

BOGEN®



MODEL NTB250
250-350 WATT
SILICON TRANSISTOR
BOOSTER AMPLIFIER

LEAR SIEGLER, INC.



BOGEN DIVISION
P.O. BOX 500
PARAMUS, N. J. 07652

INSTALLATION AND OPERATING MANUAL

READ THOROUGHLY BEFORE OPERATING EQUIPMENT

GENERAL DESCRIPTION

The Bogen Model NTB250 is a high-power booster amplifier designed to deliver up to 350 watts of output power. This high-quality amplifier has exceptional power handling capability over its entire range, and is especially recommended for industrial plants, stadiums, and similar installations where unfailing performance and high output are imperative.

The Model NTB250 Amplifier provides an output of 250 watts rms at less than 3% distortion over the frequency range of 40 to 5000 Hz. A 350-watt rms output is provided at less than 5% distortion between 50 and 12,000 Hz. The frequency response of the unit is ± 1 db from 20 to 30,000 Hz.

In addition to 8-ohm, 25-volt and 70-volt output terminals on the rear of the amplifier, a polarized output receptacle provides a source of 120-volt AC power at selected frequencies. Feedback paralleling provisions permit two or more amplifiers to be paralleled for increased power output.

The booster amplifier accepts either high-impedance or low-impedance inputs. Plug-in transformers are available for use with 500/600-ohm or 10,000-ohm impedance inputs.

A power switch, power indicator and output level meter are provided on the front panel. A level control is located on the rear panel, and a speech filter switch on the top chassis selects the optimum response for speech or music programs.

The booster amplifier operates from either a 105-125 vac line or from a 24 vdc source. A three-wire line cord provides automatic grounding when connected to a three-prong receptacle. Power consumption is 150 watts at no signal and 700 watts at maximum 350 watts audio output. A 10-amp circuit breaker and a 40-amp fuse protect the ac and dc lines, and two 20-amp fuses safeguard the output transistors.

The amplifier is furnished with two attaching brackets for mounting the unit in a standard rack cabinet.

TECHNICAL SPECIFICATIONS

***POWER OUTPUT:** 350 watts rms, 50-12,000 Hz @ less than 5% distortion; 250 watts rms, 35-20,000 Hz @ less than 5% distortion.

PEAK POWER OUTPUT: 700 watts.

POWER GAIN: 70 db at 250 watts.

FREQUENCY RESPONSE: ± 1 db from 20 to 30,000 Hz.

REGULATION: Better than 2 db from no load to full load.

SENSITIVITY: High-impedance, 1.4 volts for 250 watt output, 1.8 volts for 350 watt output. Low-impedance balanced .32 volts for 250 watt output, .38 volts for 350 watt output.

NOISE LEVEL: -83 db below 250 watts; -85 db below 350 watts.

INPUT CONNECTIONS: High-impedance, two RCA phono jacks. Low-impedance, screw terminals.

INPUT IMPEDANCES: High-impedance, 70,000 Ω . Low-impedance 10,000 Ω (with TL10K plug-in transformer), 500/600 Ω (with TL600 plug-in transformer).

OUTPUT CONNECTIONS: 8 Ω 25 V, 70 V terminals (barrier strip). 120 vac power (polarized receptacle).

OUTPUT IMPEDANCES (Balanced or Unbalanced): At 0.625 Ω (25VCT), 2.5 Ω (25V), 8 Ω (44.7V), 5 Ω (70 VCT), 20 Ω (70 V), 57 Ω (120 V) at 250 watts. 14.3 Ω (70 V), 8 Ω (53 V) at 350 watts.

*Normal production variations in performance characteristics will not exceed 1 db.

CONTROLS AND INDICATORS: Power switch, power-on indicator, output level meter on front panel. Speech filter switch and input level control on rear panel.

POWER REQUIREMENTS: 105-125 vac, 50/60 Hz, 20 - 30 vdc, 22 - 32 amp.

LINE CORD: Three-wire type SJ with three-prong grounded plug.

AUXILIARY RECEPTACLE: Three-wire grounded, rated 600 watts at 120 volts.

POWER CONSUMPTION: 150 watts at no signal. 700 watts at 350 watts audio output.

FUSES AND CIRCUIT BREAKERS: 10-amp breaker for ac line, 40-amp fuse for dc line, two 20-amp fuses for output transistors.

TEMPERATURE RANGE: -20°C (-4°F) to +70°C (+158°F).

SEMI-CONDUCTORS (All silicon except level indicator rectifier): 18 output transistors, 10 low-level transistors, 1 differential transistor, 4 stabistor diodes, 7 rectifier diodes, 2 Zener diodes.

DIMENSIONS: 17-1/8" wide (19" with brackets) x 9-1/4" high x 11-3/4" deep.

RACK PANEL MOUNTING: Side brackets furnished for mounting on 8-3/4" x 19" panel. Forced air cooling recommended when mounted in enclosed rack cabinet.

FINISH: Gray metalustre panel, black chassis.

WEIGHT: Shipping 75 lbs.

INSTALLATION

UNPACKING

The NTB250 Booster Amplifier was carefully checked before leaving the factory. Inspect shipping container and amplifier carefully for indications of improper handling in shipment. If the unit has been damaged, make an immediate claim to the dealer or distributor from whom it was purchased. If the amplifier was shipped to you, notify transportation company without delay and file a claim.

CONNECTIONS BETWEEN COMPONENTS

For high-impedance inputs, use single-conductor, low-capacity shielded wire for connecting preamplifier to amplifier. Keep leads under ten feet in length, unless emitter follower output is employed.

Speakers may be connected with standard flexible line cord (zip-cord); and up to 100 feet of cable may be used without appreciable loss.

Make certain that all input cables are kept away from speaker cables, power cables, and power transformers, and that speaker cables are kept away from power cables.

