

OPERATING INSTRUCTIONS

FOR

PACKARD-BELL
PRE-AMPLIFIER

MODEL K-1

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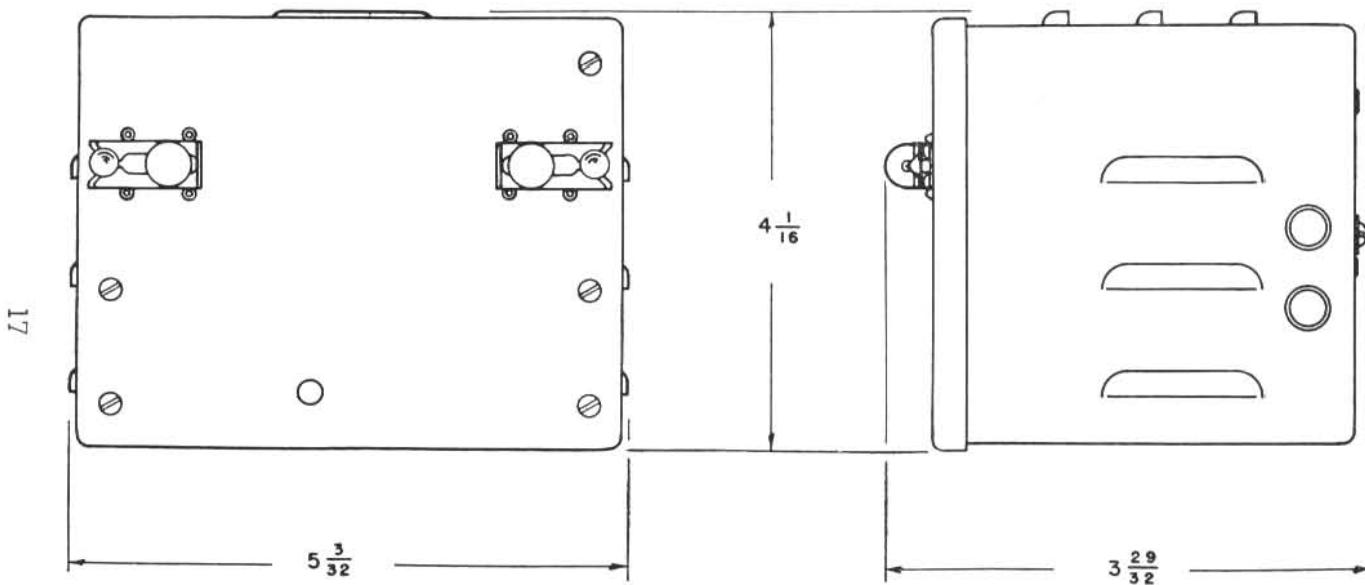


