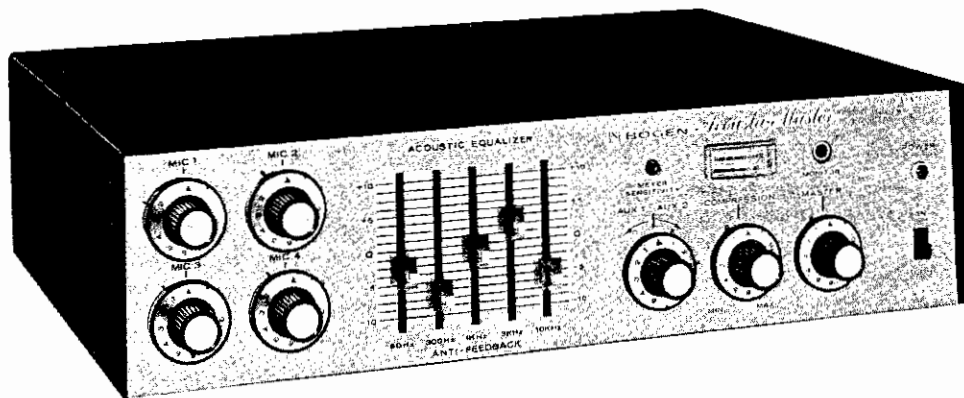


BOGEN®

ACOUSTA-MASTER PREAMPLIFIER MODEL CTM



INSTALLATION AND OPERATING MANUAL

Read Carefully Before Operating Equipment

DESCRIPTION

The Bogen Acousta-Master Model CTM Preamplifier is a silicon transistor preamp-mixer unit designed for high-quality sound systems. The preamplifier provides four high-impedance inputs, each convertible for use with low-impedance microphones by means of appropriate plug-in transformer accessories. Microphone precedence and remote control are provided for two of these channels. There are also two auxiliary inputs with a fader control.

This preamplifier model features the Bogen built-in acoustic equalizer filter circuit, which provides a means of boosting or attenuating any of five selected frequencies to suit individual room acoustics. Front panel slide controls provide the precise equalization needed to eliminate feedback or improve intelligibility and thereby improve the system performance.

Another special feature of this preamplifier is the electronic compressor limiter control, which provides uniform output regardless of wide variations in the input level. With this capability, all paging calls can be transmitted with the same volume and clarity, regardless of which operator does the paging and how far away she holds the paging microphone. The operation of these controls is described below.

Other front panel controls include four individual MIC volume controls, AUX fader, and MASTER volume control. In addition, an output level meter, a meter sensitivity control and a monitor headphone jack are located on the front panel.

The CTM provides a 500/600-ohm as well as a 150-ohm balanced or unbalanced output and an unbalanced high-impedance output. There is also a high-impedance bridging output and high-level tape output, which are unaffected by the equalizer controls.

Bogen accessories provide the preamplifier unit with telephone line connections, remote volume control, and microphone precedence facilities. Further information is contained in the Accessory section on page 9.

The preamplifier operates from a 105-125 volt, 50/60 Hz line or from a 24-28 vdc power source. A three-prong line cord provides automatic grounding when connected to a three-wire power outlet.

SPECIFICATIONS

POWER OUTPUT: 6 V into HI Z; 6 V into 500/600 Ω .
FREQUENCY RESPONSE: ± 2 db from 20 Hz to 20 kHz.
SENSITIVITY: HI Z MIC, 3 mV; LO Z MIC, 0.3 mV (500 Ω); AUX, 150 mV; Bridging, 15 mV.
HUM & NOISE: (below full rated output): MIC, 60 db; AUX, 70 db; FUNDAMENTAL, 80 db.
INPUTS: 4 HI Z MIC Inputs (each convertible to LO Z); 2 AUX Inputs with fader; BRIDGING Input; 500/600 Ω Telephone Line with WMT-1 Optional Accessory; 3 Inputs for Remote Volume Control.
OUTPUTS: HI Z; 600 Ω Balanced C.T.; 600 Ω Unbalanced; 150 Ω Balanced; 150 Ω Unbalanced; Tape Output; Bridging Output; Monitor Headphone Jack for HI Z phones (Front Panel).
OUTPUT IMPEDANCE: HI Z Output, 10 K; 600 Ω Output, 70 Ω ; Bridging, HI Z.
REGULATION: 1 db.
POWER REQUIREMENTS: 120 vac, 50-60 Hz, .1A; 12W; 24-28 vdc, 75 mA.
SEMI-CONDUCTORS: 17 transistors, 5 diodes.
CONTROLS & INDICATORS: 4 MIC Volume; AUX 1/AUX 2-fader; MASTER VOLUME; 5 Equalizer filter slide controls; 1 Compressor; Meter Sensitivity Control; Power Switch; Power Indicator Lamp; Meter.
FILTER CONTROL ACTION: ± 10 db variation at the following frequencies: 80, 300, 1 kHz, 3 kHz, 10 kHz.
FUSING: 0.25 A Fuse.
DIMENSIONS: 16 $\frac{3}{8}$ " W x 12 $\frac{3}{4}$ " D x 4 $\frac{3}{4}$ " H.
SHIPPING WEIGHT: 17 lbs.

