



Type BA-1A
Two-Stage Preamplifier

(MI-11218-A)

RADIO CORPORATION OF AMERICA
RCA VICTOR DIVISION CAMDEN, N. J.

BROADCAST EQUIPMENT

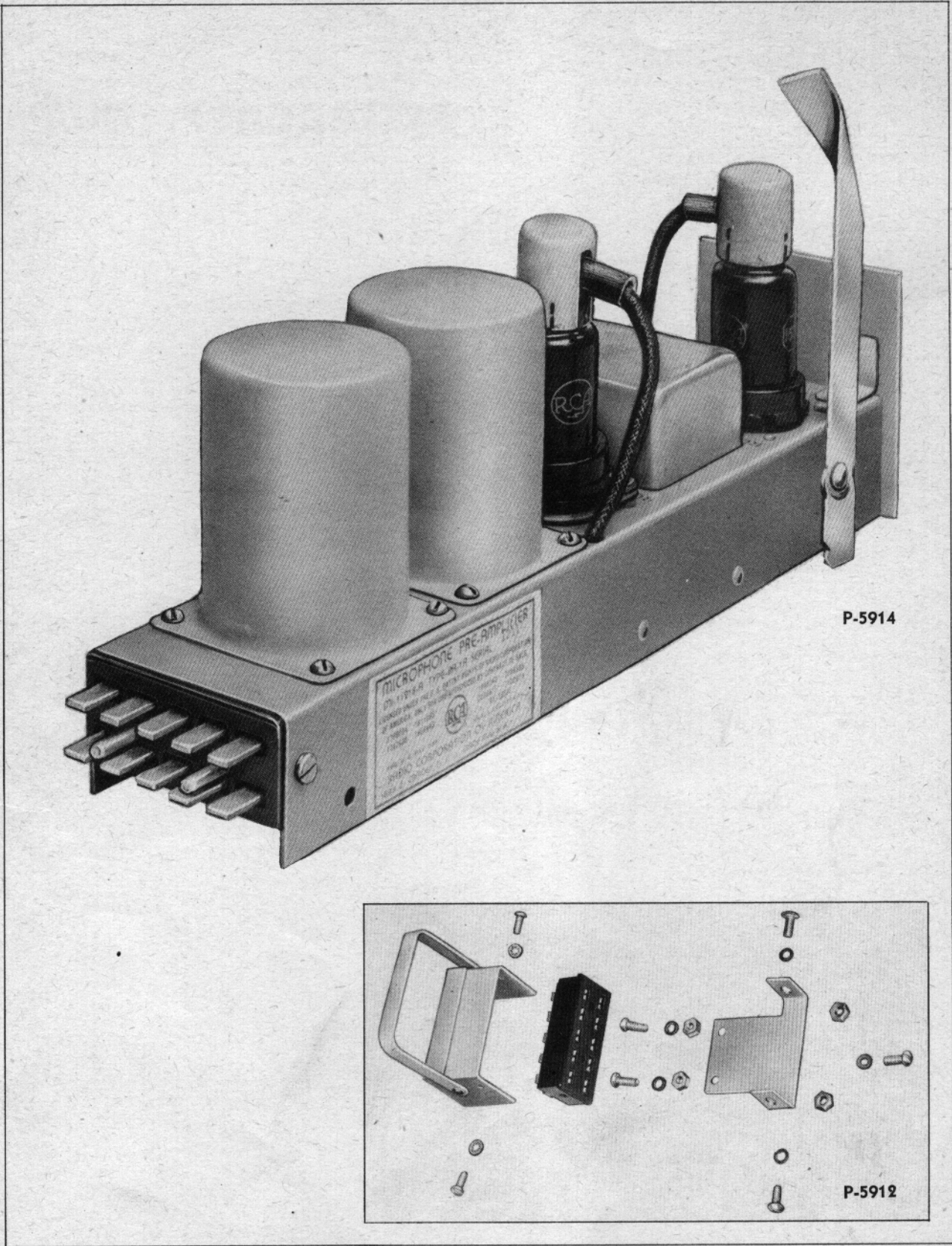
INSTRUCTIONS

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**Figure 1—Type BA-1A Preamplifier (rear view).
Inset: Adapter kit components.**

DESCRIPTION

General

1. The Type BA-1A (MI-11218-A) Preamplifier is a two-stage, resistance-capacity coupled unit, designed to operate from low-level microphones and low-impedance turntable pickups.

This amplifier may also be used as a booster amplifier by the addition of a suitable external input network and as a low-level isolation amplifier when used in conjunction with the MI-11274 Remote Volume Control, which may be obtained separately.

TECHNICAL DATA

Power Supply

Filament:
6.3 volts, 0.6 amperes, ac or dc.
Plate (maximum):
280 volts, 3.5 milliamperes, dc.
Plate (normal):
250 volts, 3.0 milliamperes, dc.
Plate (minimum):
180 volts, 2.1 milliamperes, dc.

Tubes

2 RCA 1620

When increased hum, distortion and microphonics can be tolerated the following tube complement may be substituted:

2 RCA 6J7

Gain

40 db when operating from a 250-ohm source into a 600-ohm load.
7 db when operating with bridging input into a 600-ohm load.

Source Impedance

250-ohm source. May be reconnected to operate from a 30-ohm source.

Input Impedance

Matching:

Input transformer is unloaded. Primary winding is center-tapped and the center-tap is grounded. Input impedance is higher than the source impedance for all frequencies from 30 cps to 15,000 cps.

Bridging: (MI-11274 connected)
10,000 ohms (approximate)

Maximum Input Level

Matching:

-30 dbm*

Bridging:

0 dbm* (control at maximum)†

Output Load Impedance

600 or 250 ohms

Rated Output Level and Distortion

With 280-volt plate supply:

+12 dbm* with 1.0% total rms distortion from 30 to 15,000 cps.

