

# BOGEN®

## COMMUNICATIONS, INC.

### POWER MOSFET AMPLIFIER

HTA-125A, HTA-250A

The Bogen Models HTA-125A and HTA-250A HI-TEK Professional Series Power Amplifiers are high-performance units employing state-of-the-art Power MOSFET technology. The Power MOSFET offers many advantages over conventional amplifier circuitry and delivers distortion-free power into reactive loads, such as high-performance loudspeakers or transformers.

The Model HTA-125A supplies 125 watts (HTA-250A supplies 250 watts) continuous rms output at less than 0.5% total harmonic distortion, with a frequency response of  $\pm 1\text{dB}$  from 20Hz to 20KHz.

An input signal of only 500mV is required for full rated output (150mV for low-impedance balanced input with Model TL-600 accessory transformer). Input impedances are: high-impedance unbalanced; low-impedance balanced, with TL-600 accessory transformer. Outputs include 4-ohm, 8-ohm, 25V (combined with 4-ohm output in HTA-125A), 25VCT, and 70.7V. Line-bridging may be achieved with accessory transformers.

The amplifiers are thermally protected to prevent damage due to excessive temperatures; however, they will deliver the full rated power output continuously, even at  $+49^\circ\text{C}$ . The unique self-protecting output stage prevents thermal runaway which is often encountered in conventional amplifiers. A temperature increase in the MOSFET has the effect of reducing device current, thereby decreasing power dissipation and maintaining the temperature constant.

Electronic shutdown circuitry is activated if an overload or short occurs and a front panel OVERLOAD SHUT DOWN LED illuminates. Once the cause has been rectified, the unit automatically resets. The power on/off switch, located on the front panel, illuminates when power is on. The rear panel contains an Input Level control, Input and Output connections, AC Line Fuse and an Auxiliary Receptacle. A Low-Cut Filter switch is located internally on the printed circuit board.

### INSTALLATION

#### UNPACKING

The amplifier was thoroughly checked before leaving the factory. Inspect the amplifier and shipping container carefully for evidence of improper handling during shipment. In case of damage, make an immediate claim to the dealer or distributor from whom the unit was purchased. If the amplifier was shipped to you, notify the carrier without delay and file a claim.

#### RACK MOUNTING INSTALLATION

The amplifier is designed for installation in a standard 19-inch equipment rack. Position the unit in the rack and secure with screws through the amplifier front panel.

##### Note

*Before placing the amplifier in a rack, install any accessory transformers required. See INPUT CONNECTIONS.*

#### VENTILATION

The amplifier generates heat during operation. Although the amount of heat is relatively low, the amplifier must be ventilated to prevent excessive temperature rise. If other heat-producing equipment, or several amplifiers have been installed in an enclosed rack or cabinet, ensure that the ambient temperature does not exceed  $+49^\circ\text{C}$ . To determine this, operate the system until the temperature stabilizes, then measure the air temperature near the amplifier, using a bulb-type thermometer. If the temperature exceeds  $+49^\circ\text{C}$ , space equipment farther apart or install a fan.

#### 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 amplifier. If the outlet is not properly grounded, connect a wire from the GND terminal of the amplifier to a suitable earth ground.

#### AUXILIARY POWER

##### Caution

*The front panel on/off switch does not control the auxiliary receptacle.*

The auxiliary power receptacle on the rear panel is a three-wire grounded outlet and may be used to supply power to accessory equipment in the sound system. Ensure that the accessory equipment does not require more than 300 watts. Equipment connected to the auxiliary receptacle with a three-prong line cord will be grounded, providing the amplifier line cord has been properly grounded.

