



104



marantz

model 104

Am/Fm Stereophonic Tuner

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INTRODUCTION

This service manual was prepared for use by Authorized Warranty Stations and contains service information for Marantz Model 104 Stereophonic Tuner.

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

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

1. P.W. Board

As can be seen from the circuit diagram the chassis of Model 104 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. Tuner	Mounted on P.W. Board, P100
2. Power Supply	Mounted on P.W. Board, P400
3. Switch Unit	Mounted on P.W. Board, PS00
4. Function Lamp	Mounted on P.W. Board, PY00
5. Dial Lamp	Mounted on P.W. Board, PZ01

2. AM Alignment Procedure

2.1 AM IF Alignment

1. Connect a sweep generator to the test point A or J105 and an alignment scope to J112.
2. Rotate each core of IF transformer L203 and L204 for maximum height and flat top symmetrical response.

2.2 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 L202 for maximum audio output.
2. Set the signal generator to 1650 kHz. Place the tuning pointer in the high frequency end and adjust the oscillator trimmer on the oscillator tuning capacitor (CA-2) for maximum audio output.
3. Repeat steps 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 capacitors of Antenna (CA-1) for maximum output.
6. Repeat steps 4 and 5 until no further adjustment is necessary.

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

3. FM Alignment Procedure

1. Connect an FM signal generator to the FM antenna terminals and an oscilloscope and an audio distortion analyzer to the output jacks on the rear panel.
2. Set the FM SG to 87.5 MHz and provide about 3 to 5 μV . Place the tuning pointer at the low frequency end by rotating the tuning knob and adjust the core of oscillator coil L103 to obtain maximum audio output.
3. Set the FM SG to 108.5 MHz and provide about 3 to 5 μV output. Rotate the tuning knob and place the tuning pointer at the high frequency end and adjust the trimming capacitor CF-3 for maximum output.
4. Repeat steps 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 antenna coil L101, RF coil L102 and IF transformer L105 for minimum audio distortion.
6. Set the FM SG to 106 MHz and tune the receiver to the same frequency. Adjust the trimming capacitor CF-1, CF-2 for minimum distortion.
7. Repeat steps 5 and 6 until no further adjustment is necessary.
8. Connect a DC VTVM with ± 0.5 volt range selected to the test point E (J116) and adjust the secondary core (upper) of discriminator transformer L106 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 to 1 μV , then tune the receiver to the same frequency so that no deflection is obtained.

Adjust primary core (bottom) of L106 for minimum distortion, and adjust the L107 for the maximum reading on the VTVM connected to the J114.

3.1 STEREO Separation Alignment

1. Set the FM SG to provide 1 μV at 98 MHz.
Tune the receiver to the same frequency perfectly.
2. Turn the FM SG modulation off (with the pilot signal turned off), connect a frequency counter to test point J120, and adjust R302 so that the frequency counter may precisely read 19 kHz.
3. Modulate the FM SG with stereo composite signal consisting of only subchannel signal (of course a pilot signal must be included).
4. Adjust the trimming resistor R301 for maximum and same separation in both channels.

3.2 Muting Circuit Alignment

1. Set the FM SG output to provide 25 μV (IHF) at 98 MHz and tune the receiver to the same frequency.
Adjust the trimming resistor R161 for the threshold level of 25 μV (during this adjustment turn the MUTING pushswitch "on").

4. Test Equipment Required for Servicing

Table 1 lists the test equipment required for servicing the Model 104 Tuner.

Table 1. Test Equipment Required for Servicing

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
Frequency Counter		MPX oscillator adjustment (VCO)
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

