

ELDICO

**ELECTRONIC
KEY
MODEL
EE-3A**



INSTRUCTION MANUAL

Electronic Key

Model EE-3a



TABLE OF CONTENTS

SECTION I - DESCRIPTION

1.	Introduction	1
2.	Features	1
3.	Specifications	1

SECTION II - INSTALLATION

1.	Terminal Strip.	3
2.	Power Plug	3
3.	Break-in Operation.	3

SECTION III - OPERATION

1.	Controls	5
2.	Operating Procedure	5

SECTION IV - THEORY OF OPERATION

1.	Keying Circuit.	7
2.	Monitor Circuit	7
3.	Power Supply	8

SECTION V - MAINTENANCE

1.	Adjustment Procedure	9
2.	Access Instructions	10
3.	Keying Paddle Adjustments	10
	Voltage and Resistance Charts	14

PARTS LIST (With Picture Locations)	15
---	----

LIST OF ILLUSTRATIONS

Figure 1.	Relay Action	6
Figure 2.	EE-3A, Right Inside View	12
Figure 3.	EE-3A, Left Inside View	13
Figure 4.	Schematic Diagram.	17

SECTION I

DESCRIPTION

1. INTRODUCTION

The Eldico EE-3A Electronic Key is a semi-automatic device used for continuous wave operation of a transmitter. It is housed in an attractive sloping front cabinet finished in Eldico Gray. The self-contained loudspeaker (for monitoring) is mounted at the top of the unit beneath a perforated screen.

2. FEATURES

With the control switch in the AUTO position (for automatic operation), and the key paddle operated to the right, a continuous string of DOTS is formed. With the key paddle operated to the left, a continuous string of DASHES is formed. By placing the control switch in the MAN (manual) position, dots and dashes may be made manually, as with a hand key.

NOTE: UNLESS OTHERWISE SPECIFIED, THE REMAINDER OF THIS INSTRUCTION BOOK DESCRIBES THE EE-3A WITH THE CONTROL SWITCH IN THE "AUTO" (AUTOMATIC) POSITION.

A CAL position is available on the switch which short-circuits the transmitter keyed circuit for purposes of tuning.

The EE-3A is entirely self-contained and includes an audio oscillator and loudspeaker for the monitoring of transmissions. The unit has been designed to mute the receiver audio while simultaneously providing a tone for monitoring. A hand or automatic key may be connected to the rear terminal strip, enabling the operator to utilize the muting and monitoring features of the EE-3A while operating with the hand key.

3. SPECIFICATIONS

Cabinet Dimensions:	Length: 7-5/8 inches
	Width: 4-1/2 inches
	Height: 3-3/4 inches
Dimensions of Top:	Width: 4-1/2 inches
	Length: 5-1/4 inches
Weight (unpacked):	5-3/4 pounds
Power Input Requirements:	115 volts, 60 cycles AC at 25 watts

SECTION II INSTALLATION

1. TERMINAL STRIP

Locate the five-terminal strip at the rear of the cabinet. (See Figure No. 3) Terminals 3 and 4 are to be connected to the keyed circuit of the transmitter. Be sure that polarity is observed and that Terminal 3, the ground terminal, is connected to the ground side of the keyed circuit of the transmitter.

2. POWER PLUG

Insert the power plug into a 110-115 volt, 60 cycle AC receptacle only.

CAUTION: DO NOT ATTEMPT TO OPERATE THIS EQUIPMENT FROM A 25 CYCLE OR DC SOURCE!

The unit can now be operated in its simpler mode, as a basic electronic key. To incorporate receiver "break-in", audio muting and audio transfer operation, proceed as follows:

3. BREAK IN OPERATION

Connect Terminals 3 and 5 of the rear terminal strip to the receiver headphone output terminal, again observing polarity. Terminal 3 is grounded and should be connected to the ground side of the receiver headphone terminals. Plug headphones (high impedance only) into the HEADPHONE jack at the rear of the EE-3A cabinet.

To operate the unit with low impedance headphones, it will be necessary to use a matching transformer, such as a small receiver replacement output transformer. This will match the impedance of the headphones to the 2000 to 5000 ohm impedance of the EE-3A.

NOTE: THIS UNIT HAS BEEN PROPERLY ALIGNED FOR CORRECT SPACE AND KEYING RATIO AT THE FACTORY. SHOULD READJUSTMENT BE NECESSARY, REFER TO "ADJUSTMENT" IN THE MAINTENANCE SECTION OF THIS MANUAL.