Fig. 8. Pre-Amplifier Model K-1. Outline Dimensions

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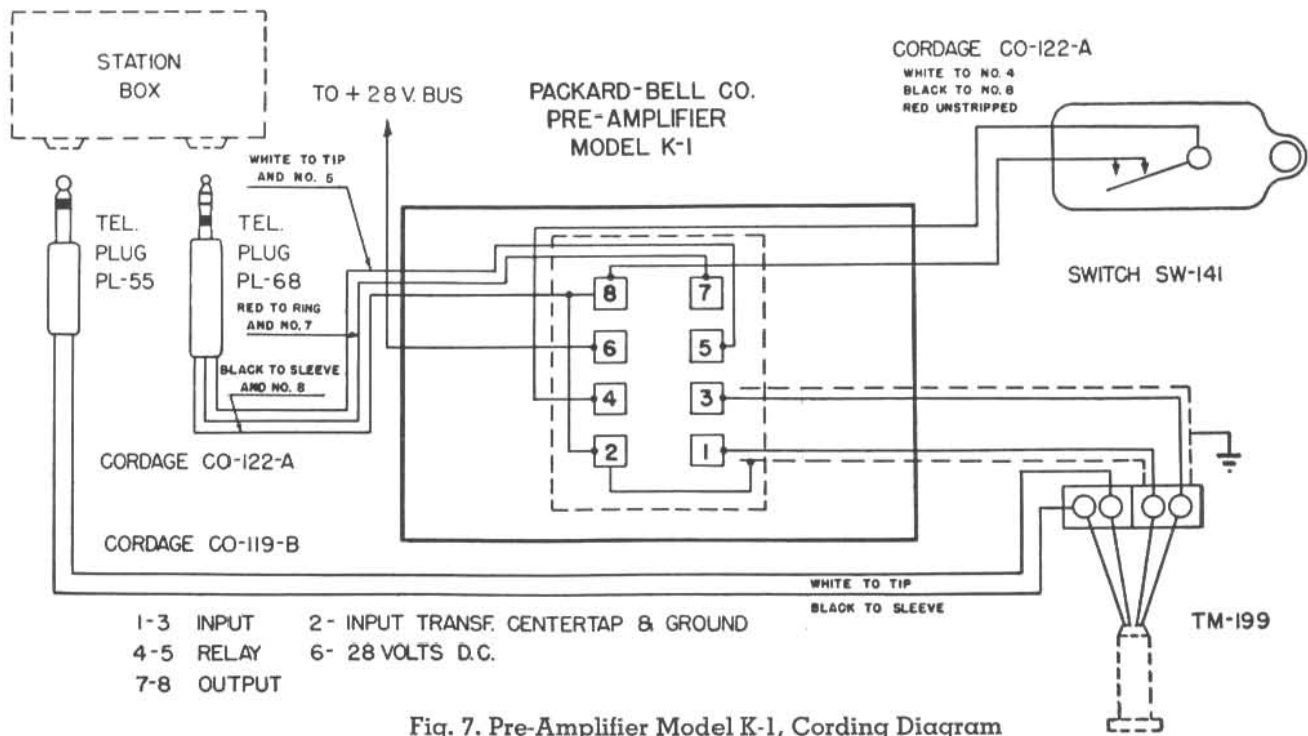


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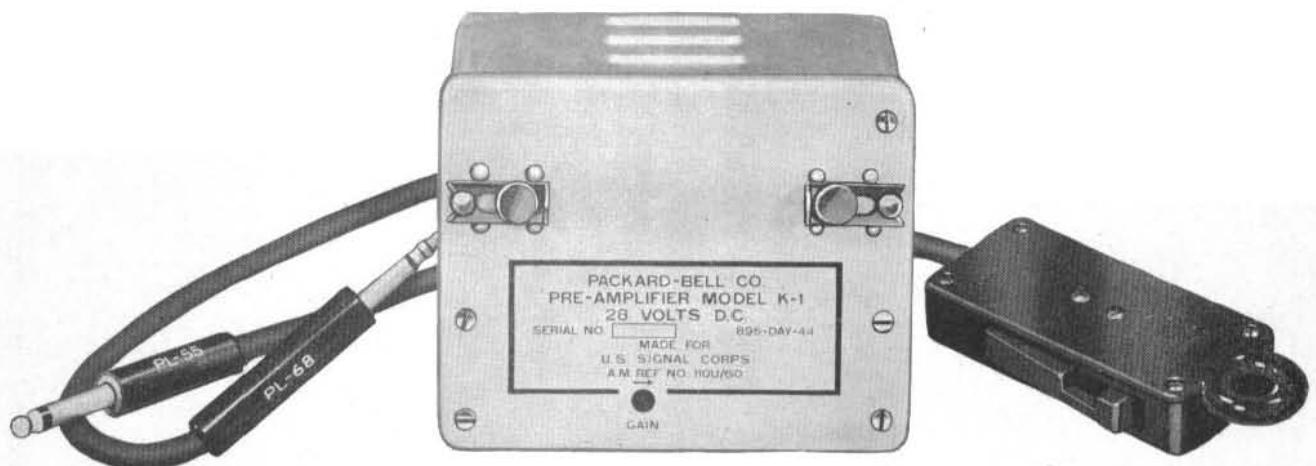


