

Power Amplifiers • TCB-60/125/250



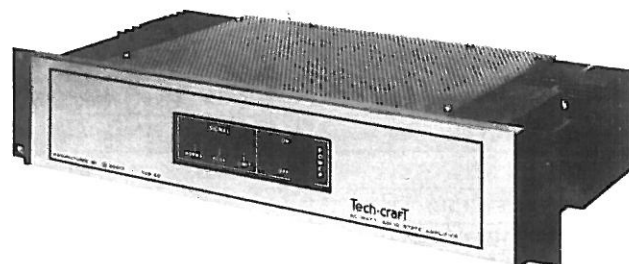
Tech-craft.

DESCRIPTION

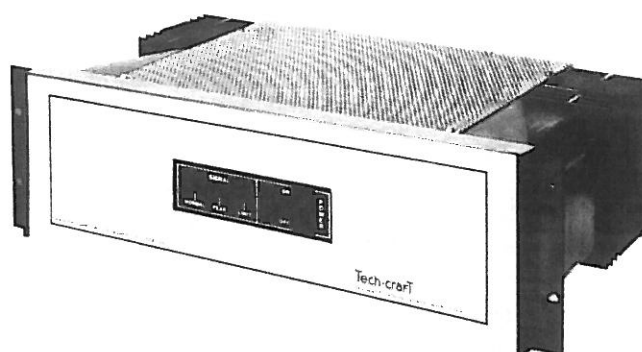
The Tech-craft TCB Series Power Amplifiers are professional, rugged, all solid-state audio amplifiers especially designed for those applications requiring high audio quality and continuous operation. The amplifiers supply their respective output power ratings at less than 1% total harmonic distortion from 25 to 22,000 Hz. An input signal of only 250 millivolts is required for full rated output. The inputs may be balanced with the use of accessory TL-10K Transformer. Residual hum and noise is at least 86 dB below rated outputs, and output regulation is better than 1 dB from no load to full load.

The TCB Series amplifiers can drive a variety of load impedances simply by changing the arrangement of jumper wires on the output terminal strips. These outputs include balanced or unbalanced 25, 50 and 70 volts, 16 volts direct unbalanced, or 40, 65 and 90 volts unbalanced. The amplifiers can drive a load directly, and deliver 65 watts (TCB-60), 135 watts (TCB-125) or 275 watts (TCB-250) rms continuous power at less than 1% THD from 25 to 22,000 Hz into 4, 2 or 1 ohm, respectively.

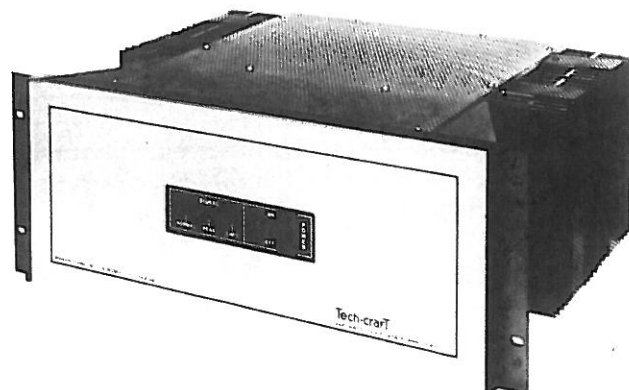
The power amplifiers can safely drive any recommended load continuously, and in fact will continue to deliver power into adverse loads (including gross overloads) without major increases in distortion. They will even operate continuously into a short-circuit with no damage to the amplifiers. Three LED indicators are provided to show whether the amplifiers are operating in a Normal, Peak, or Limiting mode. The TCB Series is also thermally protected to prevent damage due to excessively high temperatures. However, the amplifiers will deliver their full rated power outputs continuously even at 55°C (131°F). In addition to thermostatic protection, failure-preventive devices include electronic overload limiting and a rear-panel ac-line fuse.



