BOGEN®
A DIVISION OF LEAR SIEGLER, INC.

250-Watt
Booster Amplifier

Model MT250

DESCRIPTION

The Model MT250 Booster Amplifier provides a rated output of 250 watts (rms) at less than 1% distortion over the frequency range of 40 to 14,000 Hz, and 300-watts (rms) at less than 2% distortion between 50 and 12,000 Hz. Frequency response of the Model MT250 is ±2 dB from 20 to 20,000 Hz.

In addition to 8-ohm, 25-volt and 70-volt output terminals on the rear of the amplifier, a direct output is provided at a rated impedance of 0.75 ohms. A polarized output receptacle also provides a source of 120 volt ac power, at any frequency between 35 and 10 kHz, for shake tables and similar industrial applications.

The booster amplifier will accept a high-impedance unbalanced input, or high or low impedance, balanced sources by means of accessory plug-in transformers. Only 250 millivolts input is required for full-rated output.

A power switch and power indicator are provided on the front panel. The rear panel has a screwdriver-adjustable level control, a speech filter switch, and a circuit breaker that prevents the amplifier from drawing excessive primary current.

All internal circuitry is readily accessible from the top of the unit, and the output transistors are located on heat sinks secured to the sides. These heat sinks also contain a thermostat that automatically cuts off the input signal when the heat sink temperature reaches 95°C (203°F). An output bias compensation transistor is located on the chassis wall close to the heat sinks.

The amplifier, which normally operates from a 105-125 volt, 50-60 Hz source, is designed for emergency operation from a dual (+ and -) 24-volt battery supply (such as four 12-volt batteries). The amplifier is also equipped with power output terminals which provide +22 and -22 volts dc at 100 milliamperes for external equipment, regardless of the primary power source to the amplifier. Overall dimensions of the amplifier are 17⅛ inches wide, 7½ inches high and 11¾ inches deep. The unit has mounting feet for bench or shelf installation and may be rack mounted by means of the Bogen Model RPK-36 Rack Mounting Kit.

TECHNICAL SPECIFICATIONS

POWER OUTPUT: 250 watts (rms), 40 - 14,000 Hz @ less than 1% distortion; 300 watts (rms), 50 - 12,000 Hz @ less than 2% distortion.
PEAK POWER OUTPUT: 600 watts.
POWER GAIN: 80 dB at 300 watts.
FREQUENCY RESPONSE: ±2 dB from 20 - 20,000 Hz.
REGULATION: Better than 2 dB from no load to full load.
SENSITIVITY: 250 mV for rated output.
NOISE LEVEL: -83 dB below rated output.
INPUT IMPEDANCE: Hi-Z, 50k; Lo-Z, 500/600 ohms with TL600 xfmr; Bridging, 10k ohms with TL10k xfmr.
OUTPUT CONNECTIONS: 25V, 45V, 70V and 120V balanced; 14V direct, unbalanced.
OUTPUT IMPEDANCES (Balanced and Unbalanced): 0.75, 1.0, 2, 2.5, 8, 16, 20, and 58 ohms.
AC POWER OUTPUT: 300 watts of 120-volt sine wave power for industrial applications at variable frequencies between 35 and 10,000 Hz, when driven from suitable input signal source.
CONTROLS AND INDICATORS: Front panel — Power switch and power-on indicator. Rear panel — Speech filter switch (-5dB @ 100 Hz), input level control, and ac circuit breaker.
POWER REQUIREMENTS: 105-125 volts, 50/60 Hz ac; or dual 28 Vdc @ 8 amps.
LINE CORD: Three-wire type SJ with three-prong grounded plug.
AUXILIARY RECEPTACLE: Three-wire grounded, 600 watts @ 120 volts.
POWER CONSUMPTION: 105-125 Vac 50/60 Hz; 750W @full rated output, 75W @ idle. Dual (+ and -) 24 Vdc; 8A @ full rated output, 500 mA @ idle.
CIRCUIT PROTECTION: 10-amp breaker for ac line; electronic overload protection; thermostatic temperature protection.
TEMPERATURE RANGE: -20°C (-4°F) to +55°C (+130°F).
SEMICONDUCTORS: All-silicon, 27 transistors and 9 diodes.
DIMENSIONS: 17⅛" wide x 7½" high x 11¾" deep.
RACK PANEL MOUNTING: RPK-36 accessory with 19" x 8¾" rack mounting adaptor panel.
FINISH: Low-lustre black.
WEIGHT: Shipping 55 lb., net 50 lb.
ACCESSORIES: TL600 plug-in 500/600 ohms line transformer. TL10K plug-in 10,000 ohms bridging transformer. RPK-36 19" x 8¾" Rack Mounting Kit.

