

BOGEN[®]

COMMUNICATIONS, INC.

**POWER AMPLIFIER WITH
BATTERY BACKUP CAPABILITY**

MODEL MT250D

The Bogen Model MT250D power amplifier delivers 250 watts (rms) at less than 2% distortion. It is designed to operate both from 120/240VAC (50/60Hz) and from a 24-volt battery backup system. A battery saver circuit reduces idling power requirements after at least 20 seconds of no signal.

**UNITS COMPLY WITH STANDARDS FOR FIRE
PROTECTIVE SIGNALLING AMPLIFIERS;
ON/OFF POWER SWITCH IS DISABLED.**

The unit mounts directly in a standard 19-inch equipment rack without the addition of mounting brackets.

The amplifier will accept input from an unbalanced HI-Z source, balanced LO-Z source, or from a telephone line. Input impedance is 50 kilohms, nominal (HI-Z), and 600 ohms for the LO-Z input (requires accessory transformer, Model TL600). The HI-Z input requires 1 volt for rated output. The LO-Z input sensitivity is 200mV with the input selector switch in the HIGH LEVEL position, and 70mV with the switch in the TEL LINE position.

Five output transformer taps are provided on the rear panel: 12.5V, 25V, 8-ohms, 70.7V and 100V. A polarized output receptacle (to minimize shock hazard) is provided for the 100V output.

A LO-CUT switch minimizes response to low-frequency noise spectrum and optimizes speech response. A screwdriver-adjustable INPUT LEVEL control will allow higher inputs without overdrive.

The front panel contains a lighted AC power switch and an overload trip-indicator light.

INSTALLATION

Warning

Some of the procedures in this instruction manual require the removal of the amplifier cover, which presents an electrical shock hazard. For this reason, all internal servicing or modification must be performed by qualified personnel only.

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, place an immediate claim with 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's front panel.

Note

Before installing the amplifier in the rack, perform desired modifications (enable on/off power switch, connect DC power) or install any accessory transformers required.

Technical Specifications

Rated Output Power:	250 Watts
Total Harmonic Distortion:	Less than 2% at rated power, 50 to 15,000Hz
Frequency Response:	±2dB, 20 to 20,000Hz
Hum and Noise:	90dB below rated output
Regulation:	Better than 2dB from no load to full load
Input Sensitivity:	1 Volt for rated output, 200mV with Model TL600 transformer, 70mV with Model TL600 transformer and HIGH LEVEL switch in TEL LINE position
Input Impedance:	HI-Z 50,000-ohms nominal; LO-Z balanced 500/600 ohms with Model TL600 transformer; 1:1 bridging with TL100 transformer
Controls and Indicators:	INPUT LEVEL control, illuminated power switch, LO-CUT filter, HIGH LEVEL/TEL LINE sensitivity switch, OVERLOAD indicator
Constant Voltage Outputs:	12.5V, 25V, 70.7V, 100V
Speaker Impedance Output:	8 ohms
AC Power Consumption (120VAC, 60Hz/240VAC, 50Hz):	650 Watts, 30 Watts standby
DC Current Consumption (24 - 28VDC):	18 Amp; Standby with Battery Saver, 55mA; Standby without Battery Saver, 1.6A
AC Line Fuse, Slo-Blo:	12 Amp
DC Battery Fuse:	20Amp
Circuit Protection:	Thermal cutout, electronic overload circuit, power supply fuses on AC & DC inputs
Auxiliary Receptacle (not switched*):	Three-wire grounded, 300 watts @ 120 volts (except in 240V models)
Overall Dimensions (including removable feet):	19"W x 12-1/2"D x 5-1/2"H (48.3 x 31.7 x 13.9cm)
Front Panel Dimensions:	19"W x 5-1/4"H (48.3 x 13.3cm)
Finish:	Black
Shipping Weight:	60 lbs. (27.2 kg)
Accessory Equipment:	Model TL600, 600-ohm line matching transformer; Model TL100, 1:1 ratio transformer

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

Specifications subject to change without notice.

