2nd ADDENDUM FOR MODEL 250

This manual is applicable to units bearing serial numbers above 6549 and is the same as the original service manual except for the following:

(Note: Units bearing serial numbers 1001 through 3500 are described in the original manual. Units bearing serial numbers 3501 through 6549 are described in the first addendum for the Model 250).

Throughout the original manual, replace "A," "B," "Channel A" and "Channel B" with "L," "R," "L Channel" and "R Channel," respectively.

Page 1— Replace entire section labeled "Amplifier," under Circuit Description heading, with Circuit Description contained herein.

Page 2— and 3 Replace Figure 1 (Amplifier Simplified Schematic) with Figure 1 contained herein.

Page 4— Replace entire section labeled "Rectifier-Relay Board" with section labeled "Relay Board and Power Supply" contained herein.

— Replace Figure 2. (Rectifier/Relay Board Simplified Schematic) with Figure 2. (Relay Board Simplified Schematic) contained herein.

— Replace Figure 3. (Metering Circuit Simplified Diagram) with Figure 3 contained herein.

Page 5— Replace 100, 220-VOLT AC CONVERSION with:

220-VOLT AC CONVERSION

To convert the Model 250 to 220-volt operation, perform the following steps:

1. Remove the top cover.
2. Orient the Model 250 so that the rear panel is facing toward the viewer.
3. Locate TB1, the strip located on the power transformer half shell facing the rear panel, which terminates the power transformer primary wires.
4. Unsolder all jumpers from TB1.
5. Solder a jumper (18 AWG) to TB1 connecting the grey and violet transformer wires.
6. Re-attach the top cover.
7. Replace the 6-amp, 250V fuse in the unit with the 4-amp, 250V fuse, part number 451-1003, supplied with the 220-volt conversion kit, part number 105-1007-1.
8. Affix labels, supplied in conversion kit, in the appropriate locations on the unit cover, and adjacent to the line cord, fuse holder and accessory outlets.

The Model 250 is now ready for 220-volt operation.

100-VOLT AC CONVERSION

To convert the Model 250 to 100-volt operation, follow the procedure outlined for 220-volt conversion except for items 4, 5, 7, and 8. Item 7 is eliminated. These items will read:

4. Unsolder the black and white power lead-in wires and all jumpers from TB1.
5. Solder two jumpers (18 AWG) to TB1, one connecting the orange and violet transformer wires, and one connecting the grey and white transformer wires. Solder the black and white power lead-in wires to the white and orange transformer wires, respectively, at TB1.
8. Affix labels, supplied in the 100-volt conversion kit, part number 105-1008-1, in the appropriate locations on the unit cover, and adjacent to the line cord and accessory outlets.

The Model 250 is now ready for 100-volt operation.

Page 6— TECHNICAL SPECIFICATIONS

— For "Frequency Response" replace "+0 -1.5db 2 Hz to 100KHz" with +0, -3.5dB 2 Hz to 60KHz.

Page 7— In Table 1, for "AC Power Control Box," replace "Fabricate in accordance with Figure 3." with "Fabricate in accordance with Figure 4."; for "Amplifier Output Load Box," replace "Fabricate in accordance with Figure 4." with "Fabricate in accordance with Figure 5.".

— RECOMMENDED TEST EQUIPMENT

— To "Manufacturer and Model Number" for Output Load Resistors (8Ω and 4Ω), Add: "(Non-inductive)."

— In "Manufacturer and Model Number" for Shorting Plug, replace "600" with "10K."

In "PERFORMANCE VERIFICATION TEST PROCEDURE," replace as indicated:

Page 8— In paragraph C. (DC Balance Test), sub-paragraph 3—replace "R504" with "R502."

— In paragraph D. (Total Hum and Noise Test), sub-paragraph 2—replace "0.25mv" with "0.4mv."

— In paragraph E. (Bias Adjustment Test), sub-paragraph 6—replace "10 watts" with "7 watts."

— In paragraph E. (Bias Adjustment Test), sub-paragraph 7—replace "R536" with "R526" and replace "10 watts" with "7 watts."

Page 9— In paragraph F. (Maximum Power Output), sub-paragraph 7—replace "analyzer" with "oscillator."

— In paragraph G. (Relay Operation), sub-paragraph 1—replace "2 minutes" with "30 seconds."

Page 9– In paragraph G. (Relay Operation), sub-paragraph 3—add "Drive both channels."
– In paragraph G. (Relay Operation), delete sub-paragraph 4.

Page 10– Replace Figure 4. (AC Power Control Box Simplified Schematic) with Figure 4. contained herein.
– Replace Figure 5. (Amplifier Output Load Box Simplified Schematic) with Figure 5. contained herein.

In "TROUBLE ANALYSIS," replace as indicated:

Page 11– In SYMPTOM 1.—Replace "(100 watts or more)" with "(80 watts or more)."
– In SYMPTOM 1. PROCEDURE a.—Replace "...CR301 through CR304,..." with "...CR1 through CR4,..."
– In SYMPTOM 1. PROCEDURE b.—Replace "Check for open control R224, 215-1005-1 bias assembly" with "Check for open bias circuit components; Q801, Q521, C513."
– In SYMPTOM 2. PROCEDURE a.—Replace "...215-1005-1 bias assembly" with "...bias circuit components; Q801, Q521, C513."
– In Symptom 2. PROCEDURE b.—Replace "...CR301 through CR304..." with "...CR1 through CR4,..."
– Replace SYMPTOM 3 with "Transient DC voltages at loudspeaker terminals before time delay circuit is deactivated."
– In SYMPTOM 3. Add PROCEDURE b.—"Check for non-opening relay contacts."
– In SYMPTOM 4. Add PROCEDURES b. through d.—"b. Check for open transistors Q507, Q508, Q510, or Q511." "c. Check for open DC Balance control, R526." "d. Check for leaky or shorted transistors Q516 or Q517."

Page 11– In SYMPTOM 5.—Add PROCEDURE c.—"Check C502 for leakage."
– In SYMPTOM 7. PROCEDURE a.—Replace "Check for defective C506, C509, C516, and C505." with "Check for defective C505, C506, C508, C509, C510, C516, C518, C519, C520, and C526."

Page 12– In SYMPTOM 8. PROCEDURE b.—Replace "Check for transistors Q802 through Q805." with "Check transistors Q505, Q506, Q516, Q517, Q802 through Q805."
– In SYMPTOM 9.—Replace PROCEDURE b. with "Check output for proper clipping into 4 ohm load with 25.5 volts AC output (positive and negative levels must not vary more than 1 volt at 2KHz)."
– Add SYMPTOM 11.—"No Output" and add PROCEDURE a. "Check R529, Q510, Q511, Q802, Q803, Q804, and Q805.

Pages 13 and 14—PARTS LIST—The Parts List contained herein identifies all parts which differ from those used in units prior to serial number 3501.

Page 15– Replace Figure 7. (Power Amplifier Board Component Assembly Diagram) with Figure 7. contained herein.

Page 16– Replace Figure 8. (Rectifier/Relay Board Component Assembly Diagram) with Figure 8. (Relay Board Component Assembly Diagram) contained herein.

Page 17– Replace Figure 9. (Meter Board Component Assembly Diagram) with Figure 9. contained herein.

Pages 18 and 19—Replace Figure 10. (Model 250 Schematic) with Figure 10. contained herein.

CIRCUIT DESCRIPTION

AMPLIFIER

The input of the power amplifier, Figure 1, is an RF filter comprised of R550 and C501, followed by transistors Q518 and Q519 which are coupled together as a conjugate paired amplifier with 100% feedback. The output of the conjugate pair is coupled through C502 and R506 to the differential amplifier, Q501-Q502, which drives a high gain inverter, Q503. Q504 is the current source for the inverter, and Q520 serves as a current source for the differential amplifier to enhance its common mode signal rejection. The inverter is coupled to complementary pre-drivers, Q507-Q508. The output of the pre-drivers is applied to the respective drivers, Q510-Q511, which feed their respective power transistors, Q802-Q804 and Q803-Q805.

Open loop phase and gain stabilization is provided by a Miller capacitor, C518, connected between the collector and base of the inverter (Q503). Further open loop stabilization is provided by Miller feedback at driver Q510 by C525 and R561, and at driver Q511 by C524 and R560.

Output current regulation is accomplished through a current-sensing network. Excessive current levels are detected by resistors R531 and R532. Voltages developed across these resistors are applied to current sensors Q516 and Q517. When excessive current levels are detected, Q516 and Q517 develop peak-limiting signals which are applied to Q505 and Q506, respectively. These transistors disable the pre-drivers on excessive output current peaks, thus limiting peak output current to the level determined by the adjustment of R541 and R542, respectively.

