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COUNTRY	USSR	REPORT	[Redacted]
SUBJECT	Soviet English-Language Manual on a Ship's Loudspeaking Intercommunication Equipment	DATE DISTR.	25 October
		NO. PAGES	1
			50X1-HUM
		REFERENCES	

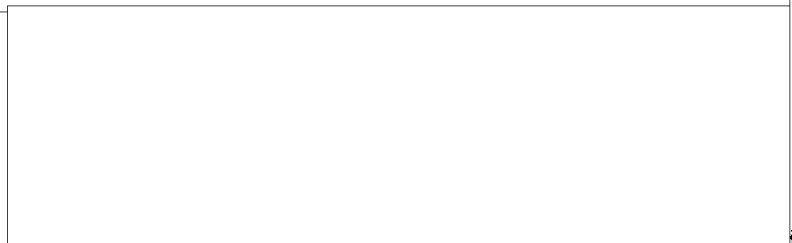
DATE OF INFO. [Redacted]
 PLACE & DATE ACQ. [Redacted]

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1. A 75-page, Soviet English-language manual entitled Description and Maintenance Instructions for Ship's Loudspeaking Intercommunication Equipment. 50X1-HUM
 [Redacted] No publishing data were given. 50X1-HUM
2. The intercom system is equipped with the TP-2 auxiliary transmitter and the "VOLNA" K1 receiver.

Distribution of Attachment (for Retention):

- [Redacted] 50X1-HUM
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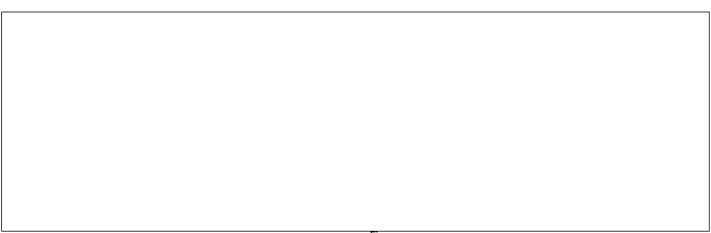
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INFORMATION REPORT INFORMATION REPORT



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**DESCRIPTION AND MAINTENANCE
INSTRUCTIONS FOR SHIP'S
LOUDSPEAKING INTERCOMMUNICATION
EQUIPMENT**

(English Language)

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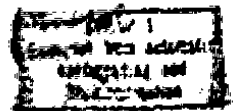
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DESCRIPTION
AND MAINTENANCE INSTRUCTIONS
FOR SHIP'S LOUDSPEAKING
INTERCOMMUNICATION EQUIPMENT

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C O N T E N T S

DESCRIPTION OF SERVICE AND BROADCASTING
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AUXILIARY TRANSMITTER 3 - 20
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DESCRIPTION OF SERVICE AND BROADCASTING

TRANSMISSION CIRCUITS WITH TYPE 10-2

AUXILIARY TRANSMITTER

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I. PURPOSE

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Translation circuit with 25W amplifier is designed for command communication and broadcasting from any one of the 2 switchboards through the three translation lines, and for broadcasting from local microphone, radio receiver and special transmissions line; sound reproduction is ensured as well.

The circuit provides for magnetic recording and magnetic recording reproduction. The equipment is designed for continuous operation in the following conditions:

- (a) temperature variations from -40°C to $+50^{\circ}\text{C}$ - for microphones and devices of waterproof design; temperature variations from -10°C to $+50^{\circ}\text{C}$ - for other devices;
- (b) relative humidity of air up to 98%;
- (c) vibration, shaking, strikes are within specifications.

II. CIRCUIT COMPOSITION

Translation circuit with T11-2 auxiliary transmitter includes the following devices:

- (a) auxiliary transmitter T11-2;
- (b) switchboards K-3 and K-3 D;
- (c) rectifiers B-I and B-I D;
- (d) microphones M4-I and M4-2 for command transmission;
- (e) plate for mounting microphone M4-I in shielded spaces;
- (f) protective case 3H for mounting microphone M4-I at the outdoor posts;
- (g) radio receiver;
- (h) microphone M4-6 for broadcasting;
- (i) electric phonograph ;
- (j) horn loudspeakers TP-I;

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- (c) Diffuser loudspeakers (only for shielded spaces -3
and -4; 50X1-HUM
(1) volume controller ;
(n) spares -2.

III TECHNICAL DATA.

1. Translation circuit ensures:

- (a) command transmission from two equivalent switchboards , broadcasting from receiver, local microphone, special transmission lines, sound pick up and magnetic recorder, through the three loudspeaking lines " СПЕЦНААВН " ("Special"), " ЖИЛАЯ " and ("Living spaces") and " ВЕРХНЯЯ ПЛУТБОА " ("Upper deck"). Magnetic recorder is not included into the equipment set;
- (b) possibility of broadcasting from switchboards through translation line " ЖИЛАЯ " ("Living spaces");
- (c) possibility to cut out the broadcasting during transmission from switchboards;
- (d) signalization showing that translation lines are occupied by transmission from switchboards;
- (e) signalization showing that translation lines are ready for broadcasting;
- (f) signalization on all the switchboards indicating that one of them is switched on;
- (g) possibility of listening to and control of the transmission level at the amplifier outlet and at translation lines;
- (h) signalization indicating presence of voltage at a.c. feeder and presence of amplifier supply voltage.

The circuit is ready for operation practically at any moment except for artistic transmission from radio receiver.

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Period of time (30 - 36 sec.) required for heating the cathodes of the tubes determines the readiness of the radio receiver for operation.

Two feeders supply the equipment with single-phase alternating current 220V, 50 c/s. Changing over from one feeder to another is effected manually. The equipment provides normal operation:

(a) at continuous variations of the feeding mains voltage within $\pm 5\%$ of rated value;

(b) at intermittent deviations of the feeding mains voltage from -13% to $+8\%$ of rated value;

(c) at short-term variations of the feeding mains voltage from -25% to $+13\%$ of rated value.

Auxiliary transmitter power consumption when supplied from a.c. mains does not exceed 90 VA at $\cos\phi=0.8$.

2. Main characteristics of the translation circuit with an auxiliary transmitter:

(a) rated power output at 36 ohm load does not exceed 25W;

(b) rated output voltage 30V;

(c) rated voltage at the amplifier circuit input at rated output power does not exceed the values: for microphone input of the auxiliary transmitter - 1.7 mV, for microphone input of switchboards - $11^{\pm} 4$ mV, for special transmission line 3B input - 3V, for input the "ПР К" ("Receiver") - 0.78V;

(d) harmonic distortion coefficient in 100 \pm 6,000 c/s frequency band when transmitting from the microphone input of the auxiliary transmitter does not exceed 7%; when transmitting from switchboards in 500 \pm 3,500 c/s frequency band, it does not exceed 8%;

(e) nonuniformity of frequency response in 100 \pm 6,000 c/s frequency band relative to its value at 1,500 c/s frequency

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voltage not exceed ± 41 ;

(f) at load shedding from 36 to 360 ohm, the output voltage of the amplifier changes not more than by 70%.

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IV DESCRIPTION OF CIRCUIT OPERATION

Separate unit of auxiliary transmitter TII-2: microphone amplifier YM, amplifier TY-25 and commutation elements, are shown in the diagram of the translation with a 25 W power amplifier (see Supplements).

Artistic transmissions should be conducted from the local microphone M4-6 through the circuit consisting of 3 auxiliary transmitter amplifiers: YM, TY-3 and TY-25; transmissions from the radio receiver or from the special transmission line are conducted through amplifiers TY-3 and TY-25.

When conducting command transmissions from the switchboard, relay of the auxiliary transmitter cuts the broadcasting sources off the auxiliary transmitter input.

"СПЕЦИАЛЬН" ("Special"), "ЖИЛАН" ("Living spaces") and "В ПАЛУБА" ("Upper deck") loudspeaker communication lines can be connected to the input of the amplifier circuit by means of commutation elements. Considered below is the switching on of the auxiliary transmitter power supply. 220 V alternating voltage is supplied to the plug connector contacts of the auxiliary transmitter TII-2 from 2 feeders:

- to W9/1 and W9/2 plug connector contacts from one feeder, and to W10/1 and W10/2 plug connector contacts,
- from another (see diagram of translation equipment connections.)

Auxiliary transmitter TII-2 power supply can be cut in by

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switching the feeder switch. When the switch is in "50X1-HUM" position, the auxiliary transmitter takes power from the shore supply feeder. When the switch is in "4-15" position, the auxiliary transmitter is fed from the feeder of Π -1 converter control board. Power supply switching on is indicated by the neon signal lamp "11b" ("Mains") lighting up (on the auxiliary transmitter Π -2 panel).

The lamp "11b" ("Mains") is connected to the circuit in parallel to primary winding of transformer T_p of rectifier R-3,5. Rectified voltage 24V is supplied to 14-a-5.6 (plus) and 14-B-5.6 (minus) contacts.

Translation lines being off (B4, B5, B6 switches in the "off" position) and auxiliary transmitter feeding being on, P3, P5 and P7 relays are energized thus shortcircuiting all the lines.

Command transmission is carried on from the switchboards. Translation line switching on from the switchboard is effected by turning the switch handle corresponding to this line to "BKA" ("On") position. Let us consider the transmission from K-3 switchboard through "ЖУААР" ("Living spaces") line. The handle of switch B3 of the switchboard must be set to "BKA" ("On") position. Contacts 15-16 when closed cut on relay P4 winding supply circuit of the auxiliary transmitter Π -2. Simultaneously relay P9 of the auxiliary transmitter Π -2 operates and supplies 24V power to YM, TY-3 and TY-25 amplifiers.

Relay P4 operates and contacts 4-5 break the relay P5 circuit and contacts 1-3 connect the audio circuit from the switchboard output to the input of amplifier TY-3. The audio voltage amplified by TY-3 and TY-25 amplifiers is fed to "K" and "O" wires of "ЖУААР" ("Living spaces") line; at the same time "O" and "III" wires of the line are being shorted.

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The circuit resulting ensures constant level of volume when used using the command transmission and is necessary for the control of artistic transmissions.

When switch B3 of the switchboard is cut on, signal lamp placed above the "ЖИТАА" ("Living spaces") line switch of the switchboard and for translation through translation lines lights up, showing that the line is busy. For artistic transmission, cut in the corresponding tumbler switch on the auxiliary transmitter panel, for switching on the "ЖИТАА" ("Living space") line, cut in B5 tumbler switch. The supply circuit of relay P5 is broken and amplifier -25 output is connected to "3" and "0" wires of the "ЖИТАА" ("Living spaces") line.

When broadcasting from the auxiliary transmitter, wire "K" is closed to wire "0" through contacts 3-4 of relay P8. Contacts 2-4 of switch B-5 close the supply circuit of the lamp ЛН2 "Готов" ("Ready") which shows that the line is ready for operation.

To conduct transmissions from the microphones, switch B1 must be set to the position "МИКР" ("micro"). The microphone switching on is indicated by lamps ЛН4 and ЛН5 (luminous plate "МИКРОФОН ВКЛЮЧЕН" "Microphone on") lighting up. For transmission from the receiver, cut on the "Сеть" ("Mains") switch. The receiver is fed. The lighted lamp "Готов" ("Ready") at the ПН-2 shows that the circuit is ready for operation. The signal goes from the receiver input to the amplifier -3 of the auxiliary transmitter ПН-2.

For sound reproduction, switch the sound pick-up of the electric phonograph in the receiver socket "ЗВУКОПРИИМАТЕЛЬ" ("Sound pick-up"), and feeding wire plug of the electric phonograph - in the receiver socket "Мотор" ("Motor"). The receiver tumbler switch B5 should be in "ЗВУКОПРИИМАТЕЛЬ" ("Sound pick-up")

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position.

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If the command and artistic transmissions happen to be carried on through the same line and simultaneously, amplifier TY-3 input is cut off from the artistic transmission source and is connected to the switchboard line input. The lamp "SAHPIO" ("Busy") at the TП-2 lights up at the same time. Acoustic control of the transmission level should be carried out with the help of a monitor loudspeaker connected to the radio receiver.

V. DESCRIPTION OF CIRCUIT DEVICES

Auxiliary Transmitter TП-2

The auxiliary transmitter TП-2 consists of the following parts: microphone amplifier YM, translation amplifier TY-3, translation amplifier TY-25, relay panel Пp-3, rectifier B-3.5, panel and case.

Schematic diagram of TП-2 is included in the diagram of translation with 25 W power amplifier (see Supplements).

1. Microphone amplifier YM is designed for preamplification of transmission from the local microphone. The amplifier consists of three amplifier stages of TП135 type crystal triodes K1 (1 pc.) and П15A type crystal triodes K2 and K3 (2 pcs.) and type 15A momentary-duty amplitude limiter comprising diodes A1-A2 with a grounded emitter.

The microphone amplifier has the following basic parameters:

(a) output voltage at 600 ohm nominal load resistance is above 0.78 V with input voltage not exceeding 1.7 mV;

(b) nonlinear distortion coefficient with nominal input voltage in 100-6,000 c/s frequency band does not exceed 3%;

(c) background noise level at the amplifier output, 400 ohm resistance, with the input closed to 600 ohm, is not more than

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Amplifier T4-3 is designed for translation amplification. The amplifier is assembled according to the diagram with a grounded emitter, and consists of two stages: pre-amplifier stage on K1 triode of $\Pi 4 B$ type and two-cycle output stage on two triodes K2 and K3 of $\Pi 4 B$ type. The rectifier of the auxiliary transmitter supplies the amplifier with 24 V voltage.

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Amplifier T4-3 has the following electric parameters:

- (a) power output at 1500 c/s frequency with 300 ohm load resistance is more than 3W;
- (b) nonlinear distortion coefficient in the frequency band from 100 to 6,000 c/s does not exceed 9%;
- (c) amplifier input voltage is less than 0.78 V;
- (d) background noise level at the amplifier input at 300 ohm resistance and with the amplifier input closed to 600 ohm resistance, is not more than 120 mV.

3. Amplifier T4-25 is intended for transmission amplification. The amplifier consists of a two-cycle stage on two triodes K1 and K2 of $\Pi 4 B$ type with a common collector.

The stage is connected to the transformer T_{p1} primary winding. The amplifier signal is taken off the output transformer secondary winding. Rectifier B-3,5 supplies the amplifier with 24 V voltage. Amplifier T4-25 has the following electric parameters:

- (a) power output with 36 ohm load resistance is more than 25 W;
- (b) nonlinear distortion coefficient in the frequency band from 100 to 6,000 c/s is less than 4%;
- (c) amplifier input voltage is less than 35 V;
- (d) background noise level at the amplifier output at 36 ohm resistance does not exceed 150 mV;

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4. Relay panel Пр-3 is intended for commutation of electric circuits in the auxiliary transmitter ТП-2 circuit. Relays installed on panel Пр-3 are used for the following purposes:

- (a) relays P2, P4 and P6 operate when command transmission from the switchboards is switched on;
- (b) relays P3, P5 and P7 are designed for connecting the loudspeaker lines to amplifier ТУ-25 output;
- (c) relay P1 serves for audio circuits commutation of amplifier ТУ-3 input and for signalling circuits commutation;
- (d) relay P8 is intended for forced broadcasting through the "ЖИВАЯ" ("Living spaces") line.

5. Rectifier Б-3,5 provides power for amplifiers with semiconductor triodes and for signalling circuits. The rectifier is assembled according to the full-wave bridge circuit with a П-shaped filter. The rectifier is fed from 127 - 220 V, 50 c/s a.c. mains. Tumbler switch B1 must be either in 127 B or in 220 B position according to the mains voltage.

Rectified voltage is stabilized.

The rectifier has the following electric parameters:

- (a) 24 V \pm 1 V rectified voltage;
- (b) pulsation coefficient at the filter output is less than 500 mV.

Switchboards K-3

Type K-3 (K-35) switchboards for three directions consist of the following main parts: housing, control panel, compensating filter (Ф), microphone amplifier (УИ) differential system (ДС) (according to the number of communication lines) and command amplifier KY-10.

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Compensating Filter

The compensating filter provides the required frequency response shape of the communication channel.

Filter electric characteristics are the following: at 1,500 c/s frequency with 12 mV input voltage and 620-ohm load resistance, filter fading is 20 ± 3 times.

At 1,500 c/s frequency, filter input resistance is $1,000 \pm 200$ ohm.

Microphone Amplifier

Microphone amplifier YM is used for operation in communication channels and for voltage preamplification.

The amplifier consists of three amplifier stages with crystal triodes П13Б (1 pc.) and П15А (2 pcs), and a momentary - duty amplitude limiter with diodes Д21А (2 pcs.).

Microphone amplifier YM has the following parameters:

- (a) at 1,500 c/s frequency and 400 ohm nominal load resistance, the output voltage is more than 0.3 V;
- (b) in a band of 500 to 3,500 c/s the nonlinear distortion coefficient at the output voltage does not exceed 3%;
- (c) nominal voltage at the amplifier input is 0.6 ± 0.1 mV;
- (d) the background noise level at the amplifier output with the amplifier loaded to 400 ohm resistance and the input closed to 600 ohms is 112 times less than the nominal level;
- (e) at 1,500 c/s frequency, input resistance is $700 \text{ ohm} \pm 100 \text{ ohm}$;
- (f) at a frequency of 1,500 c/s and 400 ohm load, the amplitude characteristic of the amplifier differs from the linear one not more than by $\pm 20\%$ (within the level ranging from the nominal

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value to the value 100 times less the nominal); 50X1-HUM

(g) if the input signal is 10 times the nominal one, the amplifier output voltage increases by 25% as compared to the value specified in paragraph;

(h) frequency response in 500 \pm 3,500 c/s band is linear with deviation not exceeding \pm 25%;

(i) if load resistance varies from 100 ohms to 2,400 ohms the output voltage varies by 25% and less ;

(j) amplifier power consumption does not exceed 15 mA d.c.

Differential System AC.