POWER AND GROUNDING

Plug the line cord into a three-wire grounded outlet providing a nominal 120-volt, 50-60 cycle power source. This will ground the amplifier as well as supply power to it. A pilot light on the NTB250 front panel indicates that power has been supplied to the amplifier.

It is advisable to ground the amplifier. Therefore, if a three-wire wall outlet is not available or if the pre-amp is not equipped with a three-wire power receptacle, an adapter such as Leviton No. 5017 should be used to convert a standard two-wire outlet for use with three-wire plugs. The adapter is provided with a grounding pigtail which should be connected to the screw holding the wall plate to the receptacle.

NOTE

If the wall plate screw is not grounded or if an adapter is not available, connect a ground wire from the GND terminal on the rear chassis of the booster to a water or steam pipe.

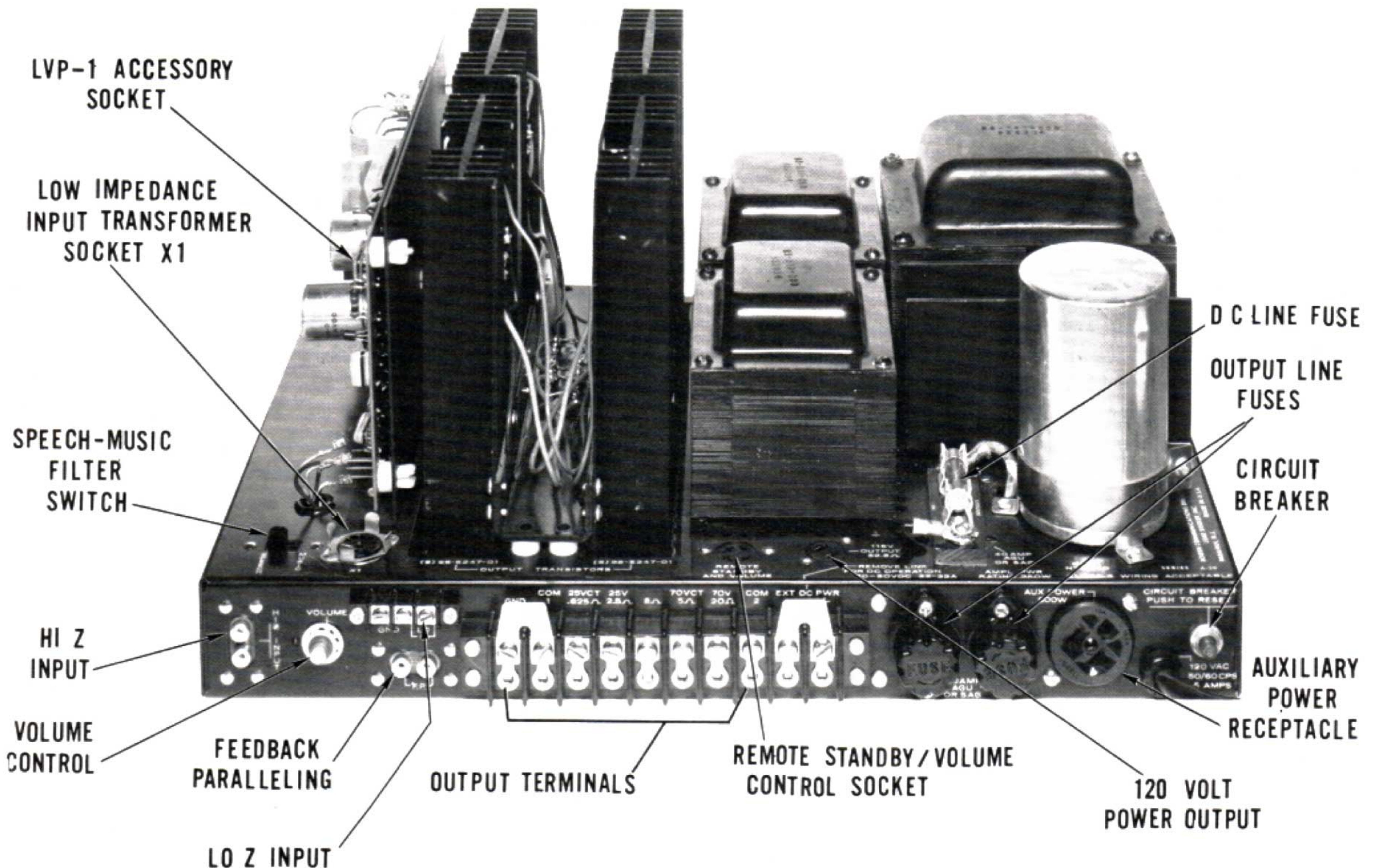


Figure 1 - Rear View of NTB250 Amplifier

AUXILIARY POWER

The auxiliary power receptacle located on the rear chassis (see figure 1) is a three-wire grounded outlet, which can supply power to associated equipment in the sound system. Be sure that the auxiliary component does not draw more than 600 watts. The power switch on the front panel of the amplifier controls this receptacle and can be used to turn the auxiliary unit on and off.

DC POWER

The amplifier may also be powered from an external nominal 24 vdc power source. Power connections are made to the terminal strip located on the rear panel (see figure 1). Remove the link across the EXT DC PWR and connect to a battery or other dc source supplying 20 to 30 volts at between 22 and 32 amperes. The dc power terminals are marked plus and minus. Make sure that the correct polarity is observed when making connections to the dc power supply.

INPUT CONNECTIONS

HIGH IMPEDANCE

Two high-impedance input receptacles are provided on the rear panel (see figure 1). The booster amplifier can be driven to a 250-watt output from any pre-amplifier or public address amplifier developing 1.4 volts across a 100 K ohm load. A 1.8-volt input is required for the full 350 watt output. The output of the preamplifier is connected to the HI Z INPUT jack on the booster.

