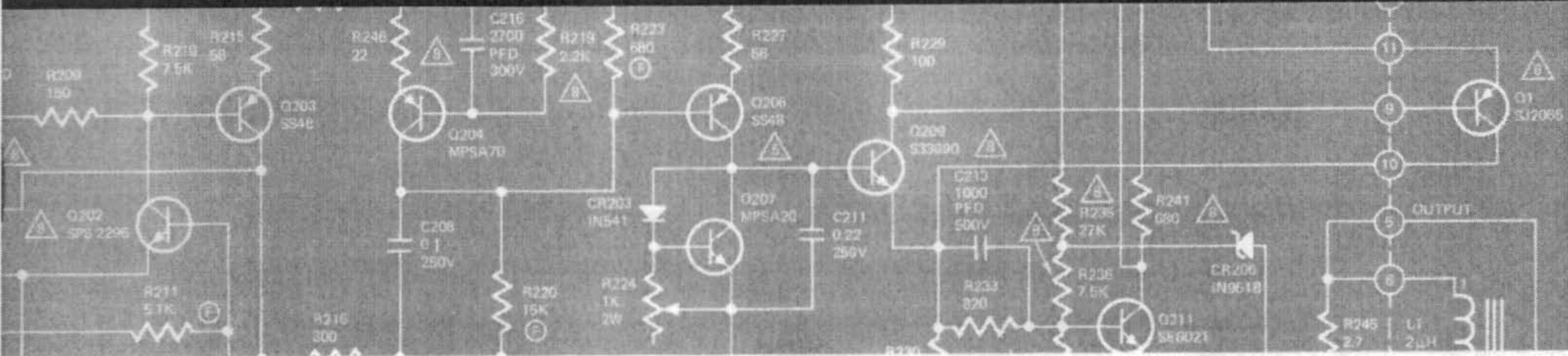
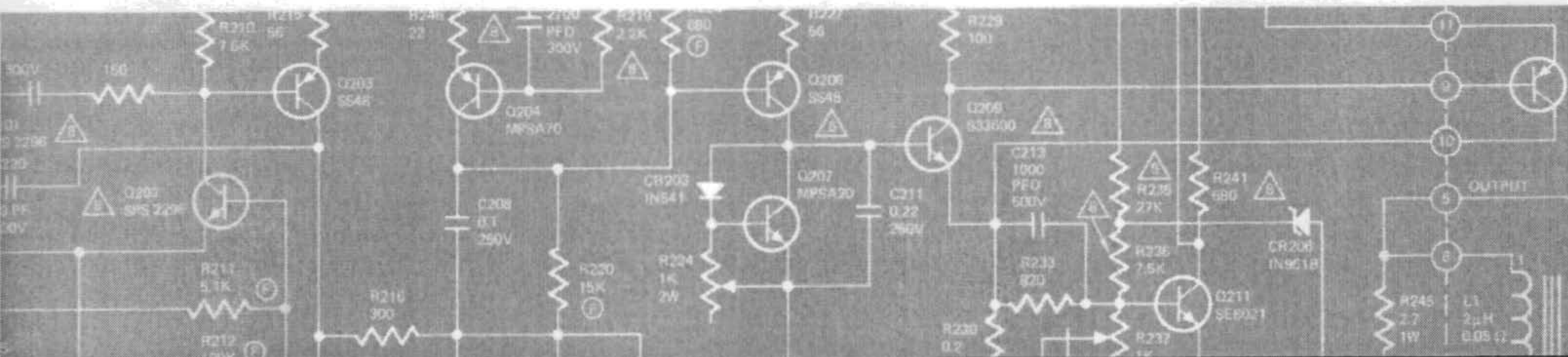


marantz.



model thirty-two SERVICE MANUAL 32



Stereo Console Amplifier

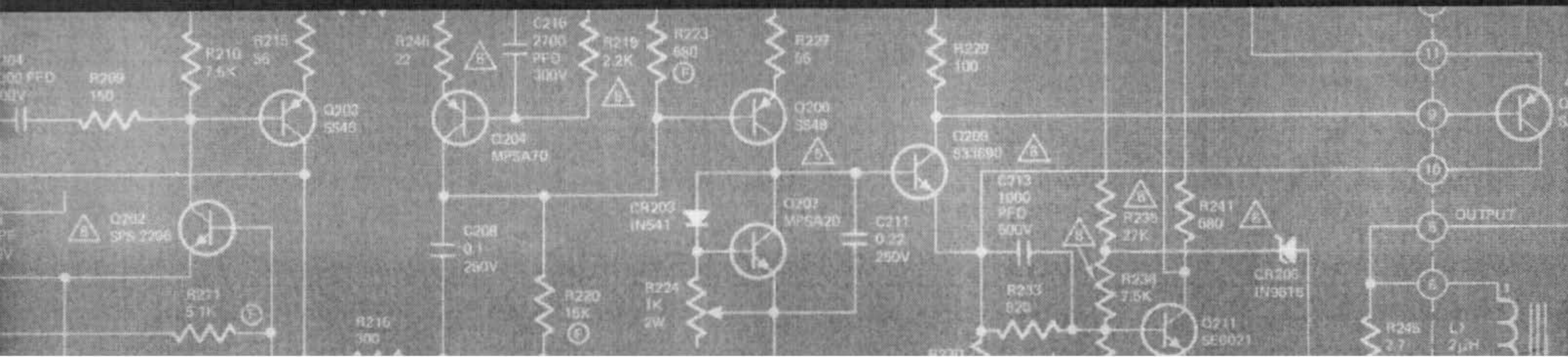


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INTRODUCTION

This service manual is intended for use by authorized warranty stations. The manual contains service information for the Marantz Model 32 Stereo Power Amplifier, manufactured by the Marantz Company, a subsidiary of 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 amplifier, Figure 1, comprises a differential amplifier (Q201, Q202), and an inverter. The inverter output is applied to the pre-drivers (Q206, Q208). DC balance between the two pre-drivers is maintained by the dynamic bias network comprising Q207, CR203, R224, and C211.

The output of the pre-drivers is applied to their respective drivers (Q209, Q210). The output from the drivers is applied to their respective power transistors (Q1, Q2).

Output current and voltage regulation are accomplished through a complex network. Excessive voltage levels are detected by Zener diodes CR206 and CR207. Excessive current levels are detected by resistors R230 and R231. Voltages developed by these components are applied to voltage-current (E-1) sensors Q211 and Q212.

When excessive levels are detected, Q211 and Q212 develop clipping signals. These signals are applied to E-1 controls Q204 and Q205. Thus, amplifier limiting is accomplished at approximately 70 watts into 8 ohms.

Feedback for the amplifier is developed at the junction of R230 and R231. The feedback is applied across two loops. Feedback applied across R225 and C210 completes the amplifier loop. Feedback applied across R212 and C206 completes the loop for the entire power amplifier section.