The differential system consists of a triple-wound differential transformer and two frequency - separation amplifying channels assembled on 115A triodes.

The differential systems have the following parameters:

(a) input resistance from the line side is 600 ohms \pm 5%;

(b) input resistance from the microphone amplifier side is more than 2,400 ohms;

(c) input voltage, from the microphone side, necessary to obtain 0,78 V voltage at the artificial load of 600-ohm line is 0.3 \pm 0.6 V;

(d) with 135-ohm load resistance and power supply from the 0.78 V voltage line, output voltage is 240 mV \pm 20 %;

(e) balancing coefficient in the frequency band (effective range) from 500 to 3,500 c/s is better than the following values:

at 500 c/s frequency - 10 times

at 1500 c/s frequency - 10 times

at 3500 c/s frequency - 5.6 times

(f) non-linear distortion coefficient in the direction: microphone amplifier - line does not exceed 3 %;

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(g) non-linear distortion coefficient in the direction: line - differential system output does not exceed 3 %;

(h) during the reverse passing of voltage from the output of the differential system to the line, attenuation is more than 10,000 times;

(i) in 500 to 3,500 c/s band frequency distortion relative to 1,500 c/s frequency in the direction: microphone amplifier - line does not exceed ± 25 %;

(j) in 500 - 3,500 c/s band, frequency distortion relative to 1,500 c/s frequency in the direction: line - differential system output does not exceed ± 25 %.

Amplifier KY - 10

Amplifier KY -10 is designed for speech transmission amplification.

Main parameters of type KY - 10 amplifiers are the following:

(a) at 1,500 c/s frequency and 90 ohm nominal load, the power output is more than 10 W;

(b) coefficient of non-linear distortion over the whole of 500-3,500 c/s frequency range, at nominal power does not exceed 8 %;

(c) input voltage is less than 240 mV;

(d) at frequency band from 500 to 3,500 c/s distortion relative to 1,500 c/s frequency does not exceed ± 40 %;

(e) background noise level at the amplifier output with the input terminals closed to 440 ohm resistance is at least 250 times less than the transmission nominal level;

(f) amplifier input resistance at 1,500 c/s frequency is more than 440 ohms;

(g) at a frequency of 1,500 c/s, the amplitude characteris-

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tic of the amplifier differs from the linear one by not more than 25% (within the total ranging from the nominal value to the value 10 times less than the nominal).

With levels ranging from the value 100 times less than the nominal one to the value 10 times less than the nominal, the amplitude characteristic differs from the linear one by not more than $\pm 7\%$;

(h) quiescent currents of the amplifier first and second stages do not exceed 20 mA;

(i) operation of the amplifiers is stable, with load resistance variation from 90 to 3,600 ohms.

Rectifier B-1 (B - 1)

Type B-1 (B-1) rectifier should provide feeding of amplifiers and type K-3 (K-3) commutator signalling circuits. The rectifier is designed for a maximum load current of 1A. Rectifier B-1 (B-1) helps to obtain the following voltages and currents:

- (a) with 1A maximum rectified current; $24 \text{ V} \pm 1 \text{ V}$;
- (b) with 0.3A maximum rectified current: $-12 \pm 1 \text{ V}$;
- (c) with 0.3 A maximum rectified current: $+12 \pm 1 \text{ V}$.

With nominal parameters of the network and with load currents varying from the maximum values to 0.05 A, rectified voltages have the following following values:

- (a) 24 V circuit: from 22 V to 26 V ;
- (b) 12 V circuit: from 11 to 14 V ;

Ripple voltage at the rectifier output, with maximum load currents does not exceed :

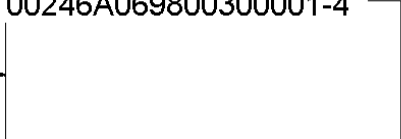
- (a) -24 V circuit: 300 mV;
- (b) +12 V circuit: 400 mV;

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With network voltage varying by $\pm 5\%$ of the nominal one, the rectified voltage varies within $\pm 5\%$ of the value measured at the nominal network voltage.

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Electroacoustic Convertors

The electroacoustic convertors are designed for conversion of sound oscillations into electric ones and vice versa.

Microphones and loudspeakers are used as convertors for speech transmission through different circuits. Microtelephones are also used as convertors for speech and music transmissions.

Purpose and brief description of electroacoustic convertors included in the equipment set are given below.

Microphones

Remote microphones $M\mu-1$ with 7 m hose are intended for operation in communication circuits.

Microphone $M\mu-2$ with a flexible stand is usually installed indoors and when the person carrying on transmission is constantly by the commutator.

Noiseproof microphone $\Delta 3M\mu-1$ used in microphones $M\mu-1$, $M\mu-2$ has the following parameters:

- Frequency bandwidth 300 - 3,000 c/s
- Sensitivity at 1,000 c/s - 0.1 mV/bar
- Impedance 600 ohms

Microphone $M\mu-6$ is designed for broadcasting and music transmission; it consists of a dynamic microphone $M\mu$, stand and connecting wires.

Microphone Characteristics

1. Frequency bandwidth : 50 - 13,000 c/s
2. Output level at 1,000 c/s frequency and 1 bar sound

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pressure : 78 db

3. Electric impedance: 250 ohm.

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Loudspeaker $\Gamma_p -1$

Horn loudspeaker $\Gamma_p -1$ is of waterproof design.

Frequency bandwidth	500-3,500 c/s
Sound pressure	10 bars
Nominal voltage	30 volts
Nominal power	1,3,5 and 10W
Weight	4.5 kg

Diagram of the loudspeaker switching on is shown on the shield of the loudspeaker case.

Loudspeaker $\Gamma_p -3$

Diffuser loudspeaker $\Gamma_p -3$ is designed for indoor installation.

Frequency bandwidth	300-3,500 c/s
Sound pressure	2 bars
Nominal power	2 W
Nominal voltage	30 volts
Weight	2 kg

Diagram of switching on is shown on the loudspeaker case.

Loudspeaker $\Gamma_p -4$

Diffuser loudspeaker $\Gamma_p -4$ with a volume control provides connection to two-wire and three-wire loudspeaker lines.

Frequency bandwidth	150 - 6,000 c/s
Nominal power	2 W
Nominal voltage	30 volts
Sound pressure	1.75 bars
Weight	3.5 kg

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Diagram of switching on is fitted to the loudspeaker cover.
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VI. OPERATING INSTRUCTIONS

1. Instructions for Devices Switching

All the translation devices are manufactured for 220 V. To switch the devices over for operation from 127 V mains, the tumbler switch is incorporated.

2. Order of Operation

Command transmissions

For transmission from the commutator:

(a) Cut on switchboard power supply. Set the feeder switch of rectifier B-1 to $\varphi/1p b$ position.

The following signals will show up: at the rectifier - "СЕТЬ ("Mains") and "Пит усил" ("Amp. feeding"), at the switchboard - "Пит сигнал" ("Signal feeding") signal. Now the switchboard is ready for operation.

(b) Take care of signalling. If the lamp of one of the lines lights up, the auxiliary transmitter is busy and transmission is forbidden.

(c) If the auxiliary transmitter is free, turn the line switch to "Вкл" ("On") position.

(d) When speaking, hold the microphone 1 cm from the corner of the mouth (the microphone insert being sidewise to the face). Speak in the ordinary voice.

(e) Turn the switch "Циркуляр" ("Conference circuit") handle for simultaneous transmission through the three lines (if all these lines are connected to the conference circuit at the switchboard) or turn the handles of all the three switches (if the lines are not connected to the conference circuit).

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(f) The transmission over, set all the switches ^{to "ISKRA"} "50X1-HUM" ("Off") position.

NOTE: During the operation, TП -2 auxiliary transmitter feeding should be continuously cut on.

Order of Broadcasting

(Transmission from auxiliary transmitter TП -2)

(a) Cut on TП -2 feeding. Set the feeding switch to ФПР Б or ФЛ Б position. Then lamps "СЕТЬ" ("Main") and "Пит. усил." ("Rect. feeding") on the auxiliary transmitter panel light up.

(b) Cut in the required lines: "СПЕЦИАЛЬН." ("Special"), "ЖИЛАЯ" ("Living spaces"), "В ПАЛУДА" ("Upper deck"), if the lamp "ЗАНЯТО" ("Busy") does not light up. Then lamp "ГОТОВО" ("Ready") lights up.

(c) When transmission is carried on from the local microphone, turn switch B1 to "Микрофон" ("Microphone") position.

(d) Carry on the transmission at a distance of 0.5 m from the microphone. Speak in the ordinary voice.

(e) Turn switch B1 to "ПР-Р" ("Receiver") position when transmission is carried on from the receiver.

Tape Recorder Operation

(Tape recorder is not included in the set of equipment installed on board the ship)

For tape recording:

(a) Connect the tape recorder input to "ТЕЛЕФОН" "ВХОД МАШИНЫ" ("Telephone, Tape recorder input") contacts of the receiver.

(b) Tune the radio receiver to the required station, adjust normal recording level by means of the radio receiver volume controller according to the tape recorder indicator and effect recording.

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For reproduction from the tape recorder :

(a) Connect the tape recorder output to the " *звучающим выводом* " ("Tape recorder sound take-off") sockets of the receiver and set switch B1 of the TП -2 to " *приём* " ("Reception") position. Adjust the required volume by means of the handle " *уровень* " ("Level") according to the device mounted on the receiver.

(b) Cut on the required loudspeaking lines at the TП -2 and start the transmission.

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50X1-HUM

RECEIVER 'BOAHA' KI
DESCRIPTION AND MAINTENANCE INSTRUCTIONS

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Main Particulars

The receiver is designed for aural reception of telegraph (continuous and tone) and telephone operations.

The receiver covers the range from 12 kc/s to 23,000 kc/s with two gaps within 60 - 100 kc/s and 1,600 - 5,000 kc/s.

The frequency range covered by the receiver is divided into nine partial ranges, as given in the table :

Range No.	Extreme frequency, kc/s	Extreme bands, m	Scale division value, kc/s
1	12-60	25,000-5,000	0.25
2	100-180	3,000-1,670	0.5
3	180-330	1,670-910	0.5
4	330-600	910-500	1
5	600-1,100	500-272.5	2
6	1,100-1,600	272.5-187.5	2
7	5,000-9,000	60-33.4	5
8	9,000-15,000	33.4-20	10
9	15,000-23,000	20-13	10

NOTE : Margin of frequency overlapping at the beginning and at the end of each partial range is at least 2%.

The input circuits all over the frequency range are designed for operation with open antenna of any length.

The receiver output is designed for 600 ohm load (amplifier input) and a pair of 130 ohm telephones.

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The receiver has the built-in dynamic loudspeaker, 0.2 VA
of 4Ω - 8 type. 50X1-HUM

The loudspeaker can be switched off by a tumbler switch fitted on the receiver front panel.

Mounted on the front panel are :

1. Range switch knob.
2. Tuning knob.
3. Knob of intermediate - frequency gain control.
4. Bandwidth switch knob.
5. Function switch knob.
6. Tone tuning knob ТАГ .
7. Knob of scale electric corrector.
8. Knob of " ТОКИ ЛАМП " ("Tube current") switch.
9. Low-frequency gain control knob.
10. Tumbler switch for receiver cut in.
11. Loudspeaker cut-in and change-over switch.
12. Tumbler switch for translation cut in.
13. Tumbler switch for "ПРИЁМНИК " ("Receiver"),
" ЗВУКОСНИМАТЕЛЬ " (" Sound pick-up") cut-in.

Inside the receiver, on unit No.1 is fitted a crystal switch.

The following tubes and semiconductor devices are used:

H.F. amplifier	6К4П
1 st mixer	6А2П
1 st oscillator	6Ж2П
Crystal generator :	6Ж2П
Frequency divider	6Ж2П
1 st I.F.amplifier (915 kc/s).	6К4П
2 nd mixer	6А2П
2 nd oscillator	6Ж2П
1 st amplifier of the 2 nd intermediate frequency (85 kc/s).	6Ж4П

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- 2 nd amplifier of the 2 nd intermediate frequency (85 kc/s) 650X1-HUM
- Main channel detector 1102
- 3rd oscillator 6H2D
- Automatic gain control amplifier. 6H2P
- Automatic gain control detector A 102
- 1 st low-frequency amplifier 6H3H
- Low-frequency amplitude limiter, 2 pcs A 102
- Power amplifier 6H17
- Rectifier 5H4C
- Rectifying diodes for measuring device M1, 4 pcs A2-F
- Voltage stabilizer CG3C
- Current stabilizer 0.85B-5.5-12
- Lighting lamp A - 17
- Gas discharger 4378A

The receiver draws power from 220, 127 and 110 V, 50 c.p.s a.c. mains.

The receiver power consumption is not more than 105 VA.

The receiver consists of the following parts:

1. Receiver.
2. Spare parts, tools and accessories set.

Electric Characteristics

The receiver is provided with jumping control of intermediate frequency pass - band.

The receiver selectivity is:

Pass-bandwidth, kc/s			Attenuation, db.
Narrow "0.5"	Mean "1.5"	Width "6"	
0.4 - 0.7	1.3 - 1.7	at least 5:5	6
not more than 3	not more than 8	not more than 24	

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Attenuation of noise at the second channel frequency **50X1-HUM** at frequencies equal to the intermediate ones is at least by 1,000 times (60 db) all over the frequency range, except range No.5 where the attenuation at the second channel is at least 50 db, and except range No.6 with 20 db attenuation at the intermediate frequency.

The receiver input circuits provide the possibility of reception without interference when there is a parasite electromotive force in the antenna and the detuning depending on the electromotive force is as follows:

Parasite electromotive force value	Relative frequency detuning
3 volts	$\pm 3 + 6\%$
30 volts	$\pm 5 + 10\%$

Sensitivity of the receiver, operating with an open antenna with signal/noise ratio equal to 5 and with output voltage at 600 ohm load equal to 0.8 V, is at least:

- (a) in 0.5 range, with continuous telegraphy duty:
 - in 1 st range. 15 microvolts
 - in 2 - 9 ranges 10 microvolts
- (b) during reception of oscillations modulated by 400 c.p.s frequency with 30% modulation depth, in 3 - 9 ranges :
 - in 1.5 band 15 microvolts
 - in 6 band 30 microvolts
- (c) sensitivity at the ultralow frequency inlet, at 1,000 c.p.s frequency is at least 250 microvolts.

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In a range of (180-15,000) kc/s, with pass-band 50X1-HUM receiver passes audio frequencies within 200 ÷ 2,500 c.p.s with output voltage irregularity not more than 6 db; at ultralow frequency output it passes frequencies within 200-6,000 c.p.s. with irregularity not more than 6 db.

Intermediate and low frequency gain control is manual within 60 db; and the automatic gain control serves to maintain the output voltage within 12 db when the input voltage varies by 60 db.

Frequency voltage at the oscillator input over all of the ranges does not exceed 40 microvolts.

Total accuracy of calibration and of the repeated adjustment of the frequency in normal conditions is at least :

- 1 st range ± 250 c.p.s
- 2 nd,3rd ranges ± 500 c.p.s
- 4 th range ± 1,000 c.p.s
- 5 th,6 th ranges ± 3,000 c.p.s
- 7,8,9 th ranges ± 0.05 %

The receiver incorporates provisions for correcting the exact scale according to the inside crystal calibrator.

Provisions are made to limit the low frequency signal amplitude, which increases the output voltage amplitude not more than by 25%, the signal at the ultralow frequency inlet increasing by 10 times.

Receiver Electric Circuit

The receiver is made according to the superheterodyne circuit with 14 vacuum tubes of 6 V series.

The receiver is characterised by double frequency conversion in 6 - 9 ranges and one-hop conversion in 1 - 5 ranges.

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The first intermediate frequency is 915 kc/s. The ^{50X1-HUM} intermediate frequency is 85 kc/s. An automatic gain control is used.

Provision is made to control currents of 10 tubes in the main channel and to control 30 v translation line. During normal operation of the tubes the control device pointer is in the shaded sector of the scale. When a tube is out of order (or is shortcircuited) the control device pointer gets out of the shaded sector, thus indicating the breakdown in the circuit of the tube.

Tube currents and translation channel voltage are controlled according to the order given in the table :

" Tube current "
" TUBE AMPL " "
switch position

Tube controlled

1	A1 - 1 (H.P. amplifier)
2	A1 - 2 (1 st mixer)
3	A1 - 3 (1 st oscillator)
4	A3 - 1 (I.P. amplifier, 915 kc/s)
5	A3 - 2 (2 nd mixer)
6	A3 - 3 (2 nd oscillator, range 5)
	A1 - 5 (frequency divider, range 4)
7	A2 - 1 (1 st amplifier of intermediate frequency, 85 kc/s)
8	A2 - 3 (2 nd amplifier of intermediate frequency, 85 kc/s)
9	A3 - 4 (L.P. pre-amplifier)
10	A4 - 1 (power amplifier)
" Translation "	30 V translation channel

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Control over the tube currents is effected in "KAAMP" (Calibration) duty at maximum intermediate frequency ^{50X1-HUM} at minimum low-frequency gain in range 6; frequency of control is 1.1 m.c.

Tube currents of crystal generator, 3rd oscillator and automatic gain control amplifier are not controlled.

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MAINTENANCE INSTRUCTIONS

Before operation open the receiver and make sure that the mains switch is in the proper position. At the manufacturers the switch is turned to 220 V position.

If the mains voltage differs from the above said , set the switch to the required position and replace the protector 1A with the protector 2A. Set the "СЕТЬ " ("Mains") tumbler switch to "ВЫКЛЮЧЕНО " ("Off") position. Set the rest knobs to the following position :

" УСИЛЕНИЕ ПЧ " ("L.F. gain ")	to the extreme right position.
" УМЕНЬШЕНИЕ ПЧ " (" I.F. gain")	to the middle position.
" ТОН ТАГ " ("Tone telegraph")	to the middle position.
" ТРАНСЛ - ВЫКЛ " ("Translation - off")	to off position.
" ПРИЕМНИК ЗВУКОВЫМ "	
("Receiver - Sound pick up ")	to "receiver" position.
" Гр ЛБ " ("Loudspeaker")	to "receiver" position.
" Ряд работы " ("Function")	to " " ("Telephone") position.
" Полоса ПЧ " ("I.F. band")	to position 6.

