BROADCAST AUDIO EQUIPMENT

Type BA-11A Preamplifier

RADIO CORPORATION OF AMERICA
ENGINEERING PRODUCTS DEPARTMENT CAMDEN, N. J.

IB-24710-1

INSTRUCTIONS FOR

Preamplifier

Type BA-11A

MI-11231

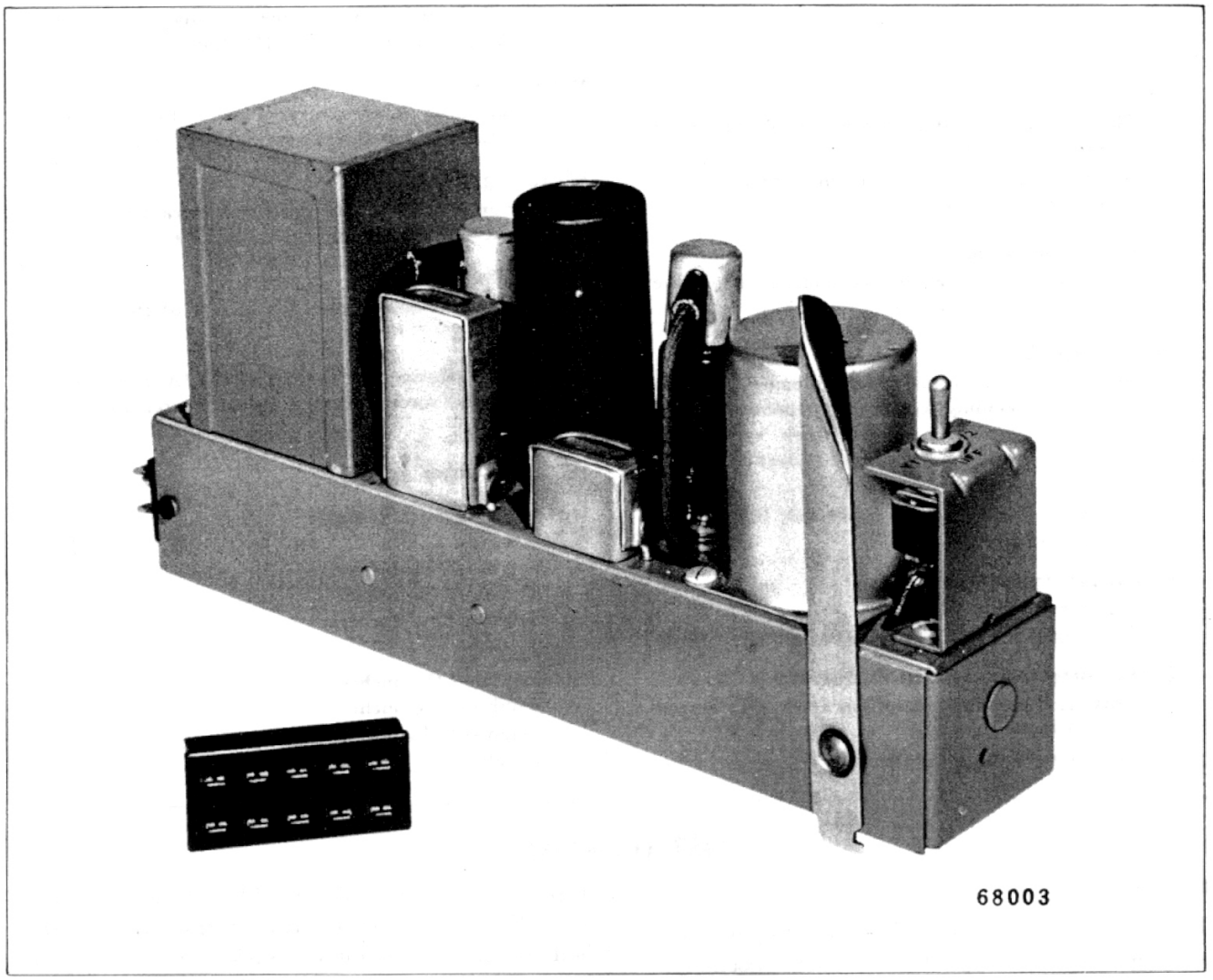

Figure 1—Type BA-11A Preamplifier

DESCRIPTION

The Type BA-11A Preamplifier, MI-11231, is a two-stage, plug-in, resistance-capacity coupled unit, designed to operate from low-level microphones and low impedance pickups. With an additional bridging gain control, this unit may also be used as a booster or isolation amplifier. The MI-11278-C,-D remote volume and bridging gain controls may be obtained separately.

