

**SERVICE
MANUAL** **PM310**



marantz

model PM310

Stereophonic Amplifier

MARANTZ DESIGN AND SERVICE

Using superior design and selected high grade components, MARANTZ Company has created the ultimate in stereo sound. Only original MARANTZ parts can insure that your MARANTZ product will continue to perform to the specifications for which it is famous.

Parts for your MARANTZ stereo are generally available within 72 hours throughout the nation via a toll-free line to our National Parts Depot in California. The sales professionals who take your call immediately refer to their own desk top computer terminal and can quickly determine the availability and price information you require. If for some reason, your order should exceed our available stock, we usually can instantly provide an alternate replacement part or current delivery information. When the order is placed and confirmed, the computer simultaneously generates "hard copy" orders at the distribution center. As hard copies come directly from the computer to the national parts depot, your requested stock is assembled and prepared for shipment and placed on the first available carrier for delivery to you.

ORDERING PARTS

Phone orders will eliminate mail delays, and we encourage the use of this method. If you order by mail, use MARANTZ parts order forms which are available from our National Parts Depot located at the following address:

SUPERSCOPE NATIONAL PARTS DEPARTMENT
20525 Nordhoff Street
Chatsworth, California 91311
Phone: 1-800-423-5108
1-213-998-9333

The following information must be supplied to eliminate delays in processing your order:

1. Complete address.
2. Complete part numbers.
3. Complete description of parts.
4. Model number for which part is required (indicate MARANTZ).
5. Account number (for account customers only).

Direct consumers will be provided with the current retail price quotation on available parts in order to advise them of the cost of the parts and shipping.

OVERSEAS PARTS ORDERING

Parts may also be ordered from the following overseas addresses:

CANADA

Superscope Canada, Ltd.
3710 Nashua Drive
Mississauga
Ontario, Canada L4V1M5

AUSTRALIA

Superscope (Australasia) Pty., Ltd.
32 Cross Street (P.O.Box 604)
Brookvale 2100 N.S.W.
Australia

JAPAN

Marantz Japan, Inc.
3622 Kamitsuruma
Sagamihara Shi
Kanagawa, Japan

EUROPE

Superscope Europe, S.A.
Avenue Leopold III, 2
7120 Perennes-Lez-Binche
Belgium

Marantz France
Rue Louis Armand 9
92600 Asnieres
Hauts-de-Seine
France

Marantz Audio U.K. Ltd.
London Road, 203
Staines
Middlesex
England

Superscope GmbH
Max-Planck-Strass 22
D-6072 Dreieich
West Germany

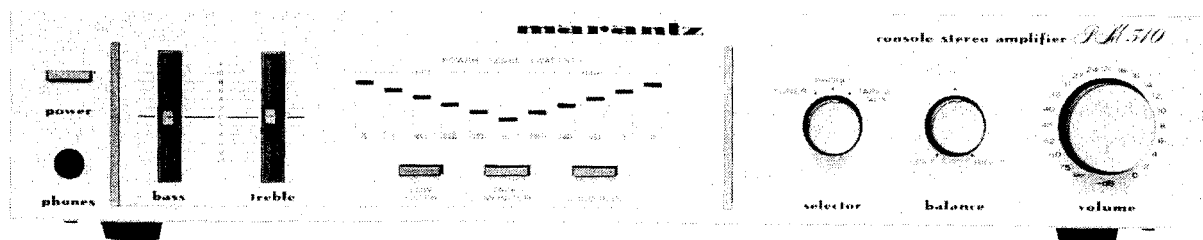
All of the above locations are fully equipped to take care of your total service needs. Because various countries have differing configuration requirements, it is necessary that you contact the service facility in your particular country. In the event that there is no service location listed for your country, please contact the nearest facility for the necessary assistance.

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We sound better.

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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

1. Excessive line consumption
 - a. Check for shorted Q801.
 - b. Check for shorted transistor Q729, through Q732.
 - c. Check for open Q709, Q710, R725, R726.
2. No line consumption or zero bias voltage
 - a. Check line cord, fuse, check for shorted Q709, Q710, R725, R726.
 - b. Check for open rectifiers Q801 or open L001.
3. High hum and noise level
 - a. Check filter capacitors C808, C809, C801, C803.
 - b. 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 Audio Oscillator AC Voltmeter	Sound Technology Model 1700B	Distortion measurements Sinewave and squarewave signal source 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

