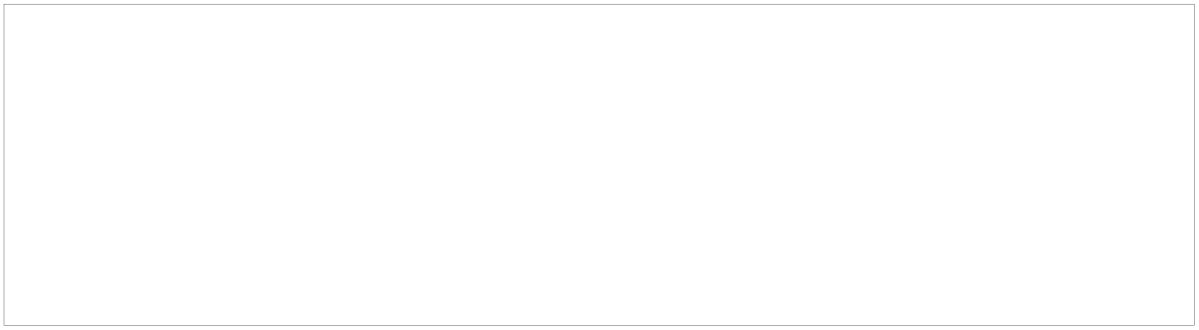

M E T E R IU

TECHNICAL DESCRIPTION

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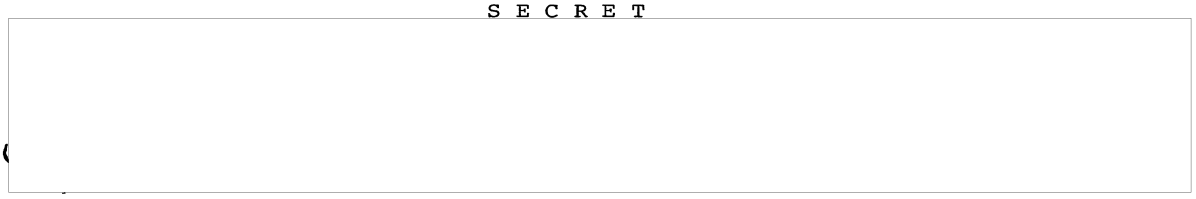

METER ИУ

TECHNICAL DESCRIPTION

Ж3.360.031-ТО

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I. TECHNICAL DATA

1. PURPOSE

The MY instrument is a level meter designed for measuring the root-mean-square value of sinusoidal, noise and D.C. voltages. The instrument is used to check receiving and amplifying channels, as well as to measure the interference voltage and perform other measurements.

2. TECHNICAL DATA

(a) Meter MY has the following measurement ranges:

A.C. voltage:

0.03-0.1-0.3-1-3-10-30-100 V;

D.C. voltage:

1-3-10-30-100-300-1000 V.

(b) The frequency range of the meter is 40 c.p.s. to 100 Kc/s.

(c) Accuracy of sinusoidal and noise voltage measurements is within 10 mV to 100 V ± 5%.

Accuracy of D.C. voltage measurement ranges from 0.1 to 1000 V not below ±5%.

(d) Input impedance of the A.C. voltmeter is 0.5 megohm, and that of the D.C. voltmeter, 10 megohms.

Input capacitance of the A.C. voltmeter is 15 pF.

(e) The voltage of 10 mV is considered as a zero level of the decibel scale.

(f) The instrument operates normally at an ambient temperature of $-5^{\circ}C$ to $+40^{\circ}C$, at a relative humidity up to 95%, and after a prolonged stay at a temperature below $-40^{\circ}C$ with the subsequent stay of the instrument at a temperature of $+20^{\circ}C \pm 5^{\circ}C$.

(g) The instrument can operate continuously for 8 hours.

(h) The instrument is supplied with 127 or 220 V ± 10%, 50 c.p.s. ±3% by the A.C. mains. The consumed power does not exceed 35 VA.

(i) The instrument weights not more than 10 kg.

(j) The instrument dimensions are 314x190x198 mm.

II. COMPONENTS

The instrument includes the following components:

(a) meter ИУ;

(b) supply cable;

(c) two measuring cables;

(d) canvas cover.

III. PRINCIPLE OF OPERATION

3. BLOCK-DIAGRAM OF METER

The level-meter block-diagram is shown in Fig. 1.

With switch П set to positions 1 or 2, the level meter functions as an A.C. electronic voltmeter.

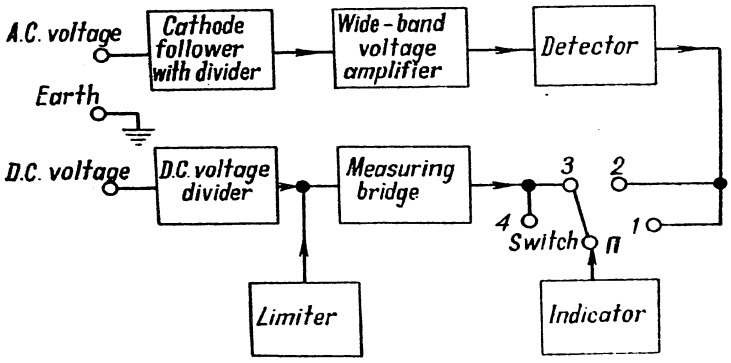

FIG. 1. BLOCK DIAGRAM OF METER ИУ

With switch П in position 1, the meter measures the root-mean-square value of sinusoidal voltage, and in position 2, the effective value of noise voltage. Via a voltage divider the A.C. voltage is applied to the wide-band amplifier and then to the detector. From the detector output the rectified voltage is fed to the indicator. With switch П in positions 3 or 4, the meter functions as a D.C. voltmeter.

With switch П in position 3, the meter measures positive D.C. voltage relative to the "earth", whereas with switch П in position 4, the meter measures negative D.C. voltage relative to the "earth".

A D.C. source voltage is applied to the D.C. voltage divider and then to the measuring bridge, into the diagonal of which an indicator is cut in.

The circuit is provided with a limiter which protects the indicator from overloading in case the measuring range on the divider is set wrong.

Both the A.C. and D.C. voltages are read off with the aid of the same indicator scales.

4. DESCRIPTION OF KEY CIRCUIT DIAGRAM

(See Diagram Ж6.294.006Сх3)

(A) A.C. Voltmeter

The A.C. voltmeter employs valves 6Н1П (13), 6Ж2П (21, 31) and 6Х2П (38).

There is a stage with a cathode load (valve 13) at the electronic voltmeter input. A low input capacitance of the stage ensures a constant high input resistance up to the frequency of 100 Kc/s.

