

SERVICE
MANUAL

PM310

marantz

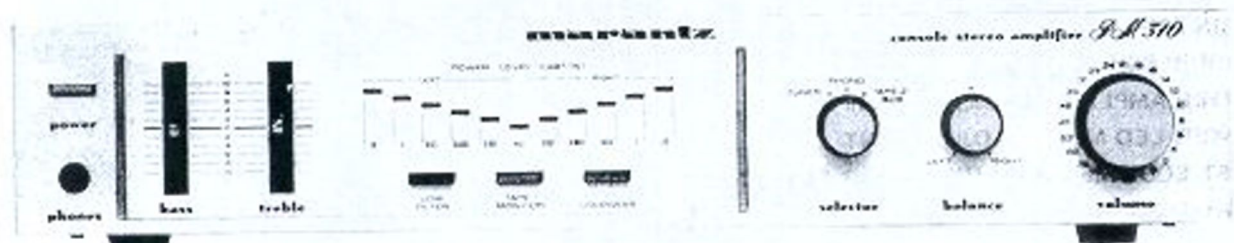
model PM310

Stereophonic Amplifier

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MODEL PM-310 STEREOPHONIC AMPLIFIER



1. INTRODUCTION

This service manual was prepared for use by Authorized Warranty Stations and contains service information for the Marantz PM 310 Stereo Console Amplifier. Servicing information and voltage data included in this manual are intended for use by knowledgeable and experienced personnel only. All instructions should be read carefully. No attempt should be made to proceed without a good understanding of circuitry operation.

The parts list furnishes complete ordering information. Most replacement parts should be ordered from the Marantz Company. However, a simple description is included for parts which can be obtained locally.

2. PRE-AMPLIFIER

Signals from the TUNER and AUX terminals are taken to the SELECTOR SWITCH (SS02).

Signals from the PHONO terminals pass through the phono amplifier (Q401) where they are amplified by 35.5 dB and at the same time undergo RIAA equalization, before going to the SELECTOR SWITCH (SS02). After being selected by the SELECTOR SWITCH, the incoming signals are taken to the TAPE MONITOR switch and TAPE OUT terminals.

Signals which enter from the TAPE IN terminals are taken to the TAPE MONITOR SWITCH.

Signals which are selected by the TAPE MONITOR SWITCH are taken to the BALANCE and VOLUME potentiometers, and then enter the main amplifier.

3. MAIN AMPLIFIER

The main amplifier contains an 6 dB/OCT type high pass filter network which can be switched in and out of circuit by means of the LOW FILTER switch.

The main amplifier has a gain of 38.5 dB, and the tone control circuit is included in the feedback circuit to control BASS and TREBLE.

4. TROUBLESHOOTING ANALYSIS

- Excessive line consumption
 - Check for shorted Q801.
 - Check for shorted transistor Q729, through Q732.
 - Check for open Q709, Q710, R725, R726.
- No line consumption or zero bias voltage
 - Check line cord, fuse, check for shorted Q709, Q710, R725, R726.
 - Check for open rectifiers Q801 or open L001.
- High hum and noise level
 - Check filter capacitors C808, C809, C801, C803.
 - Check TR Q807, Q808.

5. POWER AMPLIFIER ADJUSTMENT

ADJUSTMENT OF IDLING CURRENT

Connect a DC voltmeter to between emitters Q729 and Q731. Adjust R725 until 11 mV is reached. Likewise, adjust Q730, Q732 and R726.

6. POWER LED METER ADJUSTMENT

Adjust the Speaker Terminal to @1 kHz at rated OUTPUT (12.6V). Adjust the RX07 so that 20W LED lights up. Adjust the RX08 for another channel.

7. TEST EQUIPMENT REQUIRED FOR SERVICING

Table 1 lists the test equipment required for servicing the PM 310 Stereo Console Amplifier. The wattmeter, AC voltmeter, and variable autotransformer may be assembled as a test fixture as shown schematically in Figure 1. The load resistors and AC ammeter may be assembled into a second test fixture as shown in Figure 2.

Line Switch	OFF
Variable-line switch	Variable
Wattmeter Switch	ON
Variable Autotransformer	0 V (fully CCW)
Load	8 ohms (0.5 mfd—OFF)
Audio Generator	1 kHz
Output	5 V range
Gain	Minimum
AC Voltmeter	30 V range

8. PERFORMANCE VERIFICATION

TEST PROCEDURE

A. TEST EQUIPMENT

Refer to Table 1 for required test equipment.

B. PRELIMINARY PROCEDURES

1. Make the test setup shown in Figure 1 with the instrument controls set in the following positions:
2. Make sure that connections between the resistive load and the system terminals of the PM 310 have negligible resistance when compared with the resistance of the load itself. Appreciable resistance in wiring adds to the total load, resulting in inaccurate measurements of output power.
3. Connect amplifier output to load and connect AC cord to line power. Connect shorting plugs to the Phono input jacks of the PM 310.

Table 1. Test Equipment Required for Servicing

Item	Manufacturer and Model No.	Use
Distortion Analyzer	Sound Technology Model 1700B	Distortion measurements
Audio Oscillator		Sinewave and squarewave signal source
AC Voltmeter		voltage measurements (AC)
Oscilloscope	Tektronix Model T932 Philips Model 3232	Waveform analysis and trouble shooting and ASO alignment
Circuit Tester		Trouble shooting
DC Voltmeter	Fluke Model 8000 "Digital" Simpson Model 313, Triplet Model 801	Voltage measurements (DC)
AC Wattmeter	Simpson Model 1379	Monitors primary power to amplifier
AC Ammeter	Commercial Grade (1 ~ 10 A)	Monitors amplifier output under short circuit condition
Line Voltmeter	Simpson Model 1359	Monitors potential of primary power to amplifier
Variable Autotransformer	Superior Electronic Co., Powerstat Model 116B-10A	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, $\pm 0.5\%$ 100 W)	Commercial Grade	Provides 8-ohm load for amplifier output termination
Output Load (4 ohms, $\pm 0.5\%$ 100 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 1	Monitors and controls primary power for amplifier
Amplifier Output Load Box	Optional Item. Fabricate in accordance with Figure 2	Provides various amplifier loads and can monitor shorted output

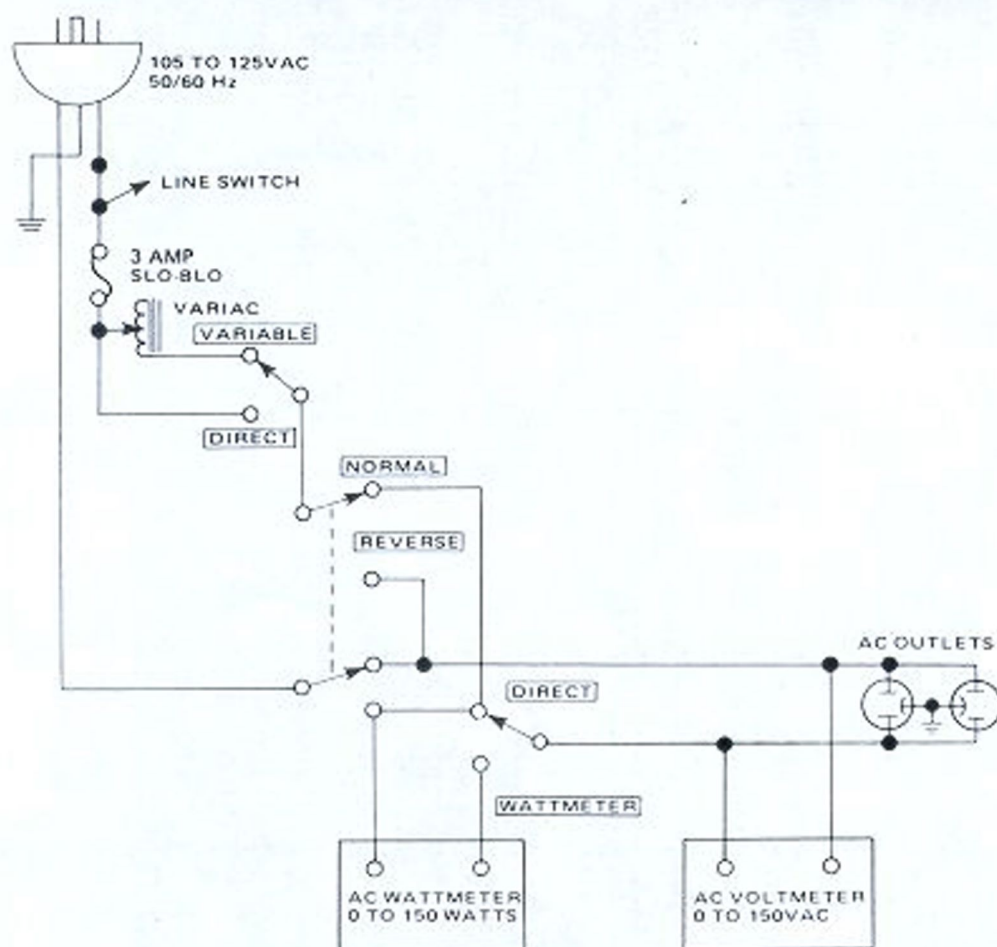


Figure 1. AC Power Control Box Simplified Schematic

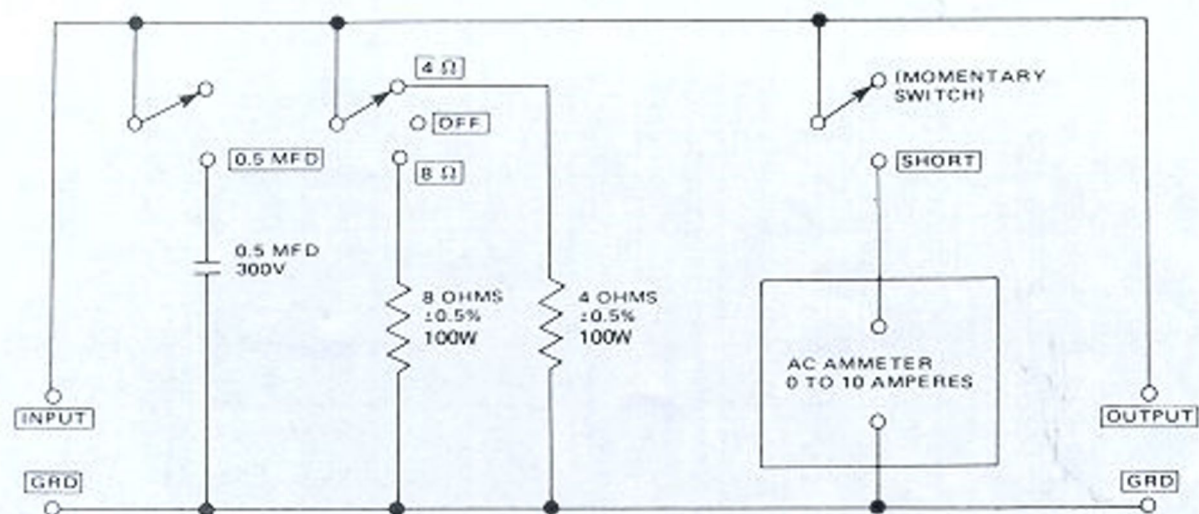


Figure 2. Amplifier Output Load Box Simplified Schematic

C. TOTAL HUM AND NOISE TEST

1. With shorting plugs connected to the Phono input jacks and an 8 ohm resistive load connected across the speaker system output terminals, connect a distortion analyzer across the load.