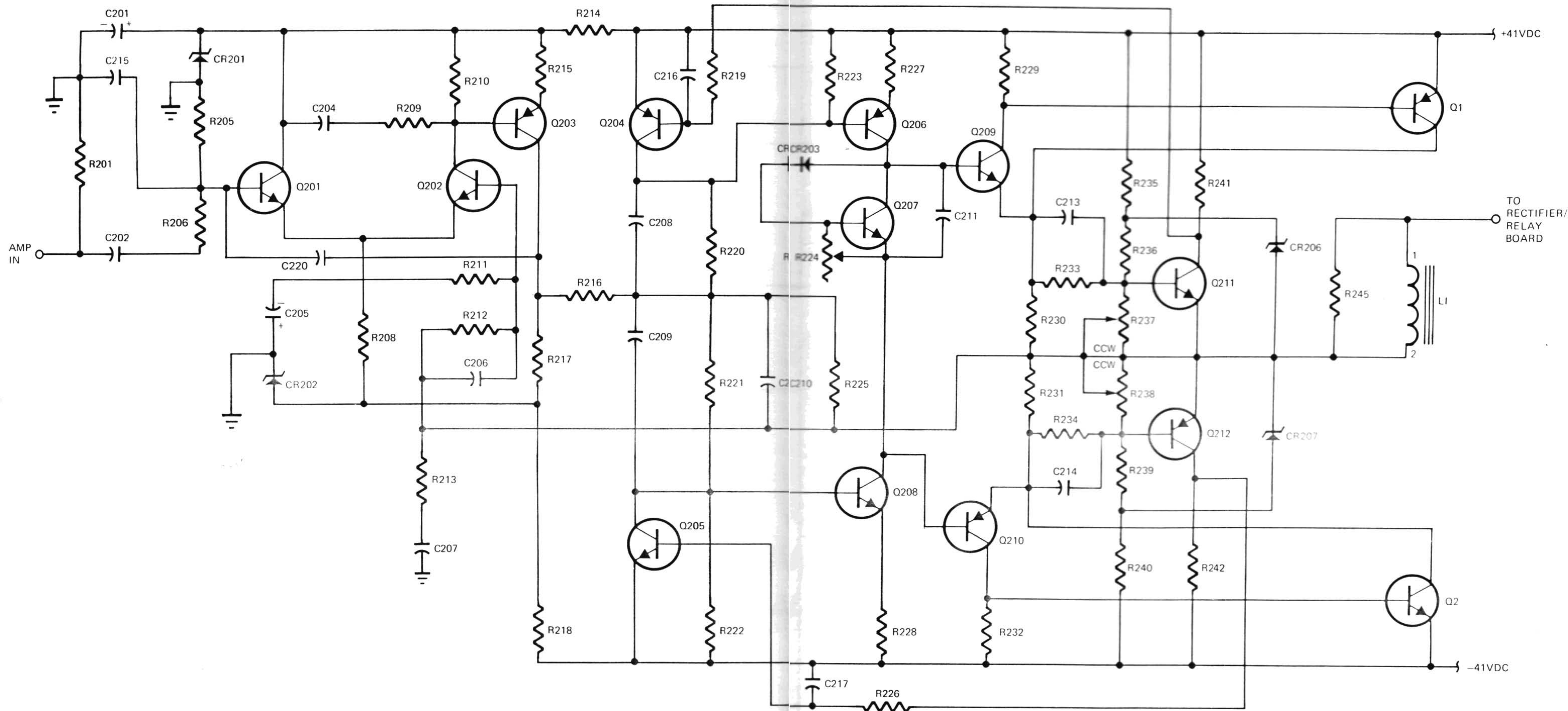


Figure 1. Amplifier Simplified Schematic.

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.

Sixty volts AC is applied to CR301 which develops the +41 and -41 volts for the power amplifier board. CR302 and CR303 develop the positive voltage to energize K301.

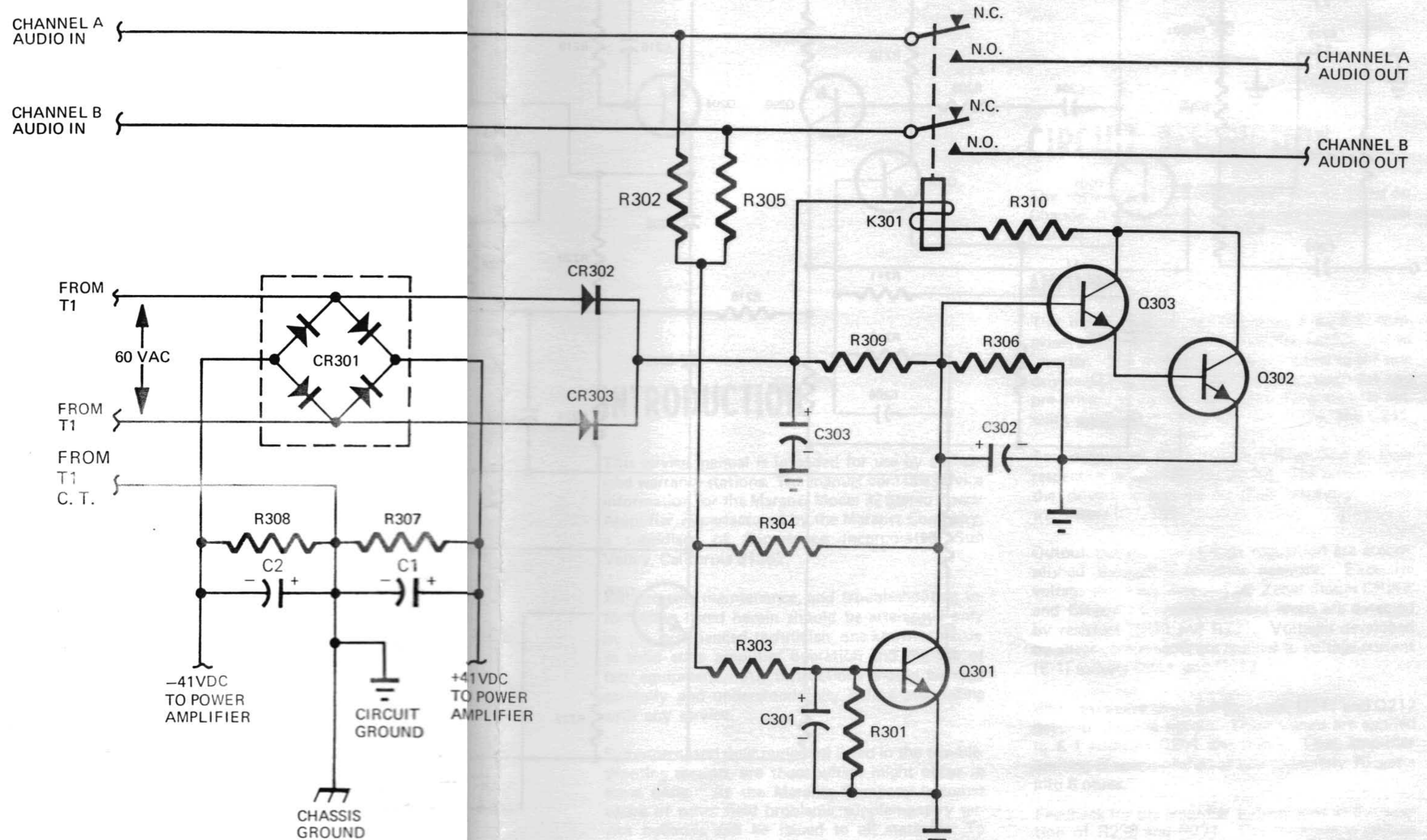


Figure 2. Rectifier/Relay Board Simplified Schematic.

TECHNICAL SPECIFICATIONS

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

Load	RMS	IHF
4 ohms	60W	90W
8 ohms	60W	90W
16 ohms	30W	45W

Total Harmonic Distortion at or below rated power, 20 Hz to 20 KHz. less than 0.15%

Intermodulation Distortion at or below rated power, SMPTE, any combination of two frequencies, 20 Hz to 20 KHz: less than 0.15%

Frequency Response +0 -3 dB 3 Hz to 80 KHz, ±0.1 dB 20 Hz to 20 KHz

Input Sensitivity 1.0 Volt for rated power

Input Impedance 100K ohms

Damping Factor Greater than 100 at 8 ohms

GENERAL

Total Noise Better than 100 dB below rated power into 8 ohms

Power Requirements 120V AC, 250W, 50/60 Hz

Dimensions 15-3/8" w. x 5-3/4" h. x 9-5/8" deep

Unit Weight 21 pounds

Shipping Weight 27 pounds

240 volt AC Conversion

Split primary windings permit easy conversion from 120 volt to 240 volt operation.

240-VOLT AC CONVERSION

To convert the Model 32 to 240-volt operation, perform the following steps:

1. Remove the top cover.
2. Remove the remaining screws holding the right hand heatsink in place.
3. Remove the heatsink.
NOTE: Do not disconnect wires. Simply lay the heatsink next to the unit.
4. Using the 240-volt AC conversion kit, part number 103-1011-1, attach the standoff terminal, part number 359-1002, to the chassis (in the No. 6 hole between the transformer and the chassis edge) using the 6-32 x 1/8 screw supplied.

5. Unsolder the white wire from the fuse holder. Unsolder the black/white wire from J3 pin 2.
6. Solder the white and black/white wire to the standoff terminal.
7. Re-attach the heatsink and top cover.
8. Replace the 4 amp, 250V fuse in the unit with the 3 amp, 250V fuse, part number 451-1001, supplied with the conversion kit.
9. Remove the protective back from the caution label and place it on the top cover.