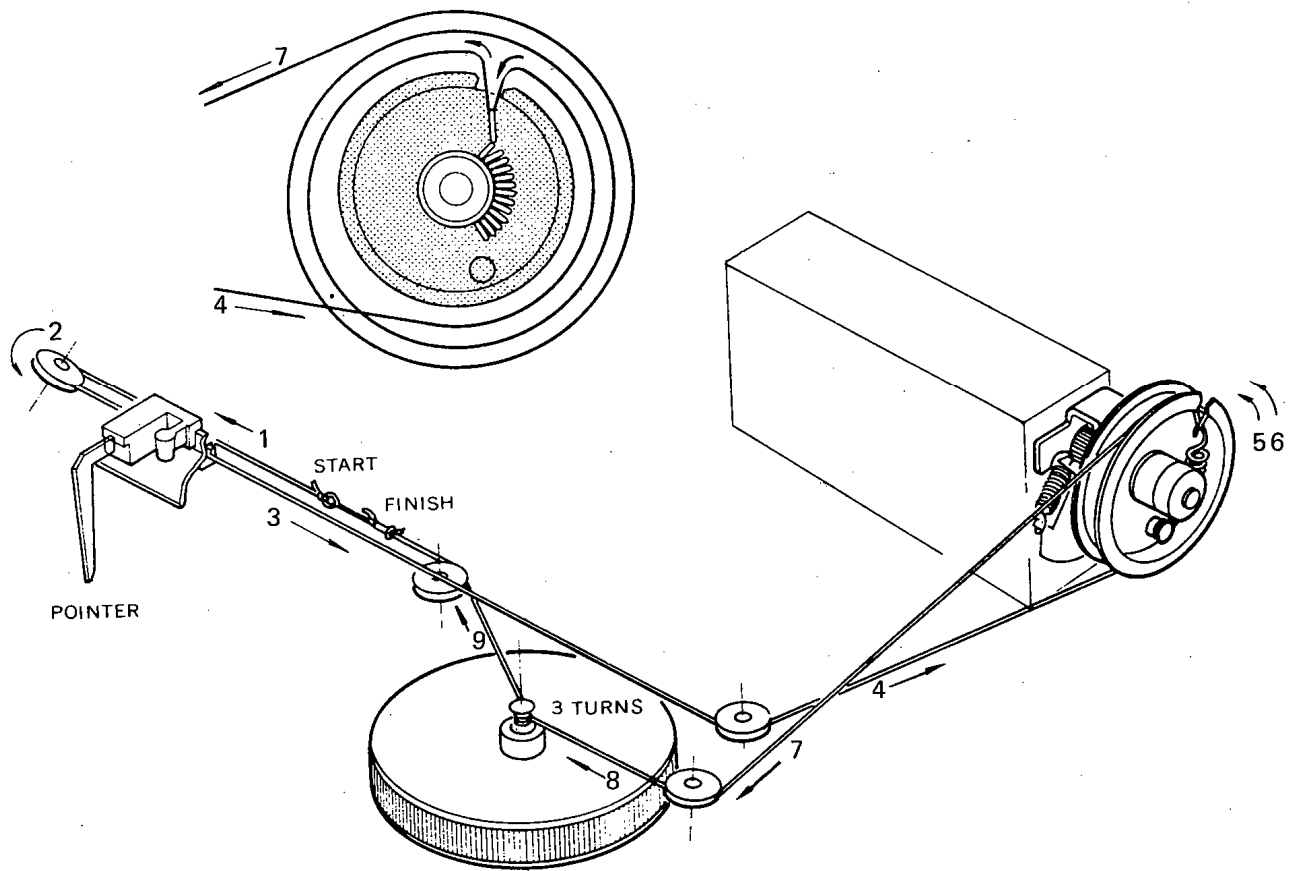


Figure 1. Dial Stringing

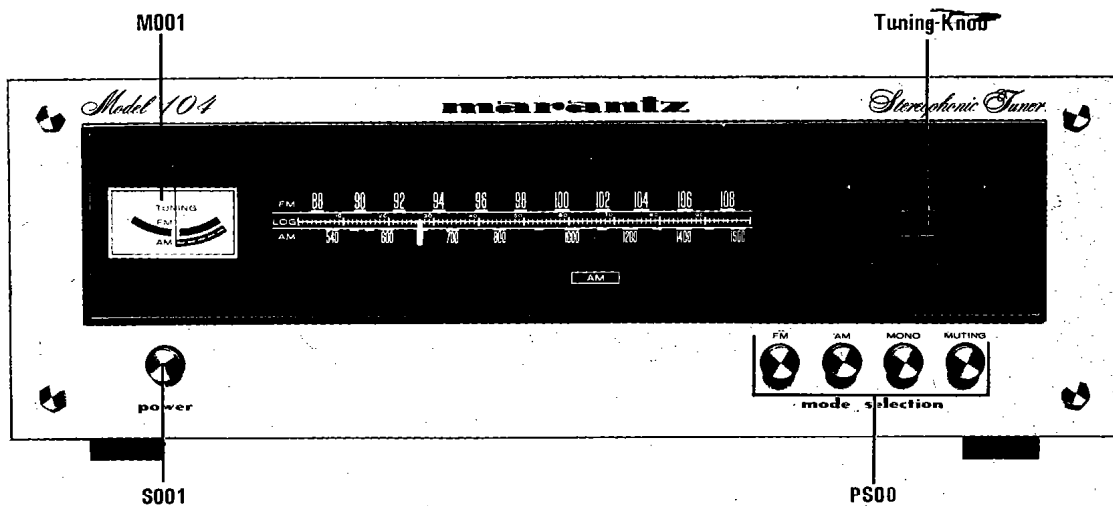


Figure 2. Front Panel Adjustments and Component Locations

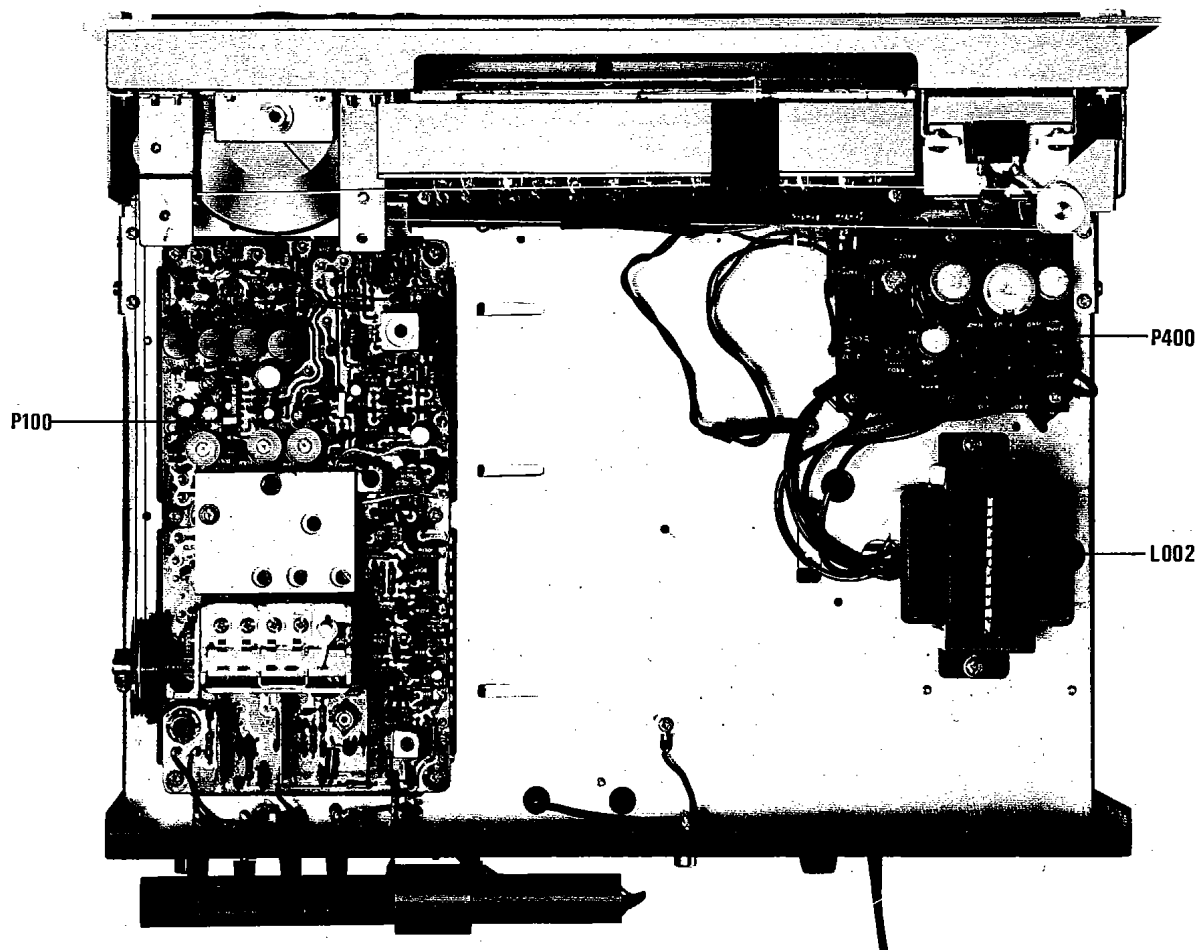


Figure 3. Main Chassis Component Locations (Top View)

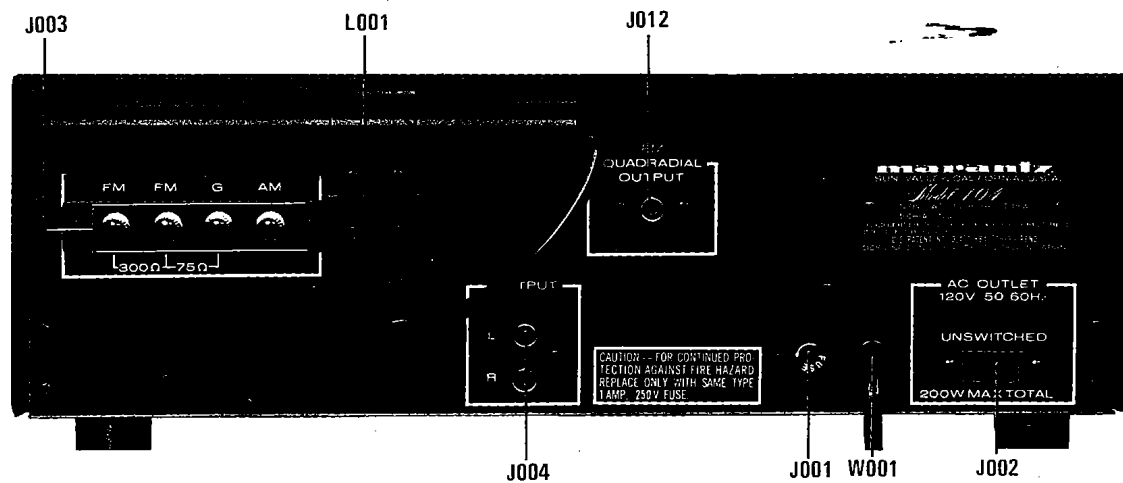


Figure 4. Rear Panel Adjustment and Component Locations

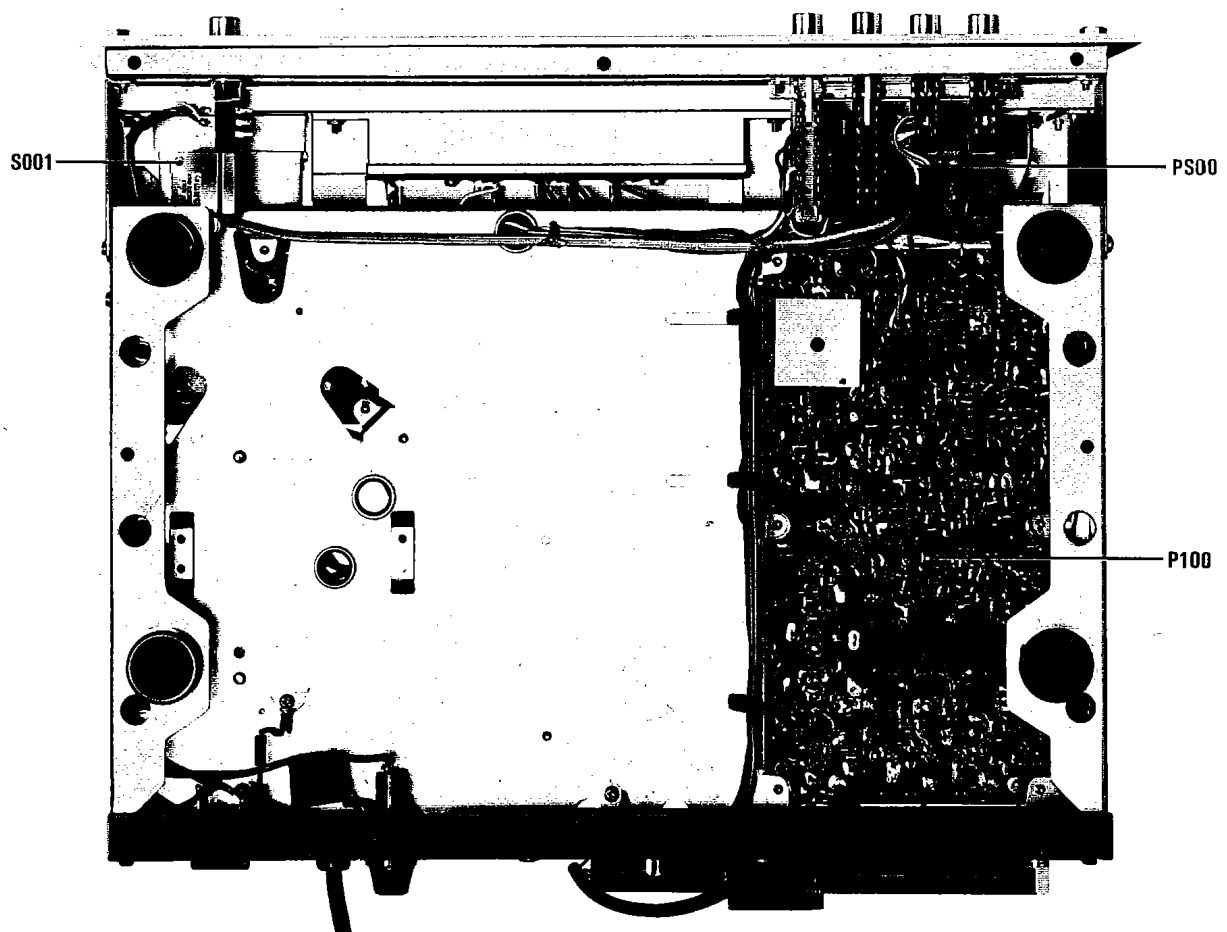
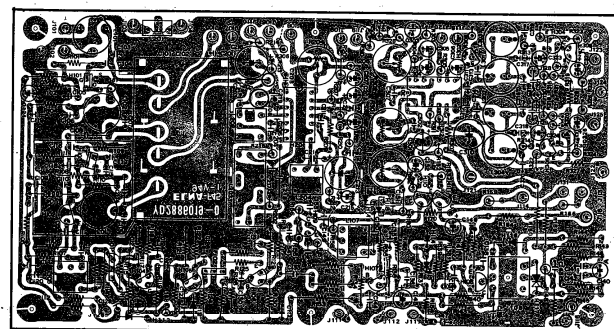
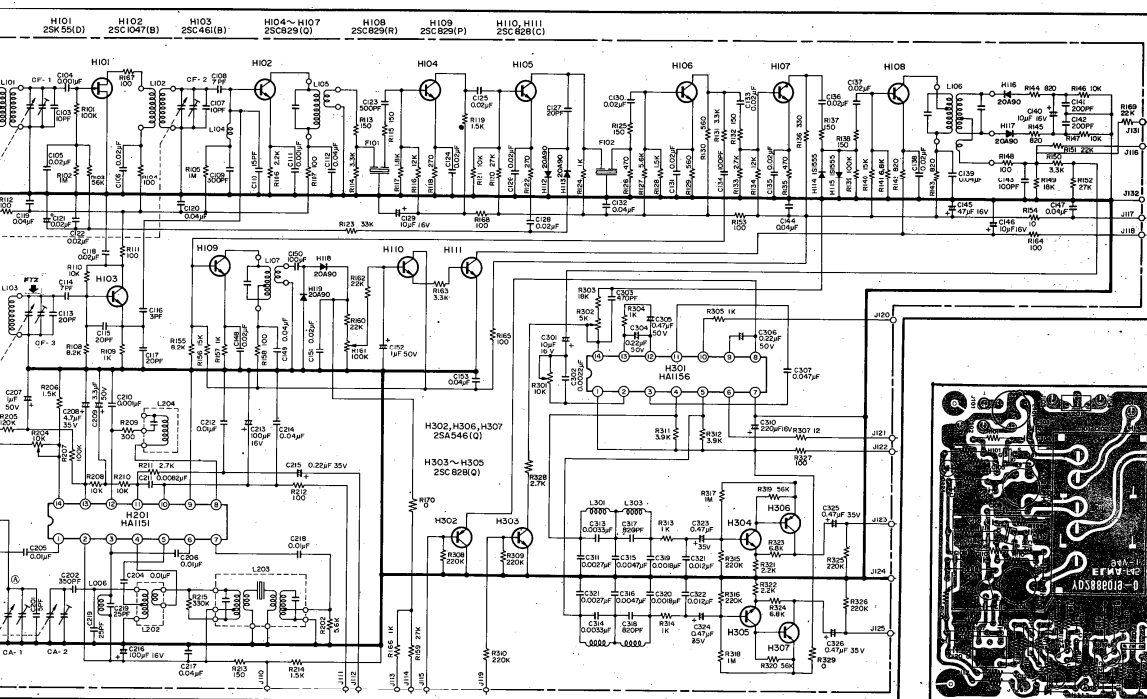
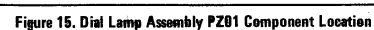
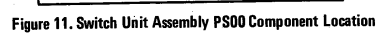
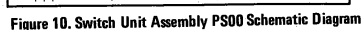
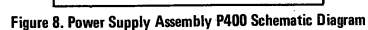