NOTE:

If the distortion analyzer does not contain a built-in voltmeter, an AC VTVM may be substituted.

2. Set the distortion analyzer controls for voltage measurements and apply power to the amplifier. Set the volume control fully CCW. Set the SELECTOR switch to PHONO.
3. If the distortion analyzer indicates more than 2.0 mV refer to the trouble analysis section of this manual.
4. Set the volume control fully CW. If the distortion analyzer indicates more than 20 mV, refer to the trouble analysis section of this manual.

D. MAXIMUM POWER OUTPUT

1. Connect the audio oscillator to the AUX input. Set audio oscillator frequency to 1 kHz. Set SELECTOR switch to AUX.
2. With the distortion analyzer connected across the output load (8-ohm), set the analyzer on the 30 VAC scale.
3. Turn the analyzer on and increase the audio oscillator output to 150 mV. The AC VTVM should read 12.6 VAC or more.

E. HARMONIC DISTORTION TEST

1. Set the frequency of the audio oscillator and the distortion analyzer to 20 kHz.
2. Set the controls of the analyzer for voltage measurement on the 30 volt scale.
3. Adjust the audio oscillator output level until the analyzer meter indicates 12.6-VAC.
4. Switch the distortion analyzer to Set Level and adjust SENSITIVITY for full scale reading on 0 ~ 1% scale.
5. Measure the total harmonic distortion with the analyzer and verify it is less than 0.3%.

NOTE:

Any parasitic oscillation in the amplifier will be displayed on the oscilloscope when capacitance is switched into the load.

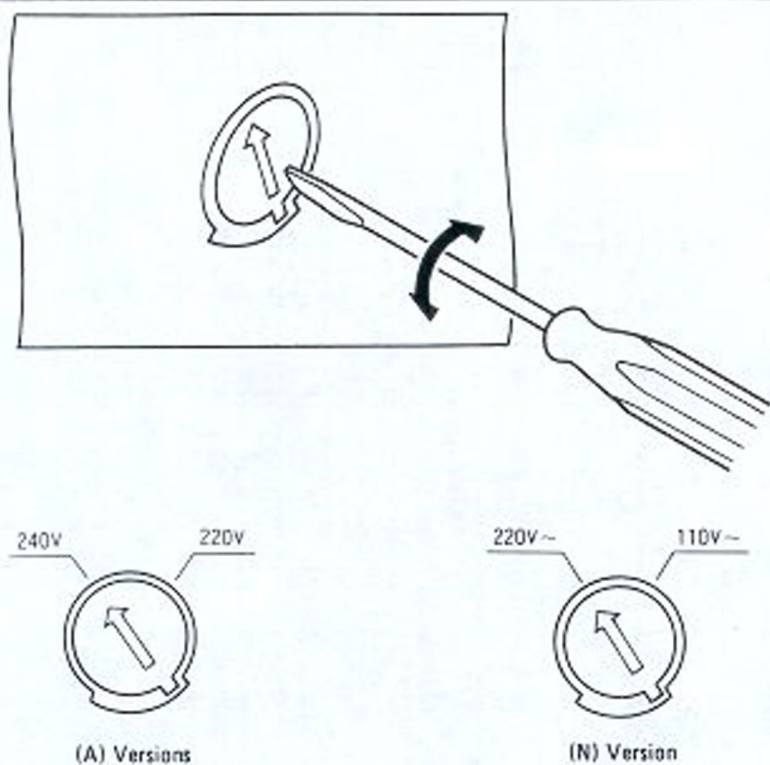
6. Switch the distortion analyzer back to SET LEVEL. (Do not readjust sensitivity of analyzer.)
7. Change the frequency of the audio oscillator and distortion analyzer to 1 kHz. Adjust audio oscillator output for a full scale reading on the 0 ~ 1% scale.
8. Measure the distortion, verifying it is no greater than 0.3%.
9. Repeat steps 7 and 8, changing frequency to 20 Hz. Distortion should be no more than 0.3%.
10. Check for parasitic oscillation; there should be none.

9. VOLTAGE CONVERSION

To convert the unit to a different power source voltage, change the position as illustrated in the drawing below.

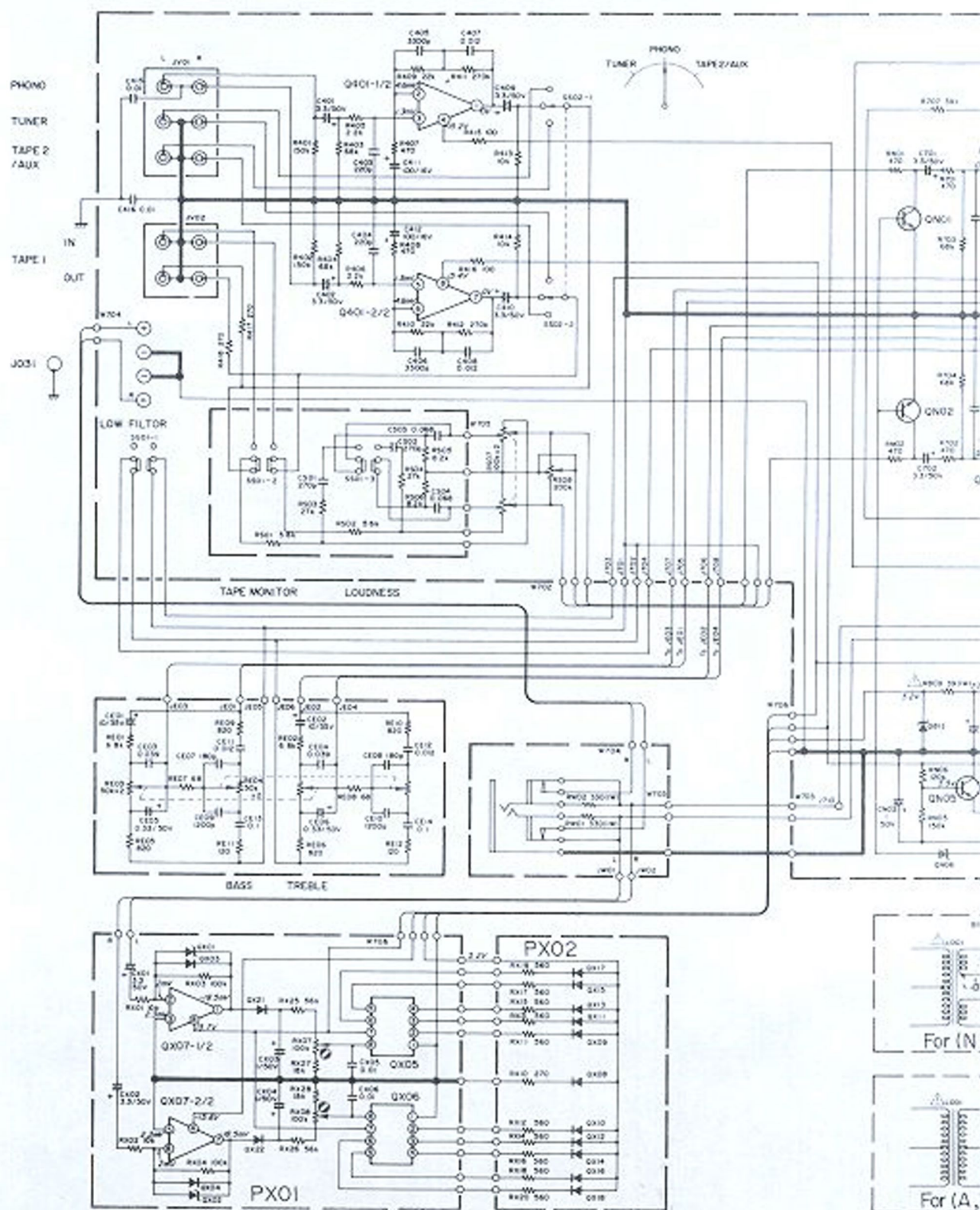
**CAUTION: DISCONNECT POWER SUPPLY CORD FROM AC OUTLET BEFORE CONVERTING VOLTAGE.
PLEASE DO NOT DISASSEMBLE THE VOLTAGE SELECTOR ABSOLUTELY.**

