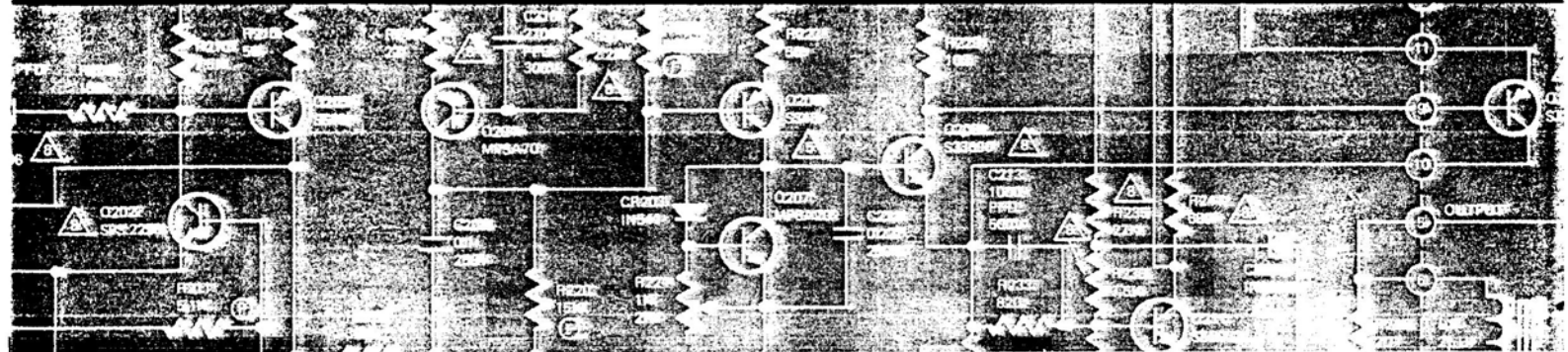


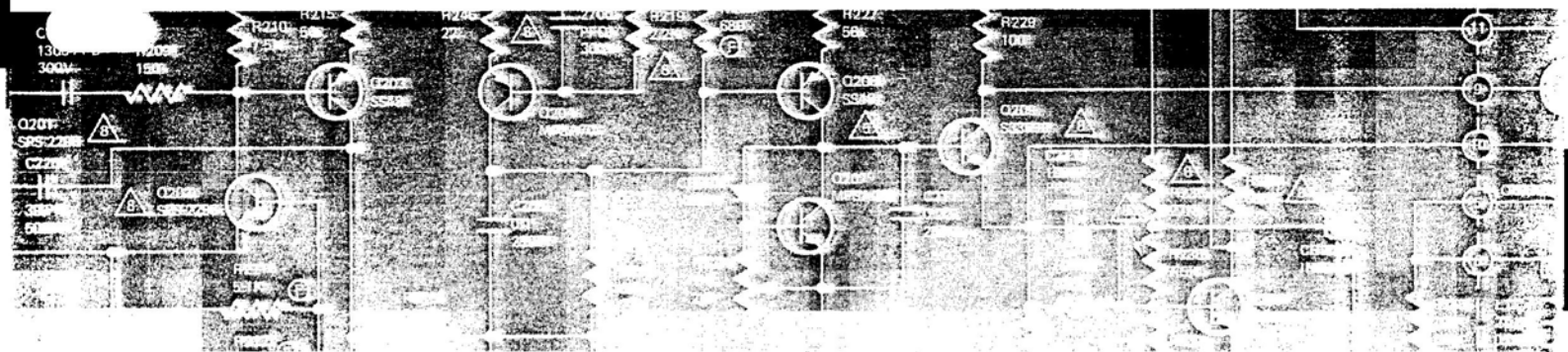
# marantz.



model two fifty

SERVICE  
MANUAL

250



*Stereo Power Amplifier*

# TABLE OF CONTENTS

| SECTION                   | PAGE |
|---------------------------|------|
| Introduction              | 1    |
| Circuit Description       | 1    |
| Meter Description         | 5    |
| 100, 220-Volt Conversion  | 5    |
| Technical Specifications  | 6    |
| Performance Verification  | 8    |
| Trouble Analysis          | 11   |
| Parts List                | 13   |
| Component Layout Diagrams | 15   |
| Schematic                 | 18   |

# LIST OF ILLUSTRATIONS

| FIGURE |  | PAGE |
|--------|--|------|
| 1.     | Amplifier Simplified Schematic                   | 2    |
| 2.     | Rectifier/Relay Board Simplified Schematic       | 4    |
| 3.     | 250 Metering Circuit Simplified Schematic        | 4    |
| 4.     | AC Power Control Box Simplified Schematic        | 10   |
| 5.     | Amplifier Output Load Box Simplified Schematic   | 10   |
| 6.     | Test Equipment Set-Up                            | 12   |
| 7.     | Power Amplifier Board Component Assembly Diagram | 15   |
| 8.     | Rectifier/Relay Board Component Assembly Diagram | 16   |
| 9.     | Meter Board Component Assembly Diagram           | 17   |
| 10.    | Model 250 Schematic                              | 18   |

| TABLE |                                       | PAGE |
|-------|---------------------------------------|------|
| 1.    | Test Equipment Required for Servicing | 7    |

## INTRODUCTION

This service manual is intended for use by authorized warranty stations. The manual contains service information for the Marantz Model 250 Stereo Power Amplifier, manufactured by the Marantz Company, a subsidiary of the Superscope Incorporated, Sun Valley, California 91352.

Adjustment, maintenance, and troubleshooting information listed herein should be attempted only by the experienced technician, one knowledgeable in solid state amplifier operation and the use of test equipment. All instructions should be read carefully and understood fully before proceeding with any service.

Symptoms (and their remedies) listed in the troubleshooting section, are those which might occur in some units. As the Marantz Company becomes aware of other field problems, supplementary service bulletins will be issued to all stations. To improve this service, all problems (and their solutions) not covered in this service manual should be brought to the attention of the National Service Manager at our Sun Valley location.

## CIRCUIT DESCRIPTION

The following circuit description will be based on Channel A only. Channel B operates in an identical manner.

### AMPLIFIER

The input stage of the power amplifier, fig. 1, is comprised of an emitter-follower, Q519, and its current source, Q518. The output of this stage is coupled through C502 and R506 to the differential amplifier (Q501, Q502), which drives an inverter (Q503) whose collector current is developed through current source Q504. The inverter is coupled to complementary pre-drivers (Q507, Q508). The output of the pre-drivers is applied to their respective drivers (Q510, Q511) which are coupled to their respective power transistors (Q802, Q804-Q803, Q805).

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. These transistors disable the pre-drivers on excessive output current peaks, thus limiting peak output current to a safe level.

Feedback for the amplifier is developed at the junction of R531 and R532. The feedback is applied across two loops. Feedback applied across R520 and C509 completes the driver-power output loop. Feedback applied across R519 and C508 completes the loop for the entire power amplifier.