TECHNICAL SPECIFICATIONS

	Model HTA-125A	Model HTA-250-A
Rated Output Power:	125 watts (rms continuous)	250 watts (rms continuous)
Distortion:	Less than 0.5 % THD into rated load impedances	Less than 0.5 % THD into rated load impedances
Frequency Response at Rated Output	±1dB from 20Hz to 20KHz	
Input Sensitivity:	High impedance: 500mV; low impedance: 150mV with TL-600 accessory transformer	
Hum and Noise:	90dB below rated output (20Hz to 20KHz)	
Output Loads:	4-ohm/25V, 8-ohm, 25VCT, 70.7V	4-ohm, 8-ohm, 25V, 25VCT, 70.7V
Output Regulation:	Better than 2dB from no load to full load	
Input Impedance:	High impedance, 50k-ohms unbalanced; Low impedance 600-ohms balanced, with TL-600 accessory transformer; 1:1 line bridging with accessory transformers TL100	
Low-Cut Filter:	-10dB @ 100Hz (Switch Selectable)	
Controls, Indicators; Front Panel: Rear Panel: Internal:	Illuminated power switch; LED overload shutdown indicator Input level control; Slo-Blo fuse Low-cut filter switch	
Power Requirements; 120VAC, 60Hz @ Full Rated Output: @ Idle:	260W 45W	520W 60W
Overload Protection:	Electronic overload protection (automatic reset)	
Thermal Protection:	220°F (105°C) Thermostat	
Fuse Protection:	4A Slo-Blo fuse	7A Slo-Blo fuse
Operating Temperature:	0°C to +49°C @ rated output	
Auxiliary Receptacle: (not switched)	Three-wire grounded* 300 watts max.	
Overall Dimensions:	19"W x 11"D x 5-3/8"H (48.3 x 27.9 x 13.7 cm)	
Front Panel Dimensions:	19"W x 5-1/4"H (48.3 x 13.3 cm)	
Finish:	Black	
Shipping Weight:	40 lbs. (18.1 kg)	54 lbs. (24.5 kg)
Associated Equipment:	Bogen Model TL-600, 600-ohm line-matching transformer Bogen Model TL-100, 1:1 ratio transformer	

\*This receptacle will be grounded only if the power amplifier has been grounded properly.

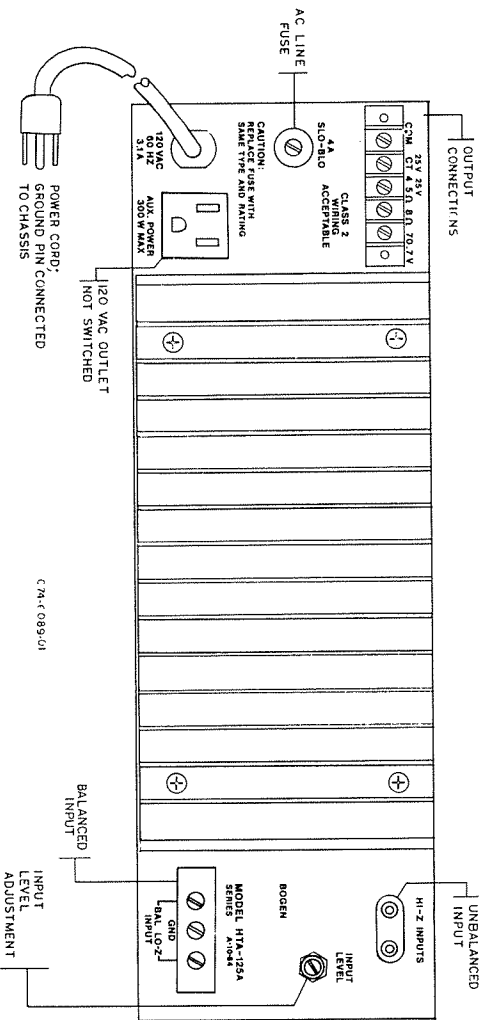


Figure 1 — HTA-125A Rear Panel Connection Diagram

## INPUT CONNECTIONS

### Caution

*The following installation instructions are for use by qualified service personnel only. To avoid an electric shock, do not perform any functions requiring the removal of the cover of the amplifier unless you are qualified to do so.*

**LOW-IMPEDANCE BALANCED INPUT.** A balanced input, provided at the BAL LO-Z terminal strip (Figures 1, 3), requires the installation of a Bogen Model TL-600 line-matching transformer. Remove the top cover of the unit and install the transformer in the socket designated T1 provided on the printed circuit board. An input signal of 100mV is required for full rated output.

