Order of the Red Banner of Labor
NON-STOP - DISCLAIMER ¹ 885

of the State Committee of the Council of Ministers of the Council of Ministers of the Council on Radioelectronics

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"ÓÒÂÅRÆÄÀÞ"
Chief designer

31

"" ____________ 1958 ã.

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The same is the case of the same

Head of Department No. 14 /BORNESS/

Head of Laboratory 144 Candidate of Technical Sciences 30·1·58 /LAPPO/

Head of Laboratory Lead Engineer /CLOSING/ 30.1.58.

1958

DISCLAIMER

WARNING

The purpose of the development is the creation of an airborne radio station

the simplest artificial satellite of the Earth, intended

to obtain information about the existence of a satellite, for coarse radio-

its direction, for the organization of mass-scale radio stations

and for studying the propagation of radio waves in the ionosphere.

The need for long-term operation of such equipment is

is obvious. With limited power supplies

on the satellite, naturally, the thought arises about the possibility of procreation

the operating time of the equipment by means of switching on and off the

radio parameters on the satellite according to some program that provides

reception of signals in certain areas of the globe and the absence of

radiation and energy consumption when the satellite passes over the ocean

us / occupying, as is known, more than 70% of the surface of the Earth /.

However, the lack of reliable data on the density of the upper words

atmosphere does not allow an advance determination of the orbital volatility

during the flight and create a software device that solves this

problem.

niya / determined the main design features of the development new device.

After a preliminary study of the possibility of creating a similar new equipment carried out in the laboratory No. 12 NA-885 in 1956, Basic requirements for a radio station in January 1957 were zafiksi-Equations in the joint protocol NNI-885 and OKA-1 MONP / ref. ÍÈÈ-885 ¹ 305 dated 31/1-57 /, which in the future replaced the tactical-technical This task was the basis for the development of the equipment.

Some of the main provisions of this protocol are given below:

- Time of continuous operation of the transmitting device - 14 days,

- The transmitting device must be rated for operation in following conditions:

- temperature of the surrounding gas in the object - from -40 to +50 o C ,

- pressure from 100 mm Hg. up to 1.2 atm,

- humidity up to 80%.

In the off state, the device should keep working capability under all conditions specified for on-board equipment products 8K71, / except for the requirements for humidity /.

The values proposed by NNI-885 were recorded in the protocol frequencies of radio transmitters and radiated power, / justification of co-The latter are given later in this report/.

In addition, at the request of OKA-1, it was decided to use radio transmitting device for transmitting indications of two signal data - "Yes-no" type gauges that allow you to judge temperature and pressure inside the object. In the future, the number of such sensors has been

The report provides a description and rationale for the scheme and design

radio stations, as well as the results of design and

attempts / including, in particular, radio ope-

new stations in various areas of the Soviet Union by air

type ÈL-14 and ÒÓ-16, organized jointly with NNI-4 MO/.

The report contains brief information about the operation of radio stations

D-200 during flights of artificial satellites; scientific results

data on observations of radio signals, in part, new data on the spread of

radio waves and the structure of the ionosphere, which will be contained in the

information that should be published by the Institute of Radio and

Elektroniki AN SSR and NNI-4 MO, leading the organization of observa-

money.

The development of the radio station was carried out in the NNI-885 laboratory

No. 12 in January-March 1957, design and production of working

the same were carried out by Department No. 15 in March-April 1957; on-

starting from the stage of design and acceptance testing, the work of the

operated as part of department no. 14 / after turning on the lab. No. 12 in Ref.

No. 14/.

Consideration of issues of radio wave propagation and choice

The main parameters of the radio station were carried out by K.I. Greenhouse and

V.I.Lappo. The development of the device was carried out by V.V. Lapo. Adjustment

devices, and their design tests and delivery to the customer

The antennas used in the radio station are offered by Dr. Tech.

science. G.T.Markovym /МНЭН/; work on the antennas was carried out by the antenna

Laboratory 0Ka-1 MOS / initial x / M.V.Krajshkin /.

1. OPERATION

The choice of transmitter frequency determines the following factors:

1. The frequency of the transmitter must be high enough for in order to ensure the reception of satellite radio signals, regardless from the position of its relatively ionized words of the ionosphere.

2. The frequency of the transmitter must be selected within the range of frequency band of the existing station.

3. The selected frequency should allow organizing the mass observations of the satellite signals by radio lunatics.

4. The selected frequency should be such that the results mass radio monitoring of satellite signals would be possible use to obtain some new data on the distribution radio waves in the ionosphere and its structure.

5. When choosing a specific frequency, consider the load this part of the range.

For further consideration of the goal, it is advisable to bring some Brief information about the structure of the ionosphere.

As is usually stated in the literature /see, for example [2] /, The ionosphere has a layered structure, i.e. in it there are some ionization maxima /Fig. one/.

x/ Part of the considerations given in this section of the report, contained in the article [1]

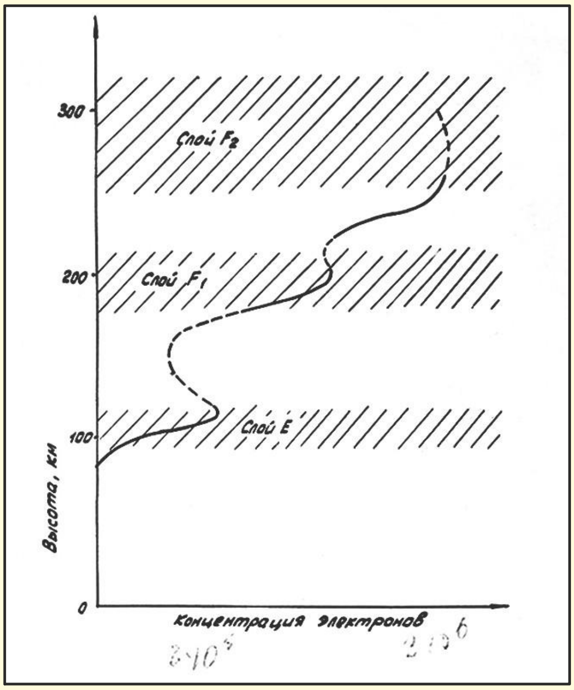


Fig. one

The main factors affecting the choice of radio frequency

the satellite chip, which is the layer of E, the maximum ionization of which

Life at an altitude of 100-120 km, and the F layer, which during the daytime hours

summer months is divided into two layers F_1 and F_2, imeåþùèõ

altitudes are about 200 and 250-400 km, respectively.

The electronic concentration of ionized words depends on

time of day, year and phase of the eleventh period of the solar

activities. эл./см³

Effective electron concentration of the layer E at the maximum

usually within 10^5 . 8.10^5 ≈ эл./см³ ≤ эл./см³

For layer F, the following figures are typical:

during the day in summer N_{max} 4.10^5 (F_2),

winter day N_{max} 2.10^6

At the heights of the Å layer, accumulations of ionization are often observed.

new clouds with an electron concen- tration up to 10^6 e/cm ^{3} /so from this layer at normal incidence.

The critical frequency is related to the maximum electronic circuit

centration centration

$$N = 1.24 \cdot 10^4 f^{2}_{max}, \qquad (1)$$

el./cm³

where N - c ,

f max - in megahertz.

The data on the heights of ionospheric layers, given above, are

Beams on the basis of the measurement of the return time of the reflected

pulse during vertical sounding of the ionosphere.

Special studies carried out in NIJ-885 at high altitudes

missile launches ANSSR [3], as well as similar experiments of the American

according to scientists [4], shows that the actual heights of the maxima

ionizations of words lie significantly /on 5O . 15O km / below, and the sama iono-

sphere / at least to the maximum layer F_2 / not bright

expressive syllable, but rather a monotonic structure smoothly

ionization with relatively small ionization maxima

öee.

On fig. 2 shows a typical high-frequency response

ionospheres for morning flight hours of 1957 obtained by the method

vertical sounding. In this figure, the altitude

the same time and

frequency characteristic calculated from the data obtained in

In the same place, the method of dispersion radiointerferometer below those indicated in the literature, and, consequently, the probability

the passage of the satellite above the ionization maximum of the F layer

etya...

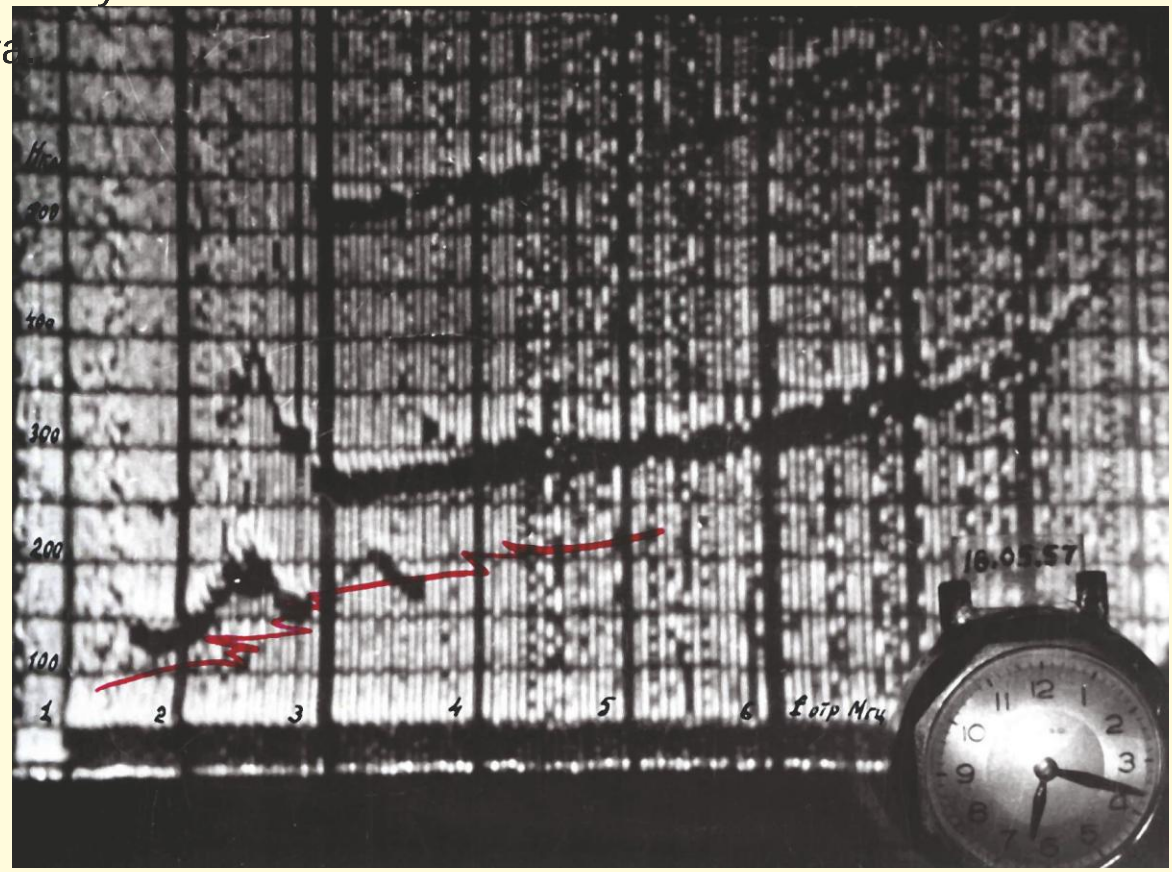


Fig. 2

The above data shows that when flying over the

even orbit / perigee ~ 220 km, apogee 700-1000 km / satellite can

The jet is both below and above the maximum of the layer F /or F_2 /.

International Geophysical Year 1957-58 coincides with mac-

a symbol of solar activity, which, as usual, will be accompanied by

driven by increased ionization of the ionosphere. The annual progress of the critical

Czech frequencies for maximum solar activity 1936-1937,

based on the data of one of the Japanese ionospheric stations

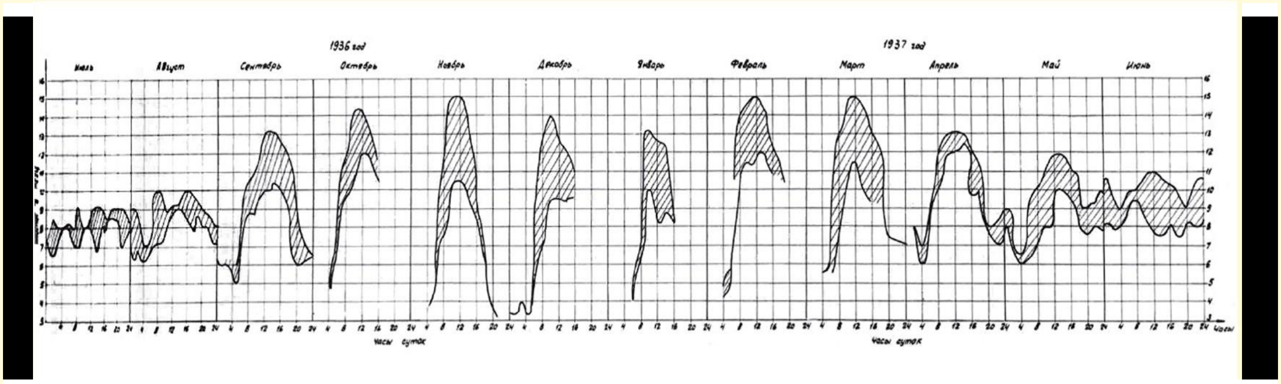


Fig. 3

Since the launch time of the first artificial satellite

During the development of the equipment, it was not precisely known, exactly

it can be seen that in order to select the waves of the transmitter, it was necessary to come out of

the worst conditions that may exist on a winter afternoon,

during the flight of the satellite over the maximum of the F layer.

Forecasts for 1957 pressure growth of critical frequencies in summer to

10 mon, and in autumn and winter / midday / up to 15 mon. From there it followed

that the frequency of the satellite's radio transmitter could not be selected lower

15 Mãö.

The highest frequency at which radio waves are reflected from

ionosphere, depends not only on the electron concentration of the layer, but

On fig. 4 shows a diagram of the possible path of radiation from satellite above the ionized layer.

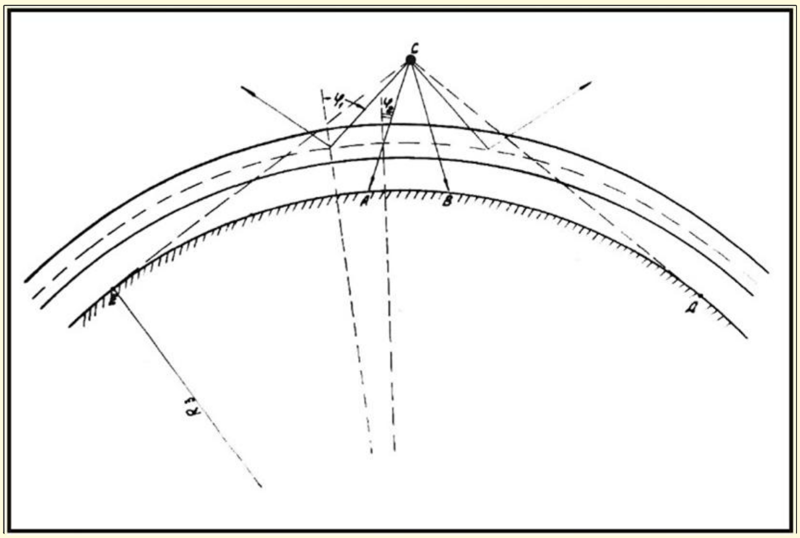


Fig. 4

reflection frequency during vertical sounding f_{kr} at is closely related to the oblique incidence reflection frequency f' the so-called "cosine law":

$$f' = \frac{f_{kp}}{\cos\varphi} \qquad (2)$$

For a certain value of the angle of incidence of the wave φ / φ_1 on Fig. 4/:

$$f_1 \le \frac{f_{kp}}{\cos\varphi}, \qquad (3)$$

and the radio wave, reflected from the layer, goes into the world space.