Model TCB 60



Model TCB 125

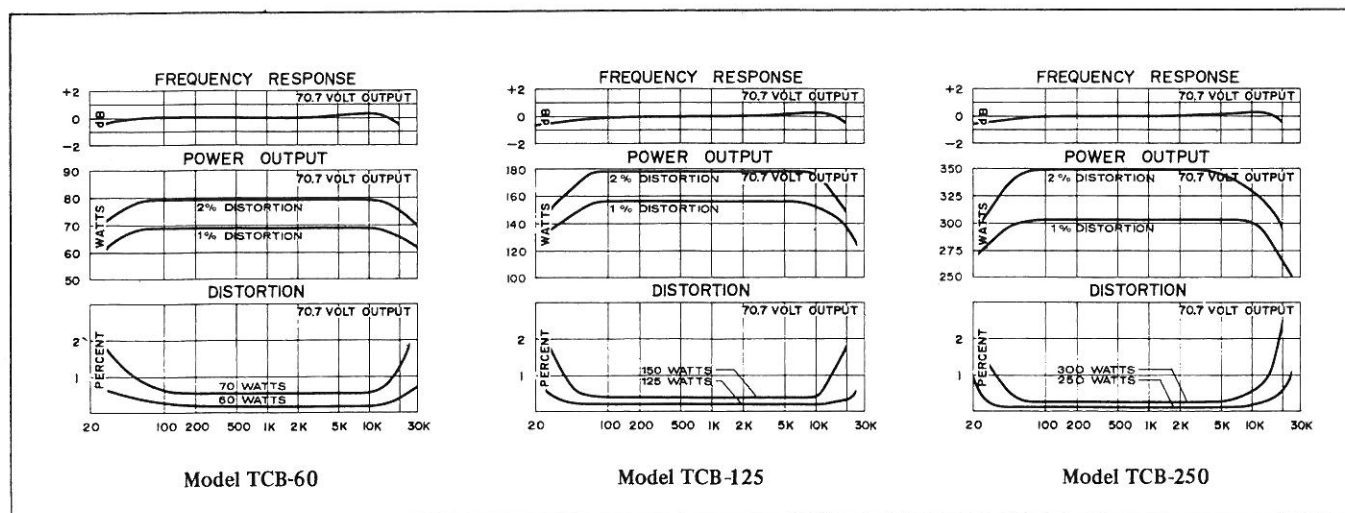


Model TCB 250

TECHNICAL SPECIFICATIONS

	MODEL TCB-60	MODEL TCB-125	MODEL TCB-250
RATED OUTPUT POWER: At less than 1% THD from 25 to 22,000 Hz At less than 2% THD from 30 to 18,000 Hz	60W (rms) @ 10.4/83 ohms 65W (rms) @ 4 ohms 70W (rms) @ 9/71 ohms 75W (rms) @ 3.4 ohms	125W (rms) @ 5/40 ohms 135W (rms) @ 1.8 ohms 150W (rms) @ 4/32 ohms 165W (rms) @ 1.5 ohms	250W (rms) @ 2.5/20 ohms 275W (rms) @ 0.9 ohms 300W (rms) @ 2/16 ohms 325W (rms) @ 0.75 ohms
INPUT SENSITIVITY:	250 mV (rms) for rated output		
FREQUENCY RESPONSE:	±1 dB, 20 to 20,000 Hz @ rated output		
HUM AND NOISE:	86 dB below rated output		
OUTPUT LOADS:	25, 50, or 70 volts, balanced or unbalanced; 16 volts direct unbalanced; 40, 65, or 90 volts combined unbalanced (see chart, p. 4 for impedances)		
OUTPUT REGULATIONS:	Better than 1 dB from no load to full load		
INPUT IMPEDANCE:	High Impedance, 50k ohms unbalanced; Low Impedance, 10k ohms or 500/600 ohms, balanced or unbalanced (with plug-in transformers)		
LOW-CUT FILTER:	-5 dB @ 100 Hz		
CONTROLS:	Input level, Low-cut filter, Power On-Off (front panel).		
INDICATORS (LED):	Signal Level; Normal, Peak, and Limit; Power On.		
POWER REQUIREMENTS: 120/240 Vac 50/60 Hz; @ Full Rated Output— @ Idle— Dual (+ and -) 24 Vdc; @ Full Rated Output— @ Idle—	187W 32W 2A 300 mA	375W 63W 4A 400 mA	750W 75W 8A 500 mA
OVERLOAD PROTECTION: Electrical (120V) Battery Thermal	Electronic overload protection		
	3A slo-blo fuse	6.25A slo-blo fuse	12A fuse
	2 - 3A fuses	2 - 5A fuses	2 - 10A slo-blo fuses
	95°C (203°F) thermostat		
OPERATING TEMPERATURE RANGE:	-20°C (-4°F) to +55°C (131°F) @ rated output		
DIMENSIONS:	19"W x 3½"H x 8½"D	19"W x 5"H x 8½"D	19"W x 7"H x 13½"D
FINISH:	Brushed nickel steel front with cadmium-plated chromate finish chassis		
WEIGHT:	25 lb., net	35 lb., net	55 lb., net
ACCESSORIES:	Model TL-600, 600-ohm line matching transformer Model TL-10K, 10,000-ohm line bridging transformer		