With 250-volt plate supply:

+10 dbm* with 0.5% total rms distortion from 50 to 15,000 cps.

+10 dbm* with 1.0% total rms distortion from 30 to 15,000 cps.

With 180-volt plate supply:

+8 dbm* with 1.0% total rms distortion from 30 to 15,000 cps.

Isolation

80 db (approximate)

Frequency Response

±1 db from 30 cps to 15,000 cps when operating from a 250-ohm source to a 600-ohm load. Refer to figure 3.

Noise Level

Total-noise level measured with 250-ohms resistance across the input terminals is 90 db or more below the rated output level of the amplifier.

Connections

10-prong plug-in connection at the rear of the chassis.

Mounting

Shelf mounting in the Type BR-2A Shelf Assembly or the Type 36-B Panel-and-Shelf Assembly.

Finish

Light umber gray.

Dimensions and Weight

Chassis dimensions:

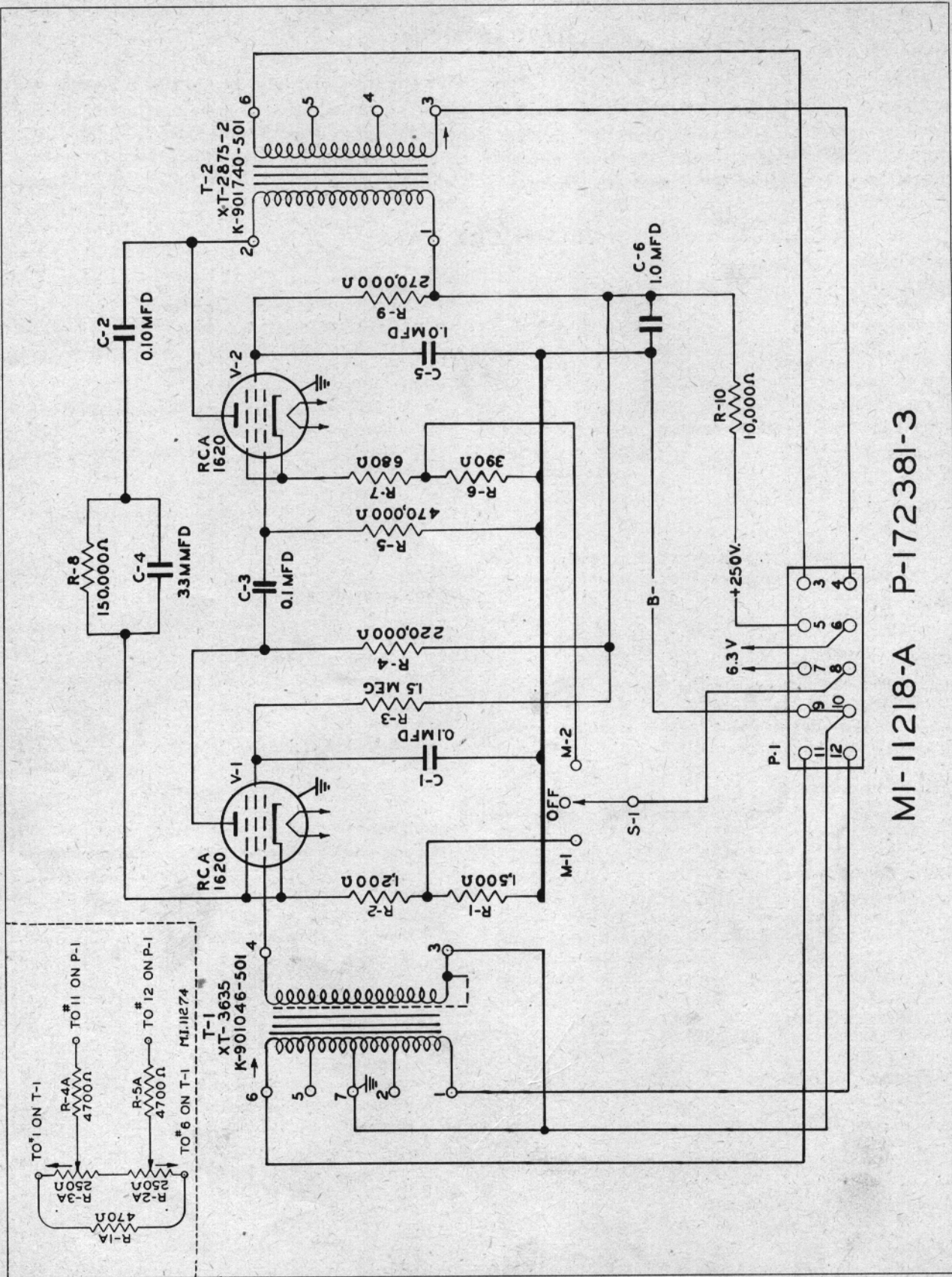
Length	11¾ inches
Width	2 7/16 inches
Height	1½ inches

Overall dimensions:

Length	13½ inches
Width	2 9/16 inches
Height	5¾ inches
Weight	4½ pounds

† Maximum permissible input level with bridging input increases with increasing loss settings of the MI-11274 Remote Volume Control.

* dbm—decibel level referred to 1 milliwatt.



MI-11218-A P-172381-3

Figure 2—Schematic diagram of Type BA-1A Preamplifier.

CIRCUIT

General

2. An input transformer, tapped for use with a 250-ohm or 30-ohm source, supplies the signal voltage to the grid of the first-stage tube. Resistance-capacity coupling is used between the two pentode-connected amplifier stages. No gain control is included in the circuit.

3. An output transformer, with tapped secondary winding, is provided to couple the second-stage tube to a 600-ohm or a 250-ohm load.