OPERATION

The Acoustic Equalizer permits you to "tune" the preamplifier to the room in which the sound system is used, so that it will operate at a substantially higher output before acoustic feedback occurs. Five slide controls, located on the front panel, boost or attenuate the output at five selected frequencies — 80 Hz, 300 Hz, 1 kHz, 3kHz, and 10 kHz. Varying room acoustics or microphone placement may cause feedback or howling at or near some of these frequencies. If so, feedback can be greatly attenuated by setting the slide control for that particular frequency as described below.

ROOM EQUALIZATION: With speakers connected and one microphone in normal operating location, turn preamplifier on and proceed as follows:

1. Connect microphone to appropriate MIC input of preamplifier.
2. Set all five acoustic filter controls to zero (center position).
3. Turn MIC volume control half-way up and the three other MIC volume controls to zero.

4. Advance MASTER volume control slowly until feedback is heard.

5. Note the frequency of the feedback tone, and determine which of the five selected frequencies on the Acoustic Equalizer is closest to it. If frequency of tone cannot be distinguished, try each control separately to determine which has the most effective control.

6. Move the control determined in Step 5, above, down toward minimum until feedback disappears.

7. Advance MASTER control again and note whether feedback is heard at another frequency.

8. Adjust the appropriate filter controls until this feedback disappears.

9. Continue to advance MASTER control and adjust individual filter controls until MASTER control is at maximum setting, consistent with a stable output without feedback at any frequency.

10. Output level reduced because of attenuating one frequency may be partly restored by boosting the adjacent frequency filter control toward maximum.

11. Note and record the settings of the individual filter controls and the MASTER control. These settings are generally applicable to all four MIC input channels, if the microphone remains in the same position.

12. If the position of the microphone is changed or additional microphones are used, some adjustment in the feedback controls may be necessary.

NOTE

If feedback is not a problem, the controls should be used to improve the voice quality and intelligibility of the paging system. In most cases, the 10 kHz and 80 Hz controls should be placed in minimum position while the 300 Hz, 1 kHz and 3 kHz should be moved toward maximum for improved presence. Each system, depending on the speakers used and room acoustics, will require some experimentation with the controls for optimum results.

COMPRESSOR LIMITER

The COMPRESSION control is used to provide relatively uniform output from the associated booster amplifier regardless of variations in the input level to the preamplifier. This is particularly important in speech applications, where a microphone may be used by a number of people with varying voices and microphone techniques. It is also useful for musical programs, particularly when handling background music.

The COMPRESSION control is turned clockwise to the higher numbers to reduce the output range for a given variation in input. Turn the control counter-clockwise to the lower numbers to increase the output range. To remove compression and restore the normal full range of the amplifier, the control is turned fully counter-clockwise to zero.

To determine the optimum setting of the COMPRESSION control for speech applications, proceed as indicated below. For music, the setting will generally be lower than for speech.

Set the COMPRESSION control fully counter-clockwise to zero position. Set the MASTER volume control to the highest level likely to be required. Use a level setting such as will permit you to pick up clearly spoken inputs in a low voice at a distance of three feet on axis from the microphone. However, do not set the volume level so high as to produce feedback or howling.

Then speaking in a loud voice directly into the microphone, turn the COMPRESSION control clockwise to the point where the output of the amplifier is reduced to the same level as obtained above. The MASTER control can be used to vary the over-all volume without upsetting the COMPRESSION adjustment.

OTHER CONTROLS

All other controls are located on the front panel, and the function of each is described below.

MIC VOLUME: The four individual MIC volume controls are used to adjust the level of each microphone input channel. The control is turned clockwise (to the higher numbers) to increase the volume and counter-clockwise to reduce it.

AUX VOLUME: This control serves a two-fold purpose. It selects either of the two auxiliary inputs and it controls the volume of the selected auxiliary input. To select the AUX 1 input, rotate the control counter-clockwise past the center position. Turning this control counterclockwise to the higher numbers increases the AUX 1 volume. To select the AUX 2 input, rotate the control clockwise past the center position. Turn the control more clockwise to increase the AUX 2 volume.

If the auxiliary input is not to be used, set the control to the center position. The center position is indicated when the triangle on the control knob coincides with the vertical line between the AUX 1 and AUX 2 designations.

