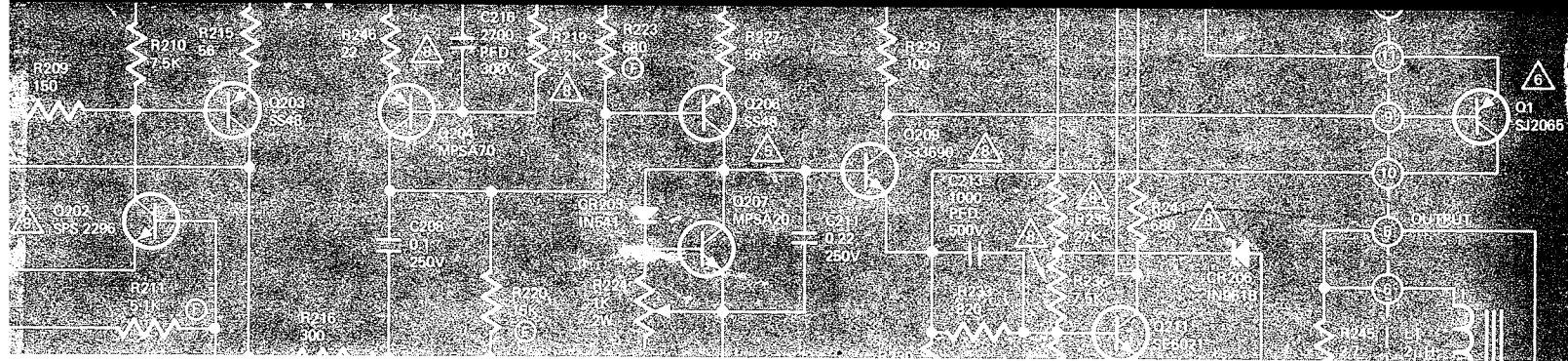
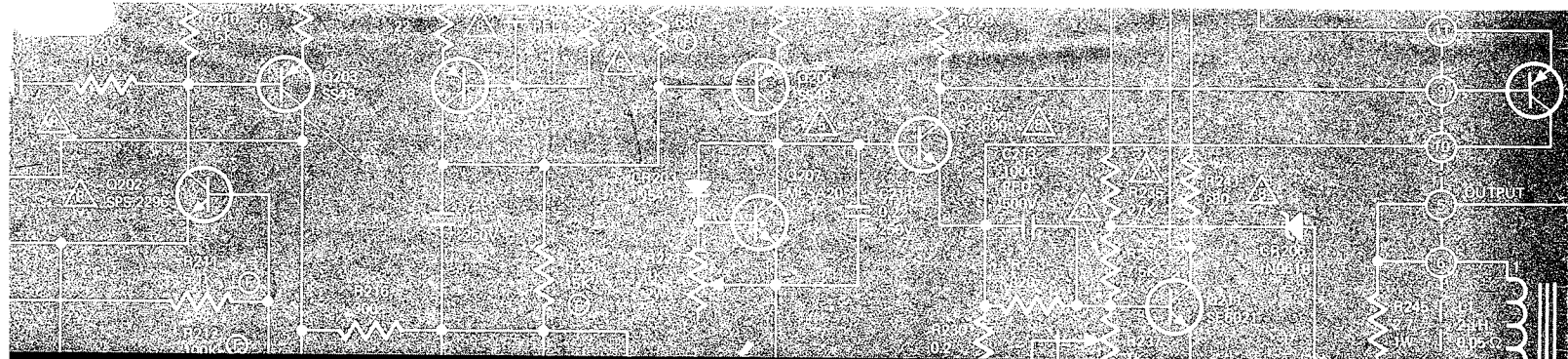