Degeneration

4. Inverse feedback from the output circuit to the first-stage tube is provided to reduce distortion, improve the frequency response, and to reduce instability caused by supply-voltage fluctuations and small variations in the characteristics of the tubes used.

INSTALLATION

Mounting

5. The Type BA-1A (MI-11218-A) Preamplifier is designed for mounting in the Type BR-2A (MI-11599) Shelf Assembly, or (in conjunction with the adapter kit furnished with each amplifier) in the Type 36-B (MI-4682) Panel and Shelf Assembly. Six preamplifiers can be installed in each of the Type BR-2A or the Type 36-B shelf assemblies. Under certain conditions it may be desirable to mount in the same shelf one or more preamplifiers in combination with a Type BA-3A Program amplifier, a Type BA-4A Monitor amplifier or a Type BX-1A Preamplifier Power

supply. Make sure that the preamplifiers are located to the left (as viewed from the front of the rack) of the other type units since this will assure a negligible increase in preamplifier noise level.

Procedure for Type BR-2A Shelf Assembly

6. Assemble the connection socket furnished with the preamplifier to one of the "U" shaped brackets supplied with the shelf assembly by means of the two fillister-head (6-32) screws furnished with the shelf assembly. Mount the socket and bracket in the correct space at the rear of the shelf using three of the 8-32 round-head machine screws and lockwashers furnished with the shelf.

7. Assemble the ejector handle to the preamplifier chassis by means of the stud, spring washer and "C" washer supplied with the preamplifier. The action of the ejector handle when inserting or removing the preamplifier will be obvious upon inspection.

Procedure for Type 36-B Panel and Shelf Assembly

8. Assemble the bracket from the adapter kit to the preamplifier so that the "U" shaped projections extend into the chassis near the connection plug. The body of the bracket will project beyond the rear of the preamplifier chassis. Fasten the bracket to the chassis with the machine screws, nuts and lock washers provided. Three 8-32 round-head-machine screws are furnished for securing the preamplifier in place on the shelf assembly. Refer to inset, figure 1.

9. A socket cover is furnished with the preamplifier which acts as a shield for the terminal connections. This cover is used when the amplifier is mounted in the Type 36-B Panel and

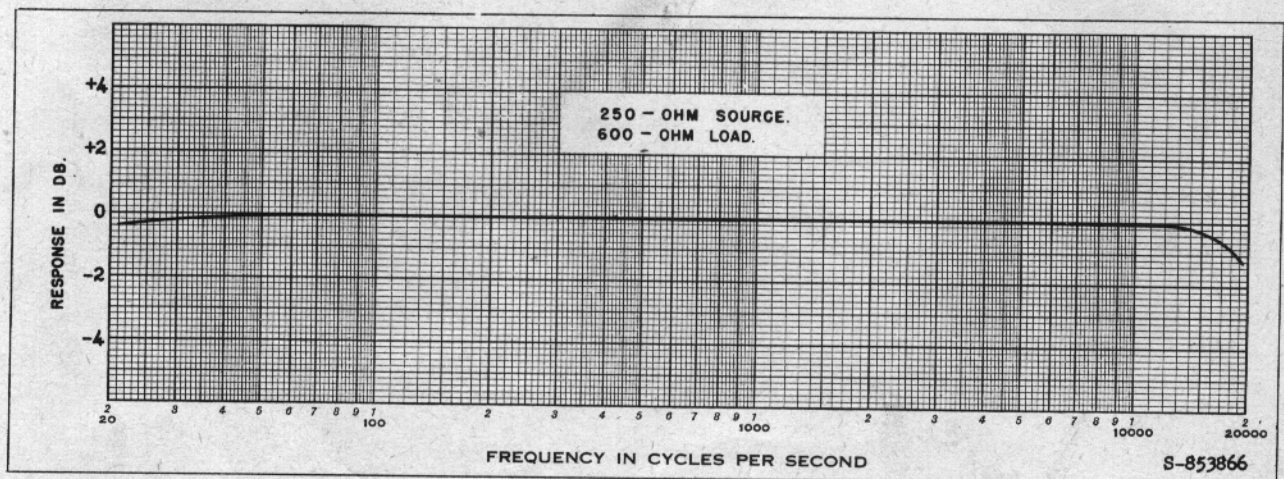


Figure 3—Normal frequency response of Type BA-1A Preamplifier.

Shelf Assembly. Figure 4 shows a typical plug-in amplifier installation on this type shelf. The style of wiring as well as the methods used for securing the wire and anchoring the resulting cable are clearly indicated.

Other Mounting Methods

10. When neither of the above shelf assemblies are available the socket with the socket cover from the adapter kit may be attached to the amplifier and the connections wired directly to the socket terminals while the unit is mounted in any convenient manner.

Input Connections

11. The BA-1A Preamplifier comes wired for operation from a 250-ohm source. If it is desired to operate from a 30-ohm source, the wiring to the taps on the primary winding of the input transformer must be changed. To do this, remove the wire connected to terminal number 6 and connect it to terminal number 5. Remove the wire connected to terminal number 1 and connect it to terminal number 2. Refer to T-1, figure 10.

Impedance Adjusting Networks

12. The Type BA-1A Preamplifier is designed with an unloaded input transformer. This type

of input circuit performs most satisfactorily when the amplifier is operating directly from microphones or low-impedance turntable pickups (for example, the Type 70-C1 and Type 70-C2 turntables). When it is desired to use the amplifier as a line booster it will be necessary to connect a resistive network ahead of the input transformer to provide a constant-impedance input. Figure 5 illustrates networks for use with balanced lines from 600-ohm and 250-ohm sources.