Only the rays inside a certain cone reach the earth's surface.

sa ABC. The corner at the top of this cone will be bigger than the top frequency of the radio signal.

In addition to the simple propagation scheme shown in Fig.

it is possible to receive a signal even outside the optical cone bridges /MSS/, for example, by multiple reflections between ion-spherical layer and earth / fig. 5/, between the layers F $_2$ and F $_1$, Å cn and t.i.

However, such types of distribution are anomalous and you cannot orient yourself on them.

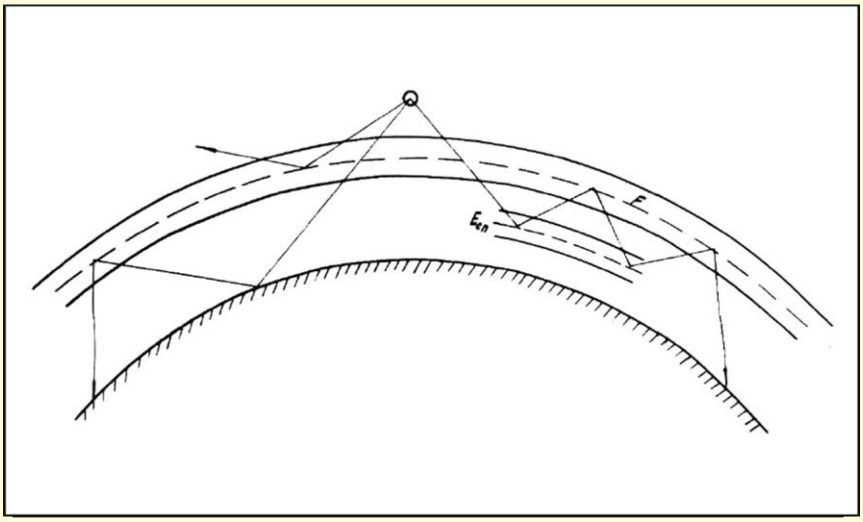


Fig. five

To locate the radio signals of the satellite, it is supposed to use use the existing branching direction network, select added radiopellengators of the "Krug" type. The upper frequency of the bearing - toroids of this type lie somewhat above 20 MHz. Number of bearings ditch /"Summer"/, able to work in a more high range /up to 60 MHz/, is small and the accuracy is much lower. This is the This is the main limitation in the choice of working hours satellite transmitter.

To organize mass observations of satellite radio signals Fans must take into account the frequency sub-band assigned deadlines. Therefore, from this point of view, it would be desirable to choose

the frequency of the satellite's radio transmitter is somewhere near the designated

beyond the ranges.

Based on the above considerations, from which the ≤

The most common are the worst ionospheric conditions / f_{kr} 15 m /

and the highest frequency of the "Krug" type pellenators, we after

Rhythmic determination of the saturation of the range of radio

means and coordination with the radio inspection of the Ministry of Communications

The frequency selected was 20.005 MHz.

The selected frequency lies fairly close to the expected frequency in

I957-58 Lag. the highest critical frequency of the layer F /in the winter field

day f_{cr} 1 5 mn/. Therefore, during the flight of the satellite, it was possible to

Given these conditions, when the cone of audibility of the signal / ACS in fig.

4/ there will be a significantly smaller cone, which determines the optical

visibility. In addition, the radio waves in the cone of hearing must

there is a significant attenuation in the F layer 2 - about 10 db /.

The duration of the session of receiving a radio signal under these conditions,

which is generally small and amounts to units of minutes, even more

It is thought that it should be difficult to observe the radio signals of the satellite

nick.

From this point of view, it would be desirable to choose the working hour

. 3 times higher

connections with the above-mentioned ideas arose the thought about one

temporary use of the second radio transmitter with another, sufficient

precisely high frequency (for which the propagation conditions in the io-

nosphere would always be favorable) and which would reduce the likelihood of

the news of a complete exit from the system of onboard radio transmitters.

These considerations led to the decision to apply the redundant

satellite transmitter kit with frequency selected within

$/2 . 3/ f_{cr.max}$.

The value of the second frequency was chosen on the border of the amateur

seven-meter range, namely 40.002 MHz. When flying satellites

above layer F cone of hearing at a frequency of 40.002 MHz

life is wider than at a frequency of 20.005.

The difference in the time of appearance and disappearance of radio signals on

These frequencies during the flight of the satellite over this area will be

depends on the state of the ionosphere and the altitude of the flight of the satellite on the data

nom segment of the orbit. Registration of this time difference, relative to

new signal level at 2 frequencies, Doppler frequencies for both

radio waves should allow obtaining new information about the structure

ionospheres. In this case, it is important that these observations have a mass

character. This could be achieved by attracting radio-observed

niami, except for special radio stations, a wide range of Soviet weather and worst ionospheric conditions /winter afternoon/.

The maximum communication range corresponds to the position of the satellite

nick on the optical horizon in relation to the receiving point, moreover, the satellite is at the apogee of the orbit /Fig. 6/. At height

apogee H a 700 km maximum direct beam communication range

approx. S 3000 km.

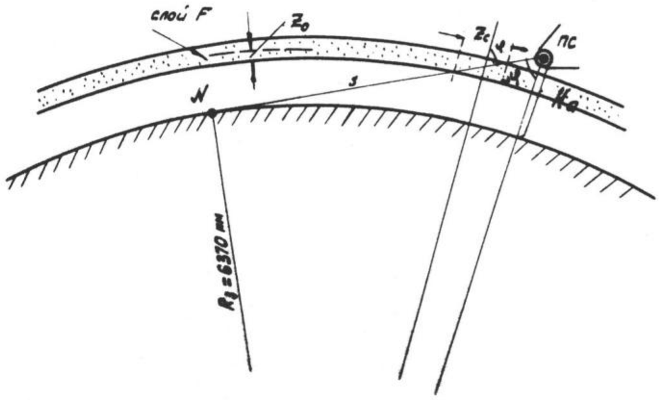


Fig. 6

The worst ionospheric conditions, obviously, have a place in the

the satellite is flying over the maximum F layer on a winter afternoon.

The following input data, characteristic of the layer, were taken

F on a winter afternoon in 1957-58

The maximum concentration of electrons N_{max} 2.10 ^{6} cm $^{-3}$.

number of collisions = 10 ^{3} . 10 ^{4} sec $^{-1}$

Layer thickness F z o = 100 300 km.

$z_c \approx \frac{2z_o}{\cos\,\varphi}$

For an approximate assessment of absorption, it was considered that the radio where φ is the angle of incidence of the wave on the real layer,

$$\varphi_{max} = \arcsin \frac{R_з}{R_з + H_a} \approx 65^o$$

$R_з$ - radius of the earth.

Specific attenuation per 1 km

$$\beta'\left(\frac{дб}{км}\right) \approx 46.10^3 \frac{N_{cp}\nu}{\omega^2}. \qquad \text{(five)}$$

Complete damping $\beta(дб) = z_c\beta'$. Considering how it usually is

when calculating the absorption of radio waves, which in real layer F

to the working class

$$N = N_{max}\left(1 - \frac{z^2}{z_o}\right) \qquad (6)$$

for an equivalent homogeneous layer of the same thickness:

$$N_{cp} = \frac{2}{3} N_{max}. \qquad (7)$$

Assuming for the entire thickness of the layer, the average value of the number of vessels is ν

Rhenium = 5.10 [3] , got:

for f_1 = 40 Ìãö, $\beta_1 \approx$ 1.75 dá,

f_2 \u003d 20 Ìãö, $\beta_2 \approx$ 7 dá.

For free space, the field strength at the point of application

Ma is evaluated by the formula

$$E_{эф}\left(\frac{мв}{м}\right) \approx \frac{222\sqrt{P_{(кВт)}}}{r_{(км)}}. \qquad \text{(eight)}$$

When the sensitivity of the receivers is Å꩜ 5 μV and the heights of receiving antennas 5 and 2.5 m / half-wave vibrators for frequencies 20 and 40 MHz/ taking into account damping in the F layer according to the formula /8/ The required radiation power is about 1 W at each frequency.

Should we receive the radio signals of the satellite, utilizing only professional network, where the sensitivity of radio receivers in in telegraph mode with a band of 1 kc is not less than 0.5 mkv, It would be sufficient to have a radiation power of the order of 10 mW.

3. OPEN RADIATION

Due to the small size of the satellite, very desirable It would be possible to build transmitters on crystal triodes. Op- significant reduction in volume and weight of the power supply would probably allow you to install additional hardware for making scientific observations. However, one of the main conditions the use of germanium crystal triodes is a guaranteed Keeping the temperature even in the satellite below +50 ^{o}C. temperature regime inside the satellite during the development of the radio ii was rather unspecified, reliability requirements were excluded even partial use of semiconductor elements in the circuit editor.

When choosing the type of lamp, the following criteria were taken into account:

1. The ability to generate about 1 watt at frequencies up to 40 MHz.

2. Ability to withstand vibration in a cold state and linear overloads inherent in the carrier rocket on the active part of the trajectory

Requirements 1-4 satisfies the standard receiver-amplifier new lamps of the ultra-miniature series "Drob", "Palma" and miniature nov /finger series/.

Since the generator, designed on any of these lamps, has approximately the same consumption at the same rate, then when choosing lamps on the basis of economy, first of all, Be sure to pay attention to the economy of the filament circuit. Relative new consumption of energy by the incandescent circuit of the pentode radio lamp, ra- operating in generator or booster modes, is: for lamp of the finger series 50 - 60%, for lamps of the "Drob" series 30-40%, for lamps of the series "Palma" 10-12%.

The most economical are the lamps of the "Palma" series. However real circuits of transmitters designed on the mentioned types the smell of lamps, may differ in terms of the number of lamps used, as well as other circuit features that affect the economy device as a whole. Therefore, the circuits were worked out on all three pah lam.

The main technical requirements can satisfy two cascaded transmitters with stabilized quartz exciter and a two-stroke high-frequency amplifier assembled on lamps type 6Æ1Á /"Drob"/ or 2Ï19Á /"Palma"/, or single-lamp The editor, assembled on a finger lamp type 6-5П according to the scheme with electronic coupling and quartz exciter in the circuit of the screen set ki. In Table. 1 shows the main energy ratios for

Table 1

Вид схемы	Задающий генератор с кварцевой стабилизацией и двухтактный УВЧ на лампах:		Одноламповая схема с электронной связью на лампе:
	2П19Б	6Ж1Б	6Ж5П
Мощность, потребл.цепями накала /вт/	1,44	7,5	5,7
Мощность, потребл.цепями анода и экр.сеток /вт/	5÷ 6	5÷ 6	4,0
Общее потребл. /вт/	7	13	9,7
Мощность в ант. /вт/	1	1	1
Полный КПД /%/	14	7÷ 8	9÷ 10
Относит.мощн.потребл. на накал /%/	21	57	60

As can be seen from the table, the circuit using three lamps of the type

2Ï19 is the most economical, even despite the fact that

The third circuit /on 6Æ5П/ uses only one lamp.

Lamp circuit 2-19B and was accepted for implementation.

To provide power to the transmitter, a battery is used - our battery, consisting of two groups of new, previously unreleased in the industry of silver-zinc batteries, developed new scientific research institute of elemental

Tom Mпер.

The incandescent battery has a voltage of 7.5 V $^{+20\%}_{-6\%}$ and is of 5 elements SOD-70 capacity 140Ah. Anode battery 130v $^{+20\%}_{-6\%}$ consists of 86 elements SPT-18 /capacity 30Ah/ and has taps to power the screen and pentode grids of the transmitter and manipulator ða: 90 â, 20 â and 10 â. Battery weight approx. 5O kg.

More details on the design and characteristics of the sources power can be found in the "Technical project for the development power supplies for "Eject". NÈÝÝÈ /inv. No. 701/.

4. MONEY

The type of work, the choice of the method of manipulation and relay type

The signal in the form of continuous radiation is difficult to distinguish when high level of interference generated by radio stations, industrial electrical installations, interferential whistles. Therefore, when In the development, it was decided to somehow "colorize" the radio signals.

If you select the "paint" type, that is, the type of modulation or manipulation the following should be taken into account:

1. The reception of signals on the ground must be of a standard ≤ ≤ communication with radio receivers.

2. Signals must have four kinds of coloring, clearly distinguishable on hearing, one of which must correspond to the normal external under the operating conditions of the transmitter /O t +50 ^{o}C ; ð > 250 mm Hg/, and three others should respond to violations of the normal external conditions viy, respectively with the closure or opening of the contact group of alarms for changes in temperature or pressure inside satellite.

3. Signals should have a form convenient for special bands.

The totality of all requirements determined the choice of "painting"

signals in the form of short-term bursts, emitted in turn

each of the two transmitters / at frequencies of 20 and 40 MHz /. For po-

short-term, controllable by the duration of the bursts, pri-

Change the way to unlock and lock the lamps Â× by screen circuits

grids carried out by a special manipulator.

The duration of the packages, corresponding to the nominal conditions

work, about 400 milliseconds. In the event of operation of the temperature alarms -

tour and pressure sharply change the duration of the bursts corresponding to

higher transmitters. Radiation at one frequency corresponds to

pause at another frequency.

When choosing a circuit and elements of the manipulator, the main assembly

The goal is to achieve the highest cost-effectiveness in terms of consumption

low power supply with small dimensions and light weight. Sub-

lag switching current /twice the screen current V×/ is

at a voltage of 90 V about 12 mA.

The electronic circuit of the manipulator was rejected, as

The power supply of the manipulator lamp / the anode current of which

vit not less than 12 mA/significantly reduces the overall efficiency. transmitter.

Another version of the manipulator circuit could be a circuit with

gas-discharge devices connected in series in the circuit

îòîîñèòåëüíîé âëàæíîñòè 30 -

relay windings. But all suitable neon lamps and stabilizers

stresses are not vibration resistant.

acceleration up to 20 g and vibration of the attachment points up to 4 g at frequent

thaõ 20 . 100 ão. The factory guarantees 4 million operations.

In the nominal mode, the number of operations for 14 days should

add up to about 3 million. Relay circuit with comparatively little

large size consumes relatively little energy - approx.

20 mw. On fig. 7 shows the principle diagram of the manipulator.