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**SERVICE
MANUAL**

MODEL 500



Stereo Power Amplifier

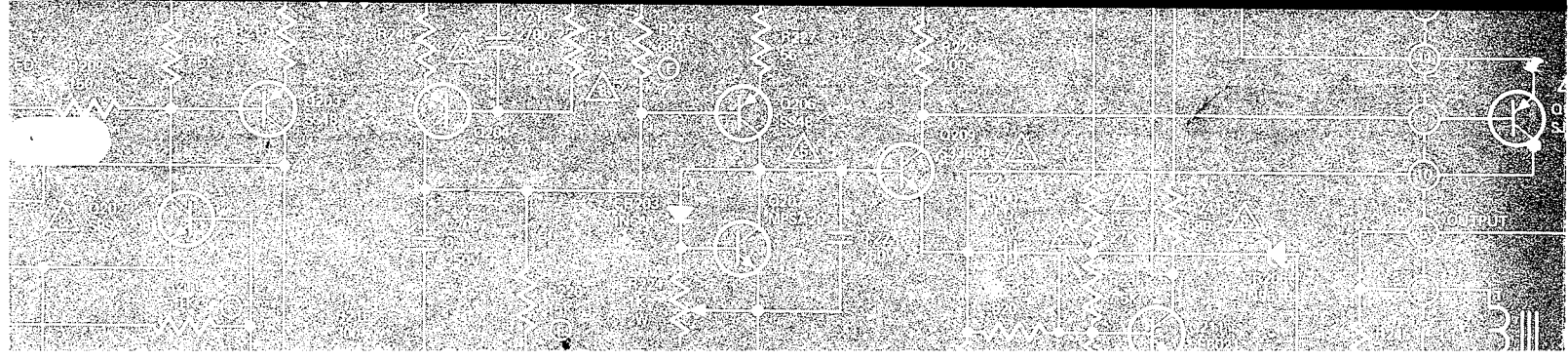


TABLE OF CONTENTS

Section	Page	Service Notes	
		Disassembly/Re-assembly Instructions	12
Introduction	1	Top Cover	12
Caution	1	Bottom Cover	13
Technical Specifications	2	Front Panel Assembly	13
Recommended Test Equipment	5	Pilot Lamp	13
Performance Verification	7	Meter Board Assembly	13
Test Procedure	7	Meter	13
Test Equipment	7	Front Panel	13
Preliminary Procedures	7	Driver Board Assembly	14
Bias Test	7	Rear Panel Assembly	14
Relay Operation Test	8	Ch. A Heatsink Component Assembly	14
DC Balance Test	8	Heatsink-Mounted Transistors	14
Total Hum and Noise Test	8	Ch. A Power Amplifier Board Assembly	15
Maximum Power Output Test	8	Heatsink Fan	15
Harmonic Distortion Test	8	Ch. B Heatsink Component Assembly	16
Frequency Response Test	8	Ch. B Power Amplifier Board Assembly	16
Gain Test	8	Rectifier/Relay Board Assembly	16
Gain Differential Test	9	Power Supply Assembly	16
Channel Separation Test	9	Voltage Conversion Instructions	16
Meter Calibration Test	9	100 VAC Conversion	16
Adjustment Procedure	9	220 VAC Conversion	16
Test Equipment	9	Parts List ("Loose" Parts)	18
Preliminary Procedures	9	Parts List - Front Panel Assembly	18
Unit Disassembly	9	Parts List - Power Supply Assembly	19
Bias Adjustment	9	Parts List - Heatsink Component Assembly	19
DC Balance Adjustment	10	Parts List - Driver Board Assembly	22
SOA Limit Adjustment	10	Parts List - Power Amplifier Board Assembly	23 & 24
Meter Calibration	12	Parts List - Meter Board Assembly	25
		Parts List - Rectifier/Relay Board Assembly	25

marantz [®]	model number 500	bulletin number
	for serial numbers ALL	M-500-1
	subject POWER TRANSISTOR REPLACEMENTS	
	engineering approval <i>H. E. Branco</i>	date 3-26-75

SERVICE BULLETIN

When replacing transistors in the Marantz Model 500, it is imperative that the Beta Range Chart be referred to before replacements are ordered. To determine the proper beta range, note the color code on the transistor, then obtain the corresponding dash number from the chart. For example:

Replacement part number 462-1056-100 is to replace a RED coded 2N3440.

Replacement part number 462-1056-400 is to replace a GREEN coded 2N3440.

<u>REF DES.</u>	<u>VENDOR PART NO.</u>	<u>MARANTZ PART NO.</u>	<u>DASH NO.</u>	<u>BETA RANGE</u>	<u>COLOR CODE</u>
Q110 Q111 Q118	2N3440	462-1056-	-100 -200 -300 -400	40 - 49 50 - 74 75 - 99 100 - 160	RED ORANGE YELLOW GREEN
Q112 Q113 Q117	2N5415	461-1049-	-100 -200 -300 -400	30 - 49 50 - 74 75 - 99 100 - 150	RED ORANGE YELLOW GREEN
Q301	SJ2504	462-1025-	-100 -200 -300	40 - 75 76 - 100 101 & UP	RED YELLOW GREEN
Q302	SJ2503	461-1018-	-100 -200 -300	50 - 100 101 - 200 201 & UP	ORANGE GREEN GRAY
Q303 Q304 Q305 Q306	SJ2500 <i>use</i> <i>2SD555</i>	462-1023-	-100 -200 -300 -400	30 - 49 50 - 69 70 - 99 100 & UP	RED ORANGE YELLOW GREEN
Q307	SJ2505	461-1019-	-100 -200 -300	40 - 75 76 - 100 101 & UP	RED YELLOW GREEN

<u>REF DES.</u>	<u>VENDOR PART NO.</u>	<u>MARANTZ PART NO.</u>	<u>DASH NO.</u>	<u>BETA RANGE</u>	<u>COLOR CODE</u>
Q308	SJ2502	462-1024-	-100 -200 -300	50 - 100 101 - 200 201 & UP	ORANGE GREEN GRAY
Q309 Q310 Q311 Q312	SJ2501 <i>use 2SB600</i>	461-1017-	-100 -200 -300 -400	30 - 49 50 - 69 70 - 99 100 & UP	RED ORANGE YELLOW GREEN

NOTE: The beta color code of the SJ2500 transistor group (Q303 through Q306) can differ from the SJ2501 transistor group (Q309 through Q312) by one color difference on either heatsink assembly. Example:

All SJ2500 transistors on Channel A heatsink are ORANGE. The SJ2501 transistors on the opposite end of Channel A heatsink can be coded all RED or all YELLOW if an ORANGE beta color code replacement is not available.


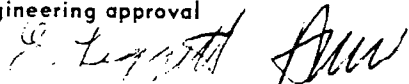
This substitution applies to the SJ2500 and SJ2501 groups only. All other devices should be matched per notes in the Service Manual. THIS SUBSTITUTION SHOULD BE DONE ONLY IF THE PROPER BETA RANGE IS NOT OBTAINABLE.

After replacing output transistor always recheck bias adjustment and harmonic distortion per instructions on page 8 of the service manual.

Incorporate this change into the Service Manual as soon as possible to ensure proper service information.