Feedback for the amplifier is developed at the junction of R531 and R532, and is applied across

two loops. The driver power output loop is across R520 and C509. Feedback applied across R519 and C508 completes the loop for the entire power amplifier.

Idling current for the power transistors is controlled by transistors Q801 and Q521, and is adjusted by R526. Q521 is employed as a V_{be} multiplier with the collector current of Q801 determining the multiplication factor. The multiplied V_{be} voltage of Q521 appears across its collector and emitter. From there, it is applied as a biasing source to the drivers which are dc coupled to the power transistors. Transistor Q801 is mounted directly to the power transistor heatsink to assure close thermal tracking.

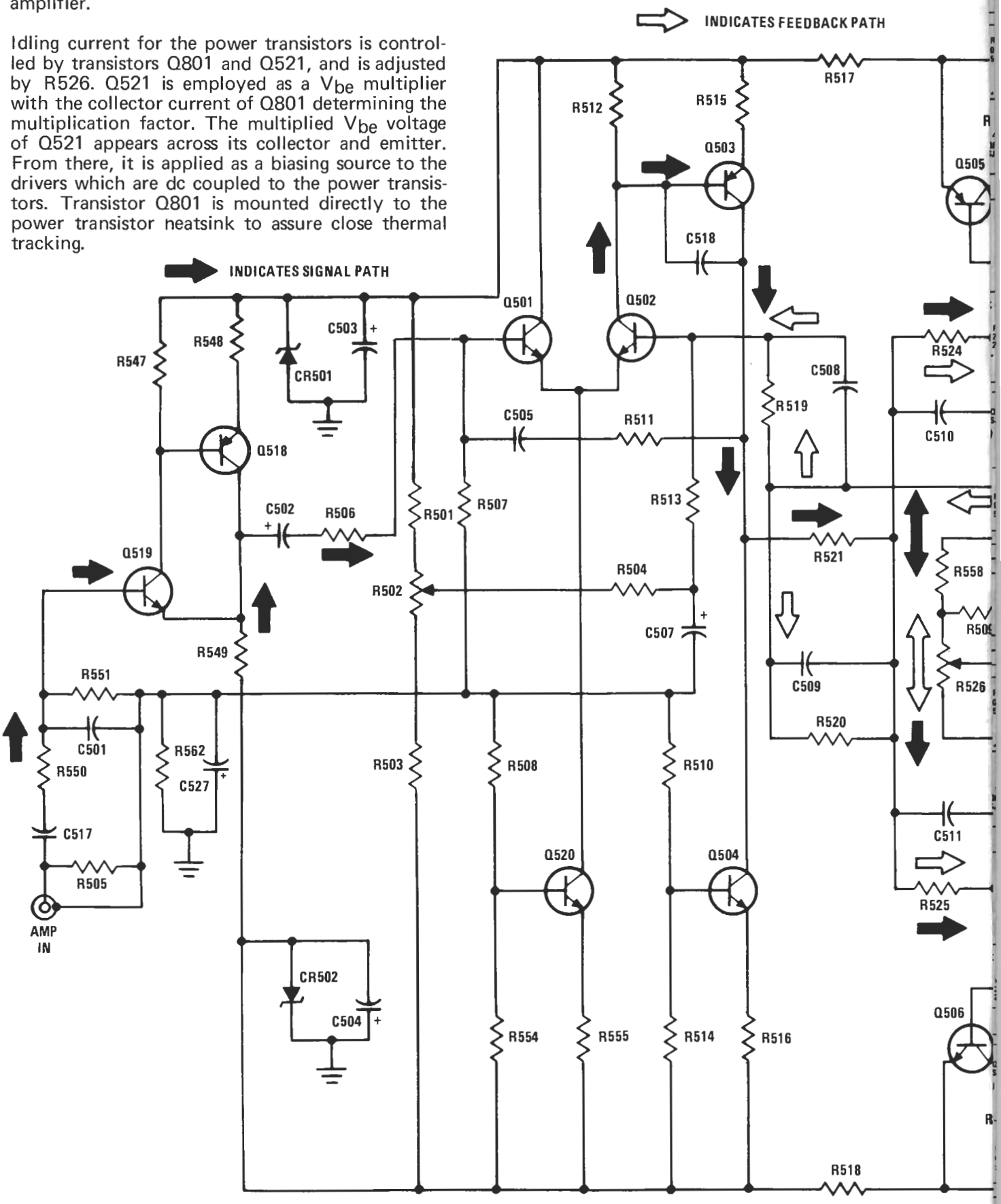
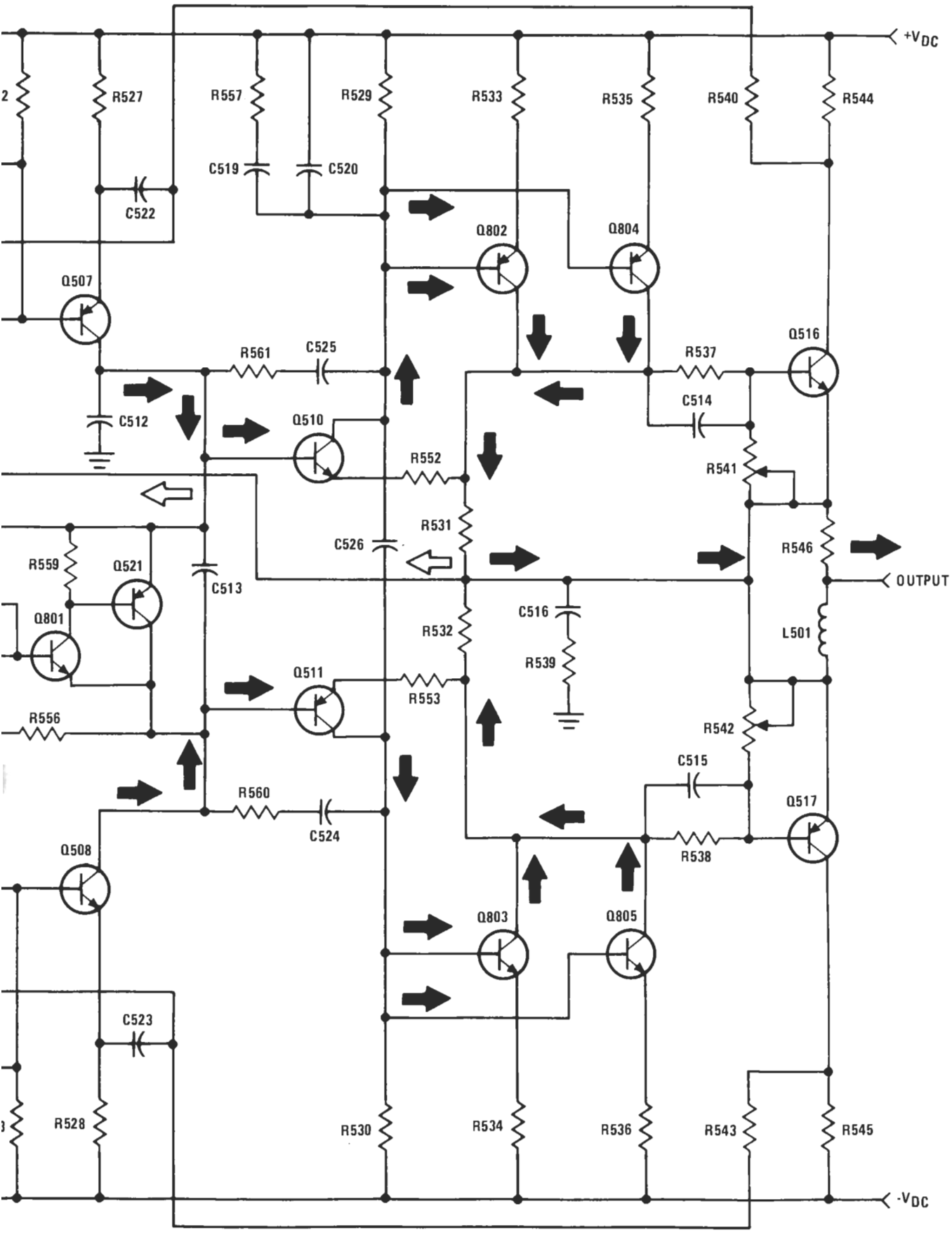