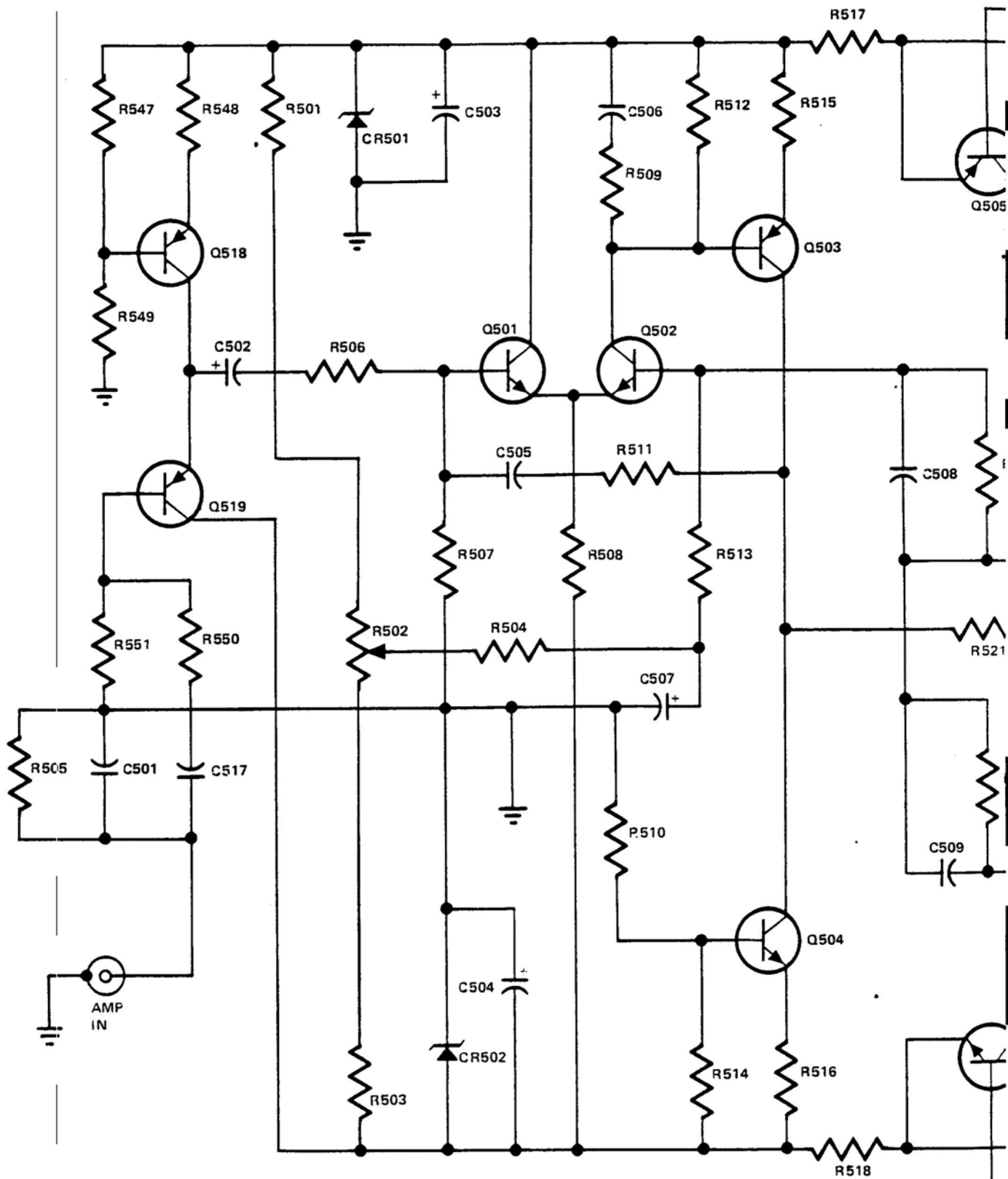
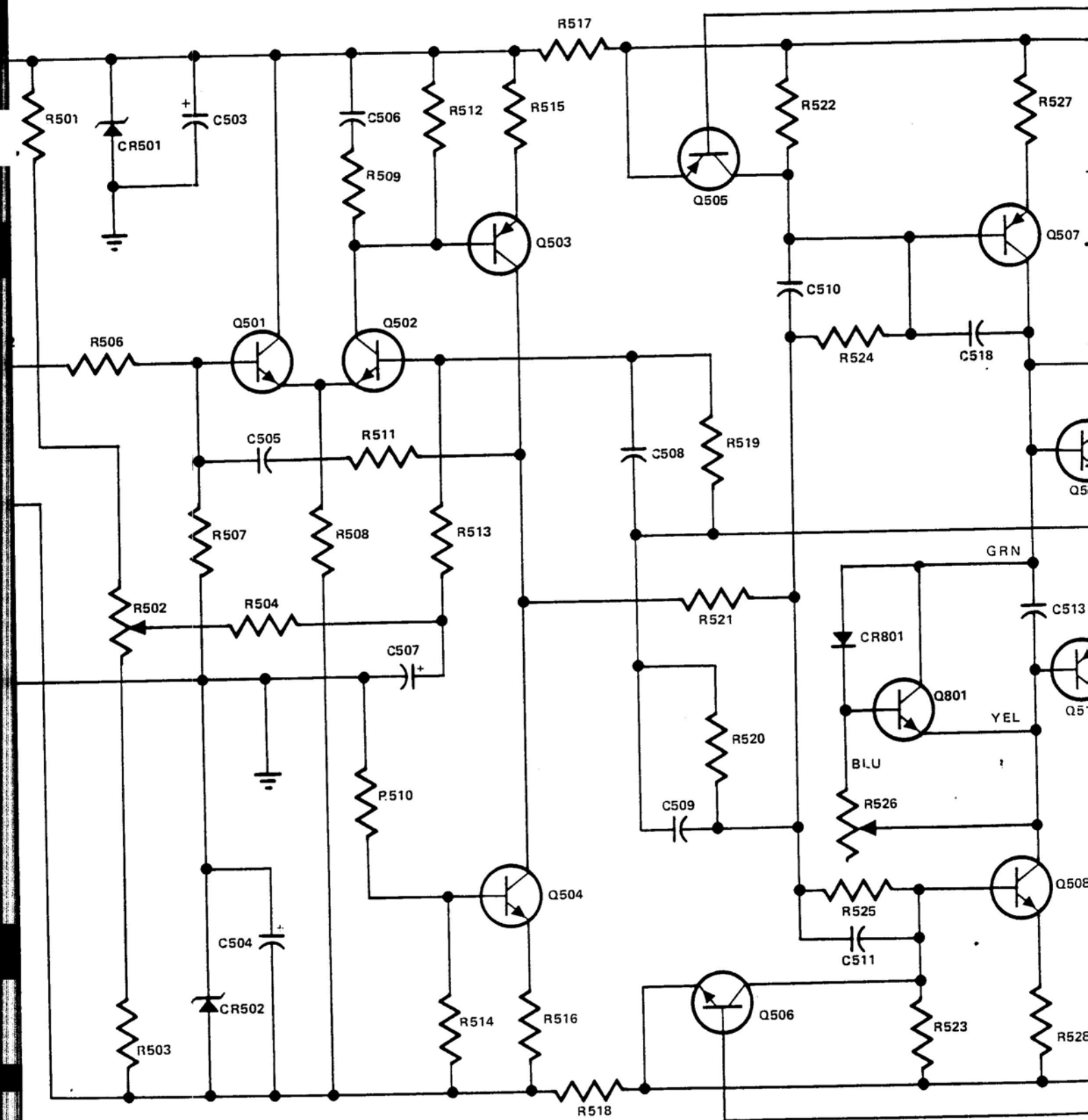
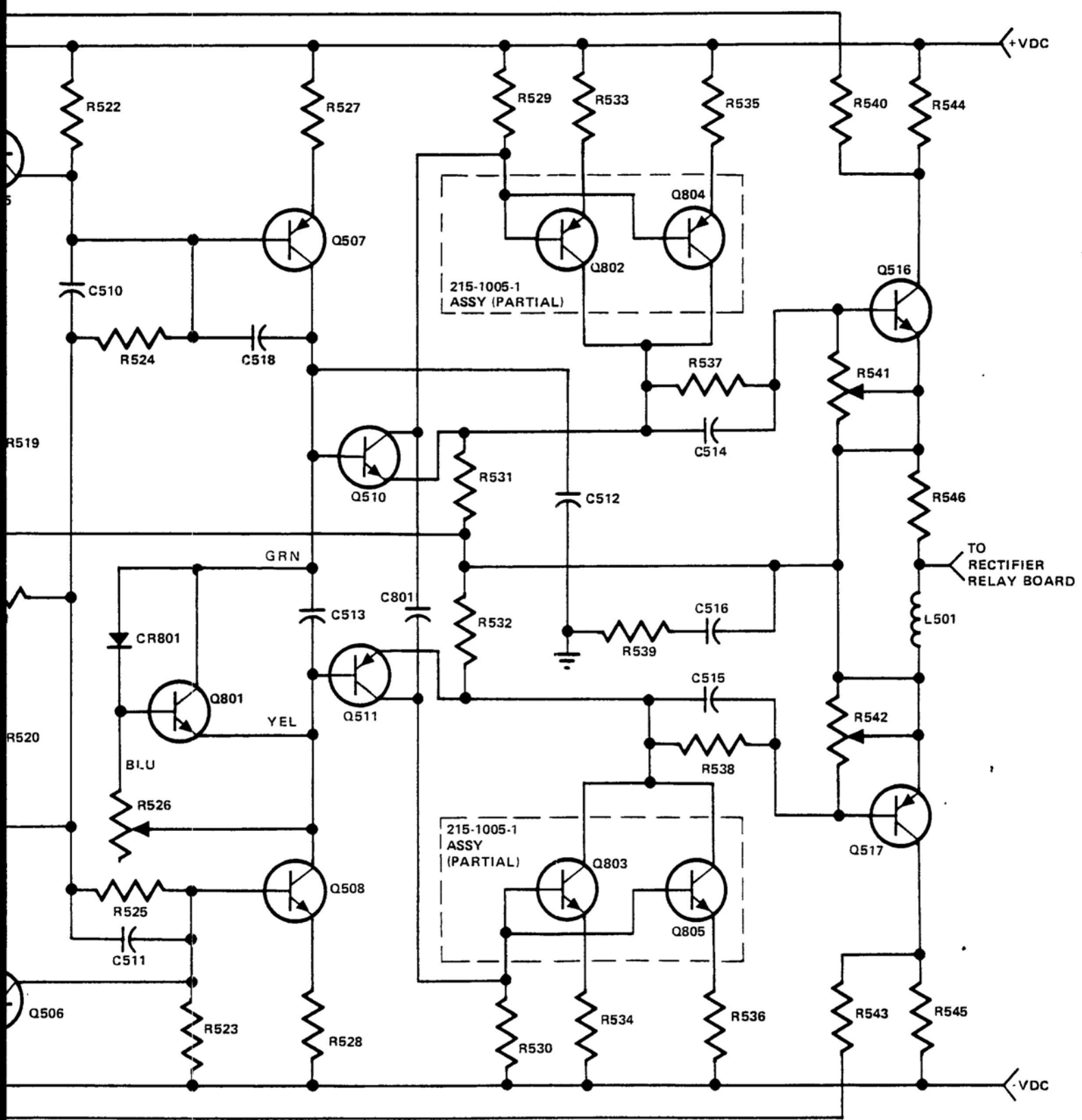


Figure 1. Amplifier Simplified Schematic



Schematic



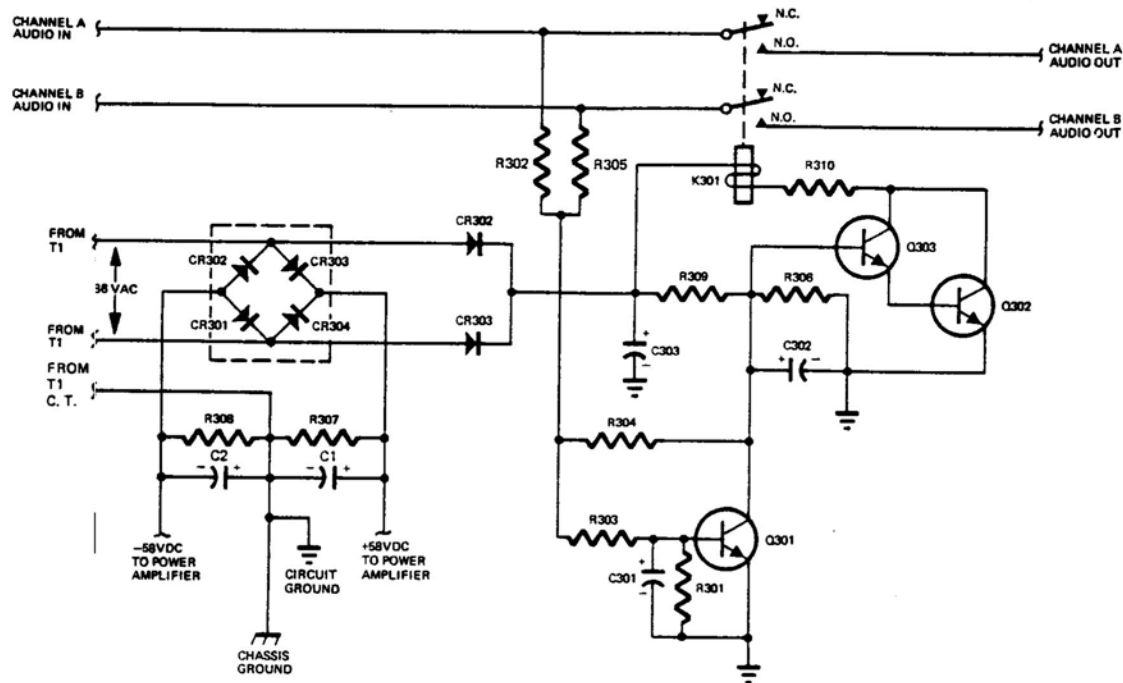


Figure 2. Rectifier/Relay Board Simplified Schematic

## RECTIFIER-RELAY BOARD

The output of the power amplifier is applied to the wipers of relay K301 on the rectifier relay board, Figure 2. Relay K301 energizes after a minimum delay of two seconds after turn on. The length 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 over +4.5 volts, or a high amplitude signal below 10 Hz be present, Q301 will turn on, shorting the base of Q303 to ground. C302 begins to discharge and K301 de-energizes. If a constant DC level over -4.5 volts is present, the voltage drop across R304 bucks the voltage present at the base of Q303 and K301 de-energizes. The output from K301 is applied to the SPEAKER TERMINALS.

Eighty six volts AC is applied to CR301 through CR304 which develop the +58 and -58 volts for the power amplifier board. CR305 and CR306 develop the positive voltage to energize K301.

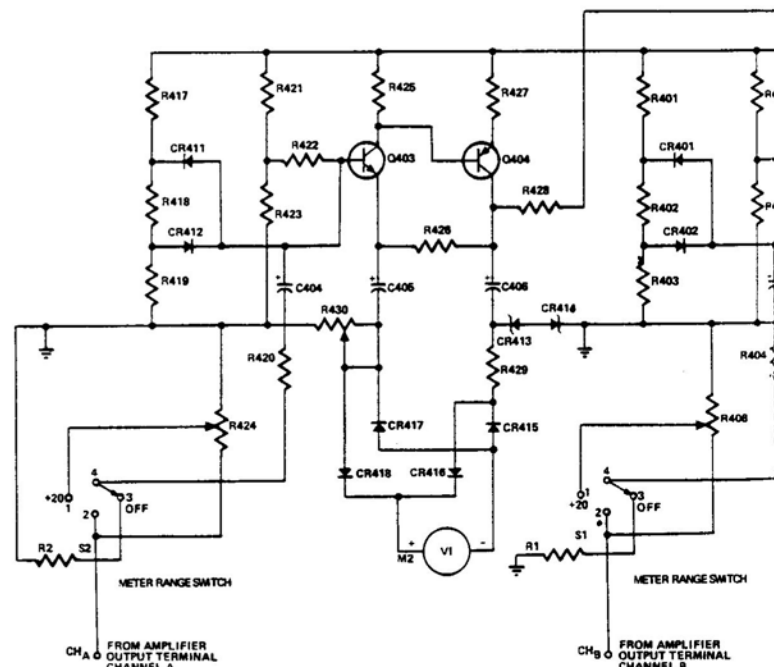
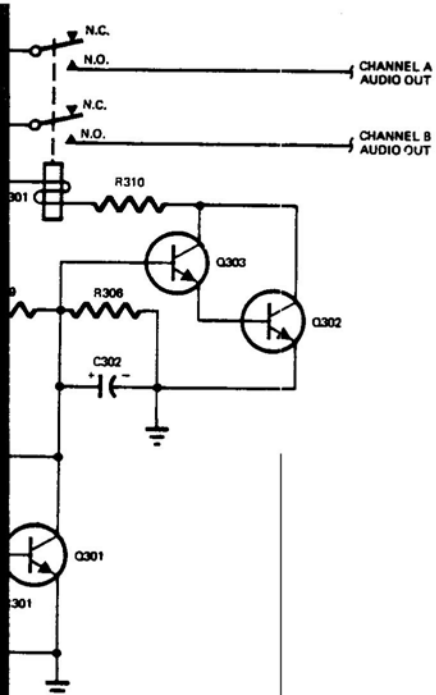


Figure 3. 250 Metering Circuit Simplified Diagram



# METER DESCRIPTION

Audio from the amplifier output terminals is applied to METER RANGE switch S2, which selects as a reference two different power output levels: 0 dB = 0.75W or 0 dB = 75W.