Switching on and off

To switch on the receiver, set the " СЕТЬ - ВЫКЛЮЧЕНО " ("Mains - Off ") tumbler switch to " СЕТЬ " ("Mains") position.

If the receiver is in good order, a characteristic noise appears in the loudspeaker in a minute after switching on the receiver .

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The noise must increase when the "Рок *отключ*" ("Function") knob is set to position [A] ("Telegraph"). Then tune the receiver to the broadcasting station.

To switch off the receiver, set the tumbler "Сеть" ("Mains - Off") to position "Выключено" ("Off").

Tuning

Tuning is effected after the receiver is switched on and checked for proper operation and calibration.

To tune the receiver proceed as follows:

- (1) Set the required range.
- (2) Set the pointer against the required frequency by turning the tuning knob.
- (3) Obtain the best volume and quality of reception by turning the tuning knob.
- (4) Obtain the most advantageous correlation of signal to noise and set the required volume by turning the knob "Усиление НЧ" and "Усиление ПЧ" ("L.P. gain" and "I.P. gain").
- (5) To send a signal from the translation receiver output, set the knob "Усиление НЧ" ("L.P. gain") to the extreme left position, and the knob "Транса включено" and "Гр-Аб" and "Токи лампы" ("Translation - Off" and "Loudspeaker" and "Tube currents") to position "Транса" ("Translation").

Then adjust the voltage in the translation channel according to the device by the knob "Усиление ПЧ" ("I.P. gain"). The device pointer should not deviate beyond 30 V mark.

The receiver incorporates a means to connect a tape recorder for radio transmissions recording with the help of jacks "Вход магн. телефон" ("Tape recorder inlet, telephone").

To reproduce a record connect the tape recorder or sound pick up outlet to jacks "Выход магн. звуков" ("Tape recorder or

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sound pick up") and set the switch "ПРИЕМНИК ЗВУЧАН "50X1-HUM"
- sound pick up ") to position "ЗВУКОМ " ("Sound pick up").

The receiver is used to reception of service correspondence, of damped, continuous and tone modulated telegraphy and telephony.

In case the station operates in a damped or continuous oscillations duty set the knob "Род работы " ("Function") to position "ТАТ " ("Telegraph") and the knob "ТОН-ТАГ " ("Tone - telegraphy") to the mark.

Tune the receiver to zero beats of the station signal and then chose the required tone of the beats by the knob "ТОН-ТАГ " ("Tone - telegraphy") .

Sometimes it is necessary to tune the receiver by turning the knob once more to chose the most advantageous ratio between the frequency of the tone and its volume.

It is recommendable to change over to 1.5 or 0.5 band in case a neighbouring radio station or any other interference is heard together with the signal.

When changing bands, use the knob "ТОН-ТАГ " ("Tone - Telegraph") to obtain proper audibility.

To receive the continuous oscillations, set the knob "УСИЛЕНИЕ НЧ " ("L.F. gain") to the position of maximum amplification, at the same time regulating the signal level by the knob "УСИЛЕНИЕ ПЧ " ("I.F. gain") only. This makes it possible to avoid claps during reception and to chose the most favourable ratio of its own audio signal to the audibility of the correspondent in case of semi-duplex operation.

Checking and Operational Correction of

Calibration

Checking up and correction of the calibration of the receiver is effected in case the operating conditions require extremely

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exact calibration of the receiver. Do it using the ins^{50X1-HUM} crystal calibrator by means of electric corrector.

To check the calibration and to correct frequency :

1. Switch off the antenna.
2. Set the knob "ТОН ТАГ" ("Tone - Telegraph") exactly to the mark.
3. Set the knob "РОД РАБОТЫ" ("Function") to " " ("Calibration") position.
4. Set the knob "УСИЛЕНИЕ НЧ" ("L.F. gain") to the extreme right position, which ensures the maximum volume of beat tone when tuning.
5. Adjust the required range .
6. When calibrating in 1 - 5 th ranges, set the crystal change-over switch to 100 and in 6 - 9 ranges to 1000 position.
7. By turning the tuning knob set the scale indicator against the quartz point (marked with a white figure against black background), placed near the operating frequency .
8. Turn the tuning knob until the quartz point frequency value is set against the mark on the microscale screen.
9. Press the electric corrector knob to engage it with the capacitor axle and then tune the receiver to zero beats by turning the knob.

Usually the calibration varies little and uniformly all over the ranges.

Disturbance of calibration in any one range shows the range is faulty.

Checking and Correction of Calibration

Pay particular attention to the receiver calibration.

Periodically (at least once a month) check the calibration of

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the receiver all over the ranges; after the repair and replacement of oscillator tubes the calibration check is obligatory. ^{50X1-HUM} During the replacement of tubes of the 3rd oscillator, large discrepancies in calibration may occur in 1-5 ranges. The same may take place in 6-9 ranges after replacement of the tubes in the 2nd oscillator; in other ranges discrepancies in calibration are negligible. In this case eliminate the error by tuning the oscillator circuit.

If calibration of one range is disturbed it means that the range circuits are faulty.

In this case tune and repair the range by adjusting the inductance and capacitance of the circuits according to the calibrator and standard-signal generator (FCC).

When calibration is shifted to one side (with equal spacings) at the beginning and at the end of the range, after repair or when the scale display is replaced by any reason (after the mechanical repair), correct the calibration by the optical system mirror moving it with the help of screws it rests upon. For this purpose tune the receiver to zero beats with the calibrator signal and set the frequency value of quartz point against the mark on the dull glass by moving the mirror.

If the calibration error at the long wave end of all the ranges is greater than at the short wave end, correct the calibration by moving the mirror at the end of the long wave range.

To correct the calibration at the end of the short wave range, use an electric corrector.

If the short wave error is greater than the long wave end error, use an electric corrector.

If checking of calibration in 1-5 ranges reveals drastic disagreement in calibration at frequencies multiple to 25 kc/s (frequencies multiple to 100 kc/s being at the right place) with sharp increase of number of high harmonics not multiple to

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25 kc/s, the frequency divider is out of order.

In such case, adjust the divider duty by turning ^{50X1-HUM} variable resistor R1 - 28 so that to obtain frequency division multiple to 4.

Remember that only an experienced specialist with a special instruments can tune and adjust the 1st, 2nd 3^d oscillator circuits as well as the circuits of the high and intermediate frequencies.

To tune the high frequency circuits of 6 - 9 bands, remove the plate with the circuits from the drum, warm the plate up at a temperature of $+(40^{\circ}-50^{\circ})C$ until the braking lubricant (which fixes the tuning slug) becomes soft and then mount the plate in the receiver and tune it smoothly turning the tuning slug.

Tuning the receiver by ear according to the receiving station results in complete detuning and deterioration of electric parameters.

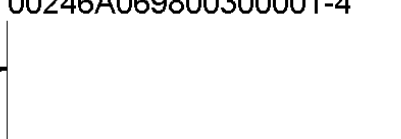
Adjustment of Mirror

To adjust the mirror, slaken the locknuts and turn the screw until the mirror is in the required position.

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50X1-HUM

DESCRIPTION OF ONE-WAY LOUDSPEAKING
COMMUNICATION SYSTEM

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I. PURPOSE

1. The equipment is provided for one-way loudspeaking ship-to ship and ship-to shore communication.
2. The equipment is designed for long term continuous operation in the following conditions:
 - (a) at temperature variations from -40°C to $+50^{\circ}\text{C}$ (for devices of waterproof version and microphones) and from -10°C to $+50^{\circ}\text{C}$ (for devices of splashproof version);
 - (b) at increased relative humidity up to 98%;
 - (c) at shaking, shocks and vibrations in accordance with the existing standards.

II. SYSTEM COMPONENTS

3. The one-way loudspeaking communication system includes:
 - (a) ПУМ megaphone control device;
 - (b) 50 W megaphone amplifier with MY rectifier;
 - (c) МГ-50 antiballistic megaphone with МГ-50 turning mechanism;
 - (d) МФ-1 microphone;
 - (e) plate for mounting МФ-1 microphone when the megaphone control panel is indoors;
 - (f) 38 protecting box for mounting МФ-1 microphones on open posts;
 - (g) 3И-6 box with spares;
 - (h) 3И-7 box with spares.

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III. SYSTEM TECHNICAL DATA

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Operation Facilities

4. One-way loudspeaking communication system provides for:

(a) talking through a megaphone from each of the four megaphone control panels;

(b) preference facility for the one of the four control panels that was the first connected to the line;

(c) remote positioning of the megaphones from each panel and preference controlling facility for the panel that was first connected to the line.

5. The equipment is powered with 127 V/220 V, 50 c.p.s one phase a.c.

The equipment provides normal operation in the following conditions:

(a) at continuous vibrations of the feeding circuit voltage within $\pm 9\%$ of the rated voltage;

(b) intermittent vibrations of the feeding circuit voltage within -13% $+8\%$ of the rated voltage;

(c) short-term vibrations of the feeding circuit voltage within -25% $+13\%$ of the rated voltage.

Maximum power consumed by the megaphone amplifier from a.c. circuit does not exceed 140 VA at $\cos \varphi = 0.85$.

When not in use no more than 66 VA are consumed at $\cos \varphi = 0.4$.

System's Main Electric Characteristics

6. (a) The system delivers 50 W at 30 V output voltage;

(b) 12 ± 2 mV input voltage;

(c) coefficient of nonlinear distortions within

500 + 3,500 c.p.s band is better than 10% ;

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(d) hum level at the system outlet with 18 ohm 150X1-HUM
not more than 300 mV.

IV. SYSTEM OPERATION

7. The one-way loudspeaking communication system is an audio-frequency amplification circuit having as a load one MR -50 megaphone. A signal is transmitted to the MYM and then to the megaphone amplifier inlet.

In the MY the signal passes through a correcting filter and is amplified by the following amplifiers: YM microphone amplifier, TY -3 amplifier and the final amplifier consisting of two TY -25 amplifiers connected in parallel.

From the final stage the signal is fed into one of the MR -50 megaphones.

Switching of the megaphones is carried out by means of a relay fitted in each megaphone amplifier. The relay is cut in by turning the "МЕГАФОН" ("Megaphone") switch of the to the 2 nd position.*

8. The wiring diagram of the one-way loudspeaking communication system is given in the Appendix.

V. DESCRIPTION OF SYSTEM COMPONENTS

MY Megaphone Amplifier

9. The megaphone amplifier is designed to amplify speech transmission and select circuits when commands and orders are given through megaphones.

*N O T E - There is one megaphone on board the tug, which operates with the switch in the "МЕГАФОН" ("Megaphone") 1 st position.

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The megaphone amplifier includes : filter, 9M microphone amplifier, T9 -3 amplifier, two T9 -25 amplifiers, 50X1-HUM panel and B-3, rectifier.

10. The correcting filter is intended to obtain the necessary frequency response curves.

Filter Electric Characteristics

(a) 20 ± 3 cycle damping at 1,500 c.p.s frequency with 12 mV input voltage and 620 ohm load resistance;

(b) 100 ± 200 ohm input resistance at 1,500 c.p.s.

The correcting filter is a detachable unit overlaid with epoxide resin. It is connected to the circuit through a plug socket. The filter is not to be repaired.

11. The 9M microphone amplifier is designed to operate in communication circuits and serves for preamplification.

The amplifier consists of three amplification stages : (K-1 type П13Б-1 pc, K2 -K3 type П15А - 2 pcs - crystal triodes) and instantaneous amplitude limiter (Д1, Д2 type Д2Б diodes - 2 pcs).

The microphone amplifiers have the following parameters:

(a) at least 0.30 V output voltage at 1,500 c.p.s with 400 ohm load rated resistance;

(b) coefficient of nonlinear distortions at rated voltage within 500 \div 3,500 c.p.s band does not exceed 3%;

(c) 0.6 ± 0.1 mV rated voltage at the amplifier input;

(d) noise and hum level in the amplifier output loaded with 400 ohm resistance, the input being closed to a 600 ohm load, does not exceed 2.5 mV;

(e) 700 ± 100 ohm input resistance at 1,500 c.p.s frequency;

(f) the amplitude characteristic at a 400 ohm load deviates from the linear one by $\pm 20\%$ within 1 - 100 per cent of the

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rated level;

(g) irregularity of frequency response of the amplifier in a 500 ± 3,500 c.p.s band does not exceed 25%;

(h) direct current consumed by the amplifier does not exceed 15 mV.

The amplifier is a detachable unit overlaid with epoxide resin. It is connected to the circuit by means of a plug socket. The microphone amplifier is not to be repaired.

12. TY -3 amplifier is intended for amplification of radio transmission.

The amplifier uses a grounded emitter configuration. It consists of two stages: pre - amplifying (K1 type П4Б triode) and two-cycle output stage (K2, K3 type П4Б triodes).

The TY -3 amplifier has the following electrical parameters:

(a) at least 3 W output at 1,500 c.p.s with 300 ohm load;

(b) coefficient of nonlinear distortions within a 500 ± 3,500 c.p.s frequency band does not exceed 5%;

(c) rated input voltage does not exceed 0.33 V;

(d) hum level in the amplifier output loaded with a 300 ohm resistance, the input being closed to a 600 ohm resistance, is under 120 mV;

(e) input resistance at 1,500 c.p.s frequency is better than 600 ohms;

(f) the amplitude characteristic of the amplifier, measured at a 1,500 c.p.s frequency deviates from the linear not more than ± 4% within 1 - 100 per cent of the rated level.

(g) irregularity of frequency response within a 500 ± 3,500 c.p.s frequency band relative to a frequency of 1,500 c.p.s does not exceed ± 25%;

(h) with load resistance varying from 300 to 3,000 ohms the amplifier output voltage changes by 25% (or less);

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(1) quiescent current of the 1st and the 2nd stages does not exceed 20 mA.

The amplifier is a detachable unit. Fitted inside the case are: conversion and output transformers, the second stage thermistor (the first stage thermistor is on the plate), capacitors and a mounting plate. The case is provided with a cover. On the case are fastened: a panel to cut the amplifier into the circuit and semiconductor triodes.

The triodes are insulated from the case with a mica gasket.

13. The TY -25 amplifier is designed to amplify radio transmissions. It is a push-pull amplifier built around two (K1 and K2) type П45 triodes with a common collector.

The input voltage is fed into K1 and K2 triodes base. The amplifier is loaded on the primary winding of the TP1 output transformer. The amplified signal is taken off the transformer secondary winding.

The amplifier draws 24 V power from the B-3,5 rectifier.

Two TY -25 parallel connected amplifiers are included into the BY circuit.

The TY -25 amplifier has the following electrical parameters :

(a) output power at 1,500 c.p.s at a rated load of 36 ohms is better than 25 W;

(b) coefficient of nonlinear distortions in a 100 - 6,000 c.p.s frequency band does not exceed 4%;

(c) rated input voltage of the amplifier does not exceed 35 V;

(d) hum level at the output of amplifier loaded with a 36 ohm resistance, the input being closed to a 820 ohm resistance does not exceed 150 mV;

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(e) at least 800 ohm input resistance at a 1,500 c.p.s. frequency;

(f) the amplitude characteristic of the amplifier at a frequency of 1,500 c.p.s. deviates from the linear not more than by 70% within 1 - 100 per cent of the rated level;

(g) irregularity of frequency response within a 100 ± 6,000 c.p.s. frequency band relative to a 1,500 c.p.s. frequency does not exceed ± 25%;

(h) with load resistance dropping from 36 ohms to 360 ohms, the output voltage changes by 30% (or less);

(i) the amplifier provides parallel operation.

The amplifier is a detachable unit. Fitted inside the amplifier case is an output transformer.

The case is provided with a cover and is composed of a clamp and two walls (radiators) which provide cooling for the triodes.

On the case are fitted: a panel for switching the amplifier into the circuit and semiconductor triodes.

14. Relay 4 panel serves for switching the one-way communication electrical circuits.

P1 relay feeds power into the amplifiers and P2 relay. The P2 relay feeds a 110 V alternating voltage into relay windings of both the megaphones.

P3 relay switches 110 V voltage from megaphone 1 to megaphone 9.

P4 relay switches megaphone amplifier output from megaphone 1 to megaphone 2.

P5 relay switches power of rotating mechanisms motors from megaphone 1 to megaphone 2.

P6 and P7 relays switch 24 V voltage when the megaphones rotate to the left or to the right.

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P3 relay connects the selsyn transmitter phase windings of megaphone 1 or megaphone 2 to the selsyn receiver. 50X1-HUM

The relays draw 24 V current from the B - 3,5 rectifier.

The relay panel is a detachable unit which consists of a metal chassis with guides and a handle to take the unit out of the apparatus.

Mounted on the chassis are three 16-contact plugs and eight P3C - 6 relays.

15. The B - 3,5 rectifier is intended to supply power to semiconductor triode amplifiers and to switching and signalling circuits.

The rectifier is a full - wave bridge circuit with a smoothing filter. It draws 127 V or 220 V, 50 c.p.s a.c.

The B1 tumbler switch is set to "127" or "220" position. The 10-12 th windings of the Tp-1 transformer are not used in the given circuit.

The rectifier has the following electrical parameters:

- (a) $24 \text{ V} \pm 1 \text{ V}$ rectified voltage;
- (b) not more than 500 mV pulsation at the filter output;
- (c) when the load current changes from its rated value, 3.5 A, to 0.05 A the rectified voltage varies within $\pm 2 \text{ V}$.

The rectifier is a detachable unit. All the parts (Tp-1 transformer, saturable choke, four type μ -304 diodes, capacitors, resistors, tumbler switch, inset of μ 1 plug socket) are mounted on the chassis.