Figure 5. Main Chassis Component Locations (Bottom View)





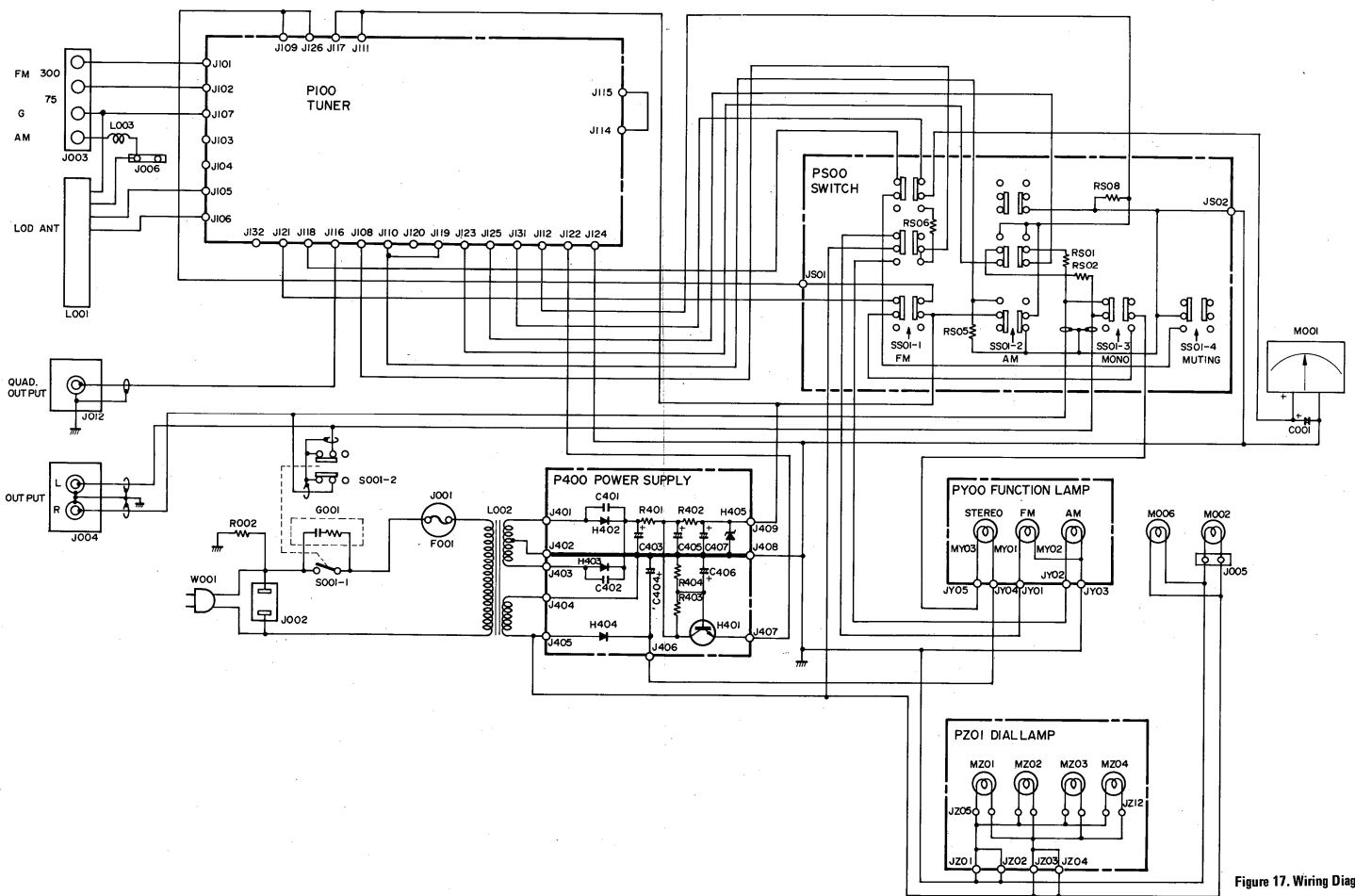
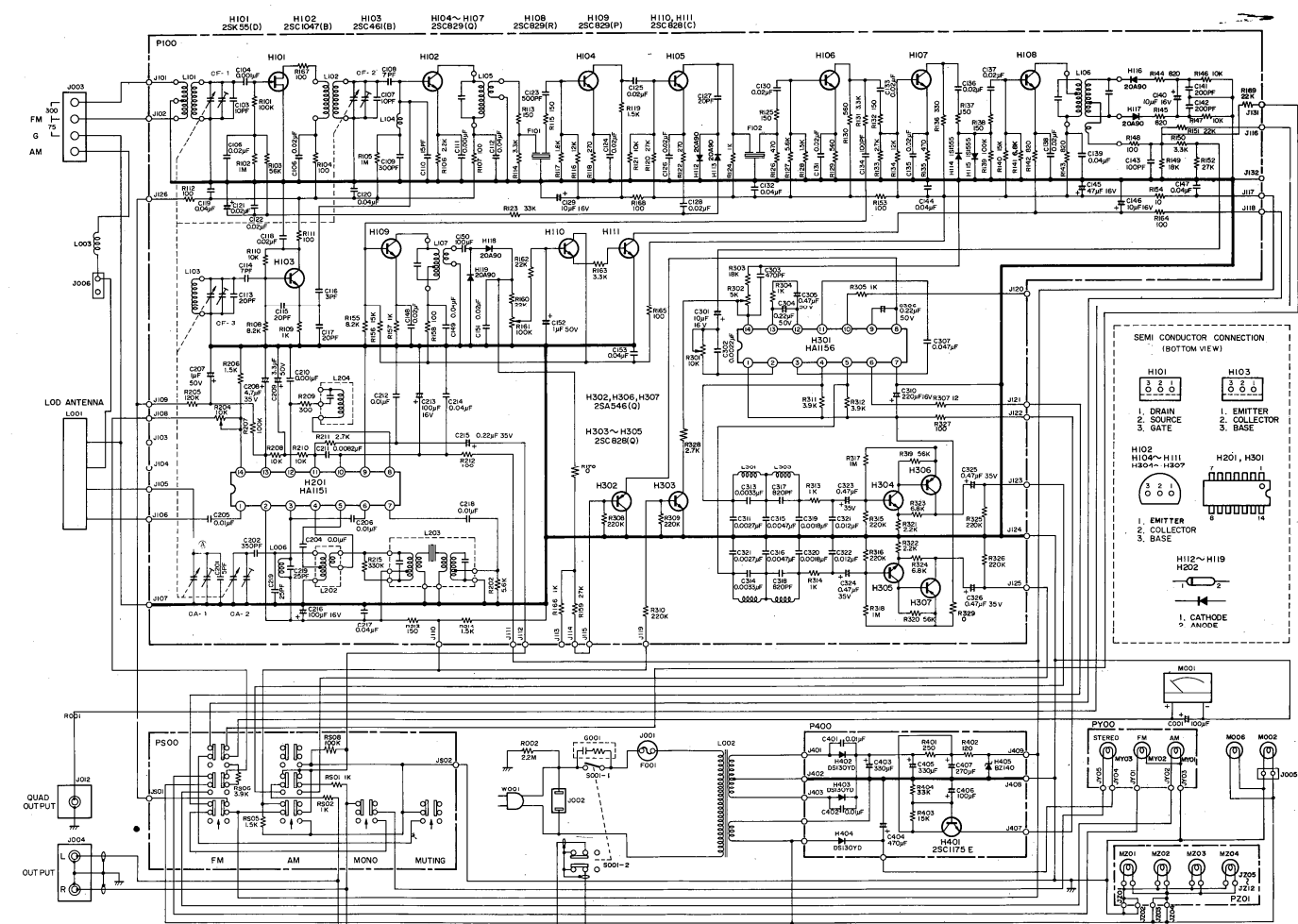


Figure 17. Wiring Diagram



Model 104 NOTE: This schematic diagram applies to units manufactured for the U.S.A. market.