Output from the range switch is applied to the input stage (Q403) of the meter drive amplifier.

Two diodes (CR411, CR412) limit excessive voltage spikes from reaching the input stage.

The output stage (Q404) drives a bridge rectifier circuit (CR415, CR416, CR417, CR418) which generates DC power for the VU meter (M2). Two zener diodes (CR413, CR414) connected back-to-back protect the meter and rectifier circuits from possible overload.

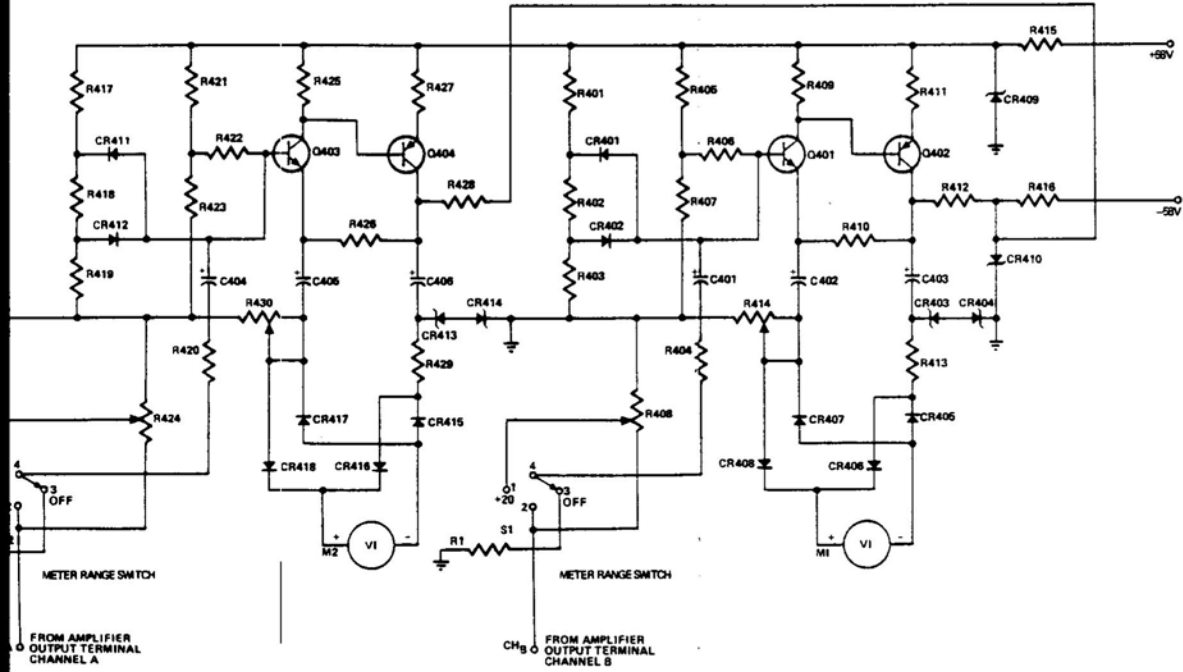
Overall amp  
eter R430.  
0 dB = 0.7  
is in the 0 d

Meter cali  
METER RA  
ing potenti  
0 dB = 75W

DC feedback  
by R426.

Zener diod  
age for the

\*NOTE:  
8 Ω load.  
8 Ω load.



# 100,220 - V0

## 220-VOLT AC CONV

To convert the Mode perform the following

1. Remove the top
2. Orient the Mode facing toward the
3. Locate TB1, the transformer half which terminates primary wires.
4. Unsolder the bla wires and all jur

3. 250 Metering Circuit Simplified Diagram

## METER DESCRIPTION

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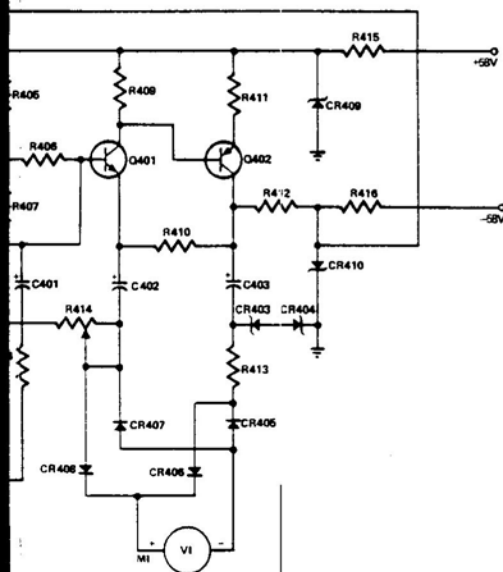
Overall amplifier gain is controlled by potentiometer R430. This adjustment calibrates the meter for 0 dB = 0.75W\* when the METER RANGE switch is in the 0 dB position.

Meter calibration for the +20 dB position of the METER RANGE switch is accomplished by adjusting potentiometer R424 for a meter indication of 0 dB = 75W\*.

DC feedback for the drive amplifier is accomplished by R426.

Zener diodes CR409, CR410 regulate supply voltage for the meter drive amplifier.

\*NOTE: 0.75W corresponds to 2.45V across an 8Ω load. 75W corresponds to 24.5V across an 8Ω load.



## 100,220-VOLT AC CONVERSION

### 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 the black and white power lead-in wires and all jumpers from TB1.

# TECHNICAL SPECIFICATIONS

Power Output (each channel, both channels driven, at rated distortion, 20 Hz to 20 KHz)

| Load    | RMS  |
|---------|------|
| 4 ohms  | 150W |
| 8 ohms  | 125W |
| 16 ohms | 64W  |

Total Harmonic Distortion . . . . . at or below rated power, 20 Hz to 20 KHz. less than 0.1%

Intermodulation Distortion . . . . . at or below rated power, SMPTE, any combination of two frequencies, 20 Hz to 20 KHz: less than 0.1%

Frequency Response . . . . . +0 - 1.5 dB 2 Hz to 100 KHz, ±0.1 dB 20 Hz to 20 KHz

Input Sensitivity . . . . . 1.5 Volts for rated power

Input Impedance . . . . . 100K ohms

Damping Factor . . . . . Greater than 100 at 8 ohms

## GENERAL

Total Noise . . . . . Better than 106 dB below rated power into 8 ohms

Power Requirements . . . . . 120V AC, 500W, 50/60 Hz

Dimensions . . . . . 15-3/8" w. x 6-1/8" h. x 9-1/2" deep

Unit Weight . . . . . 28 pounds

Shipping Weight . . . . . 34 pounds

## 220 volt AC Conversion

Split primary windings permit easy conversion from 120 volt to 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 5, 6, and 8. Item 8 is eliminated. These items will read:

5. Solder a jumper to TB1 connecting the grey and violet transformer wires.
6. Solder the black and white power lead-in wires to the brown and white transformer wires, respectively, on TB1.
7. Re-attach the top cover.
8. Replace the 6-amp, 250V fuse in the unit with the 4 amp, 250V fuse, Part # 451-1003, supplied with the 220-volt conversion kit, Part # 105-1005-1.

5. Solder two jumpers to TB1, one connecting the orange and violet transformer wires, and one connecting the grey and white transformer wires.
6. Solder the black and white power lead-in wires to the orange and white transformer wires, respectively, on TB1.

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



## TEST EQUIPMENT REQUIRED FOR SERVICING

Table 1 lists the test equipment required for servicing the Model 250 Stereo Power Amplifier. The wattmeter, AC voltmeter, and variac may be assembled as a test fixture as shown schematically in Figure 3, and the load resistors and AC ammeter may be assembled into a second test fixture as shown in Figure 4.

| Item   | Manufacturer and Model No.<br>(or equivalent)  | Use  |
|--|--|--|
| Distortion Analyzer                                      | Hewlett Packard, Model 331A or 333A  | Measures distortion and voltage of amplifier output.   |
| Audio Oscillator   | Weston Model CVO-100P (NOTE :<br>Less than 0.02 percent residual<br>distortion is required.) | Sinewave and squarewave<br>signal source.  |
| Oscilloscope   | Tektronix, Model 503; Data, Model 555  | Waveform analysis and<br>troubleshooting   |
| VTVM   | RCA Senior Volt-Ohmyst, Model WV-98C   | Voltage and resistance<br>measurements.  |
| AC Wattmeter   | Simpson, Model 390   | Monitors primary power<br>consumption of amplifier.  |
| AC Ammeter<br>(0 to 10 amps)                             | Commercial Grade   | Monitors amplifier output<br>under short circuit condition.                                      |
| Line Voltmeter<br>(0 to 150 vac)                         | Commercial Grade   | Monitors potential of primary<br>power to amplifier.   |
| Variable Autotransformer<br>(0 to 140 vac, 10 amps)      | Powerstat, Model 116B  | Adjusts level of primary<br>power to amplifier.  |
| Shorting Plug  | Use phono plug with 600 ohms across<br>center pin and shell.                                 | Shorts amplifier input to<br>eliminate noise pickup.   |
| Power Supply Bleeder<br>Resistor (10 ohms at 1 W)        | Commercial Grade   | Discharges power supply filter<br>capacitors prior to disassembly<br>or resistance measurements. |
| Output Load Resistor<br>( $8\ \Omega \pm 0.5\%$ , 250 W) | Commercial Grade   | Provides 8-ohm load for<br>amplifier output termination.   |
| Output Load Resistor<br>( $4\ \Omega \pm 0.5\%$ , 250 W) | Commercial Grade   | Provides 4-ohm load for<br>amplifier output termination.   |
| Output Load<br>Capacitor (0.5 mfd)                       | Mylar  | Provides capacitive load for<br>instability checks.  |
| AC Power Control Box                                     | Optional Item. Fabricate in<br>accordance with Figure 3.                                     | Monitors and controls primary<br>power for amplifier.  |
| Amplifier Output<br>Load Box                             | Optional item. Fabricate in<br>accordance with Figure 4.                                     | Provides various amplifier loads<br>and can monitor shorted output.                              |

# PERFORMANCE VERIFICATION

## TEST PROCEDURE

### A. Test Equipment

Refer to Table 1 for required test equipment.

### B. Preliminary Procedures

1. Set up the test equipment as shown in Figure 5, with the instrument controls set in the following positions:

|                                |               |
|--------------------------------|---------------|
| Line Switch                    | Off           |
| Variable-Line Switch           | Variable      |
| Watt Meter Switch              | On            |
| Variac                         | 0 (Fully CCW) |
| Load – Resistive               | Off           |
| Load – Capacitive              | Off           |
| Scope Output                   | 5V Range      |
| Scope Gain                     | Minimum       |
| AC Voltmeter                   | 30V Range     |
| Scope Vertical                 | 20 mv/cm      |
| Scope Horizontal,<br>Line Sync | 1 ms/cm       |
| Scope Input                    | DC            |
| Scope Trace<br>(Input Shorted) | Centered      |

2. Connections, between the output terminals of the Model 250 and the resistive load, must have negligible resistance with respect to the resistance of the load itself. Applicable resistance adds to the total load, resulting in inaccurate measurement of output power.
3. Insert a shorting plug in each input jack of the Model 250.
4. Remove the top cover of the Model 250.

### C. DC Balance Test

1. Connect oscilloscope to Channel A output terminals of the Model 250.
2. Turn Line Switch to ON and adjust variac to 120 vac.

3. After relay energizes, adjust Channel A (Left Hand Heatsink) amplifier board potentiometer R504 for an indication of a "line" zero (i.e.,  $0V \pm 50$  mv) as indicated on the oscilloscope.