MASTER: This control is used to regulate the over-all volume fed to the booster amplifier, which may include the mixed output of two or more input channels. To set this control, rotate it to maximum clockwise position. Then set the individual MIC and AUX controls to the highest level likely to be used and consistent with the operation of the limiter compressor. Adjust the MASTER control to the desired listening level for the mixed output.

POWER: This switch applies power to the preamplifier. It will also turn on any associated equipment which may be connected to the auxiliary power receptacle on the rear panel. The POWER indicator lamp will go on to show that power has been applied to the unit.

OUTPUT LEVEL METER

The output level meter on the front panel monitors the overall output of the preamplifier. The scale reads from -20 to +3, and the absolute value is determined by the setting of the SENSITIVITY control.

METER SENSITIVITY CONTROL

This control is used to set the range over which the meter will operate in a particular application. When the control is turned clockwise, the sensitivity of the meter is increased. Consequently, the maximum meter reading will correspond to a lower output than before. When the control is turned counter-clockwise, the meter sensitivity is decreased and the maximum scale reading will indicate a higher output level.

Set the control so that the average output causes the meter to read within the NORMAL range for a particular application with occasional excursions into the HIGH range. Reset the control, if necessary, for subsequent applications.

INSTALLATION

UNPACKING

The Model CTM preamplifier was carefully checked before leaving the factory. Inspect the shipping container and unit carefully for indications of improper handling. If the unit has been damaged, make an immediate claim to distributor from whom it was purchased. If it was shipped to you, notify the transportation company without delay and place your claim.

POWER AND GROUNDING

The preamplifier may be operated either from the 120 vac power line or from a 24-28 vdc battery, as described below.

OPERATING FROM 120 VAC LINE. The preamplifier is furnished with an ac line cord terminated in a three-prong plug. The line cord should be plugged into a three-wire 120-volt, 50-60 Hz outlet with an earth ground.

If no three-wire outlet is available, install an adapter (such as Leviton No. 5017) to accommodate the three-prong plug to a two-wire outlet. Secure the

adapter ground wire to the screw that holds the outlet plate (see figure 1).

CAUTION

In some areas, the wall plate screw may not be grounded. In this case, connect a No. 18 grounding wire from GND terminal on rear of preamplifier to a water pipe or steam pipe.

The auxiliary power receptacle located on the rear chassis (see figure 2) is a three-wire grounded outlet

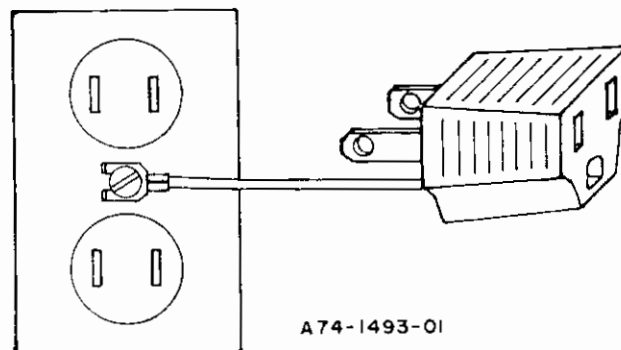


Figure 1 — Grounding Line Cord Adapter

that can supply a maximum of 250 watts to an accessory or to associated equipment in the system. The power switch on the front panel controls this receptacle. Associated equipment connected to the auxiliary receptacle with a three-prong line cord will be grounded, providing the amplifier line cord has been properly grounded as described above. Otherwise, it is necessary to ground the auxiliary equipment.

OPERATING FROM BATTERY: The preamplifier may be operated from 24 to 28 volt battery capable of sustaining a load of approximately 0.5 ampere.

CAUTION

The dc power input is not fused. It is advisable to install a 0.5 ampere fuse in the line, as shown in the illustration.

Connect the battery as shown in figure 2, carefully observing correct polarity.