PERFORMANCE CHARACTERISTICS



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, 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). The power transformer has primary taps to accommodate line voltages of 120 Vac or 240 Vac. Refer to the Maintenance section for further instructions.

AUXILIARY DC POWER CONNECTIONS. The unit may be powered from a dual (+ and -) 28-volt supply, such as four fully charged automotive-type storage batteries in series, with center tap. The unit is supplied with a three-pin male plug (in envelope) for connecting an external dc supply to the EXTERNAL DC OPERATION receptacle (see figure 3). The power switch is not functional on dc operation, but the power on indicator will light. 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 high or low-impedance 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 3). The required input level for full rated output is 250 mV.

Balanced Input. A balanced input is provided at the BAL INPUT terminals (see figure 3). The input requires 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 TL-600 for low-impedance (500/600 ohm) or a Model TL-10K for high-impedance (10,000 ohms) input.

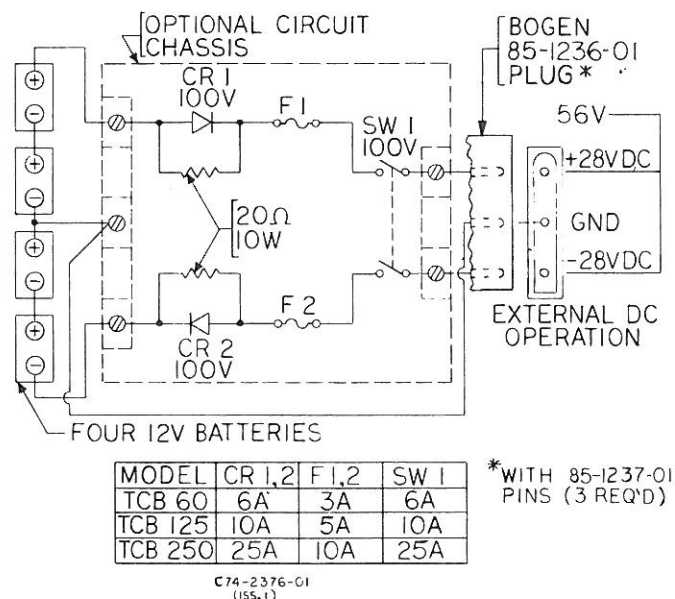


Figure 1 — Trickle Charge Circuit for Auxiliary Supply

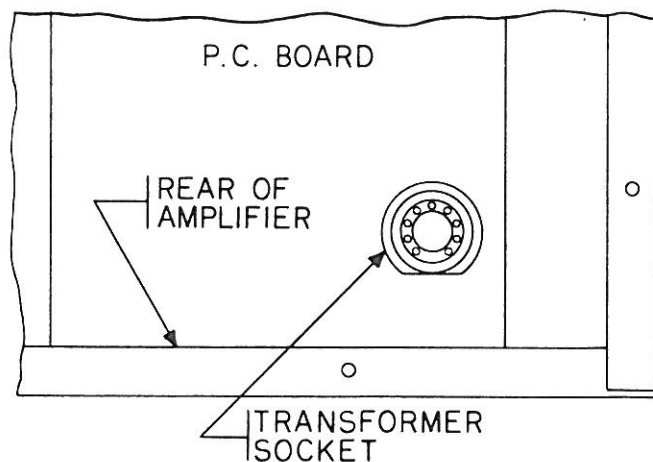
Caution

Disconnect all power sources before removing top cover.