16. The megaphone amplifier is a device, composed of a front panel and a case. On the front panel are fitted protector holders, signal lamps, a tumbler switch to cut in and out the feeders. In the case are mounted plug sockets, brackets for rectifier, amplifiers, and relay panels with terminal blocks

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for the microphone amplifier and a filter, chokes and capacitors.
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ПУМ Megaphone Control Panel

17. The ПУМ control panel is designed for remote control of megaphones and for indication of direction of their rotation.

It includes : M1 selsyn-receiver, to indicate direction of megaphones rotation; B1 change switch, to out in and out the megaphones; B2 change switch which cuts in power to the megaphones motors for right or left rotation; P1 and P2 relays to disconnect the audio circuit, the circuit of indication of rotation and power supply circuit when the megaphone control panels operate in parallel; A1, A2 and A3 diodes which ensure current flow in one direction only.

The control panel is a device which consists of a front panel and a case. On the front panel are fitted: selsyn receiver change switches, A4 semiconductor diodes signal lamp and a 16 - pin contact insert. Inside the case are fitted; plug sockets, a relay and a 16-pin block.

All the control knobs and the selsyn receiver scale are mounted on the front panel.

The megaphone control panel provides :

- (a) possibility to talk through one of the two megaphones in turn;
- (b) remote control of turning of a megaphone;
- (c) possibility to control the direction of a switched in megaphone;
- (d) possibility to connect the ПУМ device in parallel;
- (e) facility preference for device that was cut in first over other devices, connected in parallel;
- (f) possibility to get "ЗАНЯТО" ("Engaged") light signal;

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(g) possibility to connect a microphone to the 50X1-HUM

MF-50 Megaphone

18. The MF-50 megaphone is intended for transmission of commands over considerable distances in any direction.

The M1 selwyn-transmitter serves to transmit data about the megaphone position to the control panel selwyn-receiver.

The ДКВ-3 electric motor rotates the turning mechanism.

The contact rings are fitted to transfer sound frequency voltage from the fixed part to the rotating part of the megaphone.

If the megaphone is far from the megaphone amplifier, provision is made to increase the section of sound cores of the connecting cable. For this purpose the contacts of the MF-50 megaphone and MY megaphone amplifier corresponding to the W4, W5 and W6 plug sockets are connected in parallel.

The MF-50 loudspeaker is of a waterproof type.

Rated output	50 VA
Reproduced frequency band	300 - 3,000 c.p.s
Rated voltage	30 V
Sound pressure	12 bars (at least)
Weight with rotating mechanism	40 kg

1. Instructions for Switching Circuit Devices

1. All the devices for a.c. mains as delivered by the manufacturer are connected for the 220 supply.

Changing over to 127 V is done by tumbler switches, fitted inside the devices.

To change over the megaphone amplifier MY, remove the cover from the rear side of the device and turn the tumble switch to the "127" V position.

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Other devices of the circuit do not draw current ^{50X1-HUM} from the supply mains and require therefore no switching after delivery.

II. OPERATION

2. In working condition the megaphone amplifier power supply should be always on. Set the power supply switch, fitted on the MY amplifier, to the $\Phi\Pi\rho\beta$ position. This done, the "CETB" ("Mains") lamp lights up.

3. To speak through the megaphone:

(a) make sure that the system is not engaged. If the system is engaged, the lamp "ЗАНЯТО" ("Busy") will light up on the control panel. Wait until the circuit is free;

(b) if the system is not engaged cut in the megaphone by "MEΓAΦOH" ("Megaphone") switch;

(c) turn the megaphone to the required direction by the "Πεθoρoι" ("Turn") switch and begin transmission;

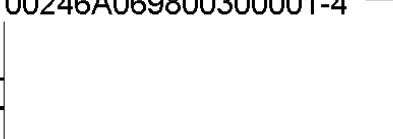
(d) keep the microphone close to the mouth corner (at 1 cm from the mouth). Carry out transmission in a loud voice;

(e) the transmission over turn the "MEΓAΦOH" ("Megaphone") switch to "BЫKΛ" ("Off") position.

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DUPLX COMMUNICATION CIRCUIT WITH
CIRCULAR DEVICES

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I. P U R P O S E

1. The circuit of two-party duplex communication is intended for communication between the hydroacoustic house and the wheelhouse.

The equipment is designed for continuous operation in the following conditions :

- (a) with ambient temperature variations from -10°C to $+50^{\circ}\text{C}$, for splash-proof devices, and from -40°C to $+50^{\circ}\text{C}$, for water-proof devices and microphones;
- (b) relative humidity up to 98%;
- (c) shaking, strokes and vibration according to standards.

II. C I R C U I T E L E M E N T S

2. The duplex circuit includes:
- (a) circular device $\Lambda\Omega 1$;
 - (b) microphones $M\Omega-1$ and $M\Omega-2$;
 - (c) plate ΩK for fastening microphones $M\Omega 1$ in sheltered spaces;
 - (d) case $3M-3$ with spares

III. T E C H N I C A L D A T A

Operation

3. The two-party duplex line ensures:
- (a) possibility to speak at a distance of 7 m from the device;
 - (b) possibility to control the feeder voltage and the rectified feed voltage in the device.

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4. The equipment is powered from 127 V or 220 V, 50 c.p.s. a.c. mains. 50X1-HUM

Device AU 1 draws power directly from one of the a.c. feeders.

The power consumption does not exceed 25 VA at cos $\varphi = 0.8$.

Main Electrical Characteristics

5. Communication circuit of the AU-1 devices has the following characteristics :

- (a) sensitivity at the microphone inlet 11 ± 4 mV ;
- (b) output power 1 VA .

IV. DESCRIPTION OF CIRCUIT

DEVICES

Device

6. The circular device AU-1 is intended for duplex two-party communication between the subscriber, who is in the room with low level of ambient noise (below 90 db) and another subscriber.

The circuit of the device AU-1 includes correcting filter Φ , microphones amplifier^{YM}, differential system AC, amplifier KY-1, loudspeaker ПДМ-1М and rectifier B-0,15.

7. The device AU 1 has the following electrical characteristics :

- (a) sensitivity at the microphone inlet at 1,500 c.p.s frequency 11 ± 4 mV ;
- (b) input resistance at the microphone inlet 250 ± 50 ohm;

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(c) output voltage in the line at 85 ohm resistance
200 mV \pm 10% ; 50X1-HUM

(d) noise and hum at the line output are not more than 2 mV;

(e) input voltage from the line side 200mV \pm 10% ;

(f) the loudspeaker output power at least 1 W;

(g) loudspeaker output voltage 5 V.

8. The device AU-1 is a welded box made of sheet steel. It consists of the main body and detachable front panel.

Mounted on the front panel are :

(a) tumbler switch B1 to cut in power to the rectifier;

(b) lamp "Лит уаиа" ("Amplifier power supply")

indicating the presence of rectified voltage;

(c) protectors $\Pi p1$ and $\Pi p2$ in the rectifier power supply circuit;

(d) resistor R1 "Баланс" ("Balance") intended for adjusting minimum audibility of transmission;

(e) resistance R2 "Громче" ("Louder") for control of input transmission volume.

Correcting Filter Φ

9. The correcting filter serves to obtain the required frequency characteristic of the line. It is made as a separate detachable unit.

10. The filter has the following electrical characteristics :

(a) input resistance at 1,500 c.p.s frequency, 1,000 \pm 200 ohm;

(b) filter attenuation at 1,500 c.p.s frequency, 12 V input voltage and 600 ohm load resistance is 20 \pm 3 times.

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Microphone Amplifier YM

11. The microphone amplifier YM is intended for operation in communication lines as a preamplifier. It is made as a separate detachable unit.

The amplifier consists of three amplifying stages composed of crystal triodes П13Б (1pc) and П13А (2 pcs), and a momentary-duty amplitude limiter (two 42E diodes).

12. The microphone amplifier YM has the following parameters :

(a) output voltage at 1,500 c.p.s frequency and 400 ohm resistance 0.3 V and more ;

(b) nominal voltage at the amplifier inlet : 0.6 mV \pm 0.1 mV;

(c) input resistance at 1,500 c.p.s frequency :
700 ohm \pm 100 ohm ;

(d) d.c. current consumed by the amplifier does not exceed 15 mA.

13. The microphone amplifier is overlaid with epoxide resins. It is not to be repaired.

AC Differential System

14. The differential system AC provides two-party, duplex circular two-wire loudspeaking communication. It is made as a separate detachable unit.

The differential system consists of a triple-wound transformer and two dividing amplifier stages (П13А triodes).

Principle of operation of the differential system is based on the triple-wound transformer properties.

15. The differential system has the following parameters:

(a) input resistance from the line side: 600 ohm \pm 5% ;

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(b) input resistance from the microphone amplifier 50X1-HUM
2,400 ohms and more;

(c) input voltage from the microphone amplifier side necessary to obtain 200 mV at 85 ohm load equivalent : $0.3V \pm 0.6 V$;

(d) output voltage supplied from 200 mV line circuit at 440 ohm load resistance : $240 mV \pm 20 \%$.

The differential system is overlaid with compound and is not to be repaired.

Amplifier K41

Power amplifier K41 is designed to amplify speech transmission.

17. The amplifier has the following electrical parameters :

(a) power output at 1,500 c.p.s frequency and 25 ohm: 1 VA and more;

(b) nominal input voltage does not exceed 240 mV;

(c) input resistance at 1,500 c.p.s frequency: 440 ohms and more;

(d) the first stage current does not exceed 6 mA; the second stage quiescent current does not exceed 16 mA.

The amplifier is made as a separate detachable unit.

Rectifier B - 0,15

18. The rectifier B-0,15 is intended to supply power to the microphone amplifier, differential system, amplifier K41 and lamp " ПИТ - ЧИЛ " ("Amplifier power supply"). The rectified current is 150 mA.

19. The rectifier helps to obtain the following currents and voltages :

(a) $24 V \pm 2 V$ rectified voltage at 0.15 A maximum rectified

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current ;

(b) the rectified voltage at the nominal voltage and at load currents from 0.05 A to 0.15 A varies from 22 V to 26 V;

(c) pulsation voltage at the rectifier output with the maximum load current does not exceed 360 mV;

(d) when the voltage differs by $\pm 5\%$ from the nominal value, the rectified voltage varies within $\pm 5\%$ of the value, measured at the nominal voltage of the power supply mains.

20. The rectifier is a separate detachable unit. A hole made in the cover for the tumbler-switch serves to facilitate switching the rectifier over to 127 or 220V mains.

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50X1-HUM

OPERATING INSTRUCTIONS

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Instructions for operation

1. The personnel should constantly control the normal operation of the equipment and observe the adopted safety rules.

2. To ensure stable operation of the equipment, the personnel should properly maintain the equipment.

The personnel should know the equipment, all the technical documents, and wiring diagrams.

Preparing for Operation and Operation

3. Before operation prepare and tune the equipment.

To do this :

(a) cut in power supply by the tumbler " СЕТЬ ВКЛЮЧ " (" Mains on"). Then the lamp " ПИТ УСИЛ " ("Amplifier power supply)lights up;

(b) set the volume regulator knob to maximum;

(c) put the microphone 1 cm from the mouth and check up the device.

5. To call a subscriber, take the microphone, put it to the mouth, call the subscriber by voice and begin transmission.

Adjust the volume regulator as to obtain the best audibility, if required.

If the ship hydroacoustic equipment is in operation, the АЦ 1 device power supply should always be out in. For this purpose, set the tumbler switch of the device АЦ 1 power supply to " ВКЛ " ("On") position; and the signal lamp " ПИТ УСИЛ " ("Amplifier power supply") lights up, the volume regulator knob must be in the middle position. These operations fulfilled, the equipment is ready for use.

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Checking of Communication

6. Check up the line daily. Particular attention should be paid to light signalling "Пит усил" ("Amplifier power supply") on the device AU 1, quality of volume of sound and possibility to regulate it.

Lists of spares are in the cases.

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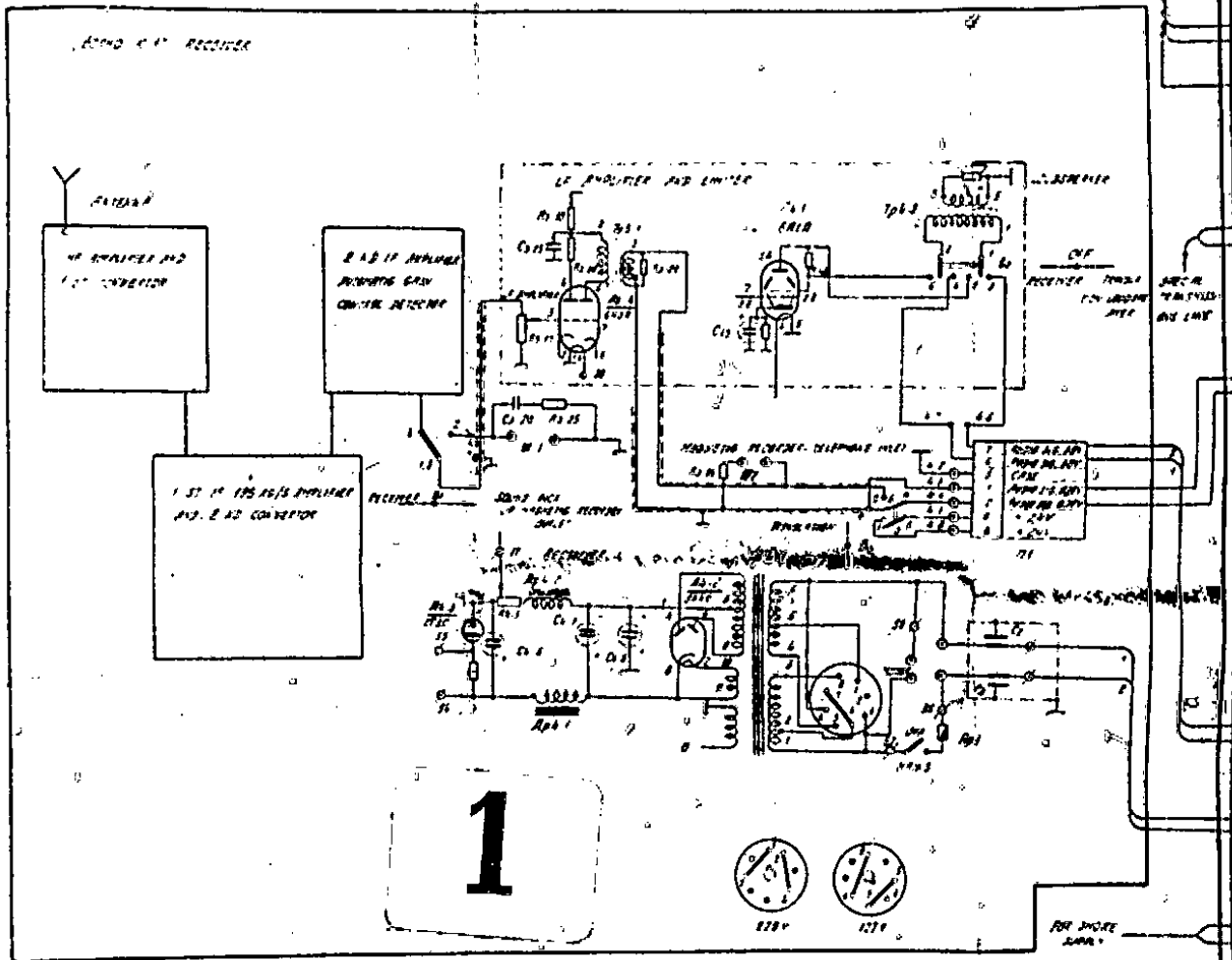
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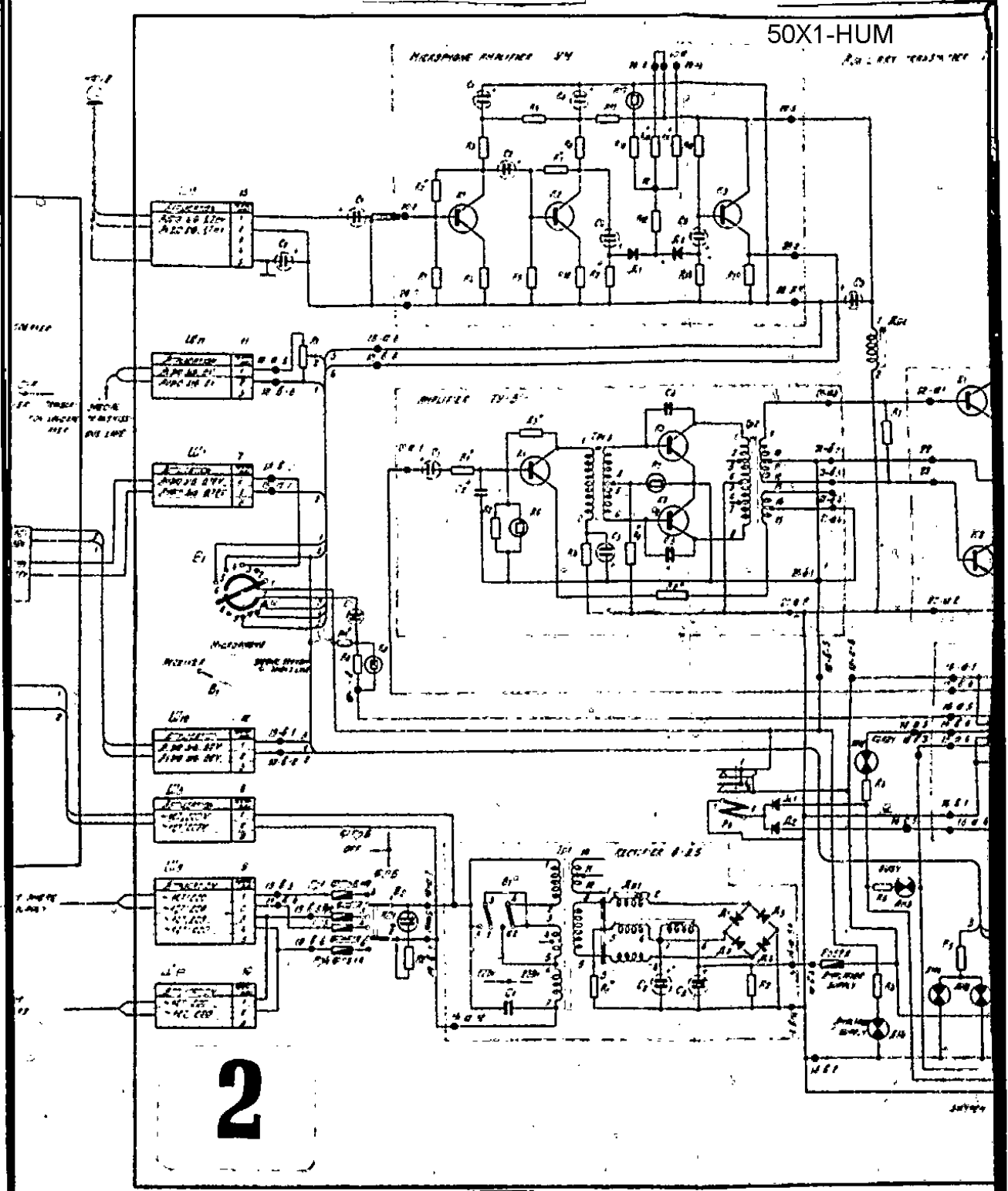