Fig. 1. Pre-Amplifier Model K-1

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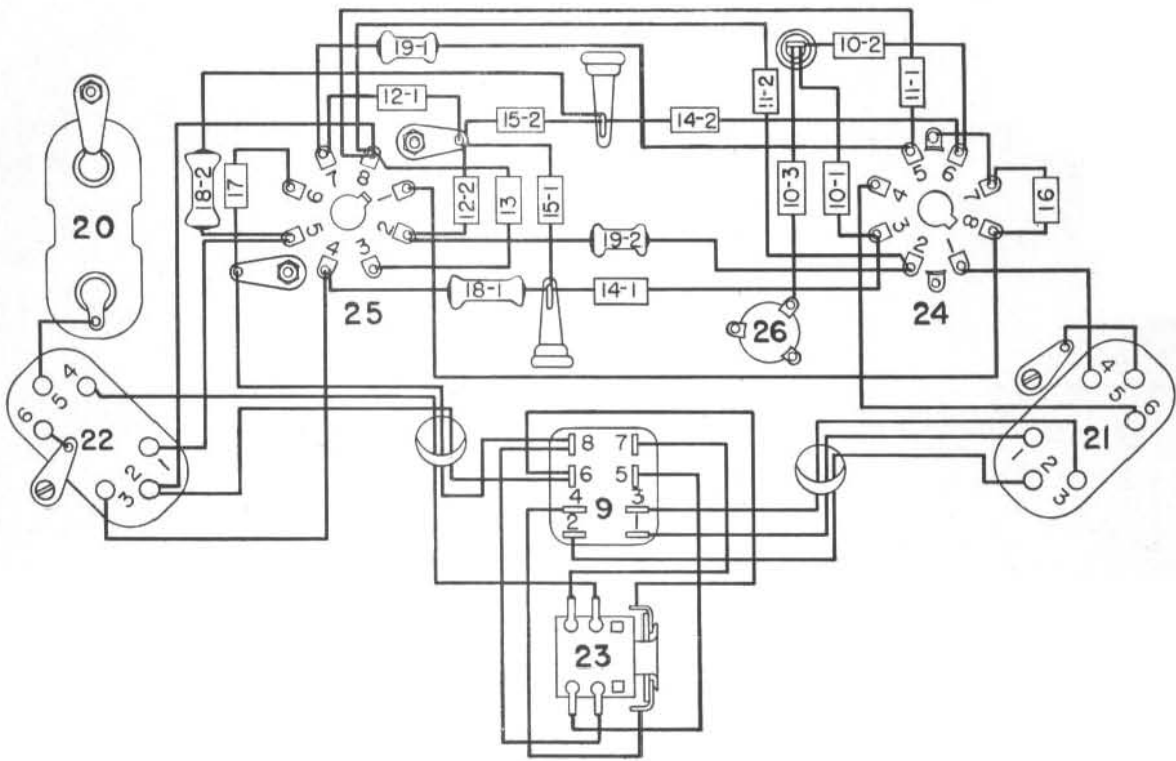


Fig. 6. Pre-Amplifier Model K-1, Practical Wiring Diagram

**SECTION V.—Continued
SUPPLEMENTARY DATA AND TABLE OF REPLACEABLE PARTS**

19. Table of Replaceable Parts—Continued

Symbol	R.A.F. Reference No.	Name	Description	Function	Dwg. No.
18-1	110C/10557	Capacitor, fixed, ceramic	10,000 mmf. ± 20%, 300V.	Feedback Feedback	2-102 A
18-2	110C/10557	Capacitor, fixed, ceramic	10,000 mmf. ± 20%, 300V.		
19-1	110C/10556	Capacitor, fixed, ceramic	750 mmf. ± 20%, 300V.	Coupling Coupling	2-127
19-2	110C/10556	Capacitor, fixed, ceramic	750 mmf. ± 20%, 300V.		
20	110C/10558	Capacitor, fixed, paper	6 mfd. —5%, ± 50%, 50 V.D.C.	D.C. Blocking	2-101
21	110K/1090	Transformer, AF	Push-Pull	Input	1-101
22	110K/1624	Transformer, AF	Push-Pull	Output	1-103
23	110F/788	Relay, general purpose	D.P.S.T., normally open	Output Closing	86-101
24	110H/1900	Socket, tube	Octal, 8 pin, black bakelite	Tube JAN-63L7GT	85-102
25	110H/1899	Socket, tube	Loctal, 8 pin, mica-filled bakelite	Tube JAN-28D7	85-101
26	110C/10560	Resistor, variable, carbon	250,000 ohm, 1½W.	Gain control	126-1

SECTION I.