4. Repeat test for Channel B (Right Hand Heatsink).

### D. Total Hum and Noise Test

1. Connect the voltmeter across the Channel A output terminals of the Model 250.
2. With shorting plugs in the input jacks, the meter should read 0.25 mv or less.
3. Repeat test for Channel B.
4. Turn Line Switch to OFF and adjust variac to 0 (fully CCW).

### E. Bias Adjustment Test

1. Preset the bias adjust potentiometer R526 on each amplifier board fully CCW.
2. After discharging the filter capacitors using a bleeder resistor, disconnect all red and blue wires from the capacitor terminals.
3. Turn Line Switch to ON and slowly advance variac while observing the voltmeter and wattmeter. The relay K301 should energize at 105 volts or less.
4. Turn Line Switch to OFF. Reconnect all red and blue wires to filter capacitors.
5. Turn Line Switch to ON and advance variac to 120 volts.
6. Observe wattmeter reading. Adjust the Channel A amplifier board potentiometer R526 to increase wattmeter reading to 10 watts above the initial reading.
7. Adjust the Channel B amplifier board potentiometer R536 to increase wattmeter reading to 10 watts above reading taken with left channel biased properly.
8. Turn the Line Switch to OFF. Remove shorting plugs from the input jacks.

NOTE: AC line voltage must be maintained at 120 volts at all times during remaining tests.

**F. Maximum Power Output**

1. Connect the audio oscillator to the input jacks of the Model 250. Set the audio oscillator frequency to 20 KHz.
2. Connect the distortion analyzer across the Channel A output load (4 ohms), set the analyzer on the 30 vac scale.
3. Turn the amplifier board potentiometers R541 and R542 fully CCW.
4. Turn Line Switch to ON. Turn the analyzer and audio generator to ON. Increase the audio oscillator output until the analyzer indicates 25.5 vac.
5. Adjust potentiometer R541 clockwise until the positive peak of the waveform, as observed on the oscilloscope, just begins to clip.
6. Adjust potentiometer R542 clockwise until the negative peak just begins to clip.
7. Change output load to 8 ohms. Set analyzer sequentially to 20 Hz, 2 KHz, and 20 KHz. Output voltage should not be less than 31.6 volts.
8. Turn Line Switch to OFF. Arrange setup for Channel B and repeat steps 4 through 7.

**G. Relay Operation**

1. Turn Line Switch to OFF. Wait approximately 2 minutes.
2. Turn Line Switch to ON. The elapsed time between the instant the power is applied until the relay energizes should be between two and ten seconds.
3. Set Audio Oscillator to 4 Hz with output reduced to minimum.
4. Increase Audio Oscillator output slowly, watching the voltmeter. The relay should de-energize between 15 and 32 volts.

**H. Harmonic Distortion Test**

1. Set Audio Oscillator frequency to 20 Hz and adjust level for 31.6V output. Set Distortion Analyzer to SET LEVEL – MANUAL mode. Adjust sensitivity for full scale reading on 0-1 scale.
2. Switch Distortion Analyzer to DISTORTION mode and monitor Channel A output. Total harmonic distortion should be no greater than 0.1%.
3. Repeat test for Channel A with Audio Oscillator frequency set at 20 KHz.
4. Repeat test for Channel A at 20 Hz and 20 KHz with 0.5 MFD across load. Total harmonic distortion should not exceed 0.15%. Verify absence of parasitic oscillation.
5. Perform steps 2, 3, and 4 for Channel B.

**J. Short Circuit Test**

CAUTION: Do not perform this test if amplifier shows any sign of parasitic oscillation.

1. With amplifier working into an 8 ohm load, set Audio Oscillator level to 22 volts at 200 Hz.
2. Short out each channel with Ammeter. Reading should not exceed 9.5 amperes.

**K. Frequency Response Test**

1. Using 8 ohm load and Audio Oscillator level at 30 volts, sweep frequency from 20 Hz through 20 KHz.
2. Output voltage should stay between 29.7 vac and 30.3 vac

**L. Meter Calibration Procedure**

1. Set the frequency of the audio oscillator to 1 KHz. Connect oscillator to CHANNEL A input jack. Connect analyzer to CHANNEL A output terminal.

2. Set the controls of the analyzer for voltage measurement on the 3-volt scale.
3. Set the METER RANGE switch to the 0 dB position.
4. Adjust the oscillator output level until the amplifier output measures 2.45 volts.
5. Observe CHANNEL A meter. The meter should indicate 0 dB. If the meter does not indicate 0 dB, adjust potentiometer R430 on the meter board for an 0 dB indication.
6. Set the controls of the analyzer for voltage measurement on the 30-volt scale.
7. Set the CHANNEL A METER RANGE to the +20 dB position.
8. Adjust the oscillator output level until the amplifier output measures 24.5 volts.
9. Observe Channel A dB meter. The meter should indicate 0 dB. If the meter does not indicate 0 dB, adjust potentiometer R424 for an 0 dB indication.
10. Perform steps 1-9 for Channel B. If calibration is necessary, use potentiometer R414 on the meter board in step 5, and potentiometer R408 in step 8.

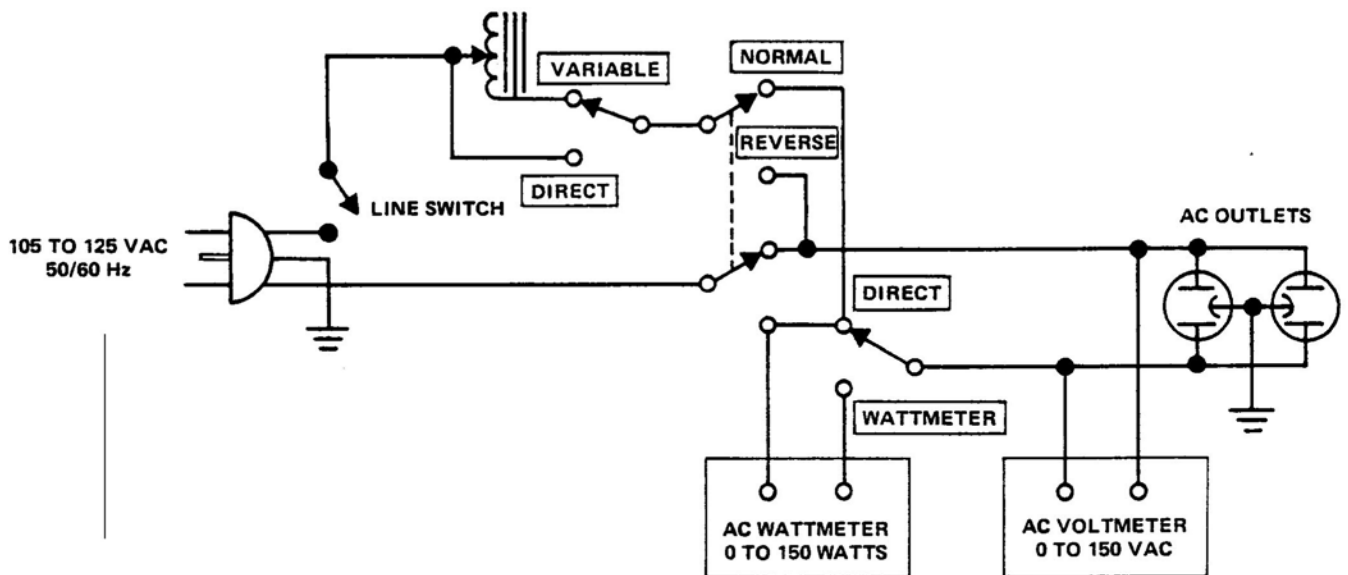


Figure 4. AC Power Control Box Simplified Schematic

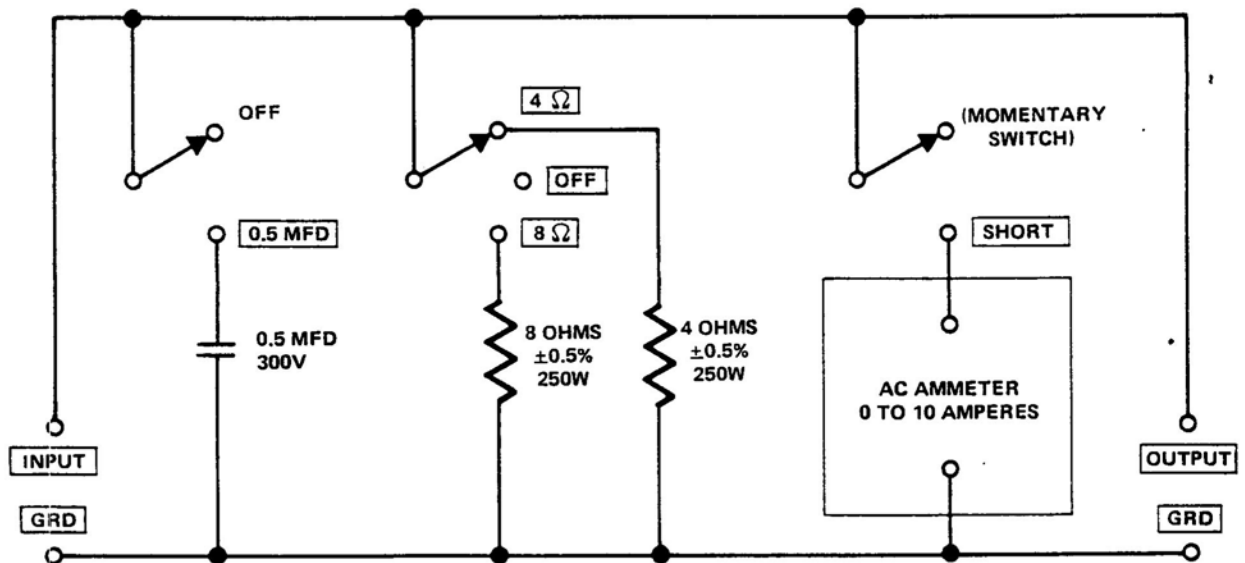


Figure 5. Amplifier Output Load Box Simplified Schematic

# TROUBLE ANALYSIS

The following section is designed to assist in locating troubles. The information given is to help in situations where problems may be difficult to isolate. Any field problems that arise will be covered through service bulletins (supplementary to this manual) that will be issued to all service stations. It is assumed that normal trouble-shooting techniques (i.e., point-to-point signal tracing, oscilloscope analysis, etc.) will be used to isolate problems.

NOTE: Performance verification is necessary following any repair.

| SYMPTOM   | PROCEDURE  |
|---|--|
| 1. Excessive line consumption (100 watts or more)   | <ol style="list-style-type: none"> <li>a. Check for shorted rectifiers CR301 through CR304, CR305, or CR306. Also check C1, C2.</li> <li>b. Check for shorted transistors Q802 through Q805, Q507, Q508, Q510 or Q511. Check for open control R224, 215-1005-1 bias assembly. Check T1 for short.</li> </ol> |
| <p>CAUTION: Because the driver and output stages are direct coupled, components may fail as a direct result of an initial component failure. If a shorted semiconductor is found, be sure to check the remaining driver and output components for short or open circuits before re-energizing the amplifier. After replacement of any of these components, increase the Variac voltage slowly while monitoring the wattmeter as described in paragraph C of Performance Verification.</p> |  |
| 2. No line consumption or zero bias.  | <ol style="list-style-type: none"> <li>a. Check line cord, fuse, transistors Q507, Q508, Q510, Q511, Q802 through Q805, 215-1005-1 bias assembly.</li> <li>b. Check for open rectifiers CR301 through CR304, CR305, CR306 or open T1.</li> </ol>   |
| 3. High DC voltage at loudspeaker terminals before time delay circuit is deactivated.   | <ol style="list-style-type: none"> <li>a. Check transistors Q301 through Q303 for leakage, shorted, or open.</li> </ol>  |
| 4. High DC voltage at loudspeaker at all times.   | <ol style="list-style-type: none"> <li>a. Check R301 through R305 for open and Q301 through Q303 for leakage, shorted, or open.</li> </ol>   |
| 5. No DC Balance.   | <ol style="list-style-type: none"> <li>a. Check Q501, Q502, R502, and Zener diodes CR501 and CR502</li> <li>b. Check R501, R503.</li> </ol>  |
| 6. High hum and noise level.  | <ol style="list-style-type: none"> <li>a. Check filter capacitors, C1, C2, C501 and C504.</li> </ol>   |
| 7. Parasitic Oscillation.   | <ol style="list-style-type: none"> <li>a. Check for defective C506, C509, C516, and C505.</li> </ol>   |

8. Improper clipping.

9. Relay Latching

10. No meter indication of output.

a. Check for proper adjustment of R541, R542.

b. Check for transistors Q802 through Q805.

a. Check Q301 through Q303.

b. Check output for proper clipping (positive and negative levels must not vary more than 1 volt at 2 KHz).

c. Check for high level DC offset at junctions R302 and R305.

a. Check Q401 through Q404. Check for defective M1, M2 (meters), open C401, C404, open CR405 through CR408 and CR415 through CR418.