**HIGH-IMPEDANCE INPUT.** A high-impedance input is provided by two RCA-type 1/4" phono jacks (see Figures 1, 3). An input signal of 500mV is required for full rated output.

**BRIDGING INPUT.** The inputs of two or more amplifiers may be paralleled without loss of gain. To do this, install a Bogen Model TL-100 transformer (for up to 6 amplifiers) in the transformer socket designated T1 on the printed circuit board. Connect the signal source to the BAL LO-Z terminal strip on the rear

panel. Use the two outside terminals on the input terminal strip and connect the cable shield to the GND terminal. If an unbalanced input is required, connect a jumper wire from the GND terminal to an adjacent input terminal.

**INPUT FROM ANOTHER AMPLIFIER.** The HTA-125A/HTA-250A amplifiers may be driven from an amplifier that provides a 25-volt or 70-volt constant voltage output. Connect the output of the driver amplifier to one of the HI-Z INPUT jacks via a resistor network (see Figure 2). The resistors shown are in addition to the normal loudspeaker load on the output of the driver amplifier.

## OUTPUT CONNECTIONS

### Caution

*Follow local electrical codes when connecting amplifier output.*

Output connections are available on the rear panel terminal strip for 4-ohm, 8-ohm, 25V, 25VCT, and 70.7V (the 4-ohm output is combined with the 25V tap on the HTA-125A). Figures 1 and 3 show the location of the output terminal strip. Class 2 wiring is acceptable for output loads. Refer to Note 2 on the schematic diagram for 4-ohm output impedance in the HTA-125A.

**SPEAKER MATCHING AND POWER DISTRIBUTION.** Use the output connection most nearly equal to the total speaker impedance. If the load impedance falls between two output terminal values, use the terminal of lower impedance. Total power distribution to speakers should not be greater than the power rating of the amplifier. Use the 70.7V terminal for connection to a large number of speakers.

**HUM.** If the connections between the signal sources and amplifier are incorrect or defective, hum-type interference may occur. Check for proper grounding, broken wires, shields, poor connector contacts, etc. Keep input cables away from speaker cables, and speaker cables away from transformers and AC power lines. Where a turntable or other auxiliary equipment is used, it may be necessary to connect a separate ground wire from the chassis of such equipment to a suitable earth ground.

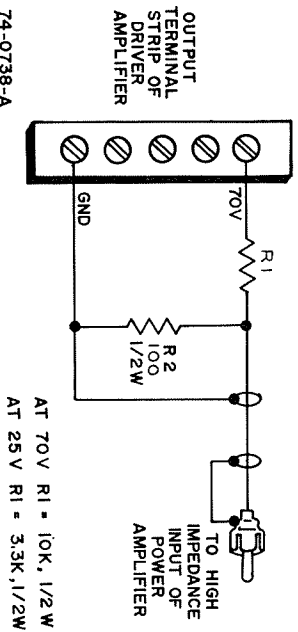


Figure 2 — Input From Another Amplifier

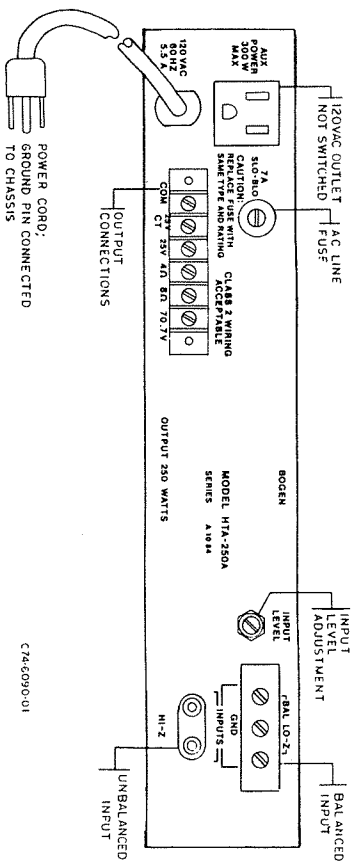


Figure 3 — HTA-250A Rear Panel Connection Diagram

## OPERATION

**POWER.** The power switch applies power to the amplifier; it does not control any associated equipment which may be connected to the auxiliary power receptacle on the rear panel. The POWER SWITCH illuminates when power has been applied to the unit.