Figure 18. Schematic Diagram

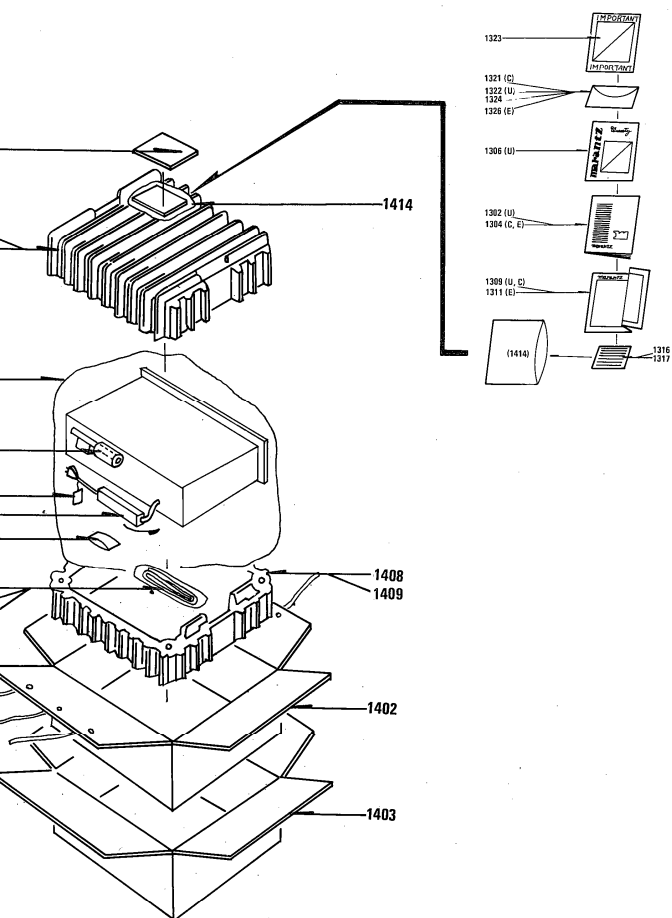


Figure 19. Packing

Parts List

REF. DESIG.	QTY	U	C	E	PART NO.	DESCRIPTION
A	1	1	1		294606340	Front Panel Assembly
0118	1	1	1		294606301	Escutcheon
0119	1	1	1		291240101	Frame
0120	1	1	1		294615801	Window
0121	5	5	5		288625901	Bush
0123	1	1	1		294605301	Cover
B	1	1	1		285227340	Flywheel Assembly
0202	2	2	2		257706302	Escutcheon
0203	1	1	1		257727301	Flywheel
0204	1	1	1		285211201	Shaft
0205	1	1	1		53110603E	Hexagon Nut
0206	1	1	1		54020601E	Flat Washer P.
C	1	1	1		120200640	Hook Assembly
0108	1	1	1		120225801	Hook
0109	1	1	1		72080802A	String
D	1	1	1		291510342	Pointer Assembly
0220	1	1	1		291510301	Pointer
0221	1	1	1		285010301	Pointer
0222	1	1	1		291510302	Pointer
M006	1	1	1		IN1008030	Lamp
E	1	1	1		282715942	Drum Assembly
0610	1	1	1		202715901	Drum
0817	1	1	1		71101569M	Spring
0818	2	2	2		51064019A	P.H.M. Screw, P 4 x 19
F	1	1	1		294616040	Rear Panel Assembly
1020	1	1	1		294616022	Bracket
1116	1	1	1		282125901	Bush
1206	2	2	2		55060305S	T.H. Rivet
0301	1	1	1		294630201	Dial
0303	1	1	1		282705302	Cover
0304	1	1	1		287311802	Spacer
0326	1	1	1		281810650	Bearing K
0330	1	1	1		51640412D	Set Screw C.P.
0331	1	1	1		54040402N	Spring Washer
0332	1	1	1		53110403E	Hexagon Nut
0406	1	1	1		54040402N	Spring Washer
0409	1	1	1		56382540G	Eyelet
0410	2	2	2		51490306A	B.H.M. Screw FS, B3 x 6
0413	2	2	2		51100306S	B.H.M. Screw, B3 x 6
0501	4	4	4		293205701	Leg
0505	1	1	1		204026507	Indicator
0507	4	4	4		51440410S	B.H.M. Screw S, B4 x 10
0511	1	1	1		285010502	Chassis
0512	6	6	6		138200503	Clamper
0514	2	2	2		51570408B	P.H. Tapped Screw, P4 x 8
0515	2	2	2		54040402N	Spring Washer
0516	2	2	2		51570306B	P.H. Tapped Screw, P3 x 6
0517	6	6	6		51570306B	P.H. Tapped Screw, P3 x 6
0518	3	3	3		51570306B	P.H. Tapped Screw, P3 x 6
0519	8	8	8		51570306B	P.H. Tapped Screw, P3 x 6
0520	6	6	6		51060306S	B.H.M. Screw, B3 x 6
0521	7	7	7		51570306B	P.H. Tapped Screw, P3 x 6
0522	1	1	1		138200503	Clamper
0523	1	1	1		51570306B	P.H. Tapped Screw, P3 x 6
0524	1	1	1		51570306B	P.H. Tapped Screw, P3 x 6

U: For U.S.A.
C: For Canada
E: For Europe

REF. DESIG.	QTY	U	C	E	PART NO.	DESCRIPTION
0525	1	1	1		288612005	Insulator
0527	1	1	1		53110303E	Hexagon Nut
0530	1	1	1		53110303E	Hexagon Nut
0531	1	1	1		53110303E	Hexagon Nut
0533	2	2	2		138200503	Clamper
0534	2	2	2		54050300R	T.L. Washer OR
0535	2	2	2		51570306B	P.H. Tapped Screw, P3 x 6
0601	5	5	4		281815401	Knob
0602	1	1	1		284925701	Lid
0603	3	3	3		257711807	Spacer
0604	1	1	1		282825702	Lid
0605	1	1	1		281815402	Knob
0606	1	1	1		294625501	Indicator
0607	1	1	1		294625502	Indicator
0608	1	1	1		294625503	Indicator
0612	1	1	1		257886101	Label, UL Caution
0613	1	1	1		257886102	Label, Do Not Remove Cover
0614	1	1	1		257886103	Label, See Marking on Bottom
0615	1	1	1		250626506	Indicator, Do Not Use As Handle
0617	1	1	1		951091101	Label, L.L. No.
0618	1	1	1		282186102	Label, Fuse Caution
0619	1	1	1		951110103	Label, UL
0621	1	1	1		951091106	Label, UL Plant
0622	1	1	1		061001102	Label, Factory Code
0623	4	4	4		52017039J	Bolt
0624	8	8	8		51100406S	B.H.M. Screw, B4 x 6
0625	4	4	4		51480406S	B.H.M. Screw F, B4 x 6
0631	1	1	1		285011202	Shaft
0632	1	1	1		289612002	Insulator
0633	1	1	1		288686101	Label, On Power Transformer
0701	1	1	1		294616050	Bracket K
0706	1	1	1		294616002	Bracket
0707	1	1	1		294616003	Bracket
0709	1	1	1		257710602	Bearing
0710	1	1	1		141511801	Spacer
0711	1	1	1		285016051	Bracket K
0716	2	2	2		51040306A	F.H.M. Screw, F3 x 6
0717	4	4	4		51100306A	B.H.M. Screw, B3 x 6
0718	4	4	4		51100306A	B.H.M. Screw, B3 x 6
0719	6	6	6		51100306A	B.H.M. Screw, B3 x 6
0720	4	4	4		51042608A	F.H.M. Screw, F2.6 x 8
0721	2	2	2		53112603E	Hexagon Nut
0723	1	1	1		294626901	Protector
0724	2	2	2		51570306B	P.H. Tapped Screw, P3 x 6
0726	1	1	1		290820101	Partitioner
0727	2	2	2		51570306B	P.H. Tapped Screw, P3 x 6
0802	1	1	1		62031650W	Lug
0806	1	1	1		389610904	Shield
0807	1	1	1		389610903	Shield
0808	1	1	1		282110901	Shield
0809	1	1	1		285010902	Shield
0811	1	1	1		62030039W	Lug
0816	1	1	1		282715901	Drum
0817	1	1	1		71101569M	Spring
0818	2	2	2		51064019A	P.H.M. Screw, P4 x 19
0821	1	1	1		285016010	Bracket
0822	4	4	4		51062606E	P.H.M. Screw, P2.6 x 6
0826	1	1	1		287100501	Clamper
0902	1	1	1		290827401	Reflector
0905	1	1	1		290827101	Holder

U: For U.S.A.
C: For Canada
E: For Europe

REF. DESIG.	QTY	U	C	E	PART NO.	DESCRIPTION
0906	2	2	2		51100308S	B.H.M. Screw, B3 x 8
0907	2	2	2		53110303A	Hexagon Nut, P3 x 6
0909	2	2	2		51570306B	P.H. Tapped Screw, B3 x 6
0910	2	2	2		51480306A	B.H.M. Screw F., B3 x 6
0913	2	2	2		388927401	Reflector
0915	1	1	1		388927101	Holder
0916	1	1	1		51100306A	B.H.M. Screw, B3 x 6
0917	1	1	1		51100306A	B.H.M. Screw, B3 x 6
0918	2	2	2		51100306A	B.H.M. Screw, B3 x 6
0919	1	1	1		288610701	Sheet
0920	1	1	1		287106302	Cover
0926	1	1	1		285016009	Bracket
0927	1	1	1		263711203	Shift
0928	1	1	1		267726201	Pulley
1006	1	1	1		294605101	Guide
1019	1	1	1		284916001	Bracket
1020	1	1	1		294616022	Bracket
1024	2	2	2		145525903	Bush
1029	3	3	3		51100306S	B.H.M. Screw, B3 x 6
1033	2	2	2		52014109S	Bolt
1102	1	1	1		257816052	Bracket K
1106	1	1	1		261927103	Holder
1108	2	2	2		51060308S	P.H.M. Screw, P3 x 8
1109	2	2	2		54050300R	T.L. Washer OR
1110	2	2	2		53110303E	Hexagon Nut, P3 x 10
1111	2	2	2		51060310S	P.H.M. Screw, P3 x 10
1112	2	2	2		53110303E	Hexagon Nut, P3 x 10
1116	1	1	1		282125901	Bush
1121	1	1	1		294626250	Pulley K
1127	2	2	2		51100306A	B.H.M. Screw, B3 x 6
1201	2	2	2		51060308S	P.H.M. Screw, P3 x 8
1202	2	2	2		53110303E	Hexagon Nut, P3 x 8
1203	2	2	2		53110303A	Hexagon Nut, P3 x 8
1204	2	2	2		54050300R	T.L. Washer OR, P3 x 16
1205	2	2	2		51060316A	P.H.M. Screw, P3 x 16
1206	2	2	2		55060305S	T.R. Rivet, P3 x 8
1207	4	4	4		51060308S	P.H.M. Screw, P3 x 8
1208	4	4	4		53110303E	Hexagon Nut, P3 x 8
1302	1	1	1		294685101	Instruction Manual
1304	1	1	1		294685131	Instruction Manual
1309	1	1	1		294685601	Schematic
1311	1	1	1		294685602	Schematic
1316	1	1	1		288785108	Instructions, Accessories
1317	1	1	1		288585107	Instructions, Mounting
1319	1	1	1		281895104	Instructions, Packing
1321	1	1	1		291881301	Envelope
1322	1	1	1		257781301	Envelope
1323	1	1	1		257785102	Instructions, Red Tag
1324	1	1	1		257785401	Guarantee Card K
1325	1	1	1		288785110	Instructions, Accessories
1326	1	1	1		281881301	Envelope
1402	1	1	1		294680101	Packing Case, Inner
1403	1	1	1		294680102	Packing Case, Outer
1406	2	2	2		289180301	Cushion
1412	1	1	1		90138303S	Polyethylene Bag
1414	2	2	2		901302501	Polyethylene Bag
1417	1	1	1		102980401	Sleeve
1418	1	1	1		956000004	Hang Tag
1419	1	1	1		271382101	Silicagel
1420	1	1	1		281905601	Buffer
1423	4	4	4		952281501	Serial No. Card
1424	4	4	4		952301512	Serial No. Card