13. When the input circuit operates from an unbalanced source (for example, series-parallel mixers) the grounded side of the incoming line must connect to terminal number 12 of the connection socket. The resistive networks shown in figure 5 can be used with the following alterations:

a. Referring to figure 5-B, remove the lower 120-ohm resistor and replace the upper 120-ohm resistor with one of 240 ohms.

b. Referring to figure 5-C, remove the lower 60-ohm resistor and replace the upper 60-ohm resistor with one of 120 ohms.

14. It will also be necessary to make the following changes in the preamplifier wiring:

a. Remove the jumper wire connecting terminal number 3 and terminal number 7 of the input

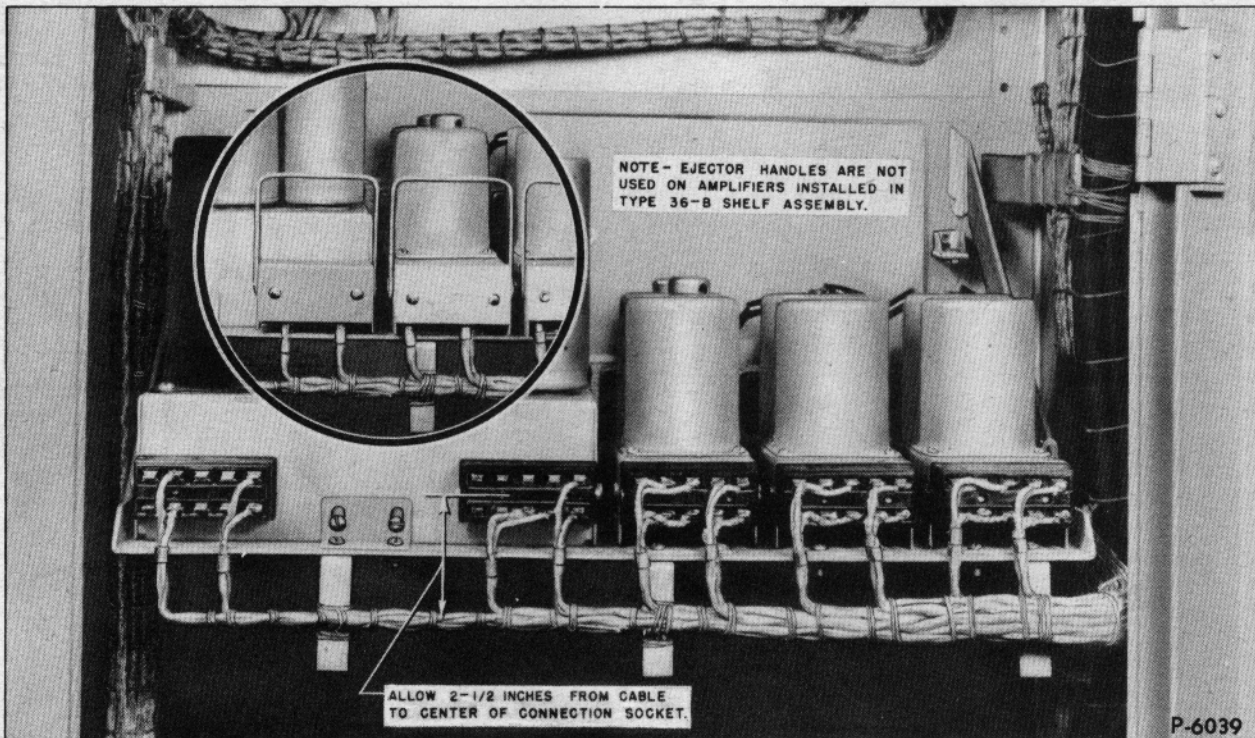


Figure 4—Mounting and wiring in Type 36-B Panel and Shelf assembly (covers removed).
Inset: Covers in place.

transformer to the ground lug (ground lug is welded to the amplifier chassis). Refer to figure 2 and figure 10.

b. Install a jumper wire connecting terminal number 3 of the input transformer to the ground lug.

c. Install a jumper wire connecting terminal number 1 of the input transformer to the ground lug. Refer to figure 2 and figure 10.

Volume Control

15. For bridging service and in applications where a volume control is desirable the MI-11274 or the MI-11274-A Remote Volume Control can be used in conjunction with this preamplifier. Use the MI-11274 if the control is to be mounted on the amplifier chassis. Refer to figure 9. To install the volume control proceed as follows:

a. Bolt the bracket of the volume control to the upper surface of the amplifier chassis near the front through the two holes provided, using the two small machine screws and nuts furnished with the control.

b. Remove the wire connecting terminal number 1 on the input transformer to terminal number 12 on the connection plug at the rear of chassis.

c. Remove the wire connecting terminal number 6 on the input transformer to terminal number 11 on the connection plug at the rear of chassis.

d. Connect the two terminals on the terminal board on the bracket of the volume control to terminals number 11 and 12 on the connection plug at the rear of the amplifier chassis, leading the wires down through the hole provided in the upper surface of the chassis. Refer to figure 9.

e. Connect the two end terminals of the dual potentiometer (these terminals have resistor R-1A connected between them) to terminals number 1 and 6 on the input transformer, leading the wires down through the same hole as in step "d." Refer to figure 9 and to the schematic in upper left corner of figure 2.

16. Bring the connections from the line to be bridged to terminals number 11 and 12 on the connection socket. Do not attempt to bridge the preamplifier across lines of higher level than +30 dbm.