SECTION III OPERATION

1. CONTROLS

Front panel controls consist of the VOLUME control which includes the ON-OFF switch; the keying paddle; the control switch, which selects CAL, AUTO or MAN; the SPEED control, a pilot lamp; and the TONE control. Rear panel controls consist of RATIO control; SPACE control; and MUTING THRESHOLD control. In addition, the HEADPHONES jack, the one ampere fuse and the five-terminal strip are also located on the rear panel.

2. OPERATING PROCEDURE

In the simpler mode of operation (with the EE-3A connected only to the transmitter keyed circuit), operation of the keying paddle will cause a monitoring tone to be heard at the loudspeaker or headphones. Adjust the TONE and VOLUME controls for satisfactory listening.

For "break-in" operation, the MUTING THRESHOLD control at the rear panel must be adjusted. Refer to Paragraph 1-E, Section V, of this manual.

A few hours of actual practice will be the best way for the operator to familiarize himself with the operation of the EE-3A.

Once a DOT or a DASH has been started by tapping the keying paddle, the complete DOT or DASH plus its associated space is completed before the next character in sequence can be initiated. This cycle cannot be stopped once it has been started, since by the action of Relay RY-1, the keying mechanism is disconnected from the circuit during this period. (Refer to schematic diagram, Figure 4.) This feature is extremely important for accurate and effortless code sending. With a minimum of practice, the EE-3A will create perfectly formed characters, and spaces within the characters.

Once the operator has become familiar with the EE-3A, he will want to determine the speed at which he is sending. A close approximation may be had by sending a series of dashes and counting the number of dashes in a five second period. The resultant number will nearly equal the speed in words per minute. (This is based on six dots per second equal fifteen words per minute. The unit must be properly adjusted and the spacing accurately sent.)

A hand key can be connected to the rear terminal strip of the EE-3A. As long as the speed used with the hand key is appreciably slower than the speed for which the EE-3A is set, there will be no need to switch the EE-3A from AUTO to MAN.