The Model 32 is now ready for 240-volt operation.

TEST EQUIPMENT REQUIRED FOR SERVICING

Table 1 lists the test equipment required for servicing the Model 32 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. (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 : Less than 0.02 percent residual distortion is required.)	Sinewave and squarewave signal source.
Oscilloscope	Tektronix, Model 503; Data, Model 555	Waveform analysis and troubleshooting
VTVM	RCA Senior Volt-Ohmyst, Model WV-98C	Voltage and resistance measurements.
AC Wattmeter	Simpson, Model 390	Monitors primary power consumption of amplifier.
AC Ammeter (0 to 10 amps)	Commercial Grade	Monitors amplifier output under short circuit condition.
Line Voltmeter (0 to 150 vac)	Commercial Grade	Monitors potential of primary power to amplifier.
Variable Autotransformer (0 to 140 vac, 10 amps)	Powerstat, Model 116B	Adjusts level of primary power to amplifier.
Shorting Plug	Use phono plug with 600 ohms across center pin and shell.	Shorts amplifier input to eliminate noise pickup.
Power Supply Bleeder Resistor (10 ohms at 1 W)	Commercial Grade	Discharges power supply filter capacitors prior to disassembly or resistance measurements.
Output Load Resistor (8 \pm 0.5%, 250 W)	Commercial Grade	Provides 8-ohm load for amplifier output termination.
Output Load Resistor (4 \pm 0.5%, 250 W)	Commercial Grade	Provides 4-ohm load for amplifier output termination.
Output Load Capacitor (0.5 mfd)	Mylar	Provides capacitive load for instability checks.
AC Power Control Box	Optional Item. Fabricate in accordance with Figure 3.	Monitors and controls primary power for amplifier.
Amplifier Output Load Box	Optional item. Fabricate in accordance with Figure 4.	Provides various amplifier loads 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, Line Sync	1 ms/cm
Scope Input	DC
Scope Trace (Input Shorted)	Centered

2. Connections, between the output terminals of the Model 32 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 32.
4. Remove the top cover of the Model 32.

C. DC Balance Test

1. Connect oscilloscope to Channel A output terminals of the Model 32.
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 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 32.
2. With shorting plugs in the input jacks, the meter should read 0.5 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 R224 on each amplifier board fully CCW.
2. After discharging the filter capacitors using the 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 R224 to increase wattmeter reading to a point halfway between the initial reading and 20 watts.
7. Adjust the Channel B amplifier board potentiometer R224 to increase wattmeter reading to 20 watts.
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 32. 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 R237 and R238 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 20.0 vac.
5. Adjust potentiometer R237 clockwise until the positive peak of the waveform, as observed on the oscilloscope, just begins to clip.
6. Adjust potentiometer R238 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 21.9 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 5 Hz with output reduced to minimum.
4. Increase Audio Oscillator output slowly, watching the voltmeter. The relay should de-energize between 10 and 22 volts.

H. Harmonic Distortion Test

1. Set Audio Oscillator frequency to 20 Hz and adjust level for 22V 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 4.5 amperes.

K. Frequency Response Test

1. Using 8 ohm load and Audio Oscillator level at 22 volts, sweep frequency from 20 Hz through 20 KHz.
2. Output voltage should stay between 20.67 vac and 23.61 vac.

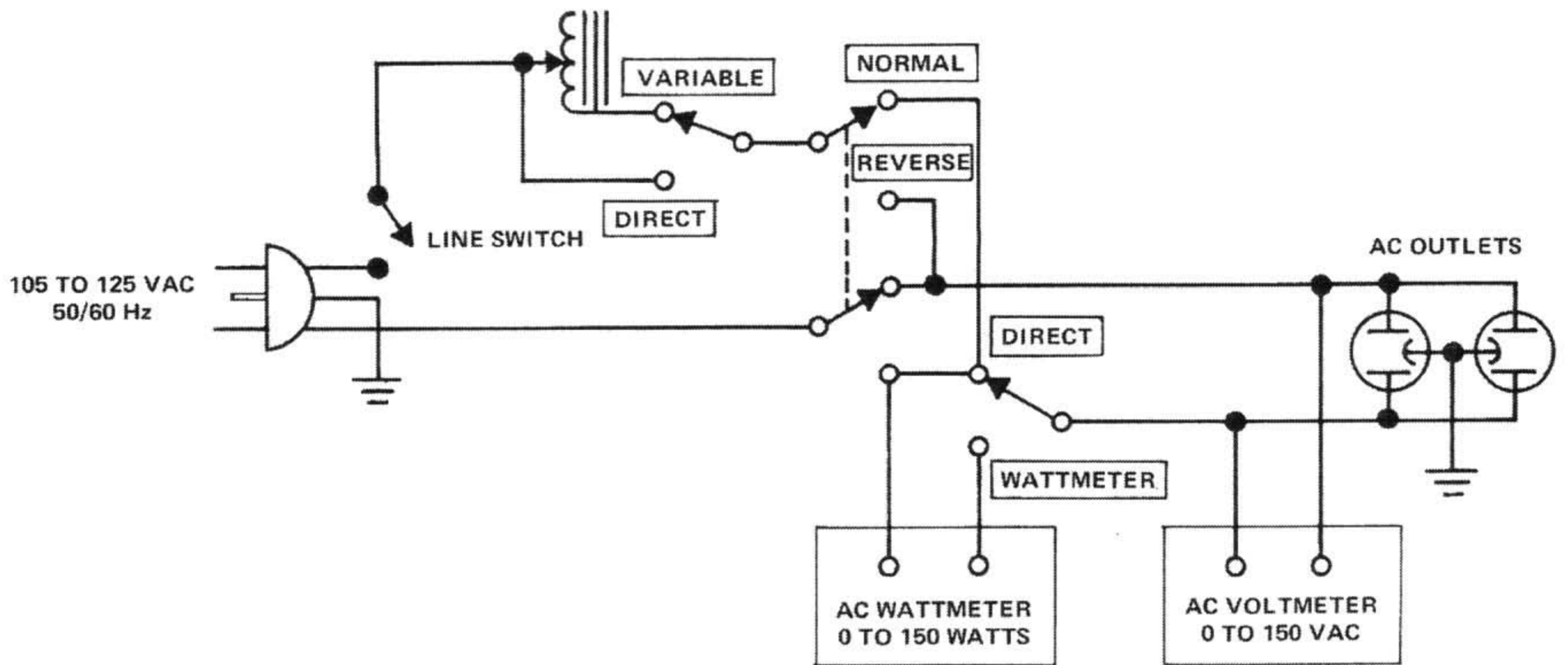


Figure 3. AC Power Control Box Simplified Schematic.

