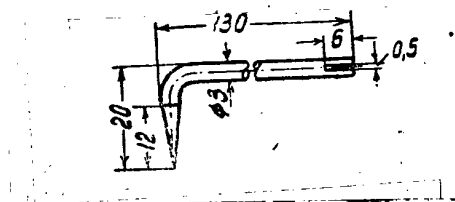


Figure 21: Tool for transmitter calibration adjustment.

The pointed section of the tool is used for turning the trimmer rotors of the master oscillator and buffer stage tuned circuits. The section with a 0,5 mm groove is used for bending the outer plates of the C 101 and C 102 variable capacitors.

Supplement 7.

Equivalent load of the power unit.

An equivalent load of the power unit should be made and used in the course locating defects of the RSB-5 transmitter /see fig.22/. The following components are required for equivalent load assembly:

1. Resistor  $R = 6,6$  ohms, 59,4 W
2. Resistor  $R = 5000$  ohms, 200 W and a resistor  $R = 3600$  ohms, 36 W.

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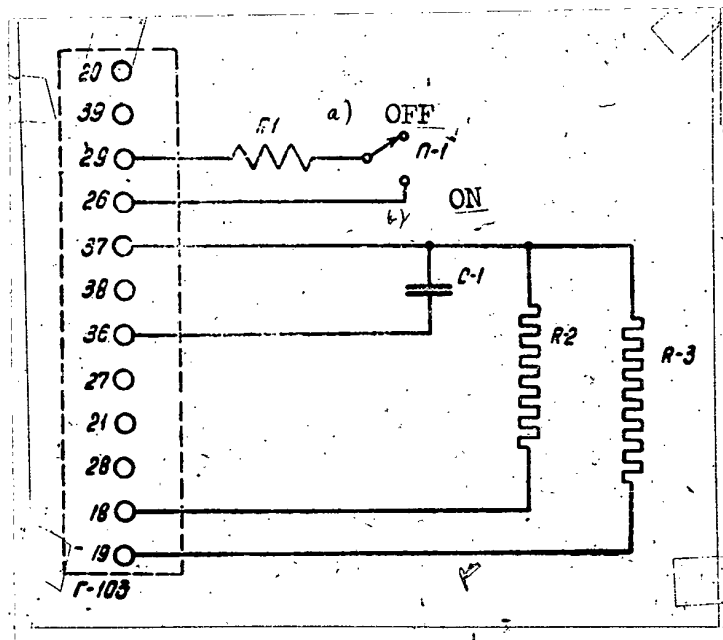


Figure 22: Wiring diagram of the power unit equivalent load.

R1/Wire wound resistor, 6,6 ohms, P1/Switch, C1/Capacitor 200 mmF 250 V, R2/Enamelled resistor 3500 ohms 36 W, R3/Enamelled resistor 5000 ohms 200 W.

The components should be assembled on a metal chassis 25 x 25 mm or on a wooden chassis of the same dimensions. Cover the chassis with thermal insulation in the latter case.

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Supplement 8.

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Set of spare parts supplied by the factory for  
overhauling the transmitter.

| Item No. | Title                                | No. reg. | Drawing No.          | Reference symbol       |
|----------|--------------------------------------|----------|----------------------|------------------------|
| 1        | 2                                    | 3        | 4                    | 5                      |
| 1        | Connecting wire 3mm dia 3 m          | 3        | 8680                 | 501                    |
| 2        | Copper wire, tin plated 2mm dia      | 10m      | 43-43-60             | -                      |
| 3        | Wire 0,8 mm dia                      | 30m      | 117-23-60            | -                      |
| 4        | Bare copper wire 1,5 mm dia          | 10m      | 113-49-15            | -                      |
| 5        | Capacitor; electrolytic 10 mF, 450 V | 5        |                      | C 210<br>C 201         |
| 6        | Capacitor KBG-MN1 2 mF, 1000 V       | 5        |                      | C 202<br>C 203         |
| 7        | Capacitor KBG-M2 0,05 mF, 400 V      | 10       |                      | C 402                  |
| 8        | R.f. choke                           | 5        | 8643                 | L 108<br>L 106         |
| 9        | R.f. choke                           | 10       | 5357                 | L 105<br>L 107         |
| 10       | Tuned circuit 200 kc                 | 2        | 8784-501             | L 301                  |
| 11       | Tuned circuit 40 kc                  | 6        | 8784-502             | L 302, L 303,<br>L 304 |
| 12       | Indicator M-61                       | 5        |                      | I 101                  |
| 13       | Indicator M-52                       | 5        | 8918-501             | I 301                  |
| 14       | Choke                                | 5        | 8293-502             | L 204                  |
| 15       | Transformer                          | 5        | 8793-501             | T 201                  |
| 16       | 2 choke assy.                        | 5        | 8789                 | L 202                  |
| 17       | Variometer                           | 3        | 8666-501<br>8666-502 | L 109<br>X 301         |
| 18       | Crystal 1000 kc                      | 2        |                      |                        |
| 19       | Fuse box                             | 2        | 8977-501             |                        |
| 20       | G471 vacuum tube socket              | 5        | 5354                 |                        |
| 21       | G 471 vacuum tube socket             | 5        | 8730-501             |                        |
| 22       | 6N7 vacuum tube socket               | 2        | 5418                 |                        |
| 23       | Terminal "I"                         | 5        | 20280-501            | G 106, G 308           |
| 24       | L.f. choke                           | 5        | 8893-501<br>8893-502 | 201<br>205             |
| 25       | Switch                               | 1        | 8988-501             | P 102                  |
| 26       | Resistor; enamelled 1000 ohms, 10 W  | 5        | 147-62-10            | R 110                  |
| 27       | Resistor; enamelled 20000 ohms, 25 W | 5        | 14767-63             | R 107                  |
| 28       | Resistor; enamelled 20 ohms, 10 W    | 5        | 14762-50             | R 108                  |
| 29       | Resistor; enamelled 25 ohms, 25 W    | 5        | 14763-34             | R 101                  |