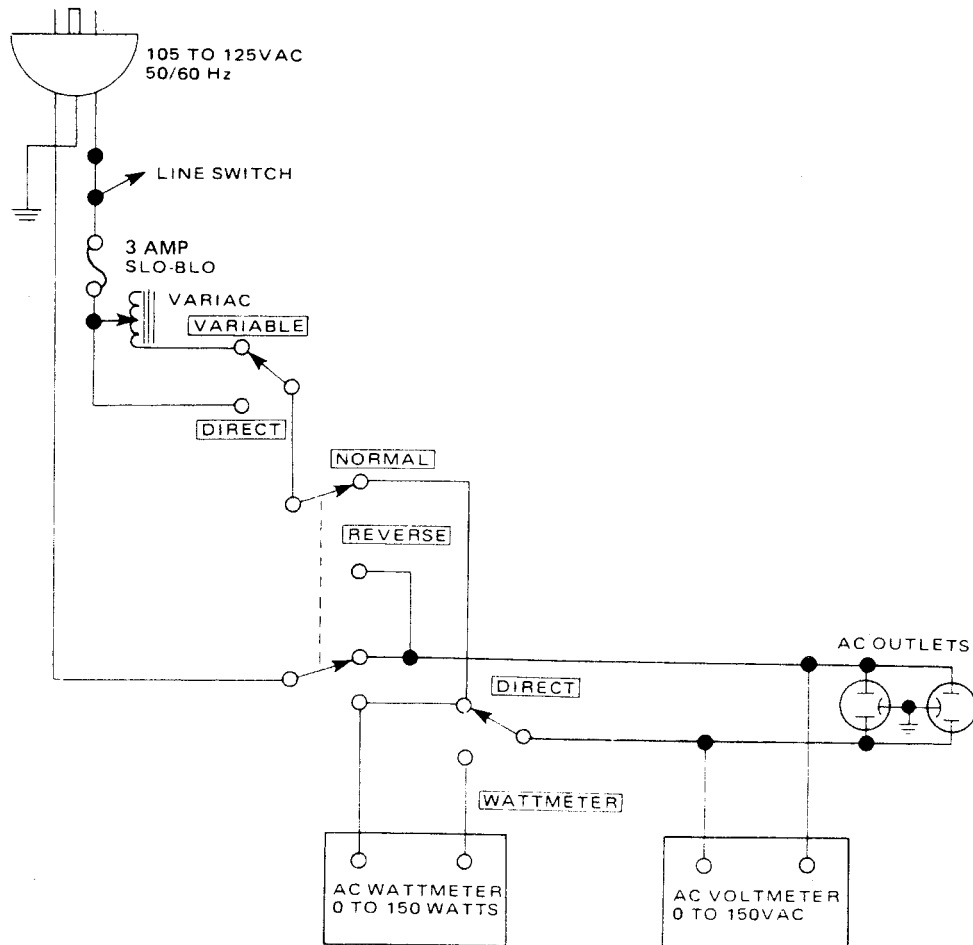


Figure 1. AC Power Control Box Simplified Schematic

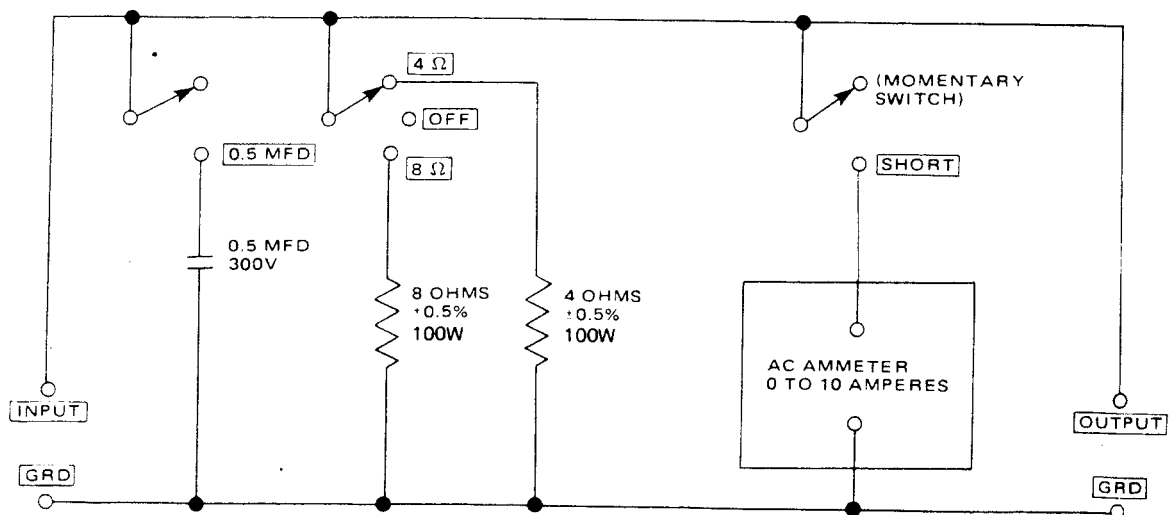


Figure 2. Amplifier Output Load Box Simplified Schematic

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.

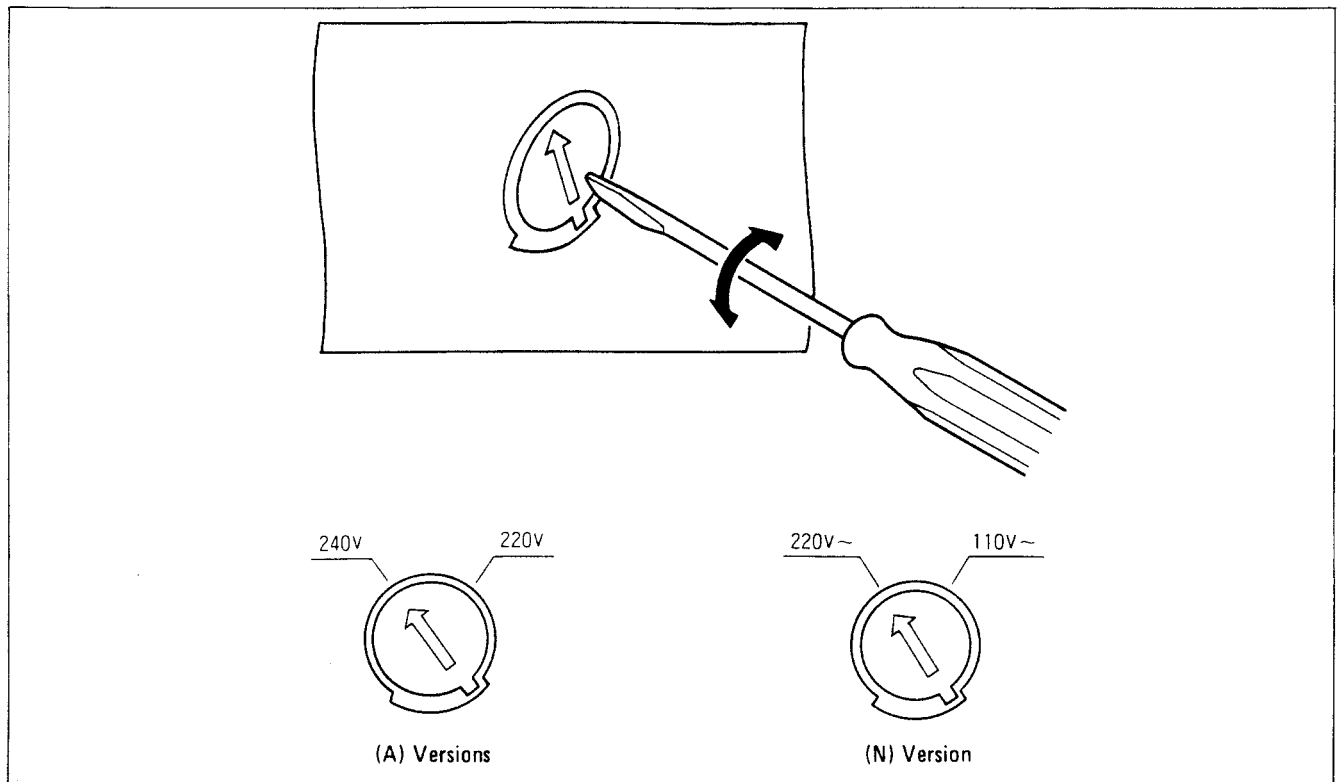
6. Switch the distortion analyzer back to SET LEVEL. (Do not readjust sensitivity of analyzer.)
7. Change the frequency of the audio oscillator and distortion analyzer to 1 kHz. Adjust audio oscillator output for a full scale reading on the 0 ~ 1% scale.
8. Measure the distortion, verifying it is no 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.

