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SERVICE MANUAL

marantz

model 2215

Stereophonic Receiver

marantz

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LIST OF ILLUSTRATIONS

INTRODUCTION

This service manual was prepared for use by Authorized Warranty Stations and contains service information for Marantz Model 2215 Stereophonic Receiver.

Servicing information and voltage data included in this manual are intended for use by the knowledgeable and experienced technician only. All instruction should be read carefully. No attempt should be made to proceed without a good understanding of the operation in the receiver.

The parts list furnish information by which replacement part may be ordered from the Marantz Company. A simple description is included for parts which can be usually be obtained through local suppliers.

1. Service Notes

As can be seen form the circuit diagram the chassis of Model 2215 consists of the following units. Each unit mounted on a printed circuit board is described within the square enclosed by a bold dotted line on the circuit diagram.

1. FM Front End & AM Tuner . . . . . mounted on P.C. Board, P100
2. FM IF Amplifier and Detector Unit . . . . . mounted on P.C. Board, P200
3. Muting Control and Meter Amplifier Unit . . . . . mounted on P.C. Board, P300
4. MPX Stereo Decoding Amplifier . . . . . mounted on P.C. Board, P400
5. Phono Amplifier . . . . . mounted on P.C. Board, P900
6. Tone Amplifier . . . . . mounted on P.C. Board, P500
7. Tone Control Volume Unit . . . . . mounted on P.C. Board, P650
8. Power Amplifier . . . . . mounted on P.C. Board, P700
9. Power Supply . . . . . mounted on P.C. Board, P800
10. Loudness, Muting, High and low Filter Switch Unit . . . . . mounted on P.C. Board, P600

2. AM Tuner

All components except Tuning capacitor and ferrite bar antenna are mounted on a printed circuit board P100.

The AM signals induced in a ferrite bar antenna are applided to the base of Mixer transistor H102 through a capacitor of C109, while the local oscillator voltage is injected to the emitter of H102 through the capacitor C157. Both AM signals and oscillating voltage are mixed at the base-emitter junction and converted into 455 KHz intermediate frequency. The resulting IF signal is applied to the first IF transformer F101 consisting of one ceramic filter and two tuned circuits.

The output of F101 is led to the transistor H103 which in turn apply its output to the transistor of next stage H104. The fully amplified IF output is then applied to the diode H107 to detect audible signal through the detector transformer L102. The detected audio signal is filtered and amplified and the final audio output is obtained from the collector of H105 and applied: one to the tape out jacks through monitor switch on the front panel and the other to the function rotary switch.

The DC component of the detected IF signal is used as a AGC voltage to control emitter current of H103 and H102 through the resistor R112 and R106 respectively. A part of IF signal output is also applied to the diode H108 through a capacitor C123 and rectified to obtain DC current for energizing the AM signal strength meter M001.

3. FM Tuner

The FM Tuner section of Model 2215 is divided into three functional blocks: FM front end, IF amplifier & Detector, Muting control and MPX stereo decoding circuit.

FM signals induced on a FM antenna are led to FM antenna coil L103. These signals are then applied to the FET RF amplifier which in turn applies its output to the next Transistor Mixer H111 through a high-Q tuned circuit. The Mixer convert its input signal into 10.7MHz intermediate frequency and amplifies it. The H110 is a local oscillator and its output is injected into the base of Mixer transistor, the injection voltage is about 100 to 200mV. The 10.7MHz front end IF output is led to the next IF amplifier unit through a coaxial cable.

The IF amplifier unit consists of five stages of IF amplifiers. Two pieces of ceramic filters are used to obtain high selectivity a pair of symmetrical diode limiter is also employed for the best limitting characteristics, improved capture ratio and good AM suppression.

A part of IF amplifier H202 is rectified by the diodes H206 and H207 and its DC output is fed back to the gate of FET RF amplifier to decrease the gain of it with increased input signal strength.

3-1 Muting and Auto-Stereo Switching Circuits

The muting circuit consisting of all solid-state electrical switching has been incorporated in the Model 2215.