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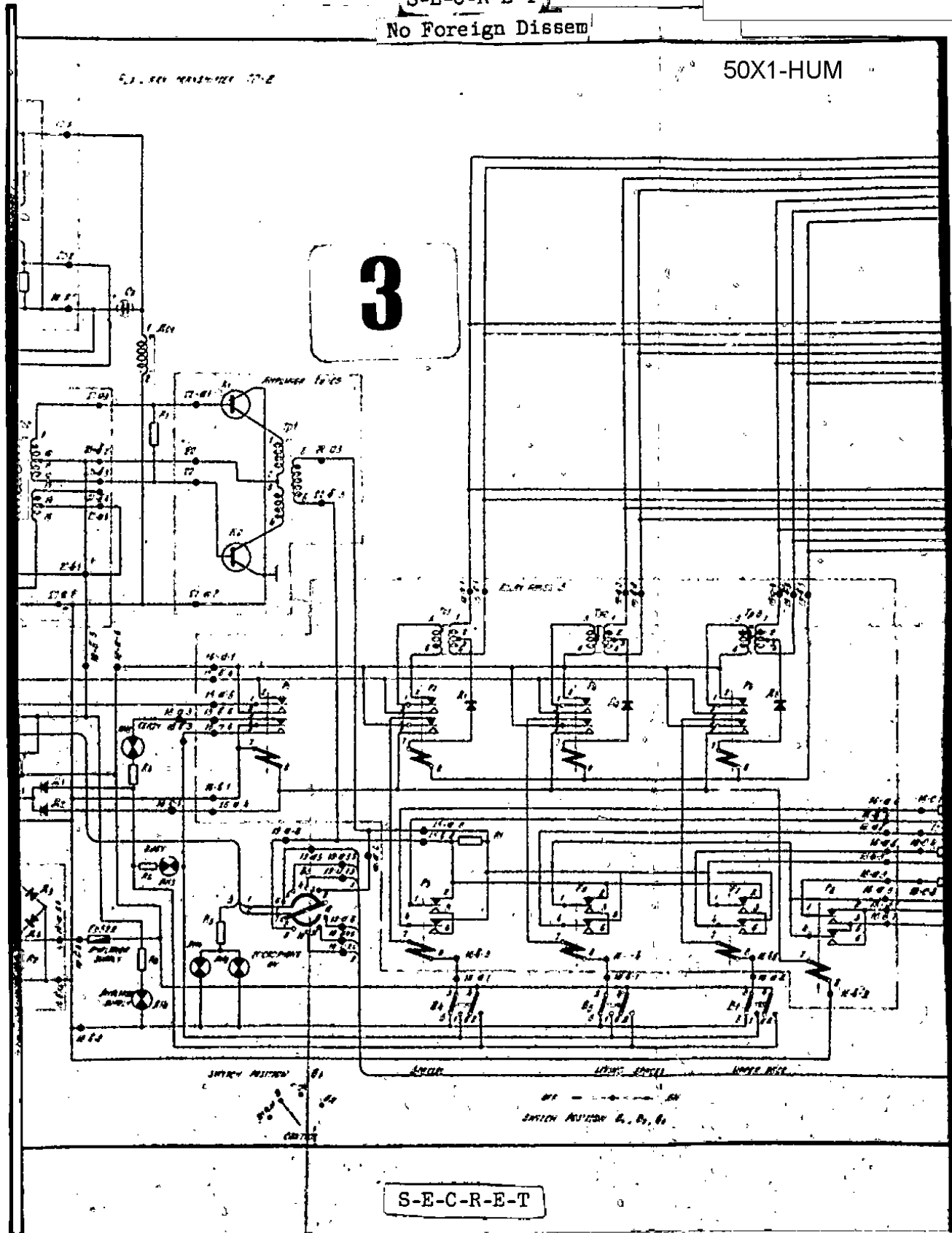
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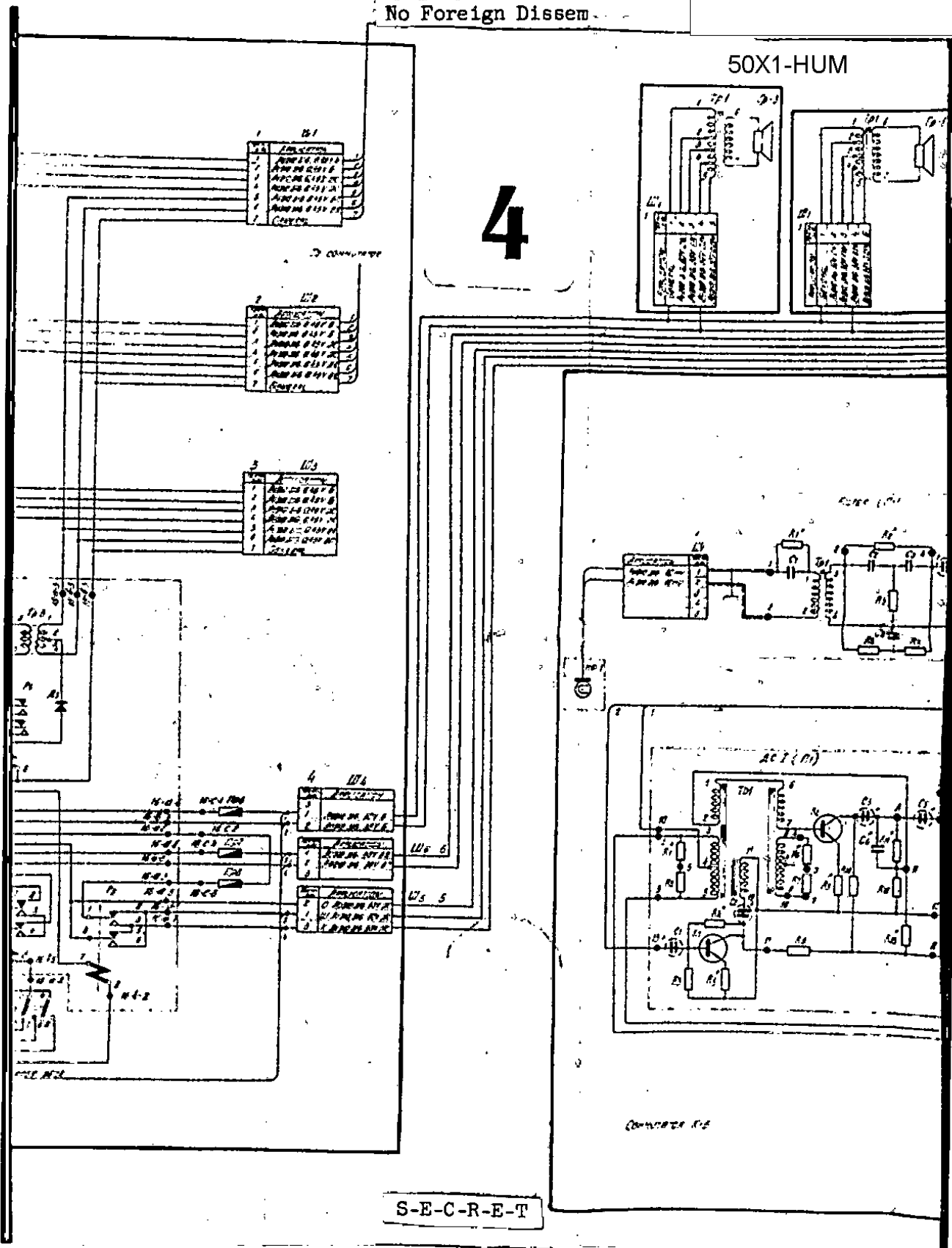
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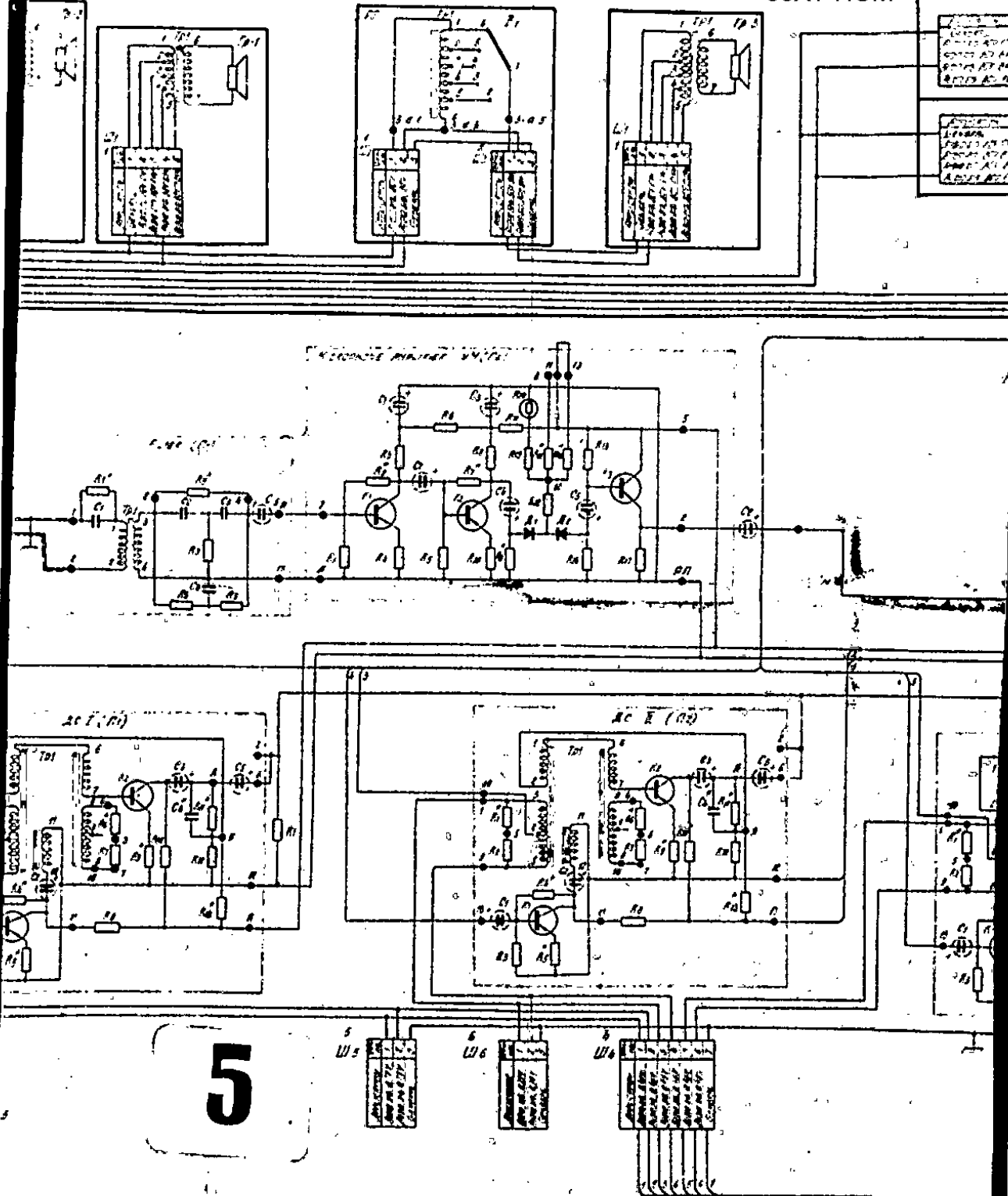