Printed in USA
904

54-5643-07

INSTALLATION

UNPACKING

The power amplifier was carefully checked before leaving the factory. Inspect both the amplifier and its shipping container for indications of improper handling. Report any equipment damage immediately to the distributor from whom the unit was purchased. If the amplifier was shipped to you, notify and place your claim with the shipping carrier without delay.

NOTE

Do not discard the small envelope packed with the amplifier.

EQUIPMENT CONNECTIONS

AC POWER CONNECTIONS. The ac line cord has a three-prong plug which should be plugged into a three-wire, grounded 120-volt, 50/60 Hz outlet. This automatically will ground the chassis. If a grounded three-wire outlet is not available, install an adapter (e.g., Leviton No. 5017) and connect the adapter pigtail to a reliable electrical system ground (such as grounded wall-plate screw, separate ground wire, etc.)

AUXILIARY DC POWER CONNECTIONS. The unit may be powered from a dual (+ and -) 24-volt battery supply (28 volts at full charge), such as four fully charged 12-volt automotive-type storage batteries connected in series with center tap. The unit is supplied with a three-pin male plug (in envelope) for connecting the dc supply to the EXTERNAL DC OPERATION receptacle (see figure 5). The power switch and the Power On indicator are not functional with dc operation. An emergency battery supply may be left permanently connected to the amplifier via the circuit shown in figure 1, which also provides a trickle charge for the batteries. *It is important to provide fuses or circuit breakers for the dc circuit.*

Caution

Observe polarity on all dc power connections.

INPUT CONNECTIONS. There are two sets of input terminals for accepting either high-impedance unbalanced, or balanced inputs.

HI-Z Unbalanced Input. A high impedance (50,000-ohm) unbalanced input is available between the HI-Z and GND input terminals (see figure 5). Minimum input level is 250 mV for full rated output. Use single-conductor, low capacity shielded wire.

Balanced Input. A balanced input is provided at the BAL INPUT terminals. Use two-conductor shielded wire, and connect the shield to the GND terminal. The input requires