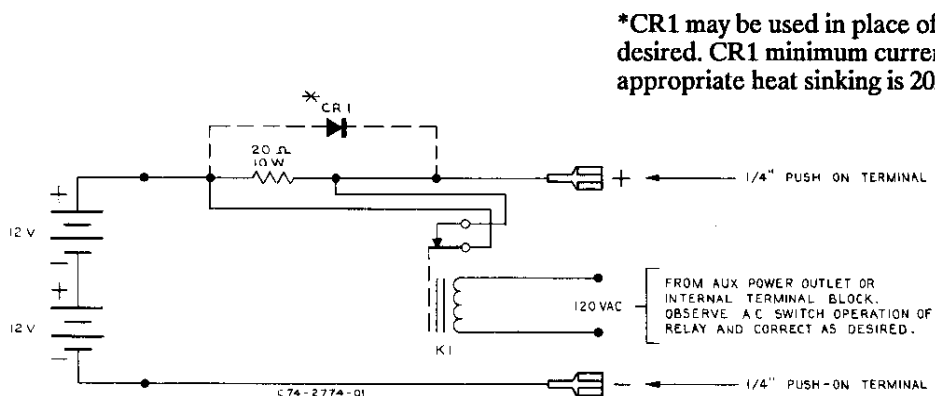


Figure 1 -- Trickle Charge Circuit for Backup Battery

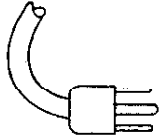
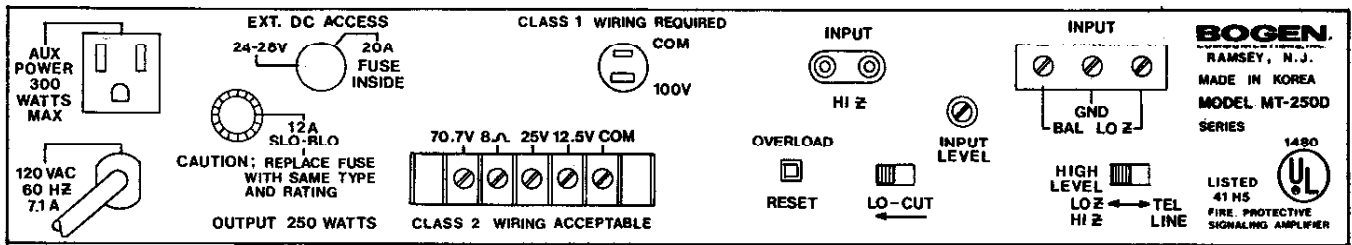


Figure 2 – Rear Apron Connections

Ventilation

The amplifier generates heat during operation. Although the amount of heat is relatively low, the equipment rack should 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° 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° C, equipment should be spaced further apart, or the rack should be equipped with a ventilating fan.

AC Power Connections

The AC line cord must be plugged into a properly grounded 3-wire outlet. This will automatically ground the chassis, the AUX POWER receptacle, and the input GND terminal, minimizing hum pickup and shock hazard.

Warning

It is important that the amplifier is properly grounded!

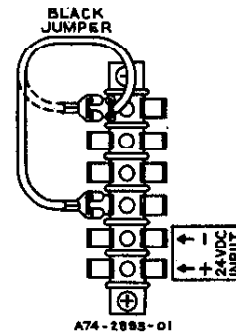
240 Volt Conversion: Refer to Figure 4.

Auxiliary Power 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, or for the trickle-charge circuit. Ensure that accessory equipment does not require more than 300 watts. Equipment connected to the receptacle will be grounded, providing the amplifier line cord is plugged into a properly grounded outlet.

Enabling the Power ON/OFF Switch

Remove one end of the black jumper from the fourth terminal (solid line in the illustration) and connect it to the first terminal (dotted line in illustration). This will enable the ON/OFF power switch.



DC Power Connections

After disconnecting power and removing the cover, the 24 volt power cable (AWG #14 minimum – check local codes) should be brought through the hole provided in the rear panel and connected to the 1/4" push-on terminal block as shown in Figure 3. The DC input terminals must be wired with correct polarity to prevent personnel danger, battery damage, and amplifier damage.

Although a fully charged 24 volt battery can be connected directly to the DC input, a continuous trickle charge circuit, as shown in Figure 1, is recommended for maximum battery life. The diode shown may be used in place of the relay, but is less power efficient.

Battery Saver Circuit

The MT250D is shipped with the battery-saver circuit defeated. To utilize this circuit, remove the jumper between pins 13 and 24. (Refer to the schematic diagram for location of this jumper.)