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| 1  | 2                                         | 3  | 4         | 5                                                                                                                                   |
|----|-------------------------------------------|----|-----------|-------------------------------------------------------------------------------------------------------------------------------------|
| 30 | Resistor; enamelled<br>350 ohms, 10 W     | 5  | 14762-11  | R 215                                                                                                                               |
| 31 | Resistor; enamelled<br>9 ohms, 10W        | 5  | 14762-24  | R 228                                                                                                                               |
| 32 | Resistor; enamelled<br>5000 ohms, 25 W    | 3  | 147-67-30 | R 230                                                                                                                               |
| 33 | Resistor; enamelled<br>50 ohms, 10 W      | 5  | 14762-33  | R 226                                                                                                                               |
| 34 | Resistor; wire-wound<br>0,25 ohm          | 2  | 14758-33  | R 201<br>R 207                                                                                                                      |
| 35 | Resistor; ceramic<br>24000 ohms, 0,25 W   | 5  | -         | R 324                                                                                                                               |
| 36 | Resistor; ceramic<br>10000 ohms, 0,25 W   | 5  | -         | R 105<br>R 102                                                                                                                      |
| 37 | Resistor; ceramic<br>15000 ohms, 0,25 W   | 5  | -         | R 213                                                                                                                               |
| 38 | Resistor; ceramic<br>33000 ohms, 0,25 W   | 5  | -         | R 321                                                                                                                               |
| 39 | Resistor; ceramic<br>33000 ohms, 1 W      | 5  | -         | R 115<br>R 307                                                                                                                      |
| 40 | Resistor; ceramic<br>47000 ohms, 0,25 W   | 5  | -         | R 309                                                                                                                               |
| 40 | Resistor; ceramic<br>47000 ohms, 0,25 W   | 5  | -         | R 307, R 309,<br>R 310, R 313,<br>R 314, R 103                                                                                      |
| 41 | Resistor; ceramic<br>6800 ohms, 1 W       | 5  | -         | R 115                                                                                                                               |
| 42 | Resistor; ceramic<br>100000 ohms, 0,25 W  | 5  | -         | R 205, R 219<br>R 208, R 220<br>R 221, R 301                                                                                        |
| 43 | Resistor; ceramic<br>800 ohms, 0,25 W     | 5  | -         | R 217                                                                                                                               |
| 44 | Resistor; ceramic<br>22000 ohms, 0,25 W   | 5  | -         | R 326                                                                                                                               |
| 45 | Resistor; ceramic<br>100000 ohms, 1 W     | 5  | -         | R 102, R 104,<br>R 215, R 225                                                                                                       |
| 46 | Resistor; ceramic<br>150000 ohms, 0,25 W  | 5  | -         | R 202<br>R 314, R 203                                                                                                               |
| 47 | Resistor; ceramic<br>200000 ohms, 0,25 W  | 5  | -         | R 401<br>R 402                                                                                                                      |
| 48 | Resistor; ceramic<br>470000 ohms, 0,25 W  | 5  | -         | R 302, R 322,<br>R 109, R 210,<br>R 317, R 319,<br>R 211, R 302,<br>R 311, R 312,<br>R 315, R 316<br>R 318, R 305,<br>R 206, R 209, |
| 49 | Resistor; ceramic<br>1800000 ohms, 0,25 W | 5  | -         |                                                                                                                                     |
| 50 | Variometer roller<br>springs              | 10 | 8984-501  |                                                                                                                                     |
| 51 | Variometer shaft                          | 2  | 8698-1    |                                                                                                                                     |
| 52 | Roller                                    | 5  | 8698-2    |                                                                                                                                     |
| 53 | Capacitor; type MKV<br>0,5 mF, 260 V      | 5  | -         | C 208, C 211,<br>C 215, C 401                                                                                                       |
| 54 | Lining                                    | 2  | 8732-501  |                                                                                                                                     |