Figure 1. Amplifier Simplified Schematic


+VDC
R527
R557
R529
R533
R535
R540
R544
C519
C520
C522
Q802
Q804
Q507
Q516
R561
C525
R537
C512
C514
Q510
R552
R541
R531
C526
R546
R559
Q521
C513
OUTPUT
Q801
C516
R532
L501
R539
Q511
R553
R556
R542
C515
R560
Q517
C524
Q508
R538
Q803
Q805
C523
R528
R530
R534
R536
R543
R545
-VDC

CIRCUIT DESCRIPTION (Continued)

RELAY BOARD AND POWER SUPPLY

The output of the power amplifier circuit is applied to the wipers of relay K301 of the relay board circuit, Figure 2. The relay energizes after a minimum delay of two seconds after AC power is applied to the unit. The duration of the delay is a factor of the time constant of R306, R309, and C302. This delay at turn-on is to prevent any transient surges from reaching the output terminals. Additionally, resistors R302 and R305 sample the audio output signals. Should a constant DC level greater than +4.5V, or a high amplitude signal below 10Hz be present, Q301 will turn on, shorting the base of Q303 to ground. C302 begins to discharge and K301 de-energizes. Should a constant DC level more negative than -4.5V be present, the voltage drop across R304 bucks the voltage present at the base of Q303 and K301 de-energizes. When the relay is energized, the audio output is applied to the speaker terminals.

The DC power supply voltage for the power amplifier circuit and the metering circuit is ±58.5V. 86.5VAC is developed across the secondary of T1, which is rectified by the full-wave bridge comprised of CR1 through CR4. The rectified positive and negative voltages are each filtered by a 20,000ufd capacitor (C1 and C2). Resistors R1 and R2 are bleeder resistors.

The DC voltage for the relay circuit is +58V. The AC voltage from the transformer secondary is rectified by CR305 and CR306 (contained on the relay board) and filtered by C303.

The filament winding of T1 provides 5.7VAC to the meter lamps DS1 through DS4. In the event of a short-circuit, fuse F2 will open when the current exceeds 2A, thereby protecting the transformer.