**LOW-CUT FILTER SWITCH.** The Low-Cut Filter switch designated SW 1 is located next to the transformer socket on the printed circuit board and is accessible by removing the top cover of the amplifier. The switch provides -10dB attenuation @ 100Hz.

### Caution

*To avoid an electric shock, do not perform any functions requiring the removal of the cover of the amplifier unless you are qualified to do so.*

**INPUT LEVEL CONTROL.** The input level control (see Figures 2,3), located on the rear panel, adjusts the input signal applied to the amplifier. Turn the adjustable screw clockwise to increase the level.

### Warning

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

**OVERLOAD SHUT DOWN INDICATOR.** Electronic shutdown circuitry activates whenever an overload or short occurs on the output of the amplifier. The front panel OVERLOAD SHUT DOWN LED illuminates indicating the discontinuation of power output; once the cause has been determined and rectified, the unit automatically resets.

**THERMAL CUT-OUT.** The amplifier is protected by a thermal cut-out which should not trip under normal conditions. If it trips, check for inadequate ventilation of the unit or for overloading. The cut-out will automatically reset after cooling.

**AC LINE FUSE.** Figures 2 and 3 show the location of the AC line fuse. Replace the fuse only with same type and rating. If a second fuse blows, do not make any attempt to operate the unit. Consult the Bogen Service Department or an authorized service agency.

## MAINTENANCE

### Caution

*There are no user-serviceable parts within the amplifier. Have all internal servicing done by a qualified technician. The warranty will become void if repairs are made by other than the Bogen Service Department or authorized service agency.*

## BOGEN SERVICE

We are interested in the maintenance of your Bogen equipment. In the event of any difficulty, do not hesitate to ask our advice or assistance. Information may be obtained by writing to: Service Department, Bogen Communications, Inc., P.O. Box 575, Ramsey, NJ 07446.

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, such as amplifiers, speakers, etc. We will send you information if the remedy appears simple. If service is required, we will send you the name and address of the nearest authorized Bogen Service Agency.

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 UPS or any responsible carrier. It will be returned to you freight prepaid while in warranty.

## REPLACING COMPONENTS

Most semiconductor components on the printed circuit board are soldered in place to ensure maximum reliability. When soldering or desoldering transistors or diodes, use a heat sink (such as a small alligator clip) between the component and the source of heat. When replacing driver transistors and output (MOSFET) transistors, be certain to install the case/heat sink insulator after