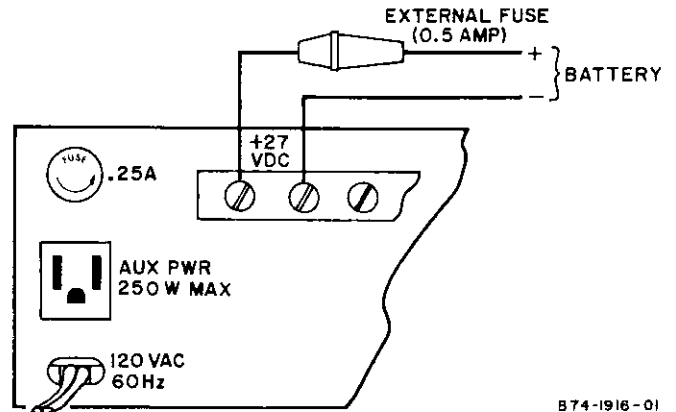
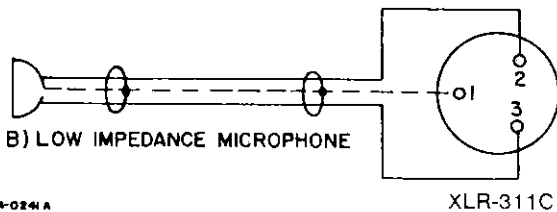
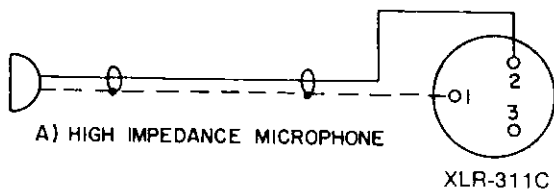


Figure 2 — Auxiliary and DC Power Connections

INPUT CONNECTIONS

MICROPHONE INPUTS

High-impedance microphones (approx. 47 K ohms) may be connected directly to any one of the four MIC input sockets. The microphone lead should be a single-conductor shielded cable under 35 feet in length and terminating in an XLR-311C connector (Bogen Part No. 85-0124-01) as shown in figure 3A.



74-024A

Figure 3 — Connecting Microphone Cable Connector

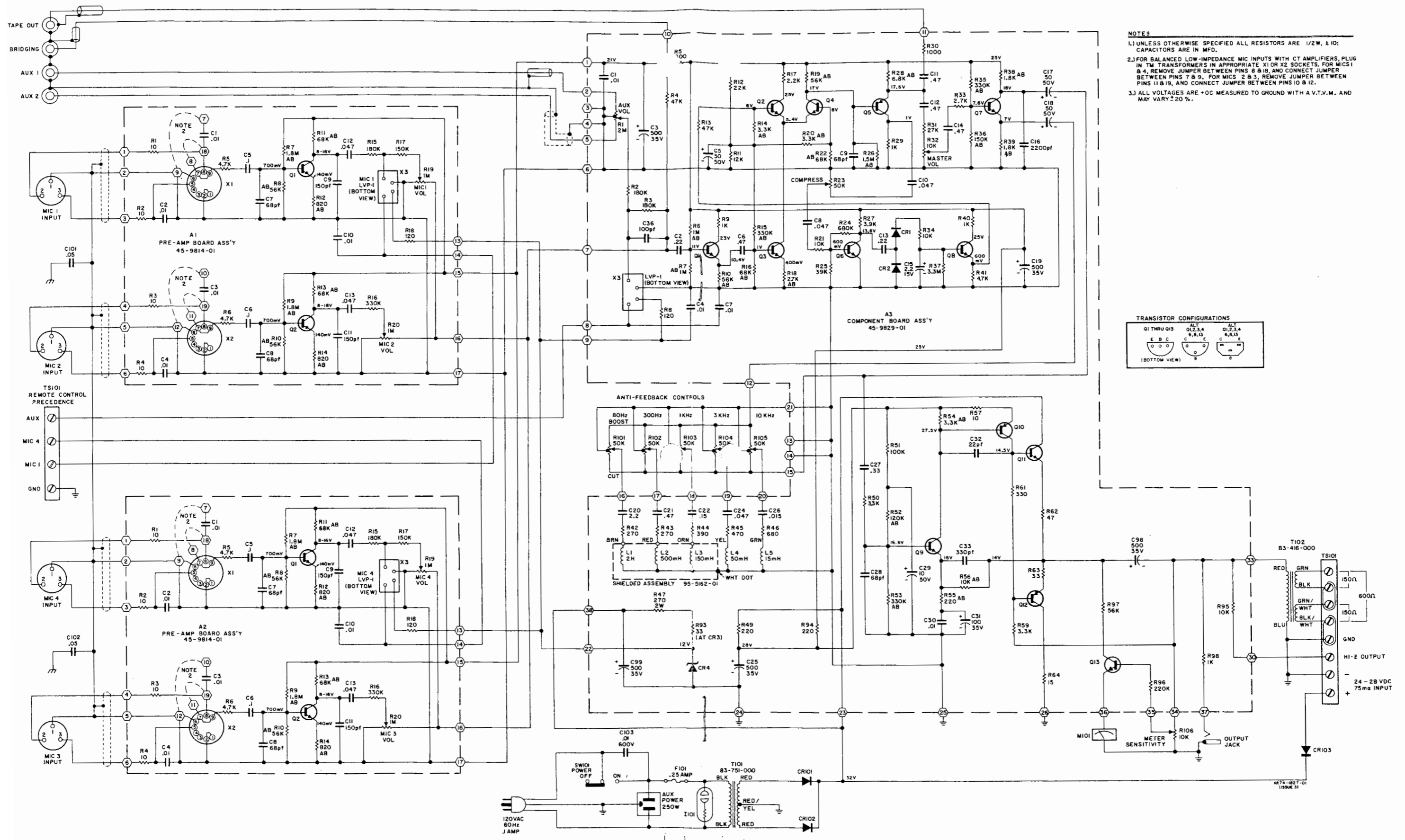
Low-impedance transformer accessories are required to permit the preamplifier to accept inputs from microphones rated at 50, 200, or 500 ohms. Before connecting microphone, insert appropriate plug-in transformers and reset pins on transformer sockets as described in the Accessories Section on page 9. Use a two-conductor shielded cable for the microphone lead, terminated in an XLR-311C connector, as shown in figure 3B.