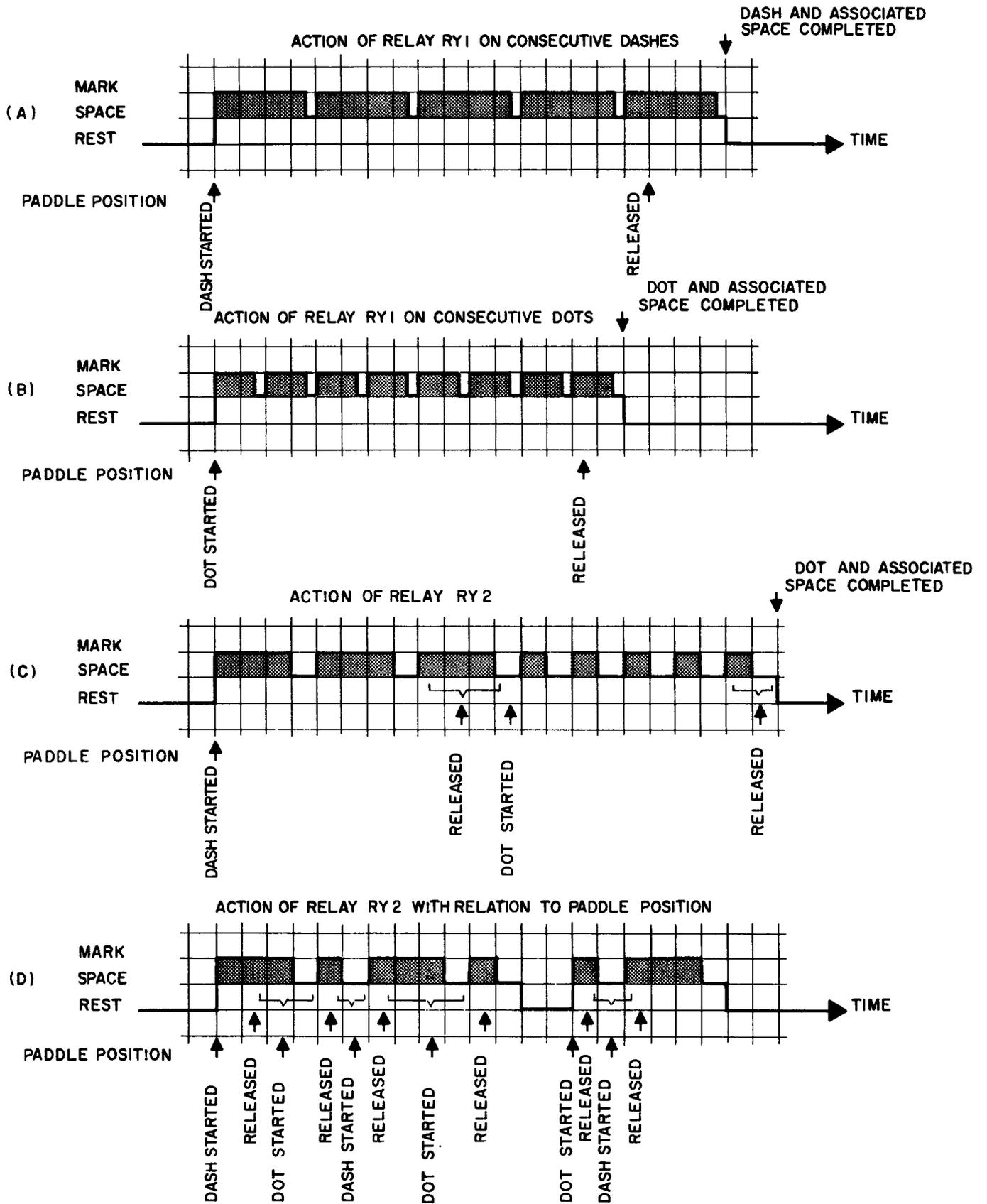


FIGURE 1
RELAY ACTION

SECTION IV

THEORY OF OPERATION

1. KEYING CIRCUIT, 12AT7...V1

In the standby position (keying paddle centered), both sections of V1 are biased to cutoff by resistance networks R5 - R7 and R6, R8 and R9. When the keying paddle is operated to the DASH (left) position and held, the full B+ of approximately 220 volts DC is applied to the timing circuit C1, R1 and R2. Voltage is also applied to the control grids of V1, but is limited by resistor R3. As soon as bias is reduced to the point where the tube conducts, Relay RY-1 is actuated, removing the voltage from the timing network. The remaining voltage on C1 is discharged through R1 and R2 to a point where V1 is again cut off by its cathode bias. The relay then returns to its normal position, again applying voltage to the timing network. These cycles are repeated until the keying paddle is released, after which the remaining portion of any cycle started is completed (See Figure 1.).

When the keying paddle is operated to the DOT (right) position and held, a lesser positive voltage is applied to the timing and grid circuits of V1 and the tube conducts. A correspondingly lesser time is required for resistors R1 and R2 to discharge capacitor C1. The ratio of this time to the time of the DASH is adjusted by the RATIO control R11 on the rear of the unit.

Relay RY-2 will open before Relay RY-1, as the cathode of V1b is biased somewhat higher and is adjusted for proper spacing within letters by the SPACE control R9, the screwdriver adjustment on the rear of the unit.

2. MONITOR CIRCUIT, 6AN8...V2

V2 operates as a conventional phase-shift oscillator and runs continuously. The tone is controlled within limits by the TONE control R22 on the front panel. In the receive position, the normally closed contacts of RY-2 ground the signal. However, when this relay is actuated and keys the transmitter, the signal is resistance coupled to V2b, which amplifies the signal. Volume is adjusted by R24, the VOLUME control on the front panel. In the simpler mode of operation, audio monitoring is available at the loudspeaker or the HEADPHONES jack on the rear panel.

When the EE-3A is connected to the receiver output (utilizing the audio break-in feature), audio from the receiver is present at neon lamp I-2. I-2 acts as a closed circuit, since it is ignited by the potential difference of the V1a cathode and the

arm of potentiometer R27, MUTING THRESHOLD control, on the rear panel. When the keying paddle is operated, the cathode voltage of V1a is increased to a point where this difference of potential is insufficient to maintain the ignition of I-2, and this opens the audio circuit from the receiver. As audio from the oscillator is present when Relay RY-2 is actuated, break-in operation is accomplished.