U: For U.S.A.
C: For Canada
E: For Europe

REF. DESIG.	QTY	U	C	E	PART NO.	DESCRIPTION
R151	1	1	1		RT0533214	Resistor, 3.3KΩ ±5% 1/4W
R152	1	1	1		RT0527314	Resistor, 27KΩ ±5% 1/4W
R153	1	1	1		RT0510114	Resistor, 100Ω ±5% 1/4W
R154	1	1	1		RT0510014	Resistor, 100Ω ±5% 1/4W
R155	1	1	1		RT0582214	Resistor, 8.2KΩ ±5% 1/4W
R156	1	1	1		RT0515314	Resistor, 15KΩ ±5% 1/4W
R157	1	1	1		RT0510214	Resistor, 1KΩ ±5% 1/4W
R158	1	1	1		RT0510114	Resistor, 100Ω ±5% 1/4W
R159	1	1	1		RT0527314	Resistor, 27KΩ ±5% 1/4W
R160	1	1	1		RT0522314	Resistor, 22KΩ ±5% 1/4W
R161	1	1	1		RA0104019	Trimming Resistor, 100KΩ (B)
R162	1	1	1		RT0522314	Resistor, 22KΩ ±5% 1/4W
R163	1	1	1		RT0533214	Resistor, 3.3KΩ ±5% 1/4W
R164	1	1	1		RT0510114	Resistor, 100Ω ±5% 1/4W
R165	1	1	1		RT0510114	Resistor, 100Ω ±5% 1/4W
R166	1	1	1		RT0510214	Resistor, 1KΩ ±5% 1/4W
R167	1	1	1		RT0510114	Resistor, 100Ω ±5% 1/4W
R168	1	1	1		RT0510114	Resistor, 100Ω ±5% 1/4W
R169	1	1	1		RT0522314	Resistor, 22KΩ ±5% 1/4W
R170	1	1	1		RC0000012	Resistor, 0Ω
R202	1	1	1		RT0562214	Resistor, 5.6KΩ ±5% 1/4W
R204	1	1	1		RA0103025	Trimming Resistor, 10KΩ (B)
R205	1	1	1		RT0512414	Resistor, 120KΩ ±5% 1/4W
R206	1	1	1		RT0515214	Resistor, 15KΩ ±5% 1/4W
R207	1	1	1		RT0510414	Resistor, 100KΩ ±5% 1/4W
R208	1	1	1		RT0510314	Resistor, 10KΩ ±5% 1/4W
R209	1	1	1		RT0530114	Resistor, 300Ω ±5% 1/4W
R210	1	1	1		RT0510314	Resistor, 10KΩ ±5% 1/4W
R211	1	1	1		RT0527214	Resistor, 2.7KΩ ±5% 1/4W
R212	1	1	1		RT0510114	Resistor, 100Ω ±5% 1/4W
R213	1	1	1		RT0515114	Resistor, 150Ω ±5% 1/4W
R214	1	1	1		RT0543214	Resistor, 4.3KΩ ±5% 1/4W
R215	1	1	1		RT0533414	Resistor, 330KΩ ±5% 1/4W
R301	1	1	1		RA0103025	Trimming Resistor, 10KΩ (B)
R302	1	1	1		RA0502020	Trimming Resistor, 5KΩ (B)
R303	1	1	1		RT0519314	Resistor, 18KΩ ±5% 1/4W
R304	1	1	1		RT0510214	Resistor, 1KΩ ±5% 1/4W
R305	1	1	1		RT0510214	Resistor, 1KΩ ±5% 1/4W
R307	1	1	1		RT0512014	Resistor, 12Ω ±5% 1/4W
R308	1	1	1		RT0522414	Resistor, 220KΩ ±5% 1/4W
R309	1	1	1		RT0522414	Resistor, 220KΩ ±5% 1/4W
R310	1	1	1		RT0522414	Resistor, 220KΩ ±5% 1/4W
R311	1	1	1		RT0539214	Resistor, 3.9KΩ ±5% 1/4W
R312	1	1	1		RT0539214	Resistor, 3.9KΩ ±5% 1/4W
R313	1	1	1		RT0510214	Resistor, 1KΩ ±5% 1/4W
R314	1	1	1		RT0510214	Resistor, 1KΩ ±5% 1/4W
R315	1	1	1		RT0522414	Resistor, 220KΩ ±5% 1/4W
R316	1	1	1		RT0522414	Resistor, 220KΩ ±5% 1/4W
R317	1	1	1		RT0510514	Resistor, 1MΩ ±5% 1/4W
R318	1	1	1		RT0510514	Resistor, 1MΩ ±5% 1/4W
R319	1	1	1		RT0566314	Resistor, 56KΩ ±5% 1/4W
R320	1	1	1		RT0566314	Resistor, 56KΩ ±5% 1/4W
R321	1	1	1		RT0522214	Resistor, 2.2KΩ ±5% 1/4W
R322	1	1	1		RT0522214	Resistor, 2.2KΩ ±5% 1/4W
R323	1	1	1		RT0568214	Resistor, 6.8KΩ ±5% 1/4W
R324	1	1	1		RT0568214	Resistor, 6.8KΩ ±5% 1/4W
R325	1	1	1		RT0522414	Resistor, 220KΩ ±5% 1/4W
R326	1	1	1		RT0522414	Resistor, 220KΩ ±5% 1/4W
R327	1	1	1		RT0510114	Resistor, 100Ω ±5% 1/4W
R328	1	1	1		RT0527214	Resistor, 2.7KΩ ±5% 1/4W
R329	1	1	1		RC0000012	Resistor, 0Ω
C101	1	1	1		CA3250002	Variable Cap., FM-3, AM-2
C103	1	1	1		DD1210001	Ceramic Cap., 10 PF ±1 PF
C104	1	1	1		DK1710201	Ceramic Cap., 0.001μF ±20%
C105	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C106	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C107	1	1	1		DD1210001	Ceramic Cap., 10 PF ±1 PF
C108	1	1	1		DD1207003	Ceramic Cap., 7 PF ±1 PF
C109	1	1	1		DD1530101	Ceramic Cap., 300 PF ±5%
C110	1	1	1		DK1615003	Ceramic Cap., 15 PF ±10%
C111	1	1	1		DK1710201	Ceramic Cap., 0.001μF ±20%
C112	1	1	1		DK1840302	Ceramic Cap., 0.04μF ±10%
C113	1	1	1		DD1520003	Ceramic Cap., 20 PF ±10%
C114	1	1	1		DD1207003	Ceramic Cap., 7 PF ±1 PF
C115	1	1	1		DD1520001	Ceramic Cap., 20 PF ±5%
C116	1	1	1		DD1103001	Ceramic Cap., 3 PF ±0.5 PF
C117	1	1	1		DD1520001	Ceramic Cap., 20 PF ±5%
C118	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C119	1	1	1		DK1840302	Ceramic Cap., 0.04μF ±10%
C120	1	1	1		DK1840302	Ceramic Cap., 0.04μF ±10%
C121	1	1	1		EV2240356	Electrolytic Cap., 0.02μF 35V
C122	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C123	1	1	1		DD1650101	Ceramic Cap., 500 PF ±10%
C124	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C125	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C126	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C127	1	1	1		DD1620001	Ceramic Cap., 20 PF ±10%
C128	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C129	1	1	1		EA1060169	Electrolytic Cap., 10μF 16V
C130	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C131	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C132	1	1	1		DK1840302	Ceramic Cap., 0.04μF ±10%
C133	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C134	1	1	1		DD1610101	Ceramic Cap., 100 PF ±10%
C135	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C136	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C137	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C138	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C139	1	1	1		DK1840302	Ceramic Cap., 0.04μF ±10%
C140	1	1	1		EA1060169	Electrolytic Cap., 10μF 16V
C141	1	1	1		DD1620101	Ceramic Cap., 200 PF ±10%
C142	1	1	1		DD1620101	Ceramic Cap., 200 PF ±10%
C143	1	1	1		DD1610101	Ceramic Cap., 100 PF ±10%
C144	1	1	1		DK1840302	Ceramic Cap., 0.04μF ±10%
C145	1	1	1		EA4760169	Electrolytic Cap., 47μF 16V
C146	1	1	1		EA1060169	Electrolytic Cap., 10μF 16V
C147	1	1	1		DK1840302	Ceramic Cap., 0.04μF ±10%
C148	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C149	1	1	1		DK1840302	Ceramic Cap., 0.04μF ±10%
C150	1	1	1		DD1610101	Ceramic Cap., 100μF ±10%
C151	1	1	1		DK1820302	Ceramic Cap., 0.02μF ±10%
C152	1	1	1		EA1050509	Electrolytic Cap., 1μF 50V
C153	1	1	1		DK1840302	Ceramic Cap., 0.04μF ±10%
C201	1	1	1		DD1105001	Electrolytic Cap., 5 PF ±0.5%
C202	1	1	1		DF6535101	Film Cap., 350 PF ±5%
C203	1	1	1		DD1520001	Ceramic Cap., 20 PF ±5%
C204	1	1	1		DF1710301	Film Cap., 0.01μF ±20%
C205	1	1	1		DF1710301	Film Cap., 0.01μF ±20%
C206	1	1	1		DF1710301	Film Cap., 0.01μF ±20%
C207	1	1	1		EA1050509	Electrolytic Cap., 1μF 50V