The DC voltage obtained by rectifing a part of IF output signal from the H204 is applied to the base of H304 and turns on it, if the IF output is greater than predetermined level (muting threshold level). When the H304 is turned on, the H305 is turned off, thus allowing the emitter-collector resistance of the H305 increasing and the collector voltage rises about 8V. The increased collector voltage increases the base bias voltage and makes the switching transistor H306 turn on, thus decreasing the collector-emitter resistance to near zero ohm and allowing the power supply path to the IC closed.

When the input signal is lower than the predetermined level, the DC output obtained is small and can not turn on the H304, thus the H304 keeps its turn-off state and this makes H305 turn on, decreasing the collector voltage and turning off H306. Thus no power is supplied to the IC H205 and signals below the threshold level are muted out. The muting threshold level can be varied by adjusting the trimming resistor R306.

The DC voltage developed at the collector of H305 is also used to make the Auto-Stereo switching transistor H403 turn on and off.

3-2 MPX Stereo Decoding Circuit

Non-equalized audio signals are applied to the first amplifier H401 which servs as a tuned amplifier for the pilot signal in the composite signals and as a buffer amplifier for the rest audio signals. The amplified 19KHz pilot signal is led to the second 19KHz amplifier H402 and further amplified if switching transistor H403 is turned on by the controlling DC signal as descibed above. The 19KHz pilot signal is rectified by the doubler circuit consisting of H412 and H413 to obtain synchronized 38KHz signal to drive the H404. The H404 is the 38KHz tuned amplifier and supplies its output to the switching matrix circuit consisting of four diodes. The composite signals are applied to the center tap of switching transformer L402-2 and decoded into left and right channel signals, then both channel signals are led to the crosstalk cancelling amplifier which utilizes complementary confuguration with NPN and PNP transistors through de-emphasiss net works. Transistors H313 and H314 are buffer amplifiers and their outputs are led to the function switch.

3.3 Suggestion for Trouble Shooting of FM Tuner

3.3.1 Symptom: No FM Reception

First turn ON the power switch and try to tune FM stations. Rotate the fly-wheel tuning knob slowly and observe the FM tuning meter. If the meter deflect at several frequencies received, the circuits preceding the IF amplifier H204 may have no failure. When no reading is obtained in the meter, check FM local oscillator circuit, using a RF VTVM. The normal local oscillator voltage is one or two volts (rms) at the tuning capacitor, depending on the tuning capacitor position. If the local oscillator voltage is normal, next check all voltage distributions in the FM circuits and compare them with those shown in the circuit diagram. When the tuning meter deflects but no sound is obtained, check audio circuits, using a high sensitive oscilloscope.

3.3.2 Symptom: No Stereo Separation

First check the "MONO" switch is in normal out position. Connect a FM RF signal generator output modulated by a stereo modulator to the rear FM antenna terminals, and check the stereo beacon is turned on or not. If not turned on, check for 19 KHz pilot signal and 38 KHz switching signal, using an oscilloscope.

4. Phono and Pre-amplifier

Signals from the tuner and AUX jacks are applied to the selector switch. Signals from the PHONO jacks are applied to the phono-amplifier consisting of transistor H901, H903 and H905. The gain of the amplifier is 40 dB. The amplified and equalized phono-signals are, then, fed to other section of the selector switch which, in turn, applies output signals from the tuner, phono-amplifier and AUX jacks to the TAPE MONITOR switch and TAPE OUT jacks. The TAPE MONITOR switch applies the signals to the balance and volume controls.

The controlled signals are fed to the pre-amplifier consisting of H501, H503 and H505. Frequency response of the amplifier can be varied by BASS and TREBLE controls. The controlled output are then led to the main amplifier through high and low pass filter push-switches.

5. Main Amplifier

Transistor H701 is a pre-driver coupled to the transistor H703 through capacitor C711. Transistor H703 drives the inverter transistors H709 and H710 which, in turn, drive the power stage consisting of H001 and H002. Transistors H705 and H709 are current limitters and operate as power protecting circuits.

Excessive currents flowing into the power stage are detected by the resistors R741 and R745 and the resultant variations are applied to the transistors H705 and H707 and make them turned on. This decreases the current flowing into the H709 and H710. In this way the currents flowing in the power stage (H001 and H002) are restricted within a safe value.