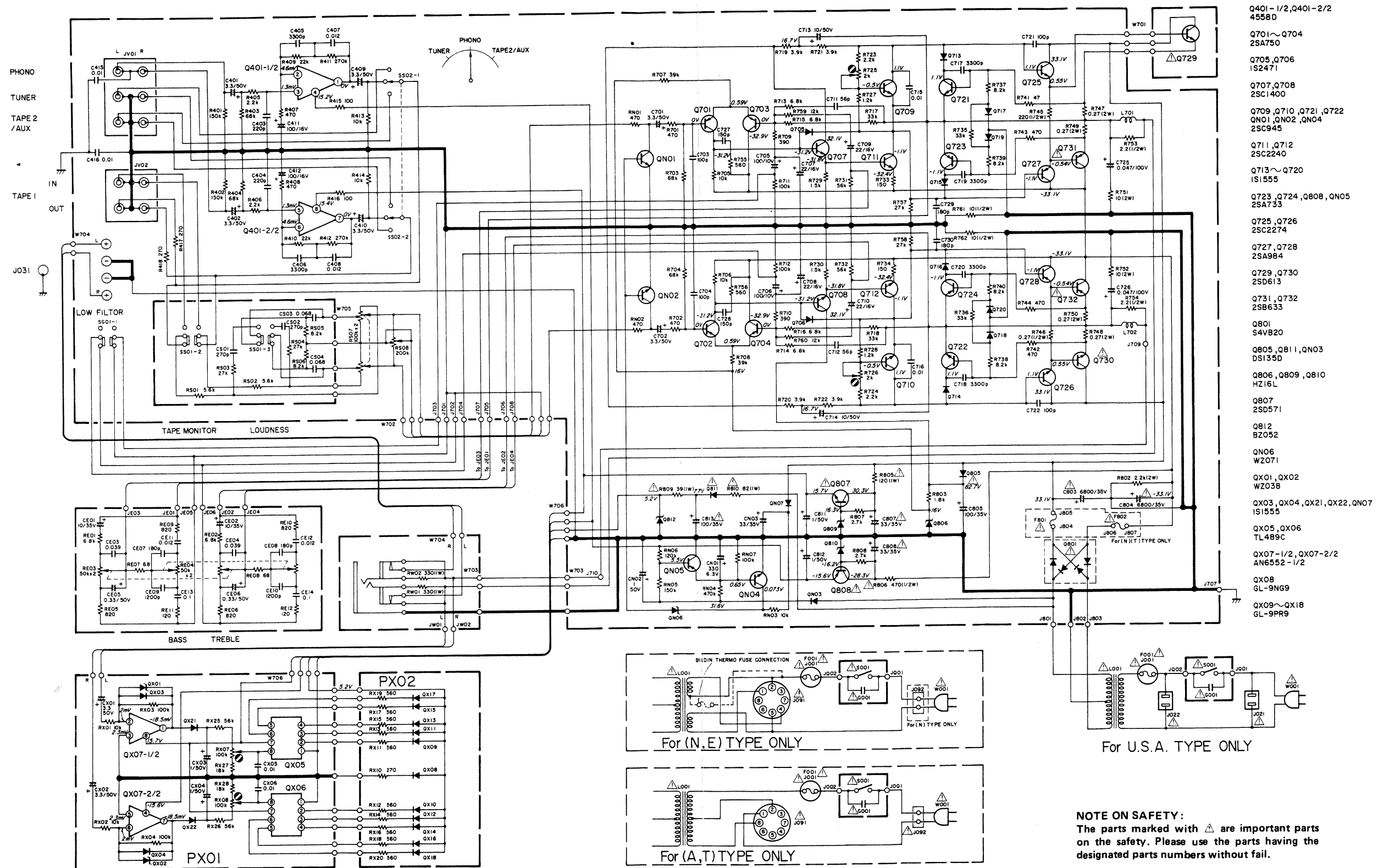
**CAUTION: DISCONNECT POWER SUPPLY CORD FROM AC OUTLET BEFORE CONVERTING VOLTAGE.
PLEASE DO NOT DISASSEMBLE THE VOLTAGE SELECTOR ABSOLUTELY.**

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.

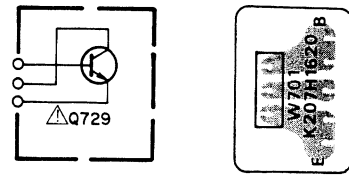
10. SCHEMATIC DIAGRAM



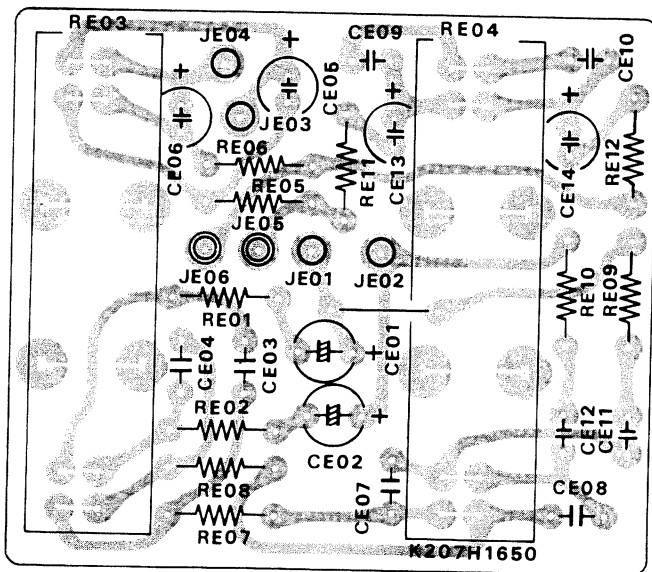
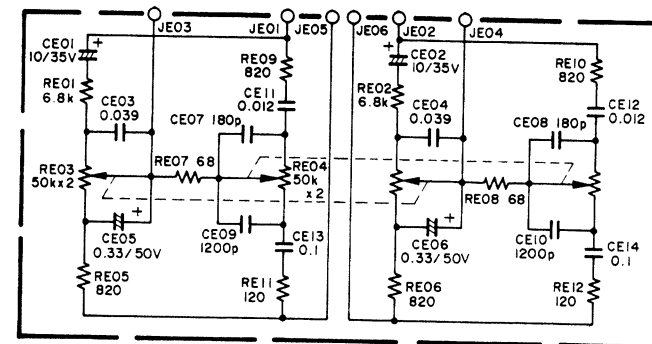
Components and wiring are subject to change for modification without notice.

11. DIAGRAM AND COMPONENT LOCATIONS

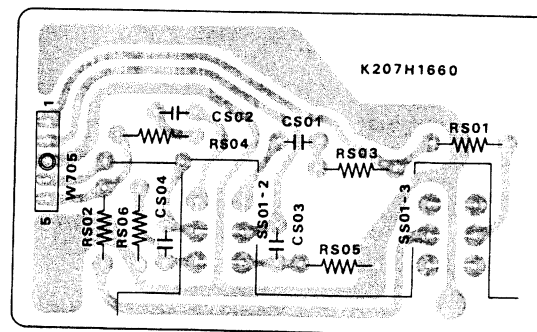
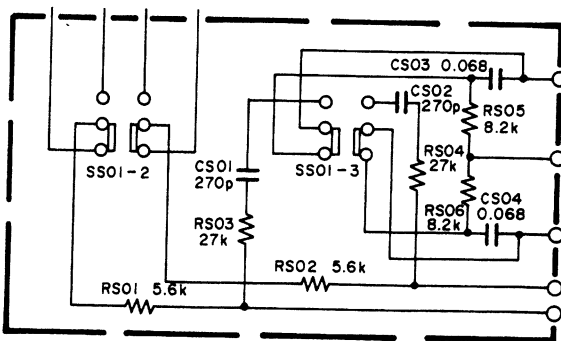
11.2 Power TR. Assembly (P701) Schematic Diagram and Component Locations