U: For U.S.A.
C: For Canada
E: For Europe

U: For U.S.A.
C: For Canada
E: For Europe

REF. DESIG.	QTY	U	C	E	PART NO.	DESCRIPTION
C208	1	1	1		EA4750359	Electrolytic Cap., 4.7 μ F 35V
C209	1	1	1		EA3350509	Electrolytic Cap., 3.3 μ F 50V
C210	1	1	1		DK1710201	Ceramic Cap., 0.001 μ F $\pm$ 20%
C211	1	1	1		DF1682201	Film Cap., 0.0082 μ F $\pm$ 10%
C212	1	1	1		DF1710301	Film Cap., 0.01 μ F $\pm$ 20%
C213	1	1	1		EA1070169	Electrolytic Cap., 100 μ F 16V
C214	1	1	1		DK1840302	Ceramic Cap., 0.04 μ F $\pm$ 10%
C215	1	1	1		EV2240356	Electrolytic Cap., 0.22 μ F 35V
C216	1	1	1		EA1070169	Electrolytic Cap., 100 μ F 16V
C217	1	1	1		DK1840302	Ceramic Cap., 0.04 μ F $\pm$ 10%
C218	1	1	1		DK1710301	Ceramic Cap., 0.01 μ F $\pm$ 20%
C219	1	1	1		DD1525002	Ceramic Cap., 25 PF $\pm$ 5%
C301	1	1	1		EA1060169	Electrolytic Cap., 10 μ F 16V
C302	1	1	1		DF1622201	Film Cap., 0.0022 μ F $\pm$ 10%
C303	1	1	1		DF5547101	Film Cap., 470 PF $\pm$ 5%
C304	1	1	1		EQ2240501	Electrolytic Cap., 0.22 μ F 50V
C305	1	1	1		EQ4740501	Electrolytic Cap., 0.47 μ F 50V
C306	1	1	1		EQ2240501	Electrolytic Cap., 0.22 μ F 50V
C307	1	1	1		DF1747301	Film Cap., 0.047 μ F $\pm$ 20%
C310	1	1	1		EA2270169	Electrolytic Cap., 220 μ F 16V
C311	1	1	1		DF1627201	Film Cap., 0.0027 μ F $\pm$ 10%
C312	1	1	1		DF1627201	Film Cap., 0.0027 μ F $\pm$ 10%
C313	1	1	1		DF1533201	Film Cap., 0.0033 μ F $\pm$ 5%
C314	1	1	1		DF1533201	Film Cap., 0.0033 μ F $\pm$ 5%
C315	1	1	1		DF1647201	Film Cap., 0.0047 μ F $\pm$ 10%
C316	1	1	1		DF1647201	Film Cap., 0.0047 μ F $\pm$ 10%
C317	1	1	1		DF5582101	Film Cap., 820 PF $\pm$ 5%
C318	1	1	1		DF5582101	Film Cap., 820 PF $\pm$ 5%
C319	1	1	1		DF1618201	Film Cap., 0.0018 μ F $\pm$ 10%
C320	1	1	1		DF1618201	Film Cap., 0.0018 μ F $\pm$ 10%
C321	1	1	1		DF1615301	Film Cap., 0.015 μ F $\pm$ 10%
C321	1	1	1		DF1612301	Film Cap., 0.012 μ F $\pm$ 10%
C322	1	1	1		DF1615301	Film Cap., 0.015 μ F $\pm$ 10%
C322	1	1	1		DF1612301	Film Cap., 0.012 μ F $\pm$ 10%
C323	1	1	1		EV4740356	Electrolytic Cap., 0.47 μ F 35V
C324	1	1	1		EV4740356	Electrolytic Cap., 0.47 μ F 35V
C325	1	1	1		EV4740356	Electrolytic Cap., 0.47 μ F 35V
C326	1	1	1		EV4740356	Electrolytic Cap., 0.47 μ F 35V
L101	1	1	1		LA1202612	FM ANT. Coil
L102	1	1	1		LA1202610	FM RF Coil
L103	1	1	1		LO1203601	FM Osc. Coil
L104	1	1	1		LC1751001	Choke Coil, 0.75 μ H
L105	1	1	1		LI1001601	FM IFT
L106	1	1	1		LI1401623	FM IFT
L107	1	1	1		LI1015602	FM IFT
L202	1	1	1		LO1001049	AM Osc. Coil
L203	1	1	1		LI1028003	AM IFT
L204	1	1	1		LI1001064	AM IFT
L206	1	1	1		LC2105001	Choke Coil, 1 mH
L301	1	1	1		LC2226004	Choke Coil, 22 mH
L302	1	1	1		LC2226004	Choke Coil, 22 mH
L303	1	1	1		LC2226004	Choke Coil, 22 mH
L304	1	1	1		LC2226004	Choke Coil, 22 mH
F101	1	1	1		FF1107005	Ceramic Filter, SFE10.7 MD-1
F102	1	1	1		FF1107005	Ceramic Filter, SFE10.7 MD-1
H101	1	1	1		HF200551D	FET, 2SK 55 (D)
H102	1	1	1		HT310471B	Transistor, 2SC 1047 (B)
H103	1	1	1		HT304611B	Transistor, 2SC 461 (B)
H104	1	1	1		HT308291C	Transistor, 2SC 829 (Q)
H105	1	1	1		HT308291C	Transistor, 2SC 829 (Q)

REF. DESIG.	QTY	U	C	E	PART NO.	DESCRIPTION
H106	1	1	1		HT308291C	Transistor, 2SC829 (Q)
H107	1	1	1		HT308291C	Transistor, 2SC829 (Q)
H108	1	1	1		HT308291D	Transistor, 2SC829 (R)
H109	1	1	1		HT308291B	Transistor, 2SC829 (P)
H110	1	1	1		HT308281C	Transistor, 2SC828 (C)
H111	1	1	1		HT308281C	Transistor, 2SC828 (C)
H112	1	1	1		HD1000302	Diode, 20A90
H113	1	1	1		HD1000302	Diode, 20A90
H114	1	1	1		HD2001105	Diode, 1S1555
H115	1	1	1		HD2001105	Diode, 1S1555
H116	1	1	1		HD1000302	Diode, 20A90
H117	1	1	1		HD1000302	Diode, 20A90
H118	1	1	1		HD1000302	Diode, 20A90
H119	1	1	1		HD1000302	Diode, 20A90
H201	1	1	1		HC1000301	IC, HA1151
H301	1	1	1		HC1000401	IC, HA1156
H302	1	1	1		HT105641B	Transistor, 2SA564 (Q)
H303	1	1	1		HT308281C	Transistor, 2SC828 (Q)
H304	1	1	1		HT308281C	Transistor, 2SC828 (Q)
H305	1	1	1		HT308281C	Transistor, 2SC828 (Q)
H306	1	1	1		HT105641B	Transistor, 2SA564 (Q)
H307	1	1	1		HT105641B	Transistor, 2SA564 (Q)
J101	1	1	1		Y1000114	Plug
J126	1	1	1		Y1000114	Plug
J131	1	1	1		Y1000114	Plug
J132	1	1	1		Y1000114	Plug
P400	1	1	1		YD2849004	P.W. Board, Power Supply
	1	1	1		ZZ2946104	P.W. Board Assembly
R401	1	1	1		GJ1025102	Resistor, 250 Ω $\pm$ 10% 2W
R402	1	1	1		GJ0512102	Resistor, 120 Ω $\pm$ 5% 2W
R403	1	1	1		RT0515314	Resistor, 15K Ω $\pm$ 5% 1/4W
R404	1	1	1		RT0533314	Resistor, 33K Ω $\pm$ 5% 1/4W
R405	1	1	1		RC0000012	Resistor, 0 Ω
C401	1	1	1		DK1810351	Ceramic Cap., 0.01 μ F $\pm$ 10% 500V
C402	1	1	1		DK1810351	Ceramic Cap., 0.01 μ F $\pm$ 10% 500V
C403	1	1	1		EA3370509	Electrolytic Cap., 330 μ F 50V
C404	1	1	1		EA4770169	Electrolytic Cap., 470 μ F 16V
C405	1	1	1		EA3370359	Electrolytic Cap., 330 μ F 35V
C406	1	1	1		EA1070169	Electrolytic Cap., 100 μ F 16V
C407	1	1	1		EA2270169	Electrolytic Cap., 270 μ F 16V
C408	1	1	1		DK1840301	Ceramic Cap., 0.04 μ F $\pm$ 10% 50V
H401	1	1	1		HT311751E	Transistor, 2SC1175E
H402	1	1	1		HD2001003	Diode, DS130YD
H403	1	1	1		HD2001003	Diode, DS130YD
H404	1	1	1		HD2001003	Diode, DS130YD
H405	1	1	1		HD3002109	Diode, BZ140
J401	1	1	1		Y1000099	Plug
J409	1	1	1		SP0301001	Push Switch, Power
S001	1	1	1		BF1049003	Printed Compo., 0.1 μ F 120 Ω
G001	1	1	1		EA1070109	Electrolytic Cap., 100 μ F 10V
C001	1	1	1		DF1747351	Film Cap., 0.047 μ F 600V
C002	1	1	1		GT0522512	Resistor, 2.2M Ω $\pm$ 5% 1/4W
R002	1	1	1		IM1104208	DC Meter, Signal
M001	1	1	1		IN1008007	Lamp, Meter Lamp
M002	1	1	1		IN1008007	Lamp, Meter Lamp