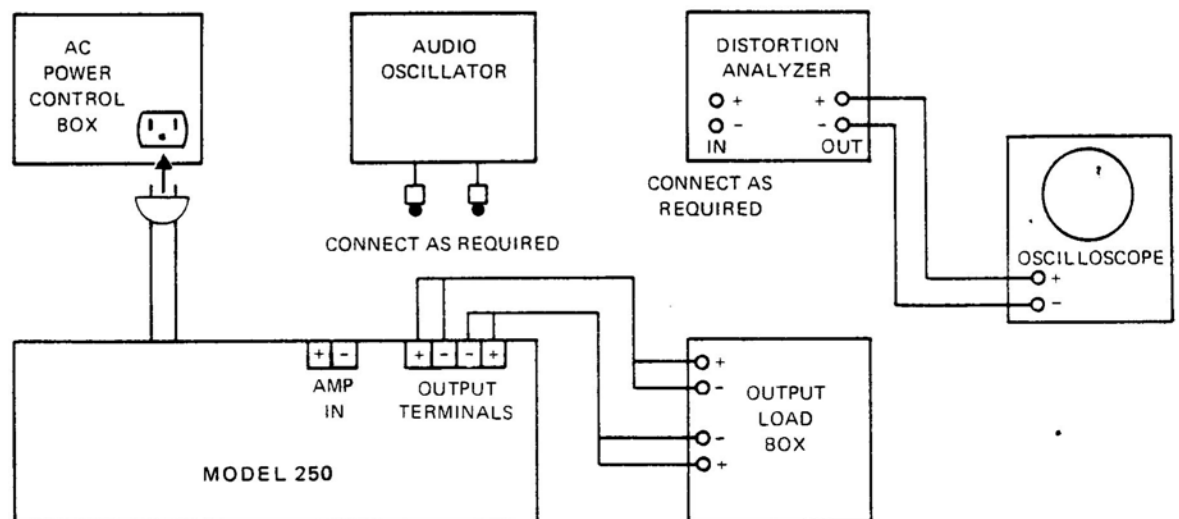


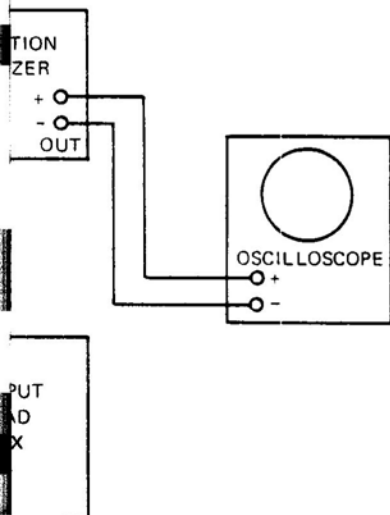
Figure 6. Test Equipment Set-Up

for proper adjustment of R541, R542.  
for transistors Q802 through Q805.  
Q301 through Q303.

output for proper clipping (positive  
negative levels must not vary more than  
at 2 KHz).

for high level DC offset at junction of  
and R305.

Q401 through Q404. Check for  
ive M1, M2 (meters), open C401 or  
open CR405 through CR408 and  
5 through CR418.





## PARTS LIST

| Reference Designation | Description and/or Remarks           | Marantz Part Number |
|-----------------------|--------------------------------------|---------------------|
| A1, A2                | HEATSINK ASSEMBLY                    | 215-1005-3          |
|                       | Transistor Socket                    | 368-1000            |
| C501                  | Cap. 150 pf, $\pm 10\%$ , 100V       | 385-1038            |
| C502                  | Cap. Elec., 10 $\mu$ f, 25V          | 381-1034            |
| C503                  | Cap. Elect., 10 $\mu$ f, 25V         | 381-1034            |
| C504                  | Cap. Elect., 10 $\mu$ f, 25V         | 381-1034            |
| C505                  | Cap. 47 pf, $\pm 10\%$ , 100V        | 385-1040            |
| C506                  | Cap. 680 pf, $\pm 5\%$ , 100V        | 385-1042            |
| C507                  | Cap. Elect., 220 $\mu$ f, 6.3V       | 381-1044            |
| C508                  | Cap. 36 pf, $\pm 5\%$ , 100V         | 385-1064            |
| C509                  | Cap. 36 pf, $\pm 5\%$ , 300V         | 385-1018            |
| C510                  | Cap. 0.1 $\mu$ f, $\pm 10\%$ , 250V  | 386-1000            |
| C511                  | Cap. 0.1 $\mu$ f, $\pm 10\%$ , 250V  | 386-1000            |
| C512                  | Cap. 410 pf, $\pm 10\%$ , 100V       | 385-1055            |
| C513                  | Cap. 0.22 $\mu$ f, $\pm 10\%$ , 250V | 386-1017            |
| C514                  | Cap. 1600 pf, $\pm 10\%$ , 300V      | 385-1020            |
| C515                  | Cap. 1600 pf, $\pm 10\%$ , 300V      | 385-1020            |
| C516                  | Cap. 0.1 $\mu$ f, $\pm 10\%$ , 250V  | 386-1000            |
| C517                  | Cap. 1.0 $\mu$ f, $\pm 20\%$ , 100V  | 388-1001            |
| C518                  | Cap. 130 pf, $\pm 10\%$ , 300V       | 385-1019            |
| CR501                 | Diode, Zener                         | 459-1006            |
| CR502                 | Diode, Zener                         | 459-1006            |
| L501                  | Toroid                               | 147-1007            |
| R501                  | Res. C/F, 7.5K, $\pm 5\%$ , 1/2W     | 433-4752            |
| R502                  | Res. Variable, 2K, 2W                | 420-1000            |
| R503                  | Res. C/F, 4.7K, $\pm 5\%$ , 1/2W     | 433-4472            |
| R504                  | Res. C/F, 100K, $\pm 5\%$ , 1/4W     | 434-6102            |
| R505                  | Res. C/F, 470K, $\pm 5\%$ , 1/4W     | 434-6472            |
| R506                  | Res. C/F, 1K, $\pm 5\%$ , 1/4W       | 434-4102            |
| R507                  | Res. C/F, 100K, $\pm 5\%$ , 1/4W     | 434-6102            |
| R508                  | Res. C/F, 7.5K, $\pm 5\%$ , 1/2W     | 433-4752            |
| R509                  | Res. C/F, 3.3K, $\pm 5\%$ , 1/4W     | 434-4332            |
| R510                  | Res. C/F, 8.2K, $\pm 5\%$ , 1/4W     | 434-4822            |
| R511                  | Res. C/F, 680 ohm, $\pm 5\%$ , 1/4W  | 434-3682            |
| R512                  | Res. C/F, 7.5K, $\pm 5\%$ , 1/2W     | 433-4752            |
| R513                  | Res. Prec., 1K, $\pm 1\%$ , 1/4W     | 431-4100            |
| R514                  | Res. C/F, 2K, $\pm 5\%$ , 1/4W       | 434-4202            |
| R515                  | Res. C/F, 27 ohm, $\pm 5\%$ , 1/2W   | 433-2272            |
| R516                  | Res. C/F, 220 ohm, $\pm 5\%$ , 1/4W  | 434-3222            |
| R517                  | Res. W/W, 1.5K, $\pm 10\%$ , 2W      | 436-4153            |
| R518                  | Res. W/W, 1.5K, $\pm 10\%$ , 2W      | 436-4153            |
| R519                  | Res. Prec., 20K, $\pm 1\%$ , 1/4W    | 431-5200            |
| R520                  | Res. C/F, 100K, $\pm 5\%$ , 1/4W     | 434-6102            |
| R521                  | Res. C/F, 300 ohm, $\pm 5\%$ , 1/4W  | 434-3302            |

| Reference Designation | Description and/or Remarks          | Marantz Part Number |
|-----------------------|-------------------------------------|---------------------|
| R522                  | Res. C/F, 560 ohm, $\pm 5\%$ , 1/2W | 433-3562            |
| R523                  | Res. C/F, 560 ohm, $\pm 5\%$ , 1/2W | 433-3562            |
| R524                  | Res. C/F, 27K, $\pm 5\%$ , 1/4W     | 434-5272            |
| R525                  | Res. C/F, 27K, $\pm 5\%$ , 1/4W     | 424-5272            |
| R526                  | Res. Variable, 1K, 2W               | 420-1011            |
| R527                  | Res. C/F, 47 ohm, $\pm 5\%$ , 1/2W  | 433-2472            |
| R528                  | Res. C/F, 47 ohm, $\pm 5\%$ , 1/2W  | 433-2472            |
| R529                  | Res. C/C, 39 ohm, $\pm 10\%$ , 1W   | 423-2392            |
| R530                  | Res. C/C, 39 ohm, $\pm 10\%$ , 1W   | 423-2392            |
| R531                  | Res. W/W, 0.1 ohm, $\pm 5\%$ , 5W   | 145-1002            |
| R532                  | Res. W/W, 0.1 ohm, $\pm 5\%$ , 5W   | 145-1002            |
| R533                  | Res. W/W, 0.15 ohm, $\pm 10\%$ , 5W | 428-0153            |
| R534                  | Res. W/W, 0.15 ohm, $\pm 10\%$ , 5W | 428-0153            |
| R535                  | Res. W/W, 0.15 ohm, $\pm 10\%$ , 5W | 428-0153            |
| R536                  | Res. W/W, 0.15 ohm, $\pm 10\%$ , 5W | 428-0153            |
| R537                  | Res. C/F, 330 ohm, $\pm 5\%$ , 1/4W | 434-3332            |
| R538                  | Res. C/F, 330 ohm, $\pm 5\%$ , 1/4W | 434-3332            |
| R539                  | Res. C/C, 27 ohm, $\pm 5\%$ , 2W    | 424-2272            |
| R540                  | Res. C/F, 2.2K, $\pm 5\%$ , 1/2W    | 433-4222            |
| R541                  | Res. Variable, 2.5K, 1/4W           | 420-1019            |
| R542                  | Res. Variable, 2.5K, 1/4W           | 420-1019            |
| R543                  | Res. C/F, 2.2K, $\pm 5\%$ , 1/2W    | 433-4222            |
| R544                  | Res. C/F, 1K, $\pm 5\%$ , 1/2W      | 433-4102            |
| R545                  | Res. C/F, 1K, $\pm 5\%$ , 1/2W      | 433-4102            |
| R546                  | Res. BWH, 1.0 ohm, $\pm 5\%$ , 2W   | 436-1102            |
| R547                  | Res. C/F, 2.2K, $\pm 5\%$ , 1/4W    | 434-4222            |
| R548                  | Res. C/F, 2.7K, $\pm 5\%$ , 1/4W    | 434-4272            |
| R549                  | Res. C/F, 10K, $\pm 5\%$ , 1/4W     | 434-5102            |
| R550                  | Res. C/F, 1K, $\pm 5\%$ , 1/4W      | 434-4102            |
| R551                  | Res. C/F, 270K, $\pm 5\%$ , 1/4W    | 434-6272            |
| Q501                  | Transistor, NPN                     | 462-1038            |
| Q502                  | Transistor, NPN                     | 462-1038            |
| Q503                  | Transistor, PNP                     | 461-1037            |
| Q504                  | Transistor, NPN                     | 462-1044            |
| Q505                  | Transistor, PNP                     | 461-1036            |
| Q506                  | Transistor, NPN                     | 462-1042            |
| Q507                  | Transistor, PNP                     | 461-1003            |
| Q508                  | Transistor, NPN                     | 462-1004            |
| Q509                  | Not Used                            |                     |
| Q510                  | Transistor, NPN                     | 462-1040            |
| Q511                  | Transistor, PNP                     | 461-1034            |
| Q512                  | Not Used                            |                     |
| Q513                  | Not Used                            |                     |
| Q514                  | Not Used                            |                     |
| Q515                  | Not Used                            |                     |
| Q516                  | Transistor, NPN                     | 462-1035            |
| Q517                  | Transistor, PNP                     | 461-1030            |

