



BOGEN®
A DIVISION OF LEAR SIEGLER, INC.

PUBLIC ADDRESS AMPLIFIERS

Models TU-35A/60A/100A

Bogen TU-A Series Public Address Amplifiers are versatile, professional-quality wall or rack-mounting amplifiers rated at 35 watts, 60 watts and 100 watts.

Three 600-ohm telephone lines may be connected to the unit, each with an individual volume control. Channel one on all models accepts a low-impedance (150 ohm) microphone or a 600-ohm line. Channels two and three provide transformer-isolated inputs for the telephone lines or accept high-impedance auxiliary inputs. Additionally, channel three may be muted for special announcements over another channel. All models provide separate volume controls for each channel, and a master volume control to set the overall level of the mixed inputs. Separate bass and treble controls permit adjustments of tonal value.

Balanced or unbalanced outputs are available for 16 ohm, 25V CT and 70V lines. All models operate from either 120V, 60Hz AC or 48V DC, positive or negative ground.

Warning

To prevent fire or shock hazard, do not expose this unit to rain or excessive moisture.

INSTALLATION

UNPACKING

Your amplifier was carefully checked before leaving the factory. Inspect the shipping container for indications of improper handling. If the unit has been damaged in transit, notify the transportation company without delay and place your claim.

POWER AND GROUNDING

The AC line cord has a three-prong plug which should be plugged into a three-wire, grounded 120V, 60Hz outlet. It is important to ground the unit. If a three-wire outlet is not

available, use an adapter and connect the grounding pigtail to the screw securing the wall plate. If the wall plate screw is not grounded, connect a wire from the ground terminal of the amplifier to a suitable earth ground.

All models may also be powered from a 48V DC source, either positive or negative ground. Make connections to terminals marked DC INPUT, observing correct polarity. For balanced outputs, leave the DC polarity link of the amplifier unconnected. For unbalanced outputs with AC or negative ground DC source, connect the link to - (negative); for unbalanced lines with positive ground DC source, connect the link to + (positive). The power switch does not function on DC operation. **An emergency battery supply may be left connected to the amplifier, which will provide automatic DC standby operation when AC power fails.** Model TU-35A DC input requirement is 1.4A; Model TU-60 A, 2.5A; Model TU-100A, 3.7A.

MOUNTING

The TU-A Series amplifiers are designed for standard 19" equipment racks or surface wall mounting. When mounting to a wall, consider proximity to heat sources and power supply, adequate air flow for chassis heat dissipation, and access to controls and terminal wiring. Where possible, secure the unit to wall studs or a suitable back brace. Use self-fastening or molly type hardware on plaster-board and other thin materials.

Four #6 x 3/4" screws are supplied with the unit. Locate the two top screws in position 18-5/16" apart and secure them to the wall, allowing the screw heads to protrude 1/8" to 1/4". The amplifier chassis contains keyhole slots to accommodate the screw heads. Fit the chassis over the screw heads and position the two bottom screws. Complete the installation by tightening all screws securely.