AUXILIARY INPUTS

Two auxiliary inputs are provided for high-level, high impedance inputs. These may be used to connect a radio tuner, tape recorder, or record player utilizing a ceramic cartridge. An input signal of 150 mV is required to obtain full output from the associated booster amplifier.

BRIDGING INPUTS

The preamplifier may be bridged to a second Bogen CTM preamplifier to double the number of inputs. For bridging, connect a single-conductor shielded cable, terminated in an RCA phone plug at each end, between the rear panel BRIDGING receptacles of the two preamplifiers.



- NOTES**
- UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/2W, & 10; CAPACITORS ARE IN MFD.
 - FOR BALANCED LOW-IMPEDANCE MIC INPUTS WITH CT AMPLIFIERS, PLUG IN TM TRANSFORMERS IN APPROPRIATE X1 OR X2 SOCKETS. FOR MICS 1 & 4, REMOVE JUMPER BETWEEN PINS 8 & 9, AND CONNECT JUMPER BETWEEN PINS 7 & 9. FOR MICS 2 & 3, REMOVE JUMPER BETWEEN PINS 11 & 9, AND CONNECT JUMPER BETWEEN PINS 10 & 12.
 - ALL VOLTAGES ARE +DC MEASURED TO GROUND WITH A V.T.V.M. AND MAY VARY ±20%.

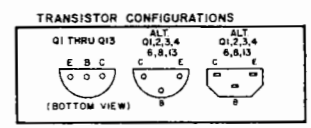


Figure 4 — Model CTM, Schematic Diagram

OUTPUT CONNECTIONS

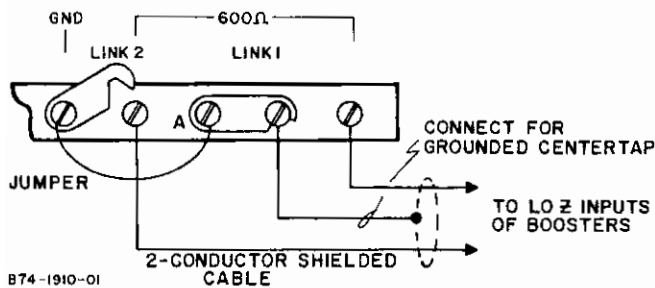


Figure 5 — Connections for Balanced 500/600-Ohm Line

The preamplifier may be used to drive one or more booster amplifiers. If the booster is located less than 35 feet from the preamp, connections may be made from the HI Z OUTPUT terminals on the rear of the unit. For longer runs, use the 600Ω or 150Ω terminals on the preamp. Connections may also be made to equalizer filter circuits located between the preamp and the booster.

LOW IMPEDANCE

500/600-OHM LINE. The preamplifier has outputs suitable for feeding a 500/600-ohm line. The line may be balanced or unbalanced and with or without a grounded center tap. When the preamp is located a considerable distance away from the amplifier, it is good installation practice to use a balanced 600-ohm connecting line to minimize pickup and ground-loop effects.

Connections for a balanced line are shown in figure 5. Use a two-conductor shielded cable. Open Link 2 and connect the shield to Link 1. Connect a jumper between terminal A and GND for grounded center tap. Make connections to the LO Z inputs of the booster amplifier.

Connections for an unbalanced 500/600-ohm line are shown in figure 6. Use a single-conductor shielded cable, and connect the shield to GND. Close Link 1 and Link 2. Make connections to the LO Z input of the booster.