6. Audio Trouble Analysis

1. Excessive line consumption	a. Check for shorted rectifiers H007, H804, H805.
	b. Check for shorted transistors H001, H002. Check L002 for short.
2. No line consumption or zero bias.	a. Check line cord, fuse, shorted H005, H006, H713 & H714.
	b. Check for open rectifiers H007, H804, H805 or open L002.
3. High hum and noise level.	a. Check filter capacitors C006, C703, & C704.
4. Parastic oscillation	a. Check for defective capacitors, C705, C706, C713, C714, C723 & C724.
5. Improper clipping	a. Check for proper adjustment of R729 & R730.

7. Voltage Conversion

This model is equipped with a universal power transformer to permit operation at 100, 120, 200, 220 and 240V AC 50 to 60Hz.

To convert the the Model 2215 to the required voltage perform the following steps:

(1) Remove the top cover.

(2) Remove the Transformer Wire Connection Terminal Cover, loosen two Cover mounting screws on the rear panel, see Fig. 1.

(3) Change the jumper wires as illustrated in Fig. 2 for the required AC voltage and replace the fuse as instructed.

CAUTION: DISCONNECT POWER SUPPLY CORD FROM AC OUTLET BEFORE CONVERTING VOLTAGE.

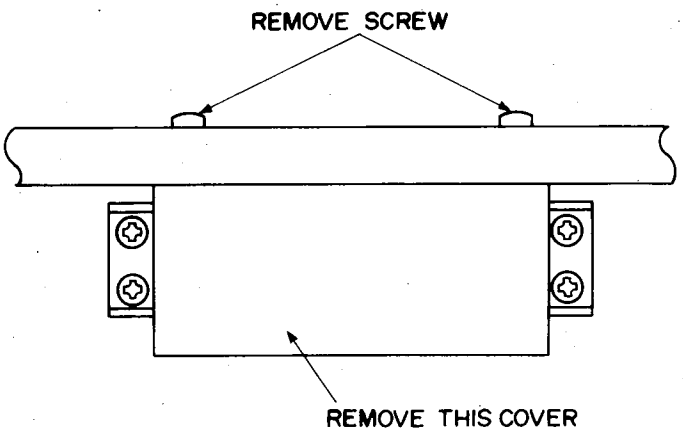
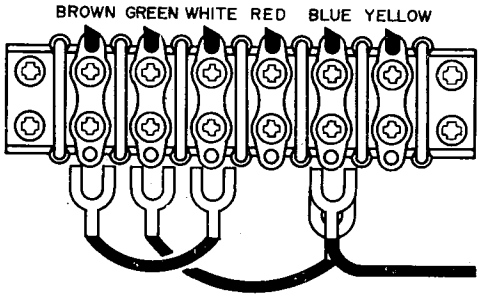
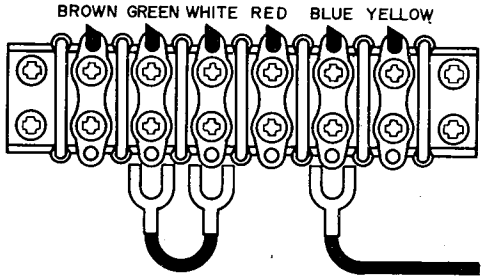


Figure 1. Remove the Terminal Cover

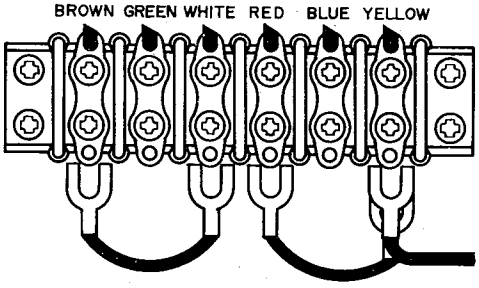
For 100 V Operation
(Use 2.5A Fuse)