LOW IMPEDANCE

For use with low-impedance inputs at 500/600 ohms balanced or unbalanced, a Bogen TL600 plug-in transformer is required. Plug this transformer into the

Low-Impedance Input Socket XI on the top chassis of the NTB250. Then connect the low-impedance input from the preamp or P.A. amplifier to the LO Z screw terminal inputs at the rear of the booster. The connection may be grounded by connecting the shield to GND or left floating, depending on whether a balanced or unbalanced input is required.

BRIDGING

The booster amplifier will accept bridging inputs at 10 K ohms, in conjunction with a Bogen TL10K transformer accessory. The transformer is plugged into the XI socket on the NTB250 top chassis. Connect the bridging input to the LO Z input at the rear of the amplifier.

OUTPUT CONNECTIONS

SPEAKER LINES

Terminals are provided on the output barrier strip at the rear of the amplifier for making connections to 8-ohm speaker lines as well as to 70-volt and 25-volt constant-voltage lines, balanced or unbalanced. Make connections as shown in Table I for the impedance or constant-voltage output desired. For detailed information on the installation of multiple speaker systems, see the Speaker Installation Bulletin No. 54-5001-02 packed with the amplifier.

POWER OUTPUT

The polarized receptacle on the top chassis provides a 120 vac output at selected frequencies for laboratory or industrial applications. A two-prong plug, Bogen Part No. 85-0109-01, is supplied with the amplifier for making connections for this receptacle. Wire the plug to the connecting cable as shown in figure 2.

PARALLELING AMPLIFIERS

Dual high-impedance inputs and F.P. (feedback

paralleling) receptacles are provided on the rear panel to facilitate paralleling of amplifiers without wiring. When paralleling amplifiers, interconnect the units as shown in figure 4. Any number of units may be paralleled to provide the desired output power. The interconnecting cable for the HI Z and F.P. receptacles should be standard audio shielded cable with phono type plugs as both ends.

NOTE

Only transformer taps of the same output impedance should be paralleled. It must be borne in mind that paralleling outputs reduces the output impedance.

Be certain the SPEECH-MUSIC switch is in the same position on all amplifiers. Rotate all VOLUME controls to maximum gain position. When it is desired to reduce the volume, each amplifier's VOLUME control should be set to achieve equal gain for all amplifiers.