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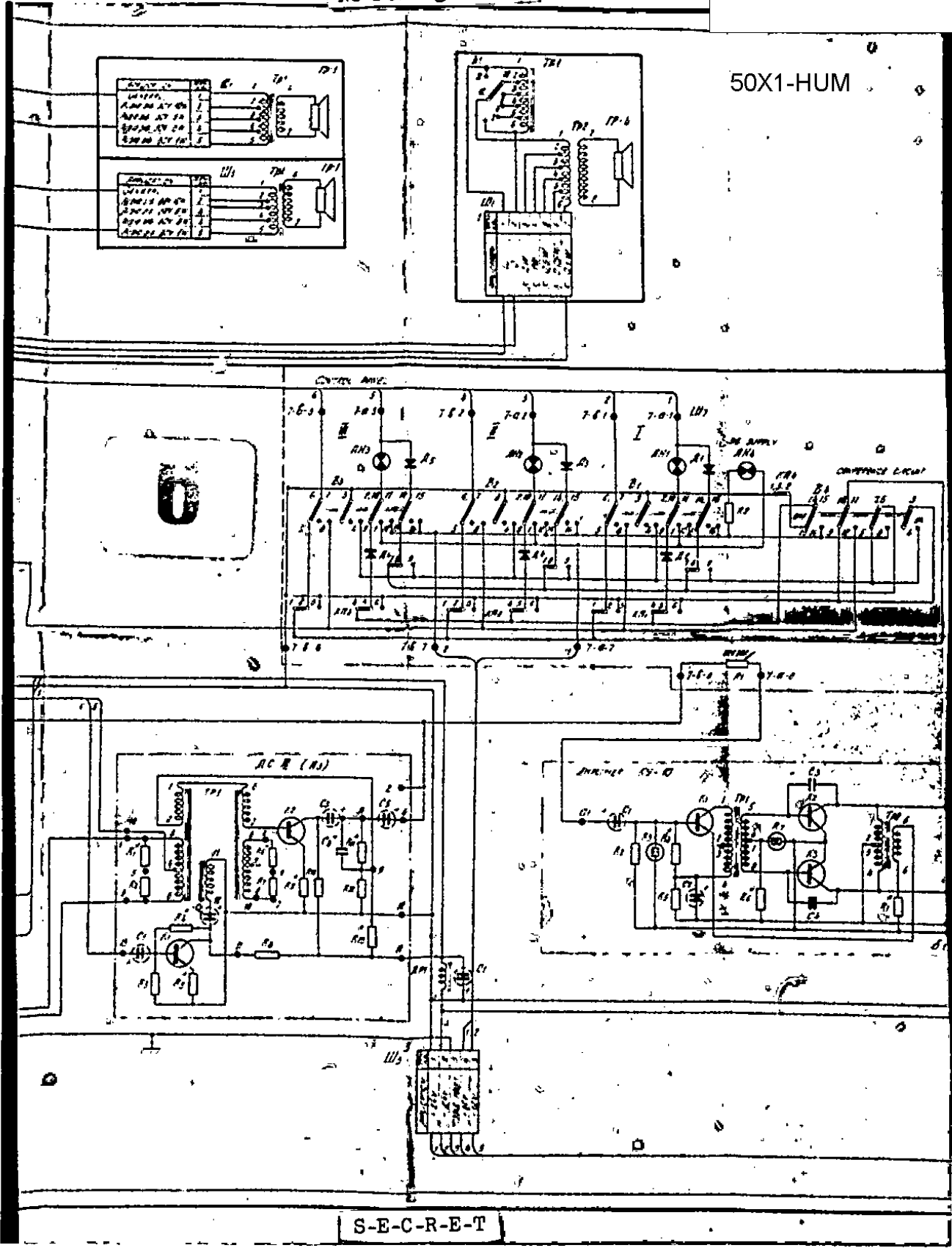
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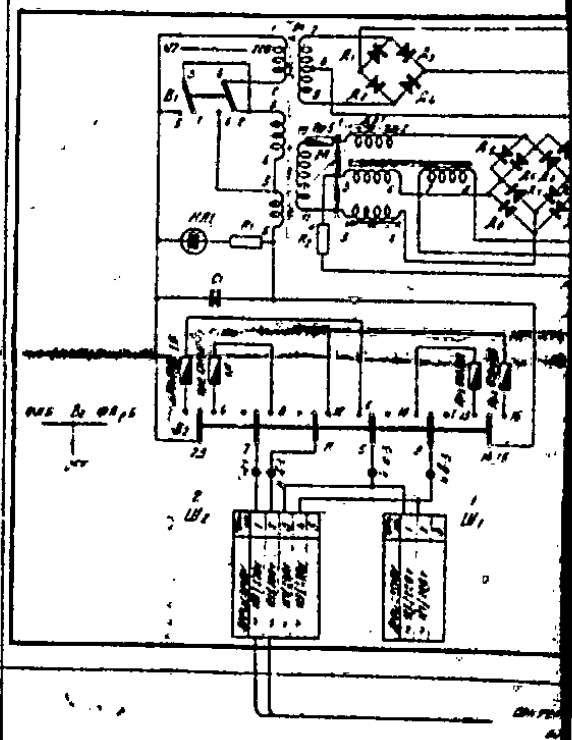
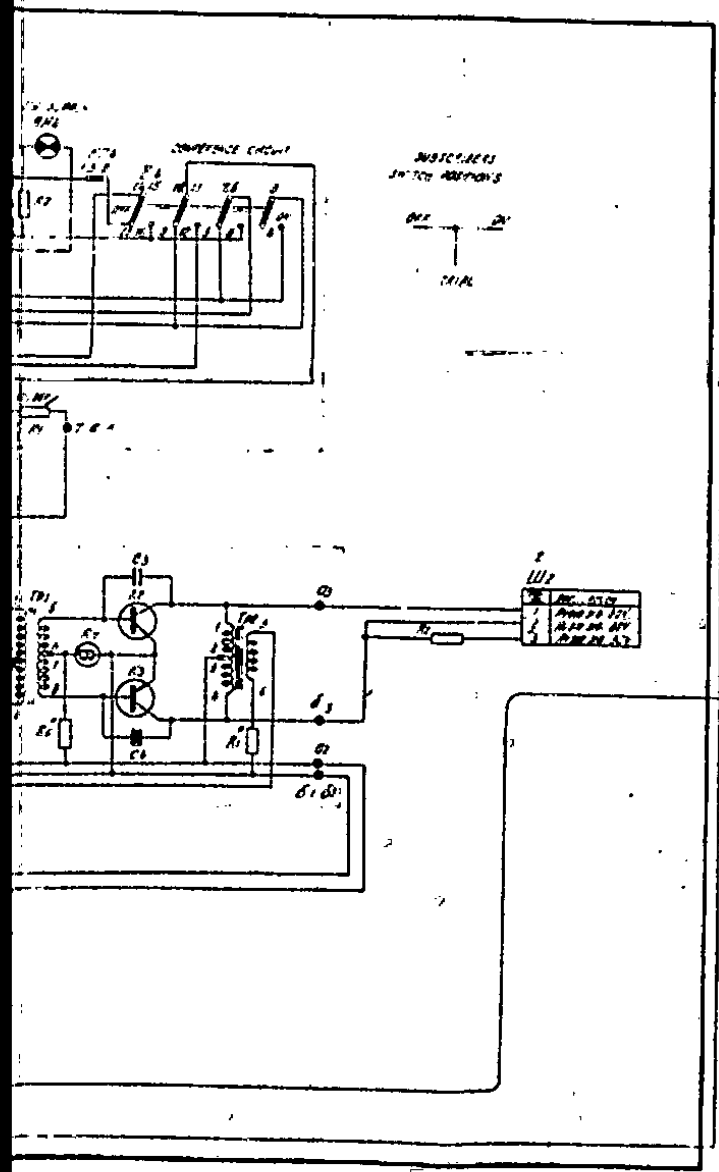
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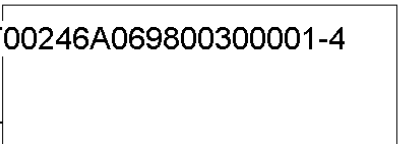
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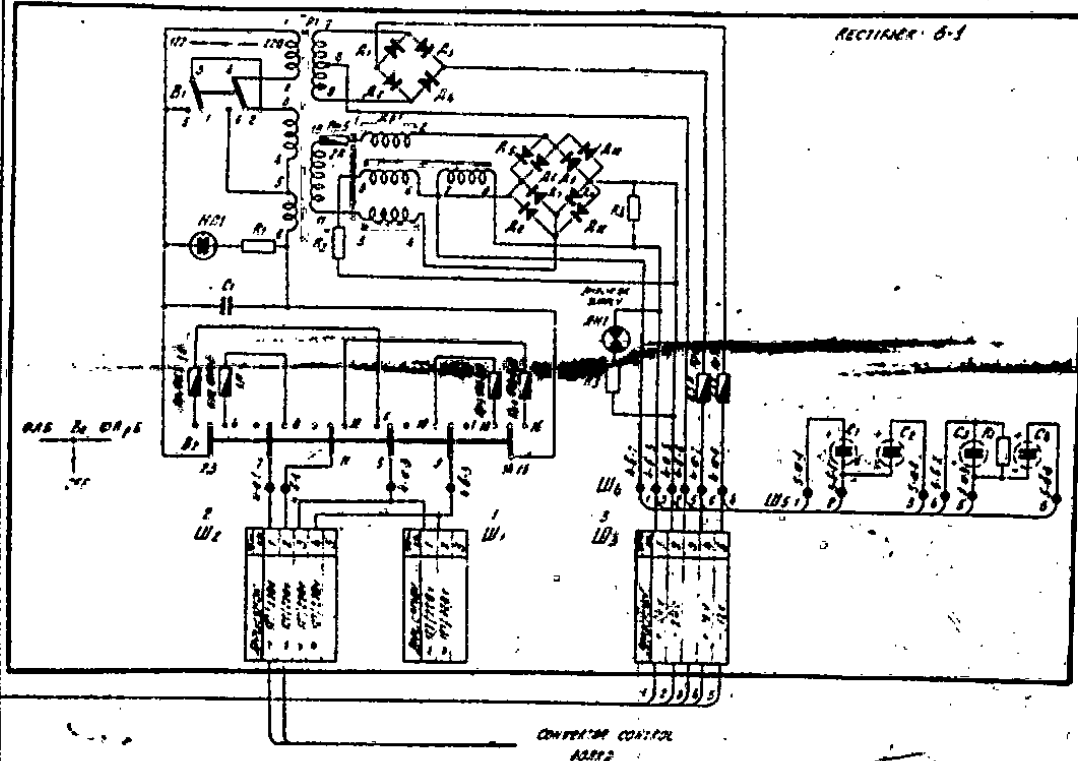
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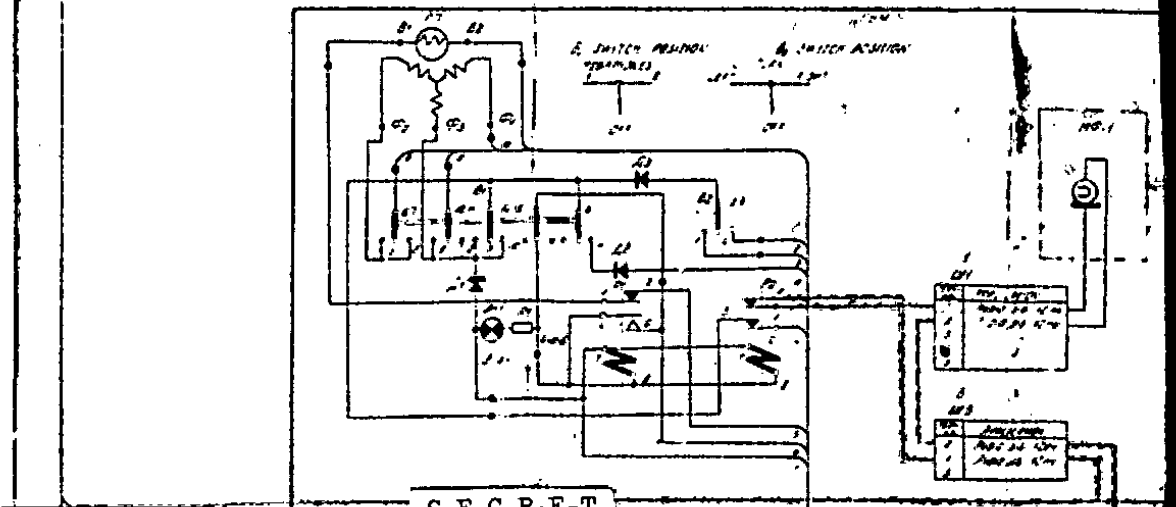
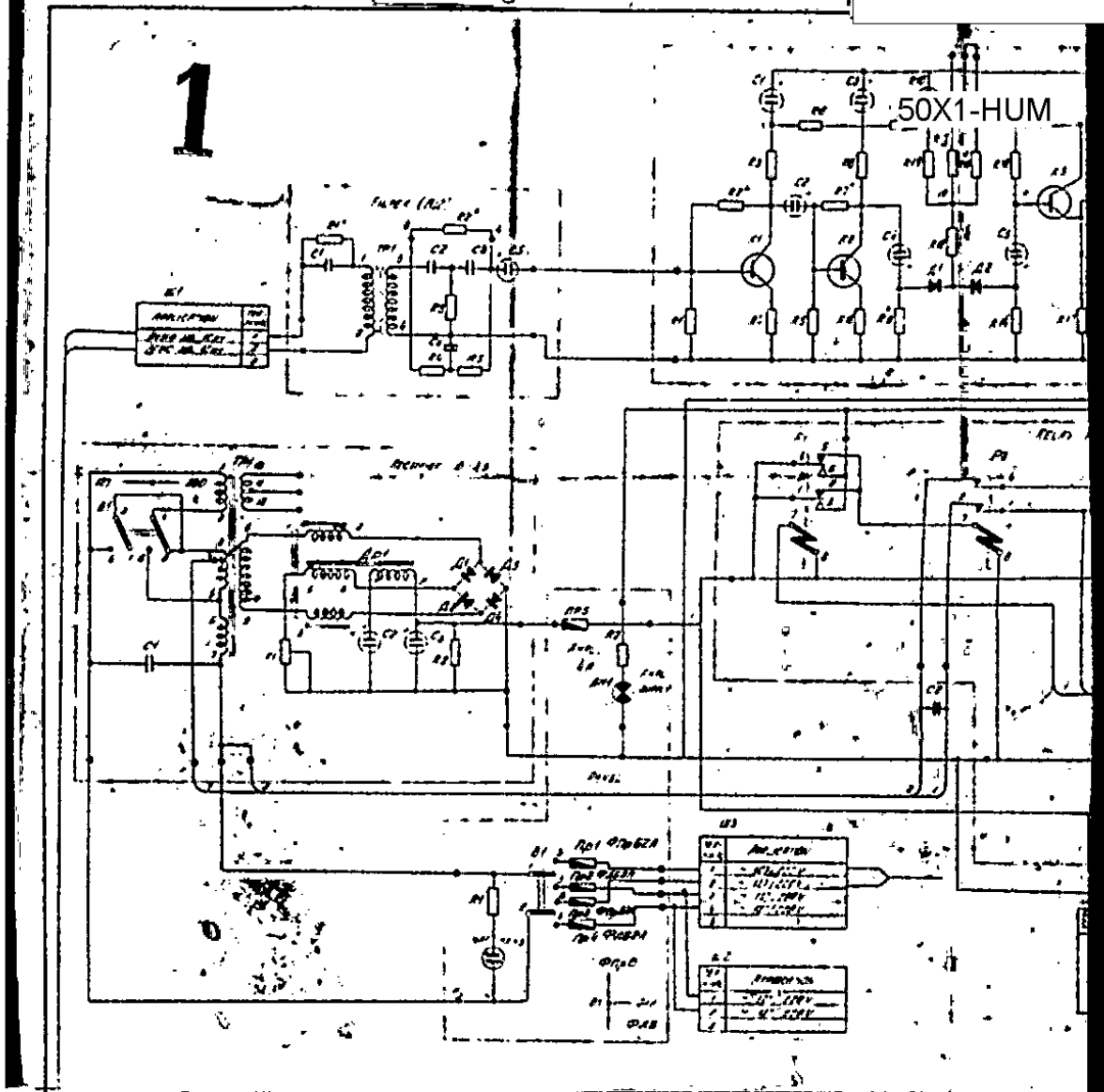
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DIAGRAM
OF TRANSLATION WITH '25 W

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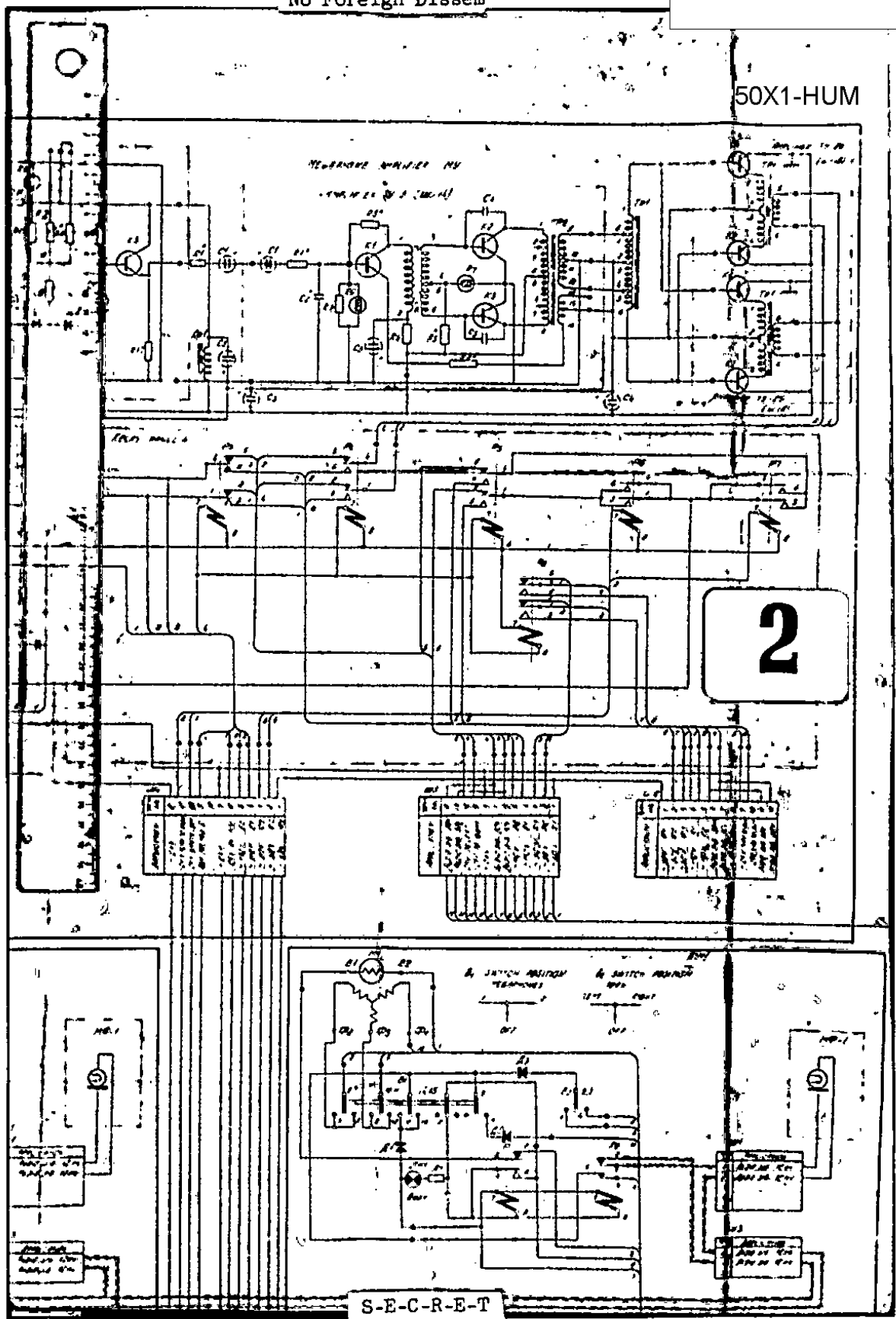