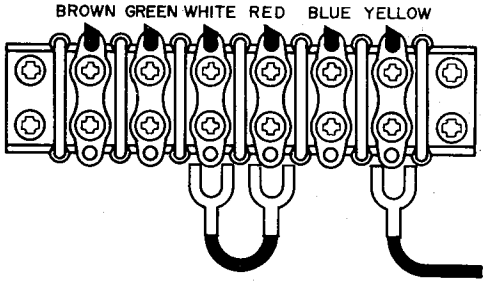
For 200V Operation
(Use 1.5A Fuse)



For 120 V Operation
(Use 2A Fuse)



For 220 V Operation
(Use 1A Fuse)



For 240V Operation
(Use 1A Fuse)

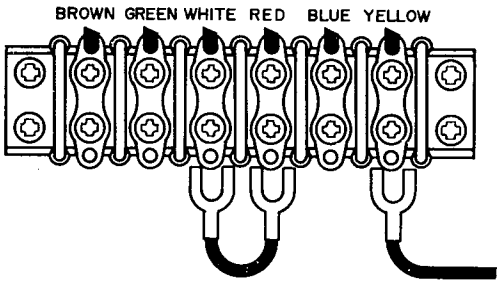


Figure 2. Voltage Conversion Chart

9. Test Equipment Required for Servicing

Table 1 lists the test equipment required for servicing the Model 2215 Receiver.

Item	Manufacturer and Model No.	Use
AM Signal Generator		Signal source for AM alignment
Test Loop		Used with AM Signal generator
FM Signal Generator	Less than 0.3% distortion	Signal source for FM alignment
Stereo Modulator	Less than 0.3% distortion	Stereo separation alignment and trouble shooting
Audio Oscillator	Weston Model CVO-100P, less than 0.02% residual distortion is required.	Sinewave and squarewave signal source.
Oscilloscope	High sensitivity with DC horizontal and vertical amplifiers.	Waveform analysis and Trouble Shooting, and ASO alignment.
VTVM	With AC, DC, RF range	Voltage measurements.
Circuit Tester		Trouble Shooting
AC Wattmeter	Simpson, Model 390	Monitors primary power to Amplifier.
AC Ammeter	Commercial Grade (1-10A)	Monitors amplifier output under short circuit condition.
Line Voltmeter	Commercial Grade (0-150VAC)	Monitors potential of primary power to amplifier
Variable Autotransformer (0-140VAC, 10 amps.)	Powerstat, Model 116B	Adjusts level of primary power to amplifier.
Shorting Plug	Use phono plug with 600 ohm across center pin and shell.	Shorts amplifier input to eliminate noise pickup.
Output Load (8 ohms, 0.5%, 100W)	Commercial Grade	Provides 8-ohm load for amplifier output termination.
Output Load (4 ohms, 0.5%, 100W)	Commercial Grade	Provides 4-ohm load for amplifier output termination.

9. AM Alignment Procedure

AM IF Alignment

1. Connect a sweep generator to the J102 and an alignment scope to the capacitor C125.
2. Rotate each core of IF transformer F101 and L102 for the maximum height and flat top symmetrical response.

AM Frequency Range and Tracking Alignment

1. Set AM signal generator to 525 KHz. Turn the tuning capacitor fully closed (place the tuning pointer at the low end.) and adjust the oscillator coil L101 for maximum audio output.
2. Set the signal generator to 1650 KHz. Place the tuning pointer in the high frequency end and adjust the trimming capacitor C155-2 for maximum audio output.
3. Repeat step 1 and 2 until no further adjustment is necessary.
4. Set the generator to 600 KHz and tune the receiver to the same frequency and adjust a slug core of AM ferrite rod antenna for maximum output.
5. Set the generator to 1400 KHz and tune the receiver to the same frequency and adjust the trimming capacitor C155-1 for maximum output.
6. Repeat the procedure 4 and 5 until no further adjustment is necessary.

Note: During tracking alignment reduce the signal generator output as necessary to avoid AGC action.