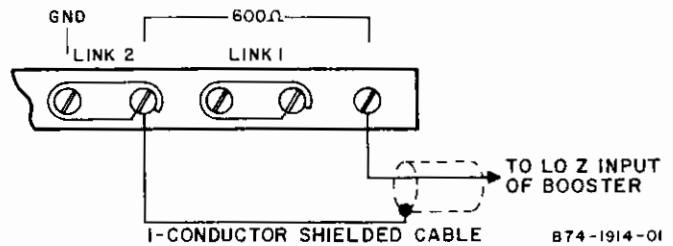


Figure 6 — Connections for Unbalanced 500/600-Ohm Line

150-OHM LINE: The preamplifier has two separate 150-ohm output lines, and either or both may be used to drive booster amplifiers with low-impedance inputs. To drive two separate boosters, make connections as shown in figure 7. For unbalanced lines, close Link 2 and connect a jumper between terminal A and GND.

HIGH IMPEDANCE

Make connections to the Hi Z and GND terminals on the output strip, as shown in figure 8. Connect to the Hi Z input of the booster amplifier. Additional boosters may be connected in parallel.

The Hi Z output is designed to work into an unbalanced line.

EQUALIZER FILTERS

External equalizer filters employed in some sound systems to eliminate feedback may require a 600-ohm source impedance at the equalizer, which is located between the preamplifier and the booster. To present this impedance, it is necessary to provide added resistance in the output lines as described below.

For a balanced line, make connections to the 600Ω terminals as shown in figure 9, and insert a 270-ohm resistor in each line. Close Link 1 and open Link 2. Connect to inputs of equalizer as described in instructions furnished with the filter unit.

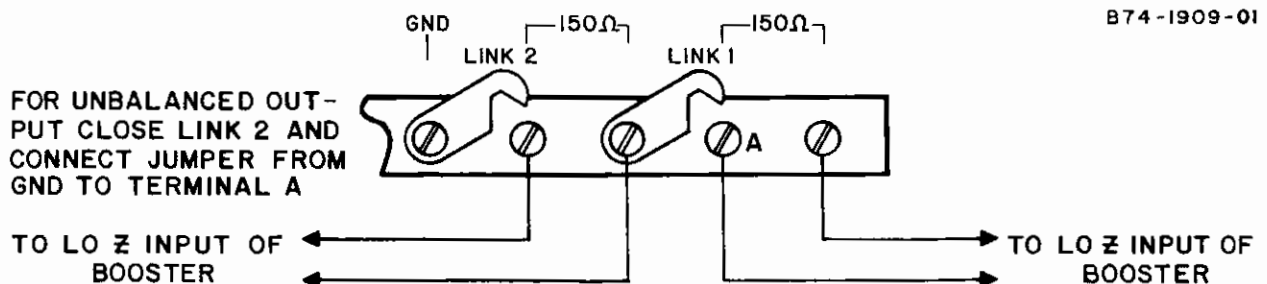


Figure 7 — Connections for Separate 150-Ohm Outputs

MONITOR: The MONITOR jack on the front panel will accommodate a high-impedance headphone plug for monitoring the output of the preamplifier.

TAPE OUTPUT. This is a high-impedance output that

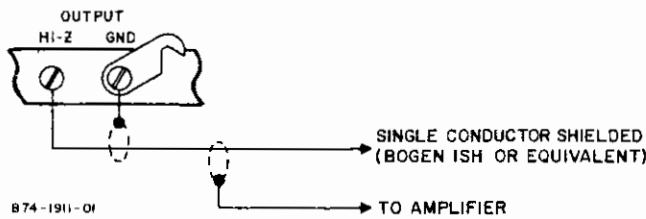


Figure 8 — Connections for High Impedance Outputs

is unaffected by the setting of the MASTER volume control. The output may be used to tape record any single input or combination of inputs applied to the preamplifier. Connect the tape output via a single-conductor shielded cable wired to a standard phono plug.

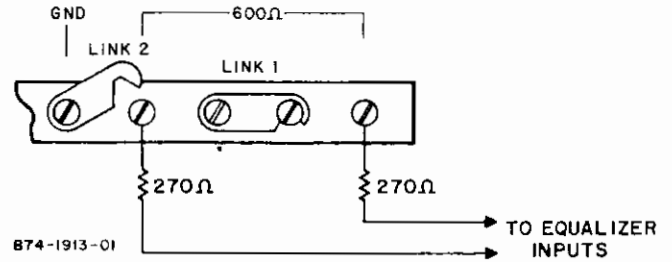


Figure 9 — Matching and Connecting Balanced Line to Equalizer

ACCESSORIES

WARNING

To install some of the accessories described below, it is necessary to remove the cover of the preamplifier, which may involve shock hazard. For this reason, these accessories should be installed by qualified personnel only.

TM50, TM200, TM500 TRANSFORMERS

Bogen plug-in transformer accessories are designed to convert the input impedance of the preamplifier to that of a low-impedance microphone. The Model TM50 is intended for microphones of 50 ohms impedance, the TM200 for 200-ohm mics, and the TM500 for 500/600-ohm microphones.