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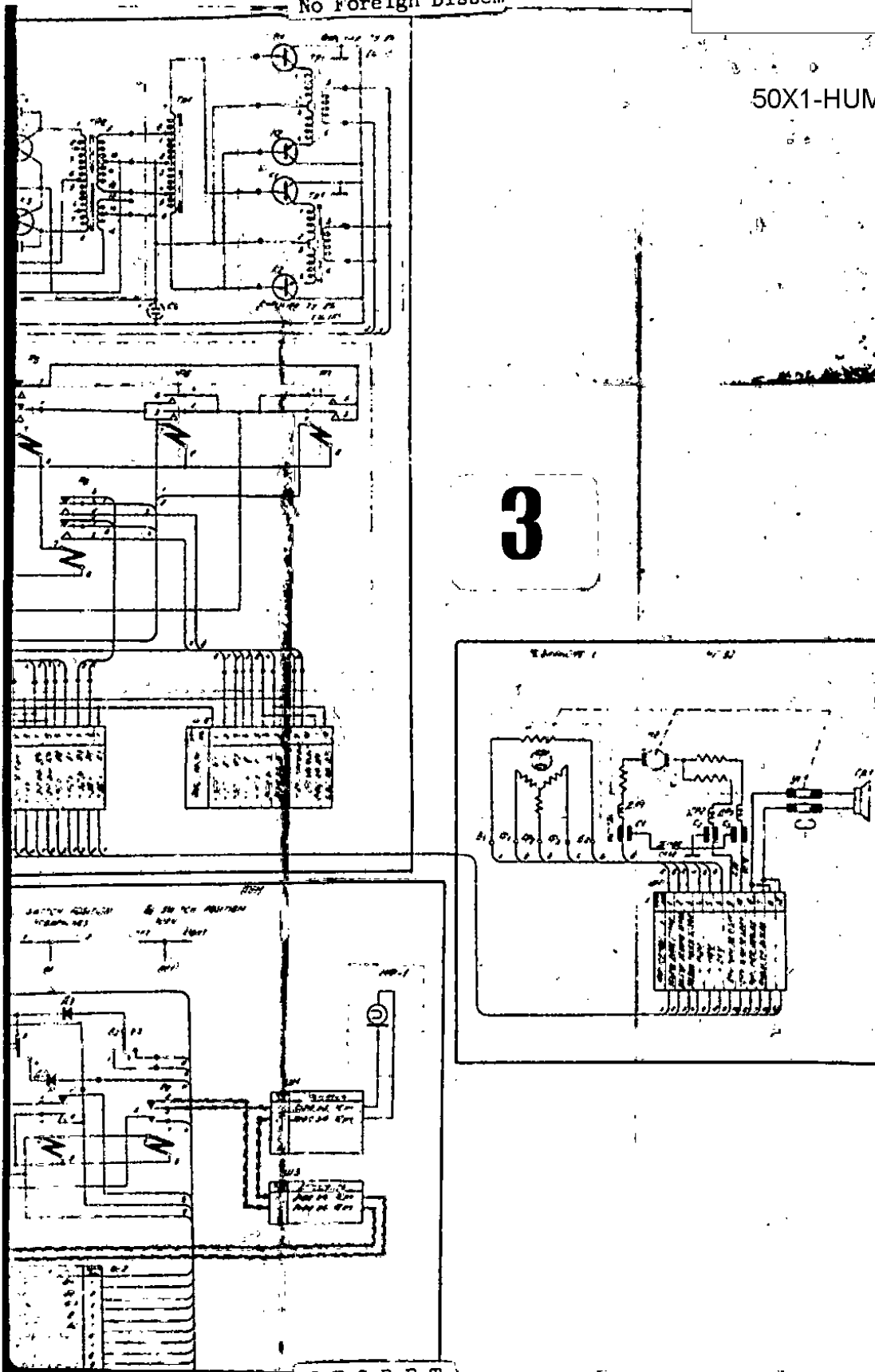
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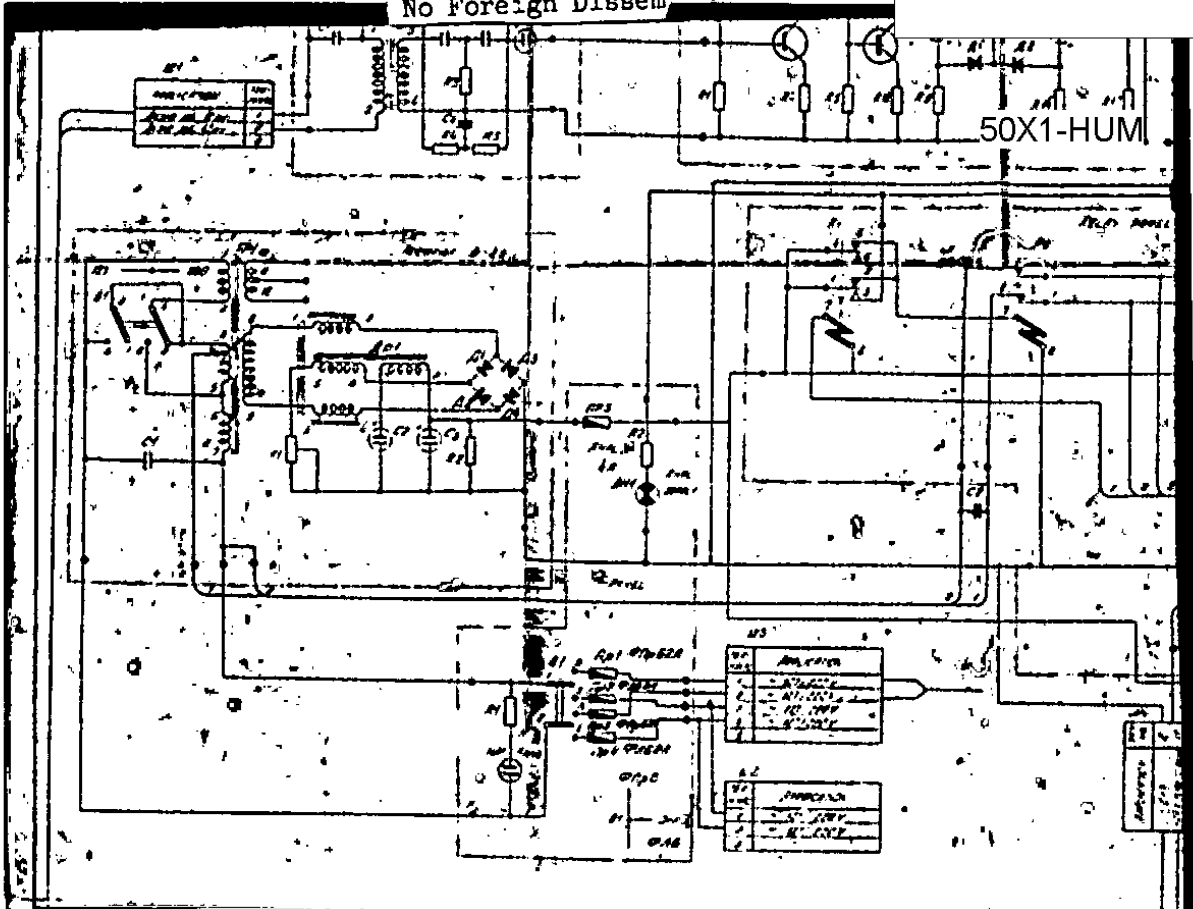
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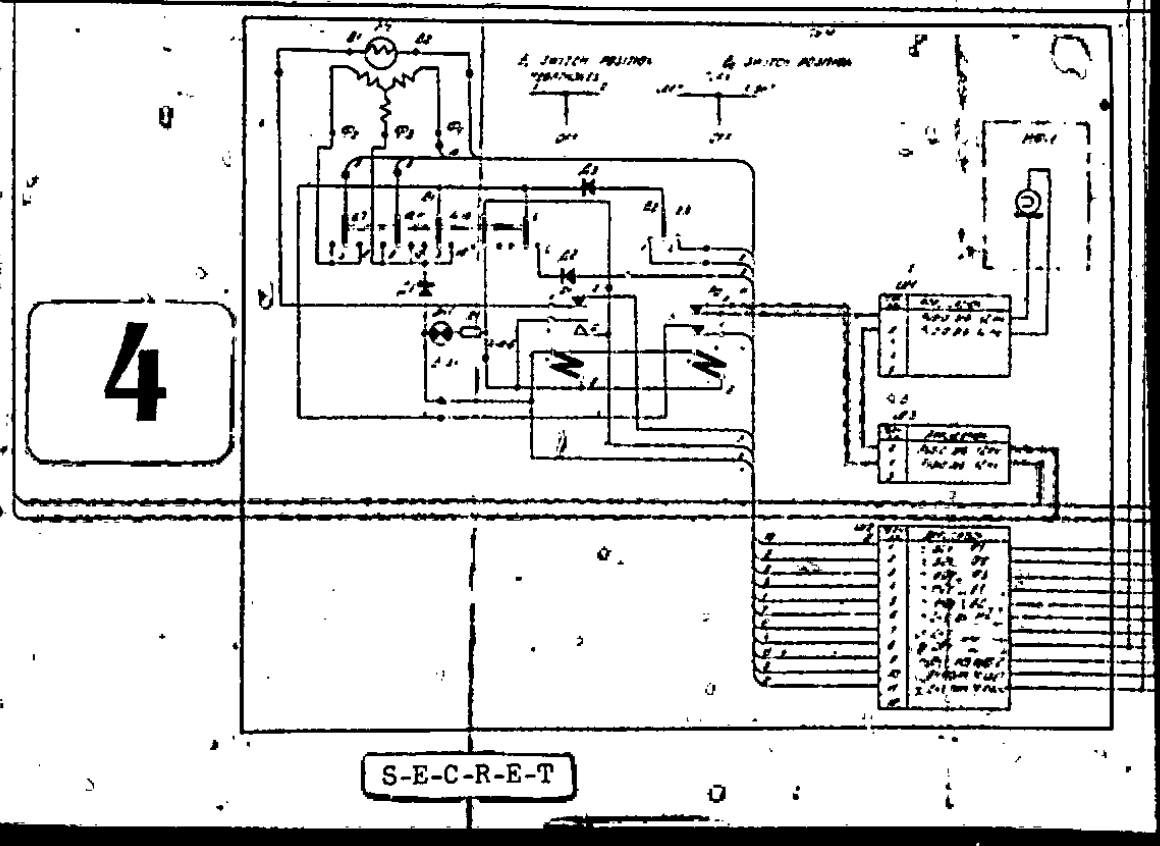
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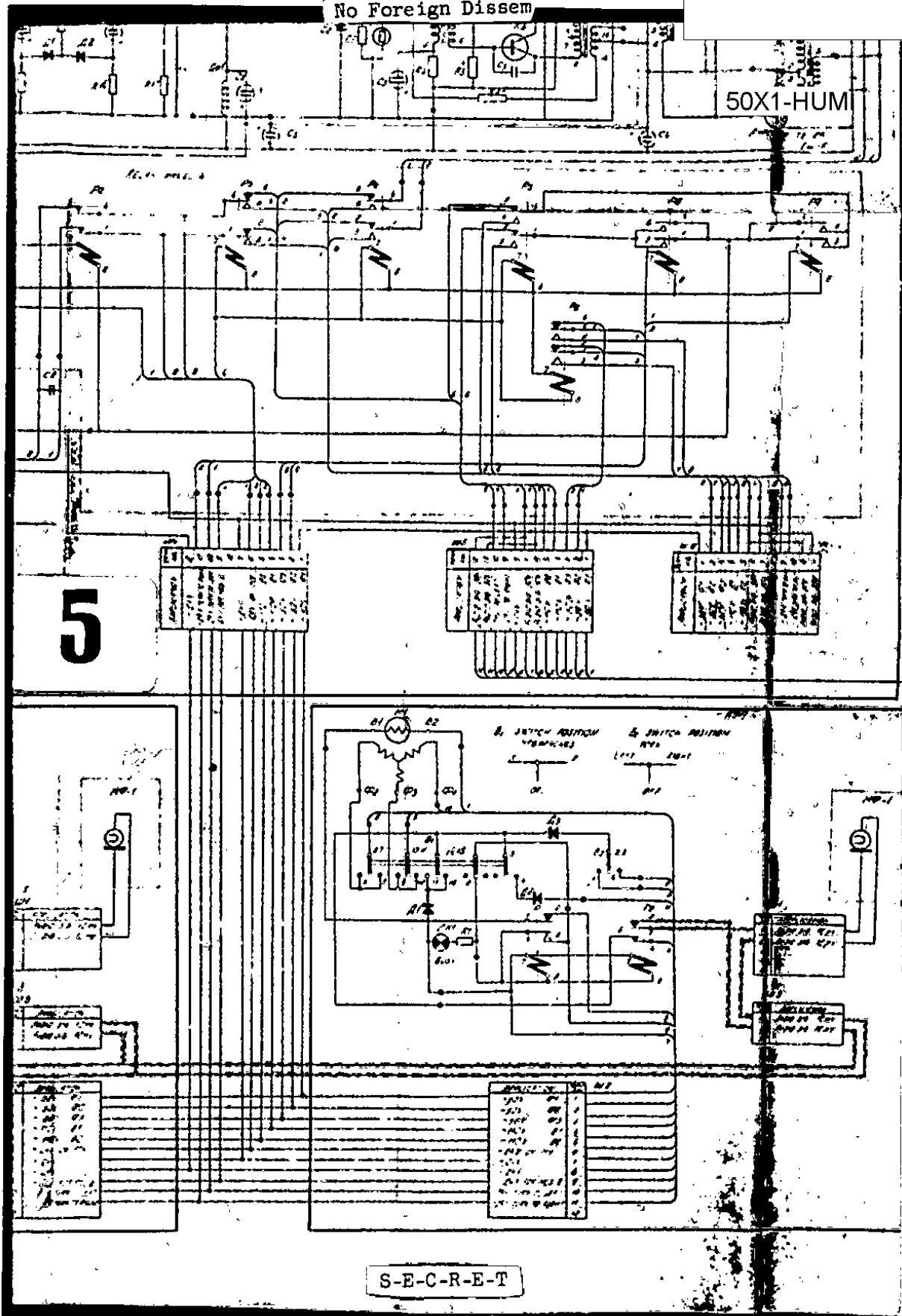


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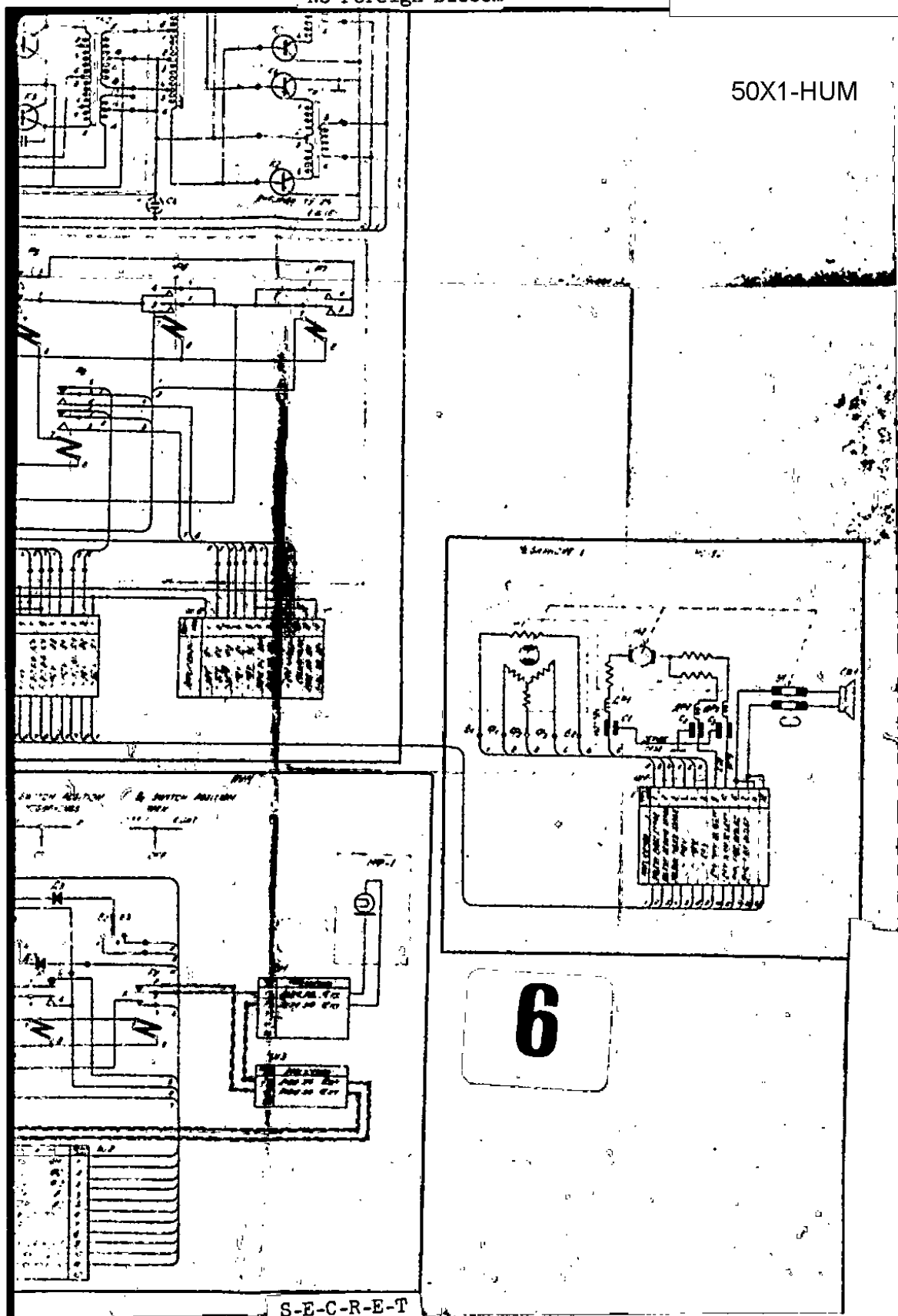


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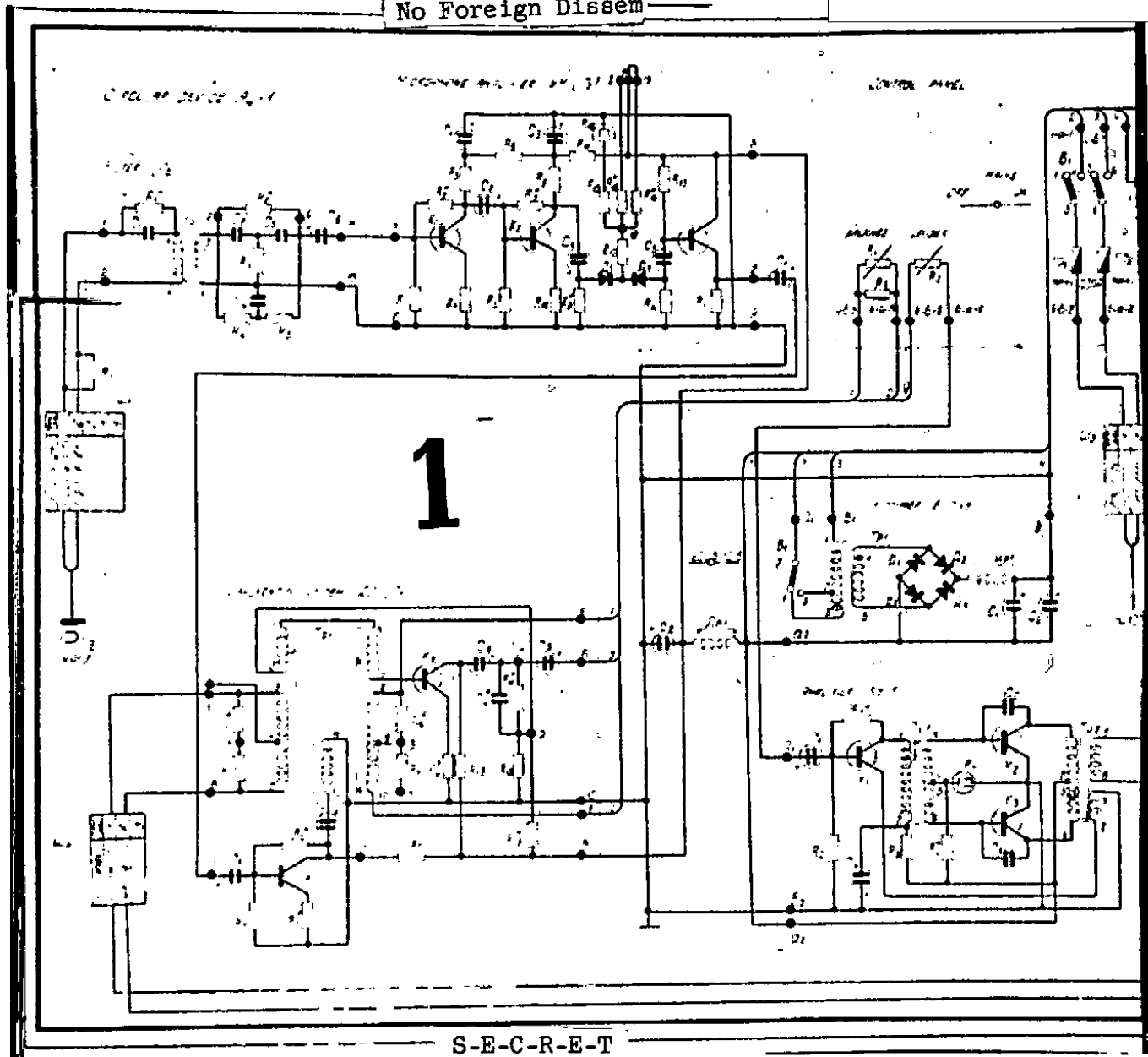