Albert Almeida, Manager
Technical Services

 SERVICE BULLETIN <small>SS-MAR0234</small>	model number 500	bulletin number M-500-2
	for serial numbers ALL	
	subject POWER OUTPUT TRANSISTOR REPLACEMENT	
	engineering approval 	date 7-15-76

Effective immediately, all field replacements of the power output transistors in the Marantz Model 500 should be replaced with the new improved devices as follows:

<u>Designation</u>	<u>Old Part Number (Motorola)</u>	<u>New Part Number (NEC)</u>
Q303 - Q306	462-1023-XXX	462-2025-000
Q309 - Q312	461-1017-XXX	461-2014-000

When the new NEC devices are used to replace the Motorola devices, all output transistors in that channel must be replaced. For instance, if only 3 devices of the 8 total in a channel fail, all 8 output transistors must be replaced. There must be no mixture of Motorola devices with NEC devices in any given channel. This is necessary since the saturation characteristics of the two transistor types are different.

After replacing output transistors always recheck bias adjustment and harmonic distortion per instructions on pages 7 through 9 of the Service Manual.


 Albert Almeida, Manager
 Technical Services

LIST OF ILLUSTRATIONS

Figure		Page
1	Model 500 Front View	1
2	Model 500 Rear View	1
3	Functional Block Diagram	3 & 4
4	AC Power Control Box Schematic	6
5	Amplifier Output Load Box Schematic	6
6	Test Equipment Set-Up	7
7	Oscilloscope Connection for SOA Limit Adjustment	11
8	SOA Limit Oscilloscope Display	11
9	Model 500 Interior View - Top	17
10	Model 500 Interior View - Bottom	17
11	Front Panel Assembly - Rear View	18
12	Power Supply Assembly - Front View	19
13	Heatsink Component Assembly	19
14	Driver Board Assembly	21
15	Power Amplifier Board Assembly	23 & 24
16	Meter Board Assembly	25
17	Rectifier/Relay Board Assembly	26
18	Model 500 Schematic	27 & 28

Table		
1	Recommended Test Equipment	5

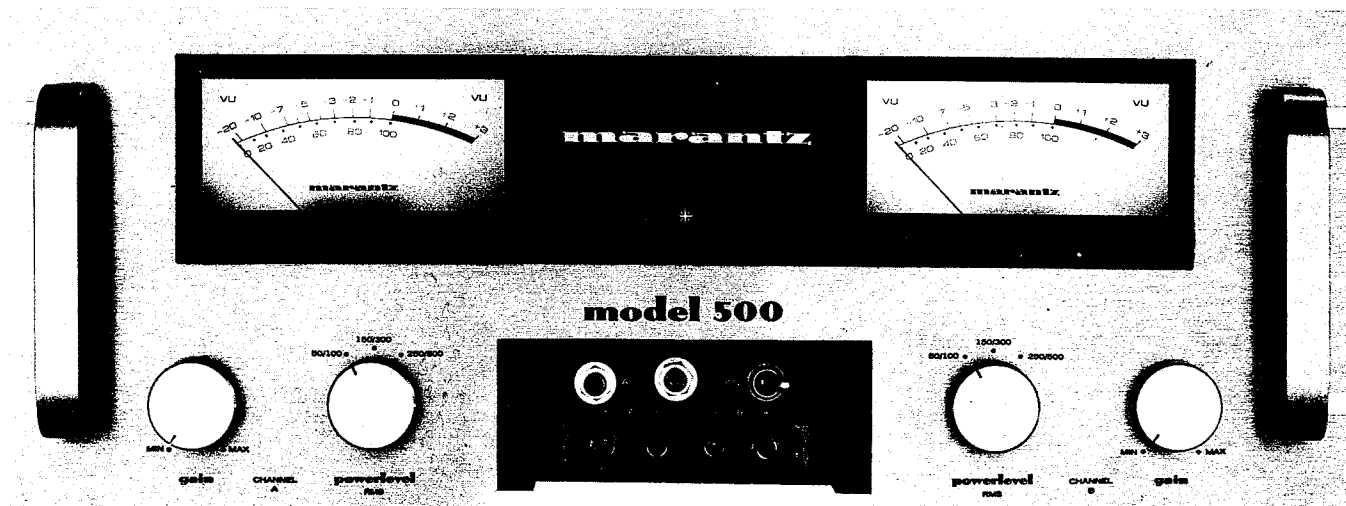


Figure 1. Model 500 Front View

INTRODUCTION

This service manual was prepared for and is intended for use only by factory authorized warranty repair stations and other equally qualified and equipped facilities. The service information contained herein is applicable to the Model 500 Stereo Power Amplifier, manufactured by the Marantz Company, a subsidiary of Superscope Incorporated, Sun Valley.

Performance evaluation and service of the Model 500 should be undertaken only by the experienced technician, one knowledgeable in solid-state amplifier operation and use of the test equipment. All instructions should be read carefully and understood fully before proceeding with any service. To better understand the functions of this amplifier, consult the Model 500 Handbook of Instructions (P/N 199-1055-000) which provides a functional and brief technical description of the unit.