| Reference Designation | Description and/or Remarks          | Marantz Part Number |
|-----------------------|-------------------------------------|---------------------|
| Q518                  | Transistor, PNP                     | 461-1013            |
| Q519                  | Transistor, PNP                     | 461-1013            |
| C801                  | Cap. 0.1 $\mu$ f, $\pm 10\%$ , 250V | 386-1000            |
| CR801                 | Diode                               | 460-1011            |
| Q801                  | Transistor, NPN                     | 462-1043            |
|                       | Heat Sensor Assy.                   | 215-1006-1          |
| Q802                  | Transistor, PNP                     | 461-1031            |
| Q803                  | Transistor, NPN                     | 462-1036            |
| Q804                  | Transistor, PNP                     | 461-1031            |
| Q805                  | Transistor, NPN                     | 462-1036            |
| A3                    | RECTIFIER/RELAY BOARD ASSEMBLY      | 200-1027-1          |
| C301                  | Cap. Elect., 22 $\mu$ f, 25V        | 381-1046            |
| C302                  | Cap. Elect., 220 $\mu$ f, 6.3V      | 381-1044            |
| C303                  | Cap. Elect., 22 $\mu$ f, 63V        | 381-1040            |
| CR301                 | Diode                               | 460-1014            |
| CR302                 | Diode                               | 460-1014            |
| CR303                 | Diode                               | 460-1014            |
| CR304                 | Diode                               | 460-1014            |
| CR305                 | Diode                               | 460-1013            |
| CR306                 | Diode                               | 460-1013            |
| K301                  | Relay, DPDT                         | 410-1000            |
| R301                  | Res. C/F, 12K, $\pm 5\%$ , 1/2W     | 433-5122            |
| R302                  | Res. C/F, 10K, $\pm 5\%$ , 1/2W     | 433-5102            |
| R303                  | Res. C/F, 75K, $\pm 5\%$ , 1/2W     | 433-5752            |
| R304                  | Res. C/F, 75K, $\pm 5\%$ , 1/2W     | 433-5752            |
| R305                  | Res. C/F, 7.5K, $\pm 5\%$ , 1/2W    | 433-4752            |
| R306                  | Res. C/F, 27K, $\pm 5\%$ , 1/2W     | 433-5272            |
| R307                  | Res. W/W, 2.2K, $\pm 5\%$ , 2W      | 436-4222            |
| R308                  | Res. W/W, 2.2K, $\pm 5\%$ , 2W      | 436-4222            |
| R309                  | Res. C/F, 470K, $\pm 5\%$ , 1/2W    | 433-6472            |
| R310                  | Res. W/W, 560 ohm, $\pm 5\%$ , 5W   | 428-3562            |
| Q301                  | Transistor, NPN                     | 462-1000            |
| Q302                  | Transistor, NPN                     | 462-1007            |
| Q303                  | Transistor, NPN                     | 462-1000            |
|                       | Standoff, Swage, #6-32              | 560-4042            |

| Reference Designation | Description and/or Remarks          | Marantz Part Number | Reference Designation | Description and/or Remarks          | Marantz Part Number |
|-----------------------|-------------------------------------|---------------------|-----------------------|-------------------------------------|---------------------|
| A4                    | METER BOARD COMPONENT ASSEMBLY      | 200-1030-1          | R421                  | Res. C/F, 10K, $\pm 5\%$ , 1/4W     | 434-5102            |
| C401                  | Cap. Elect., 2.2 $\mu$ f, 40V       | 381-1038            | R422                  | Res. C/F, 100K, $\pm 5\%$ , 1/4W    | 434-6102            |
| C402                  | Cap. Elect., 47 $\mu$ f, 10V        | 381-1037            | R423                  | Res. C/F, 10K, $\pm 5\%$ , 1/4W     | 434-5102            |
| C403                  | Cap. Elect., 47 $\mu$ f, 10V        | 381-1037            | R424                  | Res. Variable, 5K, 1/4W             | 420-1020            |
| C404                  | Cap. Elect., 2.2 $\mu$ f, 40V       | 381-1038            | R425                  | Res. C/F, 10K, $\pm 5\%$ , 1/4W     | 434-5102            |
| C405                  | Cap. Elect., 47 $\mu$ f, 10V        | 381-1037            | R426                  | Res. C/F, 47K, $\pm 5\%$ , 1/4W     | 434-5472            |
| C406                  | Cap. Elect. 47 $\mu$ f, 10V         | 381-1037            | R427                  | Res. C/F, 100 ohm, $\pm 5\%$ , 1/4W | 434-3102            |
| CR401                 | Diode                               | 460-1009            | R428                  | Res. C/F, 3.9K, $\pm 5\%$ , 1/2W    | 433-4392            |
| CR402                 | Diode                               | 460-1009            | R429                  | Res. C/F, 1K, $\pm 5\%$ , 1/4W      | 434-4102            |
| CR403                 | Diode, Zener, 6.2V                  | 459-1002            | R430                  | Res. Variable, 5K, 1/4W             | 420-1020            |
| CR404                 | Diode, Zener, 6.2V                  | 459-1002            | Q401                  | Transistor, NPN                     | 462-1009            |
| CR405                 | Diode                               | 460-1009            | Q402                  | Transistor, PNP                     | 461-1013            |
| CR406                 | Diode                               | 460-1009            | Q403                  | Transistor, NPN                     | 462-1009            |
| CR407                 | Diode                               | 460-1009            | Q404                  | Transistor, PNP                     | 461-1013            |
| CR408                 | Diode                               | 460-1009            | MISCELLANEOUS PARTS   |                                     |                     |
| CR409                 | Diode, Zener, 13V                   | 459-1004            | J1                    | A.C. Outlet                         | 360-1001            |
| CR410                 | Diode, Zener, 13V                   | 459-1004            | J2 & J3               | Input Jack                          | 360-1009            |
| CR411                 | Diode                               | 460-1009            | TB2                   | Speaker Terminal Block              | 363-1003            |
| CR412                 | Diode                               | 460-1009            | XF1                   | Fuse Holder (w/Mtg Hardware)        | 367-1001            |
| CR413                 | Diode, Zener, 6.2V                  | 459-1002            | C1                    | Cap. Elect., 20,000 $\mu$ f, 60V    | 381-1041            |
| CR414                 | Diode, Zener, 6.2V                  | 459-1002            | C2                    | Cap. Elect., 20,000 $\mu$ f, 60V    | 381-1041            |
| CR415                 | Diode                               | 460-1009            | T1                    | Transformer, Power                  | 440-1008            |
| CR416                 | Diode                               | 460-1009            | F1                    | Fuse, 6 amp, 250V                   | 451-1013            |
| CR417                 | Diode                               | 460-1009            | S1 & S2               | Switch, Meter Range                 | 453-1017            |
| CR418                 | Diode                               | 460-1009            |                       | Plastic Foot                        | 567-1000            |
| R401                  | Res. C/F, 3.3K, $\pm 5\%$ , 1/4W    | 434-4332            | R1                    | Res. C/F, 2.4K, $\pm 5\%$ , 1/2W    | 433-4242            |
| R402                  | Res. C/F, 4.7K, $\pm 5\%$ , 1/4W    | 434-4472            | R2                    | Res. C/F, 2.4K, $\pm 5\%$ , 1/2W    | 433-4242            |
| R403                  | Res. C/F, 3.3K, $\pm 5\%$ , 1/4W    | 434-4332            |                       | Front Panel                         | 134-1021-1          |
| R404                  | Res. C/F, 2.7K, $\pm 5\%$ , 1/4W    | 434-4272            |                       | Knob                                | 174-1008            |
| R405                  | Res. C/F, 10K, $\pm 5\%$ , 1/4W     | 434-5102            | M1 & M2               | Meter                               | 865-1001            |
| R406                  | Res. C/F, 100K, $\pm 5\%$ , 1/4W    | 434-6102            |                       | Escutcheon                          | 134-1022            |
| R407                  | Res. C/F, 10K, $\pm 5\%$ , 1/4W     | 434-5102            |                       | Shroud, Meter Lamp                  | 136-1018            |
| R408                  | Res. Variable, 5K, 1/4W             | 420-1020            | XDS1 thru XDS4        | Light Socket                        | 481-1003            |
| R409                  | Res. C/F, 10K, $\pm 5\%$ , 1/4W     | 434-5102            | DS1 thru DS4          | Lamp                                | 482-1006            |
| R410                  | Res. C/F, 47K, $\pm 5\%$ , 1/4W     | 434-5472            |                       |                                     |                     |
| R411                  | Res. C/F, 100 ohm, $\pm 5\%$ , 1/4W | 434-3102            |                       |                                     |                     |
| R412                  | Res. C/F, 3.9K, $\pm 5\%$ , 1/2W    | 433-4392            |                       |                                     |                     |
| R413                  | Res. C/F, 1K, $\pm 5\%$ , 1/4W      | 434-4102            |                       |                                     |                     |
| R414                  | Res. Variable, 5K, 1/4W             | 420-1020            |                       |                                     |                     |
| R415                  | Res. C/C, 2.2K, $\pm 5\%$ , 1W      | 423-4222            |                       |                                     |                     |
| R416                  | Res. C/C, 2.2K, $\pm 5\%$ , 1W      | 423-4222            |                       |                                     |                     |
| R417                  | Res. C/F, 3.3K, $\pm 5\%$ , 1/4W    | 434-4332            |                       |                                     |                     |
| R418                  | Res. C/F, 4.7K, $\pm 5\%$ , 1/4W    | 434-4472            |                       |                                     |                     |
| R419                  | Res. C/F, 3.3K, $\pm 5\%$ , 1/4W    | 434-4332            |                       |                                     |                     |
| R420                  | Res. C/F, 2.7K, $\pm 5\%$ , 1/4W    | 434-4272            |                       |                                     |                     |