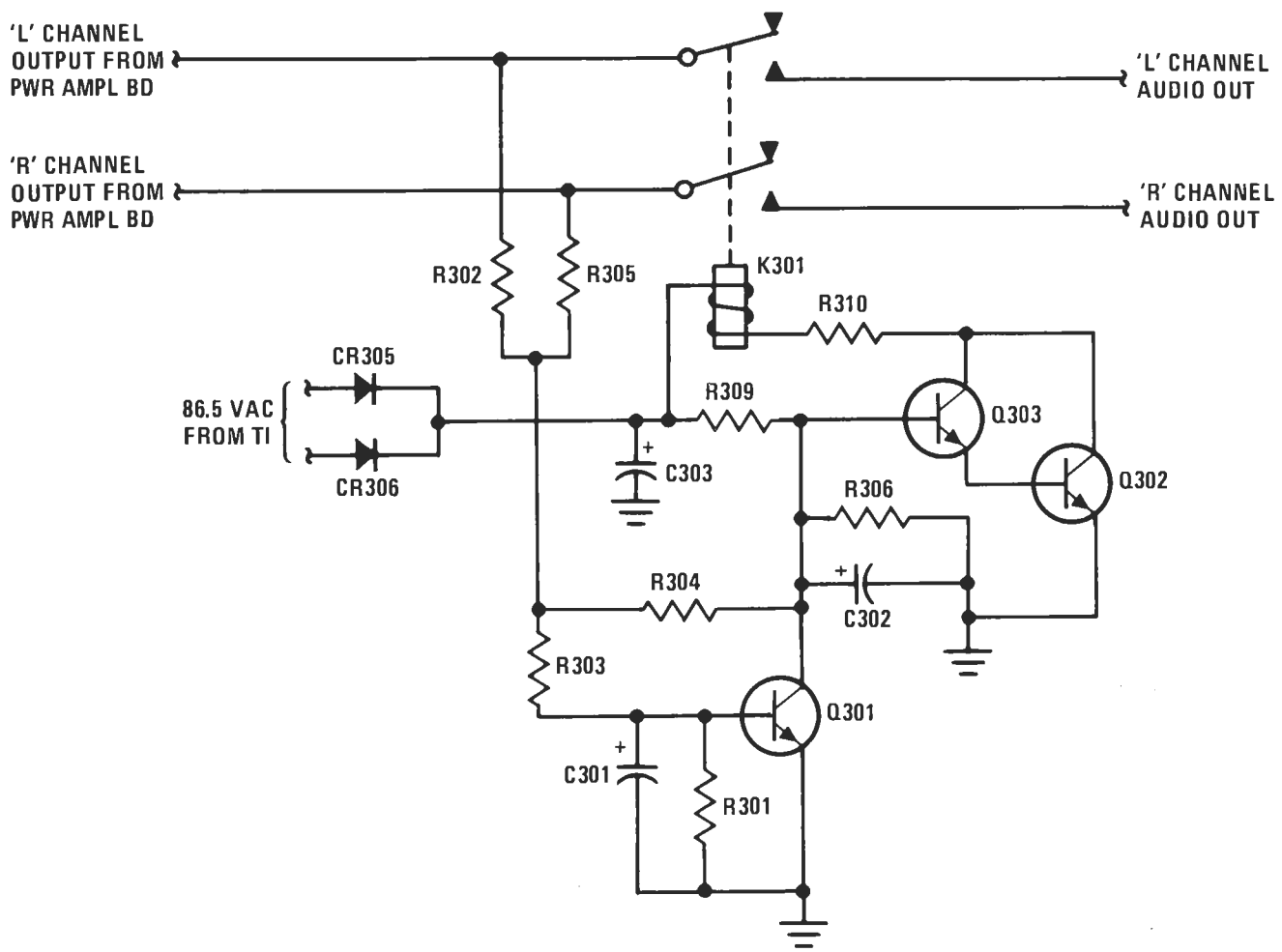


Figure 2. Relay Board Simplified Schematic

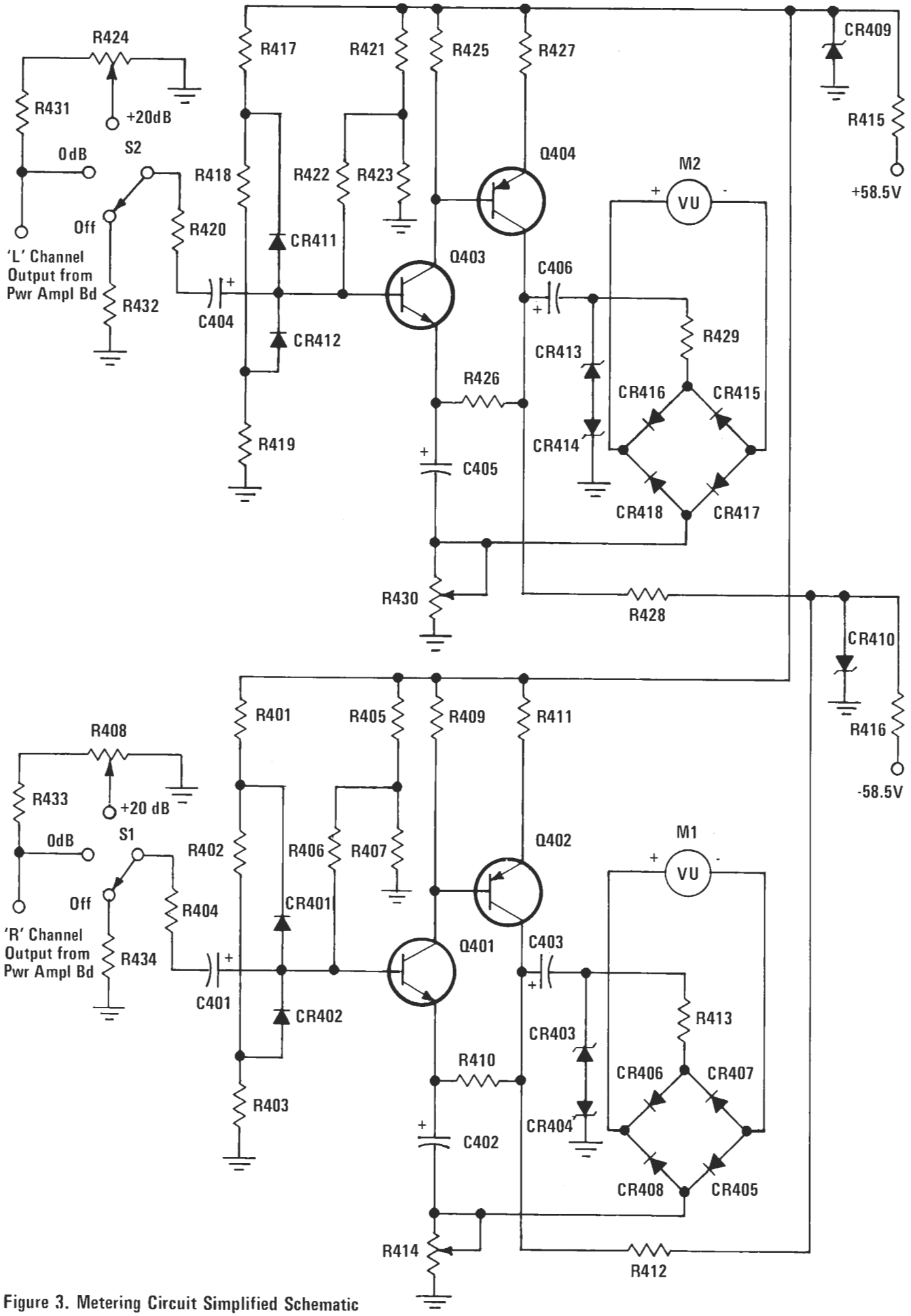


Figure 3. Metering Circuit Simplified Schematic

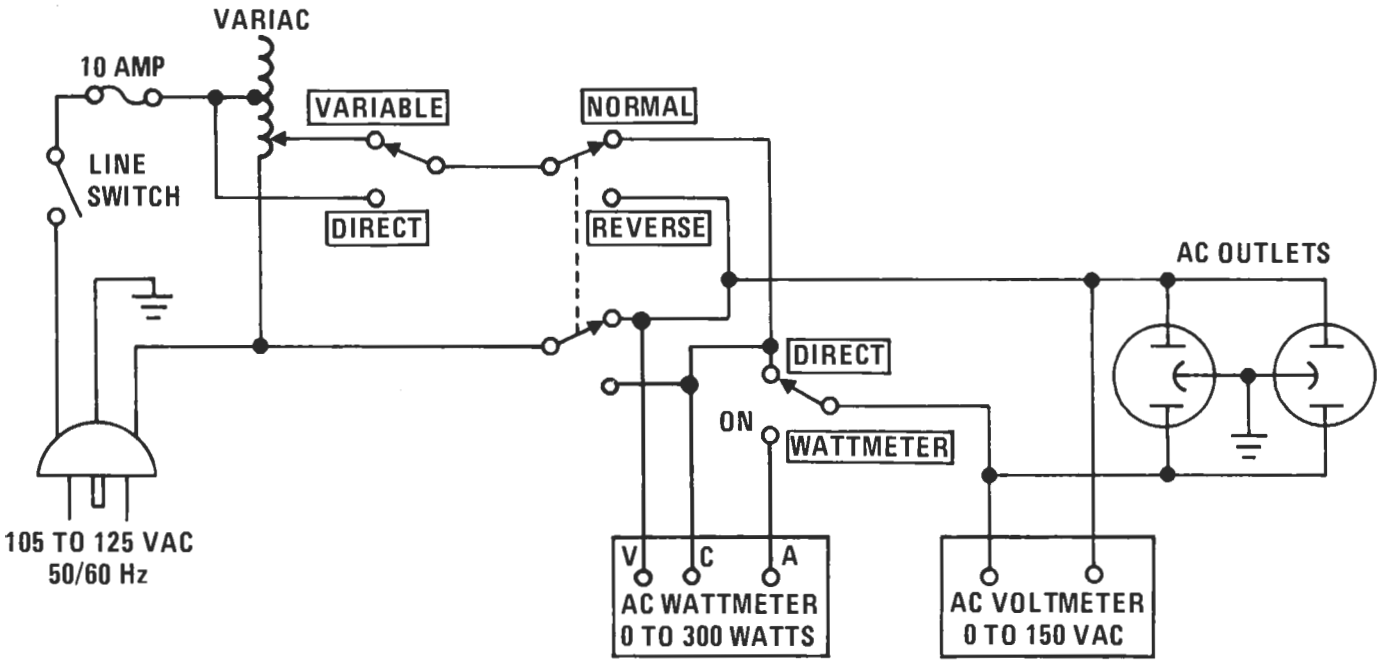


Figure 4. AC Power Control Box Simplified Schematic

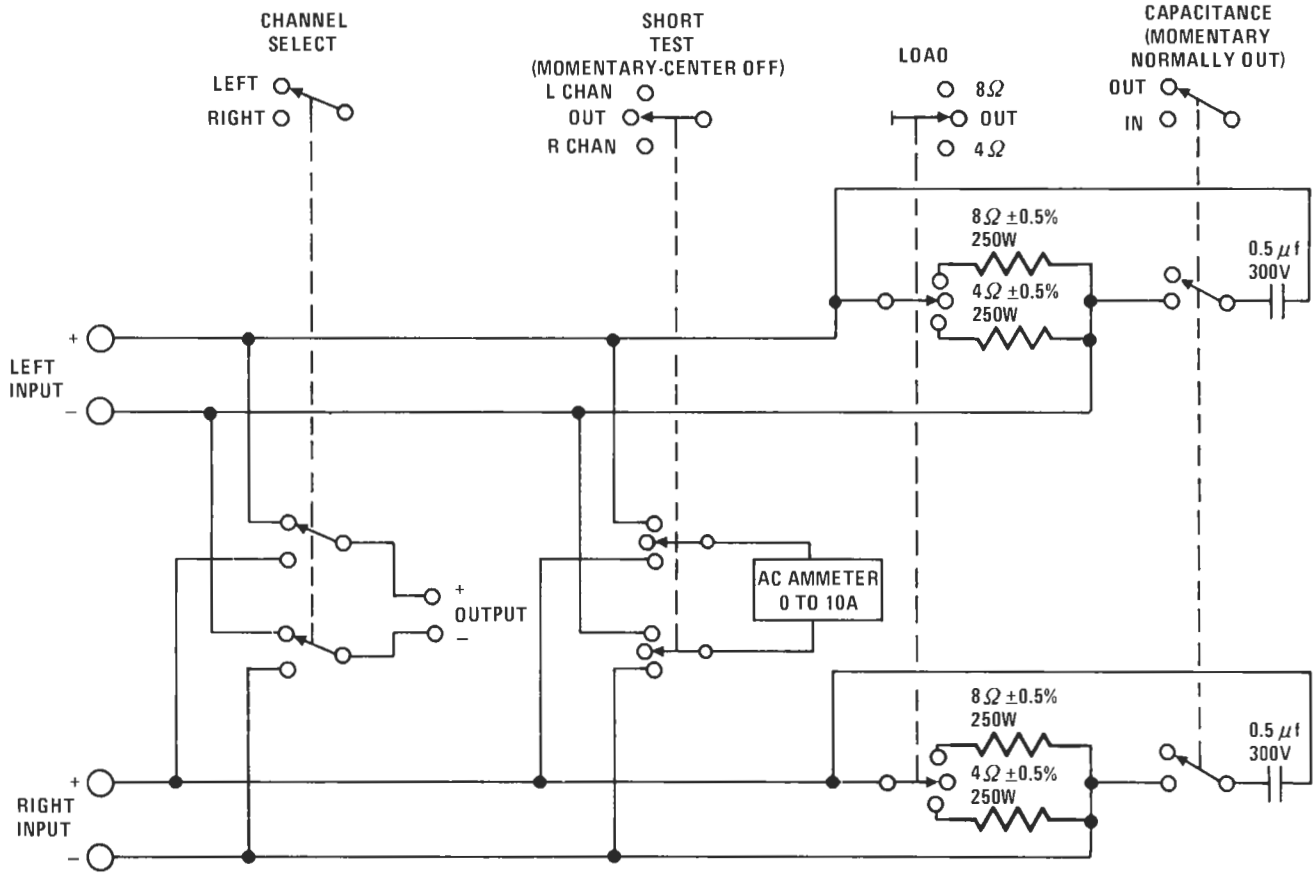


Figure 5. Amplifier Output Load Box Simplified Schematic

PARTS LIST

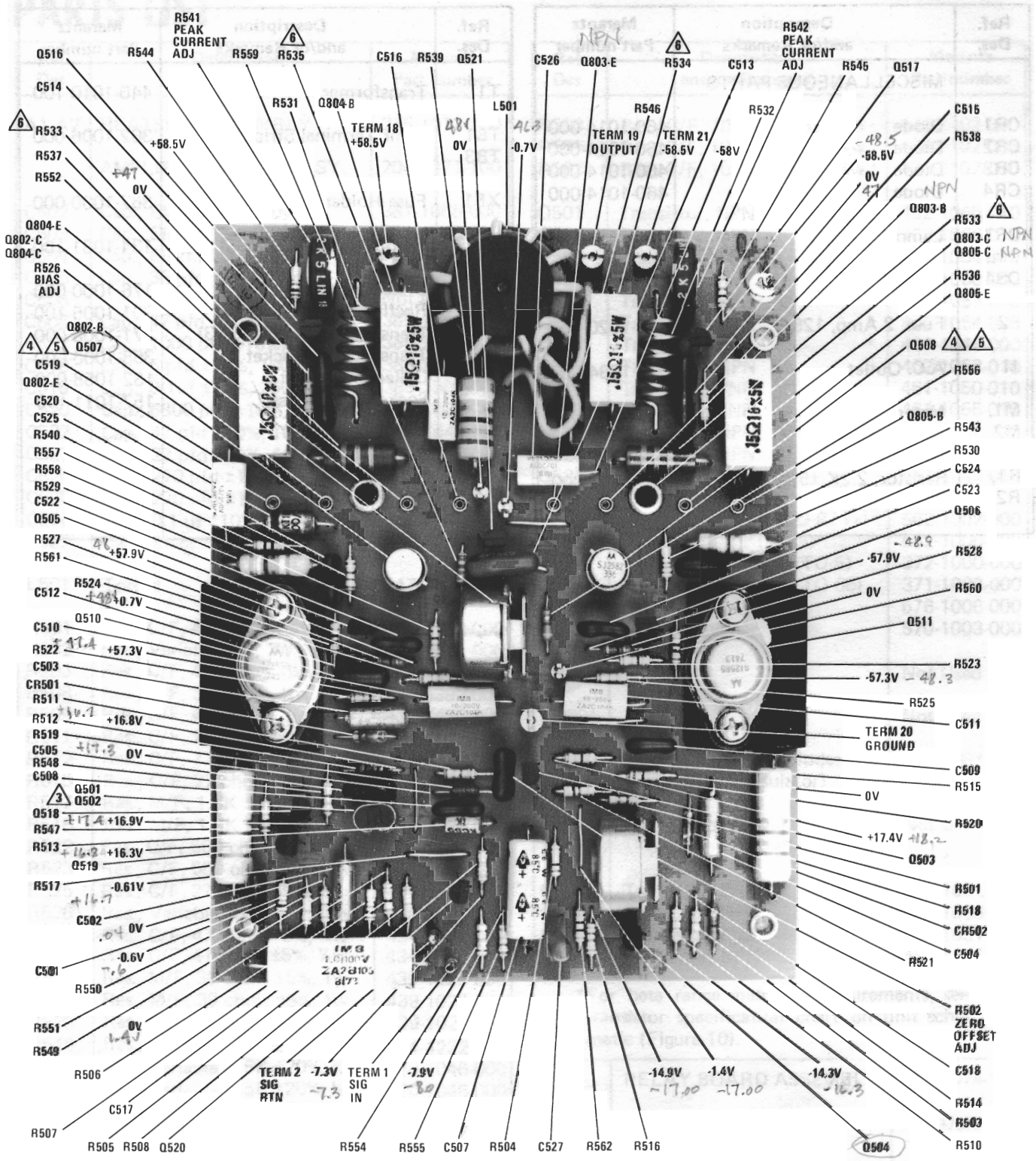
Ref. Des.	Description and/or Remarks	Marantz Part number
A1,A2	HEATSINK ASSEMBLY	215-1012-100
	AMPLIFIER BOARD ASSY.	200-1071-100
C502	Cap., Elect., 10µf, 20v	381-1068-000
C503	Cap., Elect., 10µf, 20v	381-1068-000
C504	Cap., Elect., 10µf, 20v	381-1068-000
C505	Cap., 36 pfd ±5%, 100v	385-1064-000
C506		Not Used
C508	Cap., 47 pfd ±10%, 100v	385-1040-000
C512	Cap., 1000 pfd ±10%, 100v	385-1068-000
C518	Cap., 5 pfd ±10%, 100v	385-1049-000
C519	Cap., 0.1uf ±10%, 250v	386-1000-000
C520	Cap., 6800 pfd ±10%, 400v	386-1026-000
C522	Cap., 47 pfd ±10%, 100v	385-1040-000
C523	Cap., 27 pfd ±10%, 100v	385-1036-000
C524	Cap., 270 pfd ±10%, 300v	385-1090-000
C525	Cap., 270 pfd ±10%, 300v	385-1090-000
C526	Cap., 0.1 uf ±10%, 250v	386-1000-000
C527	Cap., Elect. 100 µf, 3v	381-1089-000
L501	Toroid	147-1009-000
R501	Res., C/F, 4.7K ±5%, ¼w	434-4472-000
R502	Res., Variable, 2K, 2W	420-1045-000
R503	Res., C/F, 4.7K ±5%, ¼w	434-4472-000
R508	Res., C/F, 39K ±5%, ¼w	434-5392-000
R509	Res., C/F, 4.7K ±5%, ¼w	434-4472-000
R511	Res., C/F, 1.8K ±5%, ¼w	434-4182-000
R512	Res., C/F, 7.5K ±5%, ¼w	434-4752-000
R515	Res., C/F, 27 ohms ±5%, ¼w	434-2272-000
R517	Res., M/F, 1.3K ±5%, 3w	439-1022-000
R518	Res., M/F, 1.3K ±5%, 3w	439-1022-000
R522	Res., C/F, 560 ohms ±5%, ¼w	434-3562-000
R523	Res., C/F, 560 ohms ±5%, ¼w	434-3562-000
R525	Res., C/F, 27K ±5%, ¼w	434-5272-000
R526	Res., Variable, 100 ohms, 2w	420-1044-000
R527	Res., C/F, 47 ohms ±5%, ¼w	434-2472-000
R528	Res., C/F, 47 ohms ±5%, ¼w	434-2472-000
R529	Res., M/F, 39 ohms ±5%, 1w	439-1023-000
R530	Res., M/F, 39 ohms ±5%, 1w	439-1023-000