Circuit

The input transformer T-1, tapped for use with a 150-ohm or 30-ohm source, supplies the signal voltage to the grid of the first stage tube. Resistance capacity coupling is used between the first and second stages. No gain control is included in the circuit.

An output transformer with split winding for 600/150 ohm output is provided to couple the second stage tube to a 600 or 150-ohm load. 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.

TECHNICAL DATA

Power Supply

Heater: 6.3 v, 0.6 amperes ac or dc; biased approximately 20 v positive with respect to B–

Plate: 285 volts, 6.75 ma dc

MI-11305-D Power Supply will furnish power to 7 preamplifiers

Tubes

2 RCA 1620

Gain

40 db ±1 db operating from a 150/30-ohm source into a 600/150-ohm load

4 db operating with bridging input into a 600/150-ohm load

Source Impedance

150-ohm source; may be reconnected to operate from a 30-ohm source

Input Impedance

Matching: Input transformer unloaded; primary winding center-tap grounded; input impedance higher than source impedance for all frequencies from 30 cps to 15000 cps

Bridging: MI-11278-C, -D connected; 10,000 ohms approximate

Maximum Input Level

Matching: –22 dbm ±1 db

Bridging: 12 dbm (control at maximum) ±2 db

Rated Output Level and Distortion

Total rms harmonic distortion at 18 dbm output

50 to 15,000 cps 0.5%

Less than 50 to 30 cps 1%

Output Load Impedance

150 or 600 ohms

Isolation

80 db approximate

Frequency Response

±1 db from 30 cps to 15,000 cps, operating from 150-ohm source to 600/150 line

Noise Level

Total noise level measured with 150-ohm resistance across input terminals –83 dbm

Metering

Nominal metering voltage 1 volt, measured with external 20,000-ohm-per-volt meter

Connections

10-prong plug-in connection at rear of chassis

Mounting

Shelf mounting on the Type BR-2A Shelf Assembly, accommodating up to 6 preamplifiers

Finish

Light umber gray

Dimensions and Weight

Chassis:

Length—11¾ inches

Width —2 7/16 inches

Height—2 1/16 inches

Overall:

Length—12¾ inches

Width —2 9/16 inches

Height—5 13/16 inches

Weight—5¾ pounds

INSTALLATION

Mounting

The Type BA-11A Preamplifier is designed for mounting with the Type BR-2A Shelf Assembly. Under certain conditions it may be desirable to mount on the same shelf one or more preamplifiers in combination with a Type BA-13A Program Amplifier, a Type BA-14A Monitor Amplifier, or a Type BX-1E Preamplifier Power Supply. For such a combination 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 the least increase in preamplifier noise level.

Mounting Type BR-2A Shelf Assembly

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 fillisterhead (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. This shelf will accommodate a maximum of six preamplifiers.

Input Connections

The Type BA-11A Preamplifier is shipped wired for operation from a 150-ohm balanced source. If it is desired to operate from a 30-ohm balanced source, the wiring to the taps on the primary winding of the input transformer T-1 must be changed. To do this, remove the wire connected to terminal 6 and connect it to terminal 5. Remove the wire connected to terminal 1 and connect it to terminal 2.