Voltage Conversion Chart

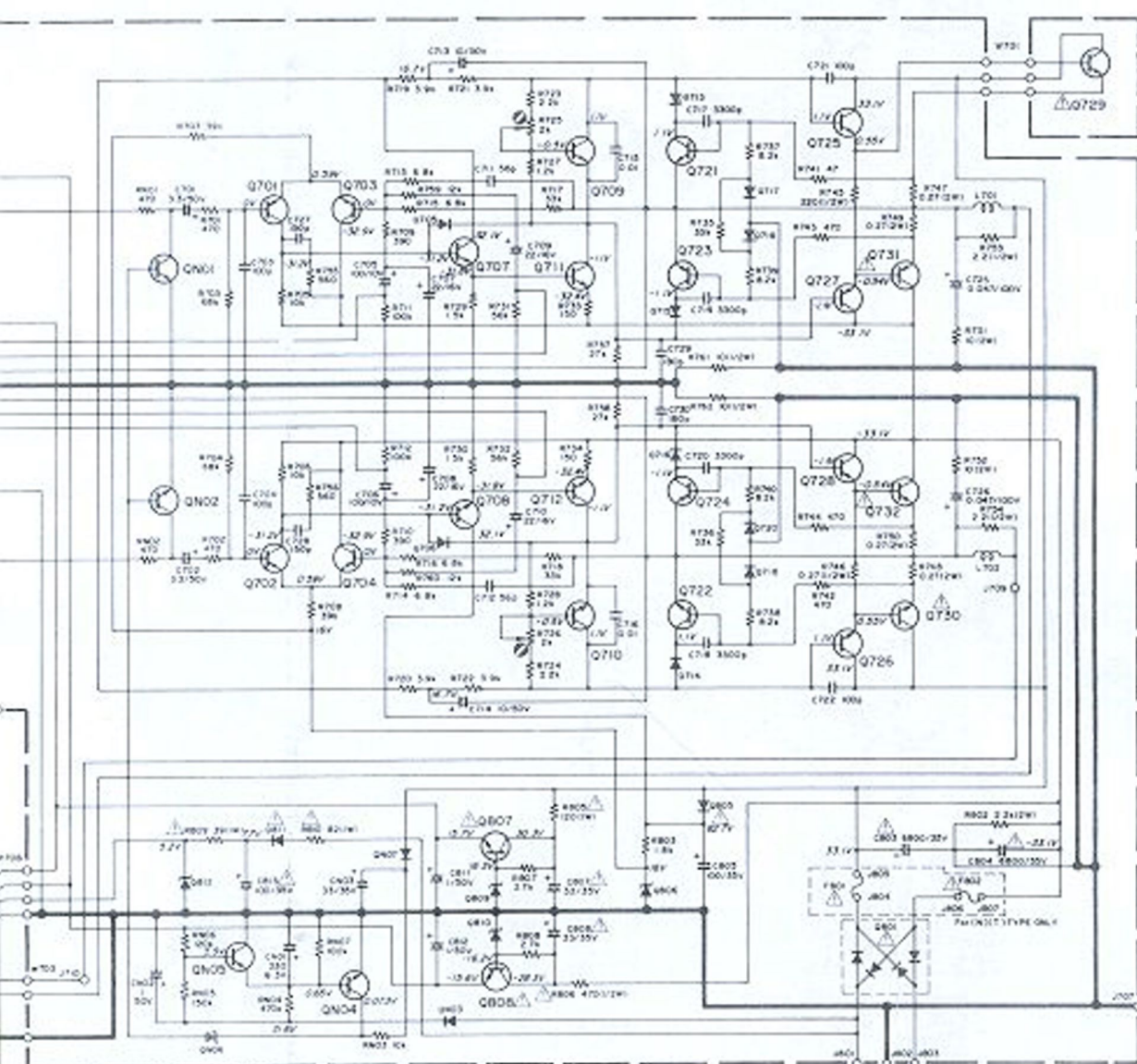


Note on safety: The parts marked with $\triangle$ are important parts on the safety. Please use the parts having the designated parts number without fail.

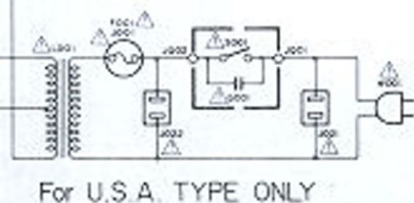
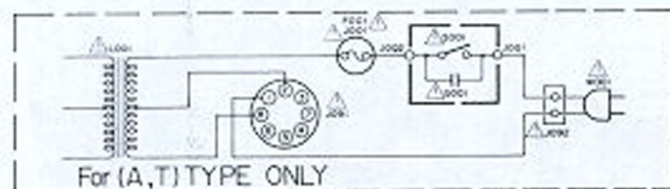
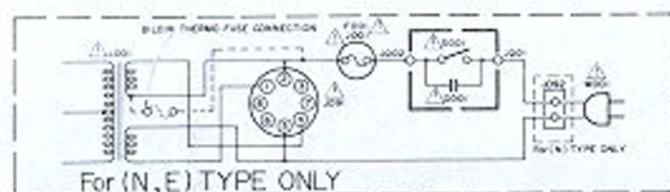
10. SCHEMATIC DIAGRAM



Components and wiring are subject to



- Q401-1/2, Q401-1/2
45580
- Q701-Q704
256750
- Q705, Q706
152471
- Q707, Q708
25C1400
- Q709, Q710, Q721, Q722
Q801, Q802, Q804
25C945
- Q711, Q712
25C2240
- Q713-Q720
151555
- Q723, Q724, Q808, Q809
25A733
- Q725, Q726
25C2274
- Q727, Q728
25A984
- Q729, Q730
25D613
- Q731, Q732
25B633
- Q801
54V820
- Q805, Q811, Q803
DS1350
- Q806, Q809, Q810
H216L
- Q807
25D571
- Q812
82052
- Q808
W2071
- QX01, QX02
W2038
- QX03, QX04, QX21, QX22
151555
- QX05, QX06
TL485C
- QX07-1/2, QX07-2/2
AN6552-1/2
- QX08
GL-9N59
- QX09-QX18
GL-9PR9

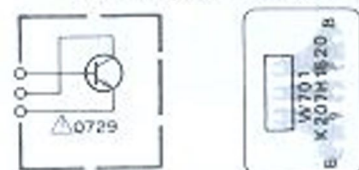


NOTE ON SAFETY:
The parts marked with Δ are important parts on the safety. Please use the parts having the designated parts numbers without fail.

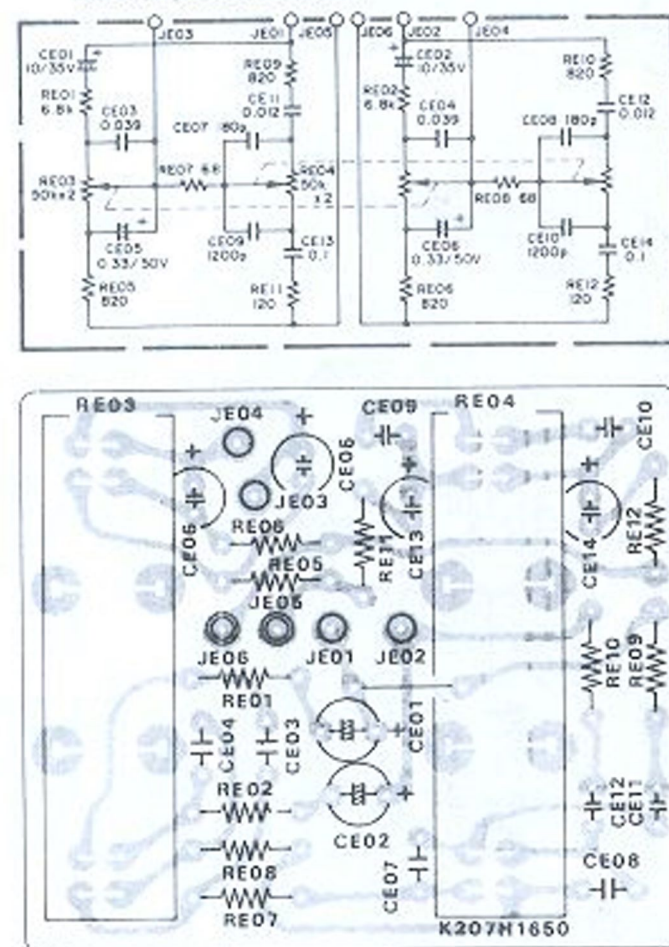
Parts and wiring are subject to change for modification without notice.

11. DIAGRAM AND COMPONENT LOCATIONS

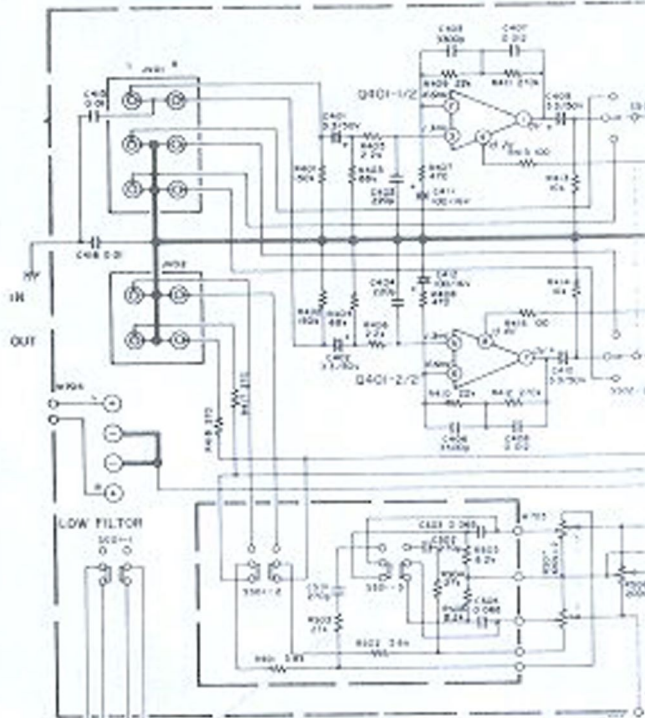
11.2 Power TR. Assembly (P701) Schematic Diagram and Component Locations



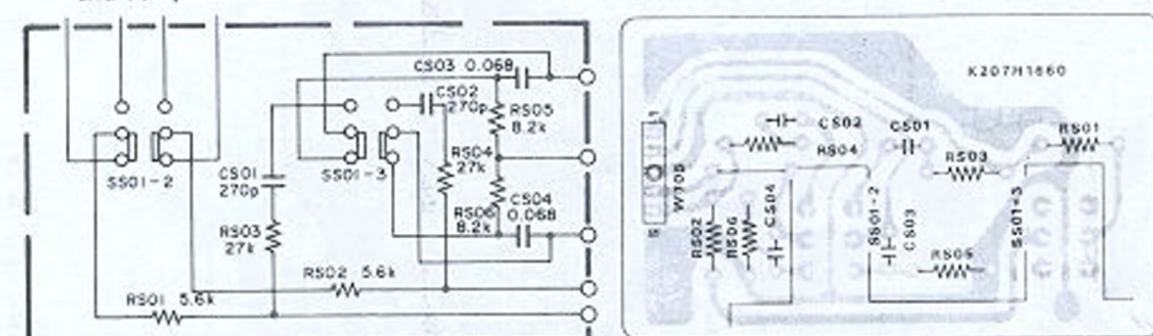
11.3 Tone Control Assembly (PE00) Schematic Diagram and Component Locations