10. FM Alignment Procedure

1. Connect a FM signal generator to the FM antenna terminals and a oscilloscope and an audio distortion analyzer to the tape output jack on the rear panel.
2. Set the FM SG to 87.5 MHz and provide about 3 to 5μV. Place the tuning pointer at the low frequency end by rotating the tuning knob and adjust the core of oscillator coil L106 to obtain maximum audio output.
3. Set the FM SG to 108.5 MHz and provide about 3 to 5μV. Rotate the tuning knob and place the tuning pointer at the high frequency end and adjust the trimming capacitor C152 for maximum output.
4. Repeat the step 2 and 3 until no further adjustment is necessary.
5. Set the FM SG to 90 MHz and tune the receiver to the same frequency. Decrease signal generator output until the audio output level decreases with the decreasing generator output. Adjust the RF coil L104 and antenna coil L103 and IF transformer L105 for minimum audio distortion.
6. Set the FM SG to 106 MHz and tune the receiver to the same frequency. Decrease the signal generator output until the audio output level decreases with the decreasing generator output. Adjust the trimming capacitor C155-3 and C155-4 for minimum distortion.
7. Repeat the step 5 and 6 until no further adjustment is necessary.
8. Connect a DC VTVM with 1 V range selected across the capacitor C277 and adjust the secondary core (black) of discriminator transformer L201 so that no voltage reading is obtained on the VTVM at no signal. Next set the FM SG to 98 MHz and increase the output level 1 KμV, then tune the receiver to the same frequency so that no deflection is obtained on the VTVM. Adjust primary core (pink) of L201 for minimum distortion.

11. Stereo Separation Alignment

1. Set the FM SG to provide 1 KμV at 98 MHz. Tune the receiver to the same frequency so that the VTVM connected to the C227 will give no readings.
2. Modulate the FM SG with 67 KHz audio frequency. Connect a oscilloscope to the R413. Adjust the core of L403 for minimum height of the 67 KHz signal on the scope.
3. Modulate the FM SG output with stereo composite signal consisting of subchannel signal only (of course a pilot signal must be included.). Adjust the core of L410 for maximum audio output, then modulate the signal generator output with a stereo composite signal consisting of L channel signal only and again adjust the core of L401 for maximum audio output.
4. Adjust the trimming resistor R428 for maximum and same separation in both channels.

12. Muting Threshold Adjustment

1. Set the FM SG output to provide 12.5μV (IHF) at 98 MHz and tune receiver to the same frequency. Adjust the trimming resistor R306 for the threshold level of 12.5μV. (During this adjustment turn the MUTING push-switch "on".)

13. Audio Adjustment

1. Connect a VTVM across the resistor R747 and adjust the trimming resistor R729 until the VTVM reads 7.5mV DC. For the other channel connect the VTVM across the R748 and adjust the R730 for the same reading.
2. Connect a oscilloscope across the speaker terminals. Apply an audio signal of 1 KHz to the AUX jacks and increase the audio signal until the audio output on the scope begin to start clipping. Adjust the trimming resistor R723 for equal and symmetrical clipping. For the other channel adjust the R724.