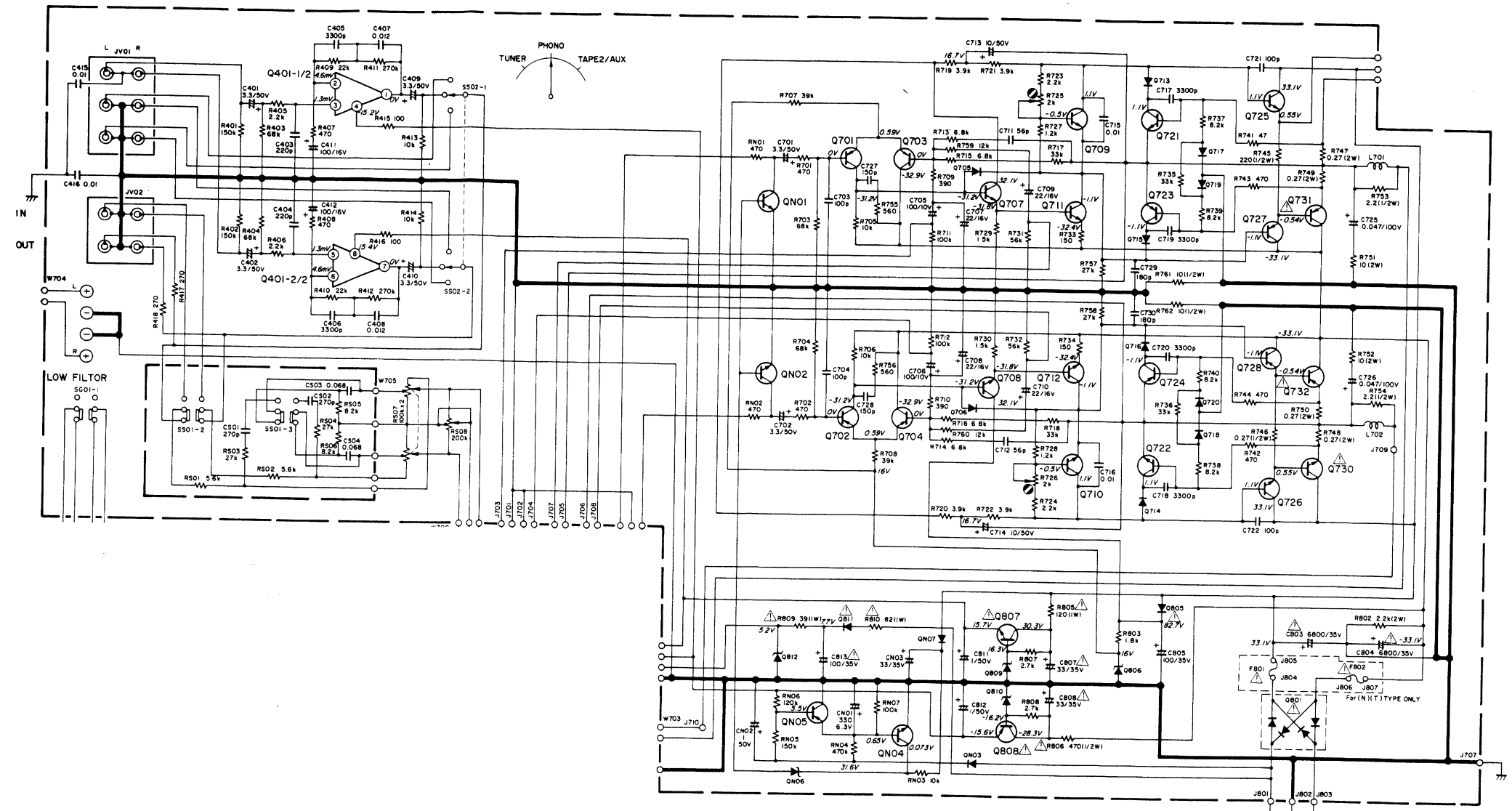
11.3 Tone Control Assembly (PE00) Schematic Diagram and Component Locations



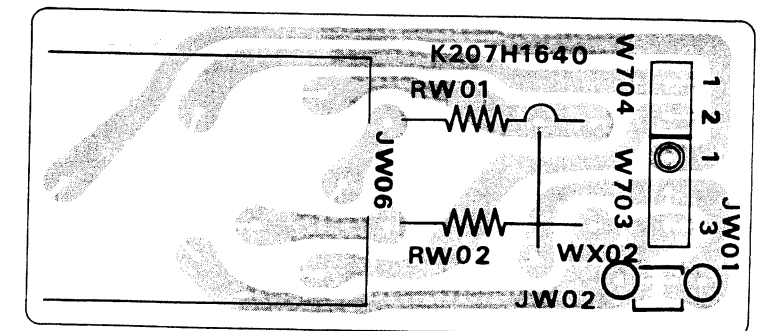
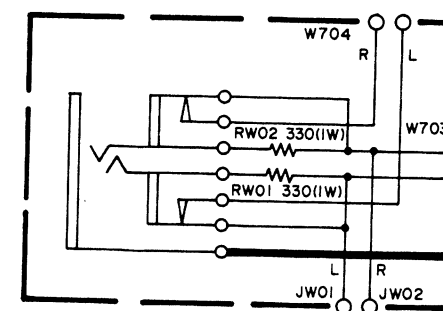
11.4 Switch/VR. Assembly (PS00) Schematic Diagram and Component Locations