Both triodes of valve 6Н1П (13) are connected in parallel in order to decrease its inner resistance, which is required to ensure linearity of the stage amplitude characteristic within 100 V. This excludes a necessity to use a high-ohmic divider at the voltmeter input which might lead to a considerable increase of input capacitance and, consequently, to the narrowing of the frequency range. The voltage divider resistors (5 to 12) serve as a stage cathode load.

Switch ПЕРЕКЛЮЧАТЕЛЬ ПРЕДЕЛОВ ИЗМЕРЕНИЙ) 15 allows to select one of the required ranges.

The circuit employs a low-ohmic voltage divider (30 kilohms) which makes its frequency characteristic almost independent of the input capacitance of the subsequent stage.

The wide-band voltage amplifier employs valves 6Ж2П (21 and 31) in accordance with the ordinary rheostat circuit with a negative feedback dependent on values of resistors 23, 24, 37 and capacitor 33.

The feedback provides for the linearity of the frequency characteristic of the amplifier and stability of its operation.

Capacitor 33 is designed for compensating the frequency characteristic at the high frequencies. Potentiometer 40 is intended to set the electronic-voltmeter zero.

To make it possible to measure the sinusoidal and noise voltages at one scale, potentiometer 80 is connected in parallel with the indicator for measuring the sinusoidal voltage. To make the indicator time constant equal to 4 to 6 sec., which is required for measuring the noise voltage, charging capacitor 78 is used. When the D.C. voltage is measured, capacitor 78 is discharged through resistor 77. Capacitor 75 serves to provide for required inertia of the indicator pointer in the process of measuring the sinusoidal voltages.

(B) D.C. Voltmeter

The D.C. voltmeter circuit is a bridge consisting of four arms. Instrument M-24, serving as an electronic-voltmeter indicator, is cut into the bridge diagonal.

Two arms of the bridge are triodes of valve 6Н1П (68), whereas the third and fourth arms are resistors 70 and 71 interconnected by potentiometer 69 which is designed for setting the electronic-voltmeter zero.

Diode 64 serves to limit the current flowing through the instrument when a voltage exceeding 4 V is applied to the left-hand triode grid of valve 68. The limiting proceeds in the following way: the anodes of valve 64 are supplied with

-3.8 V relative to the cathodes, and the valve is cut off. When the voltage at the grid of valve 68 exceeds the value ±3.8 V (depending on the polarity of the voltage to be measured, the left-hand or right-hand diode is operative), the current begins to flow through the diode. As a result, the voltage drops across resistor 63 which prevents further increase of the voltage across the grid of valve 68.

A voltage divider employing resistors 56 to 62 is connected to the voltmeter input.

The total resistance of the divider is equal to 10 megohms. Resistor 63 decreases the influence of the variation of the grid-leak resistor of valve 68 at different positions of switch MEASUREMENT RANGES 15, thus nearly excluding the necessity to compensate the instrument zero when switching over from one scale to another.

Besides, resistor 63 and capacitor 66 serve as a filter protecting the grid circuit of valve 68 from possible variable components of the voltage when measuring the D.C. voltages, as it may take place, for instance, in the process of measuring the anode voltage of the operative amplifier.

Potentiometer 67 is designed to adjust the circuit sensitivity.

The measurement ranges of both voltmeters are switched over with the aid of switch 15. Selector switch KIND OF MEASUREMENT (РОД ИЗМЕРЕНИЙ) 76 serves to select the required kind of measurements.

The circuit is supplied by the A.C. mains of 220 or 127 V, which is achieved by switching over correspondingly power-transformer 49 primary winding with the aid of fuses 51 and 54.

The rectifier employs a full-wave circuit with valve 48. A filter composed of choke 45 and capacitors 44, 46, 47 serves to smooth pulsations.

The A.C. voltmeter supply voltage is not stabilized, since a sufficient stability of the circuit is ensured at the expense of a deep negative feedback.

5. DESIGN
(See Figs 2 and 3)

All elements of the meter are mounted on the chassis consisting of two main plates: a vertical plate and a horizontal one fastened together. At the same time, the vertical plate serves as a front panel of the meter and carries all controls. There are two handles on the panel which are used to remove the chassis out of the housing and to protect simultaneously the controls from damage when the meter is placed with its front panel downwards for repair.

The meter chassis carries all elements of the circuit.

The indicator is arranged on the meter front panel and is made shockproof by means of a rubber gasket. All transformers, chokes and wire-wound resistors are impregnated with special lacquer to prevent moisture from penetrating inside the windings. All soldered joints are painted for the purpose of checking. The chassis is inserted into the housing and fastened by four screws. For the purpose of conveniently carrying the meter, its casing is made in the form of a suitcase with a detachable lid covering the front panel. The inside of the meter lid is provided with clamps which serve for arrangement of a supply cable and two measuring cables. On the rear side of the chassis, under the flap, are mounted: a supply block and two fuses for 127 and 220 V. This construction allows to change over the mains voltages and to replace the fuses without removing the meter casing. The walls of the casing are provided with louvers for better cooling of internal elements. The meter is provided with a cover to prevent the former from damage and penetration of moisture during transportation.

IV. MAINTENANCE AND OPERATION

6. PREPARATION FOR OPERATION

To prepare the meter for operation, proceed as follows:

(a) take the meter out of the canvas cover, unfasten the locks and remove the lid from the hinges;

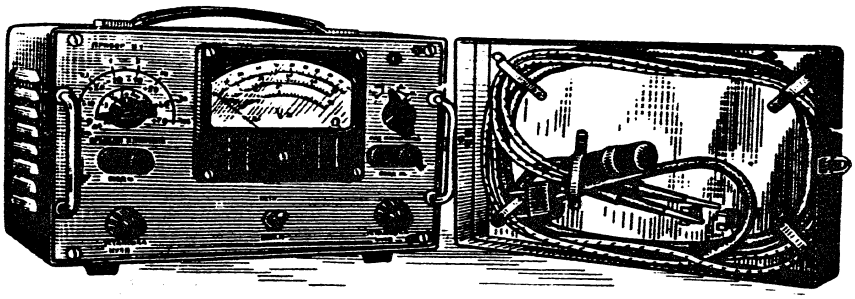

FIG. 2. FRONT VIEW OF THE METER

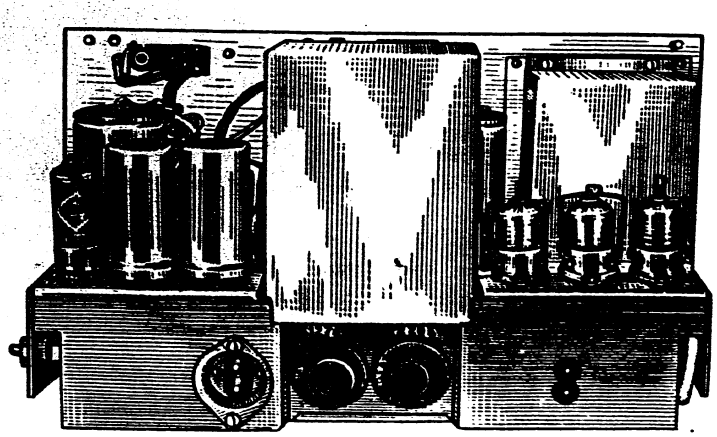

FIG. 3. REAR VIEW OF THE METER (WITH CASING REMOVED)