CONVERSION TO LO Z MICS: The Model CTM preamplifier is furnished ready for use with high-impedance microphones. To convert any of the microphone inputs to balanced low-impedance use, proceed as follows:

1. Remove four screws on each side of cover and the cover (1).
2. Remove two knobs (2).
3. Remove two nuts (3).
4. Remove two screws (4).
5. Remove preamplifier board A1. Turn board over.
6. Install low impedance transformer(s) in 9-pin socket(s). X1 is for MIC 1 input; X2 is for MIC 2 input.
7. Use spring clip(s) to secure transformer(s) in socket(s).
8. Change jumper connections as indicated in the table below.
9. At preamplifier board A2, install low impedance transformer(s) in 9-pin socket(s). X1 is for MIC 3 input; X2 is for MIC 4 input.
10. Use spring clip(s) to secure transformer(s) in socket(s).

11. Change jumper connections as indicated in the table below.

| Transformer Plugged in for: | Remove Jumper Between: | Reconnect Jumper Between: |
|-----------------------------|------------------------|---------------------------|
| MIC 1 Conversion | Pins 8 & 18 | Pins 7 & 9 |
| MIC 2 Conversion | Pins 11 & 19 | Pins 10 & 12 |
| MIC 3 Conversion | Pins 11 & 19 | Pins 10 & 12 |
| MIC 4 Conversion | Pins 8 & 18 | Pins 7 & 9 |

12. Mount preamplifier board A1 on the amplifier, using two screws at the rear, two nuts over the control shafts, and the two control knobs. Replace cover.

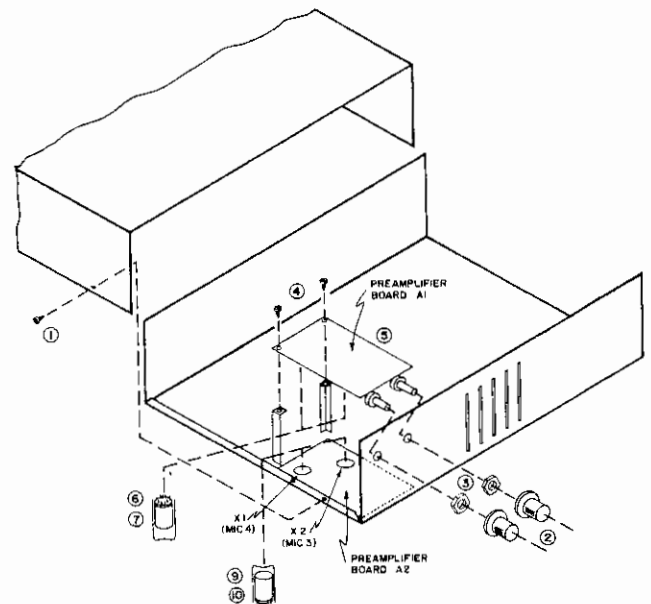


Figure 10—Installing Low-Impedance MIC Input Transformers

LVP-1 AND RVC-2A UNITS

The Bogen LVP-1 is a plug-in accessory which provides microphone precedence over the MIC or AUX channel to which the accessory is connected. The LVP-1 may be used with the MIC 1, MIC 4 and AUX channel, and a separate accessory is required for each channel.

The LVP-1 unit is also used in conjunction with the Model RVC-2A accessory to provide remote volume control of these channels. The RVC-2A will control the output level at distances up to 2000 feet from the preamplifier.

MIC PRECEDENCE: The MIC 1 and MIC 4 input channels as well as the AUX channel may be remotely controlled by installing the LVP-1 accessory. Plug the accessory into the appropriate LVP-1 accessory socket on the Preamplifier Board Assembly, after removing the preamplifier cover as described above. The MIC 1 socket is on the top preamp board (A1), MIC 4 socket is on the bottom board (A2), and the AUX socket is on the main component board (A3). See figure 11.

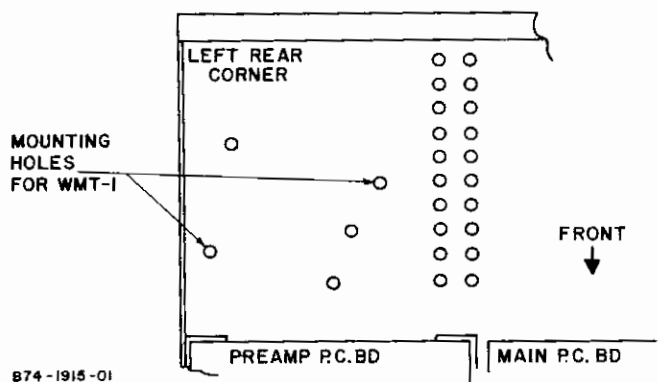


Figure 11 — Top Chassis, CTM Preamplifier

Connections are made from an external switch to the appropriate MIC 1, MIC 4 or AUX terminal and to GND terminal on the Remote Control Precedence strip on the rear panel. The switch on the paging microphone may be used for this purpose, if it has a normally open pair of contacts for the precedence function as on the Shure 450 microphone. Otherwise, an external single-pole, single-throw switch may be installed near

the microphone. When the switch contacts are closed, the controlled channel is muted. For detailed information on MIC precedence connections, see the instruction sheet furnished with the LVP-1 accessory.