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|--------|----------------------------|----|------------|---|---------------|--|
| 1      | 2                          | 3  | 4          | 5 |               |  |
| 55     | Spring                     | 5  | 8797-501   |   |               |  |
| 56     | Variometer vernier         | 1  | 8797-501   |   |               |  |
| 57     | Lining                     | 1  | 8666-1     |   |               |  |
| 58     | G 411 vacuum tube          |    |            |   |               |  |
|        | plate lead                 | 10 | 8709-501   |   |               |  |
| 59     | G 471 vacuum tube          |    |            |   |               |  |
|        | plate lead                 | 5  |            |   |               |  |
| 60     | Rubber shock mounts        | 20 |            |   |               |  |
| 61     | Terminal bar               | 2  | 8699-501   |   |               |  |
| 62     | Friction gear shaft        | 5  | 8936-15    |   |               |  |
| 63     | Friction plate             | 5  | 8936-17    |   |               |  |
| 64     | Friction washer            | 5  | 8936-16    |   |               |  |
| 65     | Wing wash washer           | 5  | 169-01-01  |   |               |  |
| 66     | Variable capacitor         | 1  | 8948-501   |   |               |  |
| 67     | Bonding strap              | 10 | 8661-501   |   |               |  |
|        |                            | 10 | 8661-502   |   |               |  |
|        |                            | 10 | 8661-503   |   |               |  |
| 68     | Screw                      | 30 | 161-37-01  |   |               |  |
| 69     | Nut                        | 30 | 165-02-09  |   |               |  |
| 70     | Screw                      | 15 | 161-60-10  |   |               |  |
| 71     | Screw                      | 30 | 161-33-21  |   |               |  |
| 72     | Washer                     | 30 | 161-33-21  |   |               |  |
| 73     | Panel key                  | 3  | 8722-501   |   |               |  |
| 74     | Key base                   | 3  | 8668-501   |   |               |  |
| 75     | Artificial antenna         | 1  |            |   |               |  |
| 76     | Aircraft electrical        |    |            |   |               |  |
|        | system cable               | 1  | 8966       |   |               |  |
| 77     | Cable connecting the       |    |            |   |               |  |
|        | power unit to the r.f.     |    |            |   |               |  |
|        | unit                       | 1  | 8778       |   |               |  |
| 78     | Cable connecting the po-   |    |            |   |               |  |
|        | wer unit to the antenna    |    |            |   |               |  |
|        | tuning unit                | 1  | 8780       |   |               |  |
| 79     | Cable connecting           | 1  | 8778       |   |               |  |
| 80     | Intermediate receiver      |    |            |   |               |  |
|        | cable                      | 1  | 9056       |   |               |  |
| 81     | Cable connecting the po-   |    |            |   |               |  |
|        | wer unit to the receiver   | 1  | 8934       |   |               |  |
| 82     | Antenna switching relay    | 10 | 8994       |   | E 102, E 103, |  |
|        |                            |    |            |   | E 301         |  |
| 83     | Starting relay             | 5  | 203449-502 |   | E 202         |  |
| 84     | Step-starting relay        | 5  | 20349-501  |   | E 201         |  |
| 85     | "Reception-transmission"   |    |            |   |               |  |
|        | relay                      | 5  | 20287-502  |   | E 203         |  |
| 86     | Relay                      | 12 | 8690       |   | E 101, E 302  |  |
| 87     | 5 throw switch             | 5  | 8771-501   |   | P 107         |  |
| 88     | 3 throw switch             | 6  | 8650-501   |   | P 204         |  |
| 89     | Switch                     | 5  | 8569, 502  |   | P 105         |  |
| 90     | Receptacle; 11 contact     |    |            |   |               |  |
|        | pins                       | 4  | 8687-501   |   | G 101         |  |
| 91     | Receptacle; 11 sockets     | 4  | 6660-501   |   |               |  |
| 92     | Receptacle; 8 contact pins | 5  | 8724-501   |   | G 302, G 202, |  |
|        |                            |    |            |   | G 205, G 207  |  |
| 93     | Receptacle; 8 sockets      | 5  | 8937-501   |   | G 203         |  |
| 94     | Receptacle; 12 cont. pins  | 5  | 2814-1     |   | G 103         |  |
| 95     | Receptacle; 12 sockets     | 5  | 8735-501   |   | G 204         |  |
| 96     | Antenna insulator          | 10 | 8991-501   |   | G 204         |  |

Supplement<sup>50X1</sup> 1.Transmitter wiring diagram.