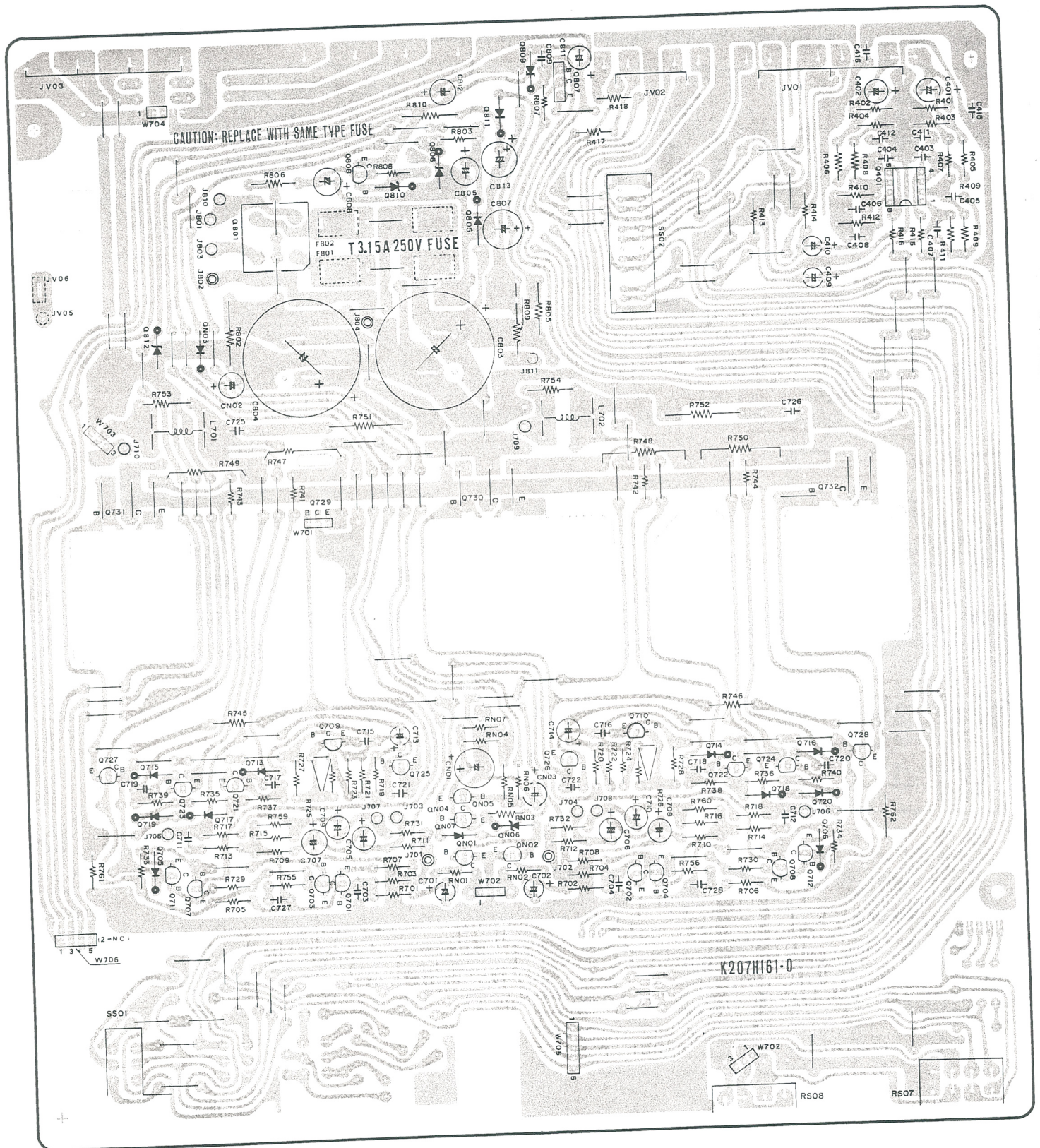


11.1 Main Assembly (P700) Schematic Diagram and Component Locations

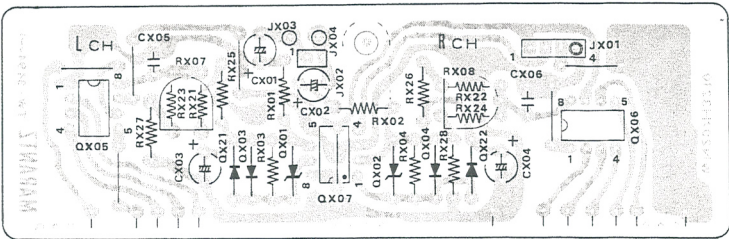
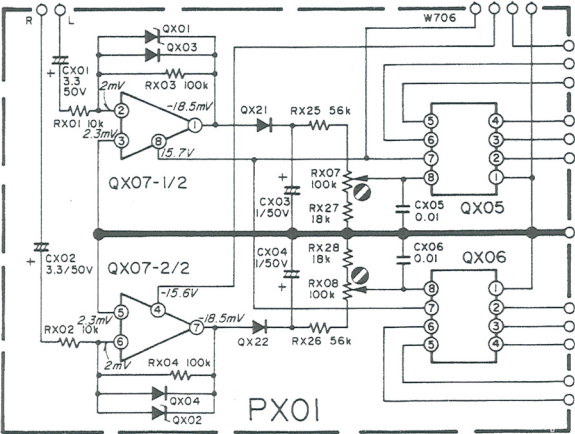


11.5 Phone Assembly (PW00) Schematic Diagram and Component Locations

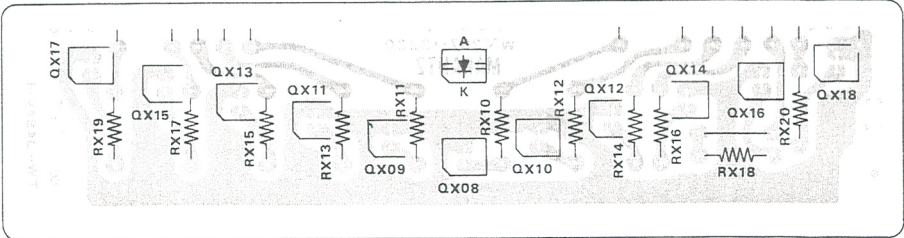
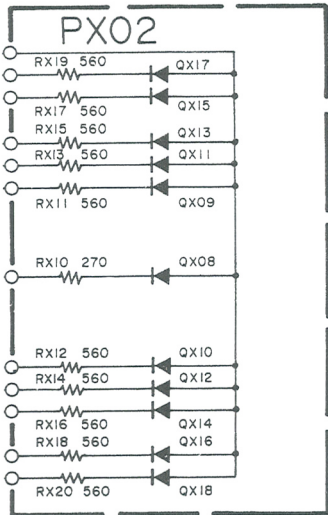




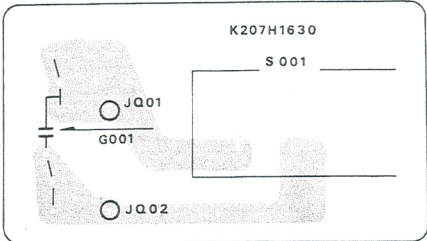
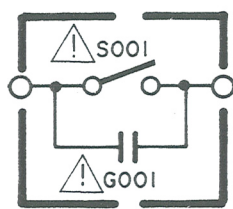
11.6 Led Level Meter Drive Assembly (PX01) Schematic Diagram and Component Locations



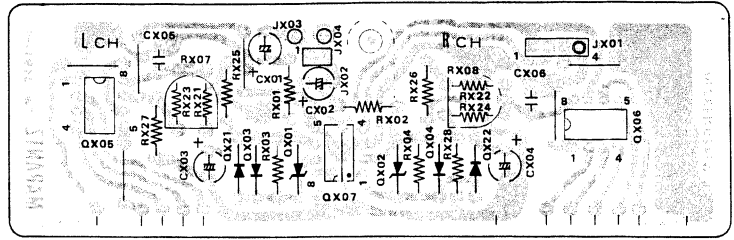
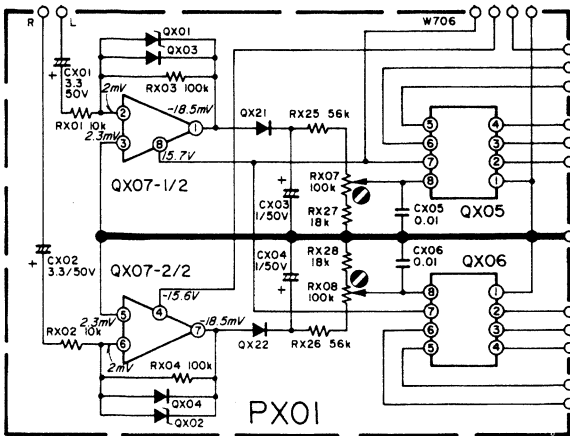
11.7 Led Level Meter Assembly (PX02) Schematic Diagram and Component Locations