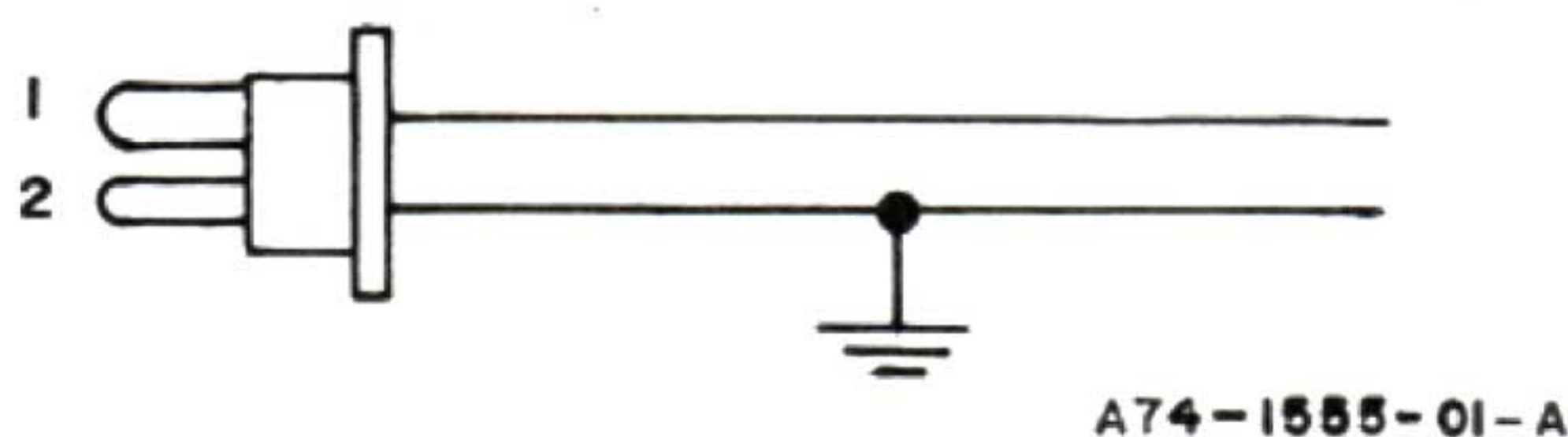


Figure 2 - Wiring Plug for 120-volt Output

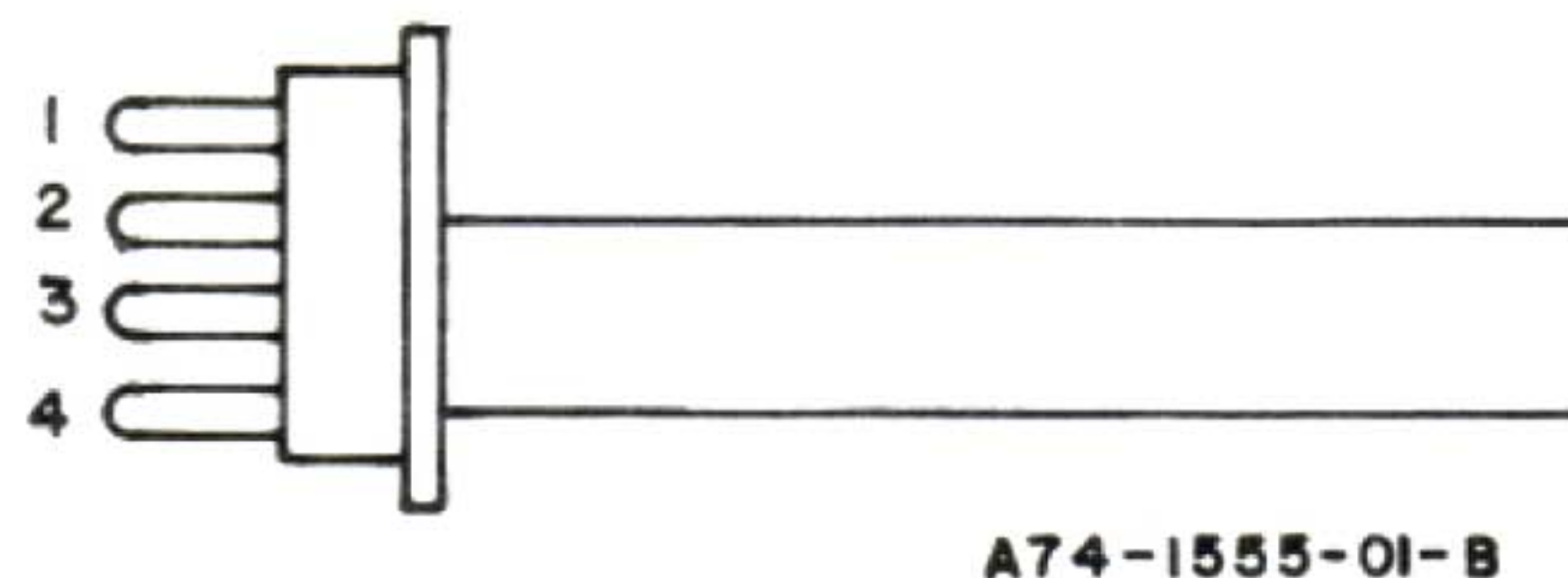


Figure 3 - Wiring Plug for Remote Operation

TABLE I - OUTPUT CONNECTIONS

	Line Connections	Other Connections
8 Ω, Unbalanced	8 Ω, COM 1	Retain link between COM 1 and GND.
8 Ω, Balanced	8 Ω, COM 1	Remove link between COM 1 and GND.
25 V, Unbalanced	25 V, COM 1	Retain link between COM 1 and GND.
25 V, Balanced	25 V, COM 1	Remove link between COM 1 and GND.
25 V, Balanced CT	25 V, COM 1	Remove link between COM 1 and GND, and ground 25 VCT.
70 V, Unbalanced, 250 W	70 V, COM 2	Ground COM 2.
70 V, Balanced, 250 W	70 V, COM 2	- - - -
70 V, Balanced CT, 250 W	70 V, COM 2	Ground 70 VCT.
70 V, Unbalanced, 350 W	70 VCT, 25 V	Connect link between COM 2 and 8 Ω, remove link between COM 1 and GND, and ground 25 V.
70 V, Balanced 350 W	70 VCT, 25 V	Connect link between COM 2 and 8 Ω. Remove link between COM 1 and GND.

REMOTE STANDBY AND VOLUME CONTROL

A four-prong plug, Bogen Part No. 85-0147-02, is furnished with the booster amplifier for use in making connections for remote operation. A Bogen LVP-1 accessory and a SPST switch, neither of which are supplied with the amplifier, are required for remote standby operation. The LVP-1 and RVC-2 accessories are needed for remote volume control. The four-prong plug is wired to the control cable as shown in figure 3 and connected to the REMOTE STANDBY AND VOLUME socket on the top chassis.

To provide remote standby operation, plug the LVP-1 accessory into the LVP-1 socket on the electronic component board. Then mount the SPST switch at a convenient remote location, and make connections to the booster amplifier as shown in figure 5. The switch is used to turn the amplifier output on and off by controlling the input signal. Power will continue to be applied to the booster when the switch is off.

For remote volume control, a Bogen RVC-2 accessory, which is not supplied with the amplifier, is used in place of the SPST switch. The LVP-1 accessory is plugged into place on the electronic component board and connections are made to the amplifier as shown in figure 5. The RVC-2 control can then be used to regulate the output level of the NTB250 amplifier.

For additional information, see the Installation Instruction sheet furnished with the LVP-1 accessories. The length of the control cable which can be used between the remote switch or remote control and the amplifier is limited by the dc resistance of the control leads. The total length of the control cable should not exceed 3,000 feet if No. 22 AWG wire is used or 8,000 feet with No. 18 wire.