Input Connections

Keep input leads away from the output leads and AC power cables. Unless the driving source provides a low-impedance output, keep the input lead under ten feet in length.

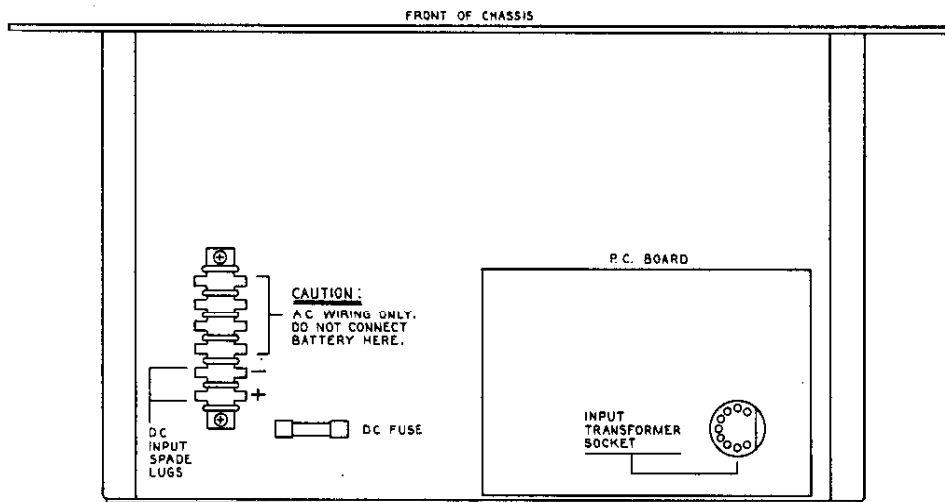


Figure 3 – Location of Accessory Transformer

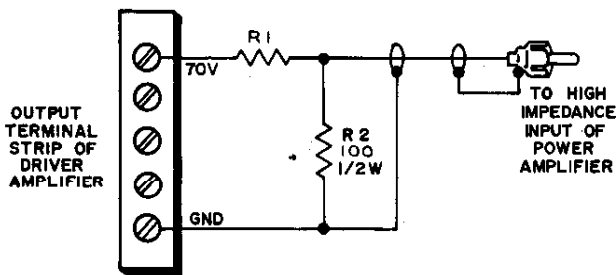
When using HI-Z or LO-Z inputs, set the HIGH LEVEL switch to the HI-Z/LO-Z position. When using a telephone line input source, set this switch to the TEL LINE position.

HI-Z Unbalanced Input

A high-impedance (50,000-ohm) unbalanced input is available at the HI-Z input jacks. Minimum input level is 1 volt for full rated output. Use single conductor, low capacity shielded wire terminated in a standard phono plug.

Input From Another Amplifier

The MT250D can be driven from a standard public address amplifier that provides a 25-volt or 70-volt output. To do this, connect the output of the amplifier to one of the HI-Z input jacks via a resistor network (see illustration below). The resistors shown are in addition to the normal loudspeaker load on the output of the public address amplifier.



AT 70V R1 = 10K, 1/2W
 AT 25V R1 = 3.3K, 1/2W

74-0738-A

Balanced Input

A balanced input is available at the BAL LO-Z input terminal strip. Use two-conductor shielded wire and connect the shield to the GND terminal. The input requires installation of a Model TL600 matching transformer on the printed circuit board (see Figure 3) which is accessible by removing the top cover from the unit. The transformer provides a 200mV input sensitivity.

Telephone Input

When the HIGH LEVEL switch on the rear panel is in the TEL LINE position, the input sensitivity of the BAL LO-Z input is 70mV. A telephone line input connection is then made to the BAL LO-Z terminals.

Bridging Input

The inputs for two or more amplifiers may be paralleled without loss of gain. To do this, install a Bogen Model TL100 transformer in the socket on the printed circuit board (see Figure 3). Connect the 600-ohm source to the BAL LO-Z terminal strip on the rear panel. Use the two outside terminals on the strip and connect the cable shields to the GND terminal. If an unbalanced input is required, connect a jumper from the GND terminal to an adjacent input terminal.

OPERATION

Power Switch

The front panel mounted power on/off switch is disabled so as to conform to the UL standard for Fire Protective Signalling Amplifiers.

Power Indicator

The power switch contains an LED which illuminates when AC power is applied. It is not operative with DC power input.