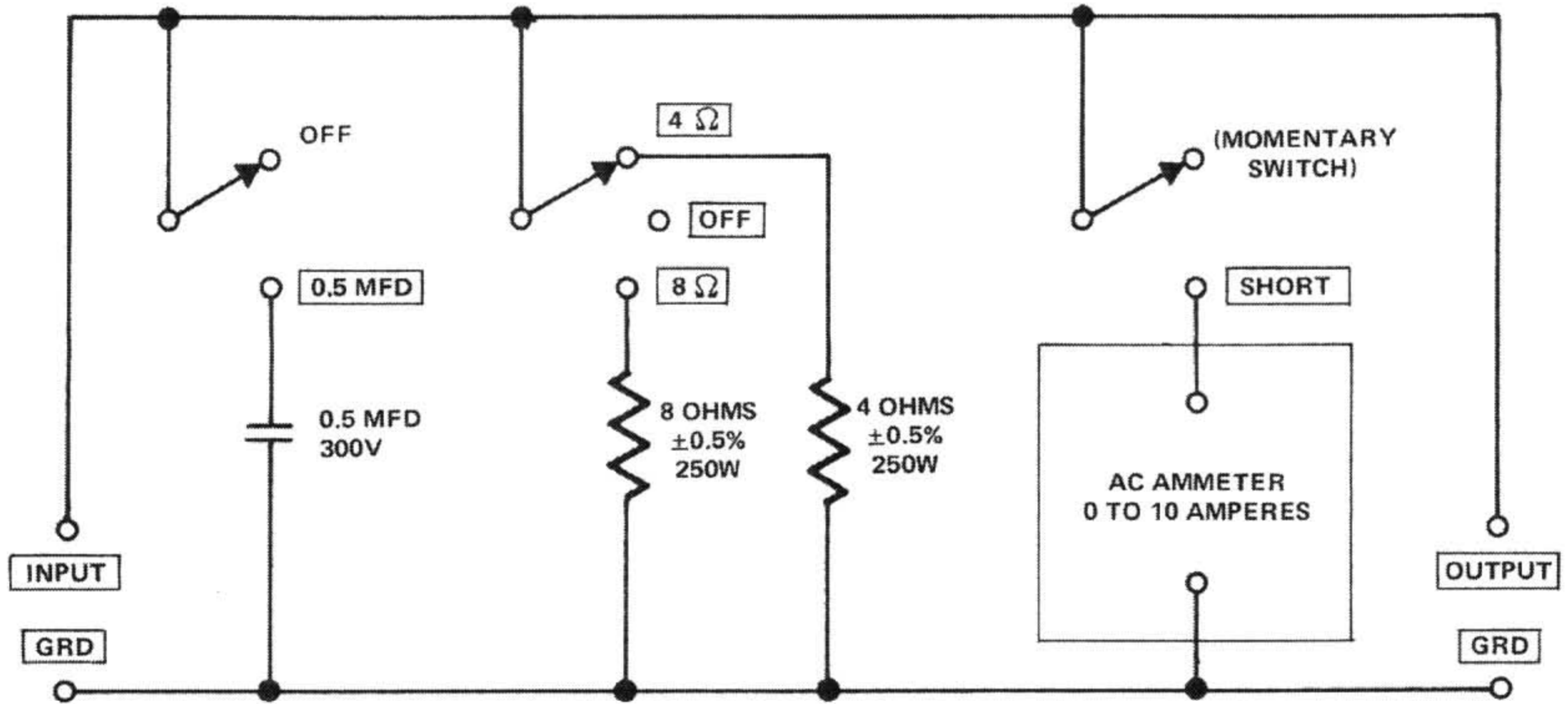


Figure 4. Amplifier Output Load Box Simplified Schematic.

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)

- a. Check for shorted rectifier CR301, also check C1, C2.
- b. Check for shorted transistors Q1, Q2, Q206 through Q210. Check for open control R224 and bias diode CR203. Check T1 for short.

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 transistor or Zener diode is found, or control, or bias diode, 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.

2. No line consumption or zero bias.

- a. Check line cord, fuse, transistors Q1, Q2, Q206 through Q212, bias diode CR203.
- b. Check for open rectifier CR301 or open T1.

3. High DC voltage at loudspeaker terminals before time delay circuit is deactivated.

- a. Check transistors Q301 through Q303 for leakage, shorted, or open.

4. High DC voltage at loudspeaker at all times.

- a. Check R301 through R305 for open and Q301 for leakage, or open.

5. No DC Balance.

- a. Check Q201, Q202, R203, and Zener diodes CR201 and CR202.
- b. Check R202, R204.

6. High hum and noise level.

- a. Check filter capacitors C1, C2, C201 and C203.

7. Parasitic Oscillation.

- a. Check for defective C204, C206, C207, and C215.

8. Improper clipping.
 - a. Check for proper adjustment of R237, R238.
 - b. Check Zener diodes CR206 and CR207.
 - c. Check transistors Q1 and Q2.

9. Relay Latching
 - 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 junction of R302 and R305.

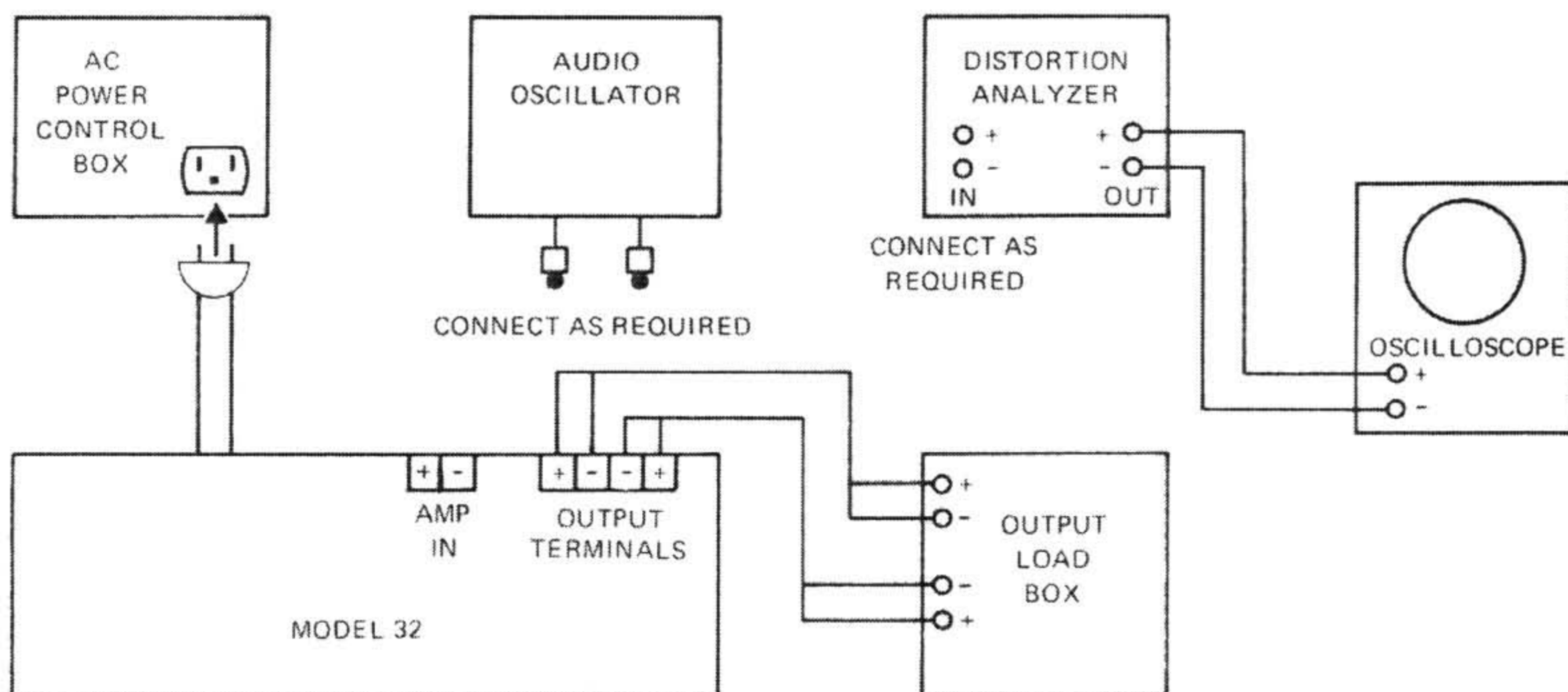


Figure 5. Test Equipment Set-Up.