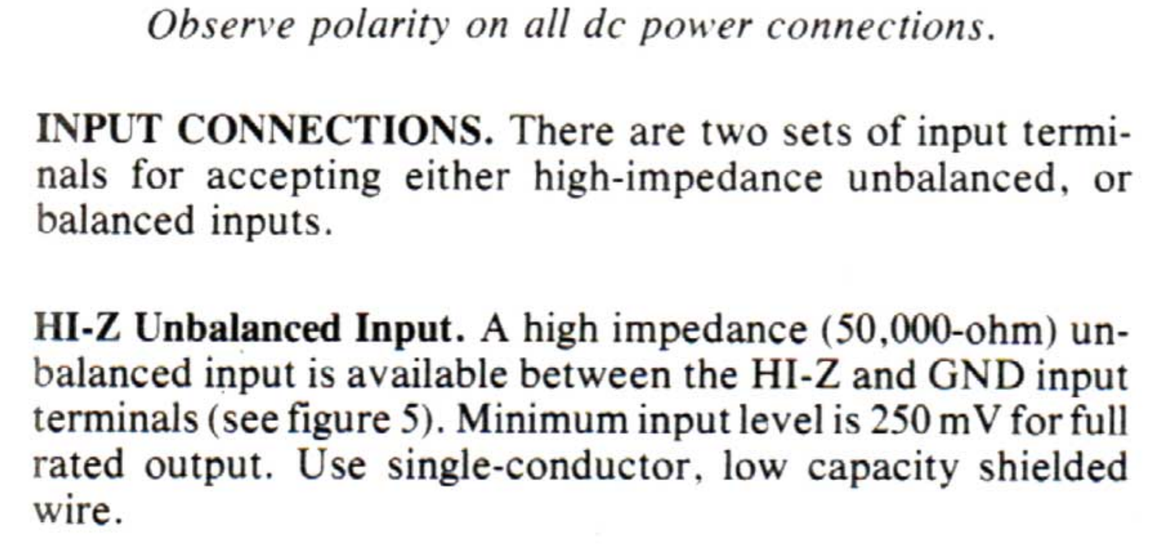


Figure 1 — Trickle Charge Circuit for Auxiliary Supply.

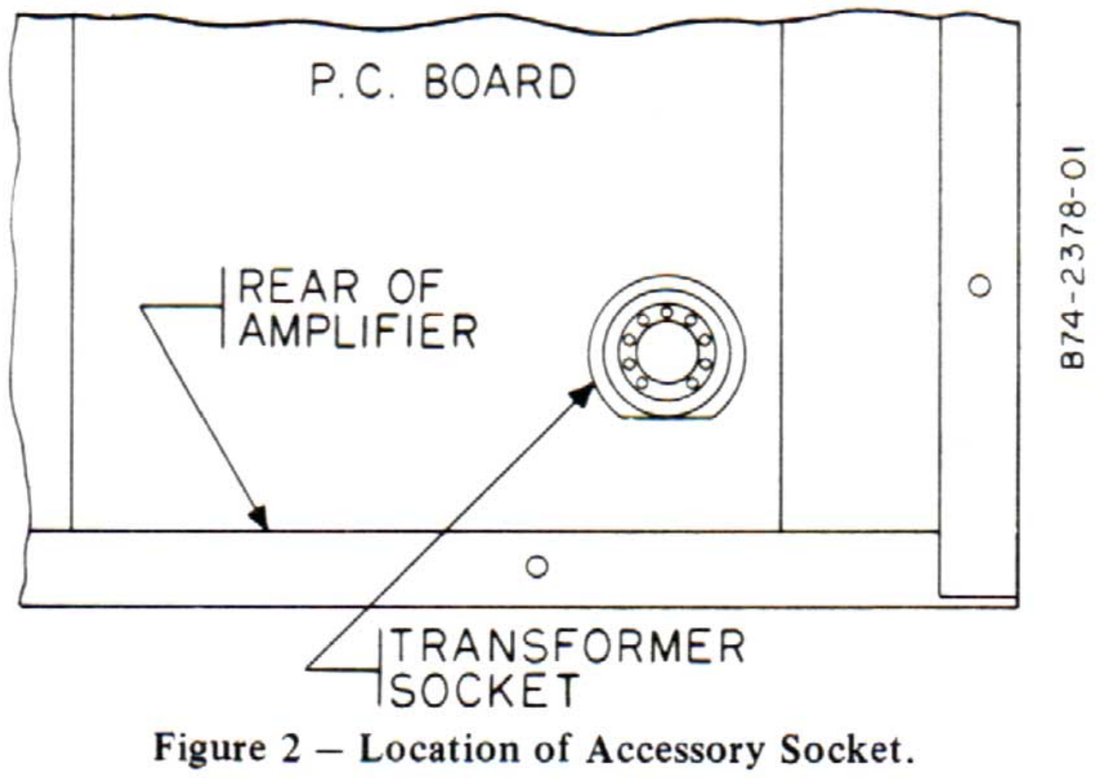


Figure 2 — Location of Accessory Socket.

installation of a matching transformer on printed circuit board A1 (see figure 2) which is accessible by removing the top cover from the unit. Install either a Model TL600 for low-impedance (500/600 ohm) or a Model TL10K for high-impedance (10,000 ohms) input.