Input Shielding

17. All audio leads should be shielded twisted pair copper wire, insulated for 200 volts, and need

not be larger than No. 19 A. W. G. All joints should be securely soldered. To prevent undesirable noise pickup and crosstalk, the shielding of the lines to the input terminals of the amplifier should be covered with a cotton braid or other suitable insulation and the shielding should be grounded only at the amplifier (point of lowest level). Make

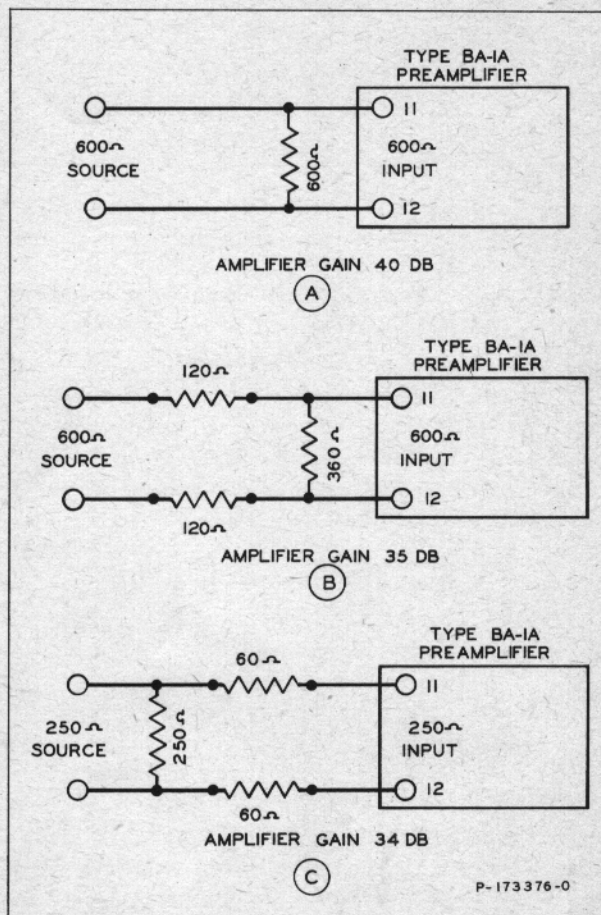


Figure 5—Preamplifier input networks.

sure that the shields are electrically continuous. Do not run the audio-input leads adjacent to, or laced in with, a-c or high-level audio lines. If the input circuits run in conduit or duct which may be subject to moisture a type of wiring having a natural or synthetic rubber covering over the shield should be used. To keep the hum level low, the heater supply circuit must also be shielded and grounded in the same manner as the input circuit.

Output Connections

18. The preamplifier comes wired for operation into a 600-ohm load. It may be reconnected to work into a 250-ohm load by changing taps on the

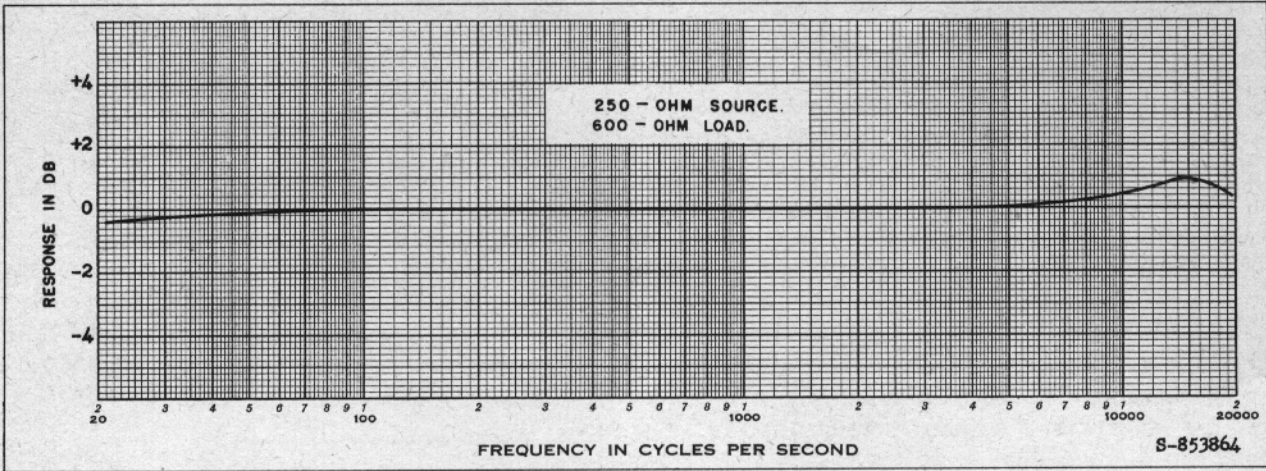


Figure 6—Frequency response with high-frequency compensation.

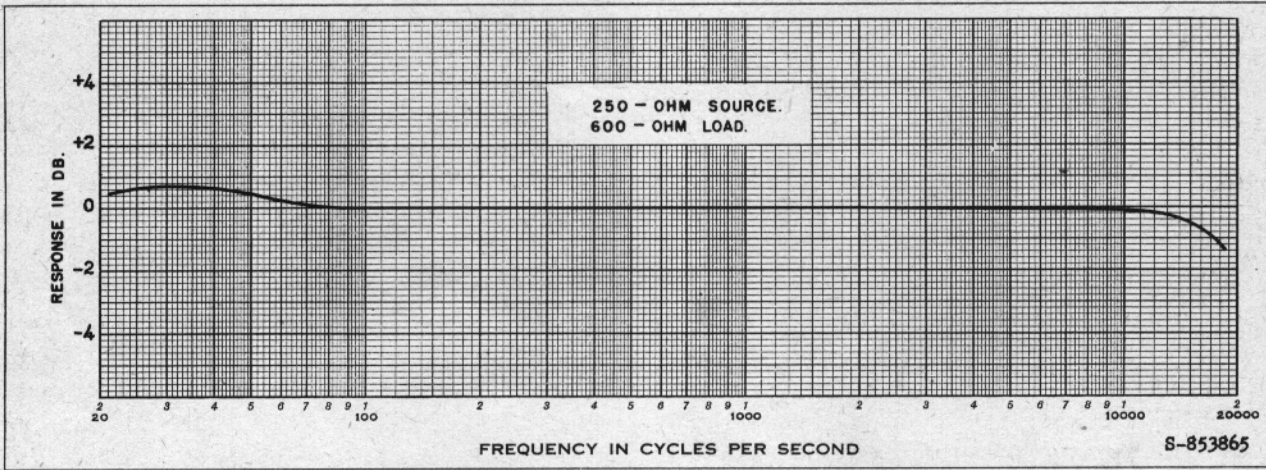


Figure 7—Frequency response with low-frequency compensation.