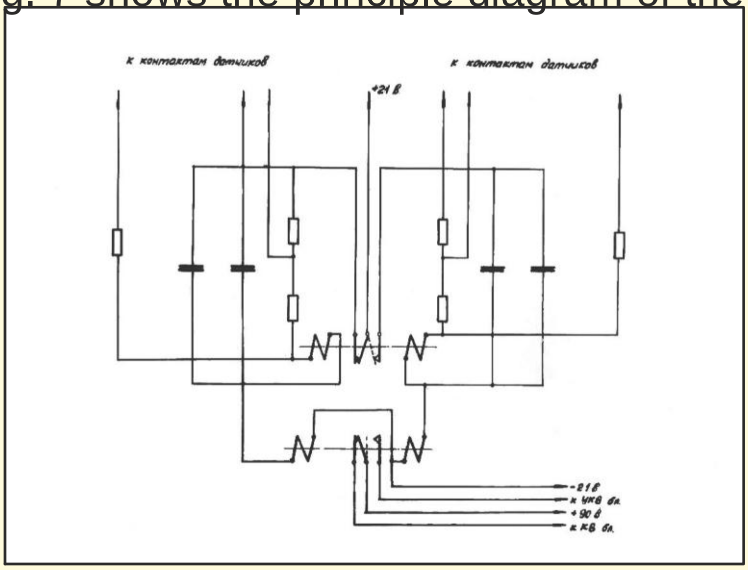


Fig. 7

On fig. 8 shows the package of the manipulator itself. Upper short-wave transmitter,

lower - rejects the ultrashort-wave transmitter. Â takt ñ

These sends will follow the high-frequency sends of the transmit-

Chikov.

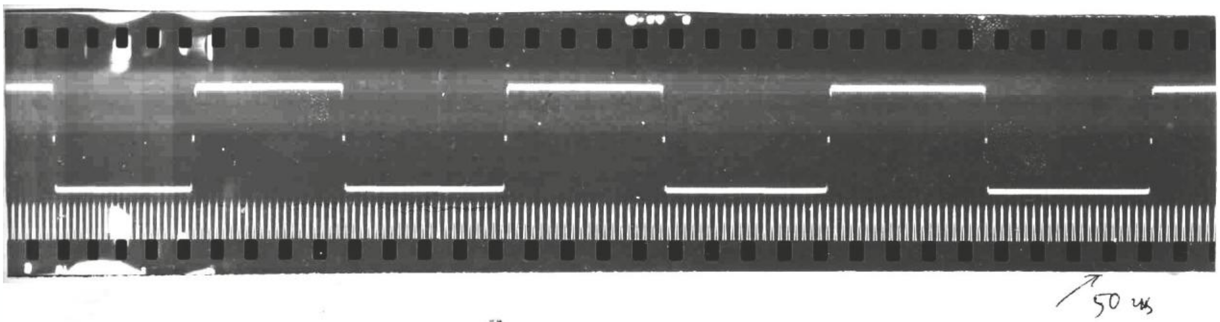
5. ANNOUNCEMENT

Due to the fact that both transmitters work in series,

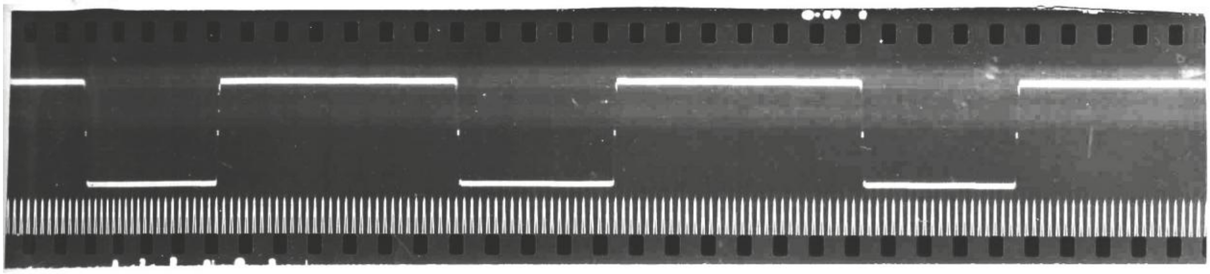
the best option would be to use one common antenna.

However, the preliminary study of this variant showed that

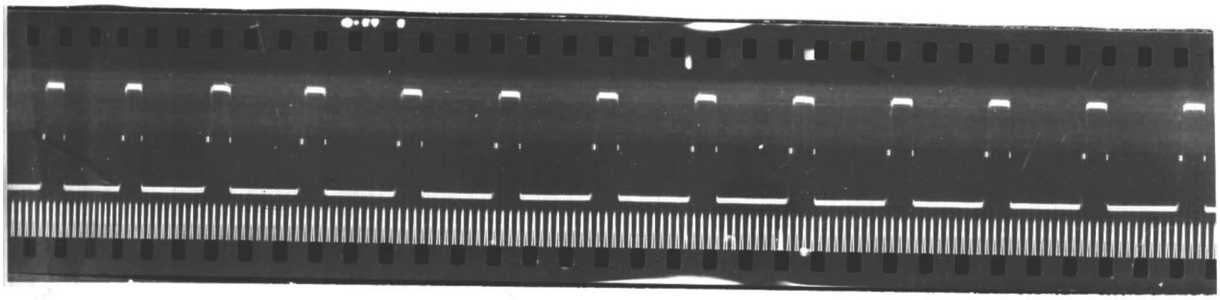
filters necessary for the normal operation of the antenna while simultaneously



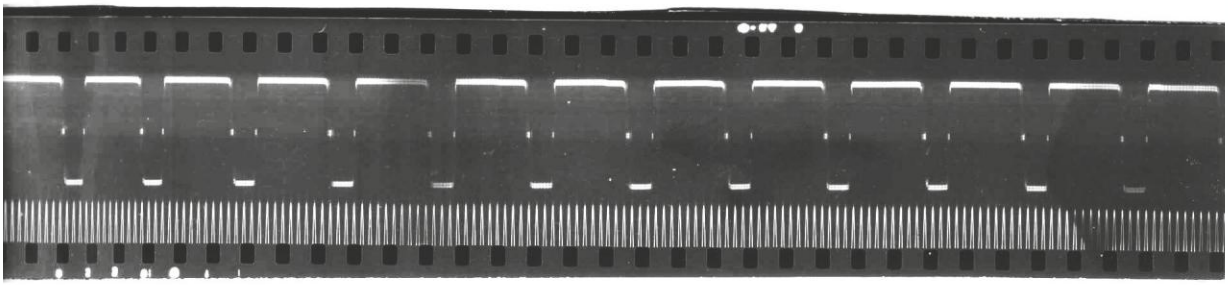
$0 < t < +50^{\circ}C$; $p > 250$ MM. pm. cm.



$t < 0^{\circ}C$; $p > 250$ MM. pm. cm.



$t > +50^{\circ}C$; $p > 250$ MM. pm. cm.



$p < 250$ MM. pm. cm.

Fig.8

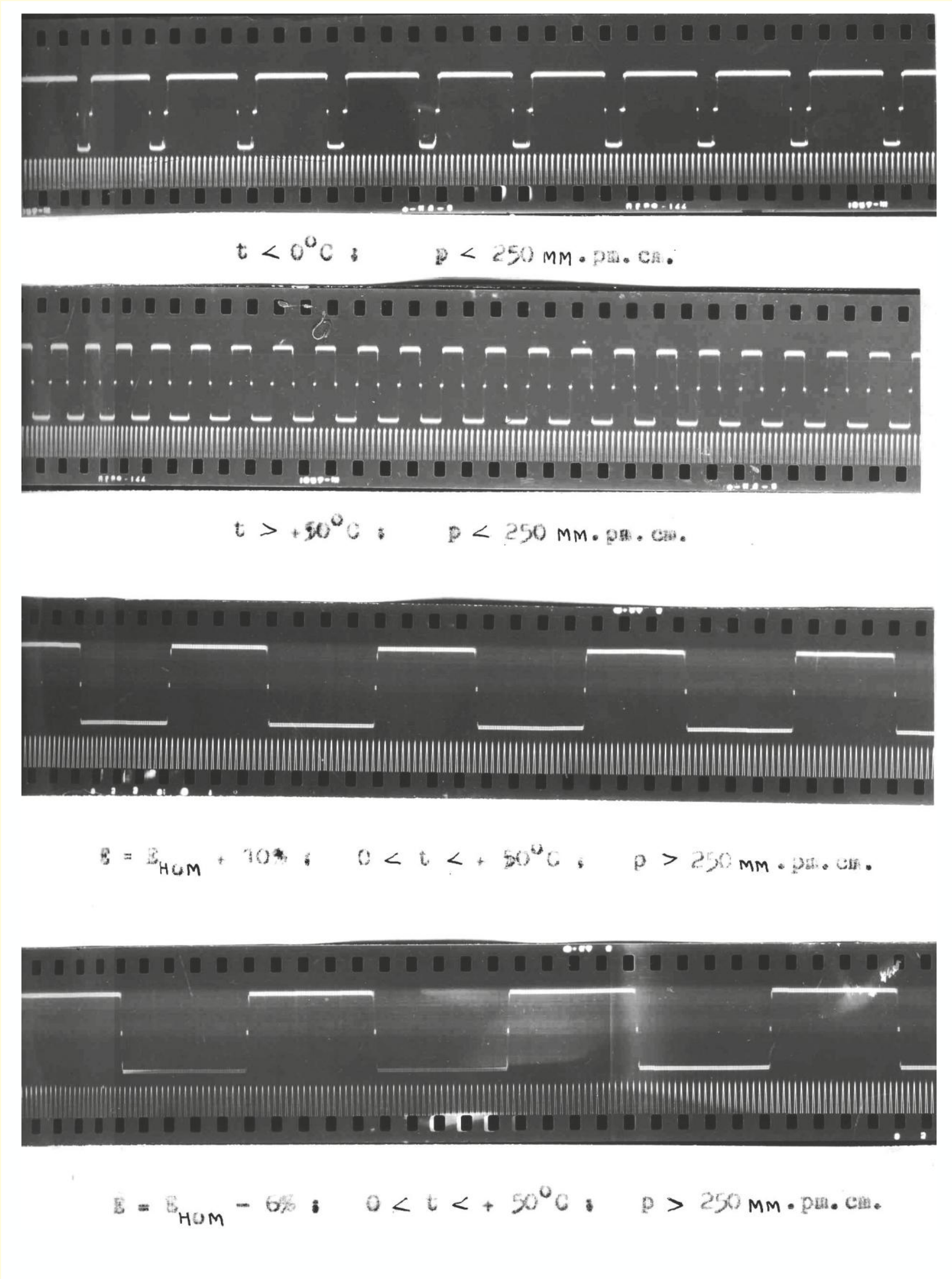

t < 0°C ; p < 250 мм.рт.ст.
t > +50°C ; p < 250 мм.рт.ст.
E = E ном + 10% ; 0 < t < + 50°C ; p > 250 мм.рт.ст.
E = E ном − 6% ; 0 < t < + 50°C ; p > 250 мм.рт.ст.

Fig. eight

on center constants, then they introduce greater losses and has a very critical setting.

From various options for soft antennas, since it was impossible to ensure the certainty of their shape in the weightlessness.

To obtain directional patterns of antennas that do not have sharp minima, angled antennas are chosen. Such antennas are good structurally compatible with the main part of the carrier rocket, pri- what ensures the safety of the pin during startup and does not degrade - are the aurodynamic properties of the rocket.

From these considerations, two hard dipole angular antennas, the dipoles of which are arranged in two mutually dicular planes. Antenna pins through fiberglass slit the insulators are attached to the body of the satellite container. Øtyri zapity- with tape conductors, which are sealed through inputs connected to the middle wires of high-frequency coaxial cable; the cable braid is connected to the container body.

The length of the ultrashort-wave antenna is 2.4 m / 0.132 λ, and short-wave 2.9 m / 0.13 λ. Smaller compared to 0.25 λ the length of these pins was determined by the length of the head parts of the launch vehicle.

On fig. 10, 11, 12 and 13 are the directional diagrams antenna. They were taken for two angles of the antenna solution α with the selected new coordinate system shown in fig. nine.

On fig. 10 shows the ultra short flow diagram wave antenna $E_\theta = \Psi(\theta)$ at $\varphi = 0$ with the opening angle $2\alpha = 48^o$;

in fig. 11 - short wave at $\varphi = 0$; $2\alpha = 48^o$

in fig. 12 - ultrashort-wave at $\varphi = 0$; $2\alpha = 70^o$

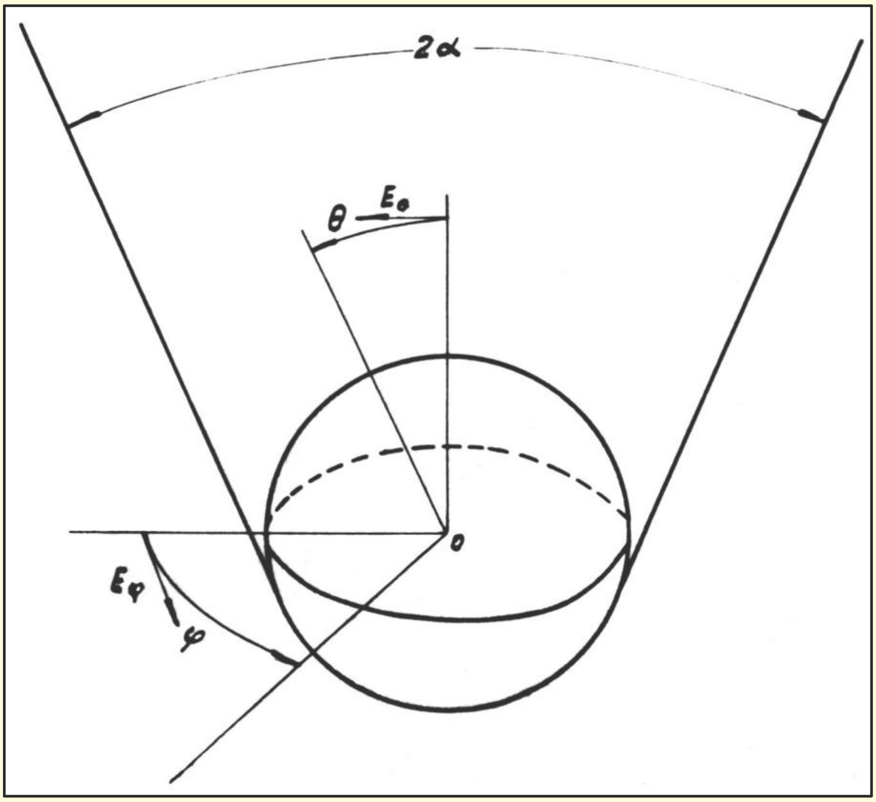
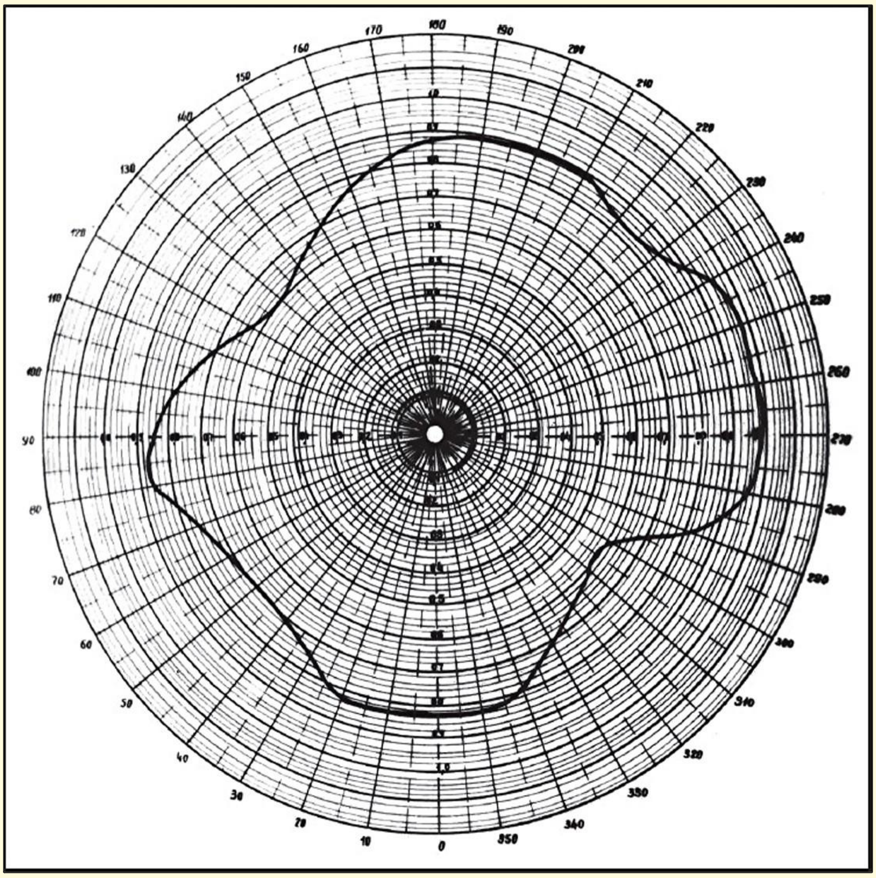