Caution

All work done inside the unit must be performed by qualified personnel. Disconnect all power sources before removing top cover.

OUTPUT CONNECTIONS. Figures 3 and 5 show the location of the output connection strip, and the 120 Vac output receptacle.

Caution

Many loudspeakers can be damaged if overdriven. Do not connect speakers without first checking the output level (refer to text under "Input Level Control", in Controls and Indicators section).

RACK MOUNTING

The booster may be installed in a standard 19-inch rack panel by means of a Bogen Model RPK-36 Rack Panel Assembly. To install the booster in the rack panel assembly, proceed as follows:

a. Remove four front screws securing booster top cover (do not remove cover).

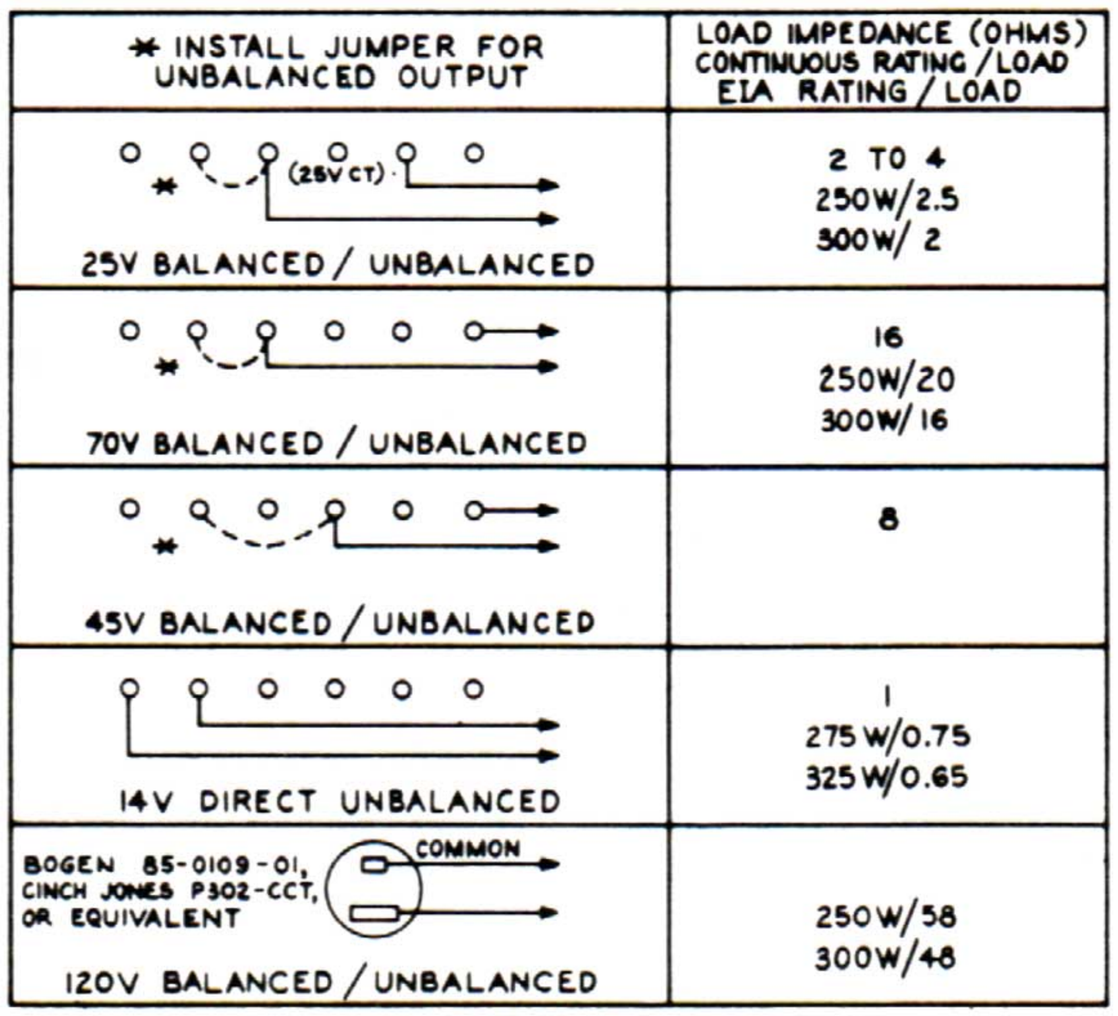
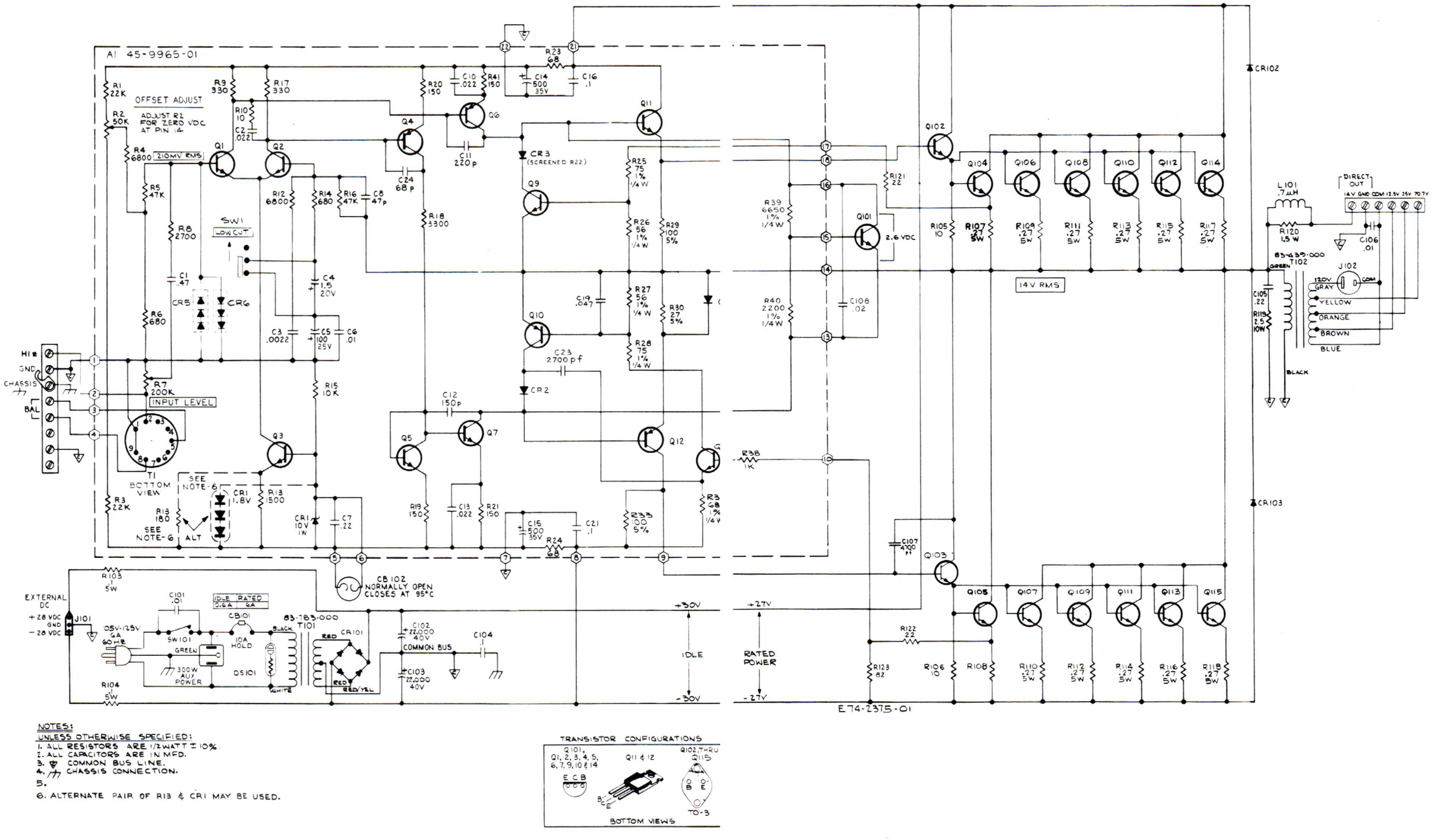


Figure 3 — Output Options.