CAUTION

1. The full line voltage exists at the terminal blocks mounted on the Heatsink Assembly & Power Supply Assembly. Care should be exercised to ensure that these terminals are not accidentally contacted causing harm to the technician and/or the equipment.
2. Do not discharge any capacitors in the Model 500 with a dead short (i.e., a screw driver blade). The filter capacitors are capable of storing a sizeable charge and the current delivered through a short-circuit may be sufficient to vaporize the screw driver causing harm to the technician or the equipment. Always use a 10-ohm 1 watt resistor for this purpose.
3. All adjustments should be made using screw drivers with insulated blades and handles. Otherwise, shorting of adjacent components may occur.
4. Never directly connect the loudspeaker terminals of one channel in parallel with those of any other, as severe damage to the output devices will result.

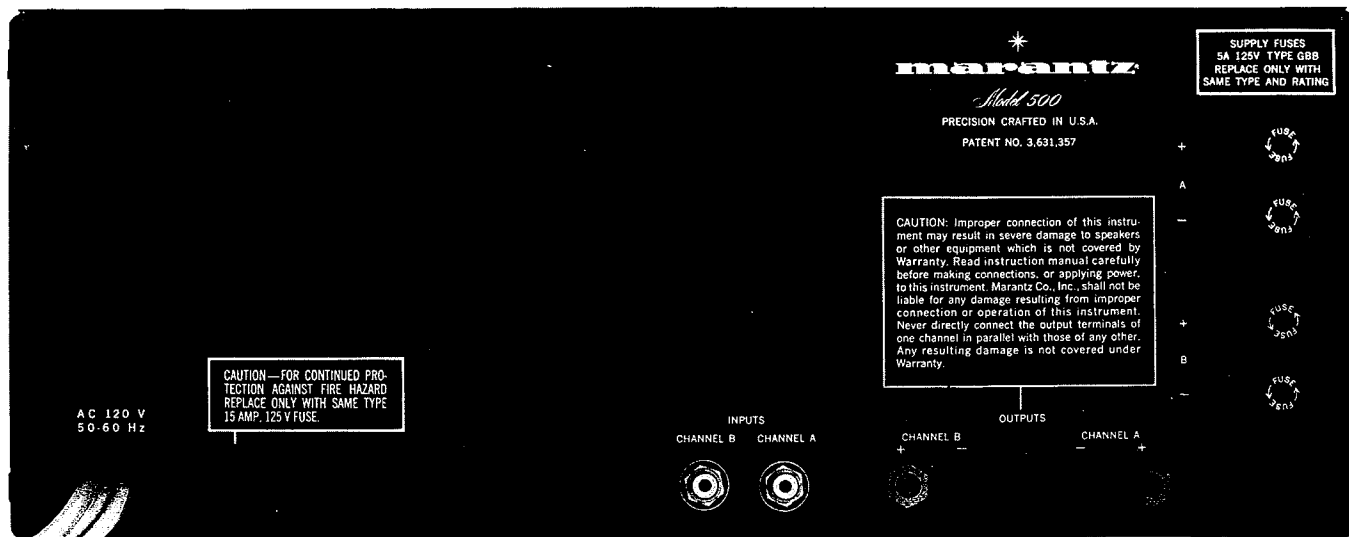


Figure 2. Model 500 Rear View

TECHNICAL SPECIFICATIONS

POWER AT CLIPPING (250/500 RANGE)

250 Watts RMS per channel, both channels driven into 8-ohm loads, 20 Hz to 20 kHz. Typically greater than 300 Watts.

TOTAL HARMONIC DISTORTION

Less than 0.05% at rated power output from 20 Hz to 20 kHz with both channels driven.

INTERMODULATION DISTORTION

Less than 0.05% at rated power output with both channels driven (S.M.P.T.E.).

CHANNEL SEPARATION

Greater than 60 dB, 20 Hz to 20 kHz.

FREQUENCY RESPONSE

20 Hz to 20 kHz at rated power output - ± 0.1 dB.

POWER BANDWIDTH

5 Hz to 35 kHz.
5 Hz to 45 kHz @ 0.1% THD

DAMPING FACTOR

Greater than 400

SENSITIVITY

2.25 Volts for 250 Watts into 8-ohm load with Gain Controls fully clockwise.

HUM AND NOISE

Better than 106 dB below 250 Watts. (8-ohm load)

INPUT IMPEDANCE

33K ohms with Gain Controls fully clockwise.

SQUARE WAVE RESPONSE

Tilt: Less than 20% at 20 Hz.
Undershoot: None
Overshoot: None
Rise Time: Less than 2.5 microseconds.
Slewing Rate: Faster than 11 Volts per microsecond.

OPERATING (PRIMARY) POWER REQUIREMENTS

<u>Nominal Voltage</u>	<u>Range</u>	<u>Rated Power*</u>	<u>Frequency</u>	<u>Fuse</u>
100 VAC	90 to 110 VAC	300 Watts	50 to 60 Hz	15A
120 VAC	108 to 132 VAC	300 Watts	50 to 60 Hz	15A
220 VAC	198 to 242 VAC	300 Watts	50 to 60 Hz	10A

*The rated line power is representative of the power requirements at 10% of full audio output into an 8-ohm load.

PHASE SHIFT

Leading 9° at 20 Hz.
Lagging 9° at 20 kHz.

METER MOVEMENT

Precision moving coil, jewel bearing meter movement.

TURN-ON

5 to 10 seconds delay prevents transient surges at turn-on from reaching output terminals. Input current limiting circuit reduces line inrush current to 50 amperes.

POWER SUPPLY

2.2 Kilowatt transformer; high current, silicon bridge rectifiers, and computer grade energy storage devices capable of energy storage exceeding 280 joules.