TECHNICAL SPECIFICATIONS

	TU-35A	TU-60A	TU-100A
POWER OUTPUT	35 watts	60 watts	100 watts
DISTORTION AT RATED OUTPUT POWER	Less than 5%, 100 to 5,000 Hz		
FREQUENCY RESPONSE	70 to 12,000 Hz $\pm$ 2dB		
SENSITIVITY	Aux: .07V; Line: -20dBm 600 ohm; Mic: 350 μ V		
INPUTS	Channel 1: Bal Lo-Z Mic or 600-ohm bal telephone line; Channel 2: Hi-Z Aux or 600-ohm bal telephone line, transformer-isolated; Channel 3: Hi-Z Aux or 600-ohm bal telephone line, transformer-isolated		
OUTPUTS	25V, 25V CT, 70V lines, 16 ohms; balanced or unbalanced		
PRECEDENCE	Standard on input #3 (requires contact closure to mute channel)		
HUM & NOISE 20 - 20K Hz	Aux: -70dB; Mic: -50dB; Lines 2 and 3: -70dB; Line 1: -50dB		
CONTROLS AND INDICATORS	Screwdriver-adjustable channel level controls (3); Bass, Treble and Master controls; Peak-reading LED; Illuminated power switch and front panel circuit breaker		
INPUT/OUTPUT CONNECTIONS	Screw terminals inside removable cover		
TONE CONTROL ACTION	Bass: $\pm$ 9dB; Treble: $\pm$ 13dB		
SEMICONDUCTORS	12 silicon transistors (14 in TU-100A); 11 diodes		
OVERLOAD PROTECTION			
120V	.93A/1.0A	1.65A	2.5A
Battery	1.5A slo-blo	2.5A slo-blo	4A slo-blo
Thermal	105°C (221°F)	105°C (221°F)	120°C (248°F)
POWER REQUIREMENTS	120 VAC, 60 Hz @ $\frac{3}{4}$ amp (TU-35A); 1.5 amp (TU-60A); and 2.0 amp (TU-100A) or 48 VDC, positive or negative ground @ 1.4 amp (TU-35A); 2.5 amp (TU-60A); and 3.7 amp (TU-100A)		
DIMENSIONS	19" W x 8 $\frac{3}{4}$ " H x 3 $\frac{1}{2}$ " D (48.3 x 22.2 x 8.9 cm)		
WEIGHT	16 lbs. (7.3 kg)	18 lbs. (8.2 kg)	21 lbs., 8 oz. (9.7 kg)
FINISH	Bogen Sand, baked enamel		

INPUT CONNECTIONS

MICROPHONE INPUT

A balanced, low-impedance microphone may be connected to terminals marked LO-Z MIC 1 on the terminal strip, and is controlled by the 1 MIC/LINE control on the front panel. Use two-conductor shielded cable for the microphone lead.

LINE INPUTS

Three 600-ohm telephone lines may be connected at terminals marked TEL LINE 1, TEL LINE 2 and TEL LINE 3. Channels 2 and 3 provide balanced isolating transformers for telephone line inputs. Screwdriver-adjustable controls labeled 1 MIC/LINE, 2 AUX/LINE and 3 AUX/LINE on the front panel regulate these inputs.

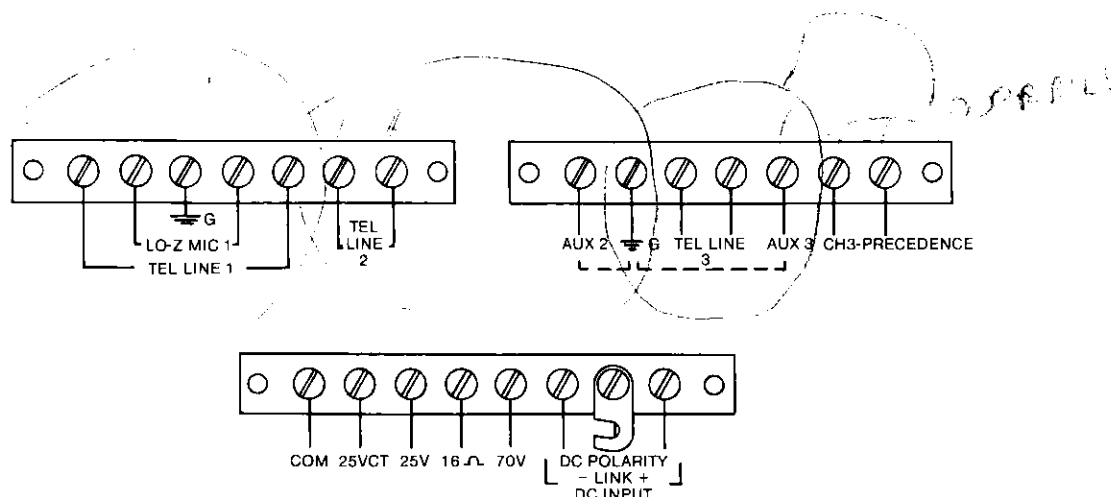


Figure 1—Terminal strip connections, all models

AUXILIARY INPUTS

Channels 2 and 3 of all units alternately provide unbalanced high-impedance auxiliary inputs. Make connections between terminals marked AUX 2 and GND and AUX 3 and GND on the terminal strip. Control is via front-panel 2 AUX/LINE and 3 AUX/LINE controls.