NOTES:
UNLESS OTHERWISE SPECIFIED:
1. ALL RESISTORS ARE 1/2 WATT ± 10%.
2. ALL CAPACITORS ARE IN MFD.
3. ⏚ COMMON BUS LINE.
4. ⏚ CHASSIS CONNECTION.
5.
6. ALTERNATE PAIR OF R13 & CR1 MAY BE USED.

TRANSISTOR CONFIGURATIONS

Figure 4 – Model MT250 Booste plifier, Schematic Diagram.

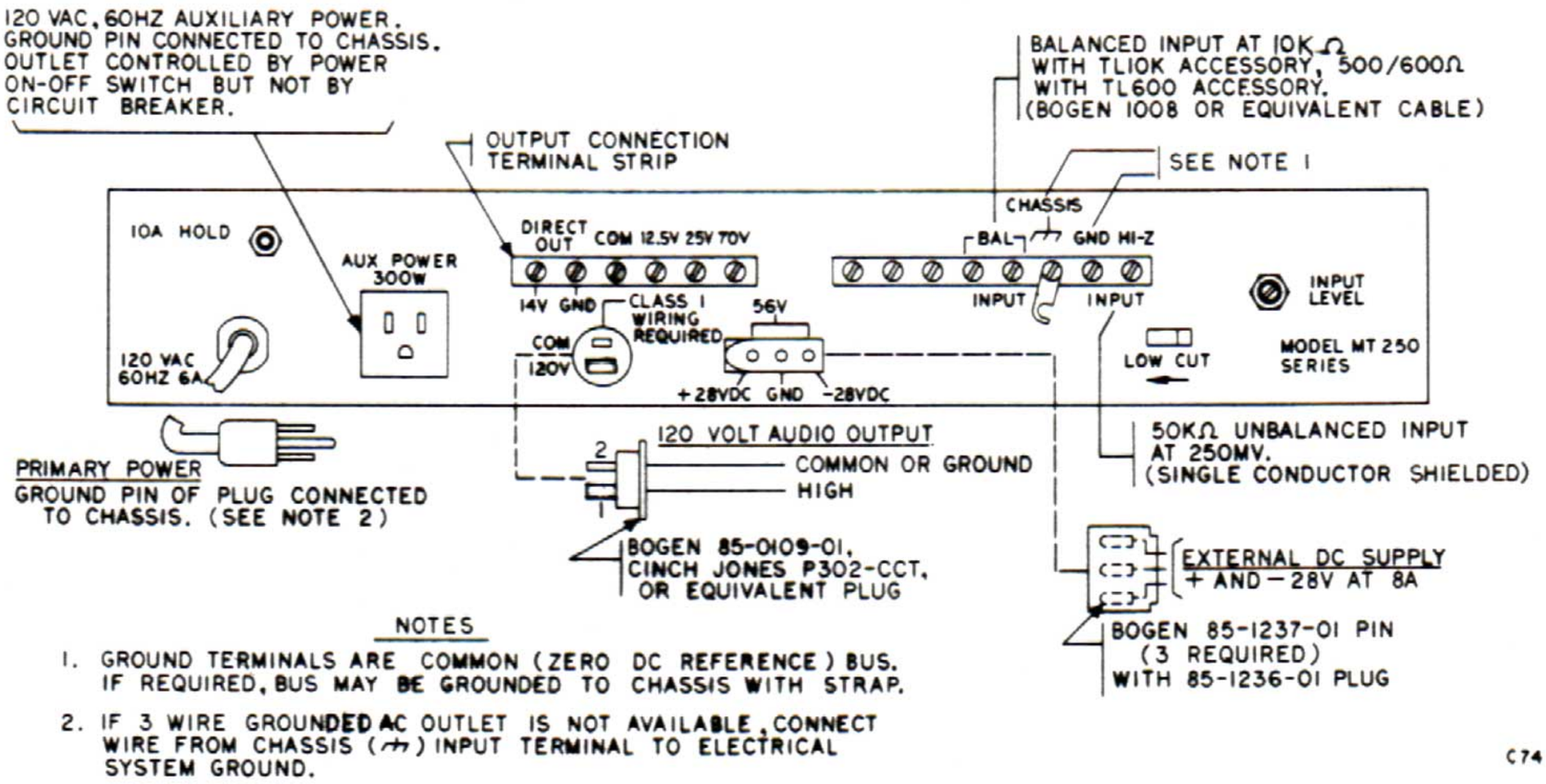


Figure 5 — Model MT250, Equipment Connections.

b. Using a narrow-bladed instrument, pry off the existing nameplate from top cover.
c. Attach new nameplate, supplied with Model RPK-36, to front of rack panel with double-backed adhesive tape (also supplied with RPK-36).
d. Install front panel on MT250, using four ¼ x 20 screws supplied with the RPK-36, into the four threaded holes provided on the booster.

CONTROL OPERATION

TABLE 1 — CONTROLS AND INDICATORS

Control or Indicator	Function
	Front Panel
Power switch	Controls ac power to booster.
Power indicator	Lights when ac power is applied to booster. Not operative with dc power input.
	Rear Panel
LOW CUT switch	Provides 5 dB attenuation at 100 Hz.
INPUT LEVEL control	Accommodates signal level applied to booster. Turn clockwise to increase level applied to booster.

Caution

Many loudspeakers can be damaged if overdriven. Therefore, always begin system setup with INPUT LEVEL control fully counterclockwise and gradually increase the setting to obtain the desired output level.

Circuit Breaker	Opens when booster draws more than 10 amperes from ac line.

ACCESSORIES

MODEL TL600 TRANSFORMER

The Bogen Model TL600 line matching transformer provides a balanced 500/600-ohm input for low-impedance sources.

MODEL TL10K TRANSFORMER

The Bogen Model TL10K matching transformer provides a balanced 10,000-ohm input for high-impedance sources.

RPK-36 RACK MOUNTING KIT

The Bogen Model RPK-36 Rack Mounting Kit is designed to mount the amplifier in a standard 19-inch equipment rack. The rack panel is finished in gray enamel.