Fig.9


180
190
200
210
220
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240
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70
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120
130
140
150
160
170

Fig.10

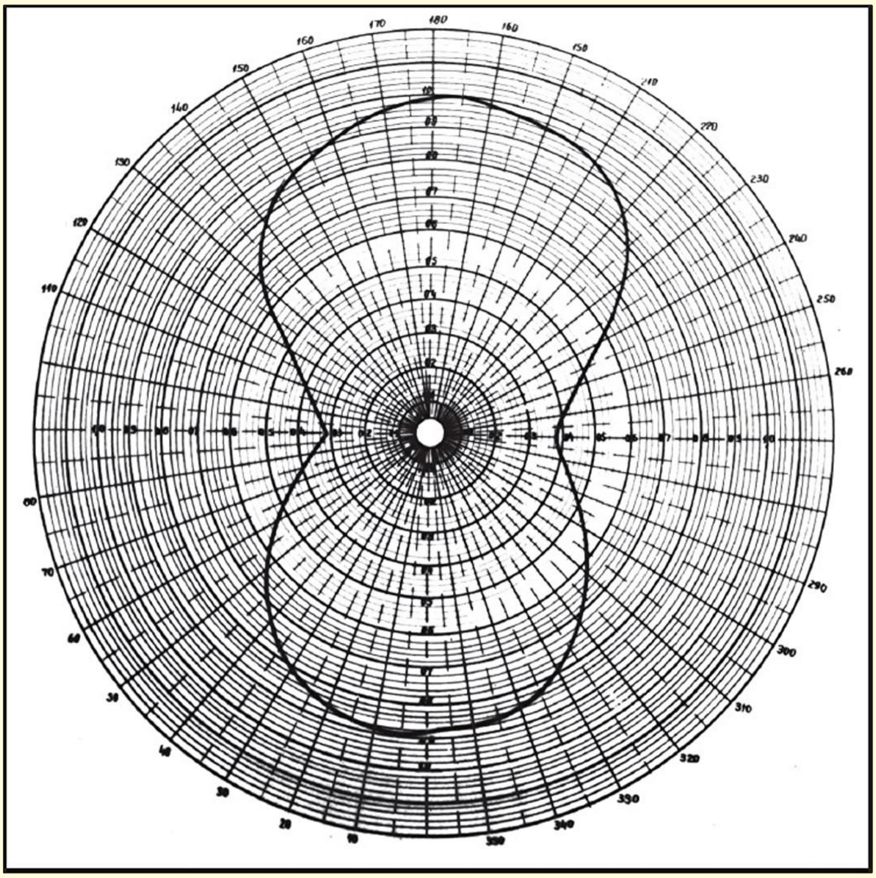


Fig.11

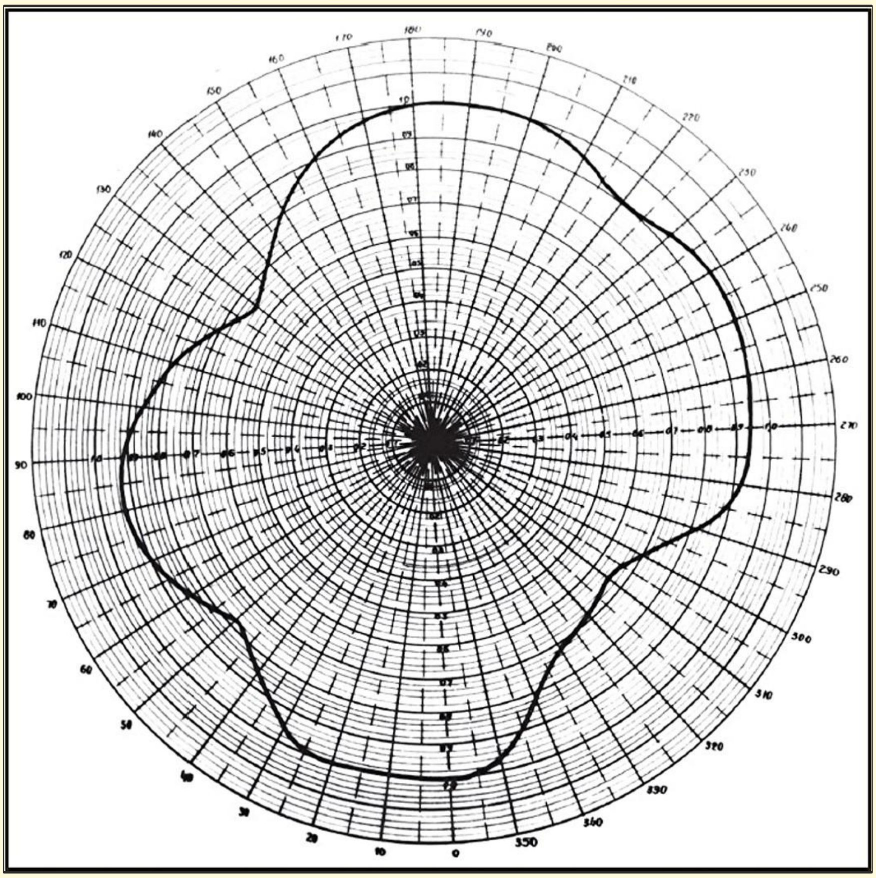


Fig.12

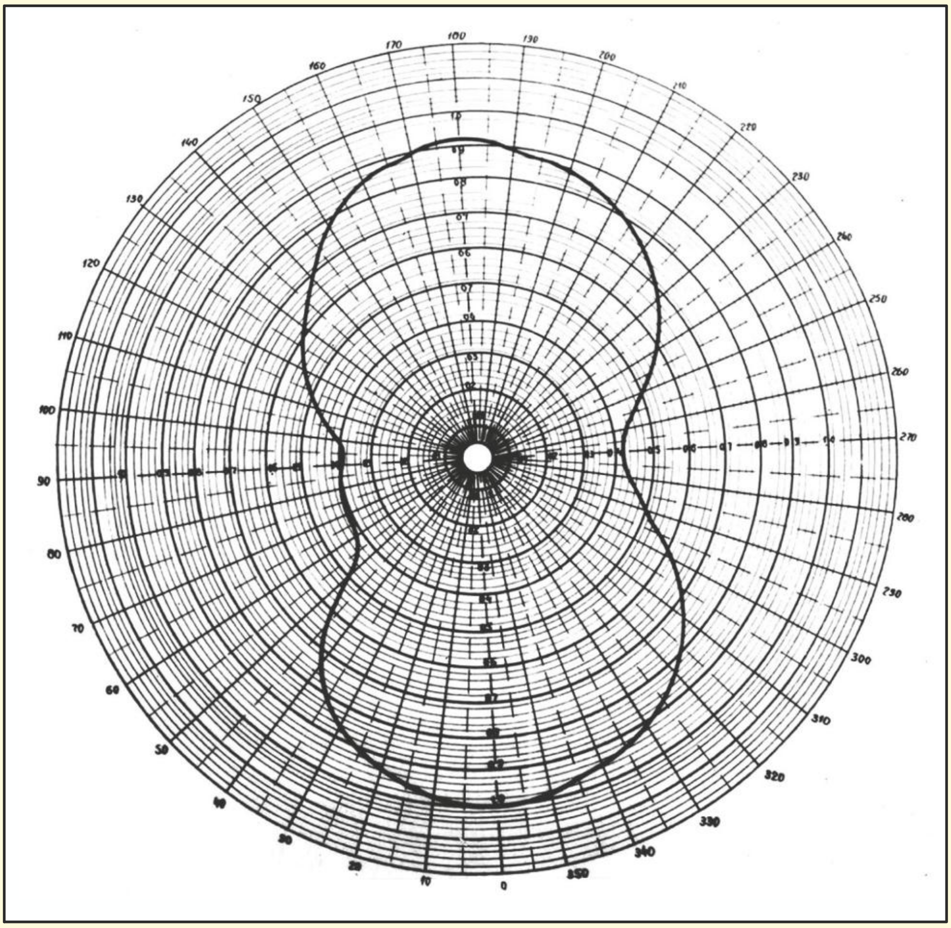


Fig.13

6. SCHEME AND CONTROL

The basic diagram of the device is shown in fig. 14. Top The circuit of the ultrashort wave transmitter / λ = 7.5 m/, / λ \ u003d 15 m / transmitter, scheme of mani- The filler is given on the left, below. Scheme of master generators of tritet- naya, the generator is assembled according to the Pirse scheme with quartz, the included between the grid and the anode of the triode part of the lamp / the role of the anode of the triode parts of the lamp are played by the screen grid/. B Anode lamp circuit circuit turned on, set to 20 MHz in a short wave and at 40 µm in ultra short wave transmitter. Just like both quartz operates at a frequency of 20 MHz, then in an ultra-short-wave chike on the anode part of the frequency doubling.

In the cathode circuits of lamps L_I, L_4, oscillatory circuits are included, formed by connected parallel coils $L_1 L_2$ / or $L_5 L_6$ /, Capacitor C6 /or C27/, interelectrode capacitance lamp /L1 or L4/ and parasitic capacitances.

The anode circuit is formed by coil L_3 / or L_7 / condenser satorom CII /or C32, C34/ and external capacitances. Capacitor C12 /or C33/ serves to symmetrize the anode circuit in relation to ground, which is necessary for the transition to a two-stroke circuit Grid power supply V×. Coupling with V-capacitance, through bypass capacitors C14, C15 /or C6, C37/.

Automatic grid blending Counting grid currents on resistances R8, R9 /or RII, R12/.