OUTPUT CONNECTIONS. Figure 3 shows the location of the output connection strips. Figure 4 shows detailed output connections and the required jumpers.

Caution

Do not connect speakers without first checking the output level (refer to text under "Input Level Control" in Controls and Indicators section).



B74-2378-01

Figure 2 — Location of Accessory Socket

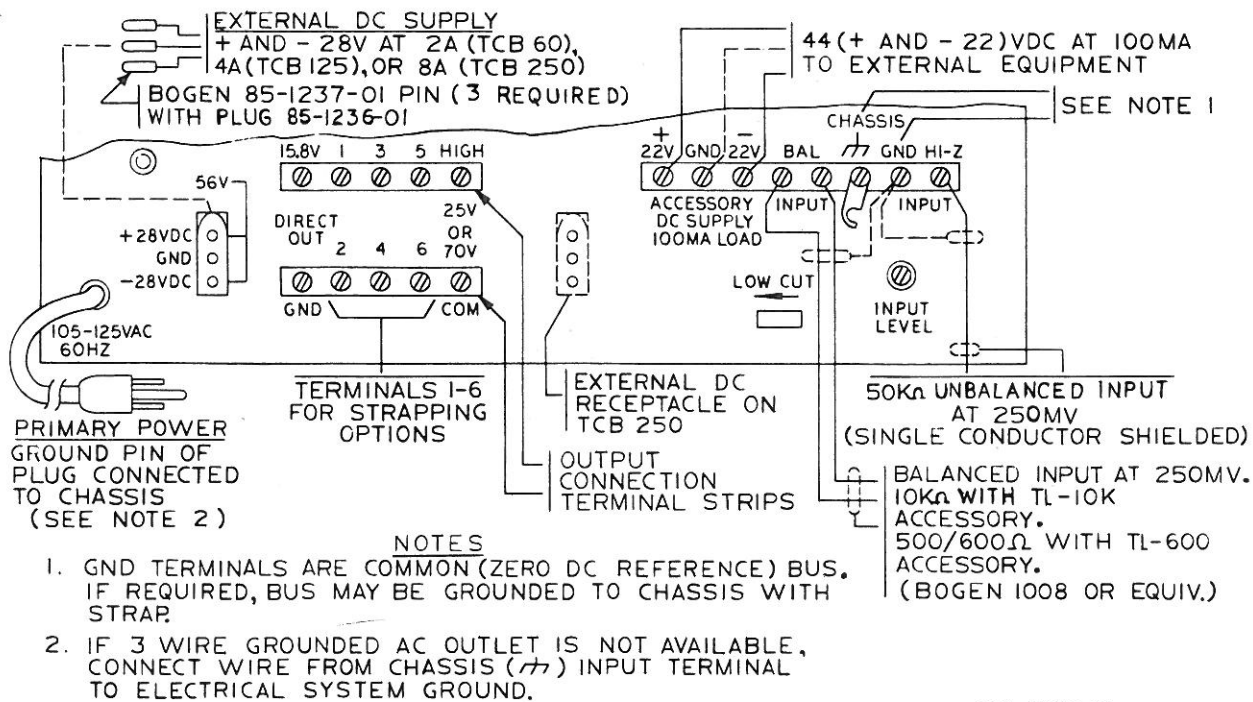


Figure 3 – TCB Power Amplifier, Typical Rear View

	8 TO 16	4 TO 8	2 TO 4
25V BALANCED / UNBALANCED *	60W / 10.4 70W / 9	125W / 5 150W / 4	250W / 2.5 300W / 2
70V BALANCED / UNBALANCED *	—	32	16
70V BALANCED / UNBALANCED *	60W / 83 70W / 71	125W / 40 150W / 32	250W / 20 300W / 16
50V BALANCED / UNBALANCED *	60W / 42 70W / 35	125W / 20 150W / 17	250W / 10 300W / 8.3
16V DIRECT UNBALANCED	4	2	1
40V UNBALANCED	32	16	8
90V UNBALANCED	128	64	32
* INSTALL JUMPER FOR UNBALANCED OUTPUT	TCB 60	TCB 125	TCB 250
	LOAD IMPEDANCE (OHMS)		
	CONTINUOUS RATING / LOAD		
	EIA RATING / LOAD		

Figure 4 – Output Strapping Options

ACCESSORIES

MODEL TL-600 TRANSFORMER

The Tech-craft Model TL-600 line matching transformer provides a balanced 500/600-ohm input for low-impedance sources.