(b) push aside the flap located on the rear wall of the meter. Check whether the fuse is inserted correctly. The fuse should be inserted into the socket, the inscription of which corresponds to the voltage value of the supply mains (127 or 220 V). Couple the supply cable connector to the voltage source;

(c) connect reliably the meter terminal marked ⏚ with the body of the object under test with a flexible copper wire with a cross-section of at least 2.5 mm^2;

(d) set toggle switch MAINS (СЕТЬ) to position OFF (ВЫКЛ.);

(e) couple the supply cable to the mains and set toggle switch MAINS to position ON (ВКЛ.). While doing so, the signal lamp will light up. After that the meter is ready for operation.

7. OPERATING INSTRUCTIONS

Warning

Do not connect the meter to the A.C. mains if it is not in the casing.

Mind that some parts of the meter are energized with a voltage dangerous to life.

Measurement of Noise and Sinusoidal Voltages

(a) Set selector switch KIND OF MEASUREMENT to position A.C. VOLTAGE (V~);

(b) take the measuring cables with lugs out of the lid and plug them into terminals marked ⏚ and A.C. VOLTAGE (V~);

(c) interconnect terminals ⏚ and A.C. VOLTAGE (V~) by a short rigid jumper and, operating knob A.C. 0 SETTING (УСТАНОВКА 0~), set the meter pointer to zero;

(d) set selector switch MEASUREMENT RANGES to position 100 V;

(e) using the cables, connect the voltage to be measured, select the required measurement range with the aid of selector switch MEASUREMENT RANGES and read the voltage off the scale.

When measuring the sinusoidal voltage, selector switch KIND OF MEASUREMENT should be in position A.C. (~), and when measuring the noise voltage, in position NOISE (ШУМ).

Measurement of D.C. Voltage

(a) Set selector switch KIND OF MEASUREMENT to position D.C. VOLTAGE (V=);

(b) take the measuring cables with lugs out of the lid and plug them into terminals ⏚ and D.C. VOLTAGE (V=);

(c) using the cables, interconnect terminals ⏚ and D.C. VOLTAGE (V=) and, operating knob D.C. 0 SETTING (УСТАНОВКА 0=), set the meter pointer to zero;

(d) select the required measurement range with the aid of selector switch MEASUREMENT RANGES;

(e) connect the voltage to be measured so that terminal ⏚ is always coupled with the grounded pole of the voltage under measurement. In case the meter pointer deflects to the left, set selector switch KIND OF MEASUREMENT to the sign of the opposite polarity;

(f) read the measured voltage off the indicator scale.

8. SWITCHING OFF THE METER

(a) Set toggle switch MAINS to position OFF;

(b) disconnect the supply cable from the mains;

(c) remove the supply cable from the socket and close the flap;

(d) disconnect the grounded wire from the ground terminal of the meter;

(e) place the supply cable into the lid. Set the latter onto the hinges and fasten the locks;

(f) place the meter in the canvas cover.

9. TROUBLESHOOTING

If any troubles occur in the meter, they should be eliminated by persons well acquainted with the circuit diagram and the principle of operation of the meter. In case some

troubles take place which are not listed below, the meter should be repaired in a workshop by skilled personnel.

A list of possible troubles which can be eliminated in operation is given below.

Trouble	Cause	Remedy
1	2	3
1. Meter switched on, signal lamp fails to light up	(a) Burnt out fuse	(a) Replace fuse
	(b) Burnt out signal lamp	(b) Replace lamp
	(c) No mains voltage	(c) Check for presence of voltage in mains
	(d) Broken supply cable	(d) Check cable and eliminate break
2. Meter fails to operate in all modes of operation, signal lamp does not light	(a) Faulty valve 48	(a) Replace valve, using set of spares
	(b) Broken one of electrical capacitors 44 or 47	(b) Send meter to workshop for repair
3. A.C. voltmeter fails to operate	Faulty one of valves 21, 31 or 38	Replace faulty valve, using set of spares
4. Potentiometer 0 SETTING (УСТАНОВКА 0) fails to operate. Indicator pointer deflects to left beyond scale	Faulty valve 38	Replace valve, using set of spares

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1	2	3
5. Zero cannot be set by potentiometer 0 SETTING when measuring D.C. voltage	Faulty valve 68	Replace valve, using set of spares

The valve replacement: When the valves are replaced, the meter does not require any additional adjustment.

10. VALVE CHART

No.	Valve No. in diagram	Valve type
1	13	6H1П
2	21	6Ж2П
3	31	6Ж2П
4	38	6Ж2П
5	48	6Ц4П
6	50	МН-14
7	64	6Ж2П
8	68	6H1П

11. D.C. OPERATING CONDITIONS

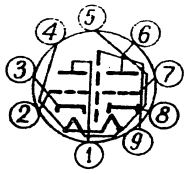
No.	Valve No. in diagram	Valve type	Valve operating conditions									Note
			Electrode No.									
			1	2	3	4	5	6	7	8	9	
1	13	6H1П	300	–	150	–	–	300	–	150	–	
2	21	6Ж2П	–	2.0	–	–	140	110	2.0	–	–	
3	31	6Ж2П	–	2.3	–	–	200	100	2.3	–	–	
4	64	6Ж2П	2.2	5.0	–	–	–	–	–	–	–	
5	68	6H1П	70	–	1.4	–	–	70	–	1.4	–	

The voltage between the connection point of resistors 14, 4, 5 and the cathode of valve 13 is 3 V.

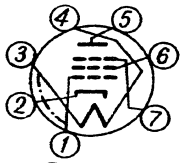
All voltages are measured relative to the earth.

Permissible deviations from the given values are ±10 per cent.