REMOTE VOLUME CONTROL: Plug an LVP-1 accessory into each channel to be remotely controlled, as described above. Connect the RVC-2A remote volume control to the Remote Control Precedence terminal strip TS101 on the rear panel of the preamplifier. Connect one lead from the accessory to the appropriate MIC 1, MIC 4 or AUX terminal and the other lead to GND. Complete installation instructions are supplied with the RVC-2A accessory unit.

After connecting the RVC-2A, turn its control knob fully clockwise and the volume control for the appropriate amplifier channel counter-clockwise. Advance the volume control on the preamplifier to the loudest position likely to be used or to the point where feedback begins. Reduce the output level at the RVC-2A control to the desired level, and adjust the control as necessary during operation.

WMT-1 TELEPHONE LINE

The Bogen Model WMT-1 line-matching transformer is an accessory which has been designed especially for matching a 500/600-ohm line to the AUX inputs.

The WMT-1 accessory is mounted on the top chassis of the unit, adjacent to the preamplifier board assemblies (see figure 11). After mounting the unit, connect the 500/600-ohm telephone line to the three-screw terminal board on the WMT-1 accessory. The phono plug on the WMT-1 is connected to the AUX 1 input of the preamp. See the instruction sheet furnished with the WMT-1 accessory for detailed installation procedure.

RPK-33A RACK PANEL BRACKETS

The RPK-33A rack panel is designed to mount the CTM preamplifier in a standard 19" sound rack. Instructions are furnished with the RPK-33A unit.

MAINTENANCE

WARNING

There are no user serviceable parts inside the unit and removal of the top cover or bottom plate presents an electrical shock hazard. Interior servicing should be attempted only by a qualified technician.

BOGEN SERVICE

We are interested in your Bogen Preamplifier-Mixer for as long as you have it. If trouble ever develops with your unit, please do not hesitate to ask our advice or assistance. Write to Service Department, Bogen Division, Lear Siegler, Inc., P.O. Box 500, Paramus, New Jersey 07652.

When communicating with us, give the model number and series number of your unit. Describe the difficulty encountered and the effects each operating control has upon the symptoms of trouble. Include details on electrical connections to associated equipment, and list such equipment. When we receive this information, we will send you service information if the trouble appears to be simple. If the trouble requires servicing, we shall send you the name and address of the nearest Bogen authorized service agency to which you can send your unit for repairs.

Before returning any equipment to Bogen, contact Bogen Service Department at the above address. If you ship your unit, pack it carefully using the original shipping carton, or a similar container and filler material, to prevent damage in transit. Send the unit, fully insured and prepaid, via railway express or United Parcel. Do not ship via parcel post unless so instructed.

FUSE

There is a 1/4A Slo-Blo power fuse on the rear of the unit. Disconnect the power cord from the 120 vac outlet or turn off the POWER switch before replacing the fuse. Use only a replacement fuse of identical rating. If replacement fuse blows, call a qualified service technician to investigate the source of the trouble.

REPLACING COMPONENTS

TRANSISTORS. All transistors are soldered to insure maximum reliability. Use extra care to keep heat away from transistors and diodes. When soldering the leads of semiconductors, use a heat sink (such as a small alligator clip) between the component and the source of heat.

PRINTED CIRCUIT BOARDS. Excessive heat or pressure will damage the copper laminate on P.C. boards. Use a small soldering iron (25-40 watts) to solder components on boards. Do not try to insert the leads of replacement components into the board without first clearing the mounting holes of solder. Do this very carefully as inserting a pick from the top of the board may damage the laminate under the board.

REMOVING BOTTOM COVER: Access to the underside of Preamp Board A2 and the Main Component Board A3 is obtained by removing the bottom plate. The plate is secured to the bottom of the preamplifier by Phillips-head screws.

CONTROLS. All controls are soldered to their respective P.C. boards. The boards must be removed from the chassis and the controls unsoldered by using a small soldering iron and a solder sucker to remove all molten solder from around the pins.

WIRING. Always restore all wires as nearly as possible to the way they were originally found. Careless placement of wires during servicing may introduce trouble evidenced by feedback and/or crosstalk.