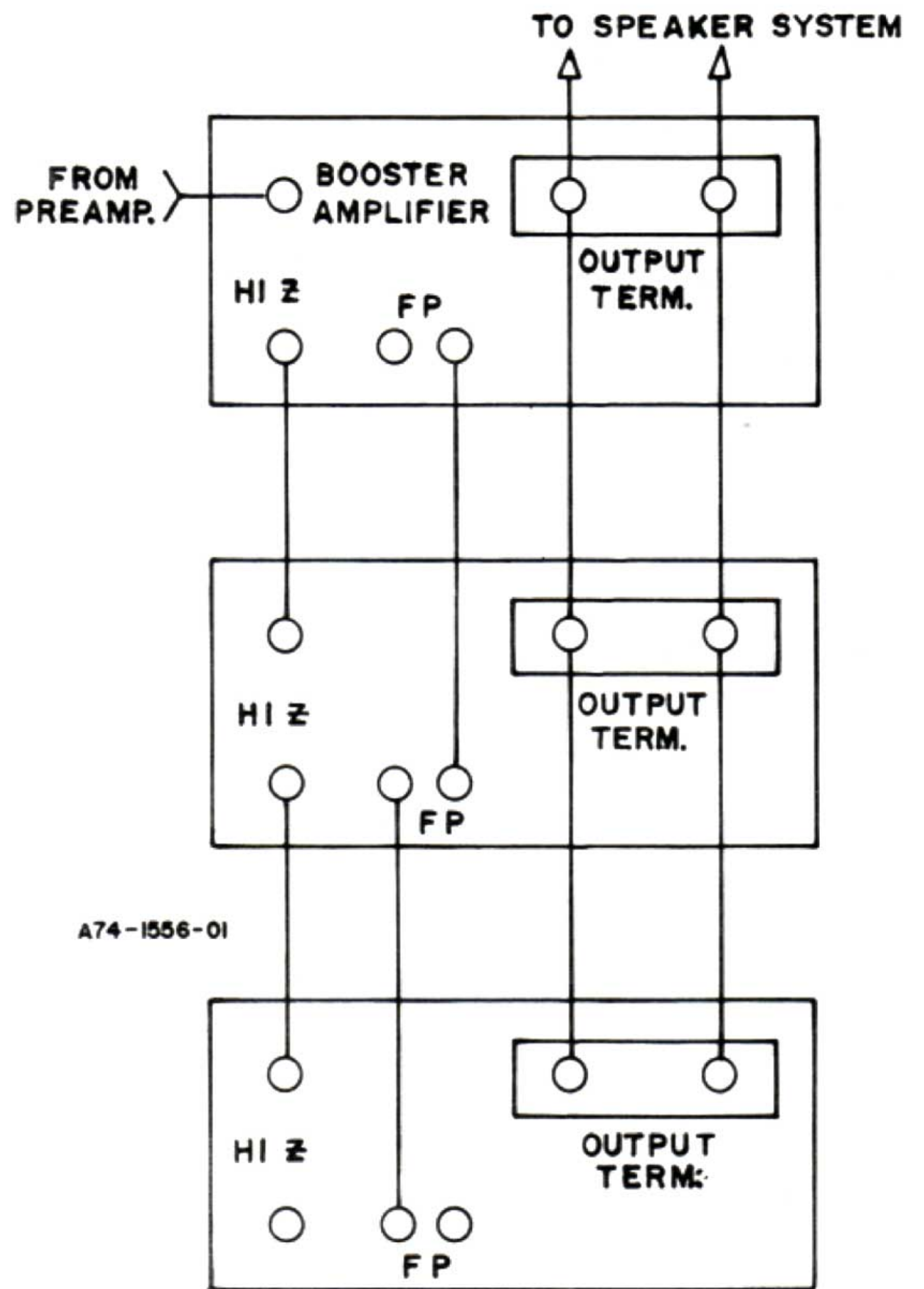
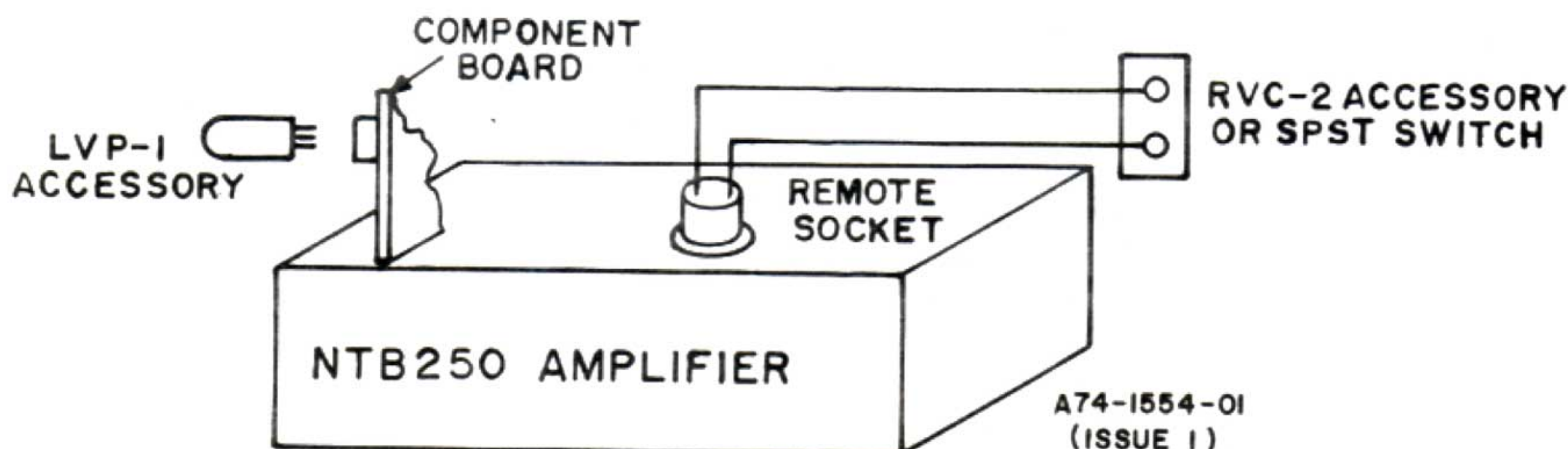


Figure 4 - Paralleling Booster Amplifiers



CONTROL FUNCTIONS

The POWER switch, power-on indicator and OUTPUT LEVEL meter are located on the front panel of the booster amplifier (see figure 6). The VOLUME control will be found on the rear panel and the SPEECH-MUSIC filter switch on the top chassis of the unit and are located in figure 1.

The VOLUME control is used primarily to compensate for variations in pre-amplifier output levels. Thus, if the preamplifier output is very high, the user will find that it is necessary to operate the preamplifier's volume control near minimum to prevent "blasting" volume output from the speaker system. Conversely, if the preamplifier output is low, the pream-

plifier's volume control may have to be operated near maximum to achieve sufficient volume.