GENERAL CHARACTERISTICS

1. Introduction

Pre-Amplifier Model K-1 is an amplifier designed to raise the output level of magnetic type microphones (U. S. Signal Corps type T-34 and T-44 and British Types 25 and 26) to that of Signal Corps Microphone type T-17, and to provide the functions of the T-17, in order that the above named magnetic microphones may be employed in conjunction with radio and interphone equipment designed for T-17 operation.

2. Components

Pre-Amplifier Model K-1 consists of the components which are shown in the following table:

Quan.	Item	Maximum Overall Dimensions Including Projections		
		H	W	D
1	Pre-Amplifier Model K-1	4⅞	5⅜	3 ²⁹ / ₃₂
1	Tube JAN-6SL7GT—VT-299	3⅝	1⅝ dia.	
1	Tube JAN-28D7	3 ⁵ / ₃₂	1⅜ dia.	

Pre-Amplifier Model K-1 weighs 3.5 lbs. complete with tubes and cords.

Figure 1, Page vi, illustrates Pre-Amplifier Model K-1.

For the unit to be operative the following supplementary equipment is required and is furnished as part of the amplifier equipment:

Quan.	Description
1	Plug PL-55, complete with cordage 119-B. Length 2 feet.
2	Terminal Blocks, TM-199.

3. Power Requirements

Pre-Amplifier Model K-1 operates from 24-28 Volts D.C. supply. Power requirements are approximately 400 milliamperes.

SECTION II. EMPLOYMENT

4. Initial Procedure

- a. Check to determine whether all the items which appear upon the list of component parts in Paragraph 2, Page 1, are available.
- b. Examine amplifier carefully for mechanical defects.

5. Installation

General.—The same general considerations apply to the installation of Pre-Amplifier Model K-1 as to other radio equipment in aircraft. The wiring must be shielded and bonded.

- a. Mount Pre-Amplifier Model K-1 on the airplane structure, in the desired position, by means of four machine screws through holes drilled at suitable locations in the back of the box. Care should be taken to so locate the holes that the screwheads will clear the chassis and the connector plug.

6. Preparation for Use

After the amplifier has been installed and all connections properly made, proceed as follows:

- a. Insert the tubes in the proper sockets and make certain that the contact pins are in full engagement with the socket contacts.
- b. Place Pre-Amplifier Model K-1 in its box and secure with slide fasteners.

7. Operation

- a. Control of Power Supply.—The source which supplies power to Pre-Amplifier Model K-1 must be locally controlled since there is no "ON-OFF" power supply switch in the amplifier.
- b. Turn the locally controlled power switch to the "ON" position. Allow a warm-up period for the tubes.
- c. Depress switch SW-141. A monitoring check of the output of the associated transmitter will reveal the quality of the performance of Pre-Amplifier Model K-1.

SECTION V.

SUPPLEMENTARY DATA AND TABLE OF REPLACEABLE PARTS

19. Table of Replaceable Parts

Symbol	R.A.F. Reference No.	Name	Description	Function	Dwg. No.
9	105X/2290	Connector, male contact	8 prong male	Connector	S-5-103
10-1	110C/4191	Resistor, fixed	39,000 ohm, ± 10%, ½ W.	6SL7GT Cathode 6SL7GT Cathode 6SL7GT Cathode	47-0004
10-2	110C/4191	Resistor, fixed	39,000 ohm, ± 10%, ½ W.		"
10-3	110C/4191	Resistor, fixed	39,000 ohm, ± 10%, ½ W.		"
11-1	110C/5746	Resistor, fixed	510,000 ohm, ± 10%, ½ W.	6SL7GT Plate 6SL7GT Plate	47-0004
11-2	110C/5746	Resistor, fixed	510,000 ohm, ± 10%, ½ W.		"
12-1	110C/348	Resistor, fixed	1 megohm, ± 10%, ½ W.	28D7 Grid 28D7 Grid	47-0004
12-2	110C/348	Resistor, fixed	1 megohm, ± 10%, ½ W.		"
13	110C/358	Resistor, fixed	10,000 ohm, ± 10%, ½ W.	28D7 Screen	47-0004
14-1	110C/10559	Resistor, fixed	2 megohm, ± 10%, ½ W.	Feedback Feedback	47-0004
14-2	110C/10559	Resistor, fixed	2 megohm, ± 10%, ½ W.		"
15-1	110C/1480	Resistor, fixed	15,000 ohm, ± 10%, ½ W.	Feedback Feedback	47-0004
15-2	110C/1480	Resistor, fixed	15,000 ohm, ± 10%, ½ W.		"
16	110C/8232	Resistor, fixed	62 ohm, ± 10%, ½ W.	Filament current equalizing 28D7 Cathode	47-0004
17	110C/8401	Resistor, fixed	200 ohm, ± 10%, ½ W.		"