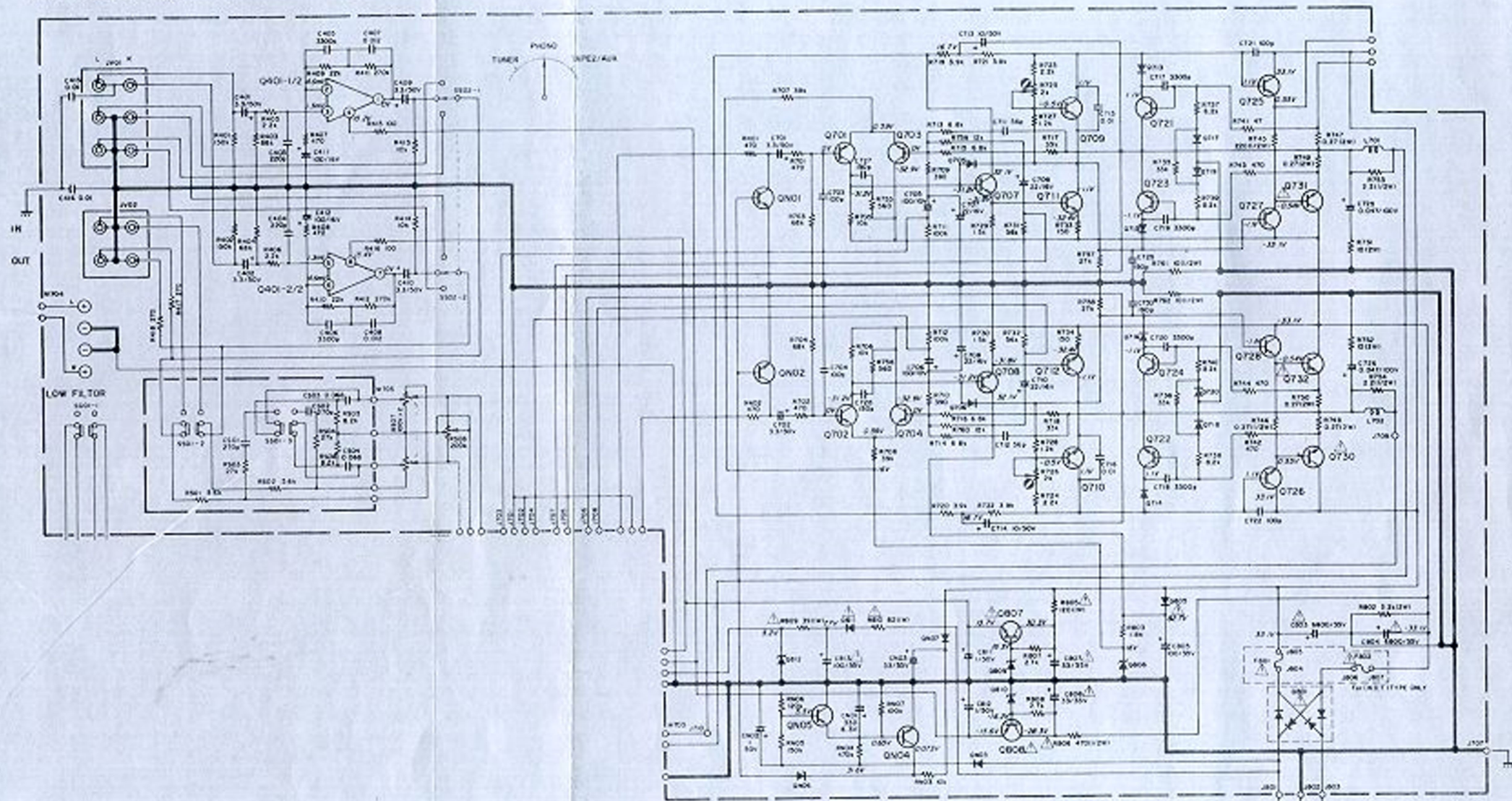
11.1 Main Assembly (P700) Schematic Diagram and Component Locations

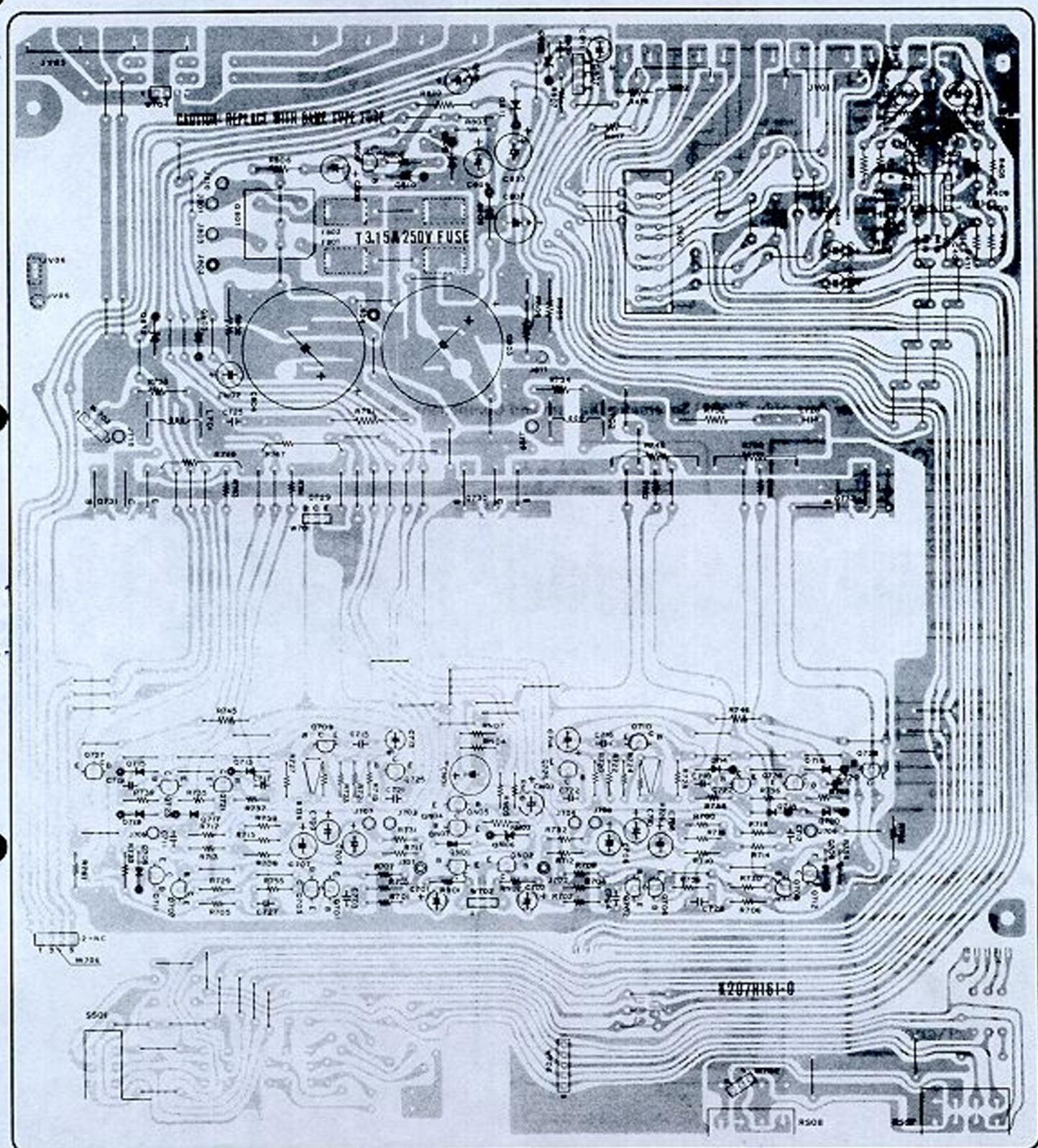


11.4 Switch/VR. Assembly (PS00) Schematic Diagram and Component Locations

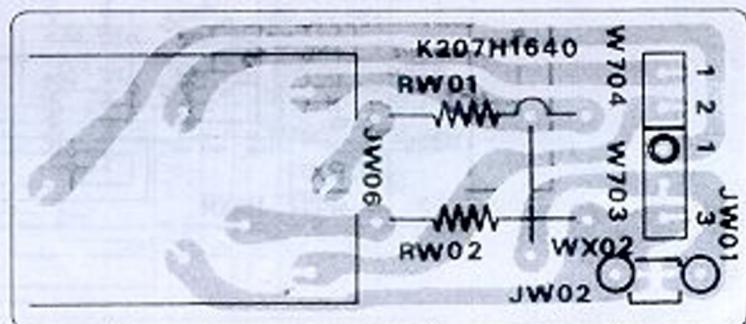
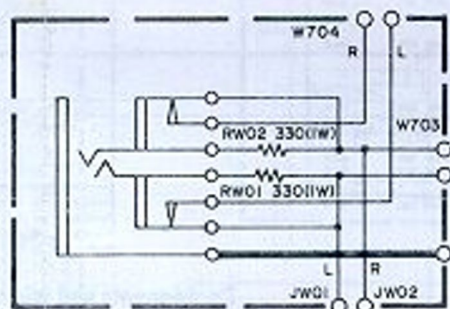


11.1 Main Assembly (P700) Schematic Diagram and Component Locations



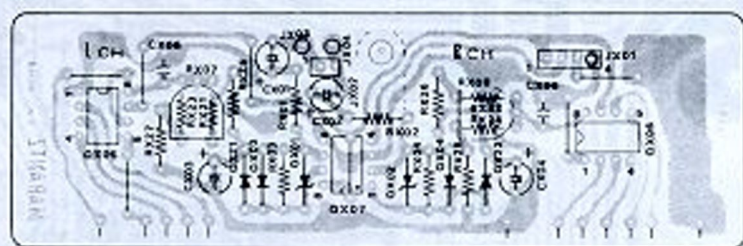
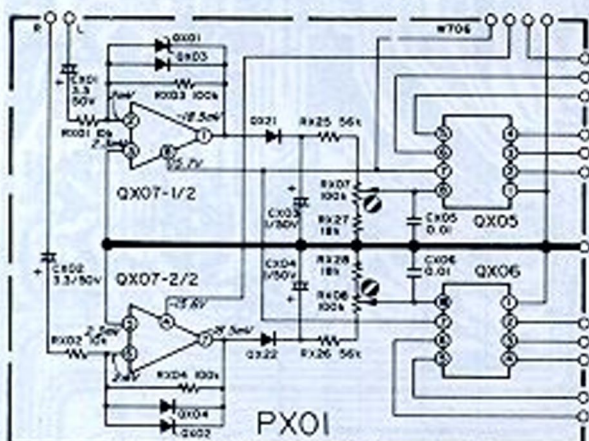


11.5 Phone Assembly (PW00) Schematic Diagram and Component Locations

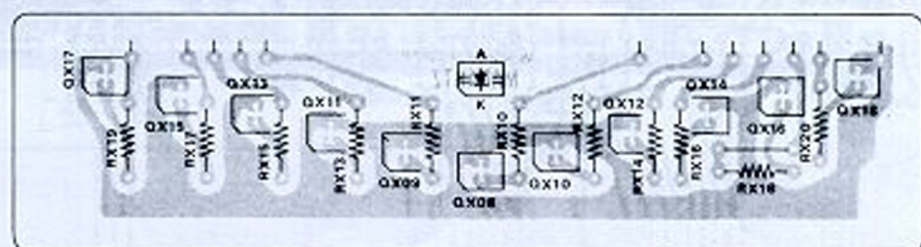
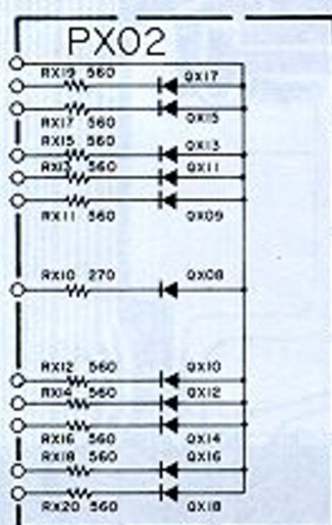