MICROPHONE PRECEDENCE

Channel 3 may be muted and overridden by special announcements or program material over another channel. An external spst normally-open switch must be connected at terminals marked CH 3 - PRECEDENCE on the terminal strip, as illustrated in figure 2. When the switch is closed, Channel 3 is muted.

OUTPUT CONNECTIONS

SPEAKERS

All models provide 16 ohm, 25V CT and 70.7V outputs, balanced or unbalanced. Connect the speaker system to the output terminals, with one lead to the COM terminal and the other to the terminal corresponding to the impedance of the speaker system. Consult the table in the schematic diagram, figure 3, for adjustments for balanced and unbalanced systems.

CONNECTING AMPLIFIERS IN SERIES

Pairs of the same model amplifier may be connected in series to effectively double the power output to the same speaker system. Refer to figure 4 for connection diagram. For balanced outputs, leave the DC polarity link of amplifier #1 unconnected. For unbalanced outputs with AC or negative-ground DC source, connect the link to - (negative); for unbalanced lines with positive ground DC source, connect link to +.

The input cables must be arranged to parallel the inputs of the two amplifiers, and the front-panel volume and tone controls must be at equal settings to ensure that the amplifiers share the load equally.

ADDITIONAL BOOSTER AMPLIFIER

An external booster amplifier may be used with all TU-A models, if desired. Modify the output circuitry of the TU-A by adding the resistor network illustrated in figure 5. Connect a patch cord to the high level/high impedance input of the booster amplifier.

USE STANDARD EXTERNAL SPST SWITCH OR NORMALLY-OPEN CONTACTS ON PAGING MIC

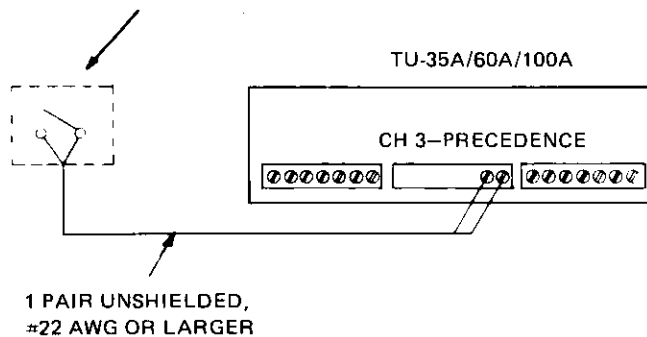


Figure 2—Microphone precedence circuit

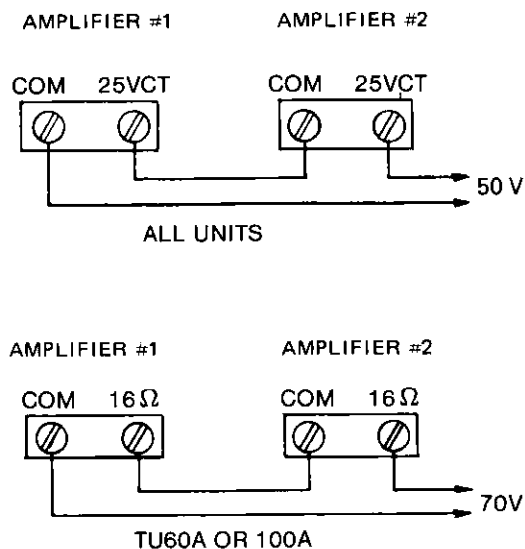


Figure 4—Connecting amplifiers in series

LINE-MATCHING TRANSFORMER

A 600 ohm line-matching transformer may be connected to the amplifier to provide an impedance match between the amplifier output and a 500/600 ohm line. Use Bogen Model WMT-1 Line-Matching Transformer or equivalent; make connection at the 25V and COM output taps on the terminal strip (cut the phono plug off the WMT-1).

OPERATION

POWER

The POWER switch applies AC power to the amplifier, and lights when switched to ON. If the amplifier is powered by an external DC source, the switch circuitry is bypassed and the power switch has no effect on operation.

MIC/LINE 1

The MIC/LINE screwdriver-adjustable control is used to adjust the volume of the microphone or line input to Channel 1. Rotate the control clockwise to increase volume and counterclockwise to decrease it. Set the control to minimum if the input is not used.

AUX/LINE 2 and 3

The two AUX/LINE controls are used to adjust the volumes of the auxiliary or line inputs to Channels 2 and 3. Rotate these controls clockwise to increase volume. Set the controls to minimum if the inputs are not used.