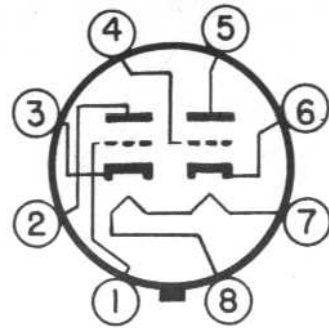
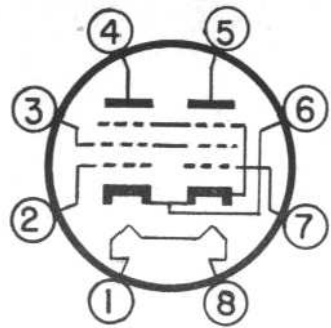


Fig. 5.

TUBE JAN-28D7 DOUBLE
BEAM POWER AMPLIFIER
BOTTOM VIEW

- 1-8 Heaters
- 2-7 Control Grids
- 3 Screen Grid
- 4-5 Plates
- 6 Cathode and BCP

TUBE JAN-6SL7GT TWIN
TRIODE AMPLIFIER
BOTTOM VIEW

- 1-4 Grids
- 2-5 Plates
- 3-6 Cathodes
- 7-8 Heaters

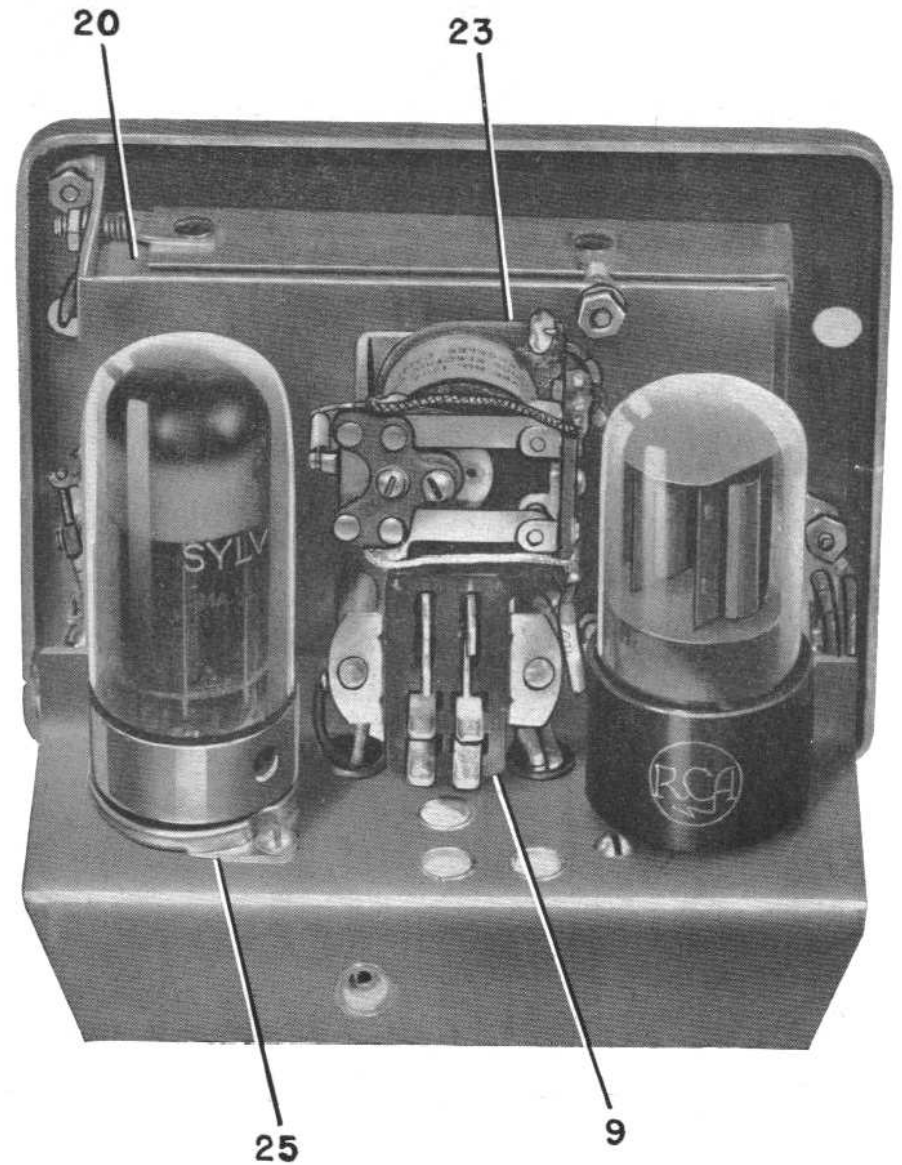


Fig. 2. Pre-Amplifier Model K-1 Cover Removed, Top View

SECTION III.

DETAILED FUNCTIONING OF PARTS

8. Pre-Amplifier Model K-1

a. Pre-Amplifier Model K-1 has been designed to equalize the output of magnetic type microphones to the level of type T-17. When the amplifier has been properly installed, connected and operating, the functional conditions which obtain are as follows:

When "Press-to-Talk" switch SW-141 is depressed, it energizes the coil of a normally open, double-pole, single throw relay. One pair of the relay contacts closes the output circuit and thus causes the amplifier to function. The other pair of contacts simultaneously operate to close the control circuits of the radio transmitters with which the amplifier is associated.