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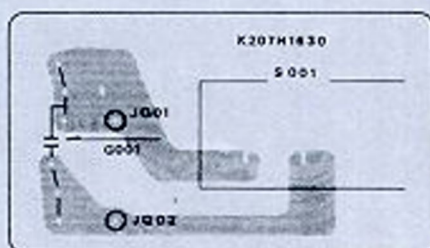
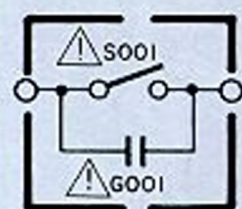
11.6 Led Level Meter Drive Assembly (PX01) Schematic Diagram and Component Locations



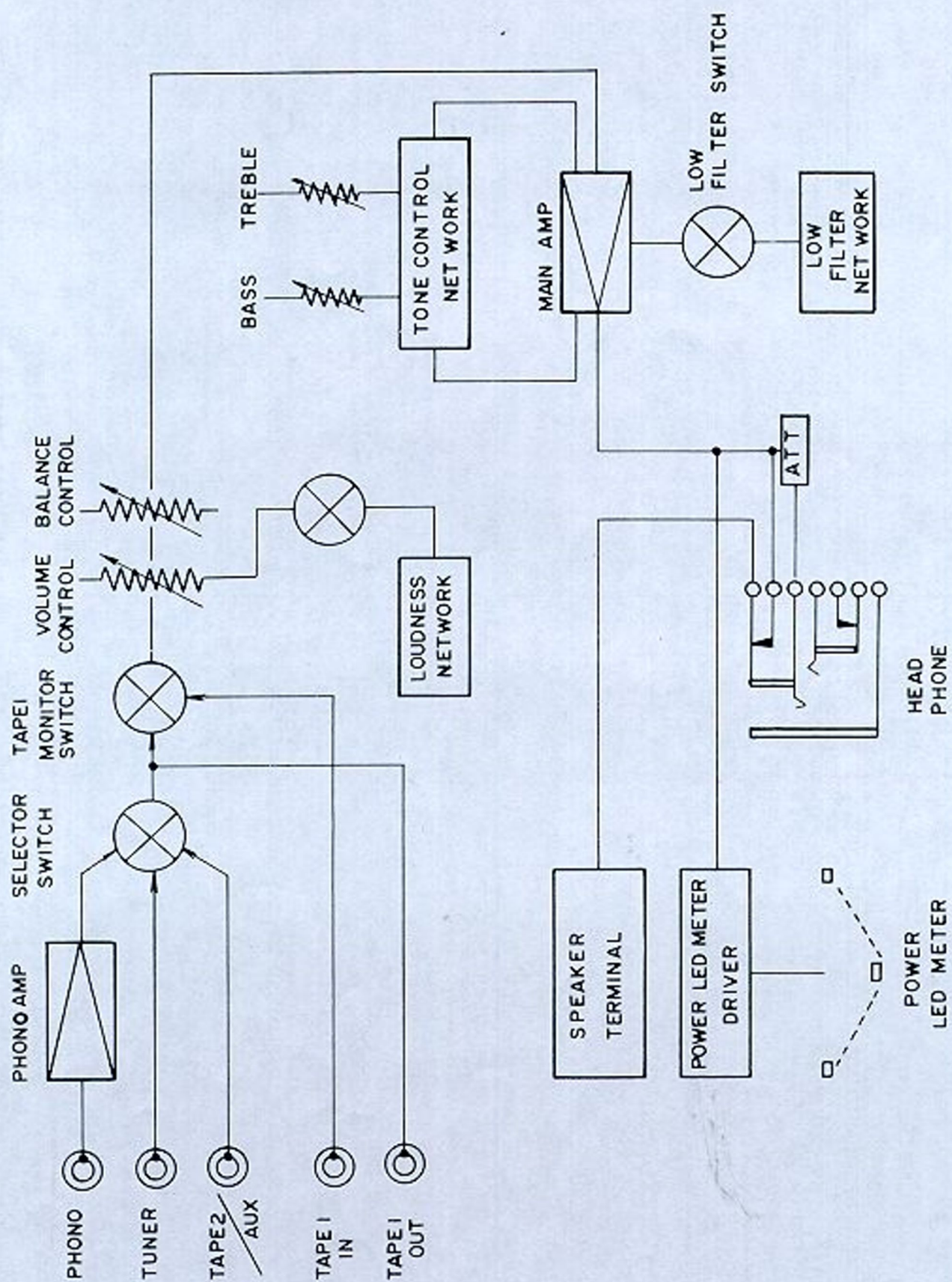
11.7 Led Level Meter Assembly (PX02) Schematic Diagram and Component Locations



11.8 Power Switch Assembly (P001) Schematic Diagram and Component Locations

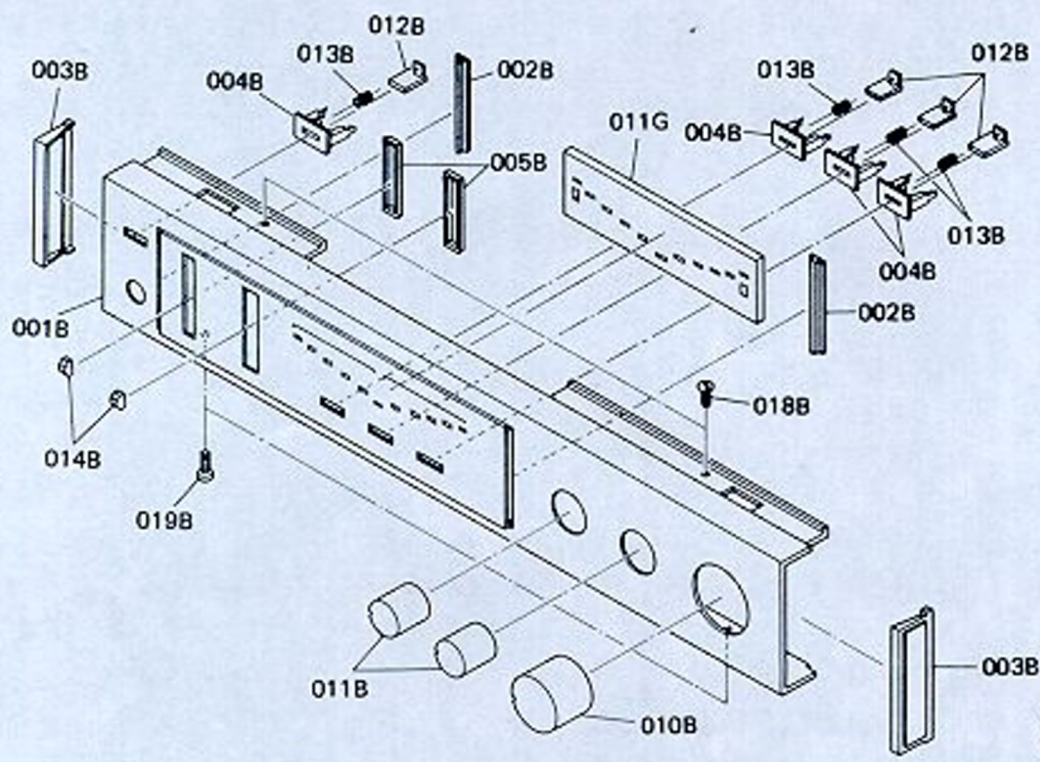


12. BLOCK DIAGRAM



13. EXPLODED VIEW AND PARTS LIST

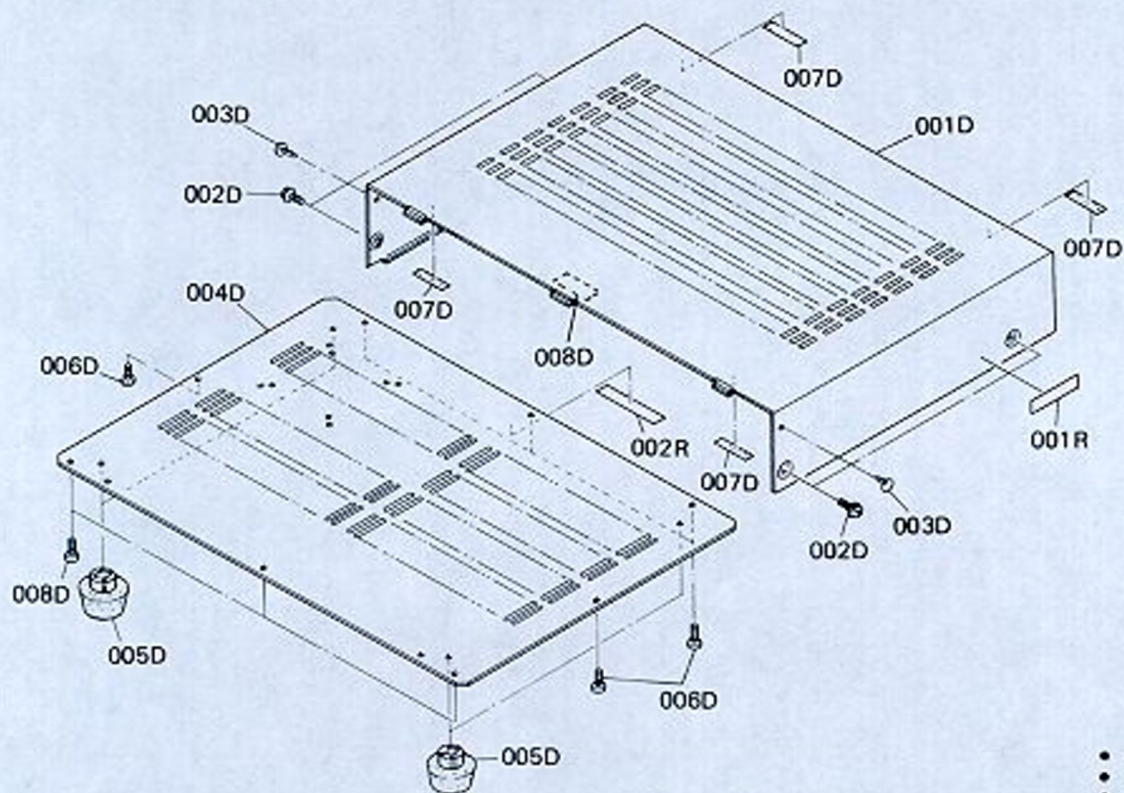
[C01-99] Front Panel



REF. DESIG.	QTY			PART NO.	DESCRIPTION
	U	N	A		
A	1	1	1	207H063400	Front Panel Assembly
001B	1	1	1	207H063010	Escutcheon
002B	2	2	2	403H063020	Escutcheon
003B	2	2	2	403H067010	Cap
004B	4	4	4	403H259010	Bushing
005B	2	2	2	001H259110	Bushing
012B	4	4	4	403H154010	Knob
013B	4	4	4	403H115010	Spring
011G	1	1	1	208H118010	Spacer