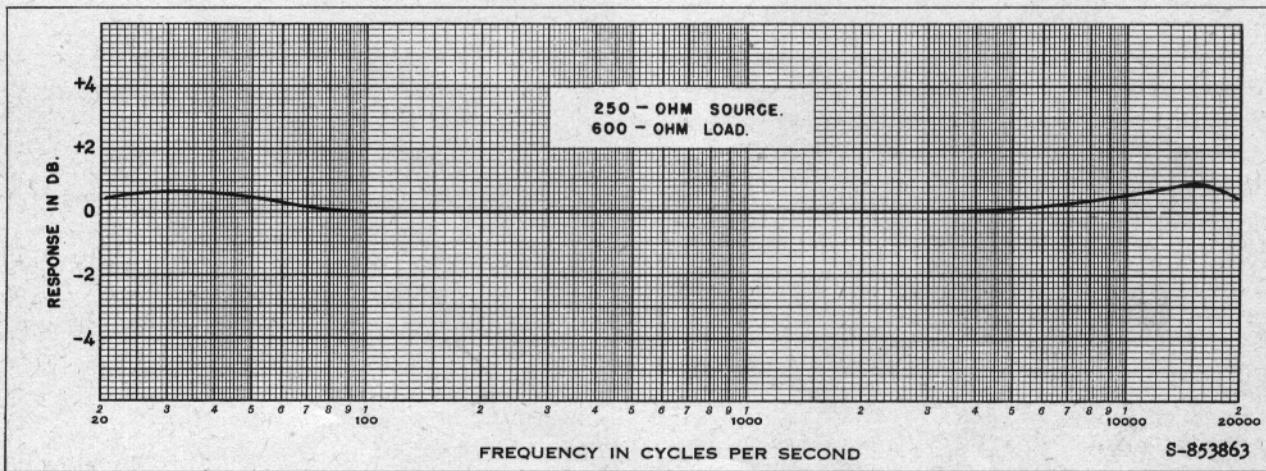


Figure 8—Frequency response with high- and low-frequency compensation.

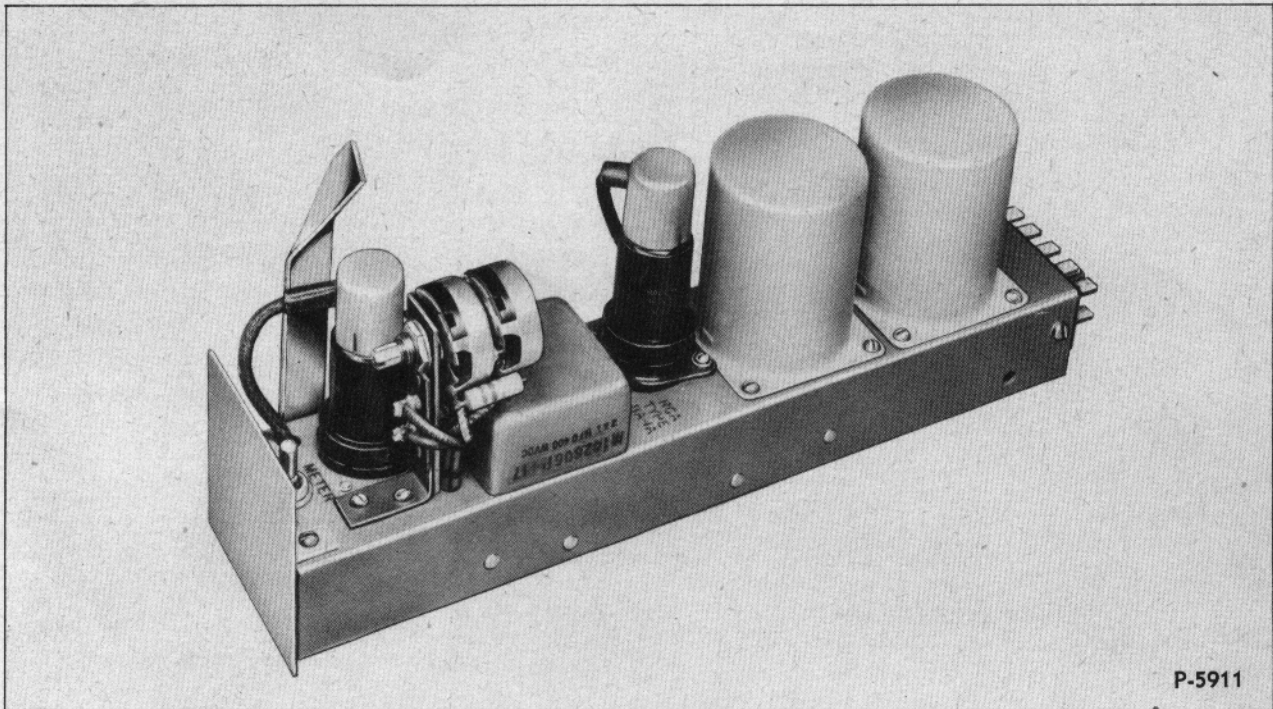


Figure 9—Type BA-1A Preamplifier with remote volume control installed.

output transformer. To make this alteration, change two wires as follows: Disconnect the wire on terminal number 6 and connect this wire to terminal number 5; Disconnect the wire on terminal number 3 and connect this wire to terminal number 4. Refer to T-2, figure 10.