The anode circuit is formed by a coil L_4 / or L_8 /, con-

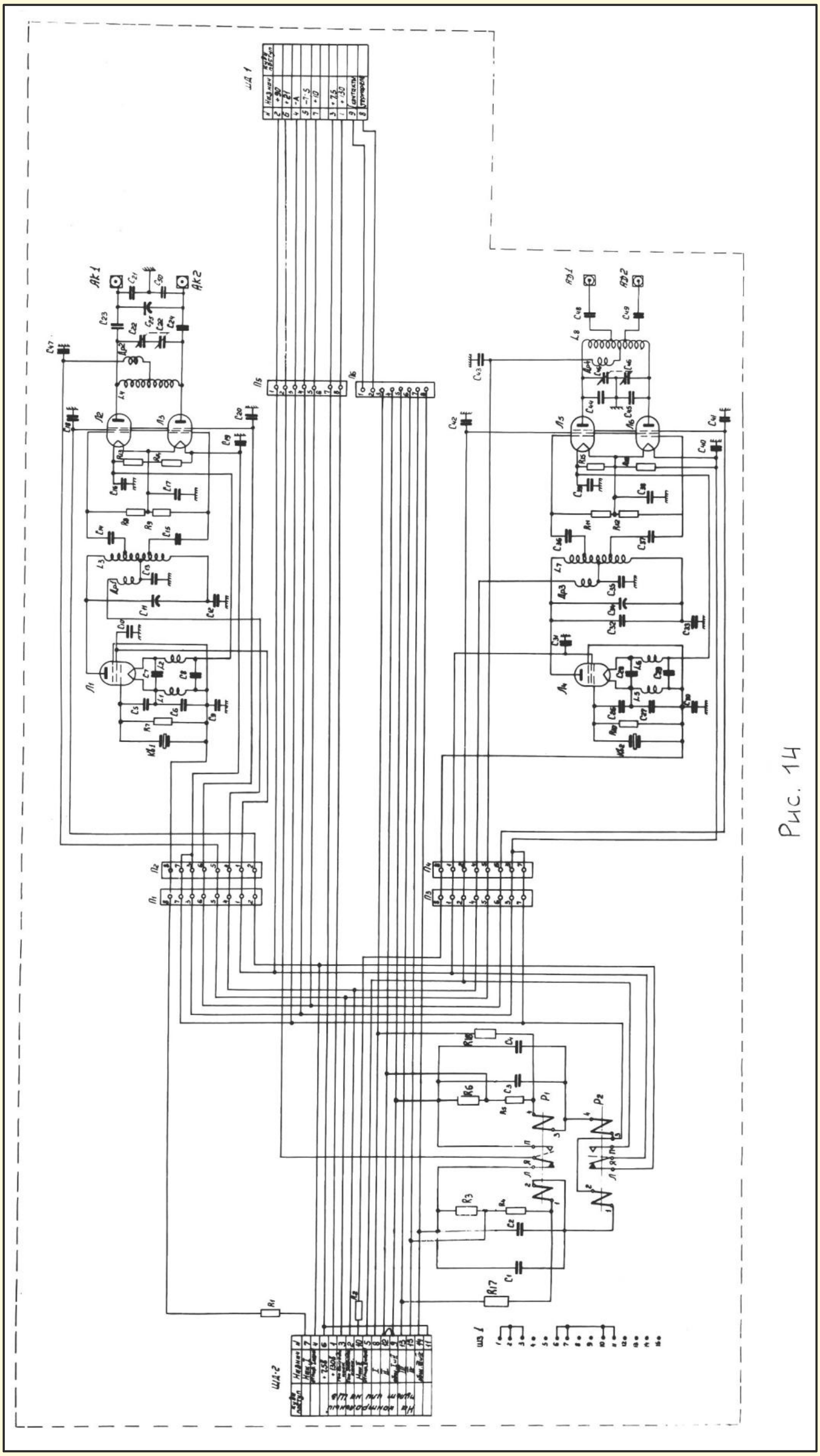


Рис. 14

ПЕРЕЧЕНЬ ЭЛЕМЕНТОВ

Позиционные обозначения	ГОСТ, ВТУ, нормаль, чертеж	Наименование и тип	Основные данные, номинал	К-во	Примеч.	изменен.
R1	ИЮ5.634.109	Сопротивление		1		
R2	ИЮ5.634.109	Сопротивление		1		
R3	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-16000-Ⅱ-Б		1	под. при рег. 10000÷24000	
R4	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-75000-Ⅱ-Б		1	под. при рег. 43000÷[illegible]	
R5	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-75000-Ⅱ-Б		1	под. при рег. 30000÷[illegible]	
R6	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-16000-Ⅱ-Б		1	под. при рег. 15000÷56000	
R7	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-0,13-Ⅱ-Б		1		
R8	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-22000-Ⅱ-Б		1	под. при рег. 20000÷24000	
R9	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-22000-Ⅱ-Б		1	под. при рег. 20000÷24000	
R10	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-0,13-Ⅱ-Б		1		
R11	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-22000-Ⅱ-Б		1	под. при рег. 20000÷24000	
R12	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-22000-Ⅱ-Б		1	под. при рег. 20000÷24000	
R13	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-240-Ⅱ		1	под. при рег. 220÷270	
R14	ОЖО.467.006ТУ	Сопротив. ОВС-0,25-1-91-Ⅰ		1	под. при рег. 82÷110	
R15	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-240-Ⅱ		1	под. при рег. 220÷270	
R16	ОЖО.467.006ТУ	Сопротив. ОВС-0,25-1-91-Ⅰ		1	под. при рег. 82÷110	
R17	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-18000-Ⅱ-Б		1	под. при рег. 10000÷30000	
R18	ОЖО.467.007ТУ	Сопротив. ОМЛТ-0,5-18000-Ⅱ-Б		1	под. при рег. 10000÷30000	
C1	ОЖО.462.015ТУ	Конденс. ОМБГ-1-160-4-(25мм)-Ⅱ		1		
C2	ОЖО.462.015ТУ	Конденс. ОМБГ-1-160-4-(25мм)-Ⅱ		1		
C3	ОЖО.462.015ТУ	Конденс. ОМБГ-1-160-4-(25мм)-Ⅱ		1		
C4	ОЖО.462.015ТУ	Конденс. ОМБГ-1-160-4-(25мм)-Ⅱ		1		
C5	ОЖО.460.009ТУ	Конденс. ОКТК-1-М-4-Ⅱ		1		
C6	ОЖО.460.009ТУ	Конденс. ОКТК-1-М-20-Ⅱ		1		
C7	Гост 7111-54	Конденс. СГМ-2-250-Г-1200-Ⅱ		1		

Составил	Лаппо		12.4.57
Проверил	Лаппо		9.5.57
Н. контр.	Сидоров		9/IV.57

ИЮ2.019.001 сх9

Лит. | Кол | № приказа | Подп | Дата

Лист 2 | Всего листов 5

ПЕРЕЧЕНЬ ЭЛЕМЕНТОВ

Позиционные обозначения	ГОСТ, ВТУ, нормаль, чертеж	Наименование и тип	Основные данные, номинал	К-во	Примеч.	Изменен.
C8	Гост 7111-54	Конденсат. СГМ-2-250-Г-1200-II		1		
C9	У60.460.014ТУ	Конденсат. КТПС-1		1		
C10	У60.460.014ТУ	Конденсат. КТПС-1		1		
C11	В65604.023Сп	Конденсат. подстроечный		1		
C12	ОЖО.460.009ТУ	Конденсат ОКДК-1-М-6-II		1	Подб. при рег. 5÷7	
C13	Гост 7111-54	Конденсат. СГМ-1-250-Г-560-II		1		
C14	ОЖО.460.009ТУ	Конденсат. ОКТК-1-Д-100-II		1		
C15	ОЖО.460.009ТУ	Конденсат. ОКТК-1-Д-100-II		1		
C16	У60.460.015ТУ	Конденсат. КО-2-СК-3600		1		
C17	Гост 7111-54	Конденсат. СГМ-4-250-Г-10000-II		1		
C18	У60.460.015ТУ	Конденсат. КО-2-СК-3600		1		
C19	У60.460.015ТУ	Конденсат. КО-2-СК-3600		1		
C20	У60.460.015ТУ	Конденсат. КО-2-СК-3600		1		
C21	ОЖО.460.009ТУ	Конденсат. ОКТК-1-М-39-II		1	Подб. при рег. 33÷38	
C22	ИЮ4.652.011Сп	Конденсат. переменный		1		
C23	ОЖО.460.008ТУ	Конденсат. ОКТК-2-М-47-II		1	Подб. при рег. 36÷51	
C24	ОЖО.460.009ТУ	Конденсат. ОКТК-2-М-47-II		1	Подб. при рег. 36÷51	
C25	ОЖО.460.010ТУ	Конденсат. ОКПК-1-6/25		1		
C26	ОЖО.460.009ТУ	Конденсат. ОКТК-1-М-8-II		1		
C27	ОЖО.460.009ТУ	Конденсат. ОКТК-1-М-20-II		1		
C28	Гост 7111-54	Конденсат. СГМ-2-250-Г-1200-II		1		
C29	Гост 7111-54	Конденсат. СГМ-2-250-Г-1200-II		1		
C30	У60.460.014ТУ	Конденсат. КТПС-1		1		
C31	У60.460.014ТУ	Конденсат. КТПС-1		1		
C32	ОЖО.460.009ТУ	Конденсат. ОКТК-1-М-36-II		1	Подб. при рег. 20÷39	
C33	ОЖО.460.009ТУ	Конденсат ОКДК-1-М-6-II		1	Подб. при рег. 5÷7	
C34	В65604.023Сп	Конденсат. подстроечный		1		
C35	Гост 7111-54	Конденсат. СГМ-2-250-Г-1200-II		1		
C36	ОЖО.460.009ТУ	Конденсат. ОКТК-1-Д-100-II		1		
C37	ОЖО.460.009ТУ	Конденсат ОКТК-1-Д-100-II		1		
C38	Гост 7111-54	Конденсат. СГМ-4-250-Г-10000-II		1		
C39	У60.460.015ТУ	Конденсат. КО-2-СК-3600		1		
C40	У60.460.015ТУ	Конденсат. КО-2-СК-3600		1		
C41	У60.460.015ТУ	Конденсат. КО-2-СК-3600		1		
C42	У60.460.015ТУ	Конденсат. КО-2-СК-3600		1		
C43	У60.460.014ТУ	Конденсат. КТПС-1		1		

Составил	Лаппо	[signature]	12.V.57
Проверил	Лаппо	[signature]	12.V.57
Н. контр.	Сидоров	[signature]	9/V-57

ИЮ2.019.001.ОЭ

Лит. | Код | № приказа | Подп. | Дата

Лист 3 | Листов 5

ПЕРЕЧЕНЬ ЭЛЕМЕНТОВ

Позиционные обозначения	ГОСТ, ВТУ, нормаль, чертеж	Наименование и тип	Основные данные, замечания	К-во	Примеч.
С44	ОЖО.460.009ТУ	Конденс. ОКТК-2-М-56-II		1	под. при рег. 51÷62
С45	ОЖО.460.009ТУ	Конденс. ОКТК-2-М-56-II		1	под. при рег. 51÷62
С46	ИЮ4.652.011сп	Конденсатор переменный		1	
С47	460.460.014ТУ	Конденс. КТПС-1		1	
С48	ГОСТ 7111-54	Конденс. СГМ-2-250-Г-1200-II		1	
С49	ГОСТ 7111-54	Конденс. СГМ-2-250-Г-1200-II		1	
С50	ОЖО.460.009ТУ	Конденс. ОКТК-1-М-39-II		1	под. при рег. 33÷38
L1-L2	ИЮ4.777.184сп	Катушка индуктивности		1	
L3	ИЮ5.062.151	Контур		1	
L4	ИЮ2.062.079сп	Контур		1	
L5-L6	ИЮ4.777.184сп	Катушка индуктивности		1	
L7	ИЮ5.062.151	Контур		1	
L8	ИЮ2.062.080сп	Контур		1	
Л1	ТЗ. завод п.я. 4106	Лампа 2П19Б „Пальма"		1	
Л2	ТЗ. завод п.я. 4106	Лампа 2П19Б „Пальма"		1	
Л3	ТЗ. завод п.я. 4106	Лампа 2П19Б „Пальма"		1	
Л4	ТЗ. завод п.я. 4106	Лампа 2П19Б „Пальма"		1	
Л5	ТЗ. завод п.я. 4106	Лампа 2П19Б „Пальма"		1	
Л6	ТЗ. завод п.я. 4106	Лампа 2П19Б „Пальма"		1	
Др1	ИЮ5.775.258	Дроссель		1	
Др2	ИЮ5.775.258	Дроссель		1	
Др3	ИЮ5.775.259	Дроссель		1	
Др4	ИЮ5.775.259	Дроссель		1	

Составил	Лаппо	[signature]	12.IV.57
Проверил	Лаппо	[signature]	12.IV.57
Н. контр.	Сидоров	[signature]	9/V-57

ИЮ2.019.001сх э

Лит. | Кол. | № приказа | Подп. | Дата

Лист 4 | Всего листов 5

ПЕРЕЧЕНЬ ЭЛЕМЕНТОВ

Позиционные обозначения	ГОСТ, ВТУ, нормаль, чертеж	Наименование и тип	Основные данные, замечания	К-во	Примеч.	Изменения
P1	РСО.452.014ТУ	Реле РПС-4 пасп. РС4.520.350Д1		1		
P2	РСО.452.014ТУ	Реле РПС-4 пасп. РС4.520.350Д1		1		
КВ1	ИЮ0.329.023ТУ	Кварц. резонатор Д-200-I		1		
КВ2	ИЮ0.329.023ТУ	Кварц. резонатор Д-200-II		1		
П1	В.65691.071сп	Колодка с лепестками		1		
П2	В.65691.071сп	Колодка с лепестками		1		
П3	В.65691.071сп	Колодка с лепестками		1		
П4	В.65691.071сп	Колодка с лепестками		1		
П5	В.65691.071сп	Колодка с лепестками		1		
П6	В.65691.071сп	Колодка с лепестками		1		
Ш1	ВЛ0.364.005ЧТУ	Штепсельный разъем СШР32П10ЭГ4 - вилка		1		
Ш2	ВЛ0.364.002ЧТУ	Штепсельный разъем ШР36П15НГ4 - розетка		1		
Ш3	ЯУ3.647.002сп	Гнездо приборное в/ч. Тип 1-19		1		
Ш4	ЯУ3.647.002сп	Гнездо приборное в/ч. Тип 1-19		1		
Ш5	ЯУ3.647.002сп	Гнездо приборное в/ч Тип 1-19		1		
Ш6	ЯУ3.647.002сп	Гнездо приборное в/ч Тип 1-19		1		
Ш7	ИЮ3.64[illegible]051сп	Штеккер с заглушкой		1		

Составил	Лаппо	[signature]	12.4.62
Проверил	Лаппо	[signature]	12.4.62
Н. контр	Сидоров	[signature]	13/IV-62

ИЮ2.019.001Сх.Э

Лит | Кол | № приказа | Подп | Дата

Лист 5 | Листов 5

The C25 condenser allows this adjustment. Short-wave communication

the transmitter with antenna - autotransmitter. Resistance

R13, R14 / or R15, R16/ serve to equalize the heating voltage

lamp.

The power supply of the anodes is sequential, carried out through a high

frequency inductors DR1, DR2 /or DR3, DR4/. Capacitors C13, C47

/or C35, C43/- blocking.

Both transmitters are powered by a common battery.

In connection with this, a serial power supply to the incandescent radio-

lamp in each transmitter. When switched on in this way, the burnout will

a new lamp does not lead to useless and overheated / in case

lamp burnout in the master generator / load of the anode battery

the other 2 lamps of the transmitter, and the second,

the redundant transmitter will continue to operate normally.

vatu. In addition, the housing of the instrument is insulated for direct current

from the power circuit. This reduces the likelihood of failure of all

the instrument in the event of a short circuit in the power supply to the housing. Disaggregated

high frequency capability by blocking capacitor

ì C9, Ñ16 /or Ñ30, Ñ39/.

The manipulator operates two polarized relays /PI and P2/

RPP-4 type. Each relay has two windings connected in pairs

in such a way that when the relay operates, the supply voltage

+21 is suitable for another pair of windings.

The period of operation of the relay depends on the value of the resistance, depending on the conditions inside the container. Alarm contacts connected with the corresponding pads P6.

Table 2

№ пп	Номер команды	Наименование сигнализатора	Номера на П6	Условия	
				Номинальные	При срабатывании
I	IУ	Сигнализ.отриц. темп. $t<0^{o}$ C	7,8	замкнут	разомкн.
2	III	Сигнализ.положит.темп: $t>+50^{o}$ C	6,8	разомкн.	замкнут
3	I	Сигнализ. давления P<250 мм рт.ст.	3,5	разомкн.	замкнут

The diagram shows two plug connectors - ШШ-1, through which supply, and ШШ-2, providing in the process of regulation and all possible checks turning on the test panel PKK-200. PKL-200 made it possible to control the lamp modes and simulate monitor the operation of the alarms.

In the combat position, the ØШ-2 socket is connected to the Ø3-I socket, shorting the corresponding contacts ØШ-2.

In terms of design, the D-200 device is Rigid frame, suspended on two shock absorbers /I/ type "Lord" /fig. 15/, which soften vibrations in the axial direction. Pope-Speech vibrations are damped by flat springs /2/ /Fig.15/.

The instrument frame is divided into three compartments. In the upper compartment /fig. 16/ The relay /I/ and other parts of the manipulator are spaced out. Â two side compartments with adjacent transmitter units / fig. fifteen/. Every the transmitter is mounted in its shielded unit, which in multifunctional battery. Springs /2/ rest against the window walls. Â zaço-

The holes between the walls of the battery window and the transmitter housing of the guide-

This is the flow of nitrogen from the fan of the thermostatic control system.