VOLTAGE CONVERSION

Special tapped primary allows easy conversion to 100 VAC or 220 VAC operation.

PROTECTION

Built-in circuits, together with line and supply fuses, provide protection against overload.

CONTROLS

Independent front panel Gain Controls and Power Level selector switch.

FRONT PANEL

Standard 19" x 7", with RETMA mounting hole spacing.

DIMENSIONS

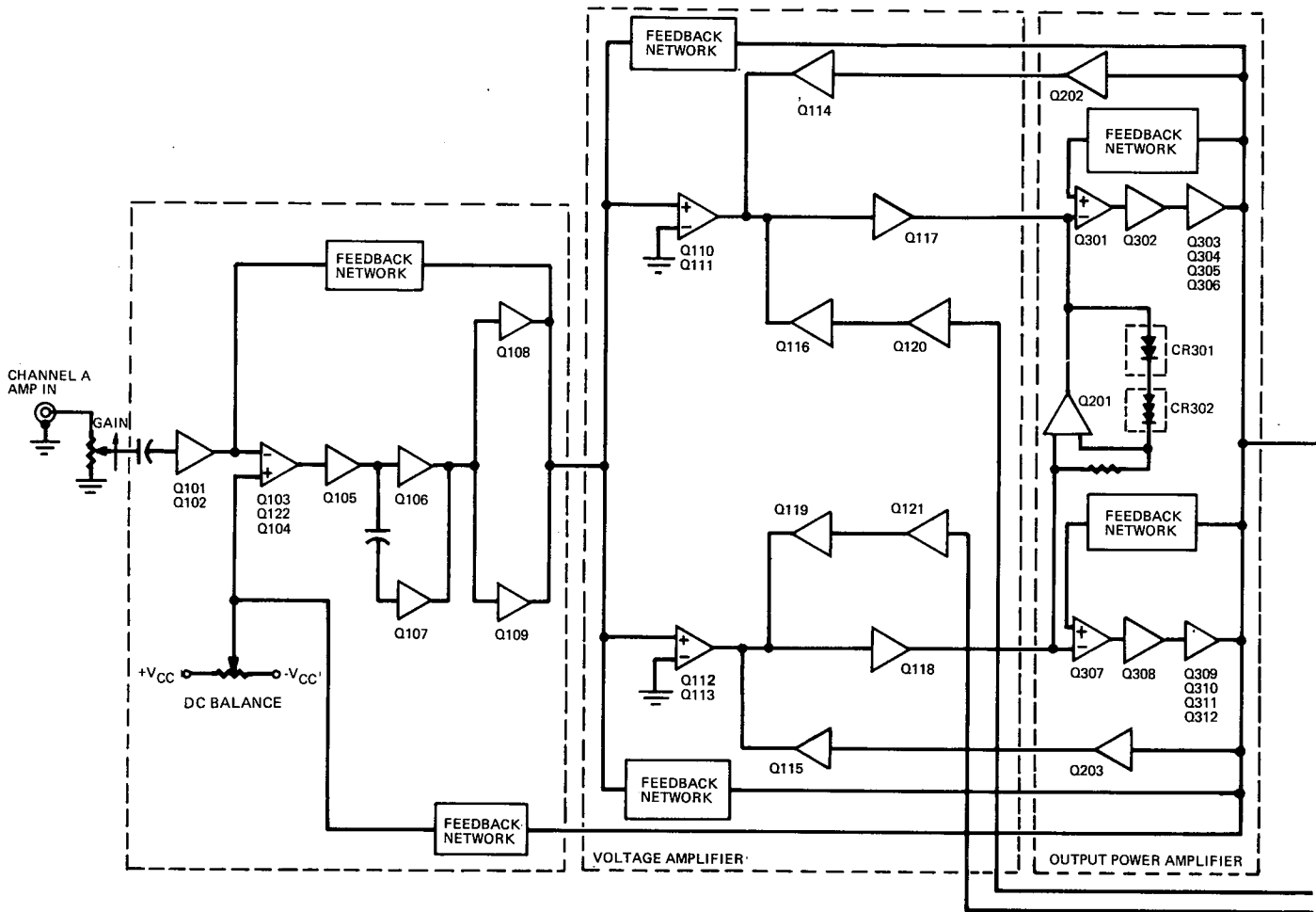
16-3/4" wide, 6-3/4" high, 17-1/8" deep from panel mounting surface.

FINISH

Brushed gold anodize and black enamel.

WEIGHT

Net: 83 Lbs.
Packed for Shipment: 88 Lbs.