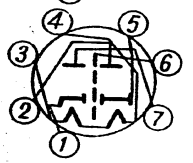
12. VALVE BASING



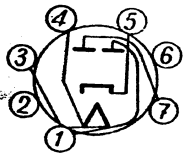
6H1П



6Ж2П



6Х2П



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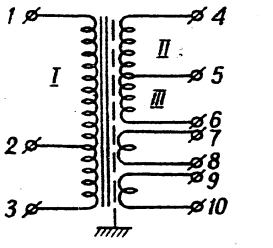
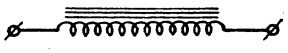
13. TABLE OF WINDING DATA

Ref. No. in diagram	Description	Electrical and other data
49	Power transformer Ж6.722.003 	Ist winding ПЭЛ, dia.0.41, 1-2=915 turns IInd winding ПЭЛ, dia.0.1, 4-5=5-6=2115 turns IIIrd winding ПЭЛ, dia.0.59, 7-8=50 turns IVth winding ПЭЛ, dia.1.08, 9-10=50 turns Magnetic circuit 34AA Ш20x30
46	Filter choke Ж6.766.020 	ПЭЛ, dia.0.12, 12,500 turns Magnetic circuit 34AA Ш12x12

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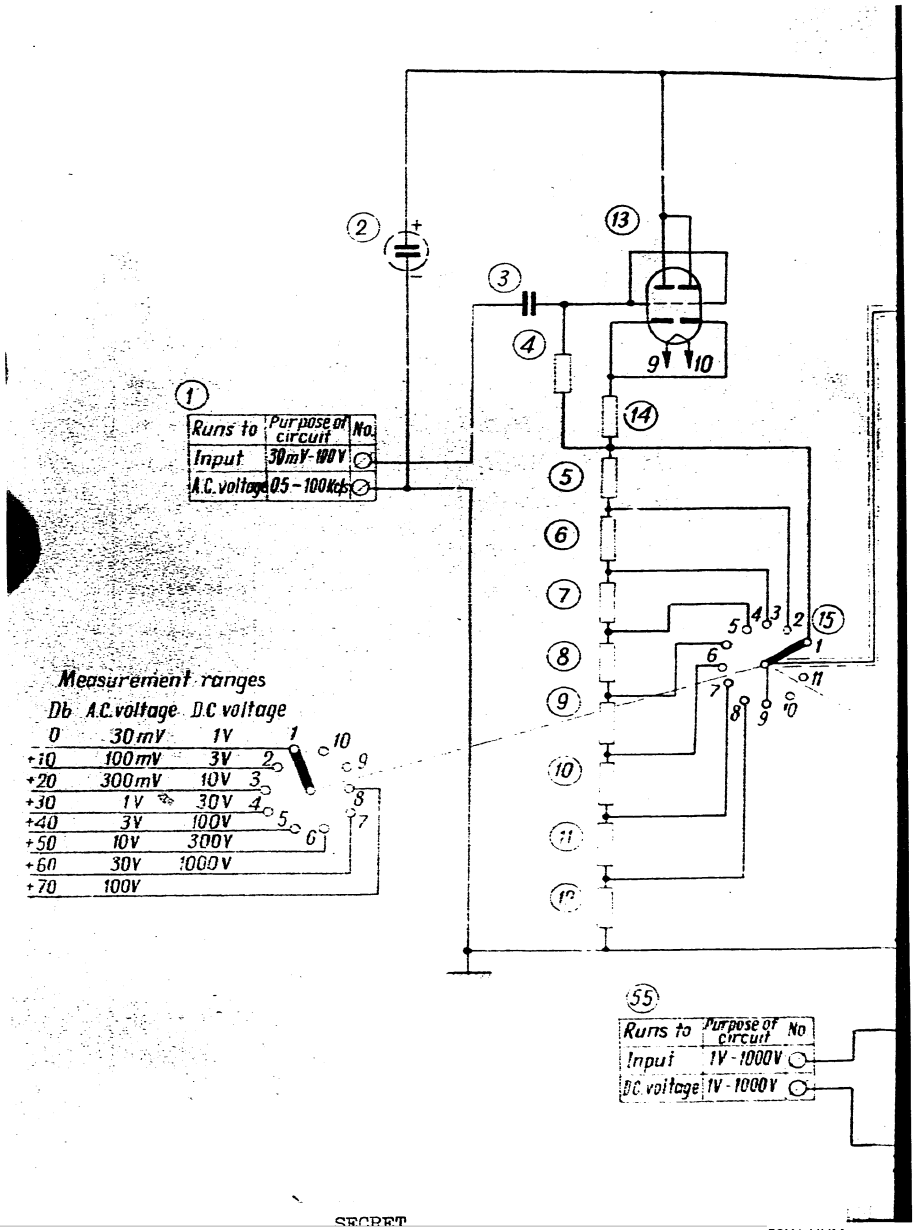

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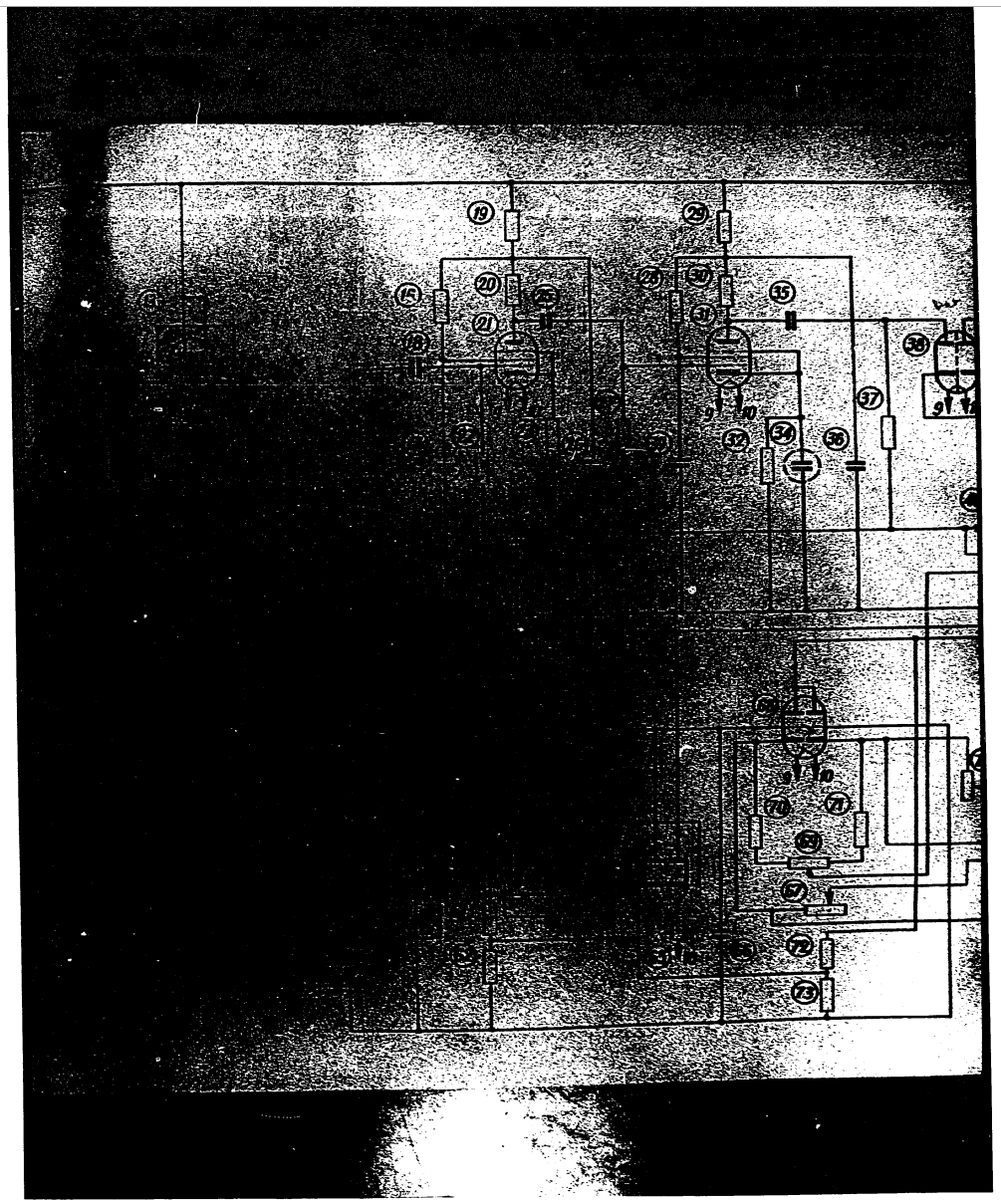