\*See ECN Change Record

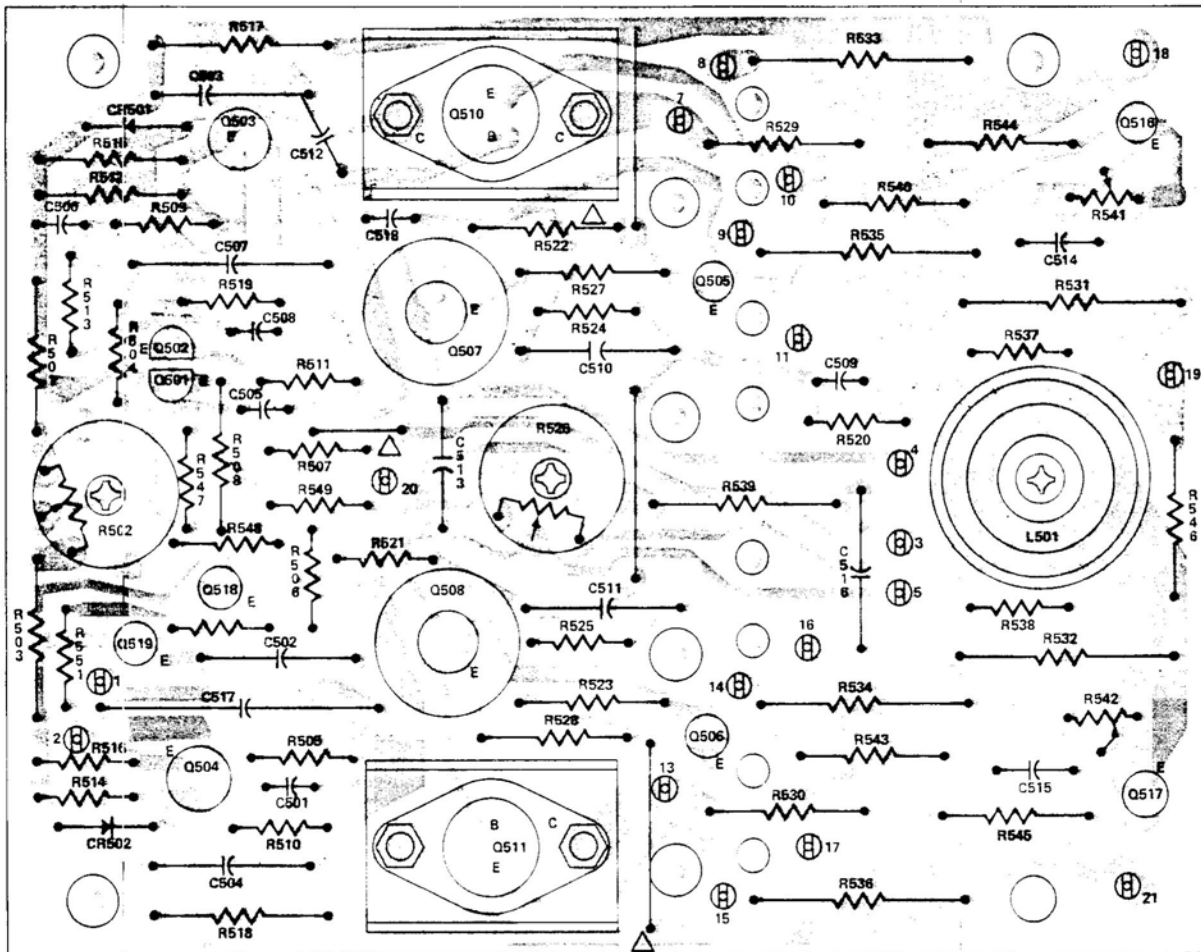
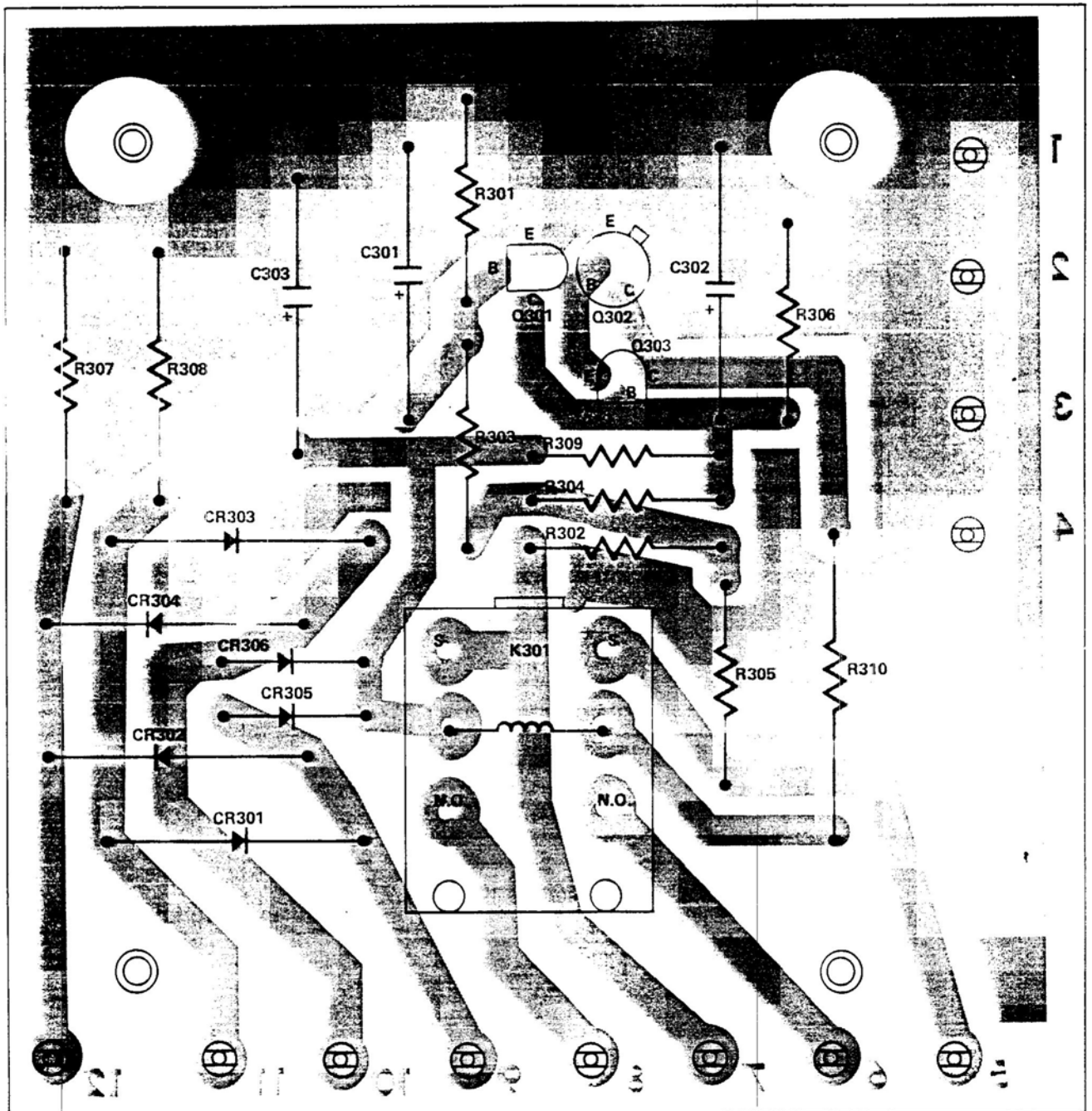


Figure 7. Power Amplifier Board Component Assembly Diagram

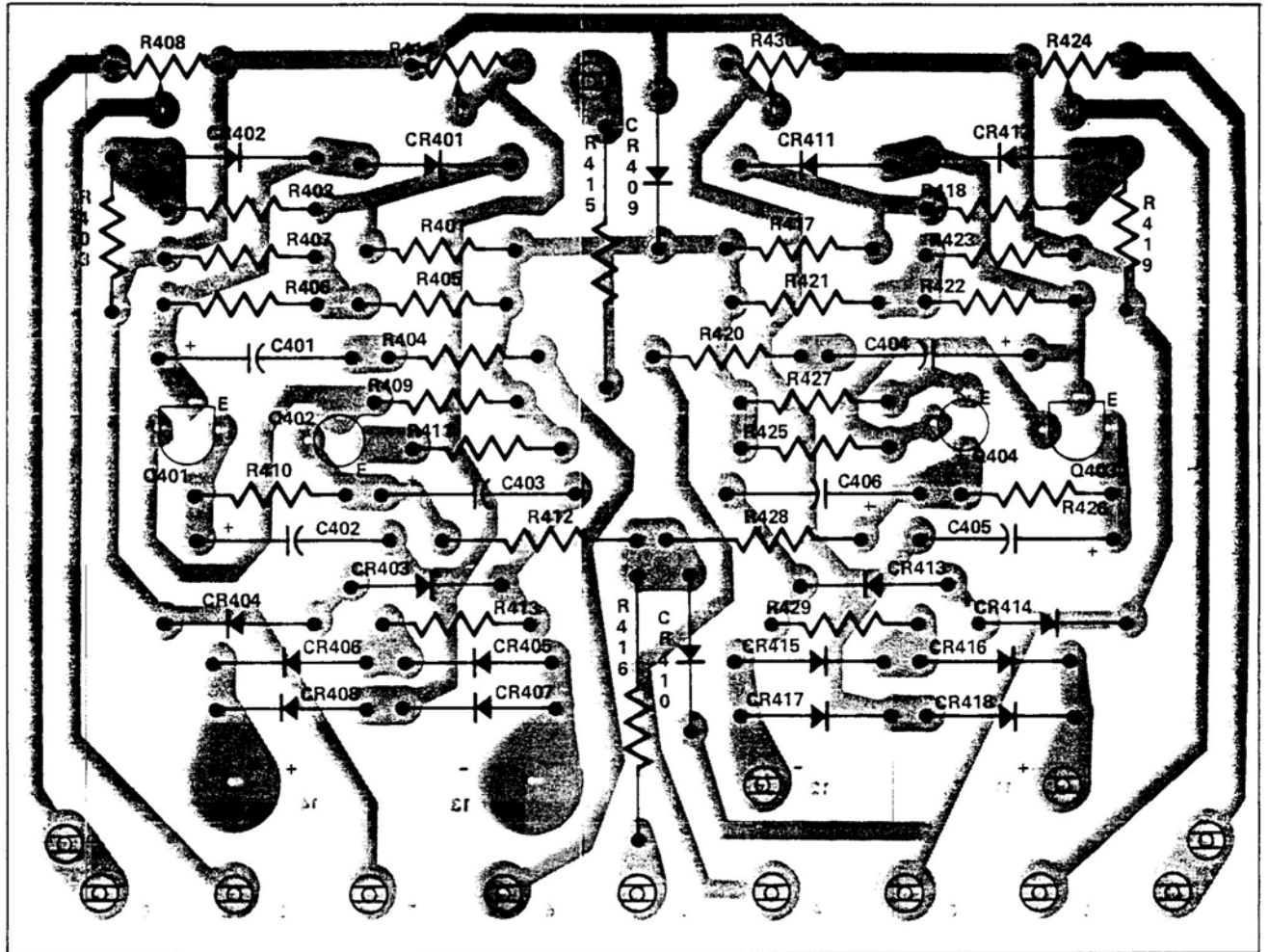


COMPONENT SIDE SHOWN  
CONDUCTOR ON FAR SIDE

CR301 THRU CR304 TO BE MOUNTED 1/8" OFF BOARD. FAR SIDE

Figure 8. Rectifier/Relay Board Component Assembly Diagram





WHEN VIEWING BLACK DOT ON C401 AND C404 WITH LEADS DOWN' POSITIVE LEAD IS ON RIGHT,  
 (APPLICABLE ONLY TO APPROVED ALTERNATE PART)