Frequency Compensation

19. The frequency response curve for this preamplifier under normal operating conditions is shown in figure 3. For certain applications it may be desirable to obtain compensation in the form of a rising characteristic toward either the high-frequency or the low-frequency ends of the curve.

20. Figure 6 illustrates a curve rising toward the high-frequency end. This condition can be obtained by removing from the circuit the 33-mmF capacitor C-4. Refer to figure 2. If the 0.1-mf interstage-coupling capacitor, C-3, is changed to one of 2,200 mmF capacity, the curve shown in figure 7 will result. Both of these changes can be made at the same time and the resulting characteristic will be as shown in figure 8.

Metering

21. The three-position selector switch on the amplifier chassis can be used in conjunction with the Type 15-D (MI-4388 or MI-4388-A) Metering Panel to conveniently check the operation of

the tubes. Circuit arrangement is such that, with the tubes operating normally, the meter will read approximately 1 volt. Center position of the switch handle is OFF. Left position checks the first stage tube and right position checks the second stage tube. When the 15-D Metering Panel is not available any suitable voltmeter having an internal resistance of 20,000 ohms-per-volt or higher can be used. Connect the positive terminal of the meter to terminal number 8, and the negative terminal of the meter to terminal number 9 on the connection socket.

Power Supply

22. The BA-1A Preamplifier is designed for use with the Type BX-1A Preamplifier Power Supply (MI-11305), which supplies both heater current and plate voltage. A maximum of six preamplifiers can be supplied from one power supply. A voltage adjustment is provided on the Preamplifier Power Supply (see R-2) which regulates the plate-supply voltage to the preamplifiers. Check the plate-supply voltage with a d-c voltmeter at the connection socket of the preamplifier to make sure of the correct value.

Noise Adjustment

23. A hum-balancing potentiometer (R-1) is provided on the Type BX-1A Preamplifier Power

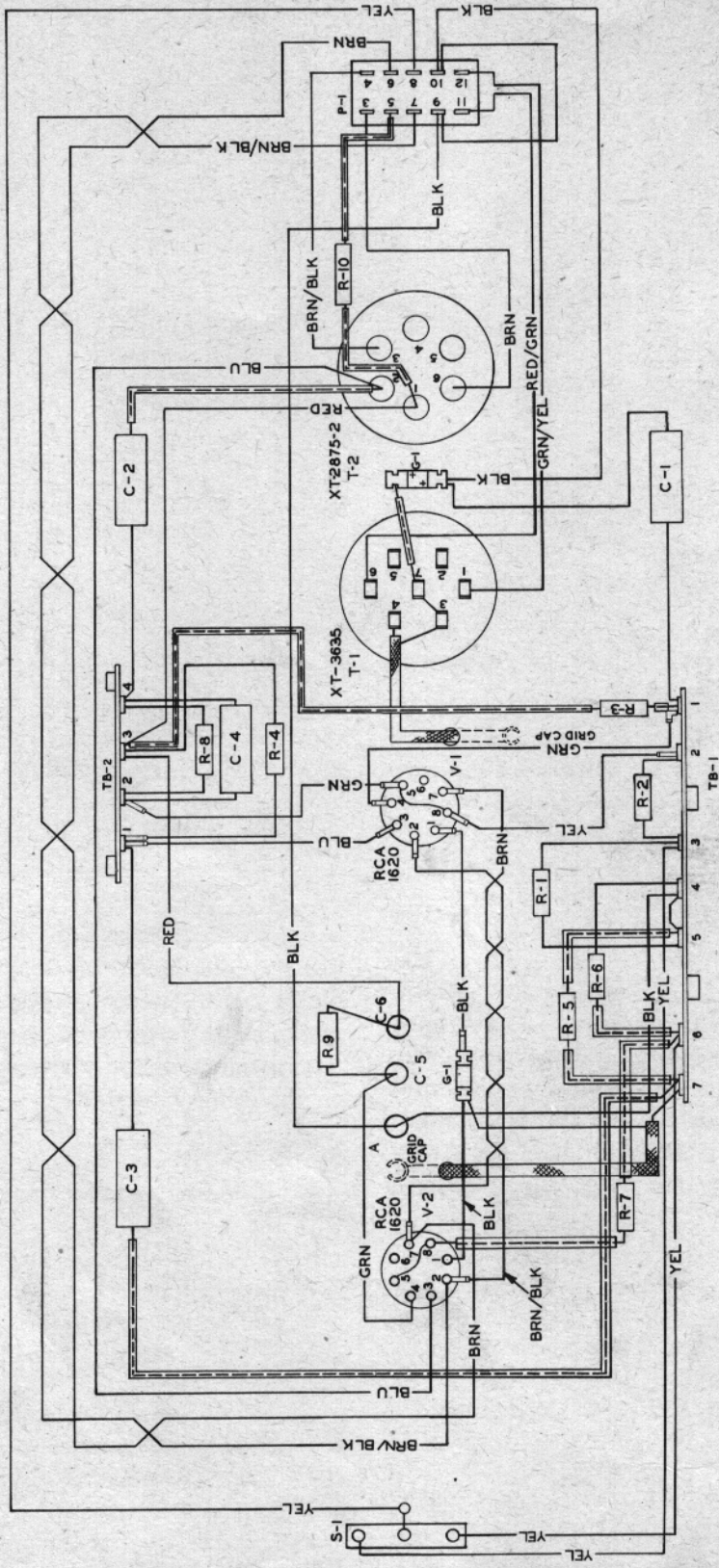


Figure 10—Wiring diagram for Type BA-1A Preamplifier.