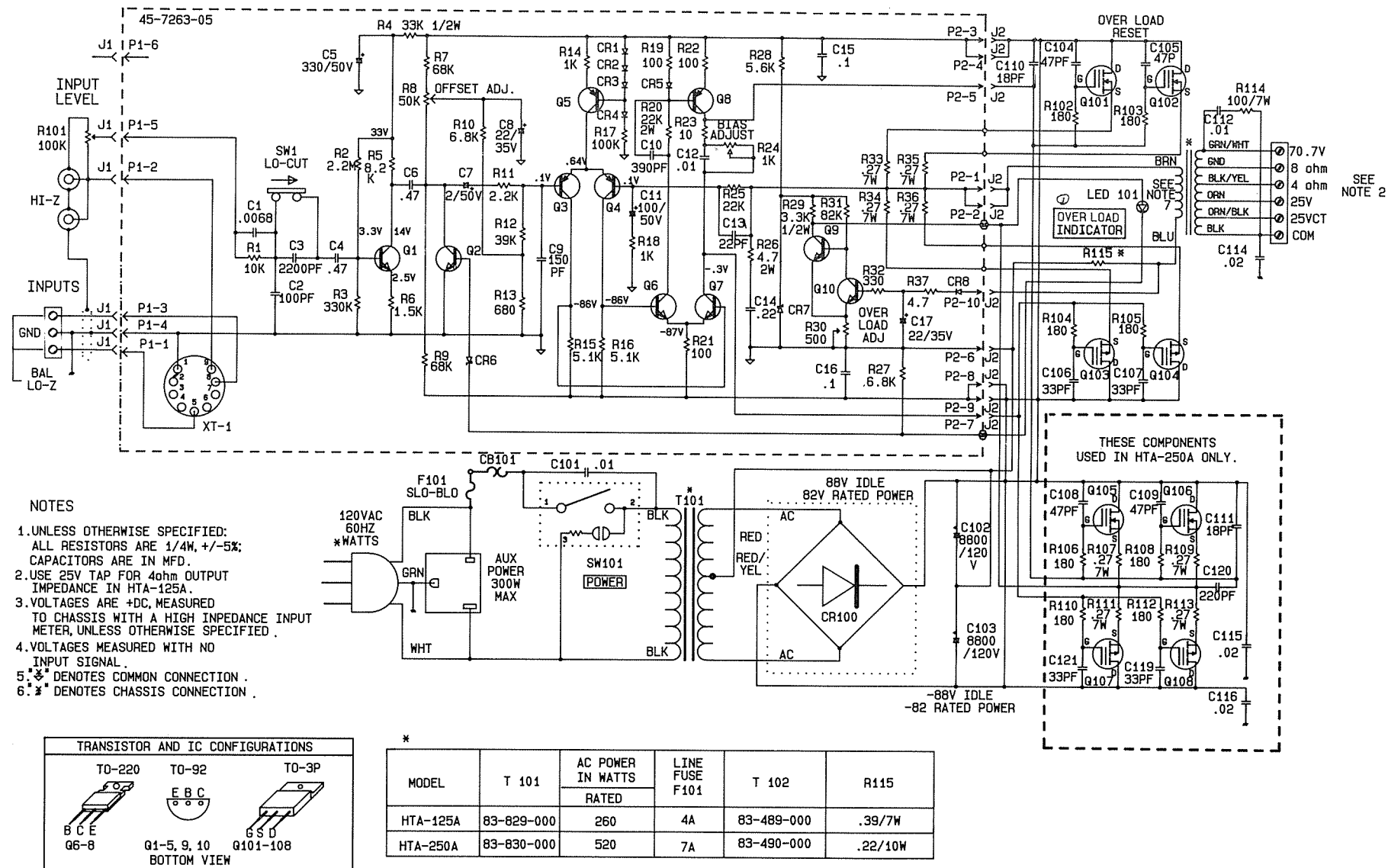


Figure 4 — Schematic Diagram, Models HTA-125A and HTA-250A

lightly coating both sides with a thermal conducting compound (such as Dow Corning No. 340, or equivalent).

Unless you are experienced in the removal of IC micromodules, do not attempt to remove them, since excessive heat can damage an IC and/or the printed circuit board. If you are certain an IC is defective, the easiest method of removal is to cut the leads off close to the component and desolder the leads individually. If you are not certain an IC is defective, the use of a low-wattage vacuum-type desoldering tool is advised.

OUTPUT OFFSET VOLTAGE, BIAS, AND OVERLOAD ADJUSTMENTS

These are factory adjustments that normally are not required in the field. If repairs are made to the amplifier, an offset voltage, bias and overload adjustment may be necessary. This adjustment routine should be attempted only by qualified service personnel.