As long as the speed used will be considerably lower than the speed for which the EE-3A is set, a hand key can be used without changing the switch from AUTO to MAN. When the keying paddle is operated manually, the front panel switch must be in the MANUAL position. Capacitor C1 is thereby removed from the timing circuit. When the keying paddle is operated to either position, a positive voltage is applied to the V1 grids, causing both sections to operate, actuating Relay RY-2. This keys the transmitter and at the same time operates the receiver muting circuit. When the hand key is operated, approximately 75 volts from the DOT voltage divider is applied to the V1 grids and operation is the same as with the keying paddle operated manually. As the 75 volts is present, both sides of the hand key must be insulated from the chassis. Terminal 2 of the rear terminal strip must be connected to the normally insulated side of the hand key, since this is a high impedance point in the circuit and AC pickup, caused by touching this, will cause erratic action of the relays.

3. POWER SUPPLY

The power supply is a conventional system, utilizing a transformer, a selenium rectifier and filter circuit. The transformer furnishes high voltage AC for the rectifier and 6.3 volts AC for filaments and indicator lamp I-1. High voltage output from the power supply is approximately 220 volts DC.

SECTION V MAINTENANCE

NOTE: THIS UNIT HAS BEEN PRESET AT THE FACTORY AND, GENERALLY, NO MAINTENANCE WORK SHOULD BE REQUIRED. SHOULD THE USER FEEL THAT READJUSTMENT IS NECESSARY, THE FOLLOWING WILL SERVE AS A GUIDE.

1. ADJUSTMENT PROCEDURE

Rotate **THRESHOLD** control fully counterclockwise and set all other controls to a center position. Apply power to the unit and operate the keying paddle. A tone should be heard in the loudspeaker.

- A. **Speed Control:** With the **SPEED** control rotated to a maximum counterclockwise position and the keying paddle operated to the **DASH** (left) position, two to three dashes per second (ten to fifteen per five seconds) should be obtained. Return the **SPEED** control to a mid position.
- B. **Space Control:** Connect an ohmmeter across the keyed circuit leads (Terminals 3 and 4 at rear terminal strip) and switch to the **R x 10** or **R x 100** scale. Operate switch on **EE-3A** to **CALIBRATE** position. Meter should deflect to full scale (zero ohms). Return the switch to **AUTO** position. Operate keying paddle to the **DASH** (left) position and adjust **SPACE** control until meter reads $3/4$ of full deflection.

NOTE: AS OHMMETERS DO NOT HAVE LINEAR SCALES, A MORE ACCURATE READING CAN BE OBTAINED BY USING THE VOLTAGE SCALE. THEREFORE, IF $3/4$ DEFLECTION IS REQUIRED AND FULL SCALE OHMS IS EQUAL TO 100 VOLTS, SET "SPACE" CONTROL FOR 75 VOLT POSITION.

- C. **Ratio Control:** With meter connected as above, operate keying paddle to **DOT** (right) position and adjust **RATIO** control **R11** until meter reads 50 per cent of full deflection. Refer to voltage scale as in Step "B" preceding.
- D. **Tone and Volume Controls:** Adjust **TONE** and **VOLUME** controls for most desirable listening levels.
- E. **Muting Threshold Control:** This control (**R27**) is located on the rear of the unit. It is used to adjust the automatic switching of the audio to the

HEADPHONES jack (from the receiver to the audio monitor). Audio from a receiver headphone output should be connected to Terminals 3 and 5 on the rear terminal strip. As Terminal 3 is grounded, be sure to observe proper polarity. High impedance headphones (see Para. 3, INSTALLATION) should be inserted into the HEADPHONES jack on the rear panel. Starting with the MUTING THRESHOLD control in the maximum counterclockwise position, advance the control in a clockwise direction until audio from the receiver is heard. When the keying paddle is operated, audio from the receiver should be muted and the tone from the monitor should be heard. Between words, or when keying is stopped, audio from the receiver should again be heard.

NOTE: THIS CONTROL SHOULD BE ROTATED IN A CLOCKWISE DIRECTION ONLY TO A POINT WHERE THE AUDIO TRANSFER AND MUTING CIRCUIT IS FUNCTIONING. IF CONTROL IS ADVANCED BEYOND THIS POINT, THE SPEED CIRCUIT MAY BE UPSET BY UNNECESSARY LOADING.