MASTER

The MASTER control sets the overall volume of the mixed inputs. After the MIC/LINE and AUX/LINE controls are set as desired, rotate the MASTER control to obtain the desired volume from the speakers.

BASS AND TREBLE

The BASS and TREBLE controls are used to adjust the tonal values of the amplifier output. The center positions provide flat frequency response. Clockwise rotation of the controls increases bass/treble response and counterclockwise rotation reduces response.

PEAK INDICATOR

A front-panel LED will light if the amplifier is driven into clipping. Adjust the output level if the LED remains on or flashes continuously.

MAINTENANCE

CAUTION

There are no user-replaceable parts within the unit. Have all internal servicing done by a qualified technician.

BOGEN SERVICE

We are interested in your Bogen equipment for as long as you have it. If trouble ever develops, do not hesitate to ask our advice or assistance. Information can be obtained by writing to Service Department, Bogen Division, P.O. Box 500, Paramus, N.J. 07652.

When communicating with us, give the model and series designation of your unit. Describe the difficulty and include details on the 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.

TO 25V OUTPUT TERMINAL
OF TU-35A/60A/100A

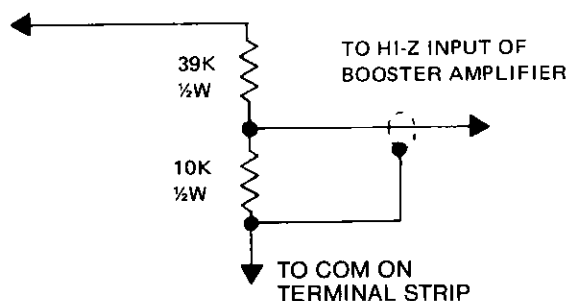


Figure 5—Connecting additional booster amplifier

When shipping your unit, pack the amplifier well, 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 UPS or any other responsible carrier. The unit will be promptly repaired and returned to you.

CIRCUIT BREAKER

If the circuit breaker opens, the ac power lamp will go out and the amplifier will have no output. Set the ac power switch to off and momentarily depress the red button on the circuit breaker to reset it. Return the ac power switch to on. If the breaker trips again, do not attempt to reset it but have the trouble investigated by a qualified technician.

PRINTED CIRCUIT BOARD

All components on top of the printed circuit board are easily accessible with the cover removed. The underside of the PC board can be exposed for repair or troubleshooting without disconnecting any wires. To do this, proceed as follows:

1. Remove 6 screws that secure top cover.
2. Remove conduit fitting from cover.
3. Pull cover up and away from unit.
4. Remove 6 screws from P.C. board and lift board up.

REPLACING TRANSISTORS

CAUTION

All transistors are soldered to ensure maximum reliability. When soldering leads, use a heat sink (such as a small alligator clip) between the transistor and the source of heat.

When replacing the driver transistors, press a small screwdriver blade into the side of the U-clip heat sink to spread the jaws of the clip. Draw the clip and screwdriver off the metal tab on the driver transistor. Reverse the procedure to install the clip on the replacement transistor. Since the U-clip heat sink is a spring clip, avoid spreading the jaws too wide. Where driver transistors have a finned clip or heat sink, remove the heat sink from the original transistor and replace by pushing down onto the new transistor. This is accomplished best by installing the heat sink before soldering transistor into circuit board.

When replacing the output transistors, clean all foreign matter from the heat sink, insulator, and transistor. Brush on a light coating of silicon compound (such as Dow Corning No. 340) to completely cover both surfaces of the insulator (Part No. 16-9278-01). Place the insulator between the heat sink and the replacement transistor. Use the original transistor mounting hardware to mount the replacement transistor.

REPLACEMENT PARTS

Most components are standard parts available through reputable parts suppliers. The parts listed here may be obtained directly from the factory. When ordering a part, specify the part number as listed, the model of the unit and give the series designation, which is a letter followed by numbers, printed on the chassis. For parts on circuit boards, also give the component board assembly number, which begins with "45."

When replacing transistors, use those made by the manufacturer specified. Transistors from other suppliers may not be satisfactory.

Where the specific model is not given, the replacement part listed applies to all three amplifiers.