Supply. Make sure to adjust this control to the point of minimum noise and hum after all connections have been made.

Alternate Power Supply

24. When the Type BX-1A Power Supply is not available, the MI-11302 or the MI-11302-A Power Supplies can, with a slight wiring change, be used as an alternate. Figure 11 illustrates the alterations required. Connect a 470-ohm, 1-watt resistor between resistor R-2 and ground. Remove the wire connecting the arm of potentiometer R-3 to ground. Run a wire from the arm of R-3 to the junction of the new resistor and R-2. Refer to figure 11.

Wiring Connections

25. All connections to the amplifier enter the chassis through the ten-prong plug on the rear of the chassis. Connections to the socket which mates with the plug on the chassis are shown in the following table:

SOCKET CONNECTIONS

No. 3—Output (low).	No. 8—Test meter (+).
No. 4—Output (high)	No. 9—B -.
No. 5—B+ (plate supply).	No. 10—input center tap.
No. 6—6.3 volts ac or dc.	No. 11—input (high).
No. 7—6.3 volts ac or dc.	No. 12—input (low).

MAINTENANCE

General

26. The care of the Type BA-1A Preamplifier should include the usual precautions observed in the maintenance of high-quality, low-level equipment. Do not allow dust or dirt to accumulate on the equipment. Perform the following operations at regular intervals:

- a. Check the tubes for normal characteristics. Label each tube, indicating condition and length of service.
- b. Clean the tube prongs and tube sockets.
- c. Keep the prongs of the amplifier connection plug clean.

Voltage and Current Values

27. In the following table are shown the voltage and current values for a typical amplifier operating under normal conditions. Use a meter having an internal resistance of 20,000 ohms-per-

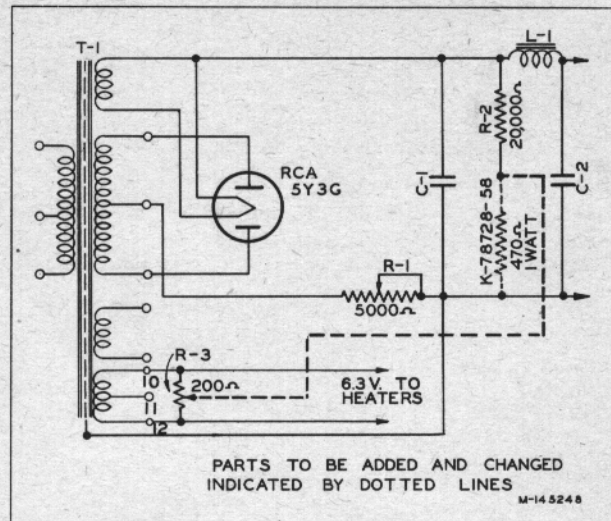


Figure 11—Alterations in MI-11302 and MI-11302-A Power Supply.

volt or higher when reading values of voltage shown.

VOLTAGE AND CURRENT VALUES

B + voltage	250 volts
Total plate current	3.0 milliamperes

	First stage	Second stage
Plate voltage	114 volts dc	220 volts dc
Screen voltage	44 volts dc	84 volts dc
Grid bias voltage	1.5 volts dc	2.5 volts dc
Filament voltage	6.3 volts ac or dc	6.3 volts ac or dc
Plate current	0.5 milliamperes	1.9 milliamperes
Screen current	0.1 milliamperes	0.5 milliamperes

CAUTION: Make sure that the grid-cap shields for both first and second stage tubes are in place whenever the amplifier is operating. The shield must make good electrical connection to the shell of the tube to insure noise-free operation.

Replacement Parts

28. The following parts list is included to provide identification when ordering replacement parts. Order from RCA Replacement Parts Department, Camden, New Jersey, giving Stock Number and Description of the parts wanted. Replacement parts supplied may be slightly different in form or size from the original parts but will be completely interchangeable with them.

LIST OF PARTS

<i>Symbol No.</i>	<i>Description</i>	<i>Stock No.</i>	<i>Symbol No.</i>	<i>Description</i>	<i>Stock No.</i>
C-1, -2, -3	Capacitor, 0.1 mf, 300 volt	30848	T-1	Transformer, Input (XT-3635)	43569
C-4	Capacitor, 33 mmf, 500 volt	39616	T-2	Transformer, Output (XT-2875-2)	50346
C-5, -6	Capacitor, dual, 1-1 mf, 400 volt	50352	....	Cap, Tube-shield	12110
R-1	Resistor 1,500 ohm, 1/2 watt	30654	....	Plug, connection, 10-contact male	48788
R-2	Resistor, 1,200 ohm, 1/2 watt	30731	....	Socket, connection, 10-contact female	49032
R-3	Resistor, 1,500,000 ohm, 1/2 watt	31449	....	Socket, Tube (for V-1)	28413
R-4	Resistor, 220,000 ohm, 1/2 watt	14583	....	Socket, Tube (for V-2)	31319
R-5	Resistor, 470,000 ohm, 1/2 watt	30648	....	Handle, Ejector, with mounting stud	52403
R-6	Resistor, 390 ohm, 1/2 watt	30498	....	Washer, Spring (for ejector handle stud)	8078
R-7	Resistor, 680 ohm, 1/2 watt	12262	....	Washer, "C" (for ejector handle stud)	2917
R-8	Resistor, 150,000 ohm, 1/2 watt	30493			
R-9	Resistor, 270,000 ohm, 1/2 watt	30651			
R-10	Resistor, 10,000 ohm, 1/2 watt	3078			
S-1	Switch, toggle, SPDT (center position OFF)	50351			