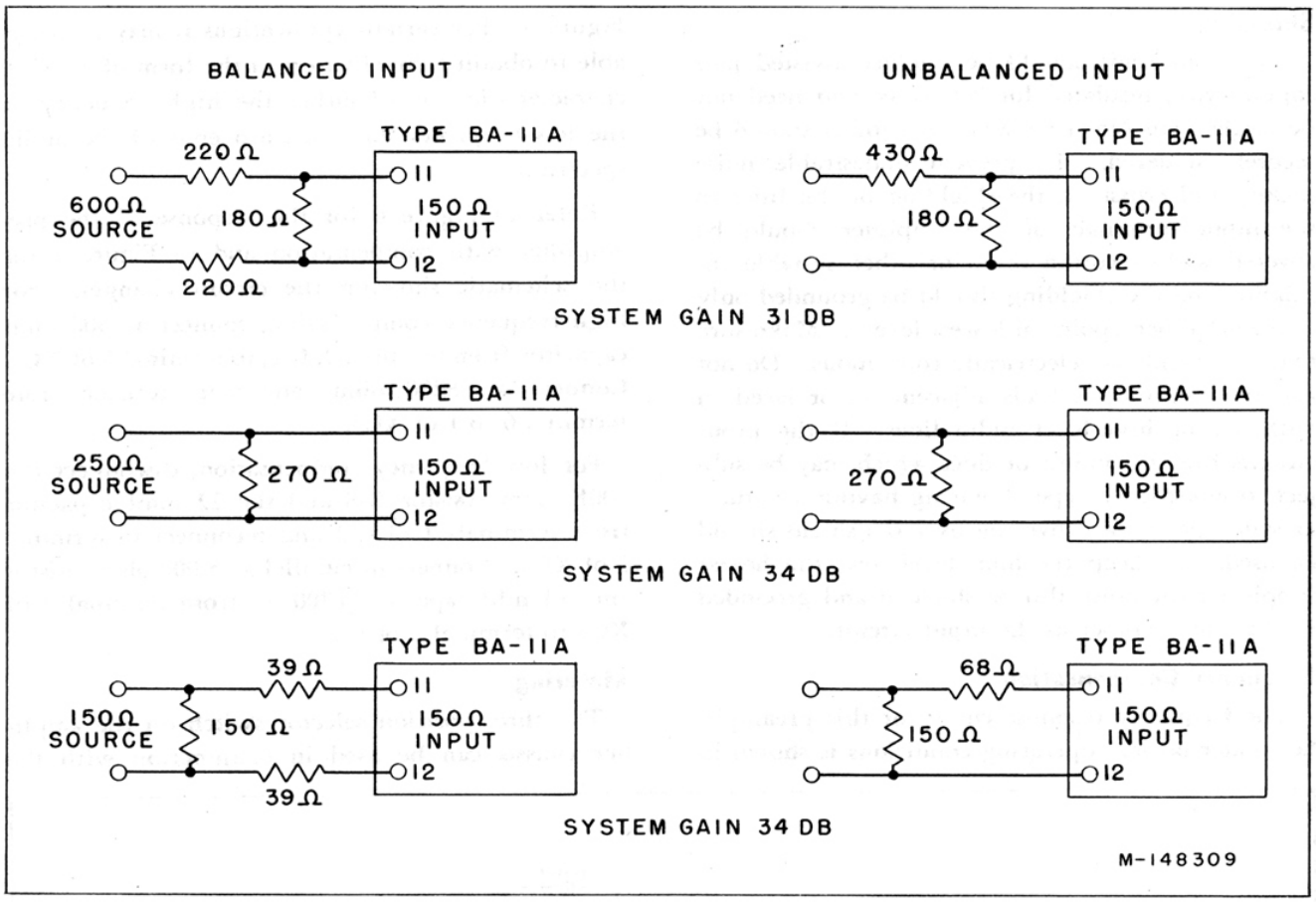

Figure 2—Preamplifier Input Networks

When the amplifier operates from an unbalanced source such as series parallel mixers, or pick-up filters, the grounded side must be connected to terminal 12 of the connection socket. Remove wire #6 from terminal 7 of T-1 and connect it to terminal 1 of T-1 when operating from a 150-ohm source, or to terminal 2 when operating from a 30-ohm source. Refer to Figures 3 and 4.

Impedance Adjusting Networks

The Type BA-11A Preamplifier is designed with an unloaded input transformer. This type of input circuit is for operation directly from microphones or low-impedance turntable pickups; for example the Type 70-C and Type 70-D 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 2 illustrates networks for use with balanced and unbalanced lines from 600-ohm, 250-ohm and 150-ohm sources.

Volume Control

For bridging service and in applications where a volume control is desirable the MI-11278-C or the MI-11278-D Remote Volume Control can be used in conjunction with this preamplifier. Use the MI-11278-D if the control is to be mounted on the amplifier chassis. To install the volume control on the chassis, proceed as follows:

1. Remove the plug button from the front of the preamplifier chassis. See Figure 1.

2. Mount the control behind the chassis front section. Align the control shaft with the center hole and the guide pin with the smaller hole to install the control in the correct position.

3. Secure the control on the outside with the lockwasher and nut supplied with the control.

When the preamplifier is mounted on the Type BR-2A Shelf Assembly, the screwdriver adjustment is made accessible by removing the front panel. Refer to IB-24734 for wiring instructions.