To adjust the OFFSET VOLTAGE and BIAS, an ammeter and a voltmeter are required; proceed as follows:

1. With power OFF and no input signal applied, disconnect the *gray* lead from the B-connection of filter capacitor C103 and connect an ammeter in series. (Meter pos to gray lead.) Set ammeter to 2 amp. range.
  2. Connect the positive lead from the voltmeter to the output transformer brown lead. Connect the common lead from the voltmeter to the common connection at C102 and C103.
  3. Rotate potentiometer R24 fully *clockwise* for the HTA-125A or fully *counterclockwise* for the HTA-250A.
  4. Turn the amplifier ON. The over-current light should not light; the ammeter should read close to 0mA.
  5. Adjust R8 for a voltmeter reading of 0mV  $\pm$ 2mV.
  6. Slowly adjust R24 to an ammeter reading of 150mA for the HTA-125A or 200mA for the HTA-250A.
- To adjust the OVERLOAD threshold, proceed as follows:
1. Rotate potentiometer R30 fully *clockwise* for the HTA-125A or fully *counterclockwise* for the HTA-250A.
  2. With the unit driver set to 75V at 20Hz, adjust R30 until the front panel OVERLOAD LED comes ON.
  3. Turn down the input and set output to 70.7V at 20Hz. The OVERLOAD LED should go OFF.

ASSOCIATED EQUIPMENT

Model	Description
TL-100	1:1 Line-Bridging Input Transformer
TL-600	Line-Matching Input Transformer, 500/600-ohm impedance

REPLACEMENT PARTS

Most components used in the amplifier 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 description of the part as listed. Specify the model of the unit and give the series designation, which is a letter followed by numbers, located on the rear panel. For parts on the circuit board, also give the component board assembly number, which begins with "45."

Schem. Ref.	Part No.	Description
<i>PC Board</i>		
—	45-7263-05	PC Board Assembly
C5	85-1292-01	Header, 6 Pin, Male
C7	79-008-064	Cap., Elect., 330µF, 50V
C8, 17	79-008-054	Cap., Elect., 2.2µF, 50V
C11	79-008-046	Cap., Elect., 22µF, 35V
CR1-5, 8	79-008-062	Cap., Elect., 100µF, 50V
CR6	96-5333-01	Diode, IN4004
CR7	96-5691-03	Diode, Zener, 1N754, 1/2W, 6.8V
Q1, 2	96-5344-14	Diode, Zener, 2W, 24V
Q3-5	96-5609-01	Transistor, KTC 3200BL
Q6, 7	96-5610-01	Transistor, KTA 1024Y
Q8	96-5611-01	Transistor, 2SC2168
Q9, 10	96-5612-01	Transistor, 2SA958
R8	96-5290-01	Transistor, MPS-A05/KTC3202Y
R24	77-007-003	Trimpot, 50 kilohms
R30	77-007-006	Trimpot, 1 kilohm
SW1	77-007-007	Trimpot, 500 kilohms
	81-003-071	Switch, Slide
<i>Chassis</i>		
C101	78-200-116	Cap., Cer. Disc., .01µF, 1400V
C102, 103	79-118-011	Cap., Elect., 8800µF, 120V
CB101	94-0014-07	Thermostat, Normally Closed
CR101	96-5373-01	Rectifier, Bridge
F101	94-0001-21	Fuse, 4A (HTA-125A)
	94-0001-11	Fuse, 7A (HTA-250A)
LED101	96-5403-01	LED, Red
Q101, 102	96-6000-42	Transistor, 2SJ352
Q103, 104	96-6000-43	Transistor, 2SK2221
Q105, 106	96-6000-42	Transistor, 2SJ352 (HTA-250A)
Q107, 108	96-6000-43	Transistor, 2SK2221 (HTA-250A)
R101	77-001-834	Control, Screw Adj., 100 kilohms
R107, 109, 111, 113	76-116-003	Resistor, .27 ohm, 7W, 10% (HTA-250A)
R114	75-742-101	Resistor, 100 ohms, 7W, 10%
R115	76-121-011	Resistor, .39 ohms, 7W, 10% (HTA-125A)
	76-116-004	Resistor, .22 ohms, 10W, 10% (HTA-250A)
SW101	81-009-036	Switch, Power
T101	83-829-000	Transformer, Power (HTA-125A)
	83-830-000	Transformer, Power (HTA-250A)
T102	83-489-000	Transformer, Output (HTA-125A)
	83-490-000	Transformer, Output (HTA-250A)

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