MAINTENANCE

Caution

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

BOGEN SERVICE

We are interested in your Bogen equipment for as long as you have it. If a problem is encountered in the use of this equipment, 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, together with a list of such equipment. When we receive this information, we will send you suggestions to correct system deficiencies or, if equipment servicing appears in order, we shall send you the name and address of the nearest authorized Bogen service agency to which you can send your unit for repairs.

When shipping your unit, pack it 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 responsible carrier. The unit will be promptly repaired and returned to you express collect.

GROUNDING

The terminal labeled "GND" on the rear of the booster is at a common zero dc reference level. In some installations, noise or hum may be encountered that requires connecting this

common reference to the chassis. This may be done with the link provided between the "CHASSIS" and "GND" terminals.

Note

In a properly installed system, the booster chassis will be tied to the electrical system ground via the 3-wire ac plug.

OUTPUT OFFSET VOLTAGE ADJUSTMENT (For Qualified Service Personnel Only)

Caution

The following adjustment requires removal of the top cover. Use standard precautions to prevent electric shock or accidental short circuits within the unit.

This is a factory adjustment that normally is not required in the field. If repairs are made to the amplifier, an offset adjustment may be needed. To determine this, proceed as follows:

a. Remove the input signal and connect a dc voltmeter with 100 mV full-scale range to pins 14 (high) and 7 (common) of circuit board A1.
b. If the meter indicates more than 0V ±10 mV, carefully turn the adjustment knob on potentiometer R2 for a meter reading of less than ±10 mV.