b. Pre-Amplifier Model K-1 is illustrated in Figure 1, Page vi. The circuit diagram is shown in Figure 4, Page 9. The practical wiring diagram is shown in Figure 6, Page 13. Model K-1 is a two stage, push-pull, resistance coupled amplifier utilizing one twin-triode, high-mu type of vacuum tube JAN-6SL7GT in the input circuit. The gain of the amplifier may be adjusted by varying potentiometer (26). This control is available from the front panel (see Figure 1, Page vi). A screwdriver should be inserted in the hole labeled "GAIN CONTROL" and the control should be rotated in a clockwise direction to increase the gain.

The input circuit is designed for magnetic microphones (U. S. Signal Corps type T-34 and T-44 and British Types 25 and 26.)

One low voltage twin-beam power amplifier vacuum tube JAN-28D7 is used in the output circuit. The output circuit is designed to equal the performance of microphone type T-17. The amplifier chassis assembly is mounted on the back of the cover and wired as a unit to a plug terminal (9) as shown in Figure 2, Page 3. This plug terminal (9) engages a mating plug secured to the inside of the box and thus permits the amplifier assembly to be removed easily. The numbering of the terminals on the plug corresponds to the numbering shown on the circuit label in the amplifier box.

9. Plug PL-55

This plug serves to connect the headphones.

10. Plug PL-68

This plug serves to connect the output of Pre-Amplifier Model K-1 to associated equipment designed for T-17 operation.