LO-CUT Switch: Provides 7dB attenuation at 100Hz.

Input Level Control.

Adjusts the signal level applied to the amplifier. Turn clockwise to increase level.

Caution

Many loudspeakers can 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

This front-panel-mounted LED illuminates upon activation of the electronic overload circuitry. Remove the cause of the overload, wait a few seconds, and press the OVERLOAD RESET button on the rear panel.

DC Fuse

The DC fuse is located inside the amplifier chassis. Do not connect a discharged battery without a charge circuit such as that shown in Figure 1, or this fuse may blow.

Thermal Cutout

The heat sinks are protected with a thermal cutout which should not trip under normal conditions. If it does trip, check for inadequate ventilation of the unit or for excessive loading. It will reset itself after cooling.

MAINTENANCE

Caution

There are no user-serviceable parts within the amplifier. Have all internal servicing performed by a qualified technician.

Bogen Service

If you encounter difficulty with your Bogen equipment, do not hesitate to ask our advice or assistance. Information can be obtained by writing to: Service Department, Bogen Communications Inc., 50 Spring Street, P.O. Box 575, Ramsey NJ 07446.

To return the amplifier for service, pack it well to avoid damage in transit, and ship insured and prepaid via UPS or other responsible carrier. The amplifier will be repaired and returned to you (freight prepaid while under warranty.)

Idle Current Adjustment

This normally needs no adjustment, but if repairs are made to the amplifier, the idle current should be checked to maintain distortion and current drain specifications.

1. Disconnect power and remove the cover.
2. Jumper pin 13 to pin 24.
3. Reconnect power, turn on the unit and allow the heat sinks to warm up at least 10 minutes.
4. Read directly across R103 to DC millivolts present with no signal applied.
5. Adjust R44 to bring the reading to 25mV.
6. Move both leads of the voltmeter to R104 to make another direct reading.
7. Adjust R45 to bring that reading to 25mV.
8. If the readings start to drift, wait another 10 minutes for thermal equilibrium and reset both R44 and R45.

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 between the component and source of heat. When replacing driver and output transistors, be certain to install

the collector insulator, after lightly coating both sides with a thermal conducting compound.

Caution

Improper soldering may damage components on the printed circuit board. This can void the warranty.

Replacement Parts

Most components used in the amplifier are standard parts available through reputable parts suppliers. The parts listed here may be obtained from the factory. When ordering a part, specify the part number and the description of the part as listed. Also specify the model of the unit and give the series designation, which is a letter followed by numbers, stamped 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>
		<i>PC Board Assembly</i>
—	45-7184-05	Cap., Elect., 22 μ F, 35V
C7	79-008-046	Cap., Elect., 10 μ F, 50V
C10	79-008-058	Cap., Elect., 100 μ F, 50V
C12,14	79-008-047	Cap., Elect., 47 μ F, 15V
C13	79-008-036	Cap., Elect., 330 μ F, 3V
C15	79-008-011	Cap., Elect., 33 μ F, 35V
C16, 17	79-008-051	Diode, 1N4148
CR1, 3-7	96-5430-01	Diode, 400prv @ 1A
CR2	96-5333-01	IC, LM317LT
IC1	96-5480-01	Transistor, J174
Q1	96-5481-01	Transistor, 2N5089
Q2-6	96-5213-01	Transistor, VN10KM
Q7	96-5479-01	Transistor, MPS-A05
Q8, 10, 11	96-5290-01	Transistor, MPS-A55
Q9	96-5283-01	Transistor, 2N6473
Q12, 13	96-5367-01	Control, 500 kilohm, linear, screwdriver adjustable
R1	77-001-827	Trimmer Potentiometer, 5,000 ohms
R44, 45, 51	77-012-004	Switch, Min. Slide
S1, 2	81-003-067	Switch, P.B. Momentary
S3	81--004-098	Heat Sink Clip
—	70-9313-01	
		<i>Chassis</i>
C101	78-200-116	Ceramic Disc, .01 μ F, 1400V
C102	79-118-009	Cap., Elect., 35,000 μ F, 40V
CB101	94-0014-07	Thermostat, 105° C (N.C.)
CR101	96-5373-01	Full Wave Bridge Rectifier, 200 prv, 35A
F101	94-0001-29	Fuse, 12A, 125V, Slo-Blo
F102	94-0002-09	Fuse, 20A, 32V
LED 101	96-5403-01	LED
Q101-104	96-5290-01	Transistor, MPS-A05
Q105, 106	96-5370-01	Transistor, 2N5878
Q107-118	96-5466-01	Transistor, 2N6254
R103-114	76-121-012	Resistor, 0.27 ohm, 10W
R115	76-121-014	Resistor, 0.5 ohm, 10W
SW101	81-009-036	Power Switch, Lightcd, 15A
T101	83-817-240	Transformer, Power
T102	83-477-000	Transformer, Output