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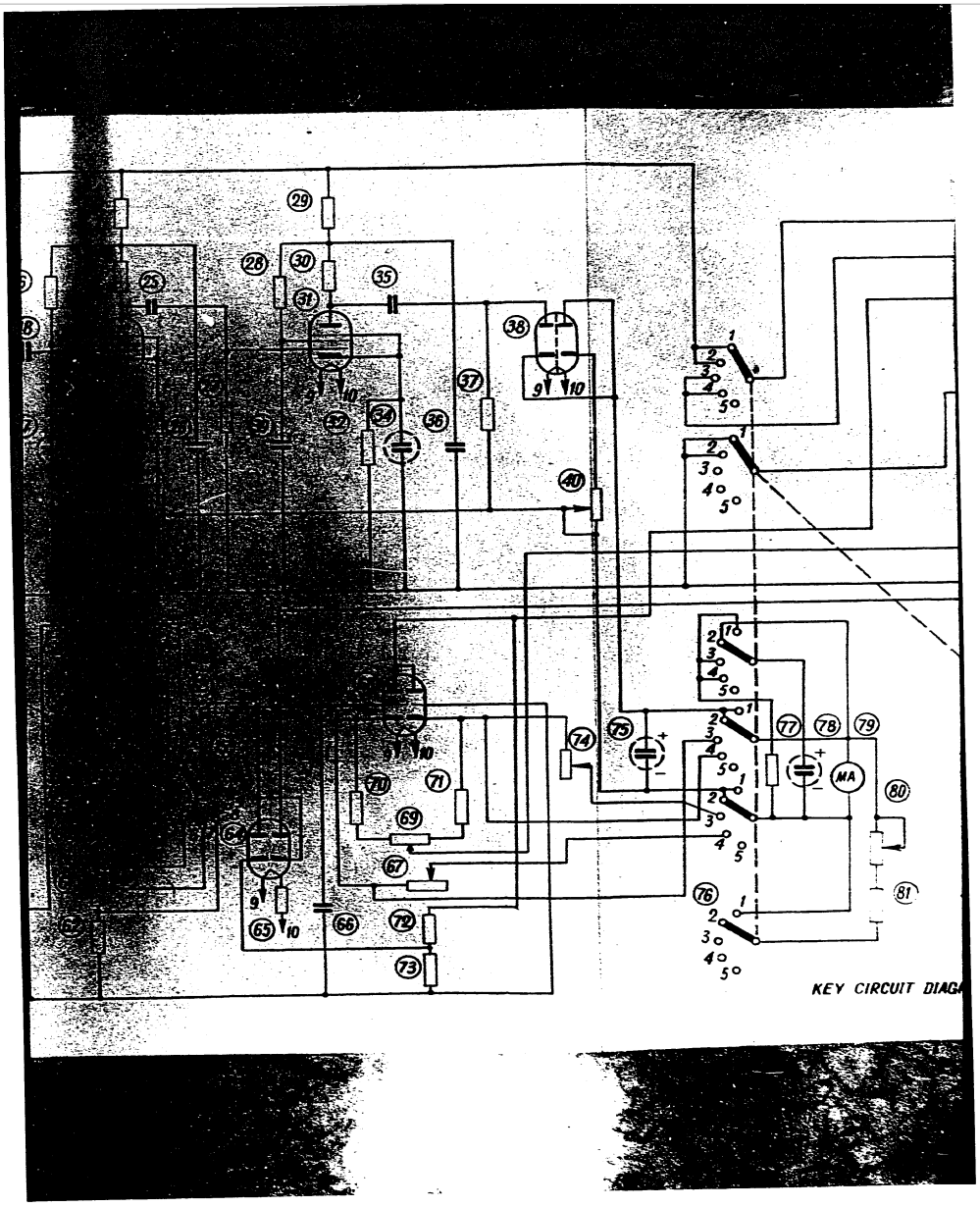