Output Connections

The preamplifier comes wired for operation into a 600-ohm load. It may be reconnected to work into a 150-ohm load by changing the jumper on the output transformer. Remove the jumper from terminals 12 and 13 on the transformer T-2. Install a jumper between terminals 11 and 12 and between terminals 13 and 15.

Shielding

All audio leads should be shielded twisted pair copper wire, insulated for 200 volts, and need not be larger than No. 19 AWG. 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 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.

Frequency Compensation

The frequency response curve for this preamplifier under normal operating conditions is shown in Figure 5. 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 or both ends of the audio spectrum.

Refer to Figure 6 for the response of the preamplifier with compensation and to Figure 7 for the schematic showing the circuit changes. For high frequency compensation, connect a 1500 mmf capacitor from terminal 2, C-1, to terminal 6 of XC5. Connect an 8200 ohm, one watt resistor from terminal 6 to 1 of XC5.

For low frequency compensation, disconnect the 100K ohm resistor R-8 and the 22 mmf capacitor from terminals 1 of C-2 and reconnect to terminal 2 of XC5. Connect in parallel a 15,000-ohm resistor and 0.1 mfd capacitor (200 v) from terminal 2 of XC5 to terminal 1 of C-2.

Metering

The three-position selector switch on the amplifier chassis can be used in conjunction with the