REF. DESIG.	QTY			PART NO.	DESCRIPTION
	U	N	A		
010B	1	1	1	208H154010	Knob
011B	2	2	2	208H154020	Knob
014B	2	2	2	208H154050	Knob
018B	2	2	2	5130030680	B.H. Tapped Screw 83 x 6
019B	2	2	2	5130030680	B.H. Tapped Screw 83 x 6

[C02-99] Lid (Top and Bottom Cover)



- U for U.S.A.
- N for Europe
- A for Australia

REF. DESIG.	QTY			PART NO.	DESCRIPTION
	U	N	A		
001D	1	1	1	208H257010	Lid, Top Cover
002D	4	4	4	51260408U0	B.T. Screw B4 x 8
003D	2	2	2	2991259010	Bushing
004D	1	1	1	208H257020	Lid, Bottom Cover
005D	4	4	4	403H057010	Leg
006D	8	8	8	5128030880	B.H. Tapped Screw B3 x 8
007D	4	4	4	2965118010	Spacer
008D	1	1	1	208H056010	Buffer

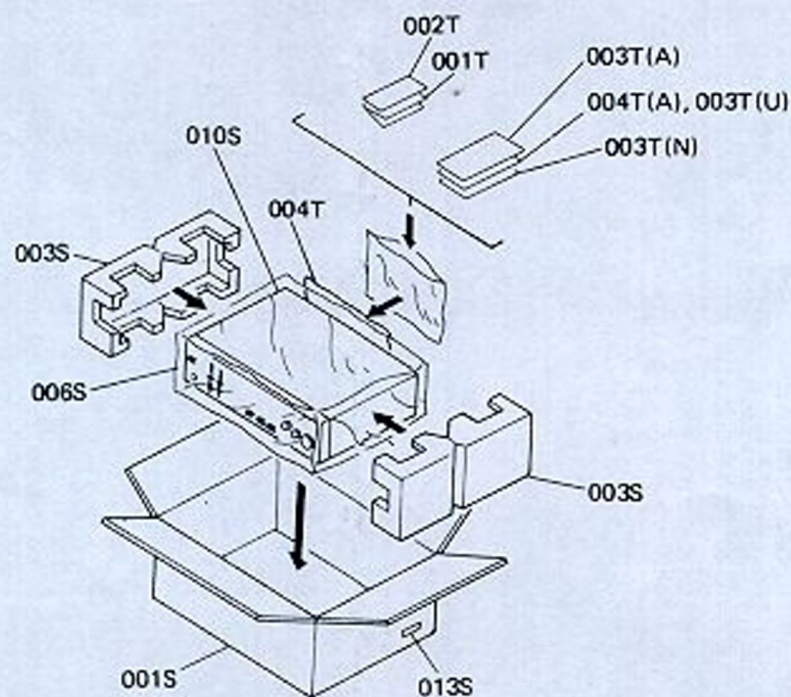
REF. DESIG.	QTY			PART NO.	DESCRIPTION
	U	N	A		
001R	1	1	1	2932861010	Label
002R	1	1	1	2578861010	Label

- U for U.S.A.
- N for Europe
- A for Australia

REF. DESIG.	QTY			PART NO.	DESCRIPTION
	U	N	A		
001F	1	1	1	208H126010	Stay, Right
002F	1	1	1	208H126020	Stay, Left
003F	4	4	4	5128030880	B.H. Tapped Screw 83 x 8
007F	2	2	2	5126030880	B.T. Screw 83 x 8
012F	1	1	1	208H004010	Table
013F	2	2	2	5128030880	B.H. Tapped Screw 83 x 8
014F	2	2	2	5126030880	B.T. Screw 83 x 8
015F	4	4	4	5126040880	B.T. Screw 84 x 8
016F	2	2	2	2147056010	Buffer
017F	2	2	2	208H118020	Spacer
001G	1	1	1	208H160010	Bracket, Front Chassis
002G	2	2	2	51100306A9	B.H.M. Screw 83 x 6
003G	2	2	2	51100306A9	B.H.M. Screw 83 x 6
004G	4	4	4	51100205A0	B.H.M. Screw 82 x 5
016G	1	1	1	208H160030	Bracket, Power LED PWB
017G	1	1	1	5128030880	B.H. Tapped Screw 83 x 8
018G	1	1	1	2276005050	Clamper
001L	1	1	1	207H267010	Heatsink
002L	4	4	4	5128030880	B.H. Tapped Screw 83 x 8
003L	4	4	4	5128030880	B.H. Tapped Screw 83 x 8
005L	1	1	1	62030039W0	Lug
006L	1	1	1	5128030880	B.H. Tapped Screw 83 x 8

REF. DESIG.	QTY			PART NO.	DESCRIPTION
	U	N	A		
△G801			1	DK18103850	Ceramic Cap. 0.01μF
△G001		1		DK18103840	Ceramic Cap. 0.01μF
△G001	1			DK18103530	Ceramic Cap. 0.01μF
△L001			1	TS16624030	Power Transformer
△L001		1		TS16624010	Power Transformer
△L001	1			TS16623010	Power Transformer
△S001		1	1	SP01010390	Push Switch, Power
△S001	1			SP01010420	Push Switch, Power
JW06	1	1	1	YJ01001420	Jack, Head Phone
S012	1	1	1	SR00030050	Rotary Switch
SS02	1	1	1	SS04040040	Slide Switch
W701	1	1	1	YU03220240	Jumper Lead, 3P
W702	1	1	1	YU03120260	Jumper Lead, 3P
W703	1	1	1	YU03300240	Jumper Lead, 3P
W704	1	1	1	YU02400240	Jumper Lead, 2P
W705	1	1	1	YU05090260	Jumper Lead, 5P
W706	1	1	1	YU04100260	Jumper Lead, 4P

[H01-99] Packing Materials



- U for U.S.A.
- N for Europe
- A for Australia

REF. DESIG.	QTY			PART NO.	DESCRIPTION	REF. DESIG.	QTY			PART NO.	DESCRIPTION
	U	N	A				U	N	A		
001S		1	1	207H801020	Packing Case	001T	1		1	207H851010	Instruction
001S	1			207H801010	Packing Case	001T		1		207H851310	Instruction
003S	2	2	2	001H809010	Cushion	002T	1		1	207H851020	Instruction
006S	1	1	1	9090909040	Polyethylene Sheet	002T		1		207H851320	Instruction
010S	1	1	1	2918107350	Sheet	003T			1	2205851040	Instruction
013S			2	9526019030	Serial No. Card	003T		1		207H856010	Circuit Diagram
013S		2		9526019060	Serial No. Card	003T	1			2818854020	Guarantee Card
013S	2			9526019010	Serial No. Card	004T			1	9631000090	Guarantee Card
019S		1		2731821010	Silicagel	004T	1			2918107390	Sheet

14. ELECTRICAL PARTS LIST

- U for U.S.A.
- N for Europe
- A for Australia

REF. DESIG.	QTY			PART NO.	DESCRIPTION
	U	N	A		
P001	1	1	1	YK207H1630 ZZ207H1630	P001-POWER SW CIRCUIT BOARD P.W. Board, Power SW P.W. Board Assembly
G001	1	1	1	DK18103850	P001-CAPACITOR Ceramic 0.01 μ F
G001	1	1	1	DK18103840	Ceramic 0.01 μ F
G001	1	1	1	DK18103830	Ceramic 0.01 μ F
S001	1	1	1	SP01010390	P001-SWITCH Push Switch, Power
S001	1	1	1	SP01010420	Push Switch, Power
P700	1	1	1	YK207H1610 ZZ207H1610 ZZ207H8610	P700-MAIN AMP CIRCUIT BOARD P.W. Board, Main Amp P.W. Board Assembly P.W. Board Assembly
C401	1	1	1	EA33505030	P700-CAPACITORS Elect 3.3 μ F 50V
C402	1	1	1	EA33505030	Elect 3.3 μ F 50V
C403	1	1	1	DK16221300	Ceramic 220pF $\pm$ 10%
C404	1	1	1	DK16221300	Ceramic 220pF $\pm$ 10%
C405	1	1	1	DF16332300	Film 3300pF $\pm$ 10%
C406	1	1	1	DF16332300	Film 3300pF $\pm$ 10%
C407	1	1	1	DF16123300	Film 0.012 μ F $\pm$ 10%
C408	1	1	1	DF16123300	Film 0.012 μ F $\pm$ 10%
C409	1	1	1	EA33505030	Elect 3.3 μ F 50V
C410	1	1	1	EA33505030	Elect 3.3 μ F 50V
C411	1	1	1	EA10701630	Elect 100 μ F 16V
C412	1	1	1	EA10701630	Elect 100 μ F 16V
C415	1	1	1	DK18103300	Ceramic 0.01 μ F +80% -20%
C416	1	1	1	DK18103300	Ceramic 0.01 μ F
C701	1	1	1	EA33505030	Elect 3.3 μ F
C702	1	1	1	EA33505030	Elect 3.3 μ F
C703	1	1	1	DK16101300	Ceramic 100pF
C704	1	1	1	DK16101300	Ceramic 100pF $\pm$ 10%
C705	1	1	1	EA10701030	Elect 1000 μ F 10V
C706	1	1	1	EA10701030	Elect 1000 μ F 10V
C707	1	1	1	EA22601630	Elect 22 μ F 16V
C708	1	1	1	EA22601630	Elect 22 μ F 16V
C709	1	1	1	EA22601630	Elect 22 μ F 16V
C710	1	1	1	EA22601630	Elect 22 μ F 16V
C711	1	1	1	DD15560370	Ceramic 56pF $\pm$ 5%
C712	1	1	1	DD15560370	Ceramic 56pF $\pm$ 5%
C713	1	1	1	EA10605030	Elect 10 μ F 50V
C714	1	1	1	EA10605030	Elect 10 μ F 50V
C715	1	1	1	DK17103300	Ceramic 0.01 μ F $\pm$ 20%
C716	1	1	1	DK17103300	Ceramic 0.01 μ F $\pm$ 20%