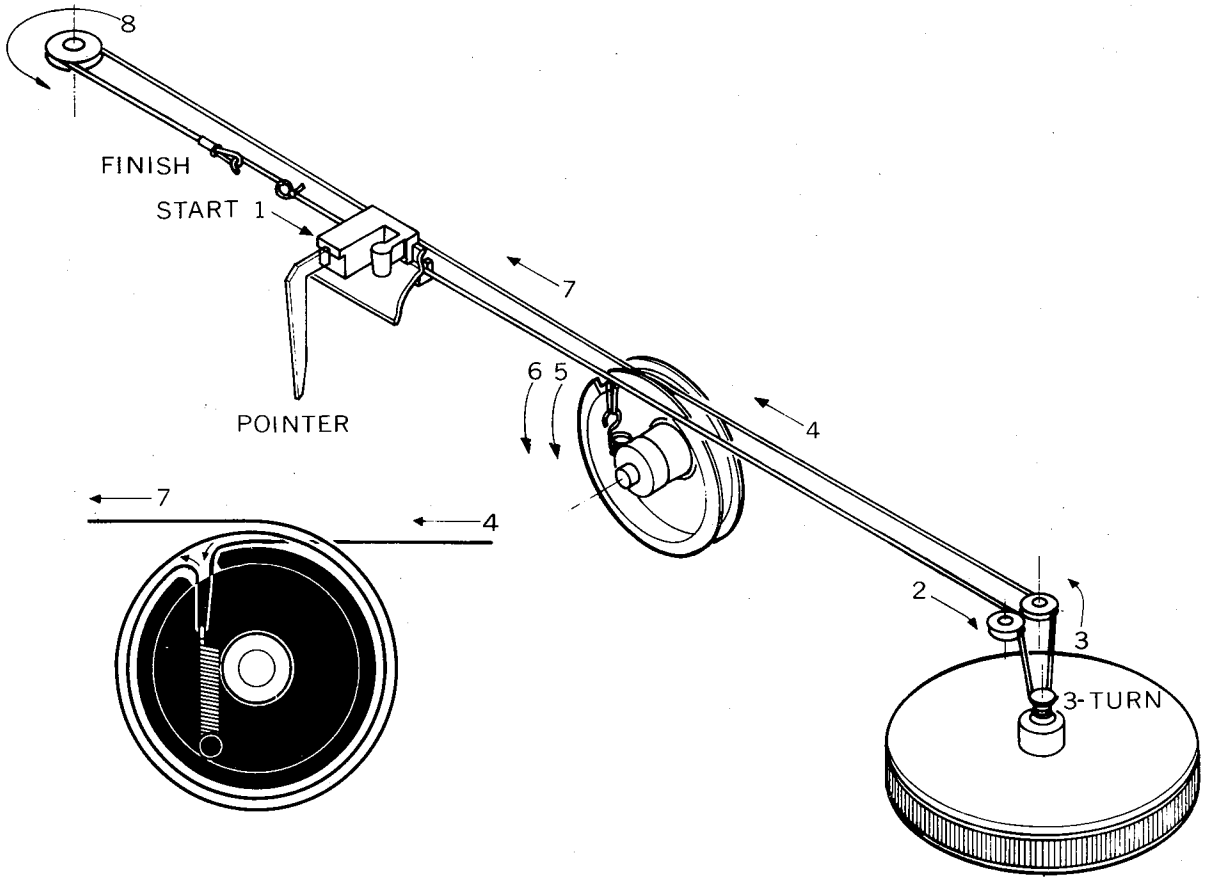


Figure 3. Dial Stringing

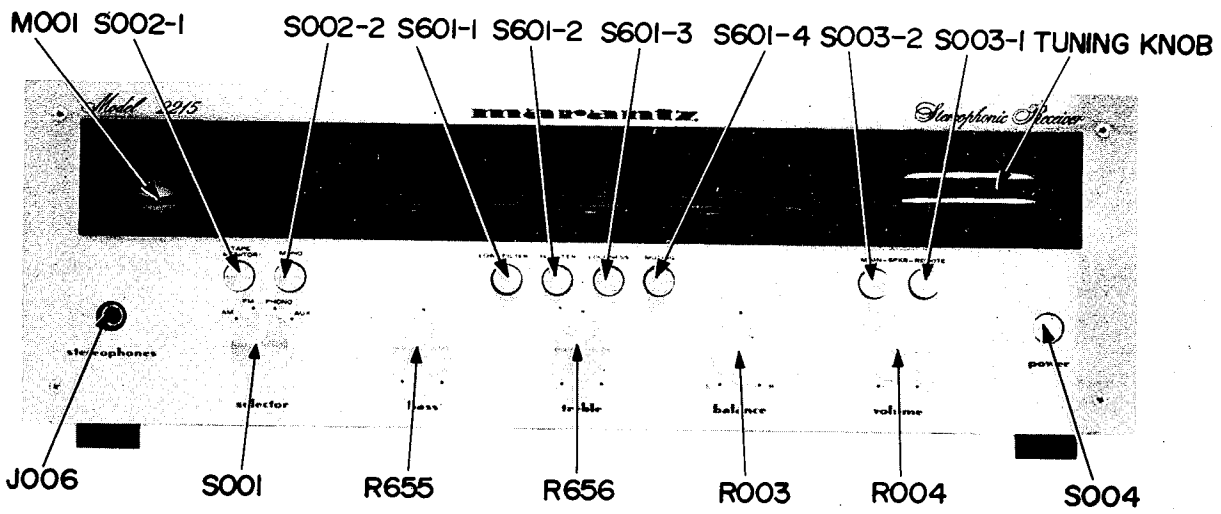


Figure 4. Front Panel