REPLACING COMPONENTS

All semiconductor components on the printed circuit board are soldered in place to ensure maximum reliability. When soldering or unsoldering transistors or diodes, use a heat sink (such as a small alligator clip) between the component and the source of heat. When replacing driver and output transistors (Q102-Q115), be certain to install the collector insulator, after lightly coating both sides with a thermal conducting compound (such as Dow Corning No. 340, or equivalent). Also, be certain to reinstall any transistor covers that were removed during maintenance procedures.

Caution

Improper soldering may damage components on the printed circuit board, and such damage can void the warranty.

REPLACEMENT PARTS

Most components used in the unit are standard parts available through reputable parts suppliers. The parts listed here may be obtained from Bogen distributors, service agencies, or directly from the factory. When ordering a part, specify the part number and the model of the unit. Also, give the SERIES designation, which is a letter followed by numbers, usually stamped on the chassis directly under the model designation. For parts on printed circuit boards, include the PC board assembly number, which begins with "45."

Standard components may be obtained from any reputable source if no manufacturer is specified, except that components listed as "selected" must be from Bogen. Where a manufacturer is specified, only that manufacturer's component should be used.

Ref. No.	Part No.	Description
A1	**45-9965-01**	**PC Board Assembly**
C4	79-510-003	Capacitor, Tantalum, 1.5μF, 20V
C5	79-008-047	Capacitor, Electrolytic, 100μF, 25V
C14, 15	79-008-049	Capacitor, Electrolytic, 500μF, 35V
CR1, 5, 6	96-5202-01	Triple Diode
CR2, 3, 4	96-5333-01	Diode, 1A, 400 PRV, 1N4004
Q1, 2	96-5394-01	Transistor, Selected
Q3	96-5298-01	Transistor, SPS1910
Q4, 6	96-5365-01	Transistor, MPSA56
Q5, 7, 14	96-5364-01	Transistor, MPSA06
Q9	96-5391-01	Transistor, Selected
Q10	96-5392-01	Transistor, Selected
Q11	96-5367-01	Transistor, 2N6473
Q12	96-5368-01	Transistor, 2N6475
R2	77-007-003	Control, Offset, 50k, Linear, Trim Pot
R7	77-001-743	Control, Level, 200k, Linear, 1/4W
R25, 28	75-154-750	Resistor, 75Ω, 1%, 1/4W
R26, 27	75-154-560	Resistor, 56Ω, 1%, 1/4W
R36	75-154-680	Resistor, 68Ω, 1%, 1/4W
R39	76-521-010	Resistor, 6650Ω, 1/4W, 1%
R40	75-154-222	Resistor, 2200Ω, 1/4W, 1%
SW1	81-003-064	Switch, Lo-Cut, DPDT, 0.5A

Chassis Electrical Parts

C101	78-200-116	Capacitor, .01μF, 1400V, Disc
C102, 103	79-115-001	Capacitor, Electrolytic, 22,000μF, 40V
CB101	94-0015-02	Circuit Breaker, 10A Hold
CB102	94-0018-01	Thermostat, Normally Open, 95°C Close
CR101	96-5373-01	Bridge Rectifier, 35A
CR102,103	96-5022-01	Diode, 1A, 400 PRV
DS101	94-0302-06	Indicator Assembly, 110 Vac, Red
L101	95-5173-01	Inductor, 0.7μH
Q101	96-5213-01	Transistor, 2N5089
Q102, 103	96-5370-01	Transistor, 2N5878
Q104-115	96-5385-01	Transistor, RCA 2N3055 H
R103, 104	76-114-101	Resistor, WW, 0.1Ω, 5W
R107-118	76-114-105	Resistor, WW, 0.27Ω, 5%, 5W
R119	76-121-002	Resistor, WW, 2.5Ω, 10W
R120	76-114-104	Resistor, 1Ω, 5W
SW101	81-009-025	Switch, SPST, 125 Vac, 15A
T101	83-783-000	Transformer, Power
T102	83-448-000	Transformer, Output

Miscellaneous Parts

—	85-1236-01	Plug, Male, for J101
—	85-1237-01	Pin, for above plug (3 required)
—	85-0109-01	Plug, Male, for J102

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