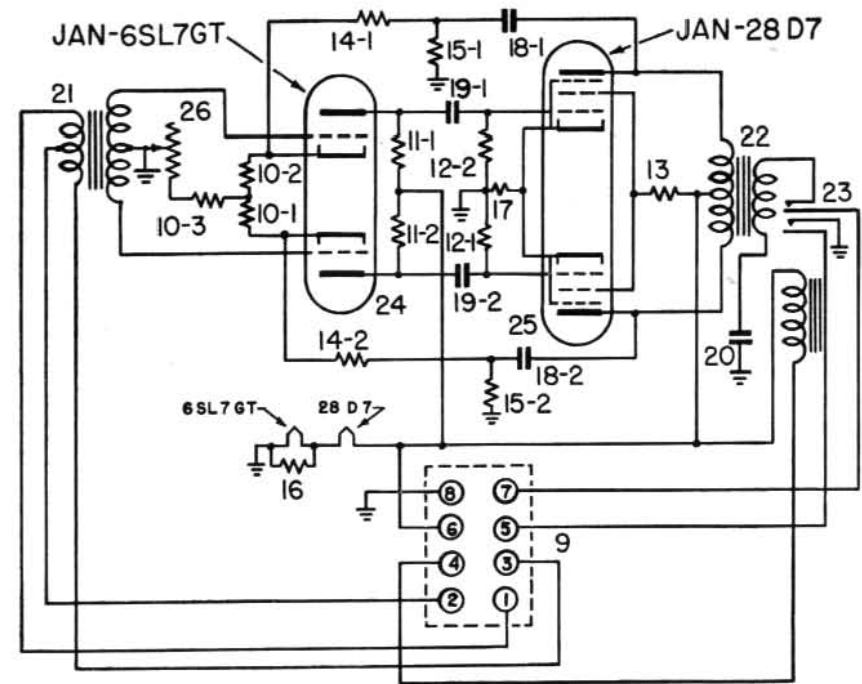


Fig. 4. Pre-Amplifier Model K-1, Schematic Diagram

1. TO MICROPHONE INPUT
2. TO INPUT TRANSF. CENTER TAP
3. TO MICROPHONE INPUT
4. TO RELAY
5. TO RELAY TRANSMITTER
6. TO B+ (H.T.)
7. TO OUTPUT
8. TO GROUND
9. CONNECTOR, male contact.
10. Resistor, fixed, 39,000 ohm, $\pm 10\%$, $\frac{1}{2}$ W. (3 req'd.)
11. Resistor, fixed, 510,000 ohm, $\pm 10\%$, $\frac{1}{2}$ W. (2 req'd.)
12. Resistor, fixed, 1 megohm, $\pm 10\%$, $\frac{1}{2}$ W. (2 req'd.)
13. Resistor, fixed, 10,000 ohm, $\pm 10\%$, $\frac{1}{2}$ W.
14. Resistor, fixed, 2 megohm, $\pm 10\%$, $\frac{1}{2}$ W. (2 req'd.)
15. Resistor, fixed, 15,000 ohm, $\pm 10\%$, $\frac{1}{2}$ W. (2 req'd.)
16. Resistor, fixed, 62 ohm, $\pm 10\%$, $\frac{1}{2}$ W.
17. Resistor, fixed, 200 ohm, $\pm 10\%$, $\frac{1}{2}$ W.
18. Capacitor, fixed, ceramic, 10,000 mmf, $\pm 20\%$, 300V. (2 req'd.)
19. Capacitor, fixed, ceramic, 750 mmf, $\pm 20\%$, 300V. (2 req'd.)
20. Capacitor, fixed, paper, 6 mfd, -5% , $\pm 50\%$, 50 V.D.C.
21. Transformer, AF, input.
22. Transformer, AF, output.
23. Relay, general purpose.
24. Socket, tube, octal.
25. Socket, tube, loctal.
26. Resistor, variable, carbon, 250,000 ohm, $1\frac{1}{2}$ W.

e. Relay (23) continuity tests comprise resistance measurement of the coil which has a nominal value of approximately 650 ohms and may be measured between coil terminals. Contact resistance may be measured between contacts and normally should be negligible when closed by light pressure.

f. Microphone Input Transformer (21)

Primary Terminals		Secondary Terminals	
1-2-3		4-5-6	
1-2.....	1.75 ohms	4-5.....	900 ohms
2-3.....	1.75 "	5-6.....	1400 "
1-3.....	3.5 "	4-6.....	2300 "

g. Audio Output Transformer (22)

Primary Terminals		Secondary Terminals	
1-2-3		4-5-6	
1-2.....	50 ohms	4-5.....	2 ohms
2-3.....	50 "	6.....	ground
1-3.....	100 "		

18. Vacuum Tubes

Two tubes are employed in Pre-Amplifier Model K-1. The functions and characteristics of the tubes required appear in the table below.