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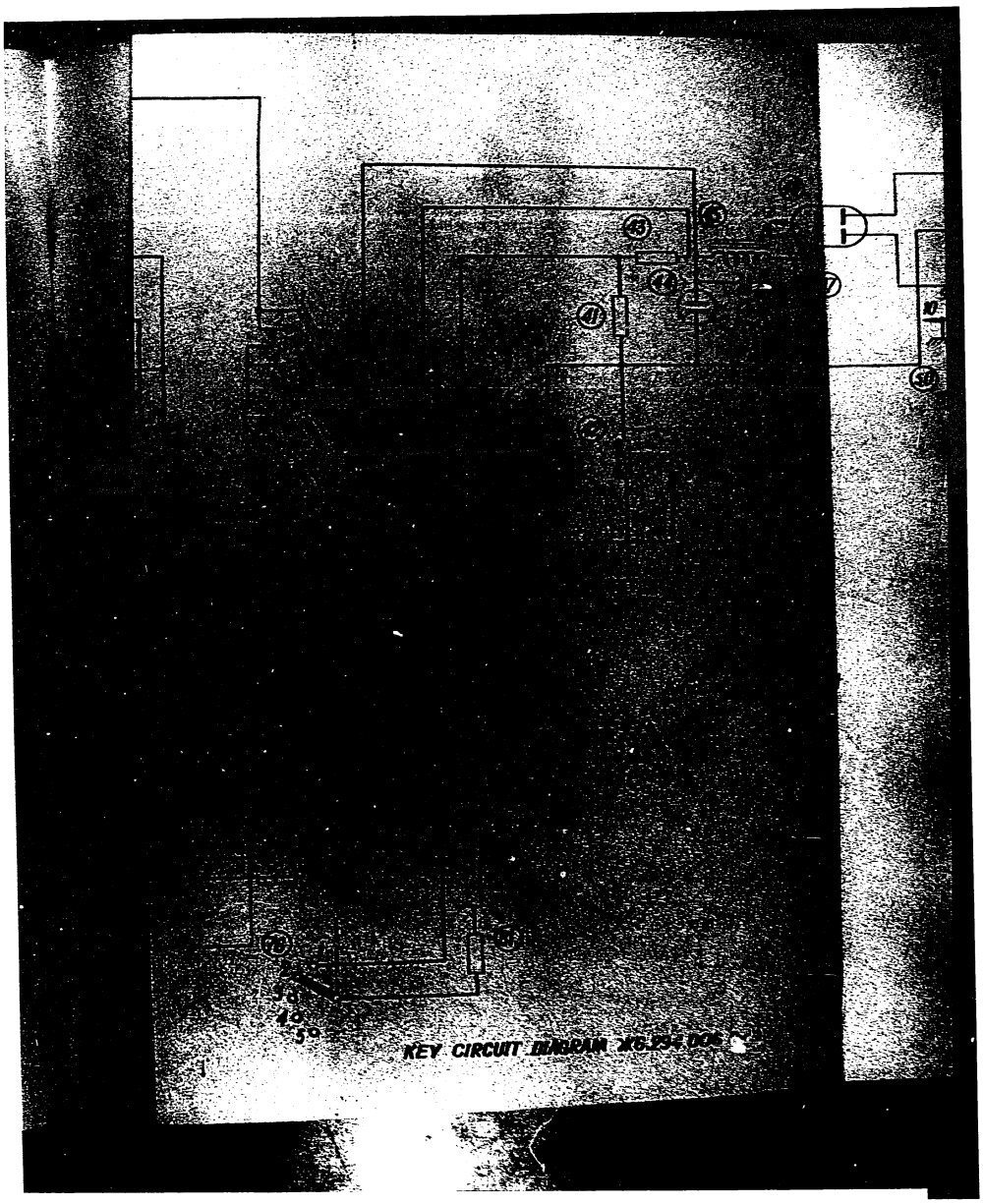

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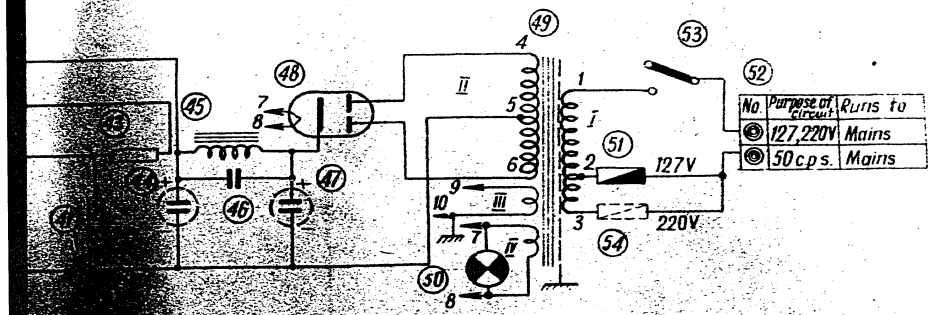
Appendix



No.	Purpose of circuit	Runs to
◎	127,220V	Mains
◎	50 c.p.s.	Mains

...measurement.

...GRAM Ж6.294.006 Сх 3

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Specifications for Key Circuit Diagram

Ref. No.	St.Std, Specifications, Dwg	Description	Rating	Qnty	Note	Modification
1	2	3	4	5	6	7
1	У7.527.014	Jack		1		
2	ГОСТ 5561-54	Capacitor КЗ-16-400-20М	20 μF	1		
3	ГОСТ 6119-54	Capacitor КСО-5-500-В-5600-I	5600 pF	1		
4	ОЖО.467.003ТУ	Resistor МЛТ-1-0.51-I-А	0.51 megohm	1		
5	ОЖО.467.003ТУ	Resistor МЛТ-1-18,000-I-А	18 kilohms	1		
	ОЖО.467.003ТУ	Resistor МЛТ-1-1600-I	1600 ohms	One of ratings	Selected in tuning, series-connected, 20,500 ohms ±1%	
	ОЖО.467.003ТУ	Resistor МЛТ-1-2000-I	2000 ohms			
	ОЖО.467.003ТУ	Resistor МЛТ-1-2400-I	2400 ohms			
	ОЖО.467.003ТУ	Resistor МЛТ-1-2700-I	2700 ohms			
	ОЖО.467.003ТУ	Resistor МЛТ-1-3000-I	3000 ohms			
	ОЖО.467.003ТУ	Resistor МЛТ-1-3300-I	3300 ohms			
6	ОЖО.467.003ТУ	Resistor МЛТ-1-5600-I	5600 ohms	1	Same, 6500 ohms ±1%	
	ОЖО.467.003ТУ	Resistor МЛТ-1-620-I	620 ohms	One of ratings		
	ОЖО.467.003ТУ	Resistor МЛТ-1-1200-I	1200 ohms			
7	ОЖО.467.003ТУ	Resistor МЛТ-1-1800-I	1800 ohms	1		
	ОЖО.467.003ТУ	Resistor МЛТ-1-160-I	160 ohms	One of ratings	Same, 2050 ohms ±1%	
	ОЖО.467.003ТУ	Resistor МЛТ-1-200-I	200 ohms			
	ОЖО.467.003ТУ	Resistor МЛТ-1-240-I; МЛТ-1-270 ohms-I	240 ohms; 270 ohms			
	ОЖО.467.003ТУ	Resistor МЛТ-1-330-I	330 ohms			
	ОЖО.467.003ТУ	Resistor МЛТ-1-300-I	300 ohms			
8	ОЖО.467.003ТУ	Resistor МЛТ-1-560-I	560 ohms	1	Same, 650 ohms ±1%	
	Т7ОЖО.467.004	Resistor ВС-0.25-100-I	100 ohms	One of ratings		
	ОЖО.467.003ТУ	Resistor МЛТ-1-120-I	120 ohms			