REF. DESIG.	QTY			PART NO.	DESCRIPTION
	U	N	A		
C717	1	1	1	DF17332350	Film 3300pF $\pm$ 20%
C718	1	1	1	DF17332350	Film 3300pF $\pm$ 20%
C719	1	1	1	DF17332350	Film 3300pF $\pm$ 20%
C720	1	1	1	DF17332350	Film 3300pF $\pm$ 20%
C721	1	1	1	DK16101550	Ceramic 100pF $\pm$ 10%
C722	1	1	1	DK16101550	Ceramic 100pF $\pm$ 10%
C725	1	1	1	DF16473540	Film 0.047 μ F $\pm$ 10%
C726	1	1	1	DF16473540	Film 0.047 μ F $\pm$ 10%
C727	1	1	1	DD15151370	Ceramic 150pF $\pm$ 5%
C728	1	1	1	DD15151370	Ceramic 150pF $\pm$ 5%
C803	1	1	1	E868803520	Elect 6800 μ F 35V
C804	1	1	1	E868803520	Elect 6800 μ F 35V
C805	1	1	1	EA10703530	Elect 100 μ F 35V
C807	1	1	1	EA33603530	Elect 33 μ F 35V
C808	1	1	1	EA33603530	Elect 33 μ F 35V
C811	1	1	1	EA10505030	Elect 1 μ F 50V
C812	1	1	1	EA10505030	Elect 1 μ F 50V
CN01	1	1	1	EA33700630	Elect 330 μ F 6.3V
CN02	1	1	1	EA10505030	Elect 1 μ F 50V
CN03	1	1	1	EA33603530	Elect 33 μ F 35V
R401	1	1	1	GD05154140	P700-RESISTORS (All Resistors are $\pm$ 5% and XW) 150k Ω
R402	1	1	1	GD05154140	150k Ω
R403	1	1	1	GD05683140	68k Ω
R404	1	1	1	GD05683140	68k Ω
R405	1	1	1	GD05222140	2.2k Ω
R406	1	1	1	GD05222140	2.2k Ω
R407	1	1	1	GD05471140	470 Ω
R408	1	1	1	GD05471140	470 Ω
R409	1	1	1	GD05223140	22k Ω
R410	1	1	1	GD05223140	22k Ω
R411	1	1	1	GD05274140	270k Ω
R412	1	1	1	GD05274140	270k Ω
R413	1	1	1	GD05103140	10k Ω
R414	1	1	1	GD05103140	10k Ω
R415	1	1	1	GG05101140	100 Ω
R416	1	1	1	GG05101140	100 Ω
R417	1	1	1	GD05271140	270 Ω
R418	1	1	1	GD05271140	270 Ω
R701	1	1	1	GD05471140	470 Ω
R702	1	1	1	GD05471140	470 Ω
R703	1	1	1	GD05683140	68k Ω
R704	1	1	1	GD05683140	68k Ω
R705	1	1	1	GD05103140	10k Ω
R706	1	1	1	GD05103140	10k Ω
R707	1	1	1	GD05393140	39k Ω
R708	1	1	1	GD05393140	39k Ω
R709	1	1	1	GD05391140	390 Ω
R710	1	1	1	GD05391140	390 Ω
R711	1	1	1	GD05104140	100k Ω
R712	1	1	1	GD05104140	100k Ω

- U for U.S.A.
- N for Europe
- A for Australia

REF. DESIG.	QTY			PART NO.	DESCRIPTION
	U	N	A		
R713	1	1	1	GD05682140	6.8k Ω
R714	1	1	1	GD05682140	6.8k Ω
R715	1	1	1	GD05682140	6.8k Ω
R716	1	1	1	GD05682140	6.8k Ω
R717	1	1	1	GD05333140	33 k Ω
R718	1	1	1	GD05333140	33 k Ω
R719	1	1	1	GD05392140	3.9k Ω
R720	1	1	1	GD05392140	3.9k Ω
R721	1	1	1	GD05392140	3.9k Ω
R722	1	1	1	GD05392140	3.9k Ω
R723	1	1	1	GD05222140	2.2k Ω
R724	1	1	1	GD05222140	2.2k Ω
R725	1	1	1	RD02020180	Trimming (B) 2k Ω
R726	1	1	1	RD02020180	Trimming (B) 2k Ω
R727	1	1	1	GD05122140	1.2k Ω
R728	1	1	1	GD05122140	1.2k Ω
R729	1	1	1	GD05152140	1.5k Ω
R730	1	1	1	GD05152140	1.5k Ω
R731	1	1	1	GD05563140	56k Ω
R732	1	1	1	GD05563140	56k Ω
R733	1	1	1	GD05151140	150 Ω
R734	1	1	1	GD05151140	150 Ω
R735	1	1	1	GD05333140	33k Ω
R736	1	1	1	GD05333140	33k Ω
R737	1	1	1	GD05822140	8.2k Ω
R738	1	1	1	GD05822140	8.2k Ω
R739	1	1	1	GD05822140	8.2k Ω
R740	1	1	1	GD05822140	8.2k Ω
R741	1	1	1	GD05471140	470 Ω
R742	1	1	1	GD05471140	470 Ω
R743	1	1	1	GD05471140	470 Ω
R744	1	1	1	GD05471140	470 Ω
R745	1	1	1	GD05221120	220 Ω 1/2W
R746	1	1	1	GD05221120	220 Ω 1/2W
R747	1	1	1	GB05272020	0.27 Ω 2W
R748	1	1	1	GB05272020	0.27 Ω 2W
R749	1	1	1	GB05272020	0.27 Ω 2W
R750	1	1	1	GB05272020	0.27 Ω 2W
R751	1	1	1	GA05100020	10 Ω 2W
R752	1	1	1	GA05100020	10 Ω 2W
R753	1	1	1	GG05022120	2.2 1/2W
R754	1	1	1	GG05022120	2.2 1/2W
R755	1	1	1	GD05561140	560 Ω
R756	1	1	1	GD05561140	560 Ω
R757	1	1	1	GD05273140	27k Ω
R758	1	1	1	GD05273140	27k Ω
R759	1	1	1	GD05123140	12k Ω
R760	1	1	1	GD05123140	12k Ω
R761	1	1	1	GG05100120	10 Ω 1/2W
R762	1	1	1	GG05100120	10 Ω 1/2W

REF. DESIG.	QTY			PART NO.	DESCRIPTION
	U	N	A		
R802	1	1	1	GA05222020	2.2k Ω
R803	1	1	1	GD05182140	1.8k Ω
R805	1	1	1	GA05121010	120 Ω 1W
R806	1	1	1	GG05471120	470 Ω 1/2W
R807	1	1	1	GD05272140	2.7k Ω
R808	1	1	1	GD05272140	2.7k Ω
R809	1	1	1	GA05820030	82 Ω 3W
R810	1	1	1	GA05390010	39 Ω 1W
RN01	1	1	1	GD05471140	470 Ω
RN02	1	1	1	GD05471140	470 Ω
RN03	1	1	1	GD05103140	10k Ω
RN04	1	1	1	GD05474140	470k Ω
RN05	1	1	1	GD05154140	150k Ω
RN06	1	1	1	GD05124140	120k Ω
RN07	1	1	1	GD05104140	100k Ω
P700-SEMICONDUCTORS					
Q401	1	1	1	HC10003090	IC 4558D
Q701	1	1	1	HT107502C0	Transistor 2SA750 E or F
Q702	1	1	1	HT107502C0	Transistor 2SA750 E or F
Q703	1	1	1	HT107502C0	Transistor 2SA750 E or F
Q704	1	1	1	HT107502C0	Transistor 2SA750 E or F
Q705	1	1	1	HD20003210	Diode IS2471
Q706	1	1	1	HD20003210	Diode IS2471
Q707	1	1	1	HT314001E0	Transistor 2SC1400 (E)
Q708	1	1	1	HT314001E0	Transistor 2SC1400 (E)
Q709	1	1	1	HT309452B0	Transistor 2SC945 P or Q
Q710	1	1	1	HT309452B0	Transistor 2SC945 P or Q
Q711	1	1	1	HT322402A0	Transistor 2SC2240 GR or BL
Q712	1	1	1	HT322402A0	Transistor 2SC2240 GR or BL
Q713	1	1	1	HD20001210	Diode IS2473
Q714	1	1	1	HD20001210	Diode IS2473
Q715	1	1	1	HD20001210	Diode IS2473
Q716	1	1	1	HD20001210	Diode IS2473
Q717	1	1	1	HD20001210	Diode IS2473
Q718	1	1	1	HD20001210	Diode IS2473
Q719	1	1	1	HD20001210	Diode IS2473
Q720	1	1	1	HD20001210	Diode IS2473
Q721	1	1	1	HT309452B0	Transistor 2SC945 P or Q
Q722	1	1	1	HT309452B0	Transistor 2SC945 P or Q
Q723	1	1	1	HT107332A0	Transistor 2SC733 P or Q
Q724	1	1	1	HT107332A0	Transistor 2SC733 P or Q
Q725	1	1	1	HT322742B0	Transistor 2SC2274 E or F
Q726	1	1	1	HT322742B0	Transistor 2SC2274 E or F
Q727	1	1	1	HT109842B0	Transistor 2SA984 E or F
Q728	1	1	1	HT109842B0	Transistor 2SA984 E or F
Q729	1	1	1	HT406133B0	Transistor 2SD613 DE or F
Q730	1	1	1	HT406133B0	Transistor 2SD613 DE or F
Q731	1	1	1	HT206333B0	Transistor 2SB633 DE or F
Q732	1	1	1	HT206333B0	Transistor 2SB633 DE or F
Q801	1	1	1	HD20008290	Diode S4VB20
Q805	1	1	1	HD20015030	Diode DS135D
Q806	1	1	1	HD30014010	Zener HZ16L
Q807	1	1	1	HT405712B0	Transistor 2SD571
Q808	1	1	1	HT107332A0	Transistor 2SA733 P or Q
Q809	1	1	1	HD30014010	Zener HZ16L
Q810	1	1	1	HD30014010	Zener HZ16L
Q812	1	1	1	HD30042090	Zener 8Z052