R539	Res., M/F, 27 ohms ±5%, 2w	439-1021-000
R540	Res., C/F, 2.2K ±5%, ¼w	434-4222-000
R541	Res., Variable, 2.5K ±20%, ¼w	420-1046-000
R542	Res., Variable, 2.5K ±20%, ¼w	420-1046-000
R543	Res., C/F, 2.2K ±5%, ¼w	434-4222-000
R544	Res., C/F, 1K ±5%, ¼w	434-4102-000
R545	Res., C/F, 1K ±5%, ¼w	434-4102-000
R547	Res., C/F, 20K ±5%, ¼w	434-5202-000
R548	Res., C/F, 270 ohms ±5%, ¼w	434-3272-000
R549	Res., C/F, 5.6K ±5%, ¼w	434-4562-000
R552	Res., C/C, 5.6 ohms ±5%, 1w	423-1562-000
R553	Res., C/C, 5.6 ohms ±5%, 1w	423-1562-000
R554	Res., C/F, 56K ±5%, ¼w	434-5562-000
R555	Res., C/F, 22K ±5%, ¼w	434-5222-000
R556	Res., C/F, 360 ohms ±5%, ¼w	434-3362-000
R557	Res., C/F, 10 ohms ±5%, ¼w	434-2102-000
R558	Res., C/F, 560 ohms ±5%, ¼w	434-3562-000
R559	Res., C/F, 470 ohms ±5%, ¼w	434-3472-000
R560	Res., C/F, 10 ohms ±5%, ¼w	434-2102-000
R561	Res., C/F, 10 ohms ±5%, ¼w	434-2102-000
R562	Res., C/F, 10 ohms ±5%, ¼w	434-2102-000
Q501	Transistor, NPN	462-1066-010
Q502	Transistor, NPN	462-1066-010
Q503	Transistor, PNP	461-1054-010
Q507	Transistor, PNP *	461-1056-000
Q508	Transistor, NPN *	462-1053-000
Q510	Transistor, NPN *	462-1054-000
Q511	Transistor, PNP *	461-1046-000
Q516	Transistor, NPN	462-1058-010
Q517	Transistor, PNP	461-1050-010
Q518	Transistor, PNP	461-1055-010
Q519	Transistor, NPN	462-1038-210
Q520	Transistor, NPN	462-1042-000
Q521	Transistor, PNP	461-1055-010
	Thermal Retainer (TO-92 Pr)	562-1007-000
	Heat Dissipator (TO-5)	562-1000-000
	Transistor Insulator (TO-5)	372-1000-000
	Transistor Insulator (TO-66)	371-1007-000
	Nylon Washer	676-1006-000
	Toroid Retainer	570-1003-000
C801		Not Used
CR801		Not Used
Q801	Transistor, NPN (includes mtg washer & insulator)	462-1067-020
	Heat Sensor Assy	Not Used
Q802	Transistor, PNP *	461-1031-010
Q803	Transistor, NPN *	462-1036-010
Q804	Transistor, PNP *	461-1031-010
Q805	Transistor, NPN *	462-1036-010

*For beta range matching requirements, see transistor specification chart on unit schematic (Figure 10).