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1	2	3	4	5	6	7
9	ОЖО.467.003ТУ	Resistor МЛТ-1-130-I	130 ohms	1	Selected in tuning, series-connected, 205 ohms ±1%	
	ТУОЖО.467.004	Resistor ВС-0.25-68-I	68 ohms	One of ratings		
	ТУОЖО.467.004	Resistor ВС-0.25-75-I	75 ohms			
	ТУОЖО.467.004	Resistor ВС-0.25-82-I	82 ohms			
10	Ж6.732.007	Wire-wound resistor	650 ohms ±1%	1	Bifilar winding	
11	Ж6.732.005	Wire-wound resistor	20.5 ohms ±1%	1	Same	
12	Ж6.732.006	Wire-wound resistor	10.2 ohms ±1%	1	Same	
13	ЧТУ.01.105.53	Valve 6Н1П		1		
14	ОЖО.467.003ТУ	Resistor МЛТ-1-680-I	680 ohms	1		
15	НО.360.006	Switch 11ПЧН-К8	11 positions, 4 wafers	1	Porcelain	
16	ОЖО.467.003ТУ	Resistor МЛТ-1-0.15-I-А	0.15 megohm	1		
17	ГОСТ 6118-52	Capacitor КЗ-2-400-20М	20 µF	1		
18	ГОСТ 6118-52	Capacitor КБГ-И-400-0.03-II	0.03 µF	1		
19	ОЖО.467.003ТУ	Resistor МЛТ-1-18,000-I-А	18 kilohms	1		
20	ОЖО.467.003ТУ	Resistor МЛТ-1-62,000-I-А	62 kilohms	1		
21	ЧТУ.01.104.53	Valve 6Ж2П		1		
22	ОЖО.467.003ТУ	Resistor МЛТ-1-0.43-I-А	0.43 megohm	1		
23	ОЖО.467.003ТУ	Resistor МЛТ-1-390-I	390 ohms	1		
24	Б6.731.002	Potentiometer 200 ohms	200 ohms	1		
25	ГОСТ 6119-54	Capacitor КСО-5-500-В-5100-I	5100 pF	1		
26	ОЖО.462.022ТУ	Capacitor МБГП-2-400-1-II	1 µF; 400 V	1		
27	ОЖО.467.003ТУ	Resistor МЛТ-1-1-I-А	1 megohm	1		
28	ОЖО.467.003ТУ	Resistor МЛТ-1-0.2-I-А	0.2 megohm	1		
29	ОЖО.467.003ТУ	Resistor МЛТ-1-18,000-I-А	18 kilohms	1		
30	ОЖО.467.003ТУ	Resistor МЛТ-1-47,000-I-А	47 kilohms	1		

1	2	3	4	5	6	7
31	ЧТУ 01.104-53	Valve 6Ж2П		1		
32	ОЖО.467.003ТУ	Resistor МЛТ-1-820-I	820 ohms	1		
33	ОЖО.461.015ТУ	Capacitor КСО-5-500-В-3000-II; КСО-5-250-В-10,000--II	3000 to 10,000 pF	1	Installed, if necessary	
34	ГОСТ 5561-54	Capacitor КЭ-16-30-50М	50 μF; 30 V	1		
35	ОЖО.462.022ТУ	Capacitor МБГП-2-400-0.25-II	0.25 μF;400V	1		
36	ОЖО.462.022ТУ	Capacitor МБГП-2-400-1-II	1 μF; 400 V	1		
37	ОЖО.467.003ТУ	Resistor МЛТ-1-82,000-I-A	82 kilohms	1		
38	ЧТУ 01.108-53	Valve 6Х2П		1		
39	ОЖО.462.022ТУ	Capacitor МБГП-2-400-0.5-II	0.5 μF	1		
40	ОЖО.468.004ТУ	Resistor СП-I-1-100-А-13	100 kilohms	1		
41	ОЖО.467.003ТУ	Resistor МЛТ-1-15,000-I-A	15 kilohms	1		
42	ОЖО.468.004ТУ	Resistor СП-I-1-3.3А$_4$	3.3 kilohms	1		
43	ОЖО.467.003ТУ	Resistor МЛТ-2-33 kilohms-I-A	33 kilohms	1		
44	ГОСТ 5561-54	Capacitor КЭ-2-400-20М	20 μF	1		
45	Ж6.775.020	Choke	Ш12x12	1		
46	ГОСТ 6118-52	Capacitor КВГ-И-200-0.1-II	0.1 μF	1		
47	ГОСТ 5561-54	Capacitor КЭ-2-400-10М	10 μF	1		
48	ЧТУ 01.109-53	Valve 6П4П		1		
49	Ж6.722.003	Transformer	Ш20x30	1		
50	НСФ0.337.001ТУ	Valve МН-14	63 V; 0.28 A	1		
51	ГОСТ 5010-53	Fuse ПК-45-0.5	0.5 A	1		
52	У7.528.031	Supply block		1		
53	НИО.360.606	Tumbler ТВ2-1	220 V	1		
54	ГОСТ 5010-53	Fuse ПК-45-0.25	0.25 A	1		
55	У7.527.014	Jack		1		
56	ОЖО.467.003ТУ	Resistor МЛТ-1-6.2-1-А	6.2 megohms	1 One of ratings	Selected in tuning, series-connected,	
	ОЖО.467.003ТУ	Resistor МЛТ-1-0.3-I-A	360 kilohms			
		Resistor МЛТ-1--360 megohms-I-A	0.3 megohm			
	ОЖО.467.003ТУ	Resistor МЛТ-1-0.43-I-A	0.43 megohm		6.84 megohms ±1%	

1	2	3	4	5	6	7
		Resistor МЛТ-1-510 kilohms--I-A	510 kilohms	One of ratings	Selected in tuning, series-connected, 6.84 megohms ±1%	
	OKO.467.003TY	Resistor МЛТ-1-0.56-I-A	0.56 megohms			
		Resistor МЛТ-1-620 kilohms--I-A	620 kilohms			
	OKO.467.003TY	Resistor МЛТ-1-0.75-I-A	0.75 megohm			
		Resistor МЛТ-1-680 kilohms--I-A	680 kilohms			
	OKO.467.003TY	Resistor МЛТ-1-0.82-I-A	0.82 megohm			
	OKO.467.003TY	Resistor МЛТ-1-0.91-I-A	0.91 megohm			
57	OKO.467.003TY	Resistor МЛТ-1-2-I-A	2 megohms	1 One of ratings	Same, 2.16 megohms ±1%	
	OKO.467.003TY	Resistor МЛТ-1-62,000-I-A	62 kilohms			
		Resistor МЛТ-1-75 kilohms-I-A	75 kilohms			
	OKO.467.003TY	Resistor МЛТ-1-0.1-I-A	0.1 megohm			
		Resistor МЛТ-1-19 kilohms-I-A	19 kilohms			
	OKO.467.003TY	Resistor МЛТ-1-0.15-I-A	0.15 megohm			
		Resistor МЛТ-1-120 kilohms-I-A	120 kilohms			
	OKO.467.003TY	Resistor МЛТ-1-0.2-I-A	0.2 megohm			
		Resistor МЛТ-1-180 kilohms-I-A	180 kilohms			
	OKO.467.003TY	Resistor МЛТ-1-220 kilohms-I-A	220 kilohms			
		Resistor МЛТ-1-0.24-I-A	0.24 kilohm			
58	OKO.467.003TY	Resistor МЛТ-1-0.62-I-A	0.62 megohm	1 One of ratings	Same, 0.684 megohm ±1%	
	OKO.467.003TY	Resistor МЛТ-1-30,000-I-A	30 kilohms			
		Resistor МЛТ-1-36 kilohms-I-A	36 kilohms			
	OKO.467.003TY	Resistor МЛТ-1-43,000-I-A	43 kilohms			
		Resistor МЛТ-1-51 kilohms-I-A	51 kilohms			