2. ACCESS INSTRUCTIONS

Should internal maintenance be required, access to the inside of the unit can be obtained by first removing the four knobs on the front of the unit. Then remove the eleven No. 4 sheet metal screws which hold the cover to the base. Grasping the sides of the cover with the fingers of both hands, apply gentle pressure with the thumbs to the SPEED and TONE control shafts and slip cover off forward.

3. KEYING PADDLE ADJUSTMENTS

- A. This unit has been preadjusted at the factory. It is recommended that the operator try the EE-3A first and make adjustments only if he feels they are necessary.
- B. To gain access to the adjustments, the cover must be removed. See Para. 2 above.

(1) Adjustments:

- a. Rotate travel screws (Picture Location Q-24 and K-11) each approximately one turn counterclockwise. Paddle should now have excessive travel, but should return to center position when released.

- b. Spring tension can be increased by rotating tension screw (Picture Location J-11) counterclockwise and holding lock nut (on same tension screw). Tension can be decreased by rotating screw clockwise.

- c. Center position play has been factory adjusted by slotted screw (Picture Location R-24). After considerable use, some wear may occur, necessitating the adjustment of this screw. A quarter or half turn in either direction should be sufficient to compensate for wear. The locknut must be held.

- d. When all other adjustments have been completed, the travel screws mentioned in Para. (a.) can be adjusted. DOT travel can be decreased by rotating screw (Picture Location Q-24) clockwise. In a similar manner, DASH travel can be decreased by rotating screw (Picture Location K-11) clockwise.