PARTS LIST

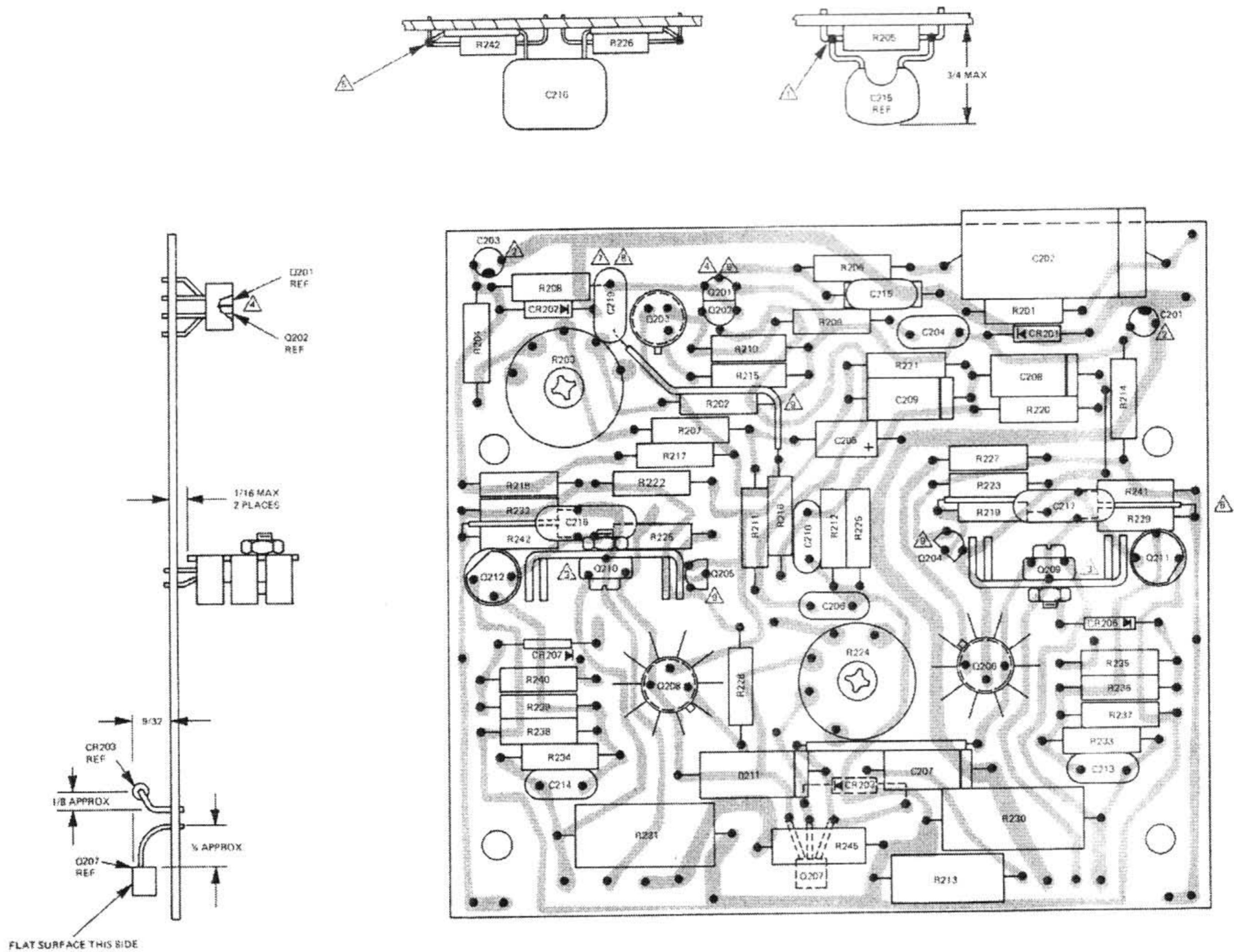
Reference Designation	Description and/or Remarks	Marantz Part Number
A1	Heatsink Assembly	215-1002-3
A2	Heatsink Assembly	215-1002-3
A3	Power Amp Brd Com Assy	200-1006-3
A4	Power Amp Brd Com Assy	200-1006-3
A5	Rect/Relay Brd Com Assy	200-1008-3
C1	Cap. Elect. 6800 mfd, 50V	381-1007
C2	Cap. Elect. 6800 mfd, 50V	381-1007
C201	Cap. Elect. 10 mfd, 16V	381-1015
C202	Cap. 1.0 mfd, $\pm 10\%$, 250V	386-1003
C203	Cap. Elect., 10 mfd, 16V	381-1015
C204	Cap. 1300 pfd, 10%, 300V	385-1033
C205	Cap. Elect. 50 mfd, 6.4V	381-1012
C206	Cap. 5 pfd, $\pm 10\%$, 300V	385-1009
C207	Cap. 0.1 mfd, $\pm 10\%$, 250V	386-1000
C208	Cap. 0.1 mfd, $\pm 10\%$, 250V	386-1000
C209	Cap. 0.1 mfd, $\pm 10\%$, 250V	386-1000
C210	Cap. 120 pfd, $\pm 10\%$, 300V	385-1017
C211	Cap. 0.22 mfd, $\pm 10\%$, 250V	386-1001
C212	Not Used	
C213	Cap. 1000 pfd, $\pm 10\%$, 500V	385-1007
C214	Cap. 1000 pfd, $\pm 10\%$, 500V	385-1007
C215	Cap. 150 pfd, $\pm 10\%$, 500V	385-1002
C216	Cap. 2700 pfd, $\pm 10\%$, 300V	385-1015
C217	Cap. 2700 pfd, $\pm 10\%$, 300V	385-1015
C218	Not Used	
C219	Not Used	
C220	Cap. 39 pfd, $\pm 10\%$, 500V	385-1035
C301	Cap. Elect., 33 mfd, 10V	381-1021
C302	Cap. Elect., 125 mfd, 16V	381-1005
C303	Cap. Elect., 10 mfd, 64V	381-1010
CR201	Diode, Zener	459-1000
CR202	Diode, Zener	459-1000
CR203	Diode, Rectifier	460-1010
CR204	Not Used	
CR205	Not Used	
CR206	Diode, Zener, 10V	459-1003
CR207	Diode, Zener, 10V	459-1003

Reference Designation	Description and/or Remarks	Marantz Part Number
CR301	Bridge Assy, Rectifier	468-1000
CR302	Diode, Rectifier	460-1006
CR303	Diode, Rectifier	460-1006
DS1	Lamp, Minature Bayonet	153-1000
DS2	Lamp, Minature Bayonet	153-1000
F1	Fuse, 4A, 250V	451-1003
K301	Relay, DPDT, 24V DC	410-1000
L1	Toroid	147-1000
Q1	Transistor, PNP	461-1011
Q2	Transistor, NPN	462-1015
Q201*	Transistor, NPN	462-1020-4
Q202*	Transistor, NPN	462-1020-4
Q203	Transistor, PNP (Beta>111)	461-1007
Q204	Transistor, PNP	461-1006-1
Q205	Transistor, NPN	462-1009-1
Q206	Transistor, PNP	461-1007
Q207	Transistor, NPN	462-1009-4
Q208	Transistor, NPN	462-1007
Q209*	Transistor, NPN	462-1021
Q210*	Transistor, PNP	461-1015
Q211	Transistor, NPN	462-1016
Q212	Transistor, PNP	461-1012
Q301	Transistor, NPN	462-1000
Q302	Transistor, NPN	462-1007
Q303	Transistor, NPN	462-1000
R201	Res C/F, 470K, 1/2W, 5%	433-6472
R202	Res Prec 10K, 1/2W, 2%	432-5101
R203	Res Var, 2K, 2W, 10%	420-1000

Reference Designation	Description and/or Remarks	Marantz Part Number
R204*	Res C/F, 7.5K, 1/2W, 5%	433-4752
R205	Res C/F, 100K, 1/2W, 5%	433-6102
R206	Res C/F, 1K, 1/2W, 5%	433-4102
R207	Res C/F, 240K, 1/2W, 5%	433-6242
R208	Res C/F, 22K, 1/2W, 5%	433-5222
R209	Res C/F, 150 ohms, 1/2W, 5%	433-3152
R210	Res C/F, 7.5K, 1/2W, 5%	433-4752
R211	Res Prec 5.1K, 1/2W, 2%	432-4511
R212	Res Prec 100K, 1/2W, 2%	432-6101
R213	Res C/C, 27 ohms, 2W, 10%	424-2273
R214	Res C/F, 1.8K, 1/2W, 5%	433-4182
R215	Res C/F, 56 ohms, 1/2W, 5%	433-2562
R216	Res C/F, 300 ohms, 1/2W, 5%	433-3302
R217	Res C/F, 5.1K, 1/2W, 5%	433-4512
R218	Res C/F, 1.8K, 1/2W, 5%	433-4182
R219*	Res C/F, 2.2K, 1/2W, 5%	433-4222
R220	Res Prec 15K, 1/2W, 2%	432-5151
R221	Res Prec 15K, 1/2W, 2%	432-5151
R222	Res Prec 680 ohms, 1/2W, 2%	432-3681
R223	Res Prec 680 ohms, 1/2W, 2%	432-3681
R224	Res Var, 1K, 2W, 10%	420-1011
R225	Res C/F, 47K, 1/2W, 5%	433-5472
R226*	Res C/F, 2.2K, 1/2W, 5%	433-4222
R227	Res C/F, 56 ohms, 1/2W, 5%	433-2562
R228	Res C/F, 56 ohms, 1/2W, 5%	433-2562
R229	Res C/F, 100 ohms, 1/2W, 5%	433-3102
R230	Res W/W, 0.2 ohms, 5W, 5%	439-1000
R231	Res W/W, 0.2 ohms, 5W, 5%	439-1000
R232	Res C/F, 100 ohms, 1/2W, 5%	433-3102
R233	Res C/F, 820 ohms, 1/2W, 5%	433-3822
R234	Res C/F, 820 ohms, 1/2W, 5%	433-3822
R235*	Res C/F, 27K, 1/2W, 5%	433-5272
R236*	Res C/F, 7.5K, 1/2W, 5%	433-4752
R237	Res Var, 1K, 1/4W	420-1013
R238	Res Var, 1K, 1/4W	420-1013
R239*	Res C/F, 7.5K, 1/2W, 5%	433-4752
R240*	Res C/F, 27K, 1/2W, 5%	433-5272
R241*	Res C/F, 680 ohms, 1/2W, 5%	433-3682