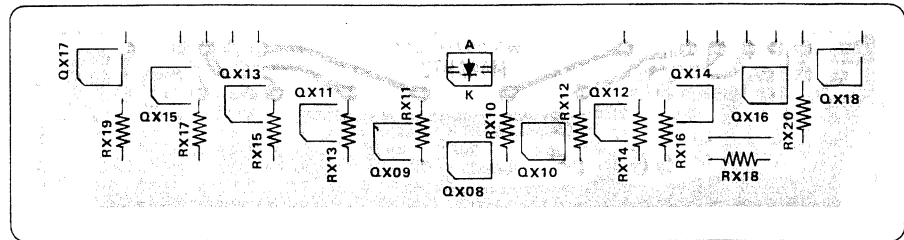
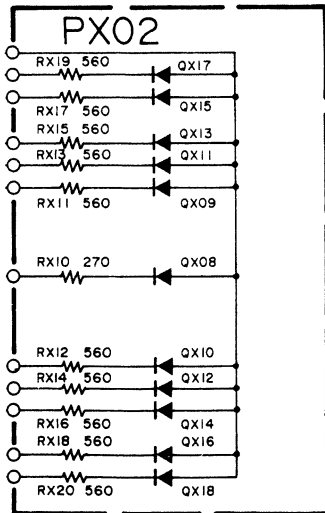
11.8 Power Switch Assembly (P001) Schematic Diagram and Component Locations



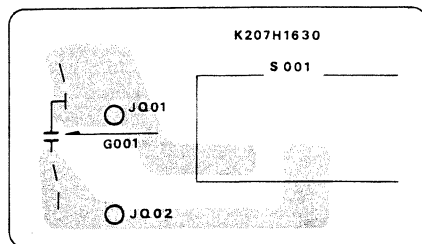
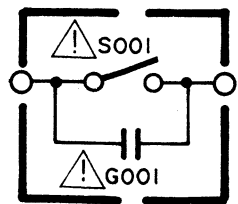
11.6 Led Level Meter Drive Assembly (PX01) Schematic Diagram and Component Locations

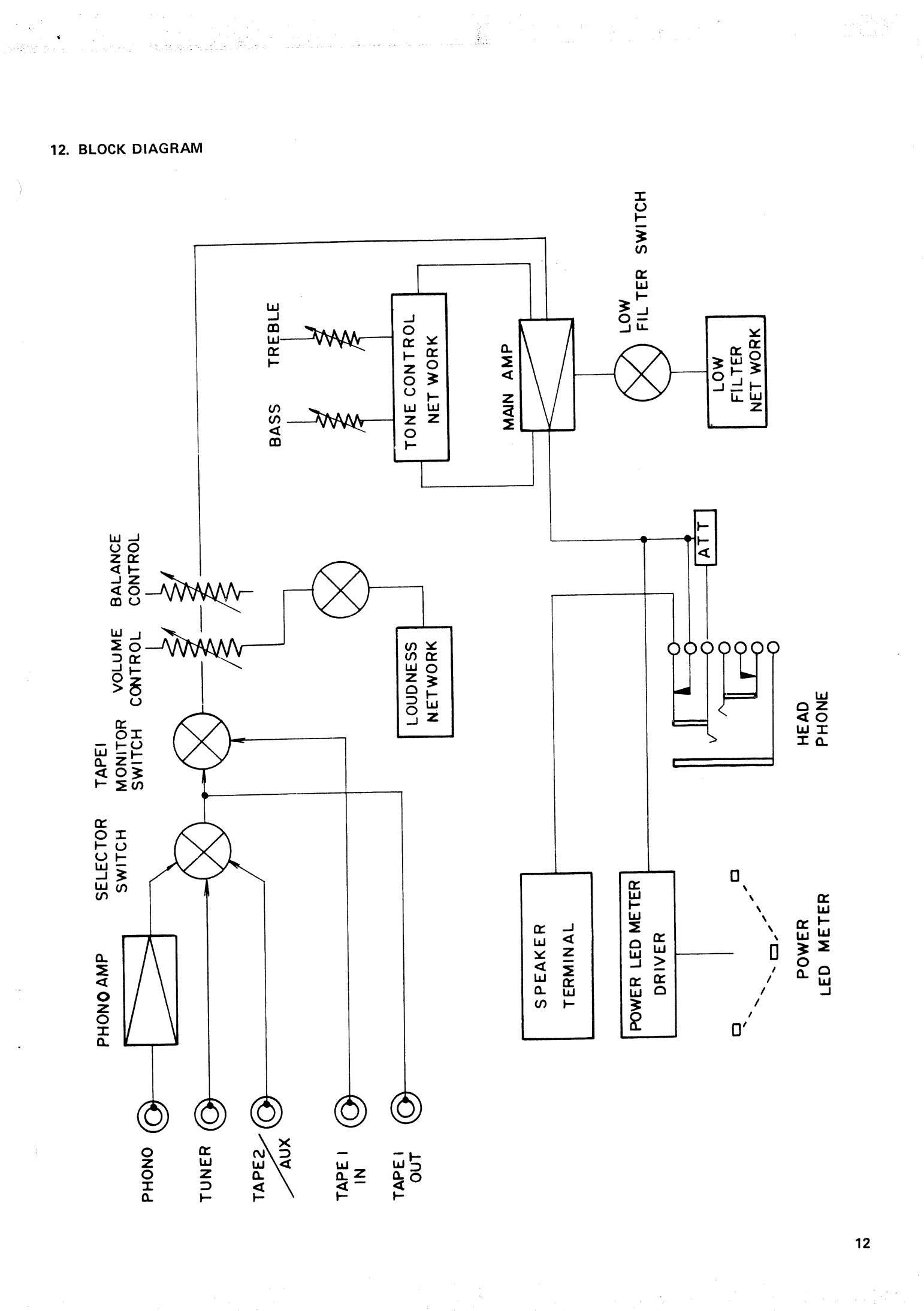


11.7 Led Level Meter Assembly (PX02) Schematic Diagram and Component Locations



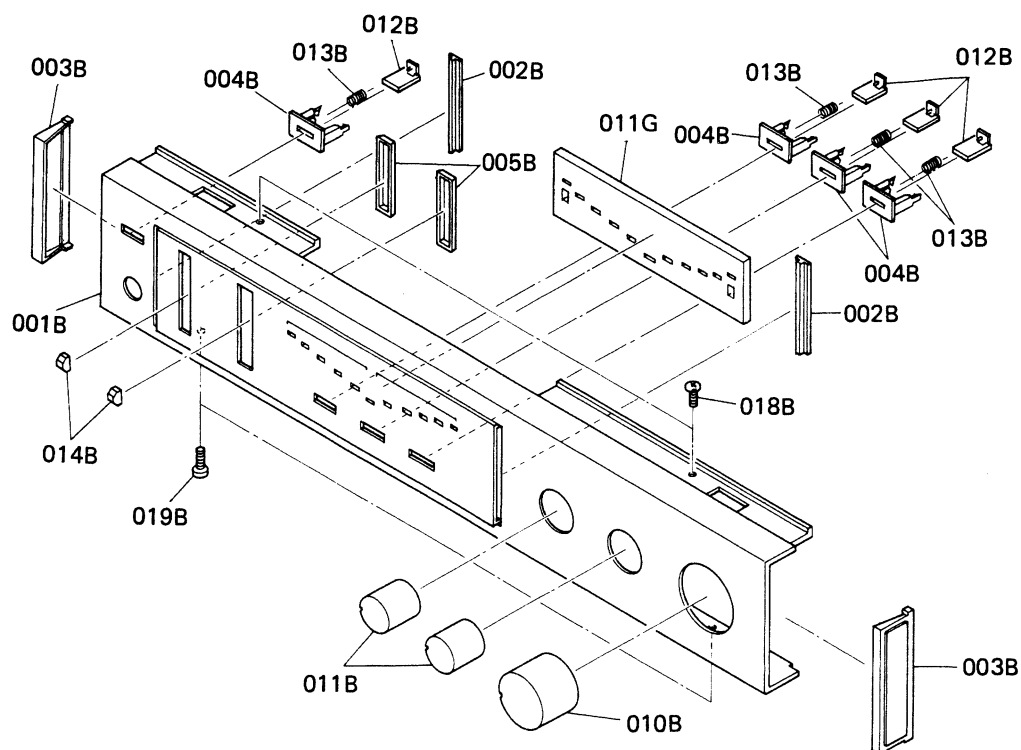
11.8 Power Switch Assembly (P001) Schematic Diagram and Component Locations