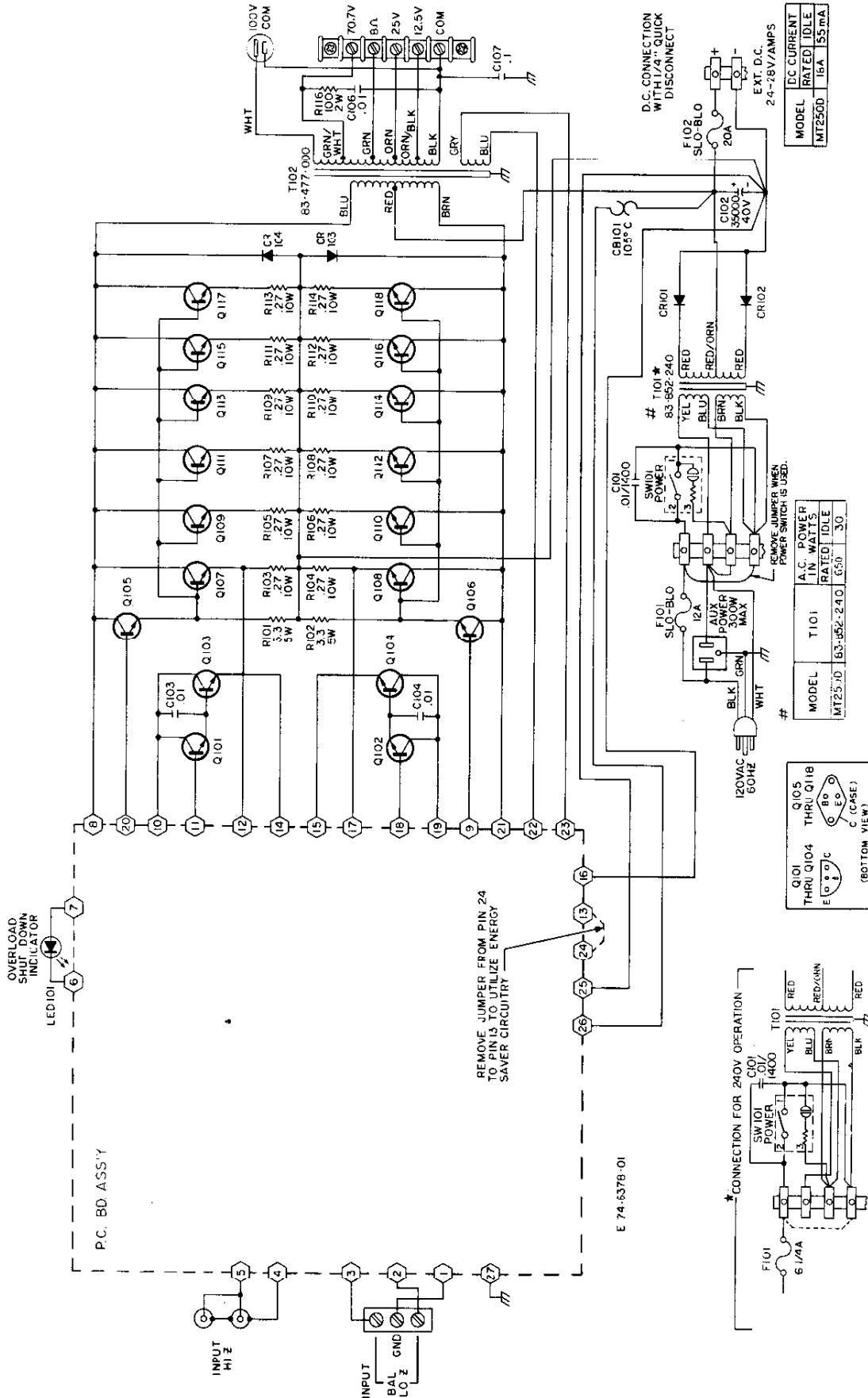


Figure 4 - MT250D Schematic Diagram, Sheet 1 of 2

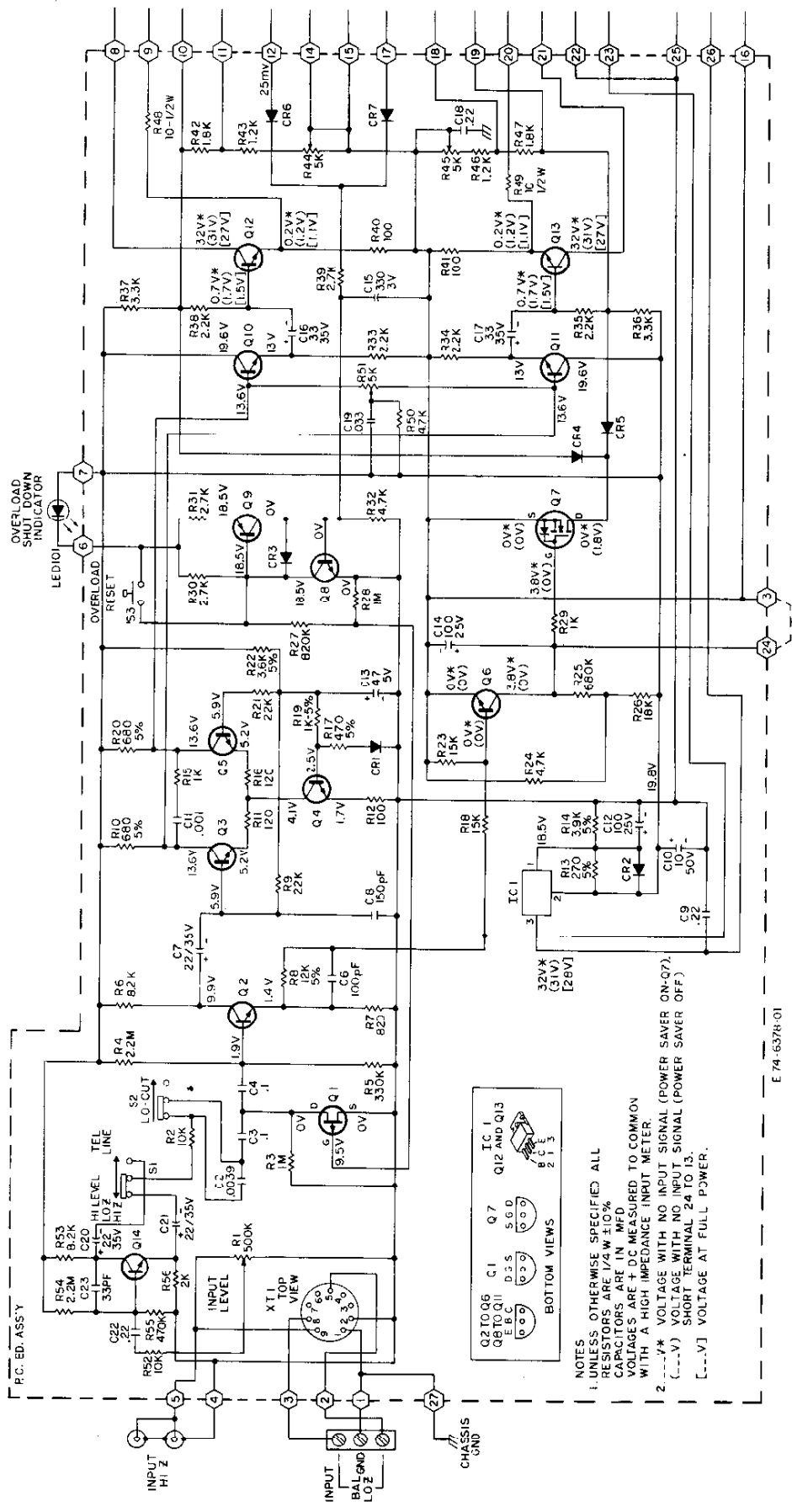


Figure 5 — MT250D Schematic Diagram, Sheet 2 of 2

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