TUBE	JAN-6SL7GT	JAN-28D7
Function	Twin Triode High- μ Triode	Low Voltage Twin Beam Power Amplifier
Heater V	6.3 V.	28.0 V.
Heater A	0.3	0.400
E_p	250.0 max.	28.0 per section
I_p Ma	2.3	19.0 max.
E_g V	-2.0	-3.5
E_{sg} V	28.0 per section
I_{sg} Ma	3.0 max.
R_p ohms	44,000	4,200
G_m umhos	1,600	3,400

NOTE: These data are the characteristics of the tubes as listed commercially. Bear in mind that the best indication of tube condition is performance in the amplifier.

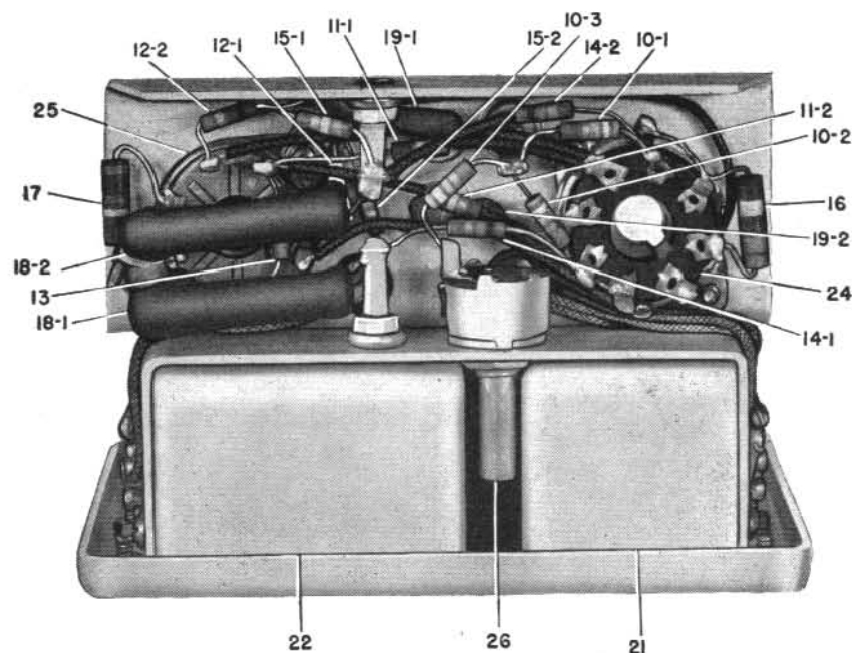


Fig. 3. Pre-Amplifier Model K-1. Cover Removed, Bottom View

11. Press to Talk Switch SW-141

This switch serves to close the relay circuit, thereby placing the amplifier and its associated equipment in operation. While only two wires are used of the three wire cordage CO-122-A, the third is provided in the event the relay is not used.

12. Shielded Twisted Pair

This cable serves to connect magnetic microphone from terminal TM-199 to amplifier input.

13. Terminal TM-199

These terminals serve to connect plug PL-55 and shielded twisted pair to associated apparatus.

SECTION IV. MAINTENANCE

14. General

Provided the component parts of Pre-Amplifier Model K-1 are properly installed and inter-connected, little or no maintenance is required.

15. Flight Inspection

This amplifier and its associated equipment should be inspected in accordance with approved inspection routines for equipment of this type.

16. Supply Voltages

Filament and plate voltages are obtained from a single 24-28 Volts D.C. source. This voltage may be checked with a voltmeter from Terminal No. 6 of the socket inside the box to ground, observing polarity. Correctness of voltage distribution in the amplifier in operation is assured by the determination of the proper values of the components and tubes and supply voltage.

17. Continuity Tests on Pre-Amplifier Model K-1

a. When difficulty is experienced with the amplifier, the vacuum tubes should be checked first. If tubes are normal, continuity tests should be made, using Test Set I-56 or equivalent for making these measurements and for checking components of the amplifier. If trouble is located in the amplifier chassis assembly it should be replaced. Cover and chassis assemblies are interchangeable.

b. Plugs PL-55 and PL-68 should be removed from their respective jacks and tubes removed from sockets when making continuity tests.

c. Check resistors at their terminals. Failure to obtain values shown on circuit label indicates a defect in the resistor.

d. Capacitors should also be checked at their terminals. Since none are shunted by resistors, a reading on the ohmmeter scale will indicate a short circuit.