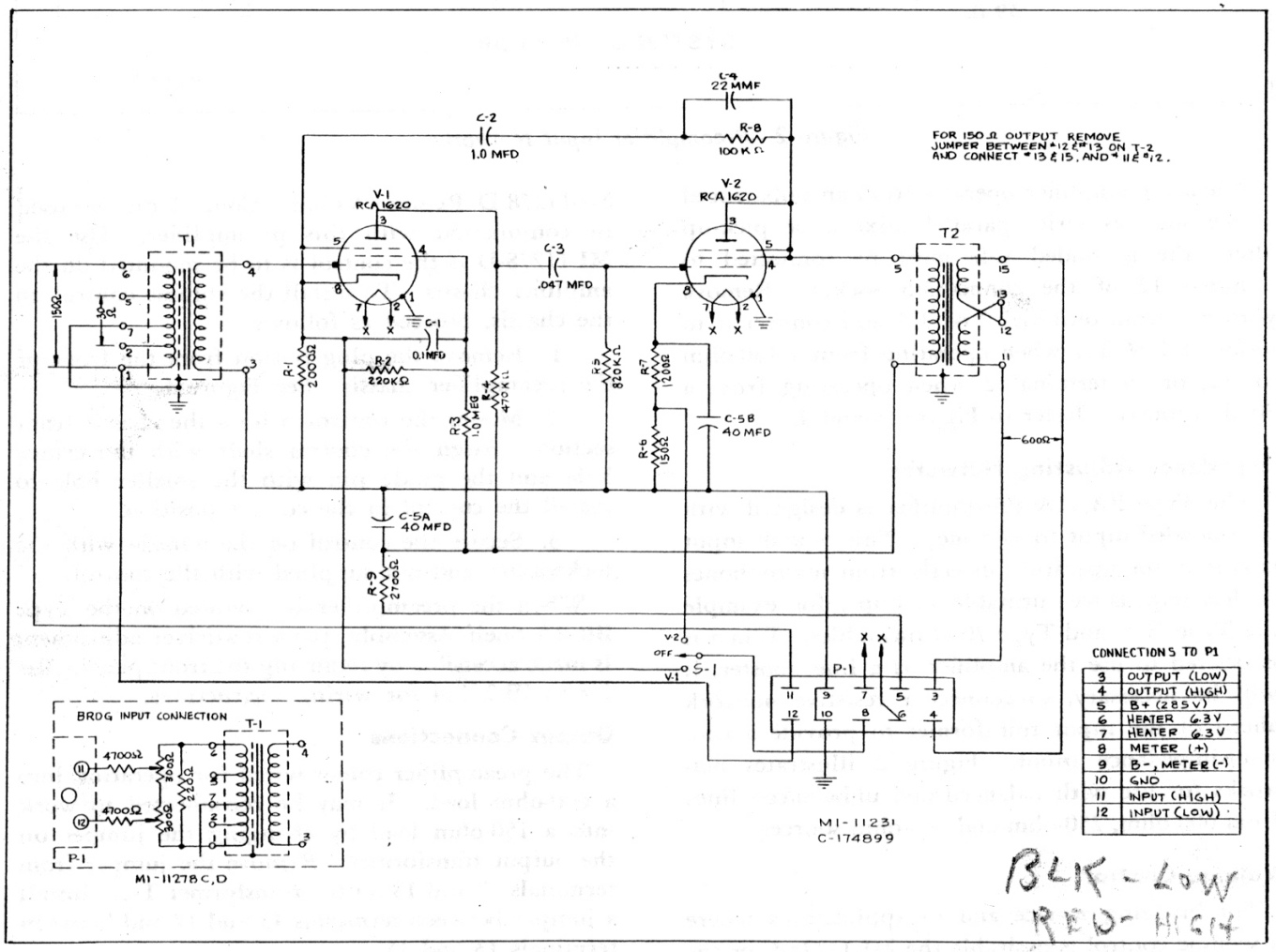

Figure 3—Schematic Diagram

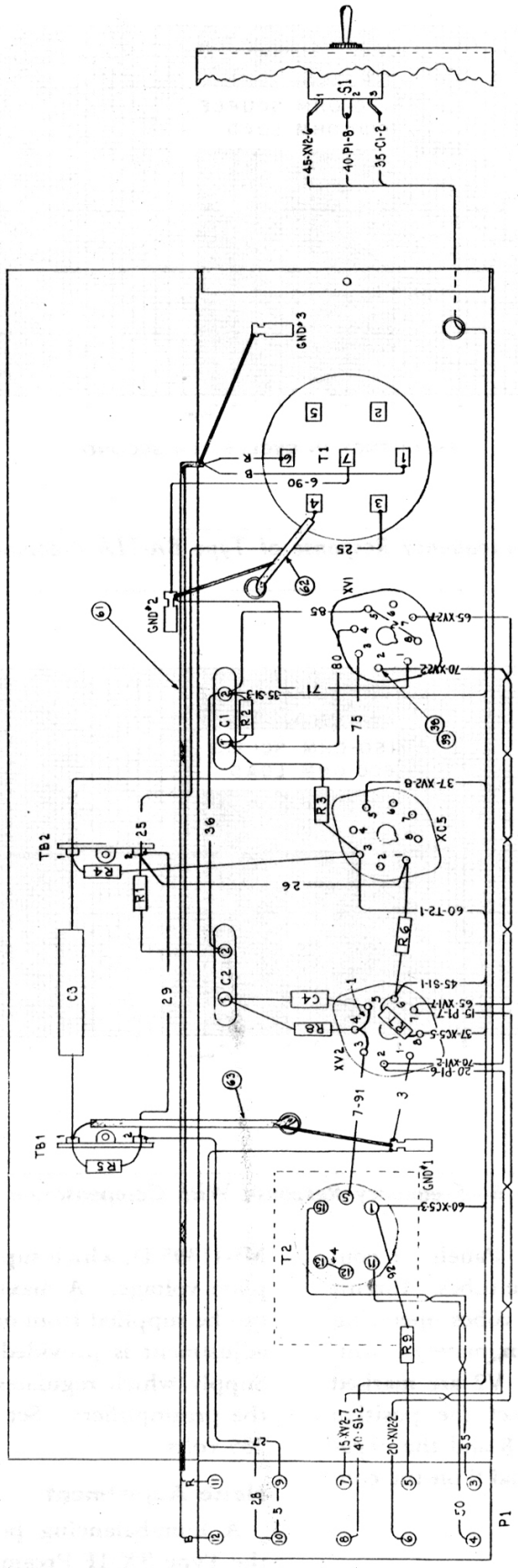

Figure 4—Wiring Diagram

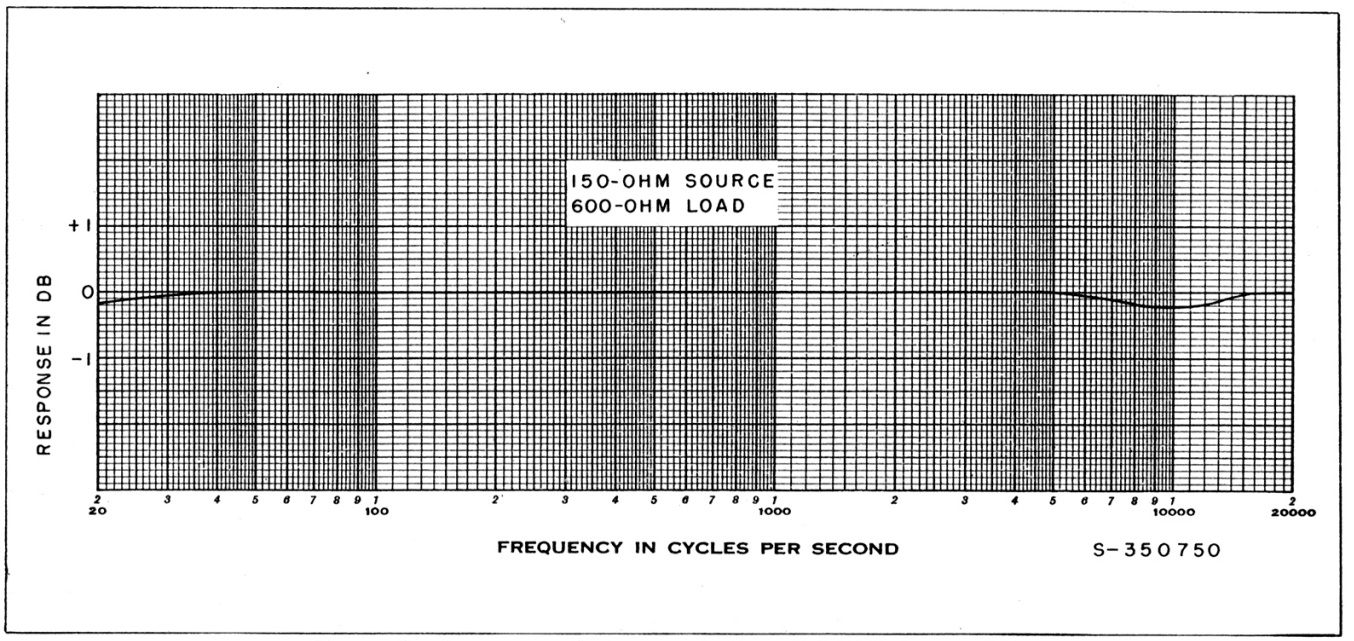

Figure 5—Frequency Response of Type BA-11A Preamplifier

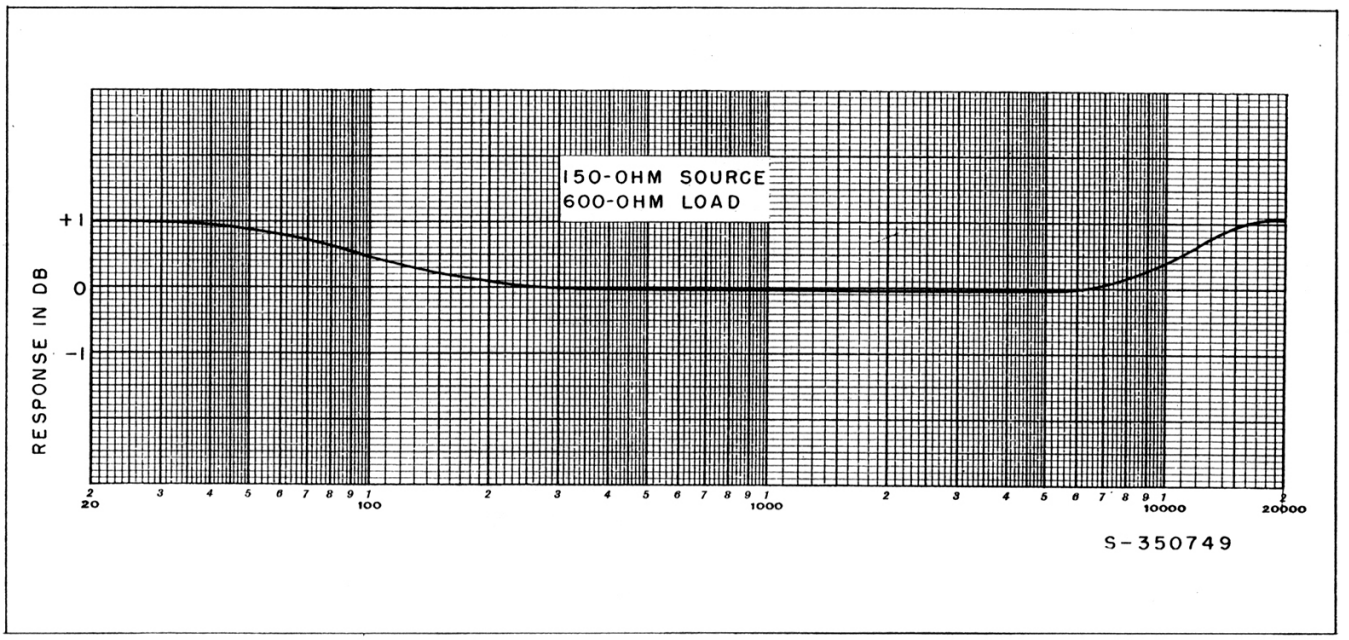

Figure 6—Frequency Response With Compensation

Type BI-1A and BI-2A, Metering Panels 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. The switch positions V1, OFF and V2 are marked on the mounting bracket. Connect the positive terminals of the meter to terminal 8 and the negative terminal of the meter to terminal 9 on the connection socket.

Power Supply

The BA-11A Preamplifier is designed for use with the Type BX-1E Preamplifier Power Supply, MI-11305-D, which supplies both heater current and plate voltage. A maximum of seven preamplifiers can be supplied from one power supply. A voltage adjustment is provided on the Preamplifier Power Supply which regulates the plate-supply voltage to the preamplifiers. Set the plate-supply voltage for 285 volts.

Noise Adjustment

A hum-balancing potentiometer is provided on the Type BX-1E Preamplifier Power Supply. Make sure to adjust this control to the point of minimum noise and hum after all connections have been made.