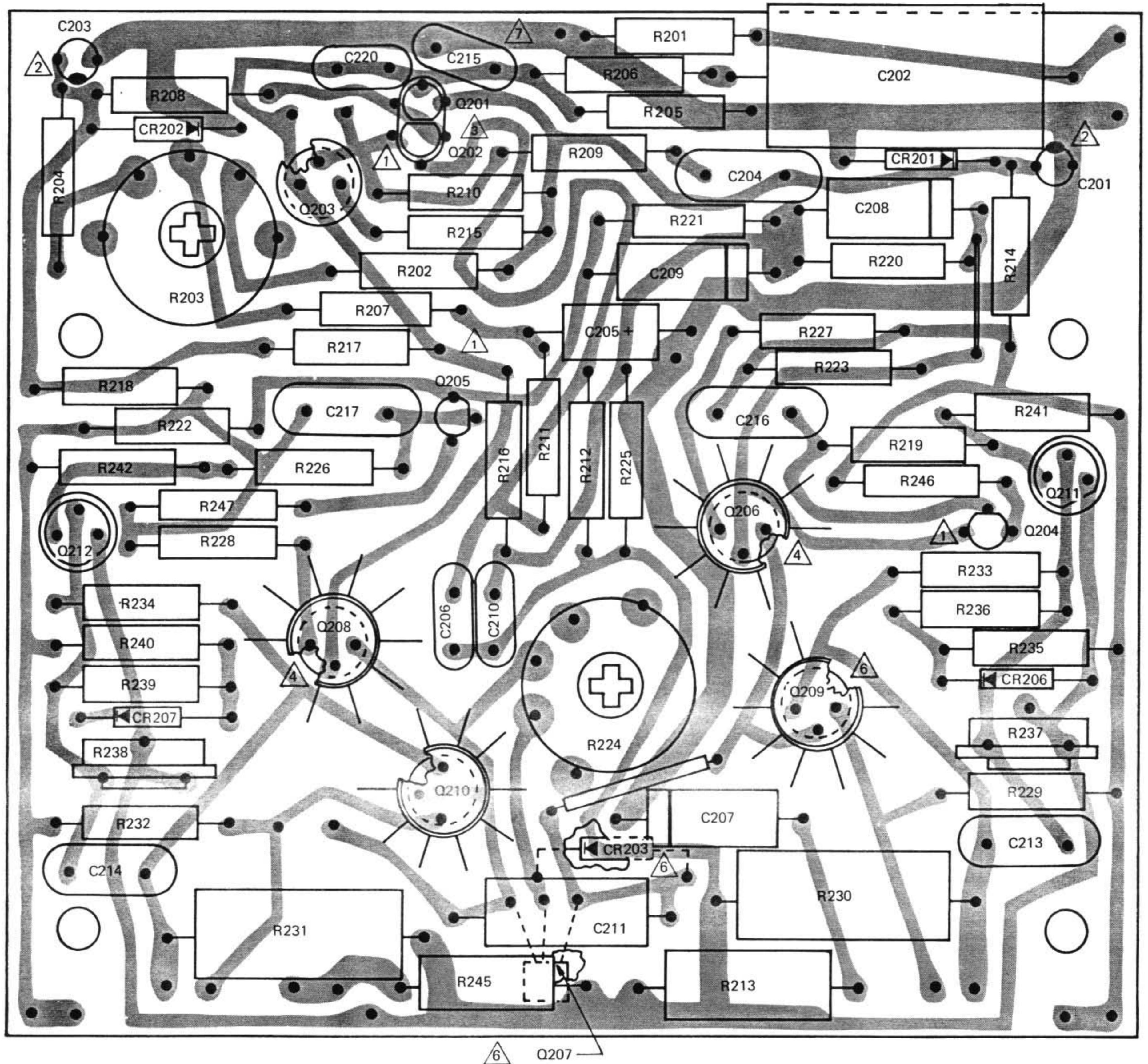
Reference Designation	Description and/or Remarks	Marantz Part Number
R242*	Res C/F, 680 ohms, 1/2W, 5%	433-3682
R243	Not Used	
R244	Not Used	
R245	Res C/C, 2.7 ohms, 1W, 10%	423-1273
R246*	Res C/F, 22 ohms, 1/2W, 5%	433-2222
R247*	Res C/F, 22 ohms, 1/2W, 5%	433-2222
R301	Res C/F, 3.3K, 1/2W, 5%	433-4332
R302	Res C/F, 10K, 1/2W, 5%	433-5102
R303	Res C/F, 27K, 1/2W, 5%	433-5272
R304	Res C/F, 75K, 1/2W, 5%	433-5752
R305	Res C/F, 7.5K, 1/2W, 5%	433-4752
R306	Res C/F, 39K, 1/2W, 5%	433-5392
R307	Res C/C, 1.5K, 2W, 10%	424-4153
R308	Res C/C, 1.5K, 2W, 10%	424-4153
R309	Res C/F, 510K, 1/2W, 5%	433-6512
R310	Res W/W, 180 ohms, 2W, 5%	436-3182
T1	Transformer, Power	440-1003
TB1	Terminal Board, 4 Position	362-1002
XDS1	Socket Assy, Pilot Lamp	481-1003
XDS2	Socket Assy, Pilot Lamp	481-1003
XF1	Fuseholder (W/Mtg Hdwe)	367-1001
XQ1	Socket, Transistor	368-1000
XQ2	Socket, Transistor	368-1000
None	Front Panel Assembly Consisting of Panel, Front Mask, Window Window, Marked Lens, Light Deflector Bezel, Front Panel	206-1001-1 134-1006-1 159-1000 170-1000-1 170-1003-1 172-1000
None	Foot	567-1000