1	2	3	4	5	6	7
	OMO.467.003TY	Resistor MJT-1-56,000-I-A	56 kilohms	One of ratings	Selected in tuning, series-connected, 0.684 megohm ±1%	
		Resistor MJT-1-62 kilohms-I-A	62 kilohms			
	OMO.467.003TY	Resistor MJT-1-75,000-I-A	75 kilohms			
		Resistor MJT-1-68 kilohms-I-A	68 kilohms			
	OMO.467.003TY	Resistor MJT-1-82,000-I-A	82 kilohms			
	OMO.467.003TY	Resistor MJT-1-91,000-I-A	91 kilohms			
59	OMO.467.003TY	Resistor MJT-1-0.2-I-A	0.2 megohm	1 One of ratings	Same, 0.216 megohm ±1%	
	OMO.467.003TY	Resistor MJT-1-6200-I	6200 ohms			
	OMO.467.003TY	Resistor MJT-1-7.5 kilohms-I-A	7.5 kilohms			
	OMO.467.003TY	Resistor MJT-1-10,000-I-A	10,000 ohms			
	OMO.467.003TY	Resistor MJT-1-15,000-I-A	15 kilohms			
		Resistor MJT-1-12 kilohms-I-A	12 kilohms			
	OMO.467.003TY	Resistor MJT-1-20,000-I-A	20 kilohms			
		Resistor MJT-1-18 kilohms-I-A	18 kilohms			
	OMO.467.003TY	Resistor MJT-1-24,000-I-A	24 kilohms			
		Resistor MJT-1-22 kilohms-I-A	22 kilohms			
	OMO.467.003TY	Resistor MJT-1-9.1 kilohms-I-A	9.1 kilohms			
60	OMO.467.003TY	Resistor MJT-1-62,000-I-A	62,000 ohms	1 One of ratings	Same, 68,400 ohms ±1%	
		Resistor MJT-1-5.1 kilohms-I-A	5.1 kilohms			
	OMO.467.003TY	Resistor MJT-1-3000-I	3000 ohms			
		Resistor MJT-1-6.2 kilohms-I-A	6.2 kilohms			
	OMO.467.003TY	Resistor MJT-1-4300-I	4300 ohms			
		Resistor MJT-1-6.8 kilohms-I-A	6.8 kilohms			
	OMO.467.003TY	Resistor MJT-1-5600-I	5600 ohms			

1	2	3	4	5	6
	ОЖО.467.003ТУ	Resistor МЛТ-1-7500-I	7500 ohms	One of ratings	Selected in units, series-connected, 12,400 ohms ±1%
	ОЖО.467.003ТУ	Resistor МЛТ-1-9100-I	9100 ohms		
61	ОЖО.467.003ТУ	Resistor МЛТ-1-[illegible]-I-A	20 kilohms	1 One of ratings	Same, 21,600 ohms ±1%
		Resistor МЛТ-1-1.2 kilohms--I-A	1.2 kilohms		
	ОЖО.467.003ТУ	Resistor МЛТ-1-[illegible]-I	620 ohms		
		Resistor МЛТ-1-1.8 kilohms--I-A	1.8 kilohms		
	ОЖО.467.003ТУ	Resistor МЛТ-1-1000-I	1000 ohms		
	ОЖО.467.003ТУ	Resistor МЛТ-1-1500-I	1500 ohms		
	ОЖО.467.003ТУ	Resistor МЛТ-1-2000-I	2000 ohms		
	ОЖО.467.003ТУ	Resistor МЛТ-1-2400-I	2400 ohms		
62	ОЖО.467.003ТУ	Resistor МЛТ-1-9100-I	9100 ohms	1 One of ratings	Same, 10,000 ohms ±1%
	ОЖО.467.003ТУ	Resistor МЛТ-1-430-I	430 ohms		
	ОЖО.467.003ТУ	Resistor МЛТ-1-620-I	620 ohms		
	ОЖО.467.003ТУ	Resistor МЛТ-1-820-I	820 ohms		
	ОЖО.467.003ТУ	Resistor МЛТ-1-1000-I	1000 ohms		
	ОЖО.467.003ТУ	Resistor МЛТ-1-1200-I	1200 ohms		
63	ОЖО.467.003ТУ	Resistor МЛТ-1-5.1-I-A	5.1 kilohms	1	
64	ЧТУ01.108-58	Valve 6Х2П		1	
65	М6.732.008	Wire-wound resistor	5 ohms ±1%	1	
66	ГОСТ 6118-52	Capacitor КБГ-И-600-0.01-II	0.01 μF	1	
67	ОЖО.468.004ТУ	Resistor СП-I-1-10A_4	10 kilohms	1	
68	ЧТУ01-105-53	Valve 6Н1П		1	
69	ОЖО.468.004ТУ	Resistor СП-I-1-10А-13	10 kilohms	1	

SECRET

1	2	3	4	5	6	7
70	ОЖО.467.003ТУ	Resistor МЛТ-1-3000-I	3000 ohms	1		
71	ОЖО.467.003ТУ	Resistor МЛТ-1-3000-I	3000 ohms	1		
72	ОЖО.467.003ТУ	Resistor МЛТ-1-75,000-I-A	75 kilohms	1		
73	ОЖО.467.003ТУ	Resistor МЛТ-1-2200-I	2.2 kilohms	1		
74	ОЖО.468.004ТУ	Resistor СП-I-1-10A_4	10 kilohms	1		
75	ГОСТ 5561-54	Capacitor КЭ-2-20-100М	100 µF	1		
76	НО.360.006	Switch 5П6Н-К8	5 positions, 3 wafers	1	Porcelain	
77	ОЖО.467.003ТУ	Resistor МЛТ-1-1600-I	1600 ohms	1		
78	ГОСТ 5561-54	Capacitor КЭ-16-8-500М	500 µF	1		
79	ТУПНОПП 533.077-54	Microammeter, type М24	0–100 µA	1	Inner resistance (1.900 ohms, cl. 1.5)	
80	ОЖО.468.004ТУ	Resistor СП-1-1-47A_4	47 kilohms	1		
81	ОЖО.467.003ТУ	Resistor МЛТ-1-2200-I	2200 ohms	1		

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