13. EXPLODED VIEW AND PARTS LIST

[C01-99] Front Panel

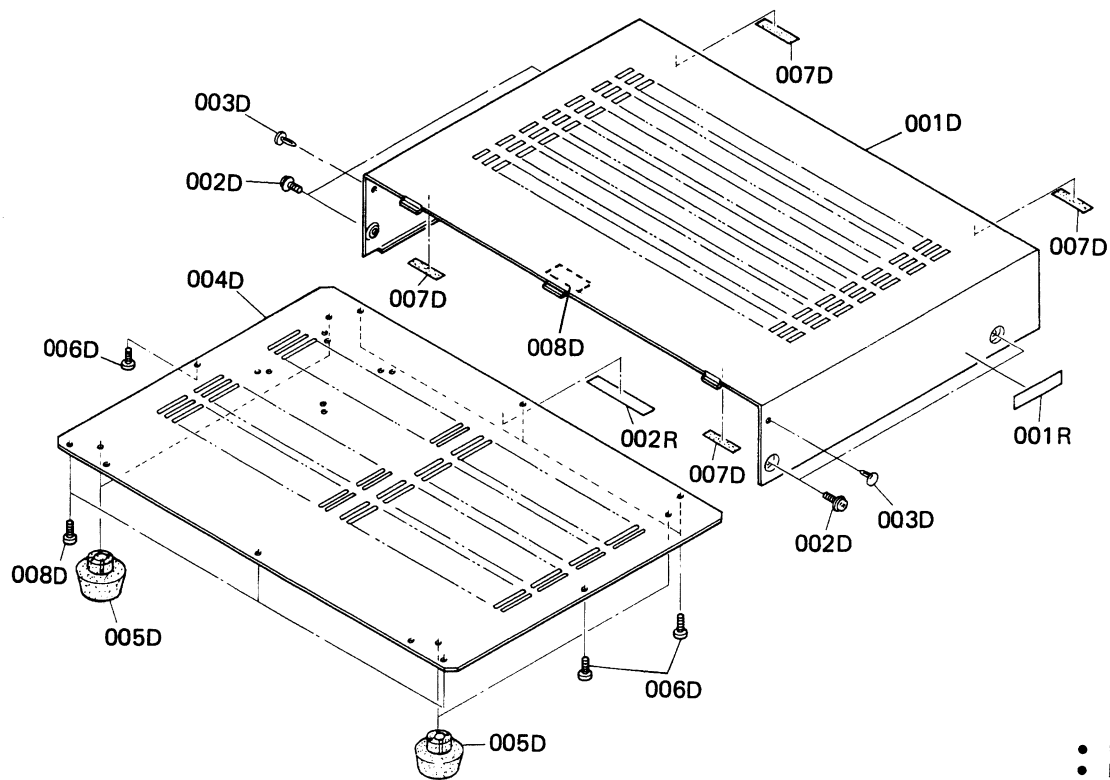


- U for U.S.A.
- N for Europe
- A for Australia

REF. DESIG.	Q'TY			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.	Q'TY			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	51300306B0	B.H. Tapped Screw B3 x 6
019B	2	2	2	51300306B0	B.H. Tapped Screw B3 x 6