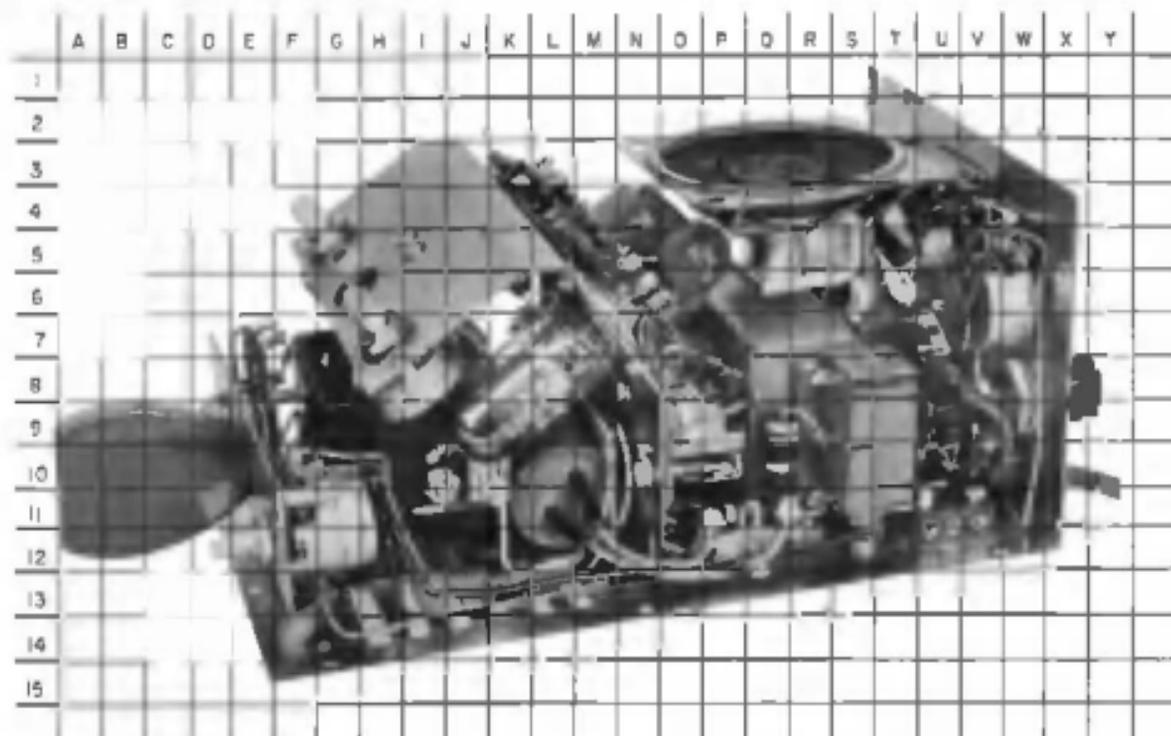


FIGURE 2
RIGHT INSIDE VIEW

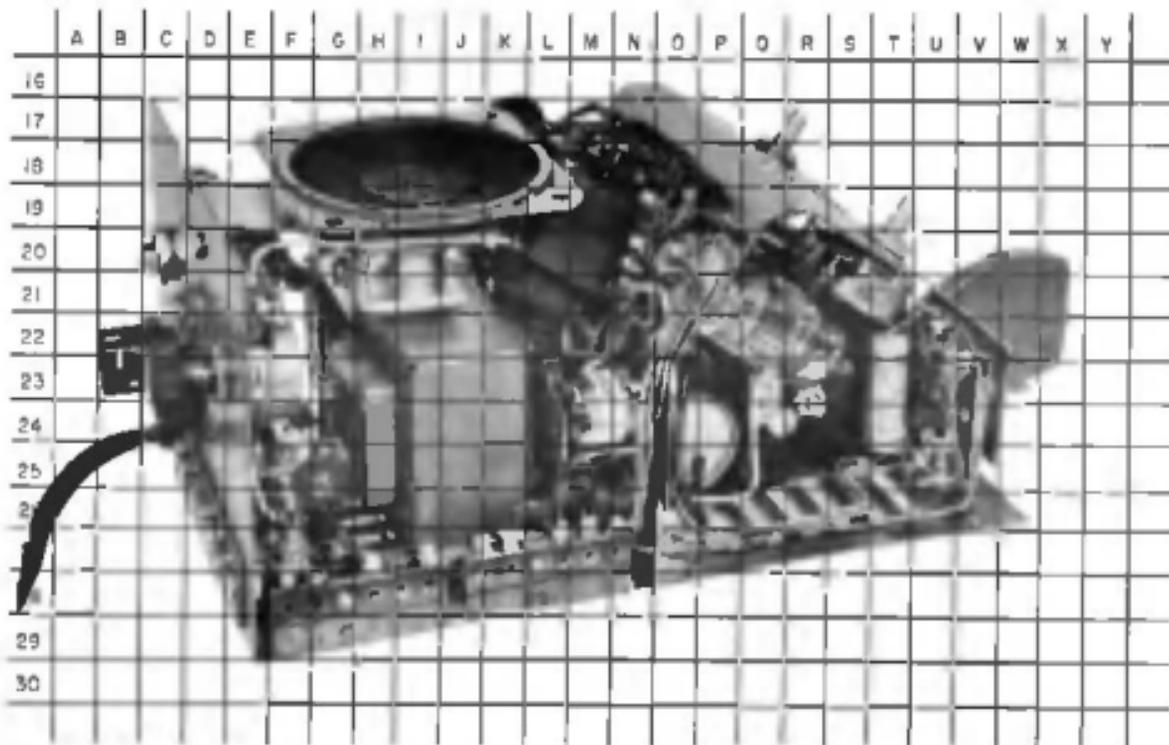


FIGURE 3
LEFT INSIDE VIEW

VOLTAGE AND RESISTANCE CHARTS

	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9	
V1	Voltage	220	0	18	0	0	220	0	30	6.3 AC
	Resistance	32K	10 Meg.	8.2 K	0	0	32K	10 Meg.	5.6 K	.5
V2	Voltage	220	0	6.3	0	6.3 AC	130	45	0	0
	Resistance	32K	0	470	0	.5	130K	500K	1.2 Meg.	0

READINGS MADE UNDER FOLLOWING CONDITIONS:

Tubes are in place, keying paddle is in neutral position, threshold control rotated full counterclockwise and all other controls rotated to mid position. Voltages are positive DC with respect to ground unless otherwise specified. Resistances measured with power plug removed from source.

PARTS LIST

NOTE: In many instances, due to photographic limitations, components in the Parts List will not be visible on the photographs. The approximate location of these parts is given, however, so that the user can locate the component when examining the unit.