3 Figure 3. Functional Block Diagram

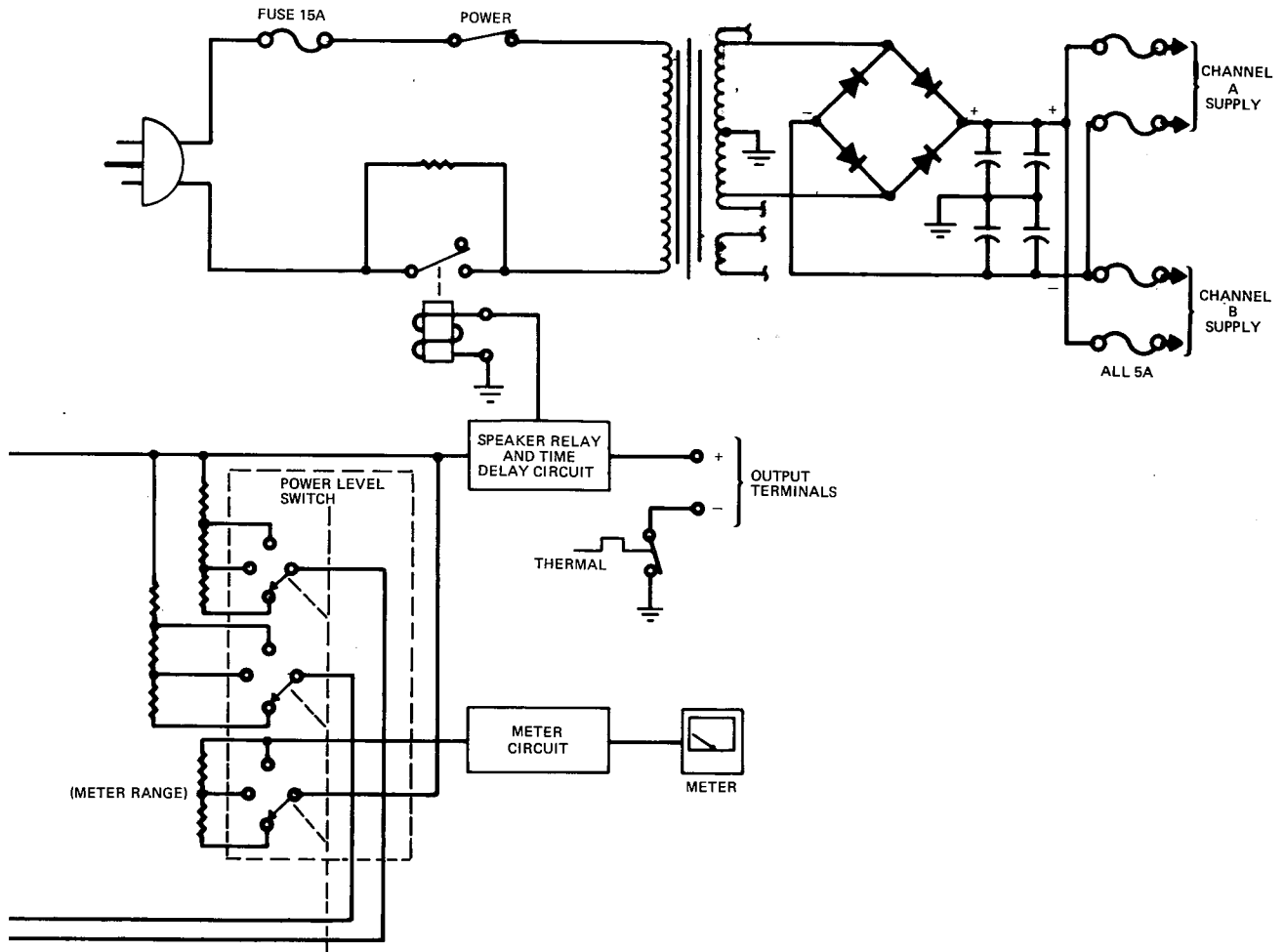


Figure 3. Functional Block Diagram (Cont.)

RECOMMENDED TEST EQUIPMENT

The test equipment listed below is recommended for servicing the Model 500 Stereo Power Amplifier. The Performance Verification and Adjustment Procedure sections of this manual are based on the use of these items or their equivalent.

TABLE 1		
Item	Manufacturer and Model Number	Use
AC Wattmeter	Simpson Model 390	Monitor primary power consumption of amplifier
Line Voltmeter (0 - 150 VAC)	Commercial Grade	Monitor primary line voltage to amplifier
Variable Autotransformer (0 - 140 VAC, 22 Amps)	Powerstat Model 136B	Controls level of primary power to amplifier
Above items to be assembled per Figure 4 as AC Power Control Box		
Output Load Resistor (4 $\Omega \pm 0.5\%$, 250W) 6 Required	Commercial Grade	Provides load for amplifier output termination
Output Load Capacitor (0.5 μ fd, 300V) 2 Required	Mylar	Provides capacitive load for instability tests
Output Load Capacitor (11 μ fd, 300V) 2 Required	Mylar	Provides phase shift for SOA Limit Adjustment
Above items to be assembled per Figure 5 as Amplifier Output Load Box		
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% residual distortion is required)	Sinewave Signal Source
Oscilloscope	Tektronix Model 503 or Data Model 555	Waveform analysis
VTVM	RCA Senior Volt-Ohmyst Model WV-98C	Voltage and resistance measurements
Resistance Substitution Box	Commercial grade with 5% RETMA steps in resistance from 270 Ω to 3.3K	Provides selectable resistance for bias adjustment
Oscilloscope	Tektronix Model 561 with two Model 3A7 Differential Comparators	Waveform analysis during SOA adjustment
Above items to be assembled per Figure 6 or as directed in Test or Adjustment Procedures		
Bleeder Resistor (10 Ω , 1W)	Commercial Grade	Discharges filter capacitors