A3	RELAY BOARD ASSEMBLY	200-1074-100
CR301		Not Used
CR302		Not Used
CR303		Not Used
CR304		Not Used
R307		Not Used
R308		Not Used
	Transistor Insulator (TO-5)	372-1000-000
	METER BOARD ASSEMBLY	
R431	Res., C/F, 22K ±5%, ¼w	434-5222-000
R432	Res., C/F, 2.4K ±5%, ¼w	434-4242-000
R433	Res., C/F 22K ±5%, ¼w	434-5222-000
R434	Res., C/F, 2.4K ±5%, ¼w	434-4242-000

Ref. Des.	Description and/or Remarks	Marantz Part number
	MISCELLANEOUS PARTS	
CR1	Diode	460-1014-000
CR2	Diode	460-1014-000
CR3	Diode	460-1014-000
CR4	Diode	460-1014-000
DS1 thru DS4	Lamp	482-1008-000
F2	Fuse, 2 Amp, 125v	451-1020-000
J1	A.C. Outlet	360-1034-000
M1, M2	Meter	865-1004-000
R1, R2	Resistor, 2.2K ±5%, 2w	436-4222-000

Ref. Des.	Description and/or Remarks	Marantz Part number
T1	Transformer	440-1010-100
TB1, TB3	Xfmr Terminal Strip	362-1006-000
XF1	Fuse Holder	367-1000-000
	Front Panel	134-1031-100
	Dress Bolts	176-1000-000
	Rectifier Terminal Board	201-1005-100
	Transistor Insulator (TO-3)	371-1006-000
	Transistor Pin Socket	368-1006-000
	Collector Bracket	132-1058-000
	Socket & Wire Assy	157-1011-100



NOTES:

1. VOLTAGES ARE DC VOLTS TO GROUND, MEASURED ON A TYPICAL UNIT.
2. CONFIGURATION SHOWN IS APPLICABLE TO CIRCUIT BOARDS FABRICATED FROM A/W 115-1071, REV N/C.

3. TRANSISTOR PAIR Q501-Q502 ARE TO BE EQUALLY SPACED OFF THE BOARD WITH THEIR ENTIRE FLAT SURFACES IN INTIMATE CONTACT. P/N 562-1005-000 THERMAL RETAINER TO BE INSTALLED ON THE PAIR.

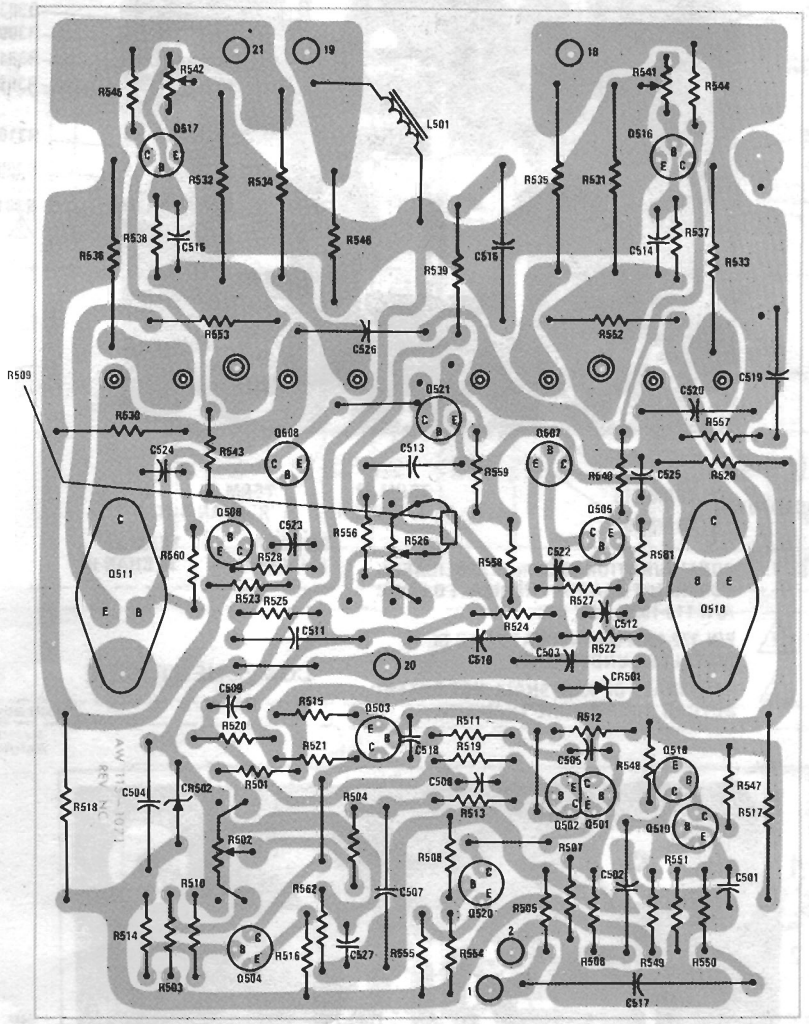
4. P/N 562-1000-000 HEAT DISSIPATOR TO BE INSTALLED ON Q507 AND Q508.