Schematic Reference	Part No.	Description
Printed circuit board		
—	45-7134-05	PC board assembly (TU-35A)
—	45-7133-05	PC board assembly (TU-60A)
—	45-7132-05	PC board assembly (TU-100A)
C3, 4	79-008-031	Electrolytic, 10uF, 16V
C5	79-008-011	Electrolytic, 330uF, 3V
C7, 11	79-008-053	Electrolytic, 100uF, 35V
C8, 12	79-008-063	Electrolytic, 2uF, 50V
C19, 32, 33	79-008-064	Electrolytic, 330uF, 50V
C23	79-008-062	Electrolytic, 100uF, 50V
C25	79-112-001	Electrolytic, 500uF, 65V, or
	79-119-001	Electrolytic, 470uF, 63V
C26	79-112-011	Electrolytic, 2000uF, 65V, or
	79-119-013	Electrolytic, 2200uF, 63V (TU-35A)
	79-112-015	Electrolytic, 2500uF, 50V, or
	79-119-015	Electrolytic, 3300uF, 63V (TU-60A, TU-100A)
C27	79-112-013	Electrolytic, 1500uF, 65V, or
	79-119-013	Electrolytic, 2200uF, 63V (TU-35A)
	79-112-011	Electrolytic, 2000uF, 65V, or
	79-119-013	Electrolytic, 2200uF, 63V (TU-60A)
	79-112-009	Electrolytic, 3000uF, 65V, or
	79-119-015	Electrolytic, 3300uF, 63V (TU-100A)
C31	79-008-044	Electrolytic, 1KuF, 35V
C34, 35	79-008-058	Electrolytic, 10uF, 50V
CB102	94-0014-07	Thermal breaker (TU-35A, 60A)
	94-0014-08	Thermal breaker (TU-100A)
CR1	96-5344-07	Diode, zener, 24V
CR2	96-5202-01	Triple diode, HVR-3
CR3-5	96-5333-01	Diode, 400 prv @ 1A
CR6,7,10,11	96-5241-01	Diode, 300 prv @ 3A
CR8	96-5453-01	Diode, 200 prv @ 6A
CR9	96-5344-13	Diode, zener, 13V
F1	94-0001-05	Fuse, slo-blo, 1.5A (TU-35A)
	94-0001-07	Fuse, slo-blo, 2.5A (TU-60A)
	94-0001-27	Fuse, slo-blo, 4A (TU-100A)

Schematic Reference	Part No.	Description
Q1-6	96-5213-01	Transistor, 2N5089
Q7	96-5298-01	Transistor, SPS1910
Q8	96-5383-01	Transistor, MPSA55
Q9	96-5357-01	Transistor, 2SD389(P)/ 2SD313D/TIP31A
Q10	96-5356-01	Transistor, 2SB512(P)/ 2SB507D/TIP32A
Q11-14	96-5385-01	Transistor, RCA 2N3055H or
	96-5397-01	Transistor, Solitron 2N3055
R25-27	77-001-789	Control, 1 megohm
R32, 35, 37	77-001-790	Control, 100 kilohm
R54, 55	76-107-096	Resistor, .82 ohm, 2W
R57, 58	76-116-003	Resistor, .27 ohm, 7W
R59, 60	76-116-003	Resistor, .27 ohm, 7W (TU- 100A only)
R64	75-742-101	Resistor 100 ohms, 7W
T1, 2	83-060-000	Transformer, line
—	70-9312-01	Mumetal can for line xfmr

Schematic Reference	Part No.	Description
Chassis		
CB101	94-0023-03	Circuit breaker, .93A/1.0A hold (TU-35A)
	94-0023-05	Circuit breaker, 1.65A hold (TU-60A)
	94-0023-08	Circuit breaker, 2.5A hold (TU-100A)
CR101	96-5443-01	LED w/clip and ring
S101	81-009-035	Switch, power, lighted
T101	83-456-000	Transformer, output (TU-35A)
	83-455-000	Transformer, output (TU-60A)
	83-453-000	Transformer, output (TU-100A)
T102	83-805-020	Transformer, power (TU-35A)
	83-809-010	Transformer, power (TU-60A)
	83-814-000	Transformer, power (TU-100A)
—	14-9076-01	Foot, rubber