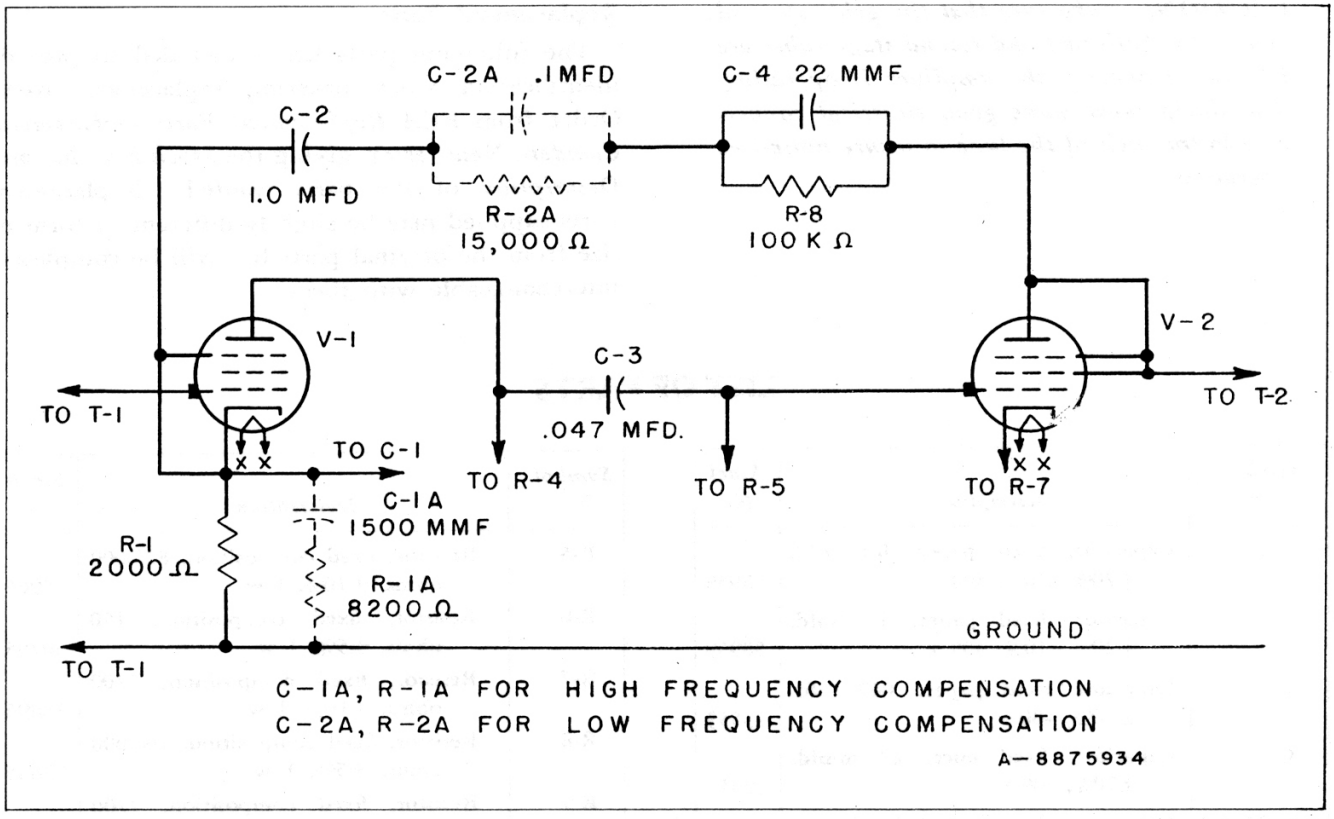

Figure 7—Partial Schematic Diagram Showing Changes For Compensation

Wiring Connections

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 P-1 on the chassis are shown in the following table:

Socket Connections to P-1	
No. 3 Output (low)	No. 8 Test meter (+)
No. 4 Output (high)	No. 9 B , Test meter (-)
No. 5 B+ (plate supply +285 v)	No. 10 Ground
No. 6 6.3 volts heater	No. 11 Input (high)
No. 7 6.3 volts heater	No. 12 Input (low)

MAINTENANCE

Cleaning

The care of the Type BA-11A 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:

1. Check the tubes for normal characteristics. Label each tube, indicating condition and length of service.
2. Check the electrolytic plug-in capacitor.
3. Clean the tube prongs and tube sockets.
4. Keep the prongs of the amplifier connection plug clean by moving the amplifier in and out of the socket several times.

Voltage and Current Values

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-volt or higher.

Voltage and Current Values	
B+ voltage	285 volts
Total plate current	6.75 milliamperes
Heater voltage	6.3 volts
Heater current	0.6 ampere

	First Stage V-1	*Second Stage V-2*
Plate to gnd	80 volts	256 volts
Screen to gnd	28 volts	——
Cathode to gnd	1.15 volts	8.22 volts
Plate Current	.36 ma	6.1 ma
Screen Current	.094 ma	——
Metering Voltage	1.15 volts	.95 volts

CAUTION: Make sure that the grid-caps and 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

The following parts list is included to provide identification when ordering replacement parts. Order from *RCA Replacement Parts Department, Camden, New Jersey,* giving the *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

Symbol No.	*Description*	*Stock No.*
C-1	Capacitor, fixed paper, 0.1 mfd, +20% −10%, 400 v	58958
C-2	Capacitor, fixed paper, 1.0 mfd, +20% −10%, 400 v	58959
C-3	Capacitor, fixed paper, .047 mfd, ±10%, 400 v	73553
C-4	Capacitor, fixed mica, 22 mmfd, ±10%, 500 v	39612
C-5A, 5B	Capacitor, dry electrolytic, 2 sections, 40 mfd, −10% +50%, 450 v, 40 mfd, −10% +250%, 25 v (plug-in type)	58960
P-1	Plug, output, 10 contacts (male)	48788
R-1	Resistor, wire wound, 2000 ohms, ±5%, 1 w	58961
R-2	Resistor, fixed composition, 220,000 ohms, ±10%, 1 w	54449
R-3	Resistor, fixed composition, 1 meg, ±10%, 1 w	71993
R-4	Resistor, fixed composition, 470,000 ohms, ±10%, 1 w	72521
R-5	Resistor, fixed composition, 820,000 ohms, ±10%, 1 w	58965
R-6	Resistor, fixed composition, 150 ohms, ±5%, 1 w	30785
R-7	Resistor, fixed composition, 1200 ohms, ±10%, 1 w	38896
R-8	Resistor, fixed composition, 100,000 ohms, ±5%, 1 w	72635
R-9	Resistor, fixed composition, 2700 ohms, ±10%, 1 w	14421
S-1	Switch, toggle, S.P.D.T., center OFF	59326
T-1	Transformer, audio input; turns ratio, 1:46 and 1:20.5	58962
T-2	Transformer, audio output	58963
XV-1	Socket, tube, 8 contacts	28413
XV-2	Socket, tube, 8 contacts	31319
XC-5	Socket, capacitor, 8 contacts	45368
	Handle, ejector	52403
	Grommet	92719
	Receptacle, 10 contact (female)	49032
	Cap, tube shield	12110

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