5. P/N 372-1000-000 INSULATOR TO BE INSTALLED UNDER Q507 AND Q508.

6. RESISTORS R533, R534, R535 AND R536 TO BE INSTALLED 1/8" MINIMUM OFF BOARD.

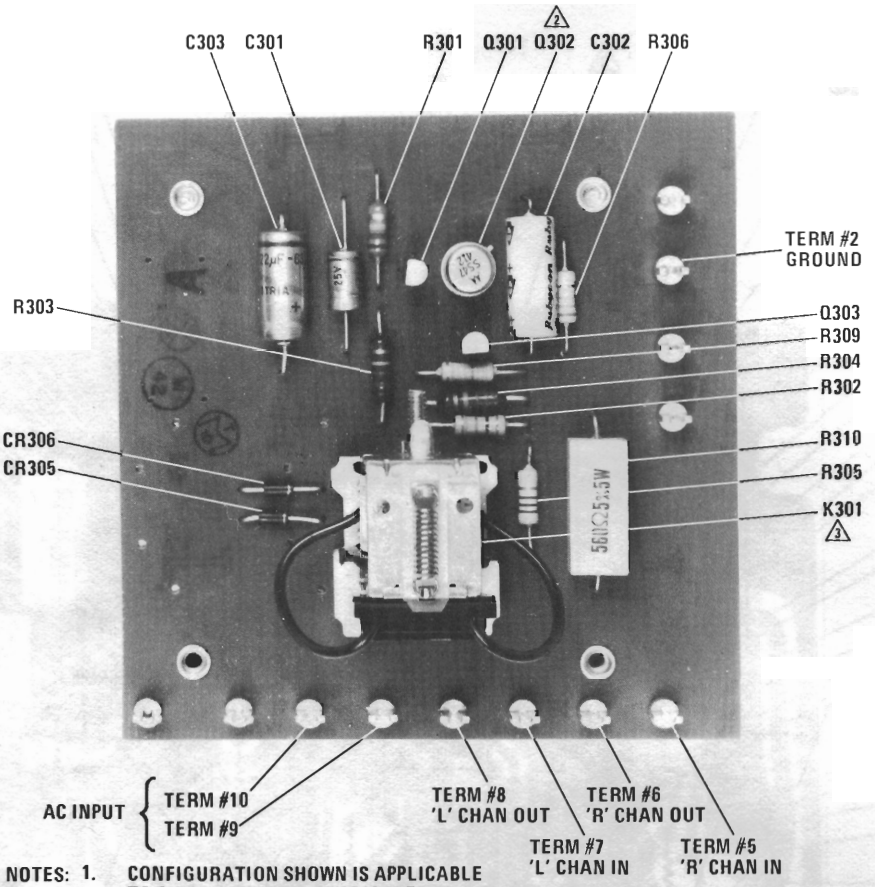
COMPONENT SIDE

Figure 7. Power Amplifier Board Component Assembly Diagram



CIRCUIT SIDE

Figure 7. (Cont.) Power Amplifier Board Component Assembly Diagram



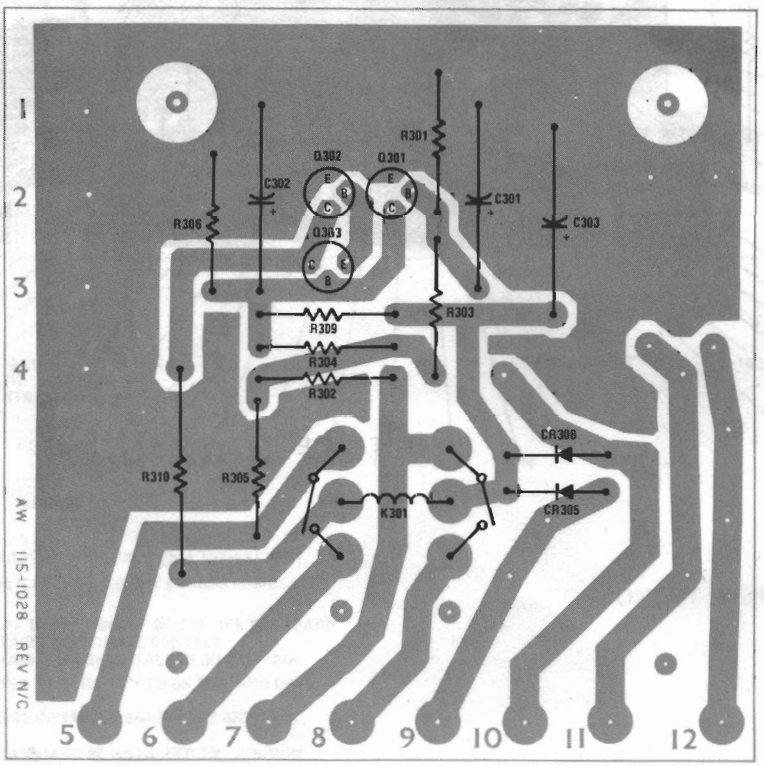
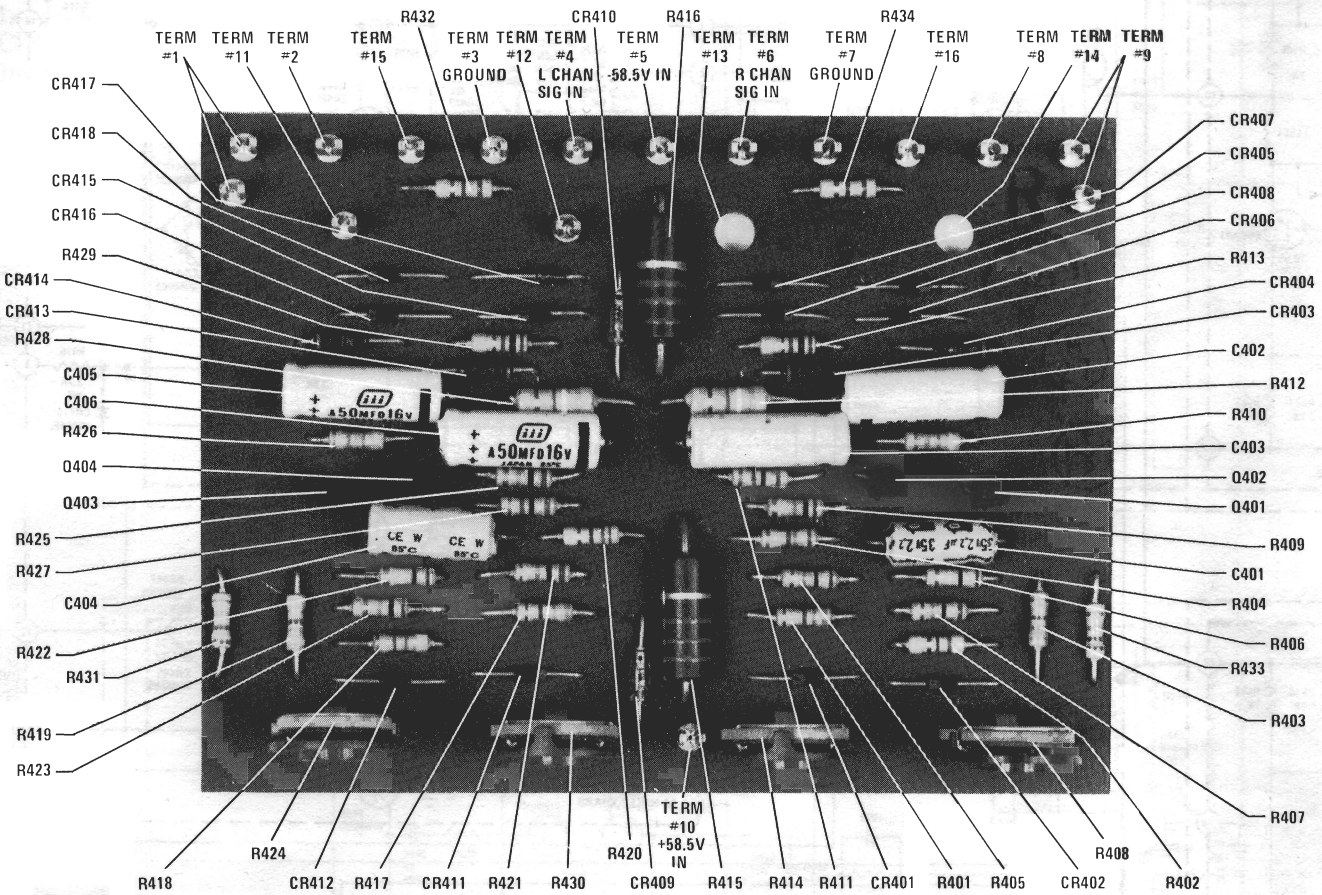
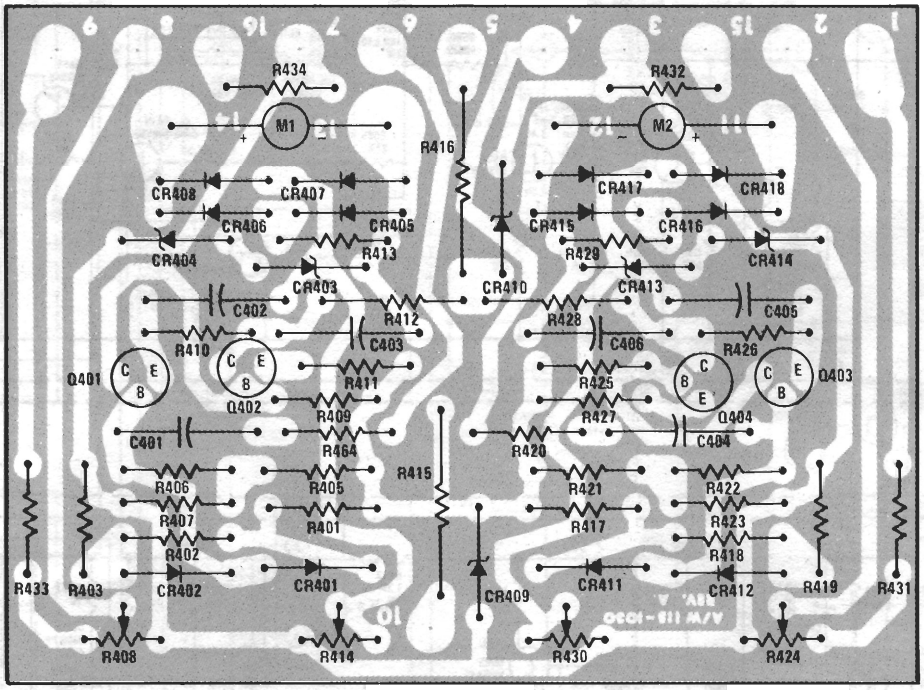


Figure 8. Relay Board Component Assembly Diagram



COMPONENT SIDE

Figure 9. Meter Board Component Assembly Diagram



CIRCUIT SIDE

Notes:

1. C401 and C404 may be a "tear-drop" tantalum capacitor. Positive lead is on right-hand side when viewing black dot with leads down.
2. Configuration shown is applicable to circuit boards fabricated from A/W 115-1030, Rev A.