The VOLUME control on the NTB250 thus permits the user to preset the gain of the amplifier so that the preamplifier's volume control is operated in its mid-range to achieve the desired volume level range. This control, which need be set only once on installation, is a screwdriver adjustment. The OUTPUT LEVEL meter should read in the NORMAL range when the VOLUME control has been properly set.

The SPEECH-MUSIC switch should be set to the SPEECH position to provide optimum speech response.

MAINTENANCE

BOGEN SERVICE

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

When communicating with us, give the model number and serial number of your unit. Completely describe the difficulty encountered. Describe 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 repair.

When shipping your unit, pack instrument well, using a sturdy shipping carton and filler material to prevent damage in transit. Send the amplifier, fully insured and prepaid, via railway express. Do not ship via parcel post unless so instructed. The unit will be promptly repaired and returned to you prepaid.

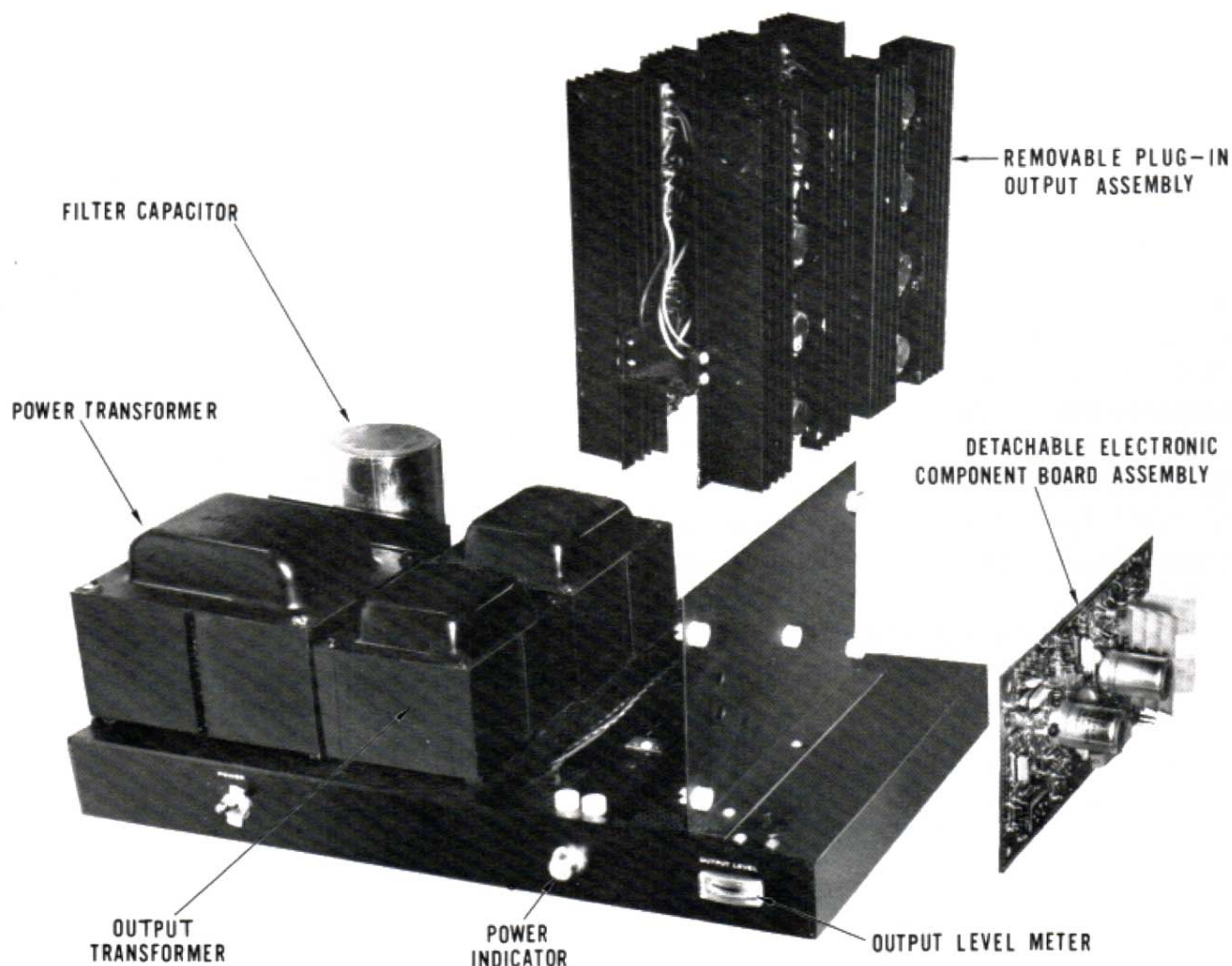


Figure 6 - Top View NTB250 Amplifier with Assemblies Detached

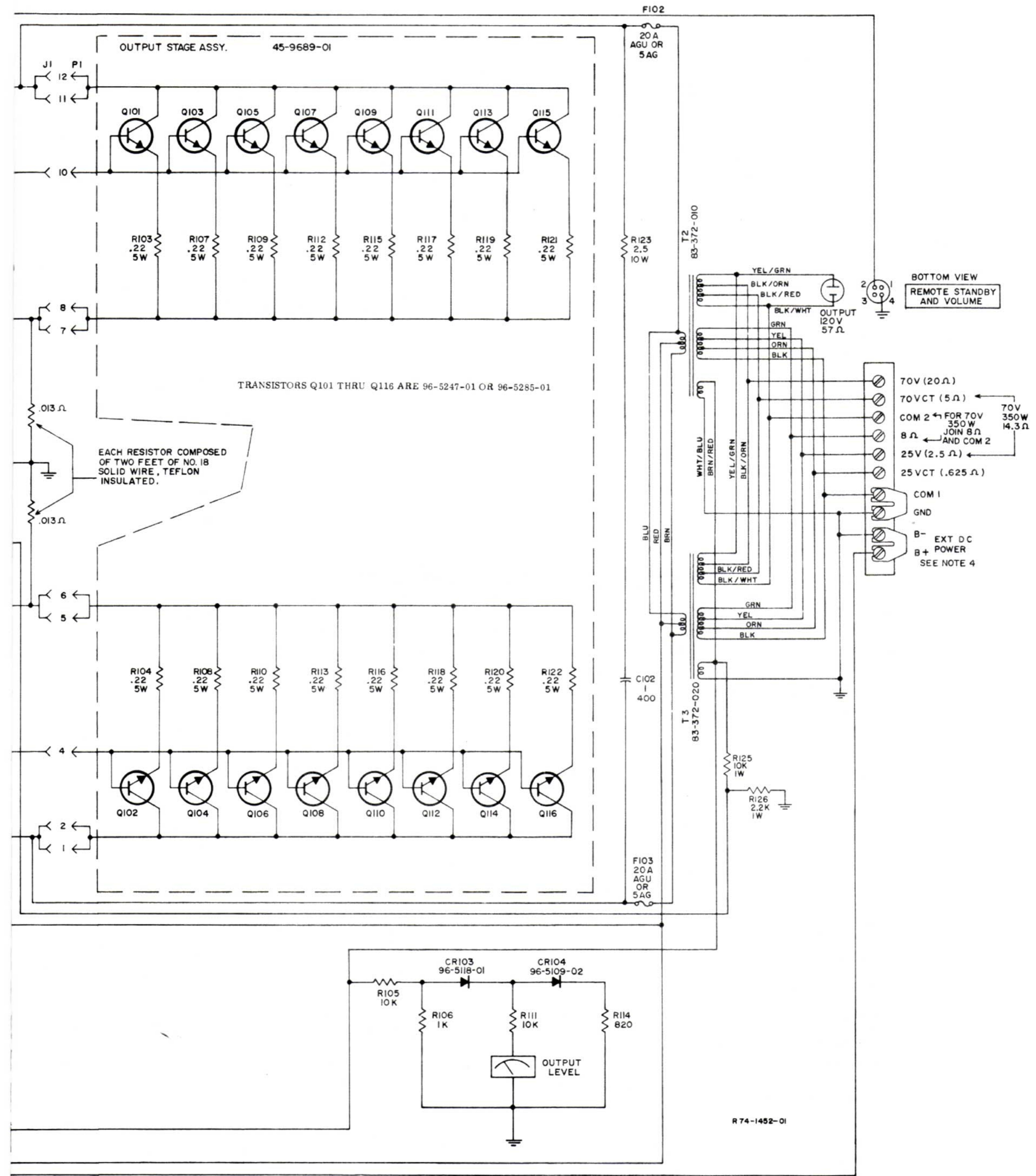
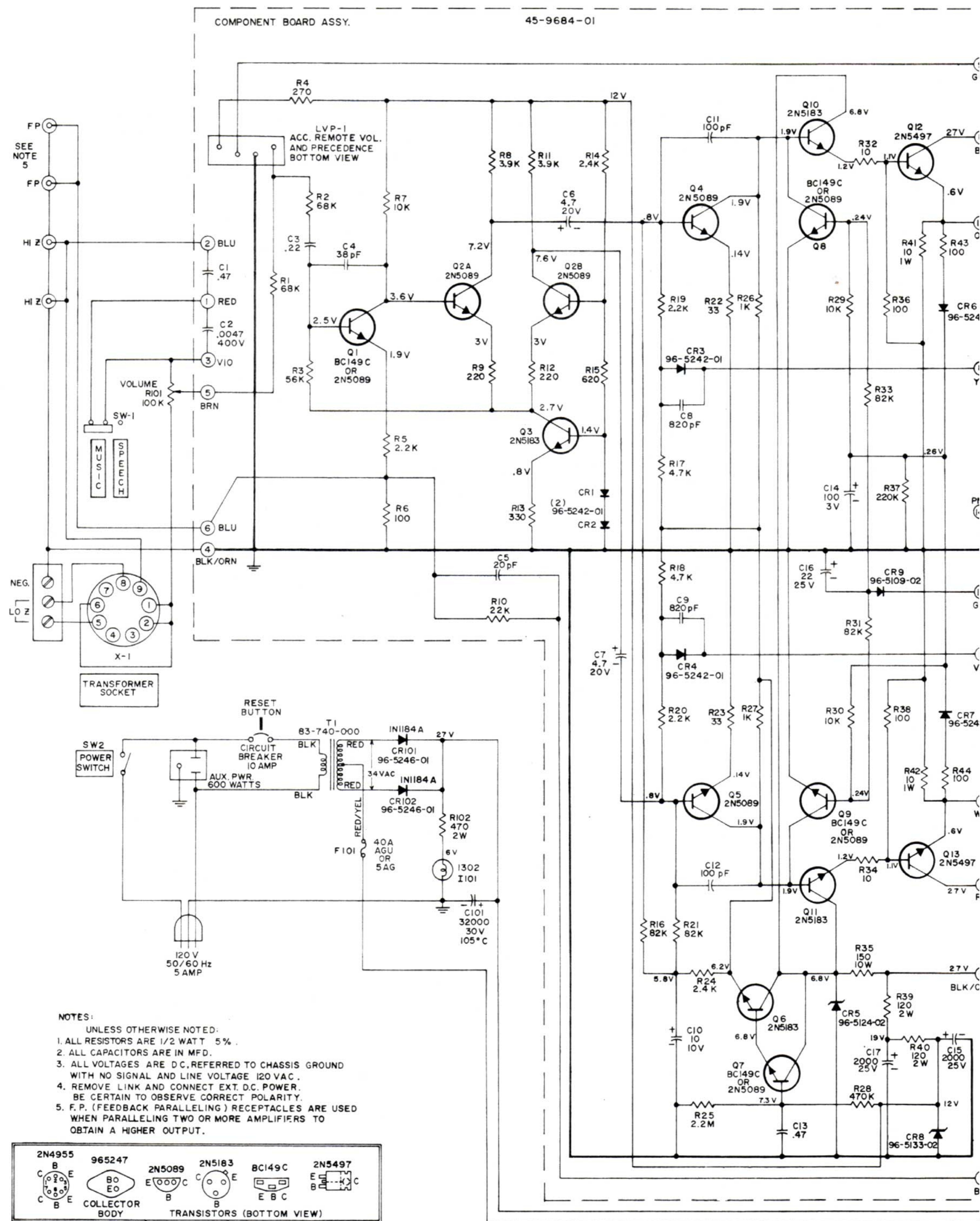