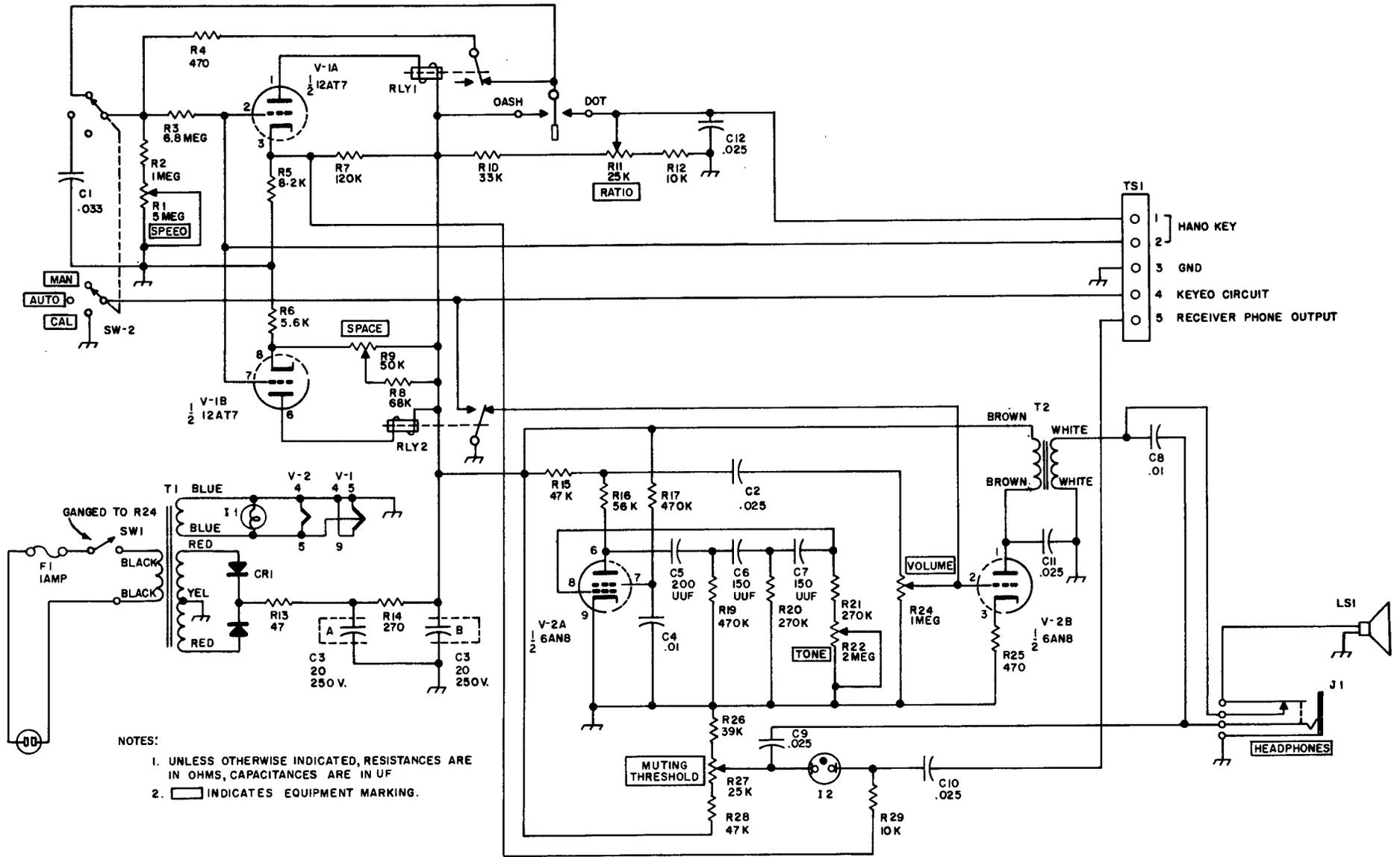
<u>Item</u>	<u>Description</u>	<u>Picture Location</u>
C1	Capacitor, .033 mfd, 400 volt tubular	T-23
C2	Capacitor, .025 mfd, 600 volt disc ceramic	N-5
C3	Capacitor, 2X 20 mfd, 250 volt tubular electrolytic	L-11
C4	Capacitor, .01 mfd, 600 volt disc ceramic	L-17
C5	Capacitor, 200 mmfd, 500 volt duramica	N-26
C6	Capacitor, 150 mmfd, 500 volt duramica	M-26
C7	Capacitor, 150 mmfd, 500 volt duramica	L-26
C8	Capacitor, .01 mfd, 600 volt disc ceramic	G-25
C9	Capacitor, .025 mfd, 600 volt disc ceramic	E-26
C10	Capacitor, .025 mfd, 600 volt disc ceramic	G-28
C11	Capacitor, .025 mfd, 600 volt disc ceramic	O-5
C12	Capacitor, .025 mfd, 600 volt disc ceramic	U-6
CR1	Selenium rectifier, full-wave	T-9
F1	Fuse, 3AG1, 1 ampere with holder	X-8
I 1	Lamp, No. 51	R-20
I 2	Lamp, NE-23	F-26
J1	Jack, phone	F-25
LS1	Loudspeaker, P. M., 2-1/2 inch	R-4
R1	Potentiometer, 5 Megohm, SPEED CONTROL	G-5
R2	Resistor, 1.0 Megohm, 1/2 watt	Q-21
R3	Resistor, 6.8 Megohm, 1/2 watt	L-8
R4	Resistor, 470 ohm, 1/2 watt	L-8
R5	Resistor, 8200 ohm, 1/2 watt	O-22
R6	Resistor, 5600 ohm, 1/2 watt	K-3
R7	Resistor, 120K ohm, 1/2 watt	N-21
R8	Resistor, 68K ohm, 1 watt	T-5
R9	Potentiometer, 50K ohm, SPACE CONTROL	U-5
R10	Resistor, 33K ohm, 1/2 watt	U-4
R11	Potentiometer, 25K ohm, RATIO CONTROL	W-6