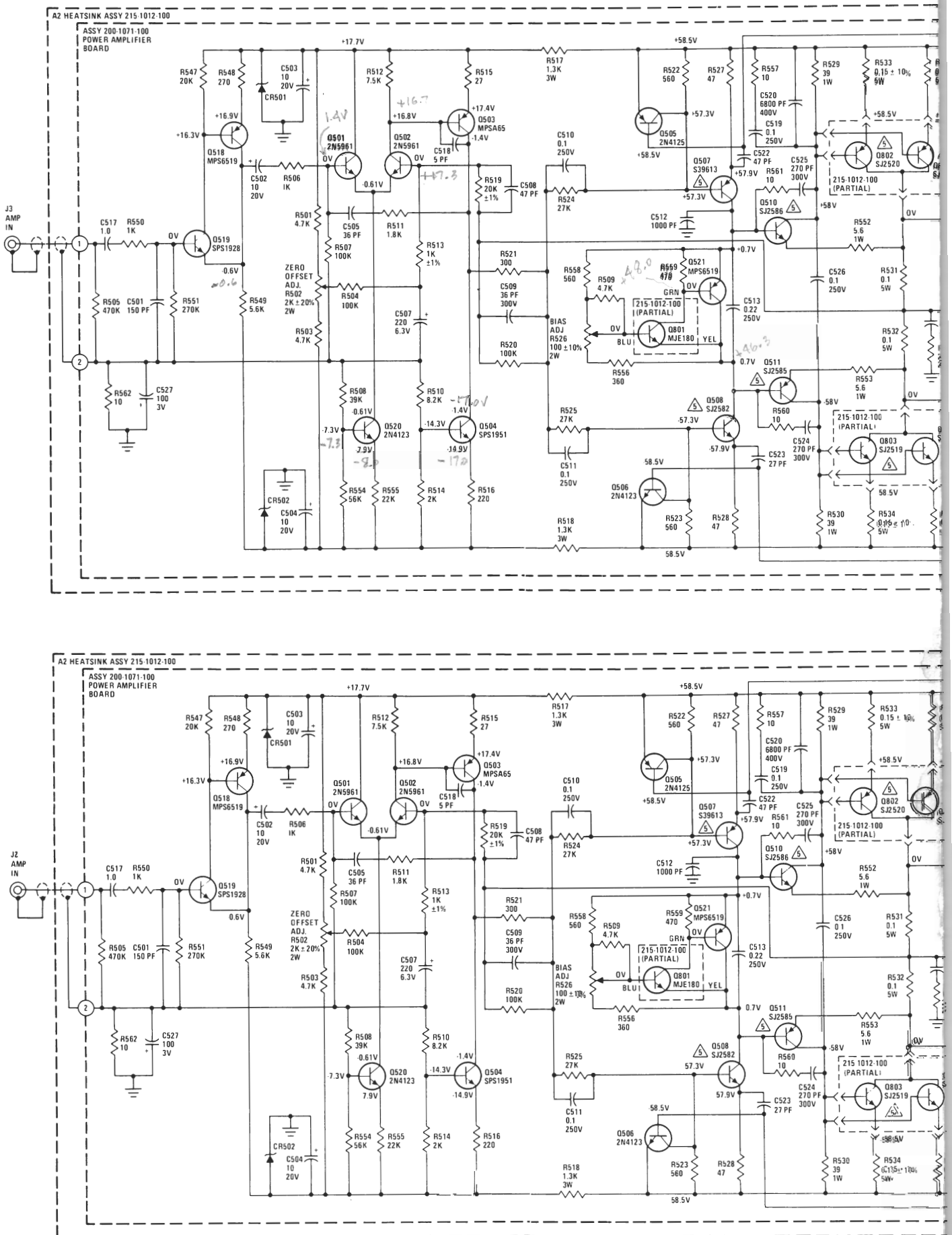
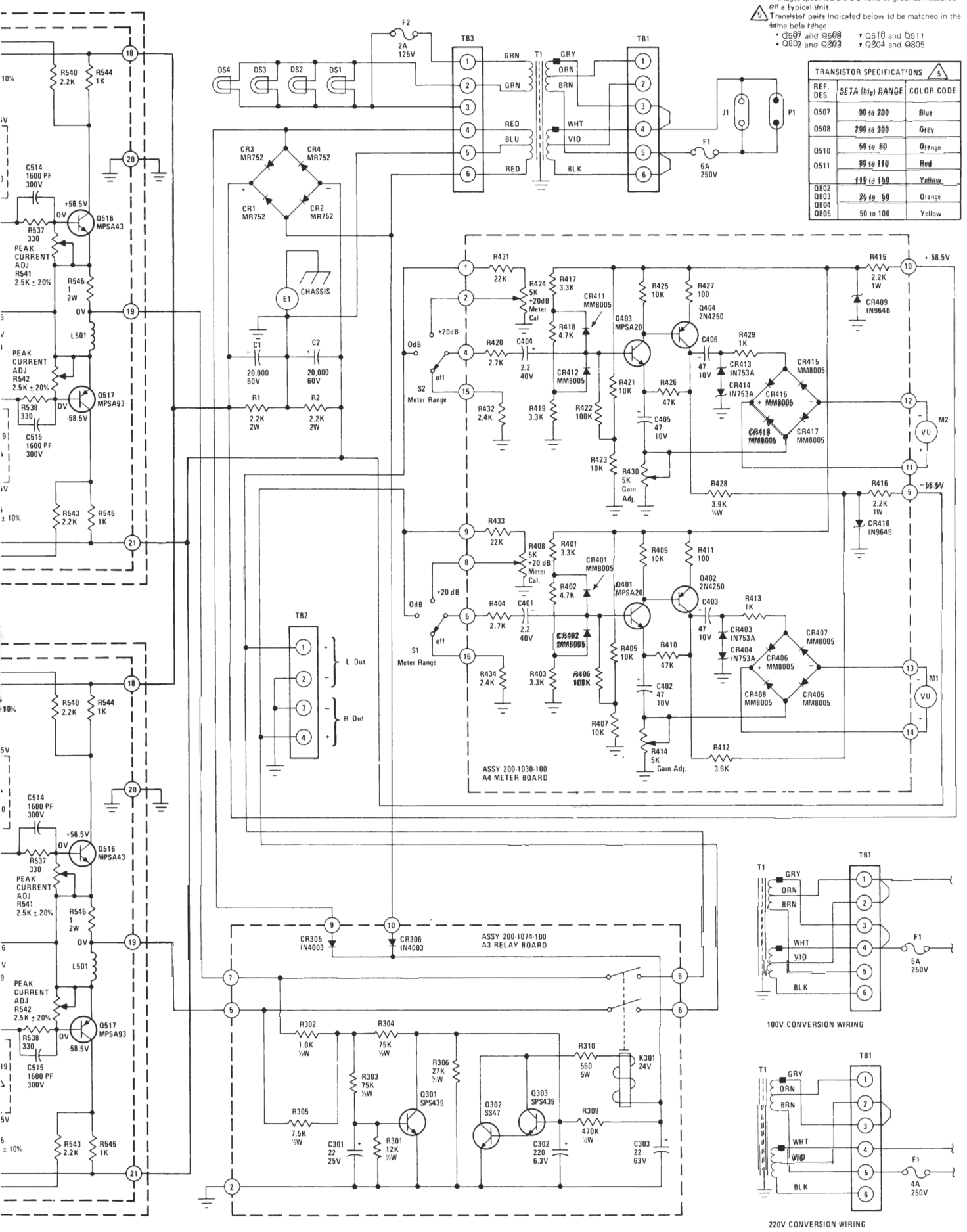


Figure 10. Model 250 Schematic

Notes: Unless otherwise specified
1. All capacitor values are in micro-farads; 100 WVDC.
2. All resister values are in ohms; ¼W.
3. All diodes are IN9678.
4. Voltages specified are DC volts to ground, measured on a typical unit.
5. Transistor pairs indicated below to be matched in the same beta range:
   - Q507 and Q508
   - Q802 and Q803
   - Q510 and Q511
   - Q804 and Q805

TRANSISTOR SPECIFICATIONS 5		
REF. DES.	BETA (h_{fe}) RANGE	COLOR CODE
Q507	90 to 200	Blue
Q508	200 to 300	Grey
Q510	50 to 80	Orange
Q511	80 to 110	Red
	110 to 150	Yellow
Q802 Q803 Q804 Q805	25 to 50	Orange
	50 to 100	Yellow



100V CONVERSION WIRING

220V CONVERSION WIRING