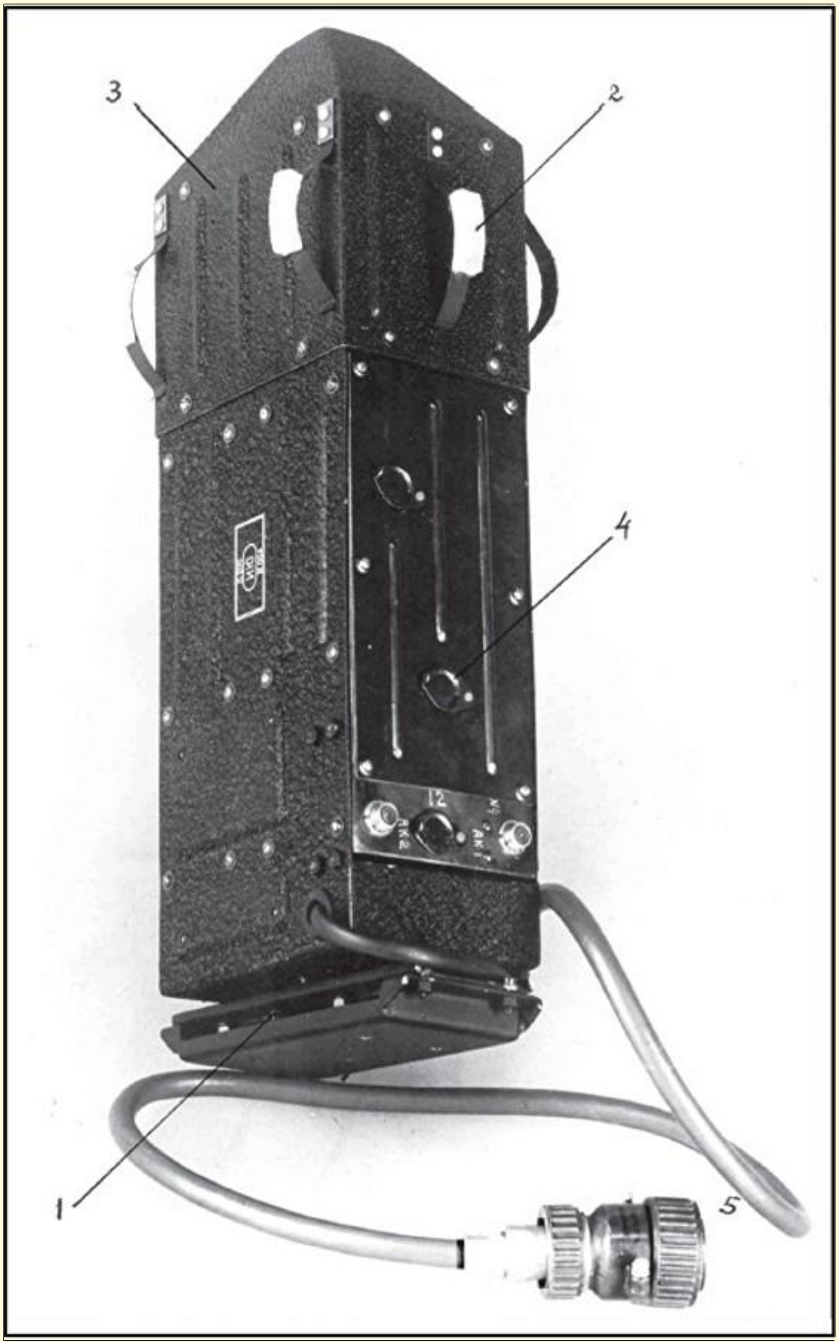


Fig. fifteen

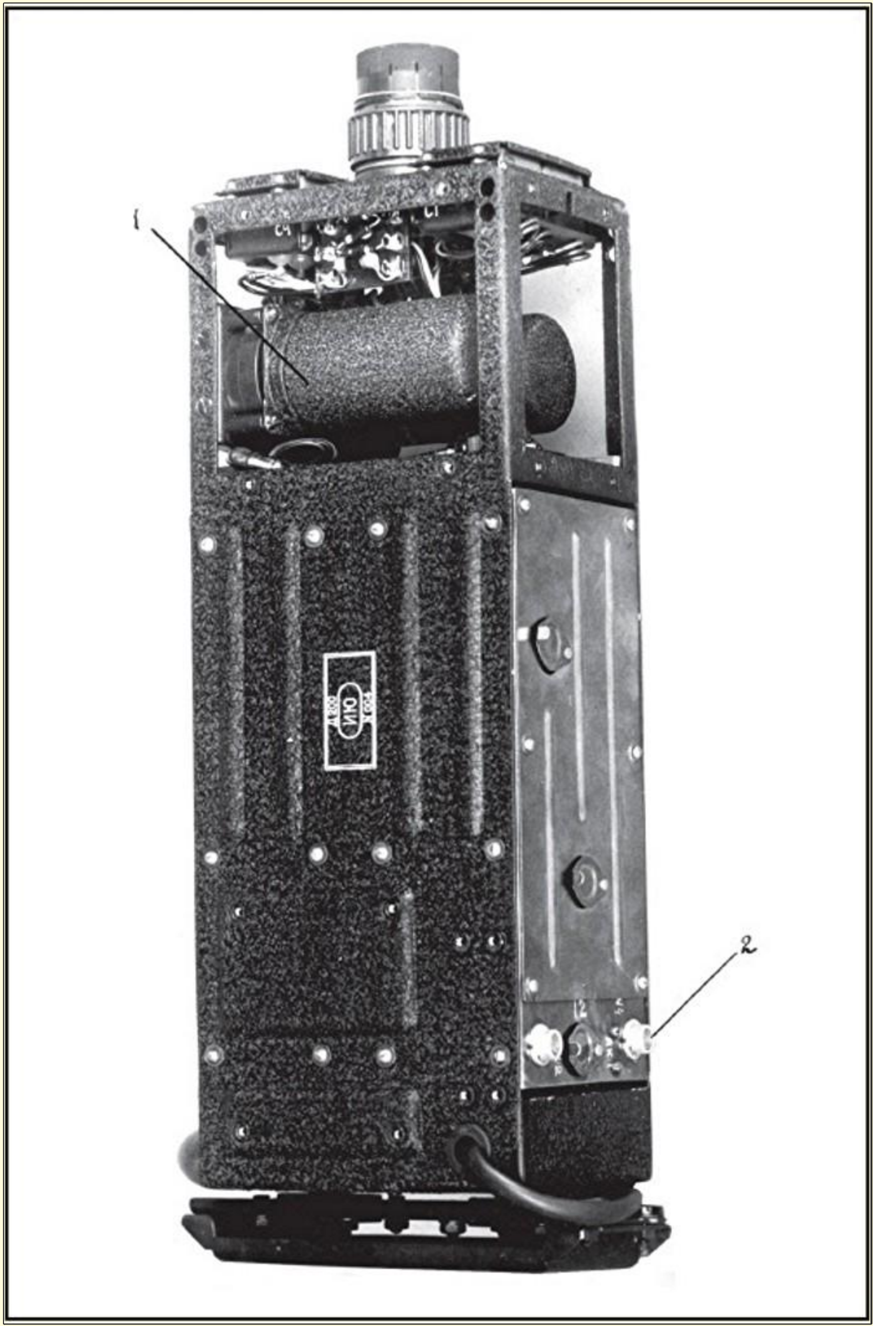


Fig. 16

The transmitter unit is divided into two compartments. Top mounted
master generator, in the lower one - Â× / fig. 17 and 18/. All contour
The new elements are assembled on a ceramic / fig. 17, 18, 19 and 20/. Con-
string capacitors after adjusting the condenser
tsangami /I/ /fig. 17 and 18/. Access to them is opened through

from the cylinders to the body. Flexible terminals of lamps directly

venously soldered to the relevant parts of the circuit.