REF. DESIG.	QTY	U	C	E	PART NO.	DESCRIPTION
J001	1	1	1		YJ0800012	Socket, Fuse Holder
J003	1	1	1		YT0104015	Terminal, ANT. Terminal
J004	1	1	1		YT0202011	Terminal, Output
J005	1	1	1		YJ0800019	Terminal, Lamp Holder
J006	1	1	1		YL0102003	Terminal, 2P Terminal
J012	1	1	1		YT0201009	Terminal, Quad.
J013	1	1	1		YJ0800009	Socket, Fuse Holder 20m/m
J014	1	1	1		YJ0800009	Socket, Fuse Holder 20m/m
J015	1	1	1		YJ0800009	Socket, Fuse Holder 20m/m
J001	1	1	1		YJ0800022	Socket, Fuse Holder 20m/m
J002	1	1	1		YJ0400056	Jack, AC Outlet
W001	1	1	1		YC0240010	AC Cord, UL CSA
F001	1	1	1		FS1010008	Fuse, UL 1.0A 30m/m
F001	1	1	1		FS1007090	Fuse, 0.7A 20m/m
F002	1	1	1		FS1010007	Fuse, 1.0A 20m/m
F003	1	1	1		FS1010007	Fuse, 1.0A 20m/m
F004	1	1	1		FS1040006	Fuse, 4.0A 20m/m
L001	1	1	1		LF1120036	ANT. Coil, AM
L002	1	1	1		TS1600911	Power Transformer, 120V
L002	1	1	1		TS1600912	Power Transformer, 110/120/220
L003	1	1	1		LC1154004	Choke Coil, 150 μ H
J015	1	1	1		BY0314001	Terminal, Dial Lamp
MZ03	1	1	1		IN1008007	Lamp, Dial Lamp
MZ04	1	1	1		IN1008007	Lamp, Dial Lamp
PS00	1	1	1		YD2946002	P.W. Board, Switch
	1	1	1		ZZ2946002	P.W. Board Assembly
RS01	1	1	1		RT0510214	Resistor, 1K Ω $\pm$ 5% 1/4W
RS02	1	1	1		RT0510214	Resistor, 1K Ω $\pm$ 5% 1/4W
RS05	1	1	1		GT0515212	Resistor, 1.5K Ω $\pm$ 5% 1/4W
RS06	1	1	1		RT0539214	Resistor, 3.9K Ω $\pm$ 5% 1/4W
RS07	1	1	1		RC0000012	Resistor, 0 Ω
RS08	1	1	1		RT0510414	Resistor, 100K Ω $\pm$ 5% 1/4W
SS01	1	1	1		SP0604004	Push Switch
JS01	1	1	1		Y1000099	Plug
JS02	1	1	1		Y1000099	Plug
PY00	1	1	1		YD2946001	P.W. Board, Function Lamp
	1	1	1		ZZ2946001	P.W. Board Assembly
MY01	1	1	1		IN1008037	Lamp, 8V 40mA FM
MY02	1	1	1		IN1008037	Lamp, 8V 40mA AM
MY03	1	1	1		IN1008037	Lamp, 8V 40mA Stereo
JY01	1	1	1		Y1000113	Plug
JY05	1	1	1		Y1000113	Plug
PZ01	1	1	1		YD2908007	P.W. Board, Dial Lamp
	1	1	1		ZZ2908007	P.W. Board Assembly
MZ01	1	1	1		IN1008007	Lamp, Dial Lamp
MZ02	1	1	1		IN1008007	Lamp, Dial Lamp
JZ01	1	1	1		Y1000113	Plug
JZ04	1	1	1		YJ0800017	Socket
JZ05	1	1	1		YJ0800017	Socket
JZ12	1	1	1		YJ0800017	Socket

TECHNICAL SPECIFICATIONS

FM SECTION:

IHF Usable Sensitivity	2.5 μ V
Selectivity (alternate carrier)	48 dB
Quieting Slope	
RF Input for 30 dB Quieting	2.2 μ V
Quieting at 5 μ V RF Input	45 dB
Quieting at 10 μ V RF Input	55 dB
Quieting at 50 μ V RF Input	65 dB
Total Harmonic Distortion	
Mono:	0.4%
Stereo:	0.7%
Capture Ratio	2.5 dB
Stereo Separation at 1 kHz	40 dB
Spurious Rejection	70 dB
Image Rejection	50 dB
IF Rejection	75 dB
AM Suppression	45 dB
Signal to Noise Ratio (1 mV RF input)	
Mono	68 dB
Stereo	58 dB

AM SECTION:

Sensitivity	25 μ V
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GENERAL:

Power Requirements	120 V AC, 50/60 Hz
Power Consumption	15 Watts
Dimensions:	
Panel Width	14-11/64 inches
Panel Height	4-23/32 inches
Depth	11-1/32 inches
Weight:	
Unit alone	12.1 lbs.
Packed for shipment	17.2 lbs.

These specifications and exterior designs may be changed for improvement without advance notice.

SERVICE INFORMATION FOR EUROPEAN MODEL

The information contained herein includes rear panel and main chassis component locations, voltage conversion, schematic diagram and technical specifications. For the alignment procedures, test equipment, and repairing hints, refer to the original service manual.

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TECHNICAL SPECIFICATIONS

FM SECTION:

IHF Usable Sensitivity	2.5 μ V
Usable Sensitivity (DIN)	2.2 μ V
Selectivity (alternate carrier)	48 dB
Quieting Slope	
RF Input for 30 dB Quieting	2.2 μ V
Quieting at 5 μ V RF Input	45 dB
Quieting at 10 μ V RF Input	55 dB
Quieting at 50 μ V RF Input	65 dB
Total Harmonic Distortion	
Mono:	0.4%
Stereo:	0.7%
Capture Ratio	2.5 dB
Stereo Separation at 1 kHz	40 dB
Spurious Rejection	70 dB
Image Rejection	50 dB
IF Rejection	75 dB
AM Suppression	45 dB
Signal to Noise Ratio (1 mV RF input)	
Mono:	68 dB
Stereo:	58 dB

AM SECTION:

Sensitivity	25 μ V
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GENERAL:

Power Requirements	220 V $\sim$, 50/60 Hz
Power Consumption	15 Watts
Dimensions:	
Panel Width	360 mm (14-11/64 inches)
Panel Height	120 mm (4-23/32 inches)
Depth	281 mm (11-1/32 inches)
Weight:	
Unit alone	5.5 kg (12.1 lbs.)
Packed for shipment	7.8 kg (17.2 lbs.)

These specifications and exterior designs may be changed for improvement without advance notice.