MODEL TL-10K TRANSFORMER

^{TL100}
The Tech-craft TL-10K line matching transformer provides a balanced 10,000-ohm input for high-impedance sources.

CONTROLS AND INDICATORS

INDICATORS

POWER. When the ac power switch is turned on, the power indicator will light. This indicator also lights when the amplifier is connected to a live auxiliary dc source.

SIGNAL. There are three output signal indicators, two for output voltage level and one for overload. The two output voltage indicators operate regardless of loading.

Normal. The NORMAL indicator lights when the voltage is from approximately one-third of maximum to maximum.

Peak. This indicator lights when the output voltage reaches approximately one-half of maximum. The NORMAL indicator remains on whenever the PEAK indicator lights.

Limit. This indicator lights if there is an output current overload condition. The other signal indicators may or may not remain on when the LIMIT indicator lights. Occasional flickering of the LIMIT indicator at full output may be ignored.

CONTROLS

LOW-CUT FILTER SWITCH. This switch, located on the rear of the amplifier, provides 5 dB attenuation at 100 Hz.

INPUT LEVEL CONTROL. This control, located on the rear of the amplifier, is used to adjust the output to the required level. Maximum sensitivity is obtained with control fully clockwise. An approximate adjustment can be made by observing the front panel signal indicators.

MAINTENANCE

Caution

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

TECH-CRAFT SERVICE

We are interested in your Tech-craft 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 to be in order, we will send you the name and address of the nearest authorized Tech-craft 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 (Do not ship via parcel post unless so instructed). The unit will be promptly repaired and returned to you.

Caution

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

PRIMARY AC VOLTAGE. (see schematic diagram, fig. 6)

WARNING
UNPLUG AC LINE CORD BEFORE CHANGING
LINE FROM 120V TO 240V

OUTPUT OFFSET VOLTAGE. 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 $0V \pm 10 \text{ mV}$, carefully turn the adjustment knob on potentiometer R2 for a meter reading of less than $\pm 10 \text{ mV}$.

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 Tech-craft 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".