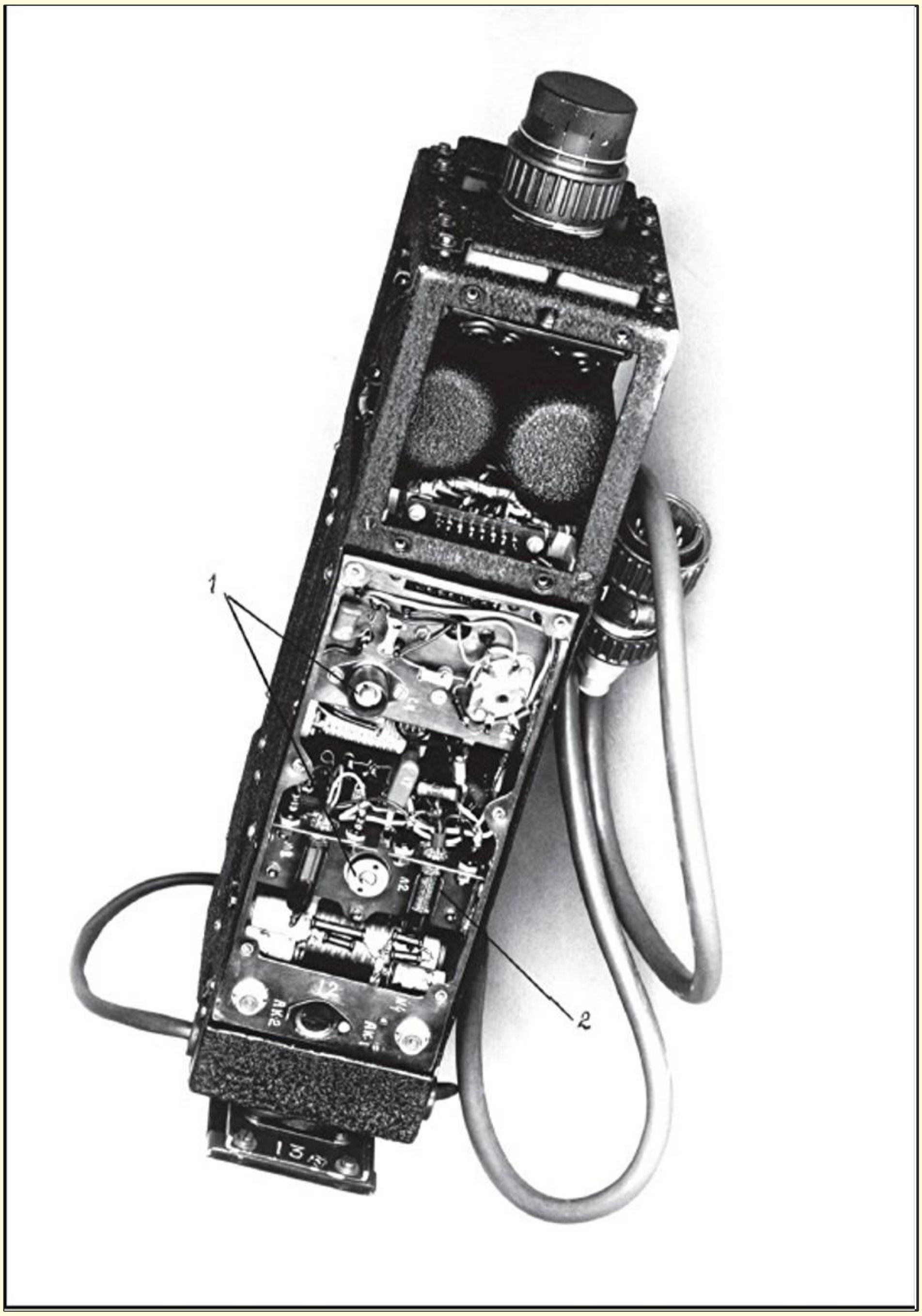


Fig. 17

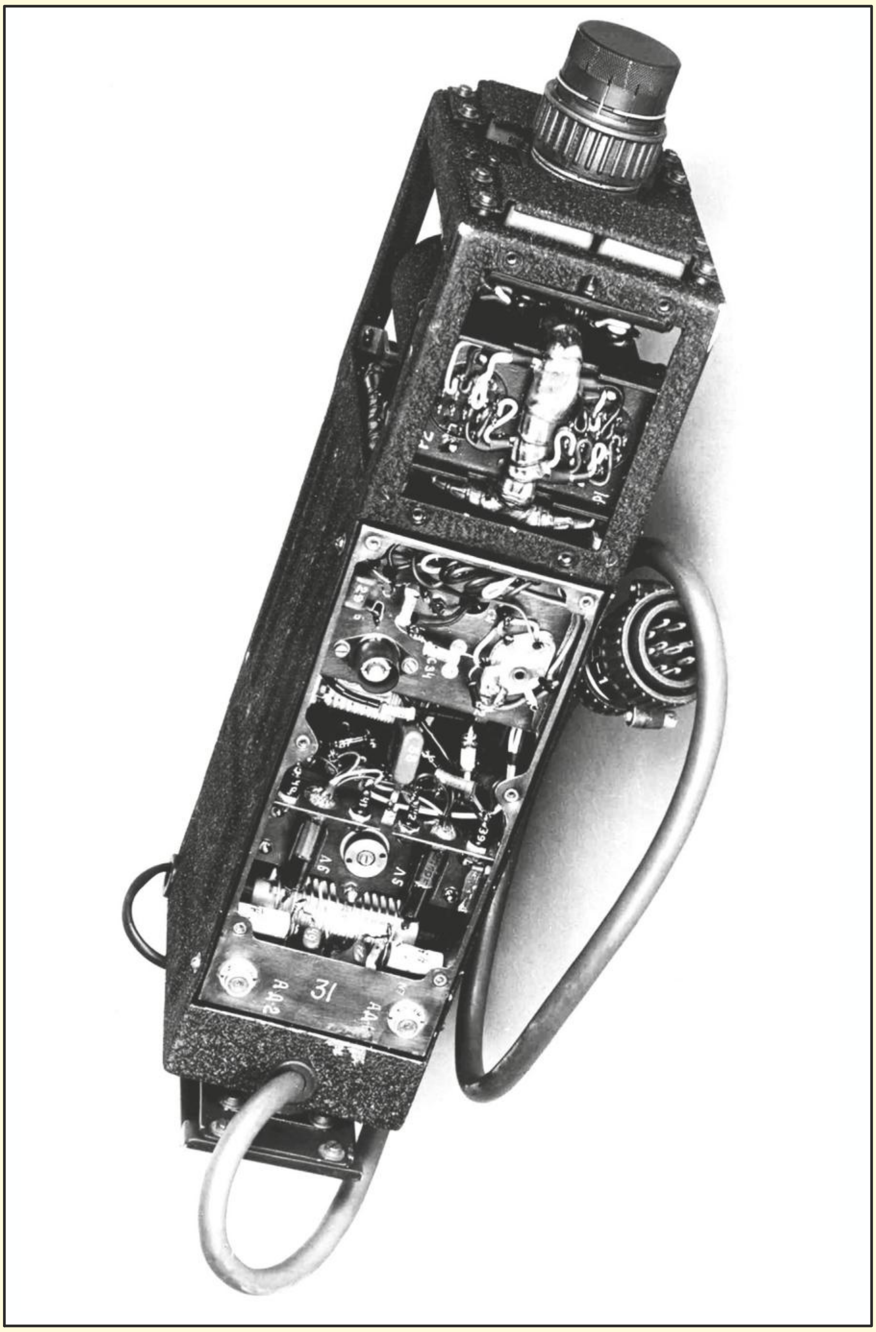


Fig. eighteen

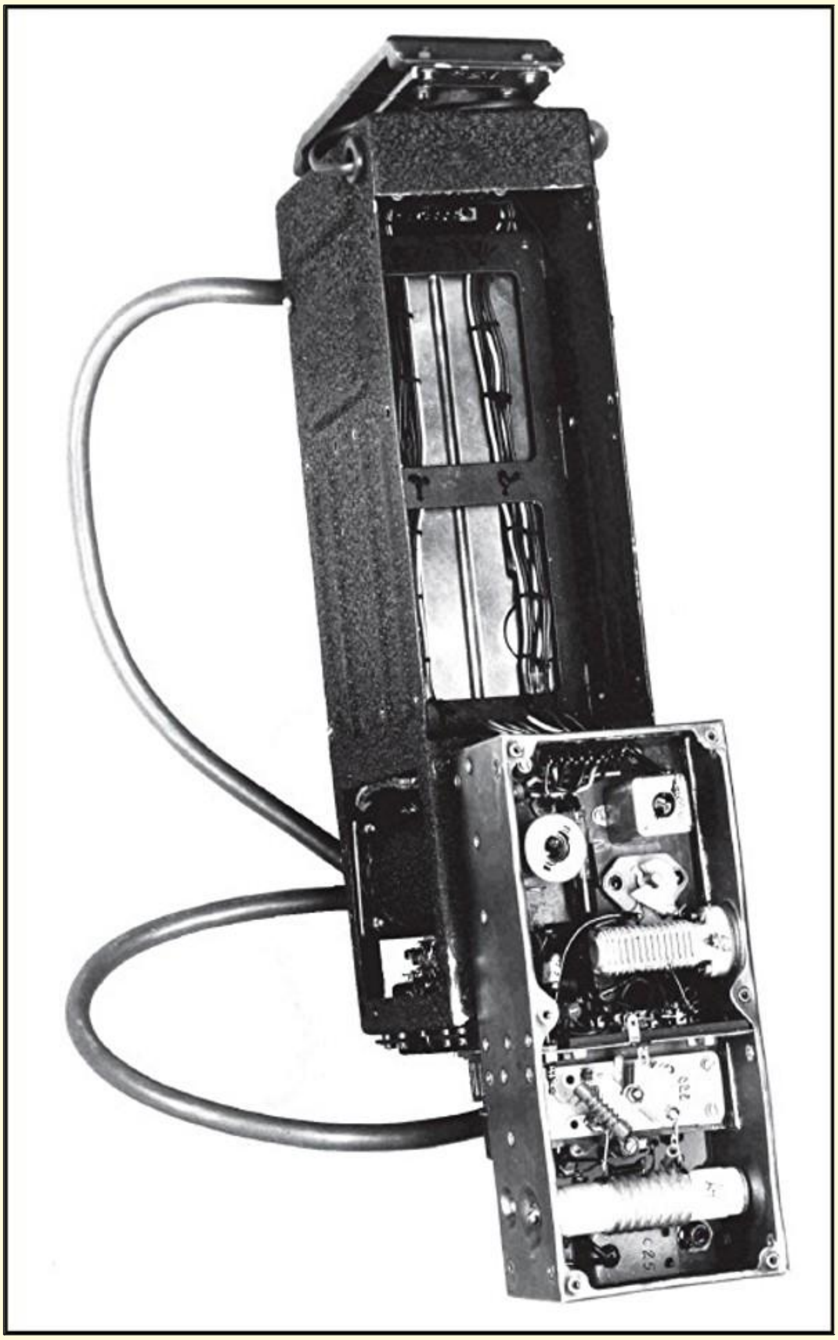


Fig. nineteen

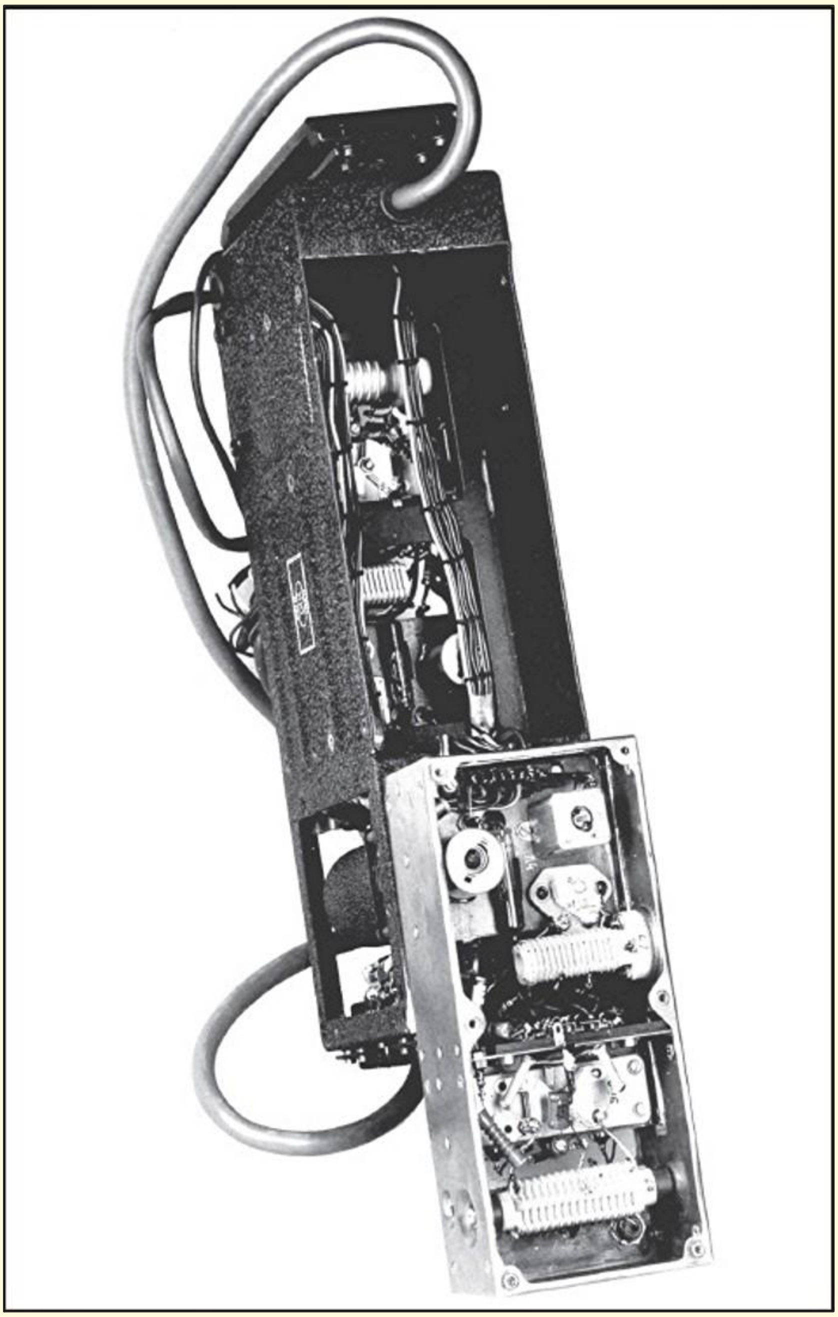


Fig. twenty

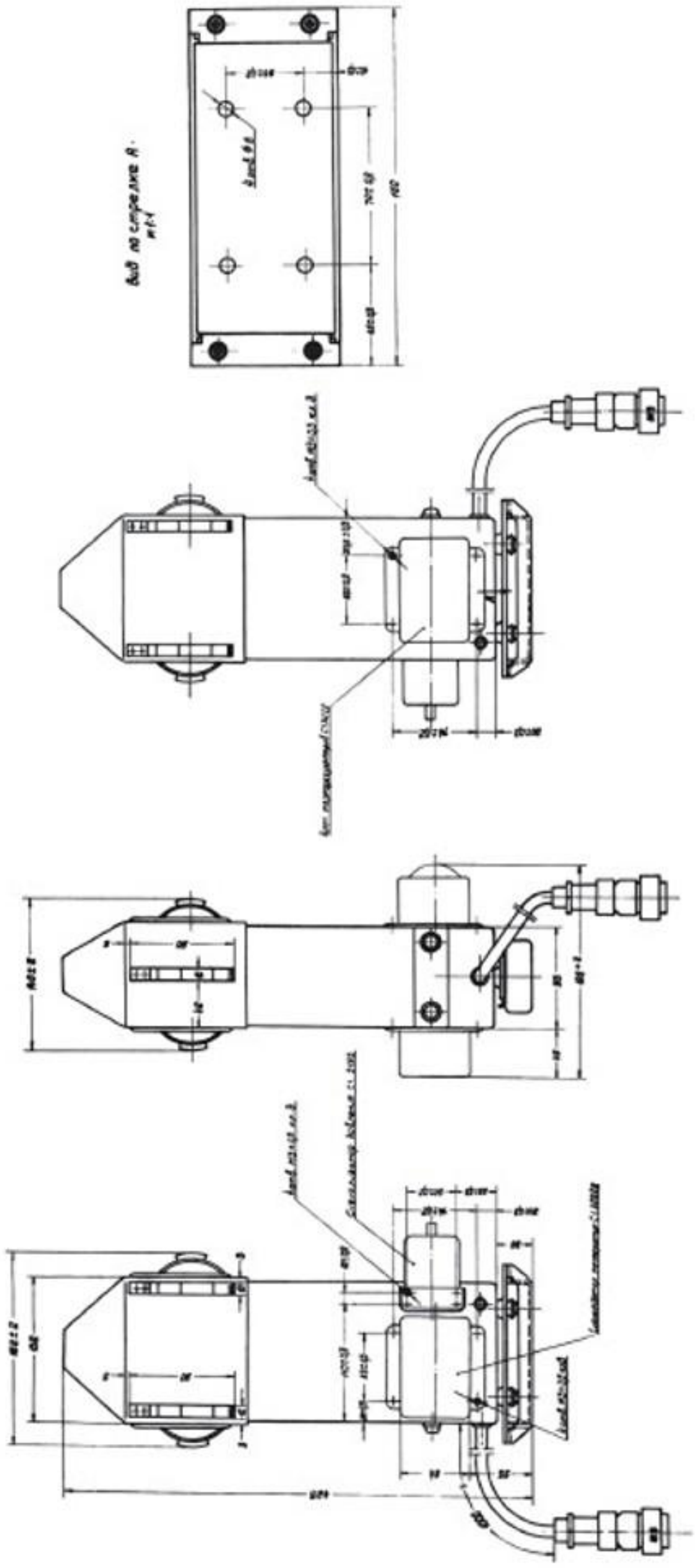


Рис.21

Connecting each transmitter to the antennas is using high frequency fluoroplastic cables connected to high-frequency connectors /2/ /Fig. 15 and 16/. device with a power supply using the cable /5/ /fig.15 and 21/. The last figure shows the placement of signalers pressure, temperature and thermostat, included in the venti-Lyator. Fan designed to cool the transmitter, mounted above the fairing of the D-200 device. Fan on at a temperature of +30 ^{o} C.

7. CONSISTENCY AND SHAPE DISCUSSION PROCEDURE

Design testing

The main task of design testing was to determine the possibility of continuous operation of the device Ä-200 together with fresh charged battery for 14 days.

During the test, a functional check was carried out by listening to the signals on the control receiver. Defining also the period of manipulation of the transmitters and the power generated in antenna equivalents. During the entire test period, the manipulation z varies from 0.56 to 0.71 sec. In Table. 3 and in fig. 21 shows but changing the power of the transmitters.

Table 3

Changing the transmitter power

Время	В начале испытания	Через 6 суток	Через 9 суток	Через 14 суток
Мощность ультракоротко-волнов. перед. /вт/	I,6	0,82	0	0
Мощность коротковолнов. передат. /вт/	2,5	0,7	0,53	0,43

On the ninth day of design tests, the

Rotary-wave transmitter. The reason for the output is the lamp

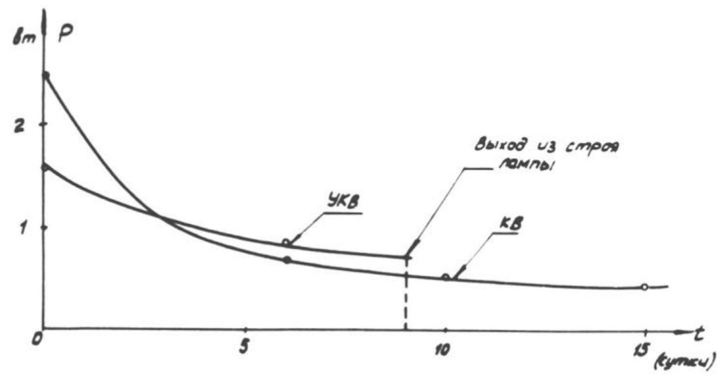
go generator. In connection with the first five-six

day/cm. curve change. during battery voltage

/fig. 23//, the cathode emission was suppressed and the oscillations were broken. After two

weekly run, this lamp has been replaced, the transmitter has been replaced

started functioning, moreover, the power turned out to be equal to 0.7 watts.



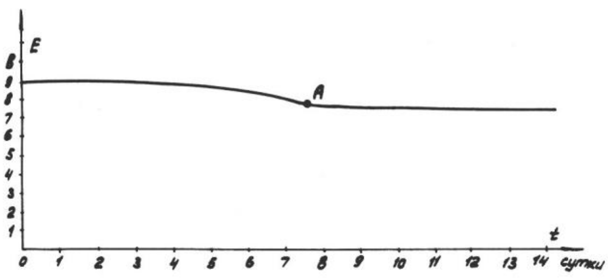


Fig. 22

Tests have shown that the filament battery has a larger reserve, therefore, in order to reduce lamp pereklala and, consequently, but, to increase the reliability of the long-term operation of the device Ä-200, the battery must be discharged before starting work 8.2-8.3 V, starting work from point A. (Fig.23).

Control tests

In the process of delivery of D-200 devices to the customer's representative in accordance with ÈÞ2.0190.014 they are subject to various testing, as well as measurements of the main parameters ditch.

The devices were tested (without voltage supply) for strength on centrifuge for 10 min. with a linear acceleration of 10 g and in Current 5 min. on a vibration stand at a frequency of 50 Hz and amplitude 1 mm, t.u. with variable acceleration 10 g.

During the test at normal, low and high temperature controlled frequency, power, antenna equivalences, transmitter burst duration in nominal in the normal mode and in case of short circuits of the pressure signaling devices and the perature.

The test results are given in Table. 4 and 5.

Table 4

Oscillation frequency and power

Номер прибора	Температура	Частота колебаний /в Мгц/		Мощность /в вт/	
		ультракоротковолн.	коротковолн.	ультракоротков.	коротковолн.
I	2	3	4	5	6
00I	-40°	40,00205	20,0032	0,52	0,9
002		40,0026	20,0044	0,44	I,0
003		40,0032	20,0042	0,57	0,9

I	2	3	4	5	6
00I		40,0026	20,0054	0,82	I,2
002	+20	40,00I8	20,005I	0,74	0,93
003		40,002I	20,0056	0,75	0,9
00I		40,0028	20,0049	0,62	0,93
002	+50	40,0028	20,0053	0,67	0,97
003		40,004	20,0053	0,73	0,97

Table 5

Transmitter burst duration per millisecond.