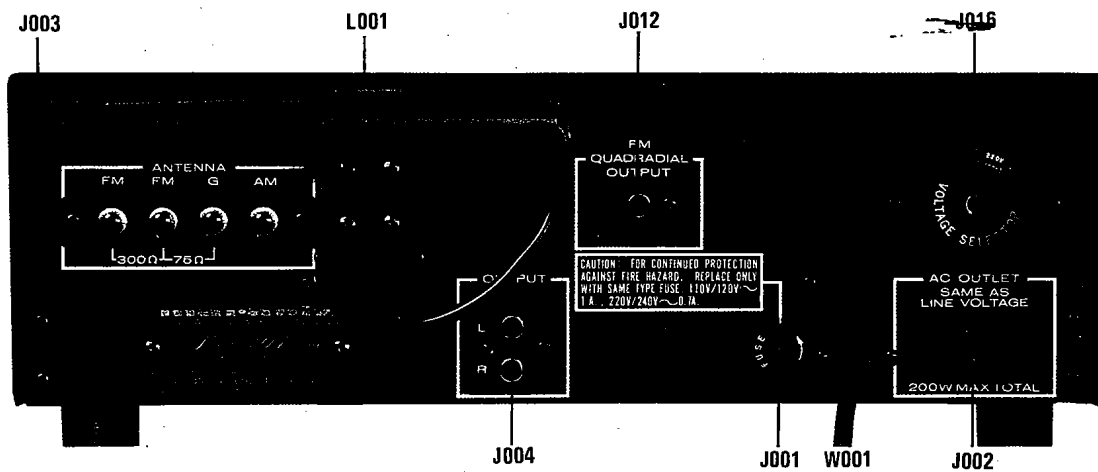


Figure 20. Rear Panel Adjustment and Facilities Locations for European Model

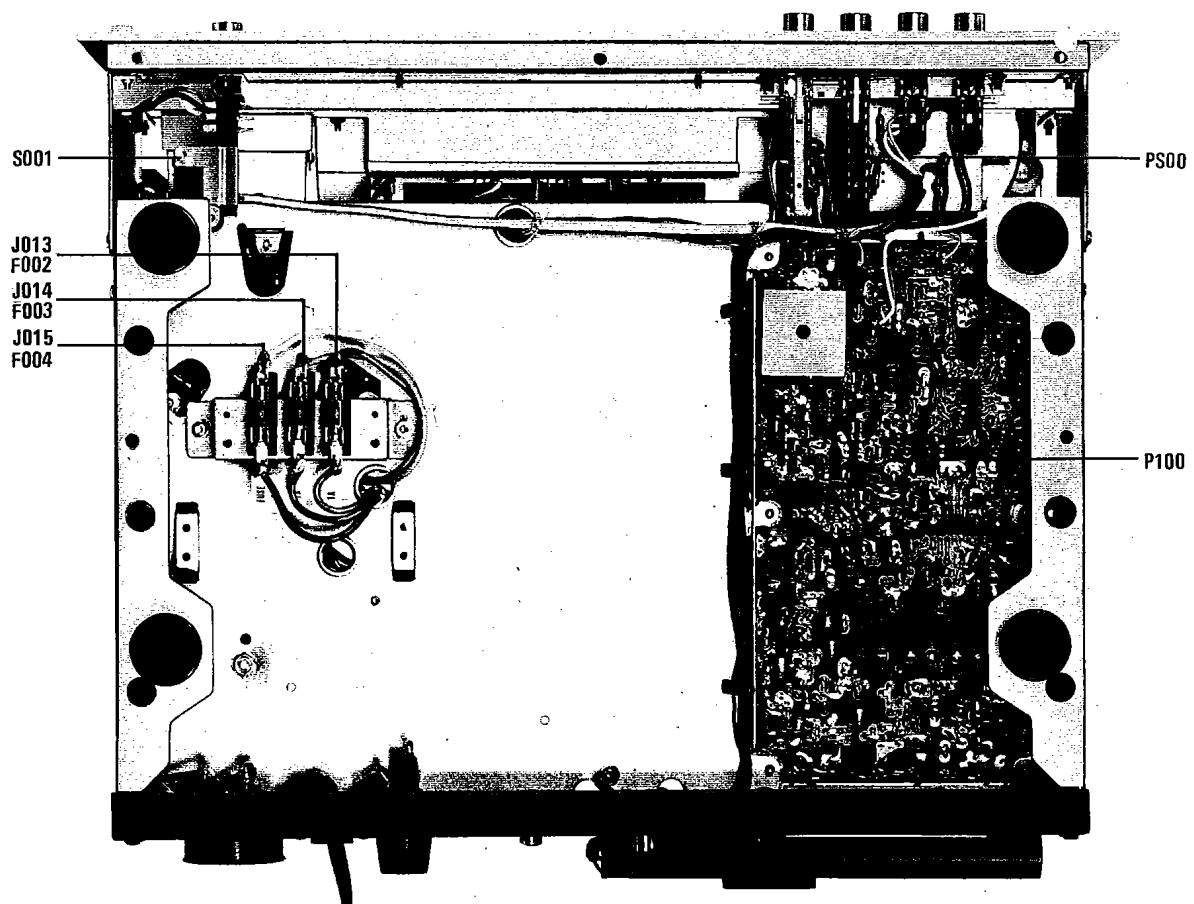


Figure 21. Main Chassis Component Locations (Bottom View) for European Model

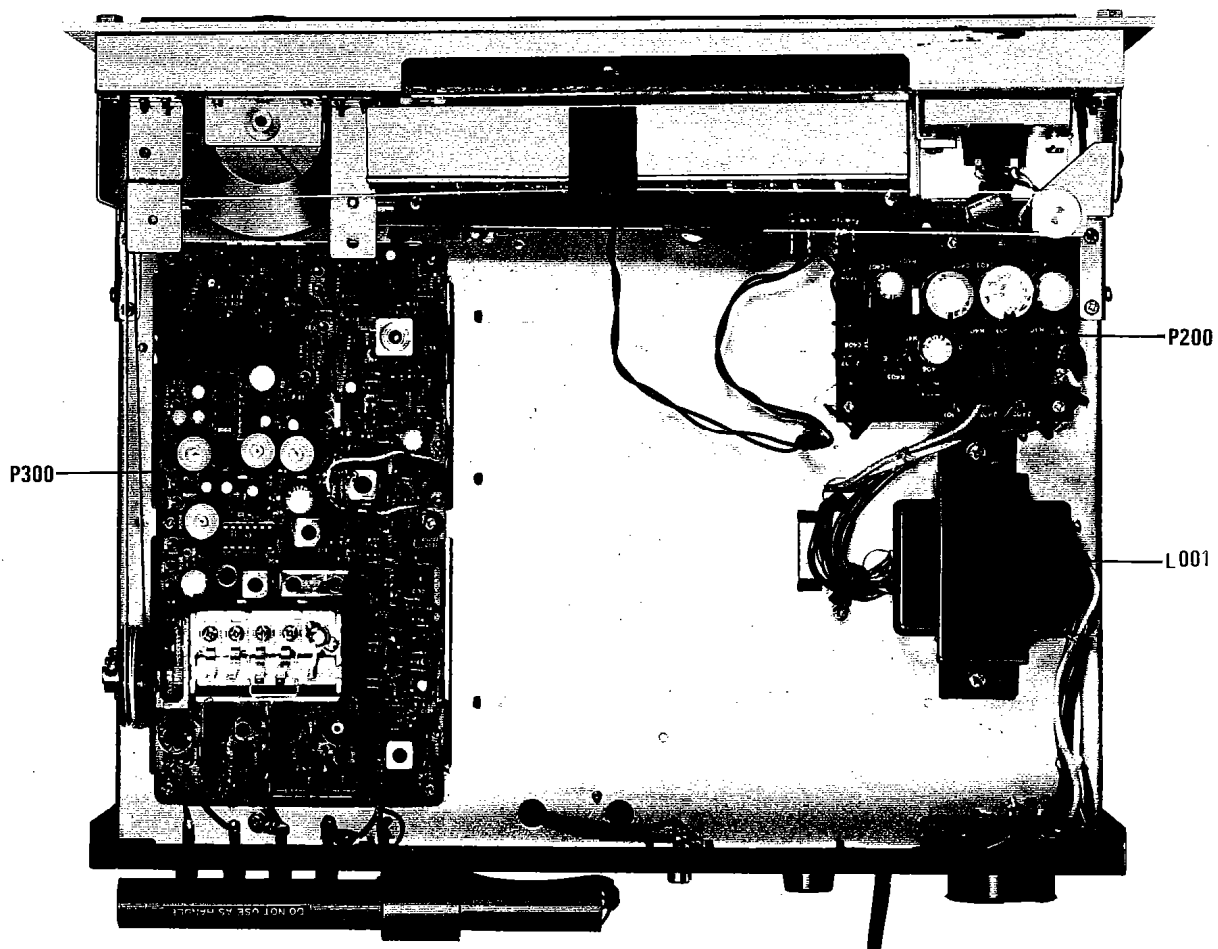


Figure 22. Main Chassis Component Locations (Top View) for European Model

VOLTAGE CONVERSION

This Model is equipped with a universal power transformer to permit operation at 110, 120, 220 and 240 V AC 50/60 Hz.

To convert the unit to the required voltage, set the plug as illustrated so that you can adjust the voltage as required.

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

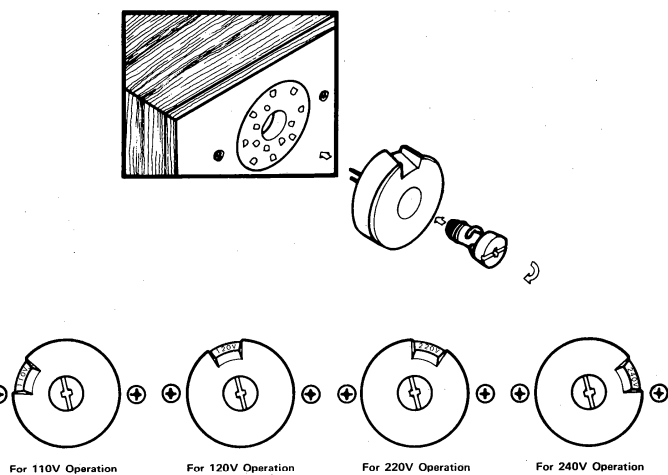
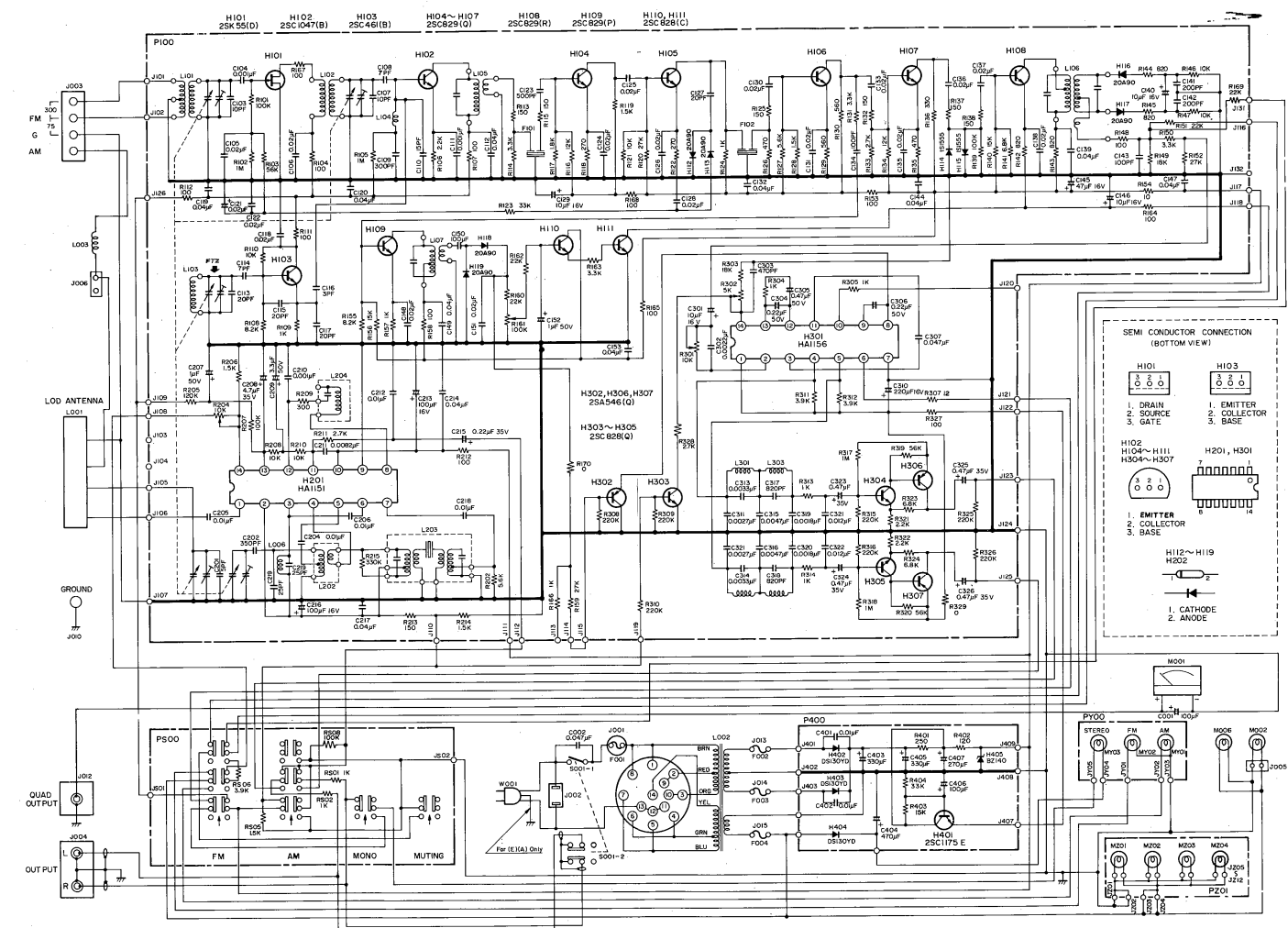


Figure 23. Voltage Conversion Chart

Instruction for the use in the range other than specified in FTZ codes

Achtung für die Leute, die in dem Gebiet wohnen,
wo die FTZ-Bestimmungen vorherrschend sind.

solte das Gerät auch für Frequenzen ausserhalb des in den FTZ-Bestimmungen angegebenen Bereiches empfangebereit sein, bitten wir, den Bereich durch Nachstellen des Kernes in der Oszillatorschule (in der Abbildung mit "FTZ" gekennzeichnet) so zu korrigieren, dass er den Bestimmungen entspricht.



Model 104 NOTE: This schematic diagram applies to units manufactured for the European market.

Figure 24. Schematic Diagram for European Model



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