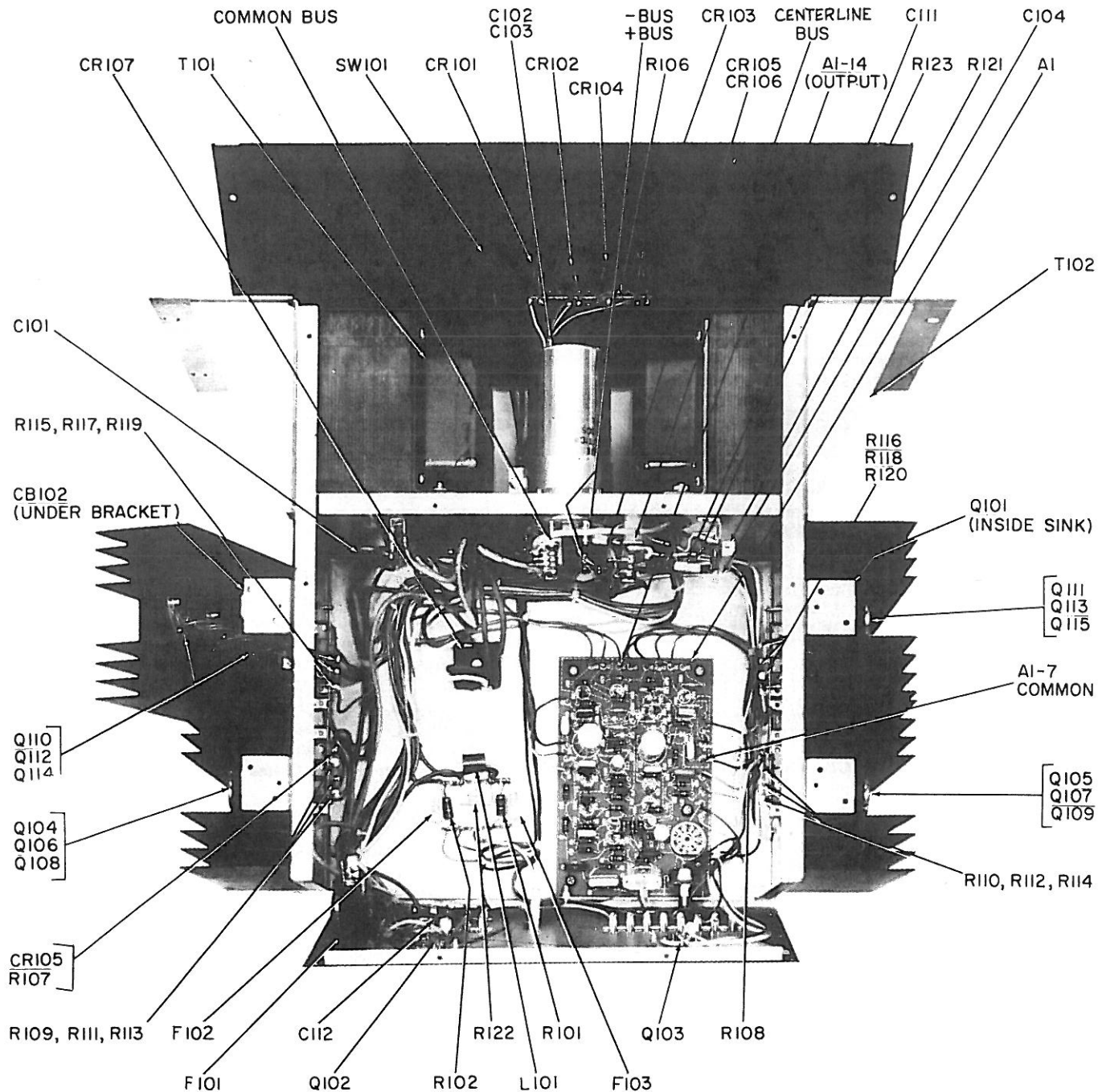


Figure 5 — Model TCB 250, Chassis Parts Location

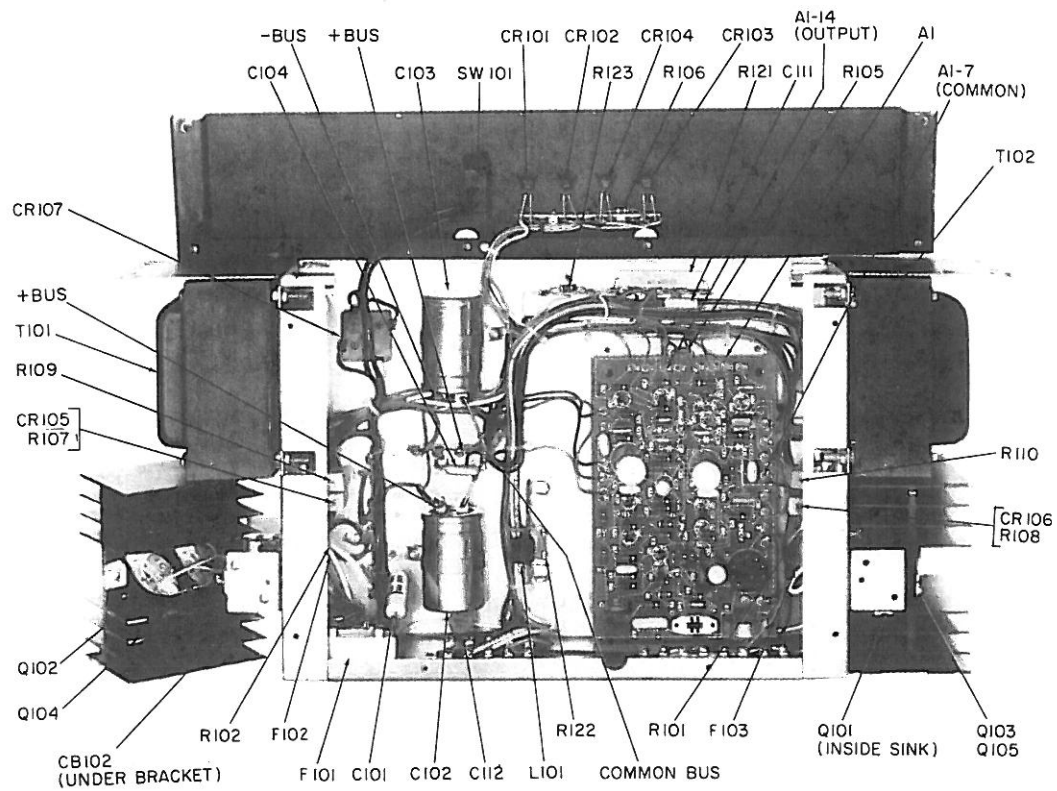


Figure 7 — Model TCB 60, Chassis Parts Location.

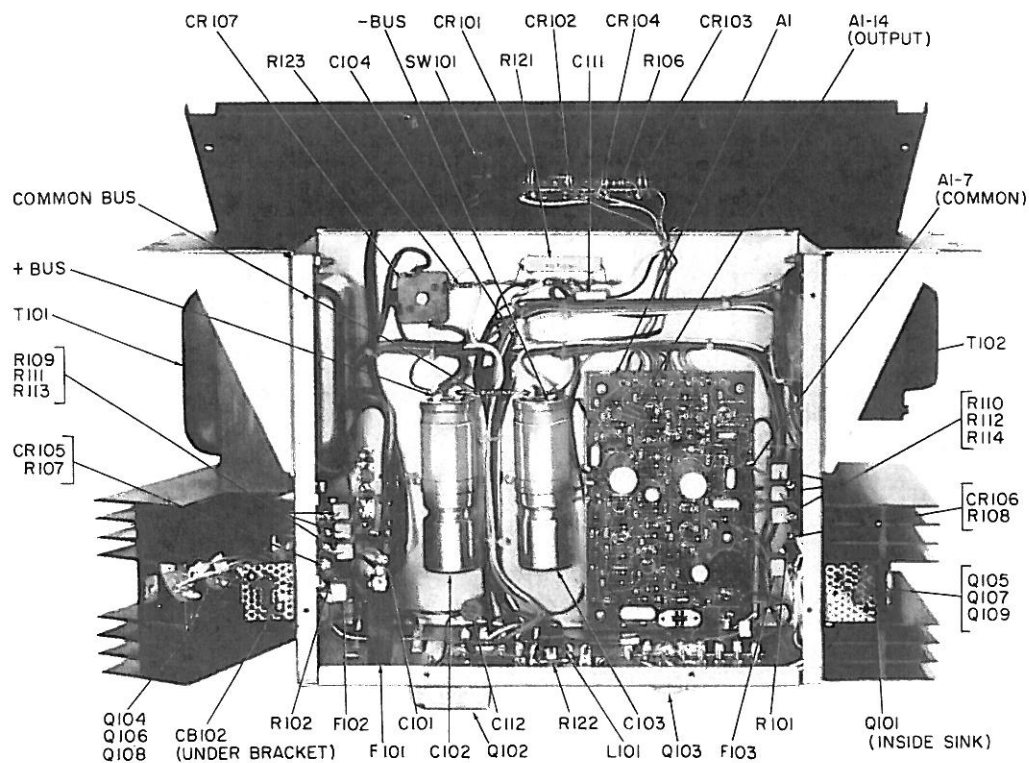


Figure 8 — Model TCB 125, Chassis Parts Location.

Standard components may be obtained from any reputable source if no manufacturer is specified, except that components listed as "selected" must be ordered from Bogen. Where a manufacturer is specified, only that manufacturer's component should be used. Unless a model is indicated, the parts listed apply to all TCB power amplifiers.