Номер прибора	Температура	Ультракоротковолн.				Коротковолн.			
		Номин. реж.	I сигнал	3 сигнал	4 сигнал	Номин. реж.	I сигнал	3 сигнал	4 сигнал
00I		390	67	I93	350	420	225	67	680
002	−40	385	67	I93	390	480	225	67	7I0
003		485	65	235	500	390	200	67	655
00I		430	60	2I0	340	420	240	60	745
002	+20	440	52	240	425	490	206	52	675
003		400	60	2I0	420	390	2I0	60	720
00I		390	67	235	400	420	235	67	670
002	+50	400	65	225	400	435	225	65	570
003		450	65	I93	355	330	I93	65	580

Aircraft tests of D-200 instruments

Observation of radio signals of the satellite and radiolocation
It should be a network of radio control points,
distributed throughout the territory of the Soviet Union. Nado was
to train the operators so that they get used to

against the background of interference, recognize the characteristic signals of the transmitters of the satellite

Nika and learn how to quickly take and maintain the satellite's entrapment.

Overflights of ground stations were also used to study

the performance of the D-200 device and the estimation of its radius

actions.

Taking into account the very short estimated duration of reception

my signals, which are evaluated in a few minutes, it is important

There were trainings for performance at those same angular speeds

transmitters with respect to radio plenganation points, which

will be with the satellite.

For this purpose in the period from May 24 to July 11, 1957 ÍÈÈ-885

in conjunction with NNI-4, two series of flight missions were organized

the main checkpoints of the Soviet Union on aircraft with installed

on them with Ä-200 devices.

The first series of overflights was carried out on the IL-14 aircraft. flights

performed, as a rule, at a height of 3-4 thousand. on the following routes

tam:

1. Moscow-Leningrad-Petrozavodsk-Murmansk-Moscow.

2. Moscow-Kiev-Odessa-Rostov-Baku-Alma-Ata-Moscow.

3. Moscow-Sverdlovsk-Novosibirsk-chita-Khabarovsk-Vladivostok-

Moscow.

The transmitters of the D-200 device worked on a hard asymmetric

new antennas / see Fig. 24 and 25/.

The instrument was operated in flight by NNI-885 representatives.

The first series of overflights provided long-term training for the operator the workers worked in conditions close to real ones, in which they work came as a result.

The routes of the overflights on the TO-16 aircraft were similar to the routes aircraft IL-14.

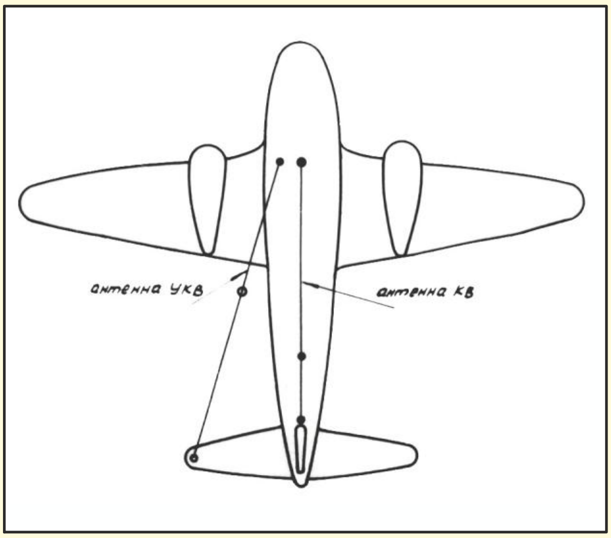


Fig. 24

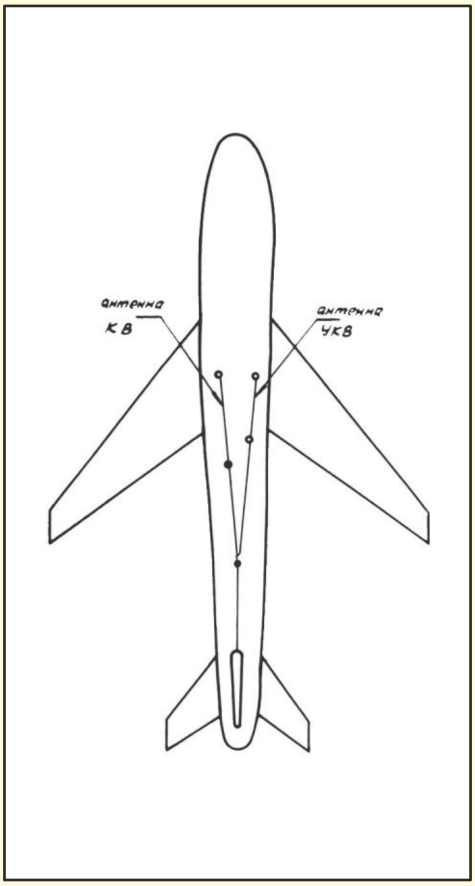


fig. 25

Due to the lack of space for people other than members crew, turning on and off the D-200 instrument during flight crewed.

Aircraft tests, in addition to the main goal - training operators, then one more positive result - allowed to evaluate a filament sufficient for the selected radiant power of the transmitters or not.

Multiple reception cases at long confirmation distances

Table 6 below shows some of the cases

reception of radio signals at a frequency of 20 MHz at various distances

from the plane.

Table 6

№ пп	Дата	Время		Место приема	Расстояние до самолета /в км/	Напряженность поля /в мкв/м/
I	4/УI-	I4-00	I5-40	Москва	7000	3
2	-"-	08-46	09-20	Хабаровск	I50	до I8,3
3	2I/УI-	I0-00	I3-37	Москва	200-500	I
4	I0/УII-	03-30	06-50	-"-	5700-3200	—
5	-"-	04-28		Иркутск	330	2-3
6	-"-	02-50	05-05	Хабаровск	800-2250	—
7	-"-	05-57	07-05	-"-	2900-3500	—
8	II/УII-	06-46		Москва	3200	I
9	-"-	08-30		-"-	I280	—
I0	-"-	I0-32	I0-50	Иркутск	4000	—

Frequently observed cases of reception at a frequency of 20 MHz at a distance

distance 3-5 thousand km, about "explainable propagation of signals for

The calculation of multiple reflections from the ionosphere allowed us to assume that

that the power of the transmitters is sufficient. When flying a satellite

above the ionosphere /F/, obviously, a similar

long-range propagation due to multiple reflections from

Helicopter tests of the D-200 device installed in the technological model of a satellite

The tests carried out on the aircraft could not be fully ideas about the radiant power, as in the case of aeroplanes test transmitters are loaded on absolutely excellent real radiating system.

Turning on the equipment in the technological model of the satellite in the terrestrial conditions led to changes in antenna impedances due to the influence of the Earth and surrounding objects.

In connection with this, a decision was made to improve the technological Helicopter satellite image. The container was hung from a helicopter tu on a kapron cord 50 m long and rises to a height of about a kilometer meter in the Tushino area.

In NYN-885, an extremely strong loudspeaker was received Reception, the signals were recorded on a tape recorder.

8. Some data on the operation of radio stations D-200 on artificial earth satellites

The D-200 radio station was installed on the first artificial satellite of the Earth, the successful launch of which was carried out 4 October November 1957, and also on the second artificial satellite of the Earth, launched November 3, 1957

On the first satellite, a silver-zinc battery, powering the transmitters, had a reserve of energy, calculated on the normal new nutrition for 15 days. / Δ Å = +20% . - 6%. Warranty circuit in the process of battery voltage drop.

The power supply circuits of the transmitters were turned on after the rocket exited

carrier into orbit at the moment of separation of the satellite from the carrier rocket

la. After this, the transmitters worked continuously for 21 days.

current In this way, the foreseen technical task requires

The concern about the duration of the work was unconditionally fulfilled. Multi-

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numerical reports on radio observations of the flight of the satellite

confirmed the possibility of reliable reception of its signals with the help of

. 3 thousand km.

Cases of ultra-long-range reception at distances up to

10 thousand km.

This is far from the ability of the direction finding network to complete the task

regular provision of the necessary data for coordination-computer

casting center for calculating the parameters of the orbit and predicting

flight path.

In Table. 7 shows some data on the comparison of radio-

satellite signals received at Moscow and

of the technical radio control of the Ministry of Communications.

Table 7

Moscow Comparative Point 55 ° 47' N.S.
37 ° 40' a.a.

№ пп	Дата	Время моск.	Координаты спутника шир.	долг.	выс. /км/	Дальность прямой видимости /км/	Дальность приема /по Земле/ /км/	Напряженность поля в мкв/м
I	5/X-57г	03ч-28м	+64,5°	+28°	275	I820	I670	I,8
2	6/X-57г	0Iч.49м	+53,6	+I7,5	228	I680	I335	4
3	-"-	05ч-I3м	+60,2	+57,5	376	2I00	I405	6
4	-"-	05ч.I5м	+55,5	+65,5	392	2I50	2040	4
5	7/X-57г	08ч.30м	+55	+I2	393	2I45	I700	I,4
6	-"-	0Iч.56м	+65	+48	272	I8I0	II60	2,5

Khabarovsk Comparative Point 48 o 30' N.S.
135 o 05' a.a.

№ пп	Дата	Время моск.	Координаты спутника			Дальность прямой видимости/км/	Дальность приема /по Земле/ /км/	Напряж. поля в мкв/м
			шир.	долг.	выс. /км/			
I	7/X-57 г	02ч.0Iм	+57,8	+II2,5	374	2I00	I980	I,9
2	-"-	02ч.02м	+55,2	+II7	392	2I40	I500	3,5
3	-"-	03ч.42м	+45	+I05	460	2330	2335	0,4

The figures given in the table show that when using - receivers for receiving radio signals of the satellite professional receivers devices with sensitivity in telegraph mode 0.25 . 0.5 uV The power of the transmitter may be reduced at least to 10 times

Own observations carried out in NNI-885, as well as many numerical messages and magnetic recordings of satellite signals, received from Soviet and foreign observers, testifying to that for the entire time of operation of the transmitters in the mode of manipu- No alarms were recorded pressure and temperature, i.e. The mode inside the satellite matched normal /0 ^{o} C < t < +50 ^{o} C, p > 250 mm Hg/

In the process of observing the satellite's radio signals, the phenomena of violations of the normal operation of the transmitter manipulator, ending in a smoothly programmable increase in the frequency of the com- transmitters, ending with the transitions of one or simultaneously Set both transmitters to continuous send mode. Increasing the indicated phenomena cannot be "explained in any way - or damage -

Elements of the manipulator of the radio station and so far have not been found

reliable about "clarification.

On the second artificial satellite of the Earth, in contrast to the first

satellite, the power supply of the transmitters was calculated only

for 5 days. x) The transmitter was located in a separate missile

container carrier, according to the design of a similar container, the first

about the satellite. Since the container is not separate from the media, it was

the design of the antenna has been changed. We used symmetric du-

shaped stub antennas located along the head cone

rocket parts. Antenna length /along the chord/ ~0.25 for UK and

~0.12 for kV transmitter. Radiation diagrams in the plane

Å θ _ ‾

òû / ñì. Fig. 26/.

The transmitters of the second satellite provided the specified radiation time

monitoring and operation of the direction-finding network. Just like during the flight

of the first satellite, observed the phenomenon of disruption of normal operation

switching schemes of transmitter links, similar in nature

phenomena noted during the flight of the first satellite.

The results of radio observations of the signals of radio stations Ä-200

the first and second artificial satellites of the Earth and, in particular,

data received at the comparator offices of the Ministry of Communications,

x) Кроме того, передатчик, работавший на f=40,002 Мгц, для удобства регистрации доплеровых частот был переведен в режим непрерывного излучения.

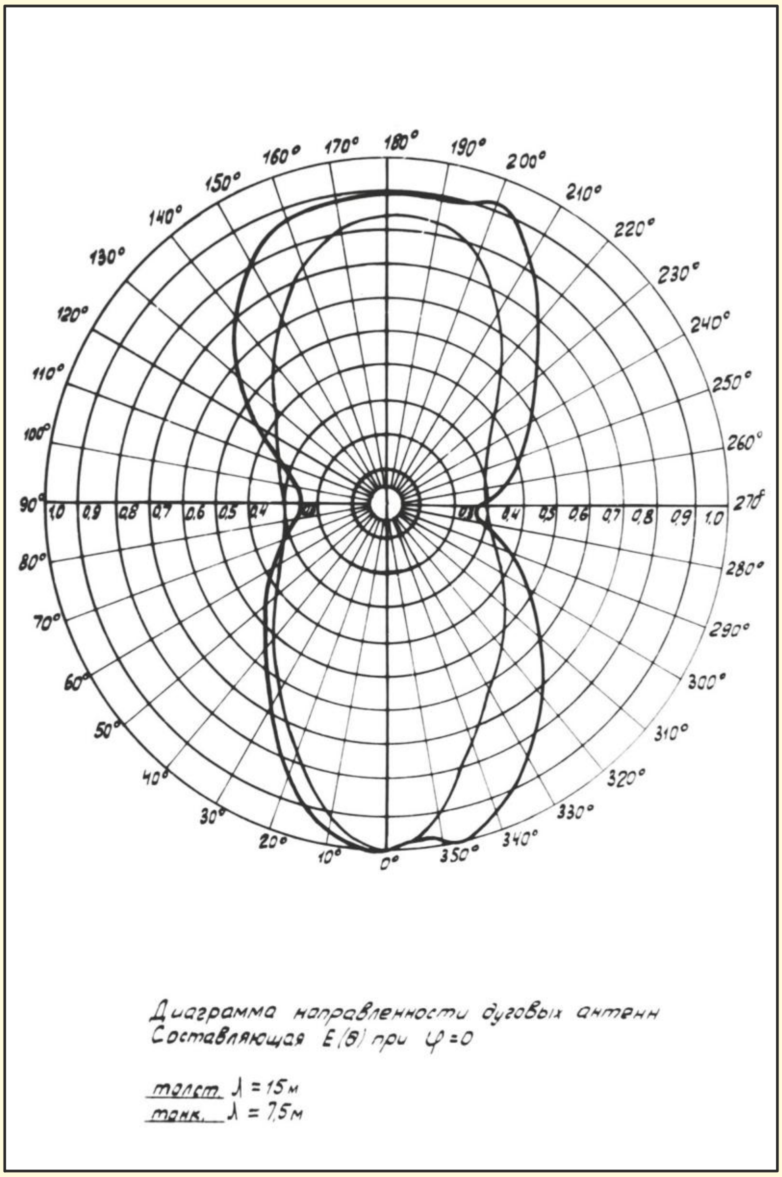
180° 190° 200° 210° 220° 230° 240° 250° 260° 270°
280° 290° 300° 310° 320° 330° 340° 350° 0° 10° 20° 30° 40° 50° 60° 70° 80° 90°
100° 110° 120° 130° 140° 150° 160° 170°
1,0 0,9 0,8 0,7 0,6 0,5 0,4
0,4 0,5 0,6 0,7 0,8 0,9 1,0
Диаграмма направленности дуговых антенн
Составляющая E(θ) при φ=0
толст. λ = 15м
тонк. λ = 7,5м

Fig. 26

LAYER

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