1/Power unit, 2/R.f.unit, 3/To unit No.3, 4/Suppr.grd.  
G-411, 5/Suppr.grd. G-471, 6/Control grd.G-471, 7/Comm.,  
8/RUK 300B start, 9/Wave No.3, 10/Phones, 11/Suppr.grd.  
G-411, 12/Suppr.grd-G-471, 13/C.Grd G-471, 14/Comm.,  
15/Wave No.1, 16/RUK300B start, 17/Wave No.2, 18/Phones,  
19/Suppr.grd. G-411, 20/Suppr.grd.G-471, 21/Oprn.mode,  
22/Wave No.3, 23/Wave No.2, 24/Wave No.1, 25/Side tone,  
26/Relay, 27/Oprn.mode, 28/Comm., 29/Heater, 30/Aircraft  
el.system, 31/To the receiver, 32/Side tone, 33/To the an-  
tenna tuning unit, 34/To the control box, 35/To No.1 unit,  
36/To No.2 unit, 37/Control box, 38/Antenna tuning unit,  
39/OFF, 40/COR.

Supplement 9.Low tension circuit wiring diagram.

1/R.f. unit, 2/Power unit, 3/Control box, 4/Aircraft el.  
system, 5/Receiver, 6/Antenna tuning unit,

Supplement 10.Mixer circuit wiring diagram.

2/Power unit, 3/R.f. unit, 4/Control box.

Supplement 1.

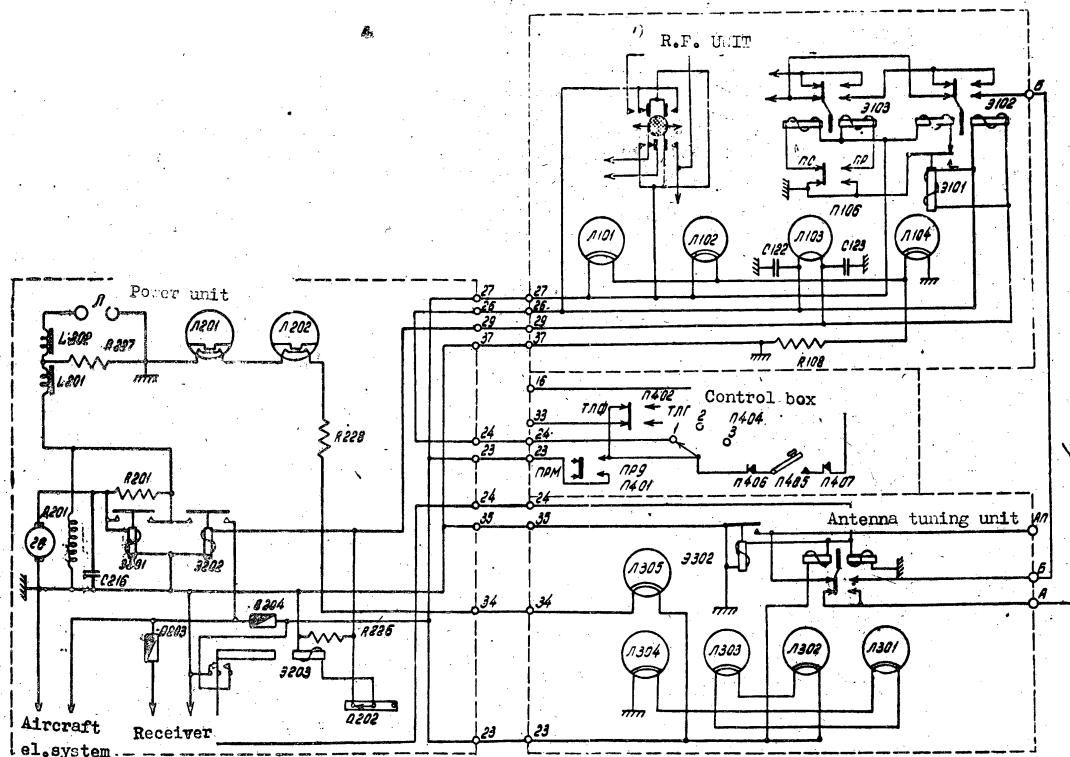


SECRET  
NO FOREIGN DISSEM

50X1

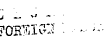
Low Tension circuit  
Wiring diagram

Supplement 9

SECRET  
NO FOREIGN DISSEM

Supplement 10

MIXER CIRCUIT  
WIRING DIAGRAM



DISSEM

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