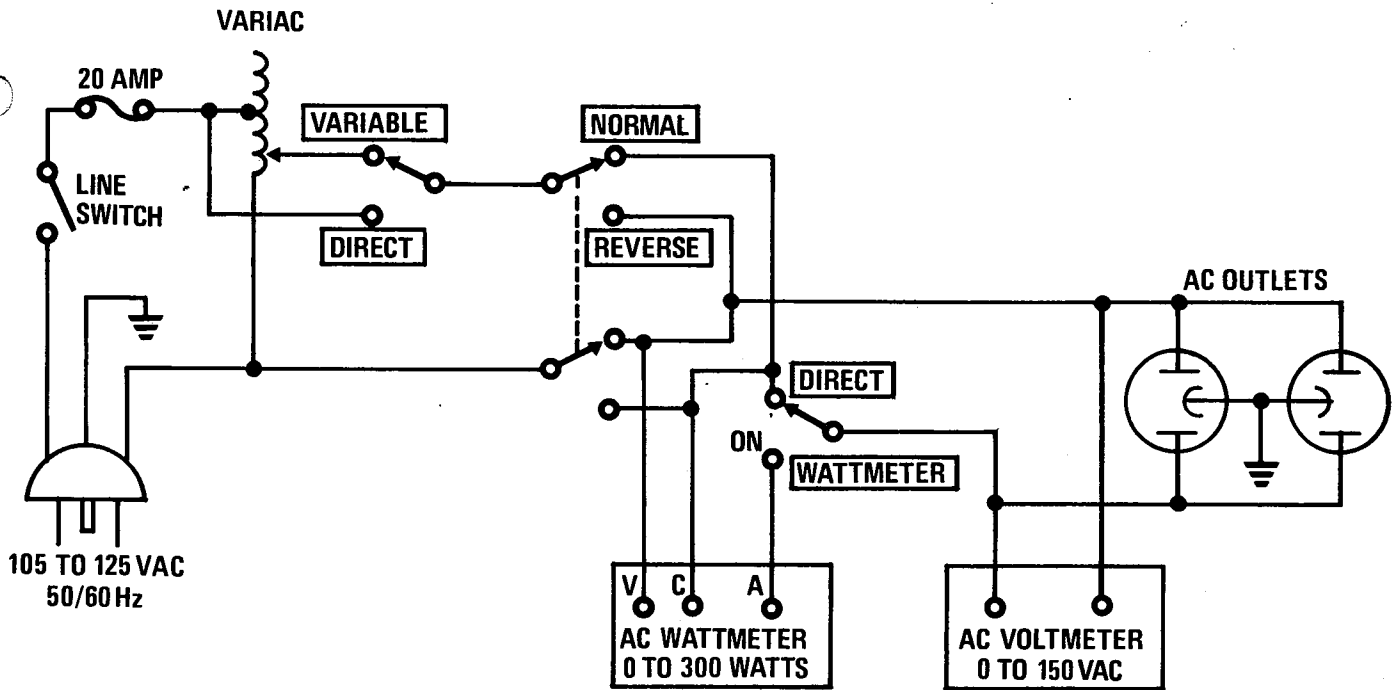


Figure 4. AC Power Control Box Schematic

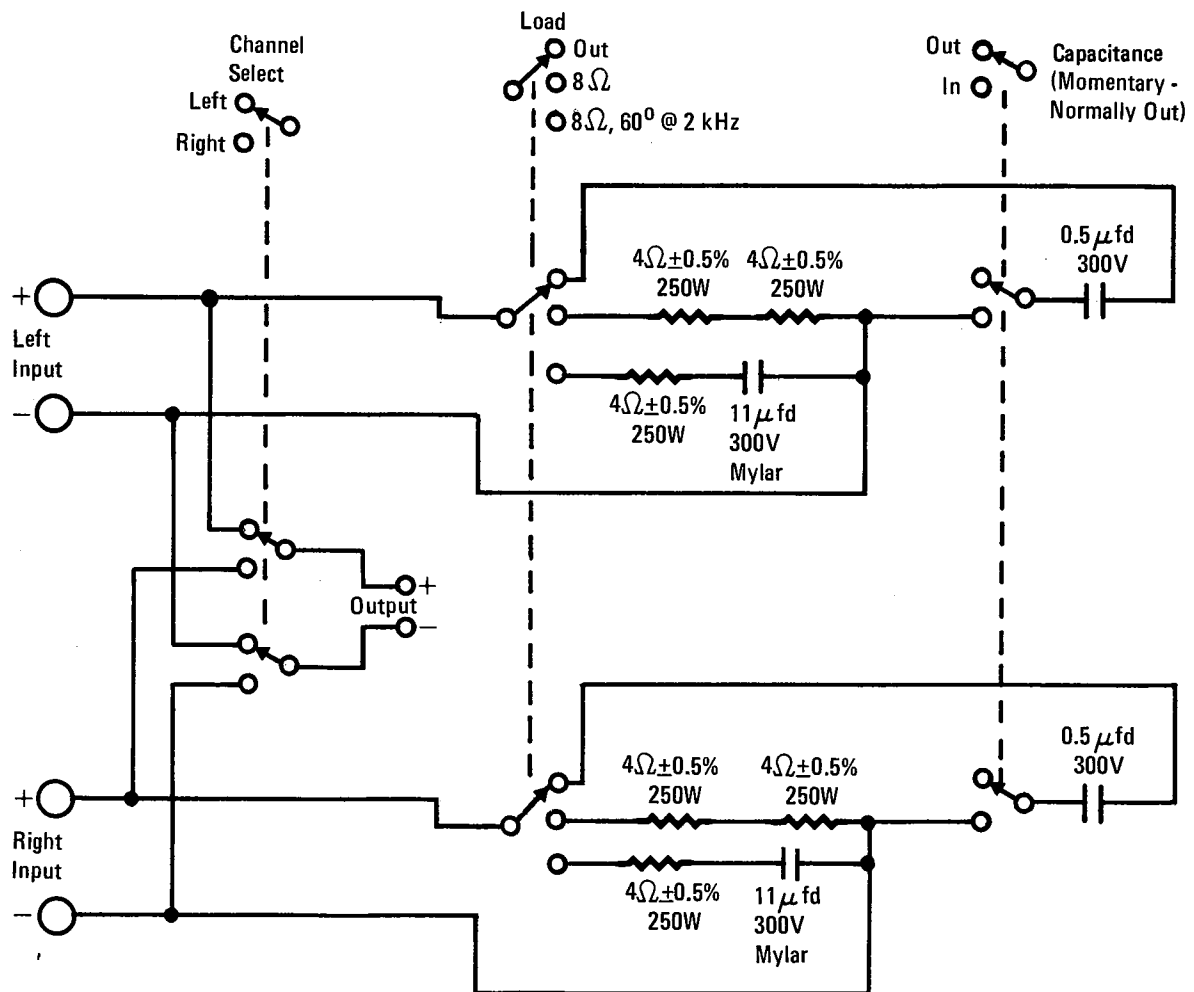


Figure 5. Amplifier Output Load Box Schematic

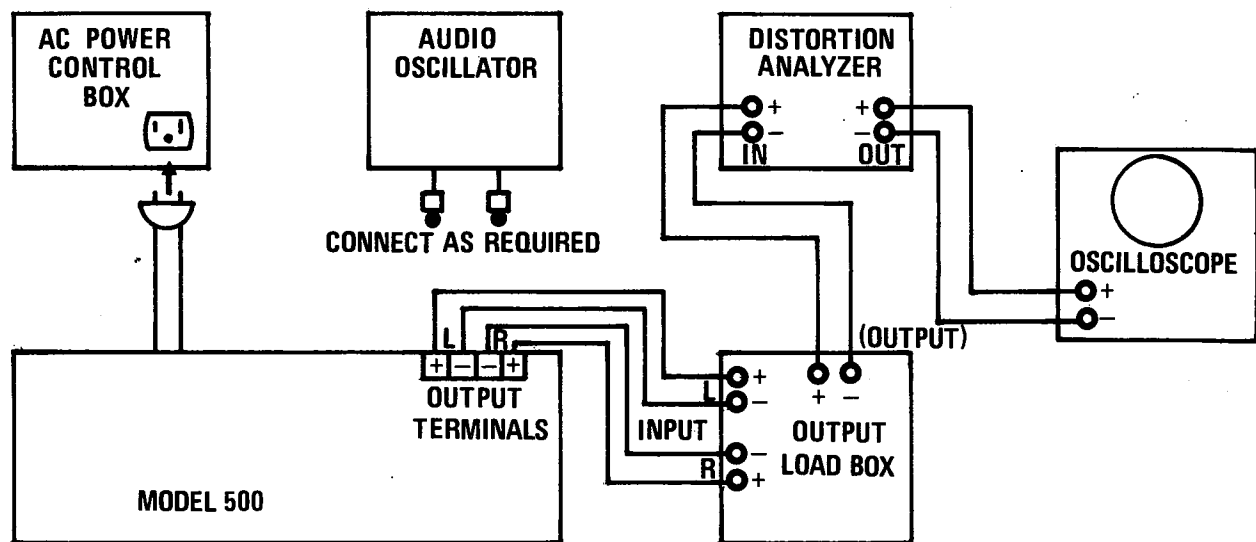


Figure 6. Test Equipment Set-Up

PERFORMANCE VERIFICATION

Test Procedure

All tests outlined below should be performed after any repair or adjustment. The tests described in paragraphs C through L may also be used as a method of isolating the defect prior to service. Should the results of the tests be other than as specified, refer to the Adjustment Procedure section of this manual. Unless otherwise specified, all tests are to be performed on both audio channels, with the results specified applying equally to each channel.

A. Test Equipment

Refer to Table 1 for list of recommended test equipment.

B. Preliminary Procedures

1. All tests are performed with the unit under test and the test equipment connected as shown in Figure 6. Only the rear panel input/output connection facilities of the Model 500 will be used for these tests. Except for the IDLING POWER test, all tests are conducted with 120 VAC line voltage applied to the unit. Unless otherwise specified in the procedure, the test equipment controls will be set in the following position:

AC Power Control Box

Line Switch ON
 Wattmeter Switch. DIRECT
 Variac 120 VAC LINE

Amplifier Output Load Box

Channel Select . . . SET FOR CHANNEL UNDER TEST
 Capacitance Switch OUT

During all the tests listed below the controls of the Model 500 under test will be set as follows:

Gain (both channels). MAX
 Power Level (both channels). . . 250/500
 Power ON

2. Connections, between the output terminals of the Model 500 and the Output Load Box, must have negligible resistance with respect to the resistance of the load itself. Appreciable resistance adds to the total load, resulting in inaccurate measurement of output power.

C. Bias Test

1. With the Line Switch OFF, the Variac set to 0 (fully CCW) and the Wattmeter Switch to WATTMETER, plug the unit line cord into the AC Power Control Box.
2. On the Amplifier Output Load Box, set the Load Switch to OUT.
3. Turn the Line Switch ON and slowly advance the Variac while observing the Voltmeter and Wattmeter on the Power Control Box. When the line voltage reaches 120 VAC the Wattmeter should indicate between 120 and 150 watts.
4. If the Wattmeter reading is greater than 160 watts for any static Variac position, do not further increase the AC voltage.