*See ECN Change Record



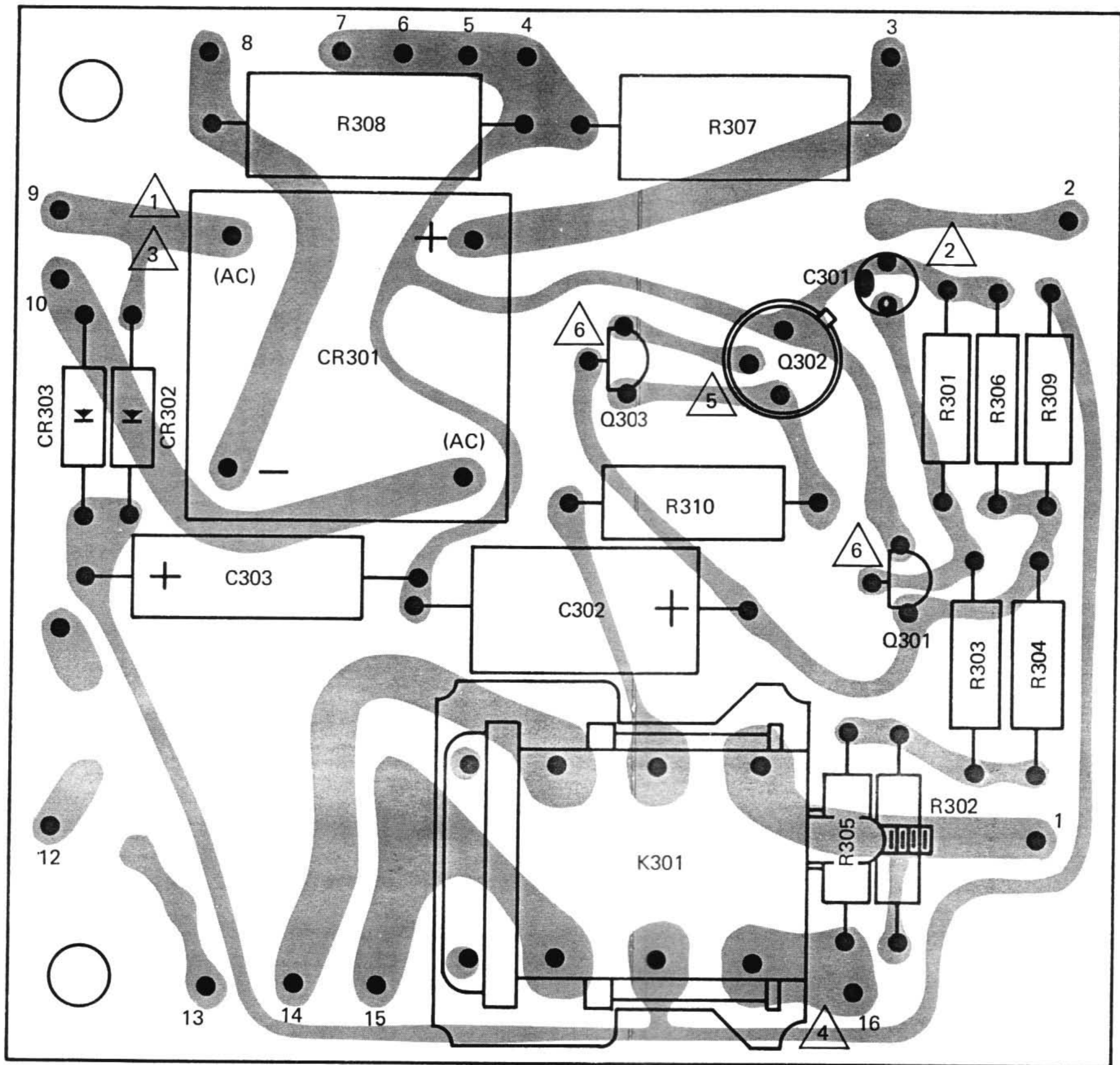
1. INSTALL C215 APPROX. AS SHOWN, WITH LEADS SOLDERED TO R205 LEADS.
2. C201 AND C203 POLARITY IS INDICATED BY COLORED DOT ON ONE SIDE, HOLDING THE CAPACITOR WITH THE COLORED DOT TOWARD THE VIEWER, THE POSITIVE LEAD IS ON THE RIGHT.
3. METAL SIDE OF Q209 AND Q210 TO BE NEXT TO HEAT DISSIPATER.
4. Q201 AND Q202 LOCATED AS SHOWN, WITH CASES TOUCHING. INSTALL HEAT SHRINKABLE TUBING OVER Q201 AND Q202 AND SHRINK.
5. INSTALL C216 APPROX. AS SHOWN, WITH LEADS SOLDERED TO R226 AND R242. C216 LEADS TO BE SLEEVED.
6. INSTALL C217 IN SIMILAR MANNER AS SHOWN FOR C216 WITH LEADS SOLDERED TO R219 AND R229. C217 LEADS TO BE SLEEVED.
7. C219 OPTIONAL ITEM.
8. INSTALL C219 AS SHOWN (BETWEEN R208 AND R216 SLEEVE LEADS).
9. Q201, Q202, Q204, AND Q205 ARE TO BE INSTALLED WITHOUT CUTTING TRANSISTOR LEAD. HEIGHT OF THE TRANSISTOR OFF THE BOARD NOT TO EXCEED 1/2".

Figure 6. Power Amplifier Board Component Assembly Diagram Revision 1.



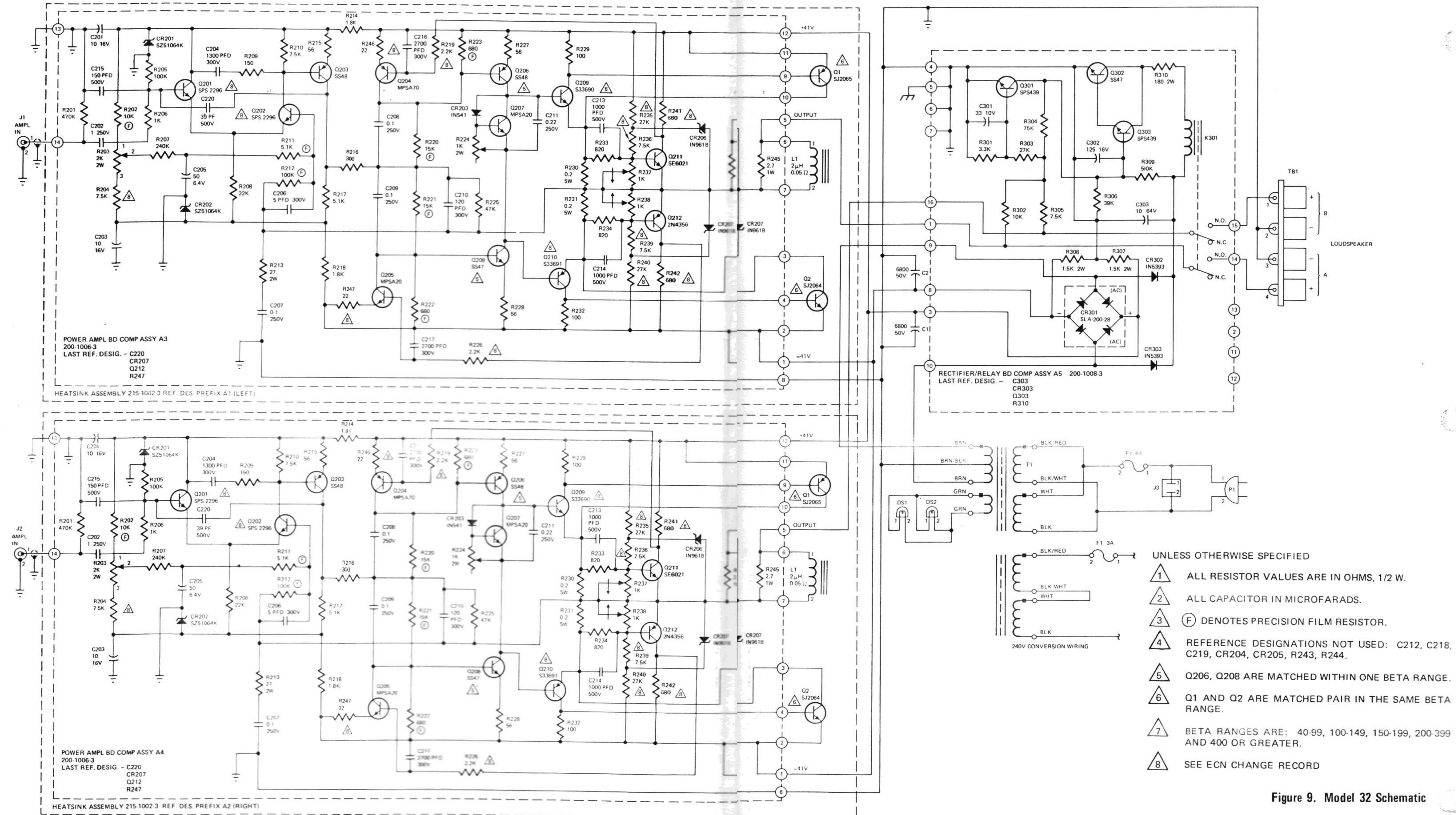
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|--|--|
| <p>1. Q201, Q202, Q204, AND Q205 ARE TO BE INSTALLED WITHOUT CUTTING TRANSISTOR LEADS. HEIGHT OF THE TRANSISTOR OFF THE BOARD NOT TO EXCEED 1/2".</p> <p>2. C201 AND C203 POLARITY IS INDICATED BY COLORED DOT ON ONE SIDE, HOLDING THE CAPACITOR WITH THE LEADS DOWN AND THE COLORED DOT TOWARD THE VIEWER, THE POSITIVE LEAD IS ON THE RIGHT.</p> <p>3. Q201 AND Q202 LOCATED AS SHOWN, WITH CASES TOUCHING. INSTALL HEAT SHRINKABLE TUBING OVER Q201 AND Q202 AND SHRINK.</p> | <p>4. Q206 AND Q208 TO BE MATCHED WITHIN 1 (ONE) BETA RANGE. Q209 AND Q210 TO BE MATCHED IN SAME BETA RANGE. BETA RANGES ARE 40-99, 100-149, 150-199, 200-399 AND 400 OR GREATER.</p> <p>5. USE BOARDS FABRICATED FROM A/W 115-1006 REV G ONLY FOR ASSEMBLY CONFIGURATION SHOWN.</p> <p>6. CR203 AND Q207 ARE INSTALLED IN SAME MANNER AS SHOWN IN FIGURE 6.</p> <p>7. C215 OPTIONAL ITEM.</p> |
|--|--|

Figure 7. Power Amplifier Board Component Assembly Diagram Revision 2.