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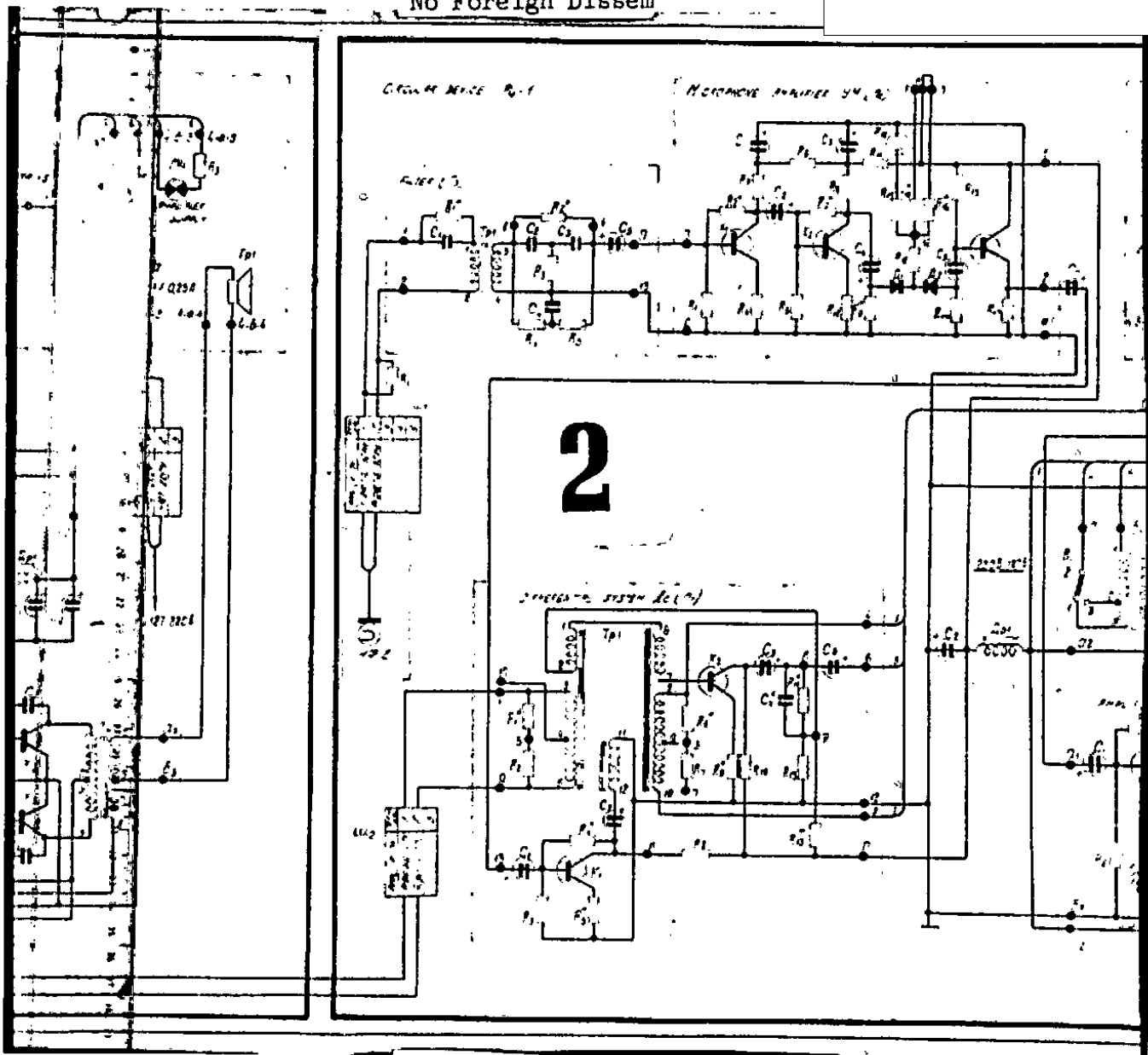
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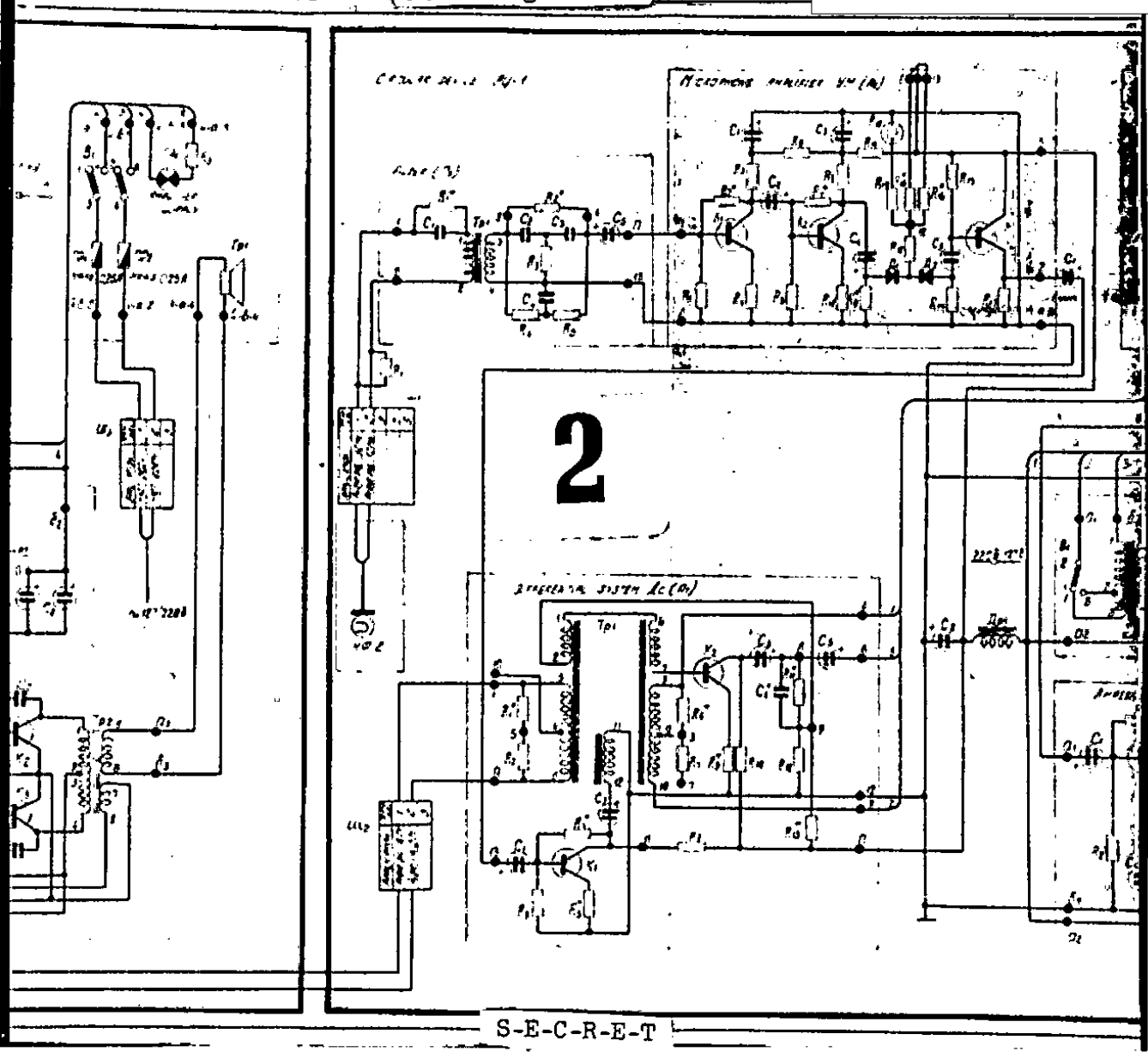


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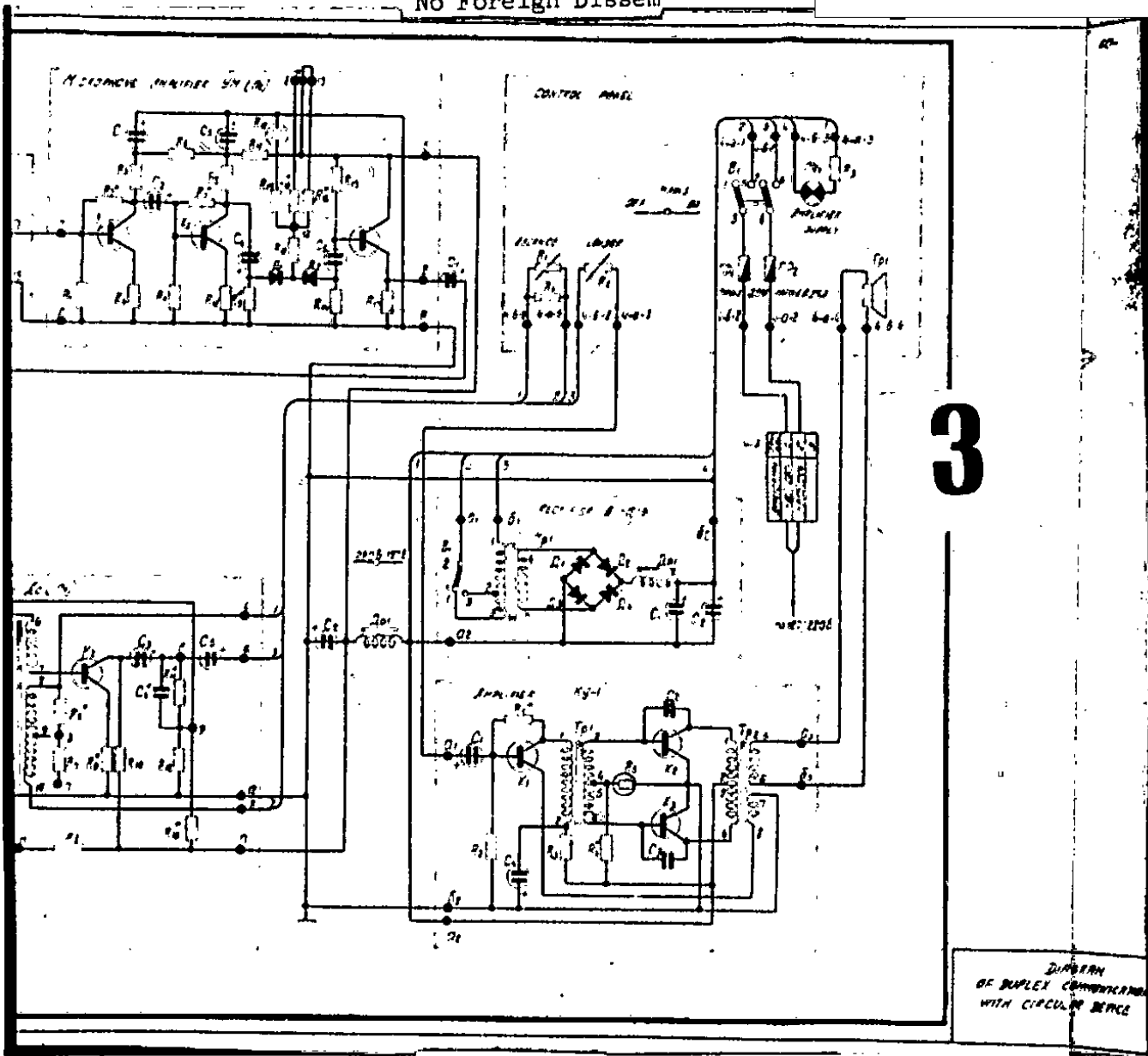


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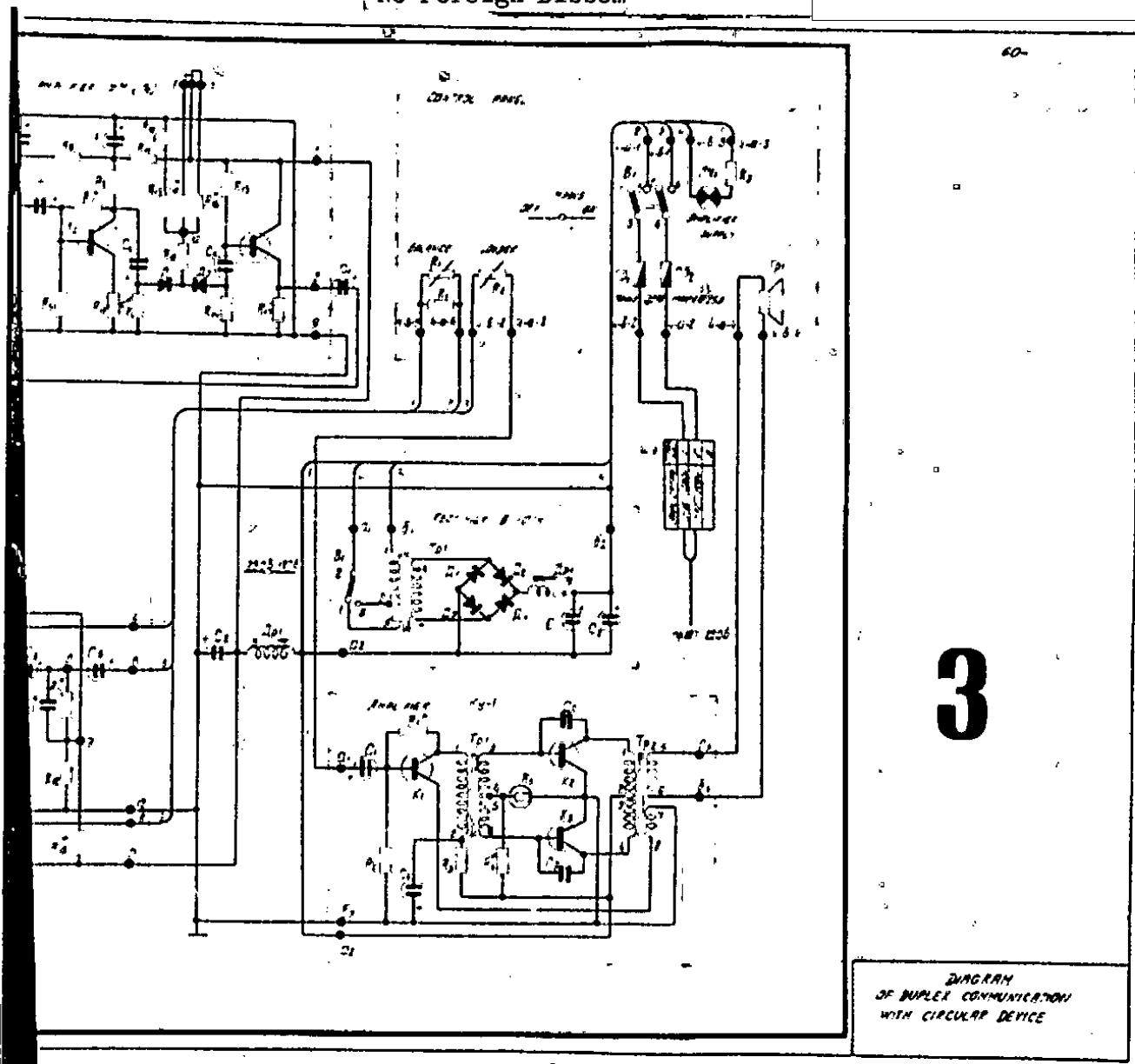
DIAGRAM
OF DUPLEX COMMUNICATION
WITH CIRCULAR SERVICE

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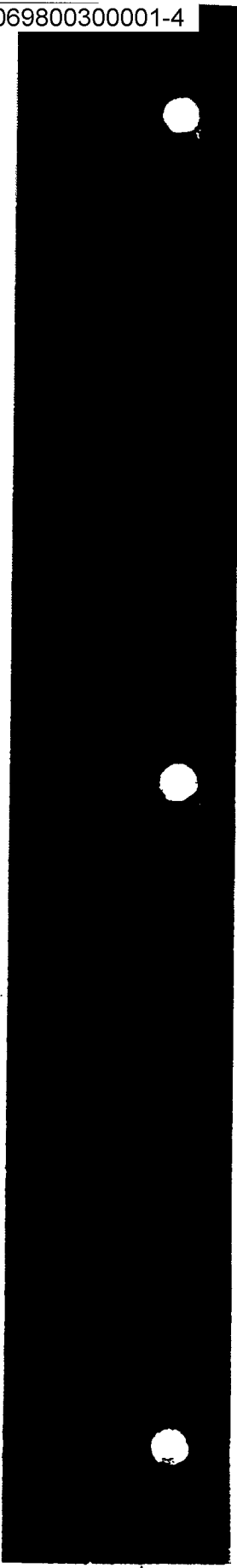
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DIAGRAM
OF DUPLEXER COMMUNICATION
WITH CIRCULAR DEVICE

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