Adjustment and Component Locations

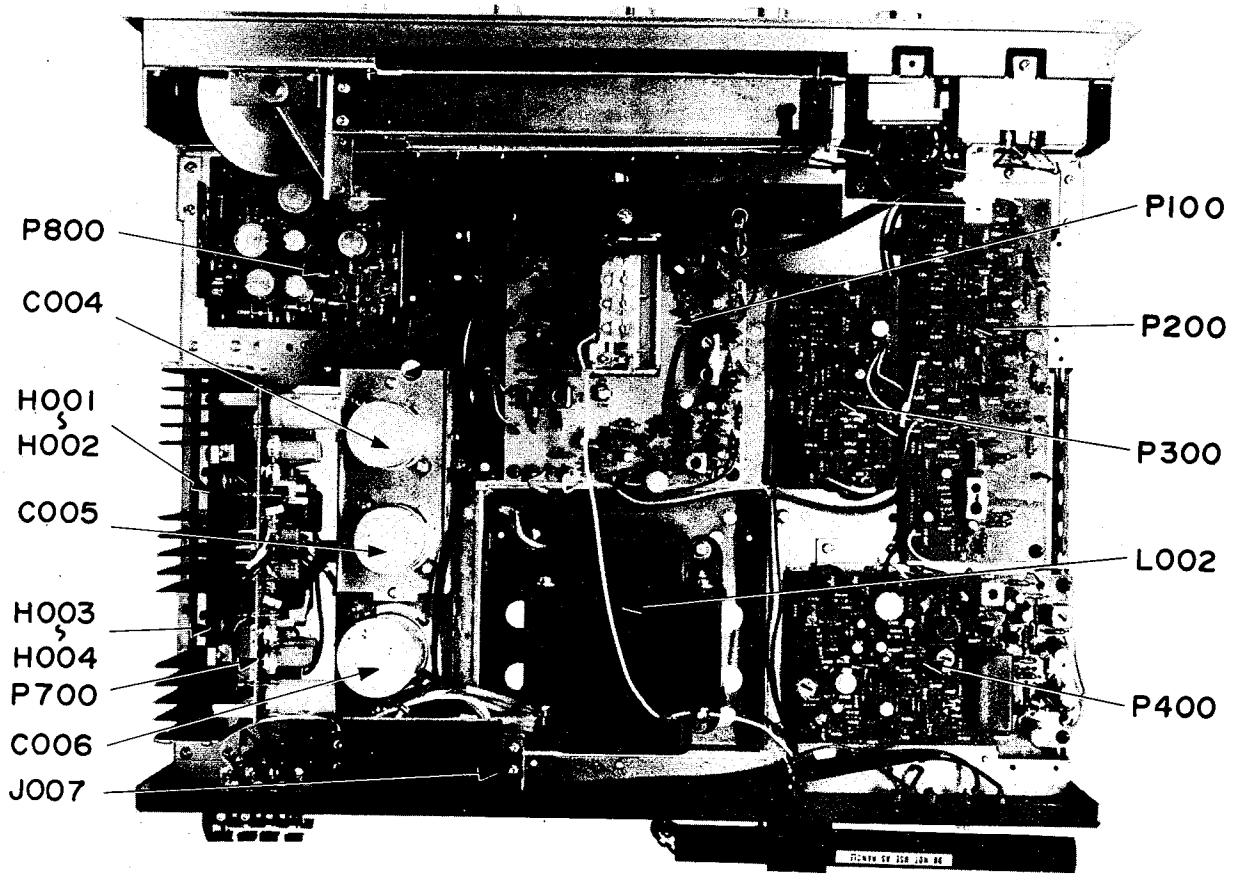


Figure 5. Main Chassis Component Locations (Top View)