- | | |
|---|--|
| <p>1. RED DOT INDICATES POSITIVE LEAD OF CR301 AND MAY BE LOCATED ON LEAD SIDE OR OPPOSITE LEAD SIDE OF COMPONENT.</p> <p>2. C301 POLARIZATION IS DETERMINED BY HOLDING THE COMPONENT WITH THE BLACK MARKING TOWARD VIEWER – IN THIS POSITION THE POSITIVE LEAD IS ON THE RIGHT.</p> <p>3. CR301 TO BE INSTALLED FLUSH TO 1/8" ABOVE BOARD.</p> | <p>4. RELAY TERMINALS NEED NOT BE TRIMMED.</p> <p>5. Q302 TO HAVE A BETA GREATER THAN 30.</p> <p>6. Q301 AND Q303 ARE TO BE INSTALLED WITHOUT CUTTING TRANSISTOR LEADS. HEIGHT OF THE TRANSISTOR OFF THE BOARD NOT TO EXCEED 1/2".</p> |
|---|--|

Figure 8. Rectifier/Relay Board Component Assembly Diagram.



POWER AMPL BD COMP ASSY A3
200-1006-3
LAST REF. DESIG. - C220
CR207
Q212
R247

HEATSINK ASSEMBLY 215-1002-3 REF. DES. PREFIX A1 (LEFT)

POWER AMPL BD COMP ASSY A4
200-1006-3
LAST REF. DESIG. - C220
CR207
Q212
R247

HEATSINK ASSEMBLY 215-1002-3 REF. DES. PREFIX A2 (RIGHT)

RECTIFIER/RELAY BD COMP ASSY A5 200-1008-3
LAST REF. DESIG. -
C303
CR303
Q303
R310

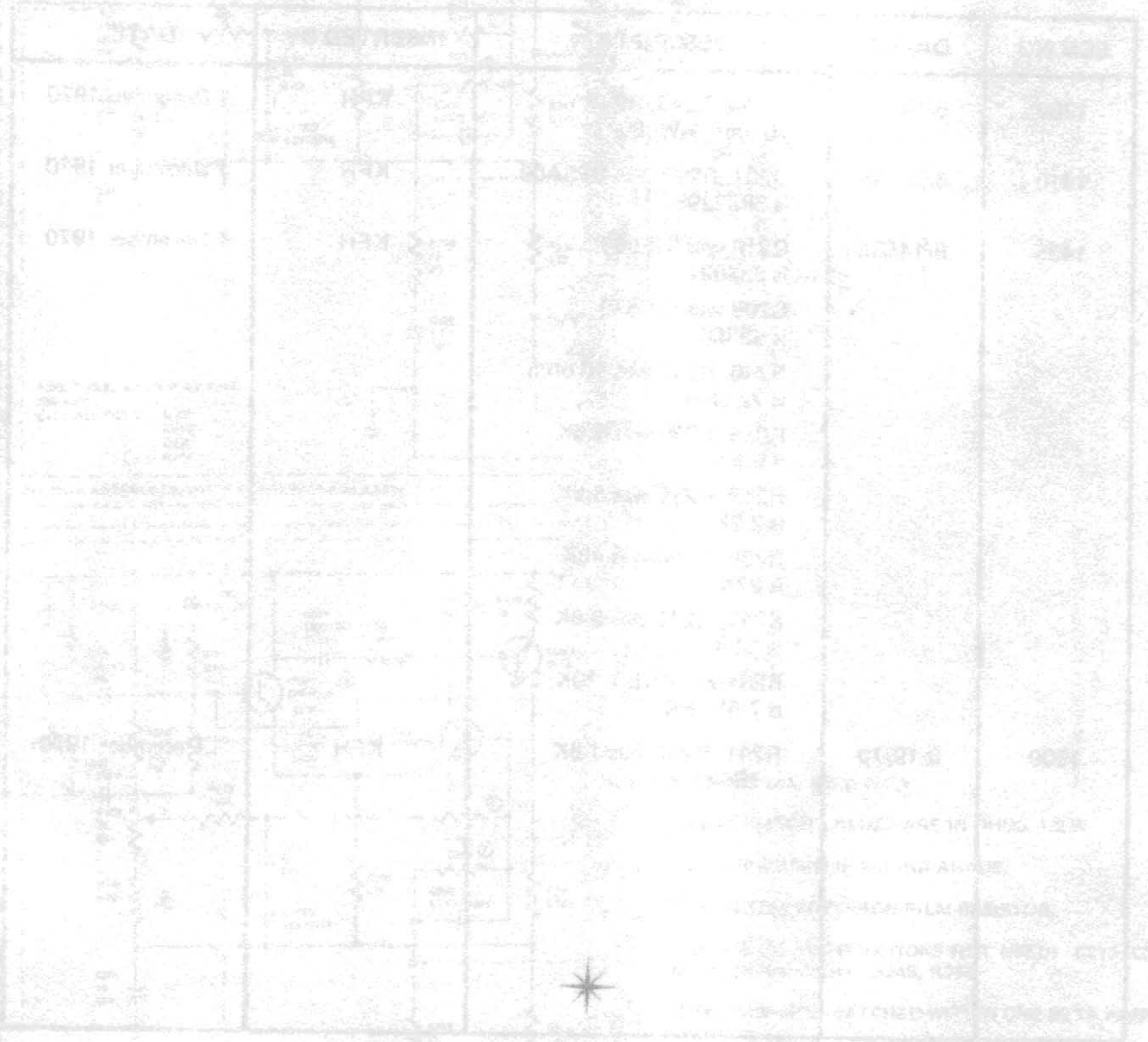
- UNLESS OTHERWISE SPECIFIED
- 1 ALL RESISTOR VALUES ARE IN OHMS, 1/2 W.
 - 2 ALL CAPACITOR IN MICROFARADS.
 - 3 (F) DENOTES PRECISION FILM RESISTOR.
 - 4 REFERENCE DESIGNATIONS NOT USED: C212, C218, C219, CR204, CR205, R243, R244.
 - 5 Q206, Q208 ARE MATCHED WITHIN ONE BETA RANGE.
 - 6 Q1 AND Q2 ARE MATCHED PAIR IN THE SAME BETA RANGE.
 - 7 BETA RANGES ARE: 40-99, 100-149, 150-199, 200-399 AND 400 OR GREATER.
 - 8 SEE ECN CHANGE RECORD

Figure 9. Model 32 Schematic

CHANGE RECORD

Enter changes on the Model 32 here for a permanent record. Insert pages into manual. Retain or discard old pages, as instructed.

ECN NO.	DATED	DESCRIPTION	INSERTED BY	DATE
1362	5/14/70	Added R246, R247 10 ohm, ½W, 5%	KFH	1 December 1970
1410	6/30/70	Q201, Q202 was MPSA09 is SPS2296	KFH	1 December 1970
1435	8/14/70	Q210 was SJE569 is S33691 Q209 was SJE570 is S33690 R246, R247 was 10 ohm is 22 ohm R236, R239 was 5.6K is 7.5K R219, R226 was 5.6K is 2.2K R235, R240 was 43K is 27K R241, R242 was 5.6K is 1.5K R204 was PREC. 10K, 2% is 7.5K, 5%	KFH	1 December 1970
1509	8/19/70	R241, R242 was 1.5K is 680 ohm	KFH	1 December 1970



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