PARTS LIST (cont'd)

<u>Item</u>	<u>Description</u>	<u>Picture Location</u>
R12	Resistor, 10K ohm, 1/2 watt	U-6
R13	Resistor, 47 ohm, 2 watt	Q-10
R14	Resistor, 270 ohm, 2 watt	P-11
R15	Resistor, 47K ohm, 1/2 watt	N-6
R16	Resistor, 56K ohm, 1/2 watt	M-5
R17	Resistor, 470K ohm, 1/2 watt	N-6
R18	Not Used	
R19	Resistor, 470K ohm, 1/2 watt	L-27
R20	Resistor, 270K ohm, 1/2 watt	L-27
R21	Resistor, 270K ohm, 1/2 watt	K-27
R22	Potentiometer, 2 Megohm, TONE CONTROL	I-8
R23	Not Used	
R24	Potentiometer, 1 Megohm w/SPST switch VOLUME CONTROL	G-12
R25	Resistor, 470 ohm, 1/2 watt	M-5
R26	Resistor, 39K ohm, 1/2 watt	G-23
R27	Potentiometer, 25K ohm, MUTING THRESHOLD	F-23
R28	Resistor, 47K ohm, 1/2 watt	F-20
R29	Resistor, 10K ohm, 1/2 watt	G-27
RY1	Relay, pulsing	N-24
RY2	Relay, keying	O-9
SW1	Switch, SPST, part of R-24	G-11
SW2	Switch, control	U-23
T1	Transformer, power, ET-330 446 V CT.	J-24
T2	Transformer, audio, ET-331	M-20
TS1	Terminal Strip, 5 terminal	D-26
V1	Vacuum tube, 12AT7	Q-22
V2	Vacuum tube, 6AN8	L-8

SCHEMATIC DIAGRAM

FIGURE 4



- NOTES:
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UF
 2. INDICATES EQUIPMENT MARKING.

WARRANTY

Eldico Amateur Equipment

Eldico Electronics warrants this amateur product, manufactured by Eldico, to be free from defective material and workmanship, and agrees to remedy any defect or to furnish a new part in exchange for any part of any unit of its manufacture, which under normal installation, use and service, discloses such defect, provided:

1. Promptly following his purchase, the buyer completes and returns to Eldico the registration card included in the Instruction Manual furnished with the equipment.
2. Notice of the claimed defect is submitted to Eldico in writing within 90 days from the date of the original purchase.
3. Upon receipt of shipping instructions from Eldico, the unit is delivered by the owner to Eldico intact, for examination, with all transportation charges prepaid to our factory.
4. The examination discloses, in our judgment, that the product is thus defective.

This warranty does not extend to any Eldico product which has been subjected to misuse, neglect, accident, excessive moisture or exposure, incorrect wiring not our own, improper installation, or use in violation of instructions furnished by us, nor to units which have been repaired, rewired, or altered outside of our factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by Eldico without charge to the owner. This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products. In no event shall Eldico have any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

IMPORTANT! It is necessary that the Registration Card included herewith be filled out and mailed to the company promptly in order for this guarantee to be effective.



ELDICO ELECTRONICS

1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100