Figure 9. Meter Board Component Assembly Diagram

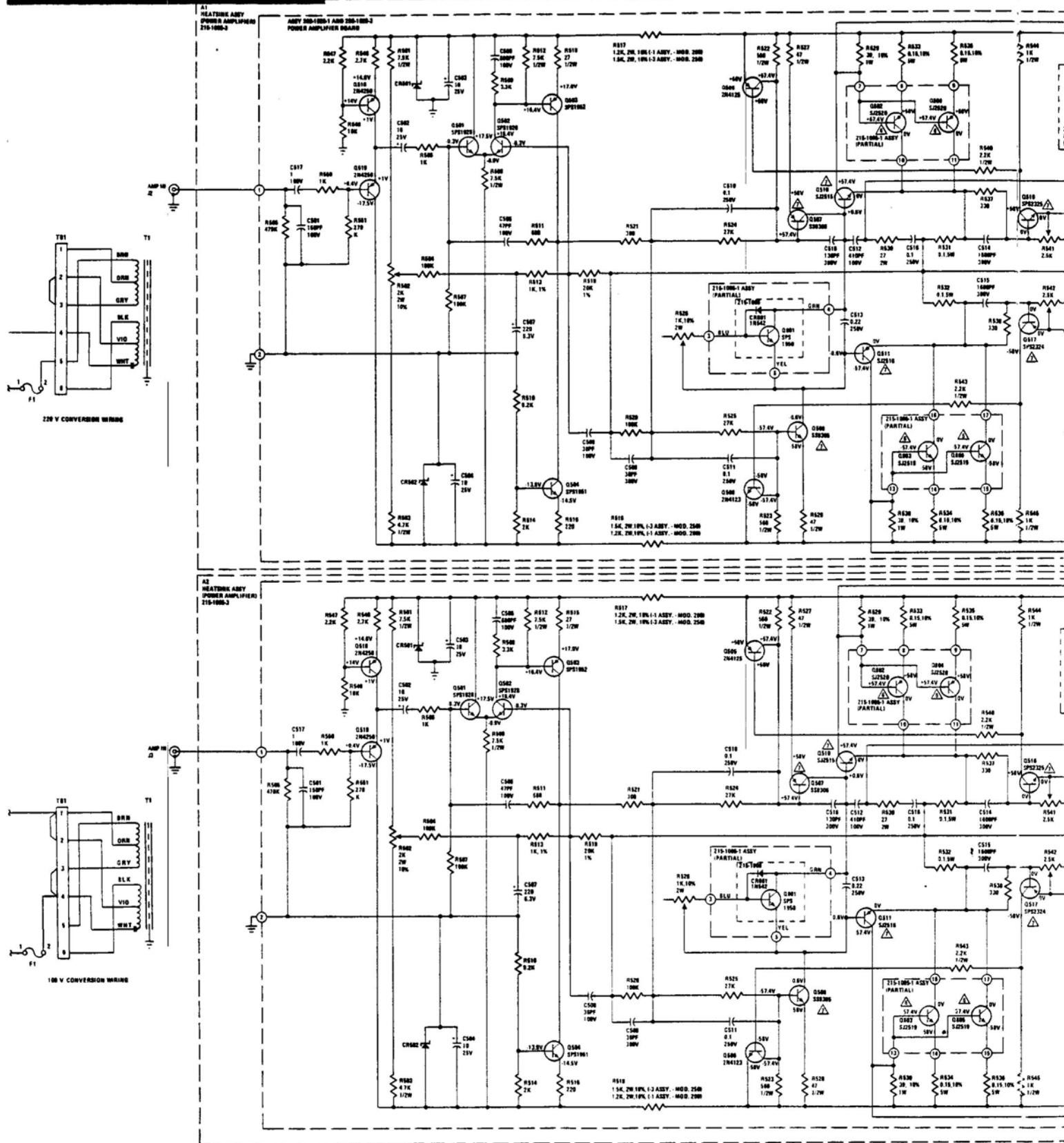
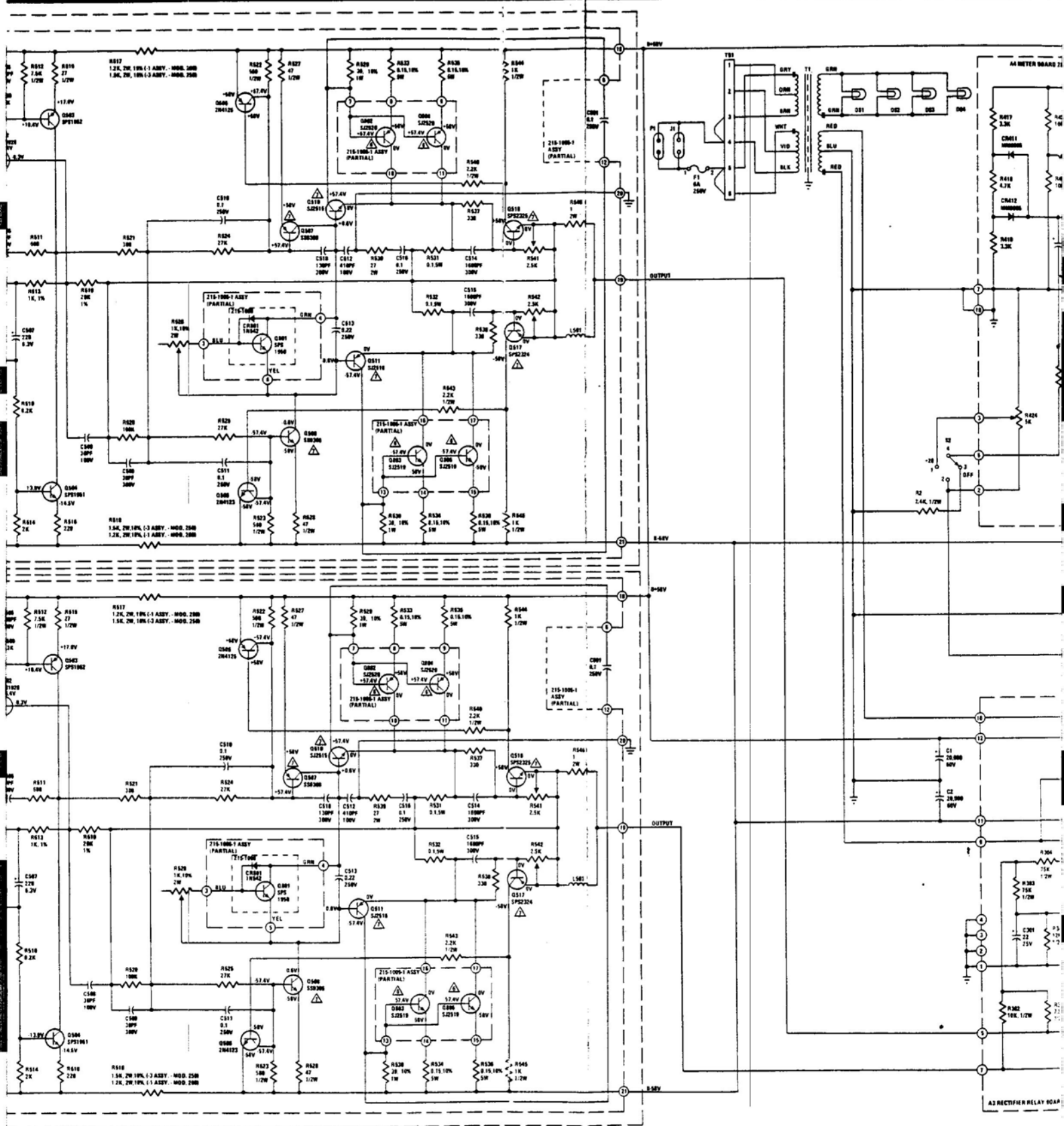
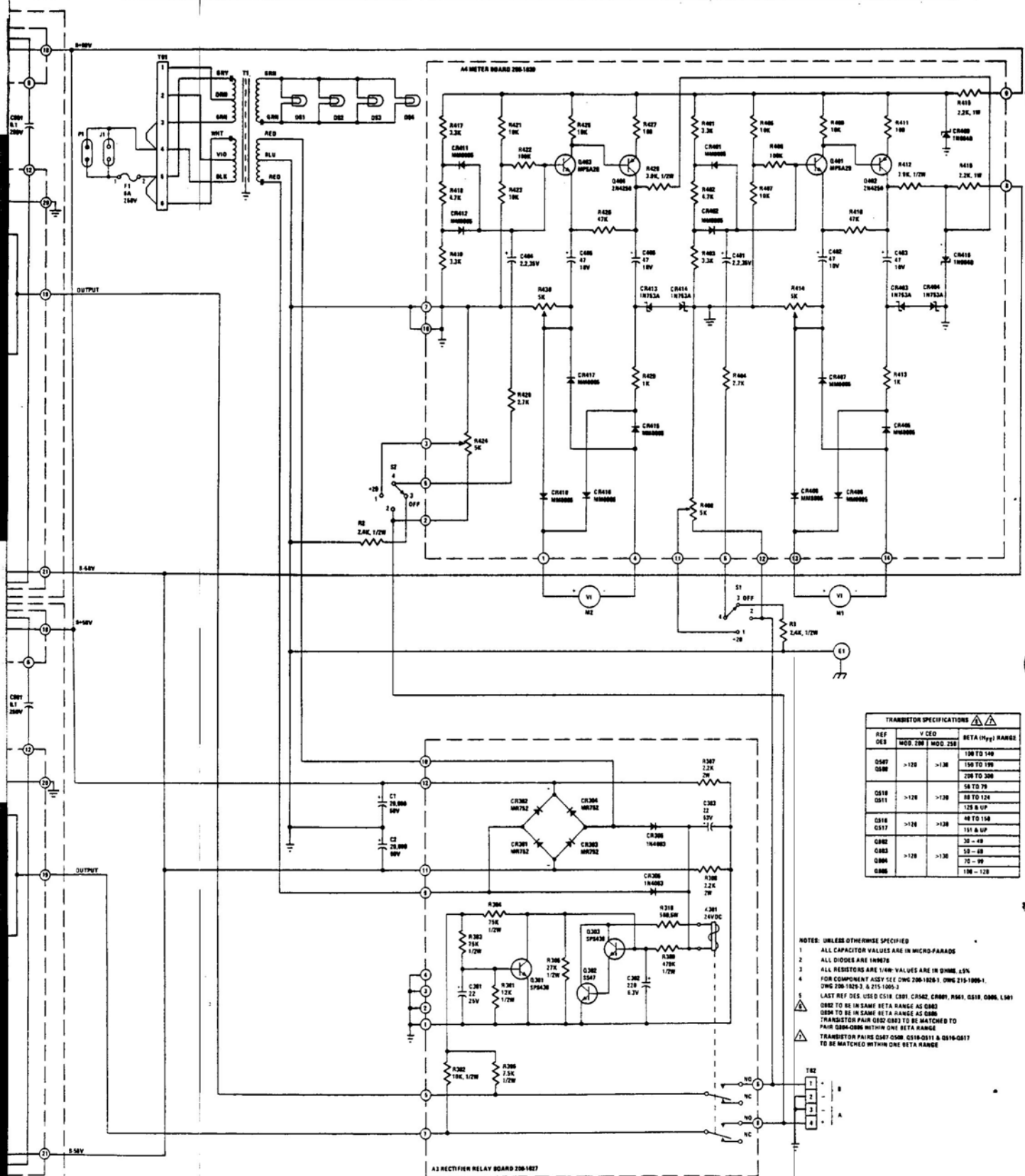


Figure 10. Model 250 Schematic







| TRANSISTOR SPECIFICATIONS |                  |         |  |
|---------------------------|------------------|---------|--|
| REF DES                   | V <sub>CE0</sub> |         | BETA (h <sub>FE</sub> ) RANGE          |
|                           | MOD 206          | MOD 208 |  |
| Q507<br>Q508              | >120             | >130    | 150 TO 140<br>150 TO 190<br>200 TO 300 |
| Q516<br>Q511              | >120             | >130    | 50 TO 70<br>80 TO 120<br>125 B UP      |
| Q516<br>Q517              | >120             | >130    | 40 TO 150<br>151 & UP                  |
| Q502                      | >120             | >130    | 30 - 40                                |
| Q503                      | >120             | >130    | 30 - 20                                |
| Q504                      | >120             | >130    | 70 - 90                                |
| Q505                      | >120             | >130    | 100 - 120                              |

NOTES: UNLESS OTHERWISE SPECIFIED  
 1 ALL CAPACITOR VALUES ARE IN MICRO-FARADS  
 2 ALL DIODES ARE 1N9670  
 3 ALL RESISTORS ARE 1/4W- VALUES ARE IN OHMS, 15%  
 4 FOR COMPONENT ASSEMBLY SEE DWS 206-1028-1, DWS 215-1000-1,  
 DWS 206-1028-3, & 215-1000-3  
 5 LAST REF DES USED Q516, Q511, Q502, Q503, Q504, Q505, Q506, Q507  
 Q502 TO BE IN SAME BETA RANGE AS Q503  
 Q504 TO BE IN SAME BETA RANGE AS Q505  
 TRANSISTOR PAIR Q502-Q503 TO BE MATCHED TO  
 PAIR Q504-Q505 WITHIN ONE BETA RANGE  
 TRANSISTOR PAIRS Q507-Q508, Q516-Q511 & Q516-Q517  
 TO BE MATCHED WITHIN ONE BETA RANGE