- U for U.S.A.
- N for Europe
- A for Australia

REF. DESIG.	QTY			PART NO.	DESCRIPTION
	U	N	A		
QN01	1	1	1	HT30945280	Transistor 2SC945 P or Q
QN02	1	1	1	HT30945280	Transistor 2SC945 P or Q
QN03	1	1	1	HD20015030	Diode DS135D
QN04	1	1	1	HT30945280	Transistor 2SC945 P or Q
QN05	1	1	1	HT107332A0	Transistor 2SA733 P or Q
QN06	1	1	1	HD30023090	Zener WZ071
P700-MISCELLANEOUS					
L701	1	1	1	LL23905120	Choke Coil
L702	1	1	1	LL23905120	Choke Coil
△F801	1			FS10315800	Fuse
△F802	1			FS10315800	Fuse
RS07	1	1	1	RM01040400	Variable Resistor 100k Ω x2
RS08	1	1	1	RK02040110	Variable Resistor 200k Ω
SS02	1	1	1	SS04040040	Slide Switch
JV01	1	1	1	YT02060130	Terminal
JV02	1	1	1	YT02040260	Terminal
JV03	1	1	1	YT03040190	Terminal
P701-POWER TR. CIRCUIT BOARD					
P701	1	1	1	YK207H1620	P.W. Board, Power TR.
	1	1	1	ZZ207H1620	P.W. Board Assembly
P701-TRANSISTOR					
Q729	1	1	1	HT40613380	Transistor 2SD613 DE or F
PE00-TONE CONTROL CIRCUIT BOARD					
PE00	1	1	1	YK207H1650	P.W. Board, Tone Control
	1	1	1	ZZ207H1650	P.W. Board Assembly
PE00-CAPACITORS					
CE01	1	1	1	EA10603530	Elect 10 μ F 35V
CE02	1	1	1	EA10603530	Elect 10 μ F 35V
CE03	1	1	1	DF16393300	Film 0.039 μ F $\pm$ 10%
CE04	1	1	1	DF16393300	Elect 0.039 μ F $\pm$ 10%
CE05	1	1	1	EA33405030	Elect 0.33 μ F 50V
CE06	1	1	1	EA33405030	Elect 0.33 μ F 50V
CE07	1	1	1	DK16181300	Ceramic 180pF $\pm$ 10%
CE08	1	1	1	DK16181300	Ceramic 180pF $\pm$ 10%
CE09	1	1	1	DF16122300	Film 1200pF $\pm$ 10%
CE10	1	1	1	DF16122300	Film 1200pF $\pm$ 10%
CE11	1	1	1	DF16123300	Film 0.012 μ F $\pm$ 10%
CE12	1	1	1	DF16123300	Film 0.012 μ F $\pm$ 10%
CE13	1	1	1	EA10405030	Elect 0.1 μ F 50V
CE14	1	1	1	EA10405030	Elect 0.1 μ F 50V

REF. DESIG.	QTY			PART NO.	DESCRIPTION
	U	N	A		
PE00-RESISTORS (All Resistors are $\pm 5\%$ and $\frac{1}{4}W$)					
RE01	1	1	1	GD05682140	6.8k
RE02	1	1	1	GD05682140	6.8k
RE03	1	1	1	RS05030350	Variable 50k Ω x2
RE04	1	1	1	RS05030350	Variable 50k Ω x2
RE05	1	1	1	GD05821140	820 Ω
RE06	1	1	1	GD05821140	820 Ω
RE07	1	1	1	GD05680140	68 Ω
RE08	1	1	1	GD05680140	68 Ω
RE09	1	1	1	GD05821140	820 Ω
RE10	1	1	1	GD05821140	820 Ω
RE11	1	1	1	GD05121140	120 Ω
RE12	1	1	1	GD05121140	120 Ω
PS00-SW/VR ASS'Y CIRCUIT BOARD					
PS00	1	1	1	YK207H1660	P.W. Board, SW/VR Ass'y
	1	1	1	ZZ207H1660	P.W. Board Assembly
PS00-CAPACITORS					
CS01	1	1	1	DK16271300	Ceramic 270pF $\pm 10\%$
CS02	1	1	1	DK16271300	Ceramic 270pF $\pm 10\%$
CS03	1	1	1	DF16683300	Film 0.068 μ F $\pm 10\%$
CS04	1	1	1	DF16683300	Film 0.068 μ F $\pm 10\%$
PS00-RESISTORS (All Resistors are $\pm 5\%$ and $\frac{1}{4}W$)					
RS01	1	1	1	GD05472140	4.7k Ω
RS02	1	1	1	GD05472140	4.7k Ω
RS03	1	1	1	GD05273140	27k Ω
RS04	1	1	1	GD05273140	27k Ω
RS05	1	1	1	GD05822140	8.2k Ω
RS06	1	1	1	GD05822140	8.2k Ω
PS00-SWITCH					
SS01	1	1	1	SP020301100	Push Switch
PW00-PHONE ASS'Y CIRCUIT BOARD					
PW00	1	1	1	YK207H1640	P.W. Board, Phone Ass'y
	1	1	1	ZZ207H1640	P.W. Board Assembly
RW01	1	1	1	GA05331010	Resistor 330 Ω $\pm 5\%$ 1W
RW02	1	1	1	GA05331010	Resistor 330 Ω $\pm 5\%$ 1W
JW06	1	1	1	YJ01001420	Head Phone Jack
PX01-LED LEVEL METER DRIVE CIRCUIT BOARD					
PX01	1	1	1	WN207H3210	P.W. Board, LED Level Meter Drive
				ZZ207H3210	P.W. Board Assembly
PX01-CAPACITORS					
CX01	1	1	1	EA33505030	Elect 3.3 μ F 50V
CX02	1	1	1	EA33505030	Elect 3.3 μ F 50V
CX03	1	1	1	EA10505030	Elect 1 μ F 50V
CX04	1	1	1	EA10505030	Elect 1 μ F 50V
CX05	1	1	1	DF16103300	Film 0.01 μ F $\pm 10\%$
CX06	1	1	1	DF16103300	Film 0.01 μ F $\pm 10\%$

- U for U.S.A.
- N for Europe
- A for Australia

REF. DESIG.	QTY			PART No.	DESCRIPTION
	U	N	A		
					PX01-RESISTORS (All Resistors are $\pm 5\%$ and $\frac{1}{4}W$)
RX01	1	1	1	GD05103140	10k Ω
RX02	1	1	1	GD05103140	10k Ω
RX03	1	1	1	GD05104140	100k Ω
RX04	1	1	1	GD05104140	100k Ω
RX07	1	1	1	RA02030060	Trimming 20k Ω
RX08	1	1	1	RA02030060	Trimming 20k Ω
RX25	1	1	1	GD05563140	56k Ω
RX26	1	1	1	GD05563140	56k Ω
RX27	1	1	1	GD05183140	18k Ω
RX28	1	1	1	GD05183140	18k Ω
					PX01-SEMICONDUCTORS
QX01	1	1	1	HD30076090	Zener WZ038
QX02	1	1	1	HD30076090	Zener WZ038
QX03	1	1	1	HD20001210	Diode IS2473
QX04	1	1	1	HD20001210	Diode IS2473
QX05	1	1	1	HC10008370	IC TL489C
QX06	1	1	1	HC10008370	IC TL489C
QX07	1	1	1	HC10019020	IC AN6552
QX21	1	1	1	HD20001210	Diode IS2473
QX22	1	1	1	HD20001210	Diode IS2473
					PX01-MISCELLANEOUS
JX01	1	1	1	YJ07000750	Jack
					PX02-LED LEVEL METER CIRCUIT BOARD
PX02	1	1	1	WN207H3220	P.W. Board, LED Level Meter
	1	1	1	ZZ207H3220	P.W. Board Assembly
					PX02-RESISTORS (All Resistors are $\pm 5\%$ and $\frac{1}{4}W$)
RX10	1	1	1	GD05271140	270 Ω
RX11	1	1	1	GD05561140	560 Ω
RX12	1	1	1	GD05561140	560 Ω
RX13	1	1	1	GD05561140	560 Ω
RX14	1	1	1	GD05561140	560 Ω
RX15	1	1	1	GD05561140	560 Ω
RX16	1	1	1	GD05561140	560 Ω
RX17	1	1	1	GD05561140	560 Ω
RX18	1	1	1	GD05561140	560 Ω
RX19	1	1	1	GD05561140	560 Ω
RX20	1	1	1	GD05561140	560 Ω
					PX02-SEMICONDUCTORS
QX08	1	1	1	HI10006320	L.E.D. GL-9NG9
QX09	1	1	1	HI10007320	L.E.D. GL-9PR9
QX10	1	1	1	HI10007320	L.E.D. GL-9PR9
QX11	1	1	1	HI10007320	L.E.D. GL-9PR9
QX12	1	1	1	HI10007320	L.E.D. GL-9PR9
QX13	1	1	1	HI10007320	L.E.D. GL-9PR9
QX14	1	1	1	HI10007320	L.E.D. GL-9PR9
QX15	1	1	1	HI10007320	L.E.D. GL-9PR9
QX16	1	1	1	HI10007320	L.E.D. GL-9PR9
QX17	1	1	1	HI10007320	L.E.D. GL-9PR9
QX18	1	1	1	HI10007320	L.E.D. GL-9PR9

(W01-99)	Assembly and Wiring
(T01-99)	Adjustment
(X01-00)	Correction

15. TECHNICAL SPECIFICATIONS

AUDIO SECTION

POWER OUTPUT, DIN, 8 OHM, PER CHANNEL	28W
POWER OUTPUT, RMS 1 kHz, 8 OHM, PER CHANNEL	25W
TOTAL HARMONIC DISTORTION AT RATED POWER OUTPUT	0.3%
I.M. DISTORTION AT RATED POWER OUTPUT	
(250 Hz AND 8 kHz MIXED, AMPLITUDE RATIO 4:1)	0.3%
POWER BANDWIDTH	10 Hz ~ 30 kHz
DAMPING FACTOR 8 OHM	50

Frequency Response

Phono (RIAA)	±1.0 dB
Aux (±1 dB)	15 Hz ~ 50 kHz

Signal-to-Noise Ratio (IHF-A Network)

Phono (MM)	74 dB
Aux	96 dB

Input Terminals

Phono: Input Impedance	47 k ohms
Input Capacitance	250 pF
Overload Margin	33 dB
Input sensitivity	2.8 mV
Aux: Input Impedance	25 k ohms
Input Sensitivity	150 mV

Phono Equivalent Input Noise	0.5 μ V
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Phono Dynamic Range (Ratio of input overload to equivalent input noise)	93 dB
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Channel Balance (0 to -40 dB/40 Hz ~ 16 kHz)

Phono	Less than 2.0 dB
Aux	Less than 2.0 dB

Output Voltage, 1 kHz

Tape Out	415 mV
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Output Impedance, 1 kHz

Tape Out	220 ohms
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GENERAL

Power Requirements	220 V AC, 50 Hz
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(N version is featuring an external voltage selector for use on 110V. Other versions can be converted by a qualified technician to operate on 240V.)

Power Consumption at Rated Output, both Channels Driven	105W
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Idling Power	16W
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Semiconductor Complement

Transistors	29
Diodes	22
Integrated Circuits	4

Dimensions

Panel Width	416 mm
Panel Height	73 mm
Depth	302 mm

Weight

Unit Alone	4.8 kg
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Specifications and appearance are subject to change for modification without notice.