Ref. No.	Part No.	Description
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A1	45-9948-01	PC Board Assembly
C4	79-510-003	Capacitor, Tantalum, 1.5 μ F, 20V
C5	79-116-002	Capacitor, Electrolytic, 100 μ F, 25V
C14, 15	79-117-001	Capacitor, Electrolytic, 500 μ F, 50V
C22	79-116-001	Capacitor, Electrolytic, 22 μ F, 25V
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 (SPS-1910)
Q3	96-5298-01	Transistor, SPS1910
Q4, 6	96-5365-01	Transistor, MPSA56
Q5, 7, 14	96-5364-01	Transistor, MPSA06
Q8	96-5176-01	Transistor, MPS 6518
Q9	96-5391-01	Transistor, Selected (2N5089)
Q10	96-5392-01	Transistor, Selected (MPS6518)
Q11	96-5367-01	Transistor, 2N6473
Q12	96-5368-01	Transistor, 2N6475
Q13	96-5213-01	Transistor, 2N5089 or
	96-5346-01	Transistor, BC239C
R2	77-007-003	Control, Offset, 50k, Linear
R7	77-001-743	Control, Level, 200k, Linear
R25, 28	75-154-750	Resistor, 75 Ω , 1%, 1/4W
R26, 27	75-154-560	Resistor, 56 Ω , 1%, 1/4W
R36	75-154-910	Resistor, 91 Ω , 1%, 1/4W
R39	76-521-010	Resistor, 6650 ohms, 1/4W, 1%
R40	75-154-222	Resistor, 2200 ohms, 1/4W, 1%
SW1	81-003-067	Switch, Lo-cut, Slide, DPDT
C101	78-200-116	Capacitor, .01 μ F, 1400V Disc (TCB-250)

Chassis Electrical Parts

C102, 103	79-118-001	Capacitor, Electrolytic, 5,000 μ F, 40V (TCB 60)
	79-118-002	Capacitor, Electrolytic, 13,000 μ F, 40V (TCB 125)
	79-118-003	Capacitor, Electrolytic, 22,000 μ F, 40V (TCB-250)
CB102	94-0018-01	Thermostat, Normally Open, 95°C Close

Ref. No.	Part No.	Description
CR101-104	96-5403-01	Indicator, LED, OPCOA LSM-6-50
CR105,106	96-5333-01	Diode, 1A, 400 PRV
CR107	96-5373-01	Bridge Rectifier, 35A
F101	94-0001-08	Fuse, 3A, 125V, slo-blo
	94-0001-10	Fuse, 6.25A, 125V, slo-blo
	94-0021-01	Fuse, 12A, 250V, quick-act
F102, 103	94-0005-08	Fuse, pigtail, 3A (TCB-60)
	94-0005-10	Fuse, pigtail, 5A (TCB-125)
	94-0001-26	Fuse, slo-blo, 10A (TCB-250)
L101	95-5173-01	Inductor, 0.7 μ H
Q101	96-5213-01	Transistor, 2N5089
Q102,103	96-5370-01	Transistor, 2N5878
Q104,105	96-5385-01	Transistor, RCA 2N3055H, single-diffused (TCB-60) (TCB-125) (TCB-250)
Q104-109		
Q104-115		
R103,104	76-114-101	Resistor, .1 ohm, 5W, 10% (TCB-250)
130, 131		
R103,104		
109, 110	76-114-105	Resistor, .27 ohms, 5W, 10% (TCB-60) (TCB-125) (TCB-250)
R109-114		
R109-120		
R107,108	76-114-103	Resistor, .91 ohms, 5W, 5% (TCB-60)
R121	76-121-002	Resistor, 2.5 ohms, 10W, 10% (TCB-60, 125) (TCB-250)
R121,126		
R122	76-114-104	Resistor, 1 ohm, 5W, 10% (TCB-125, 250)
R126	76-107-105	Resistor, 4.7 ohms, 2W, 10% (TCB-125)
R127	75-742-101	Resistor, 100 ohm, 7W (TCB-125, 250)
R128	76-114-101	Resistor, .1 ohm, 5W, 10% (TCB-60)
	76-121-006	Resistor, .1 ohm, 10W, (TCB-125)
	76-121-007	Resistor, .05 ohm, 10W (TCB-250)
SW101	81-009-021	Switch, SPST, 125Vac, 10A (TCB 60, TCB 125)
	81-009-022	Switch, SPST, 125Vac, 15A (TCB 250)
T101	83-778-240	Transformer, Power (TCB 60)
	83-779-240	Transformer, Power (TCB 125)
	83-780-240	Transformer, Power (TCB 250)
T102	83-436-000	Transformer, Output (TCB 60)
	83-437-000	Transformer, Output (TCB 125)
	83-438-000	Transformer, Output (TCB 250)