Figure 7 - Schematic Diagram Model NTB250 Booster Amplifier

REMOVABLE ASSEMBLIES

The Electronic Component Board Assembly and the Output Stage Assembly may be readily removed from the chassis to facilitate servicing as shown in figure 6. The component board is detached by removing five Phillips head screws which fasten it to the mounting plate and disconnecting the push-in wire plugs. The output stage, consisting of the output transistors mounted on an extrudable aluminum heat sink, is detached from the chassis by removing the four Phillips head screws on the heat sink and then unplugging the assembly.

CAUTION

There are no user serviceable parts in the chassis, and no replacement or repair should be attempted except by a qualified service technician.

FUSE REPLACEMENT

In addition to the 10-ampere circuit breaker for the ac power line, a 40-ampere cartridge fuse is located on the top chassis to protect the dc lines (see figure 1). This fuse should be replaced only with a 40-amp AGU or 5AG fuse.

The output lines are also protected by two 20-ampere fuses located on the rear panel and shown in figure 1. These fuses should be replaced with 20-amp

AGU or 5AG fuses only. Unscrew the fuse cap and remove the fuse from the holder.

PILOT LIGHT

The power-on indicator light on the front panel utilizes a long-life bulb, which will seldom require replacement. If it should burn out, however, it may be easily replaced. Unscrew the lens cap on the front panel (see figure 6) and remove the lamp. Replace with a 6.3-volt .050 amp miniature lamp, G.E. 1302,

TRANSISTORS

Transistors show little, if any, deterioration with age and, at the present time, are considerably more reliable than the best vacuum tubes. Therefore, some transistors are soldered into equipment like resistors or capacitors. If the set is inoperative, it generally is safe to assume that these transistors have not failed and that the trouble is elsewhere in the equipment.

However, if previous tests indicate that a transistor might be faulty, it must be removed from the circuit for checking. The plug-in transistors in the output stage can be easily replaced after detaching the output stage assembly as described above. After removing defective transistor, brush a silicon grease compound such as Dow Corning No. 340 on the heat sink and transistor. Make certain that no foreign matter remains on heat sink or transistor. To insure proper contact, screw down plug-in transistors tightly.

REPLACEMENT PARTS

The components used in Bogen equipment, with exception of items listed below, are standard parts available through most parts jobbers. However, several parts should be replaced only with genuine Bogen parts. These parts are listed here and are available through Bogen distributors, service agencies or directly from the factory.

When ordering a part, specify part number and description of the part as listed below. Specify the model and give the series designation, which is a run letter followed by numbers, stamped or screened on the rear of the chassis. Also, give the component board assembly number (45-) for all parts mounted on PC boards. For reference designations, see the schematic diagram, figure 6.

Ref. No.	Part No.	Description
C101	79-108-002	Capacitor, 32,000 μ F, 30V, 105C
CR101, 102	96-5246-01	Diode, Silicon Rectifier
CR103	96-5118-02	Diode, 15 PIV, 30 ma
CR104	96-5109-02	Diode, 150 PIV, 100 ma
F101	94-0006-06	Fuse, 40 A, 32 V
F102, 103	94-0006-04	Fuse, 20 A, 32 V
I101	94-0222-01	Lamp, Power Indicator
R101	77-001-605	Volume Control, 100 K Ω
R123	76-121-002	Resistor, 2.5 Ω , 10 W
T101	83-740-000	Transformer, Power
T102	83-372-010	Transformer, Output
T103	83-372-020	Transformer, Output
	85-0147-02	Plug, Remote Standby & Volume
	85-0109-01	Plug, Polarized, 120 V Output
	70-9166-01	Link, Output Terminal Strip

ELECTRONIC COMPONENT BOARD ASSEMBLY Part No. 45-9684-01

C6, 7	79-504-040	Capacitor, Tantalum 4.7 μ F, 20V
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Ref. No.	Part No.	Description
C10	79-504-048	Capacitor, Tantalum, 10 μ F, 10 V
C14	79-508-002	Capacitor, Tantalum, 100 μ F, 3 V
C15, 17	79-106-003	Capacitor, Electrolytic, 2000 μ F, 25 V
CR1-4, 6, 7	96-5242-01	Diode, Stabistor, Silicon
CR5	96-5124-02	Diode, Xener, 6.8 V
CR8	96-5138-02	Diode, Zener, 12 V
CR9	96-5109-02	Diode, Silicon 150 PIV
Q1, 7, 8, 9	96-5229-01	Transistor, BC149C
Q2A, 2B, 4, 5	96-5213-01	Transistor, 2N5089
Q3, 6, 10, 11	96-5244-01	Transistor, 2N5183
Q12, 13	96-5245-01	Transistor, 2N5497
R42	76-121-001	Resistor, 150 Ω , 10 W

OUTPUT STAGE ASSY., PART NO. 45-9689-01

Q101-116	96-5247-01	Transistor
	or	
	96-5285-01	
R101-116	76-113-098	Resistor, 0.22 Ω , 5 W