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

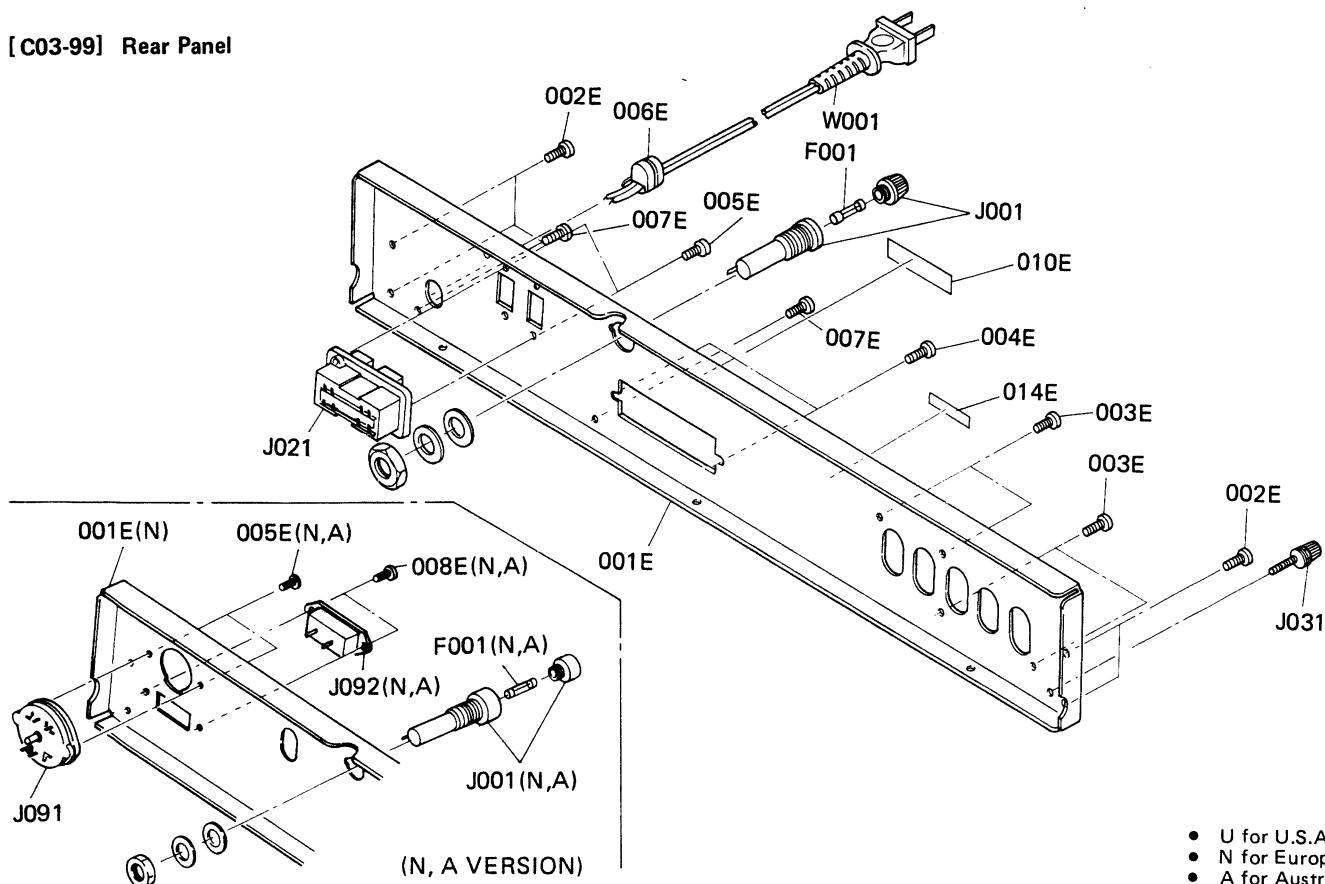


- U for U.S.A.
- N for Europe
- A for Australia

REF. DESIG.	Q'TY			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	51280308B0	B.H. Tapped Screw B3 x 8
007D	4	4	4	2965118010	Spacer
008D	1	1	1	208H056010	Buffer

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

[C03-99] Rear Panel



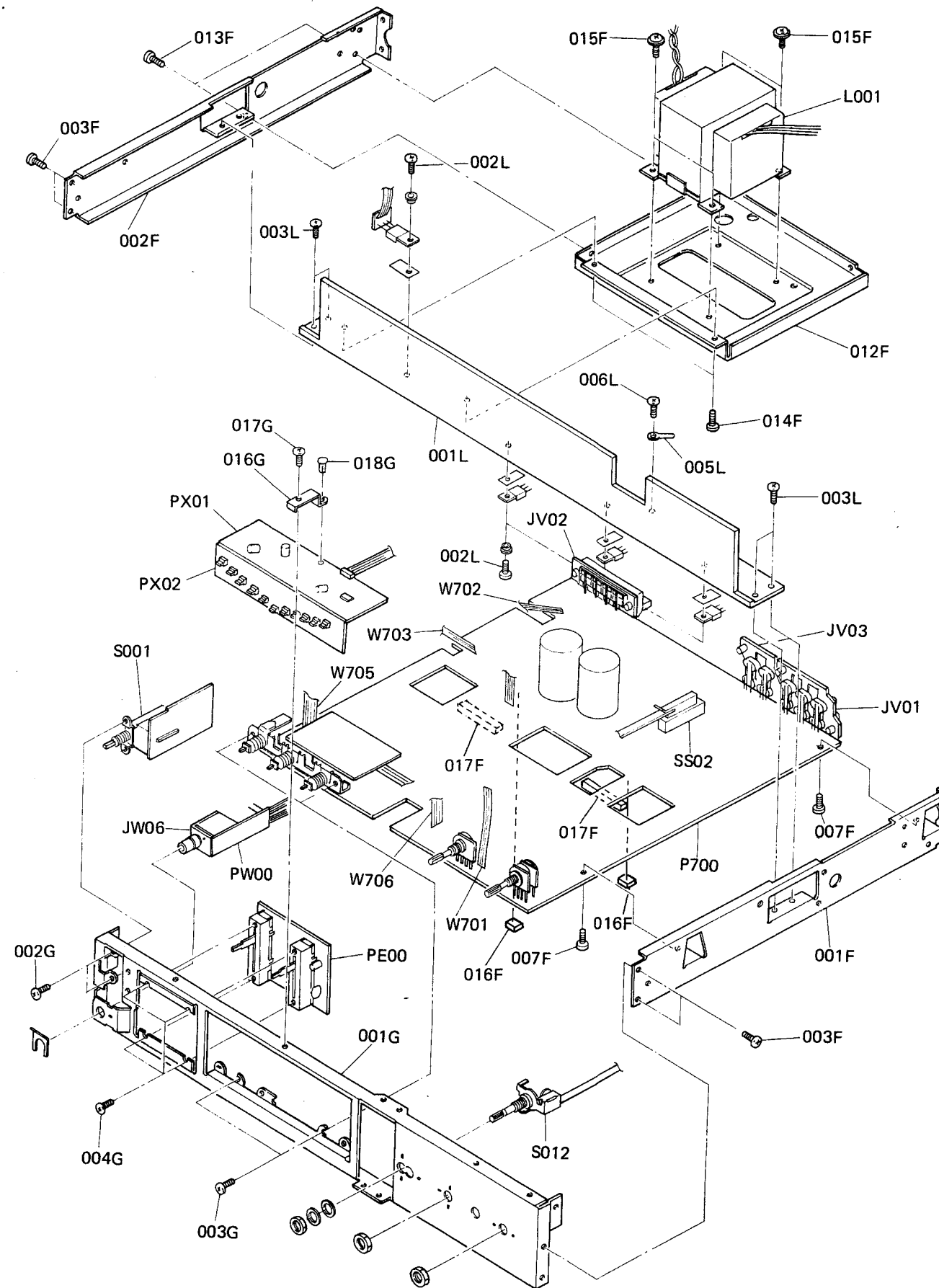
- U for U.S.A.
- N for Europe
- A for Australia

REF. DESIG.	Q'TY			PART NO.	DESCRIPTION
	U	N	A		
001E	1			207H160230	Bracket, Rear Panel
001E		1		207H160240	Bracket, Rear Panel
001E	1			207H160210	Bracket, Rear Panel
002E	4	4	4	51280308U0	B.H. Tapped Screw B3 x 8
003E	4	4	4	51280308U0	B.H. Tapped Screw B3 x 8
004E	2	2	2	51280308U0	B.H. Tapped Screw B3 x 8
005E	2	2	2	51280308U0	B.H. Tapped Screw B3 x 8
006E	1			1455259030	Bushing
007E	2	2	2	51280308U0	B.H. Tapped Screw B3 x 8
008E	2	2	2	51280308U0	B.H. Tapped Screw B3 x 8
010E	1	1	1	2112265010	Indicator
014E		1		4581861010	Label
△ F001	1	1	1	FS10063800	Fuse 630mm AT
△ F001	1			FS10150500	Fuse 1.5A

REF. DESIG.	Q'TY			PART NO.	DESCRIPTION
	U	N	A		
△ J001		1	1	YJ08000290	Jack
△ J001	1			YJ08000310	Jack
△ J021		1		YJ04000740	Jack, AC Outlet
△ J091			1	BY05030040	Voltage Selector (220/240V)
△ J091		1		BY05060040	Voltage Selector (110/220V)
△ J092		1	1	YB04000590	Plug, Inlet
J031	1	1	1	YL03010250	Terminal, Ground
△ W001			1	ZC02006030	A.C. Power Cord
△ W001		1		ZC01805030	A.C. Power Cord
△ W001	1			ZC01900070	A.C. Power Cord
JW06	1	1	1	YJ01001420	Jack, Head Phone

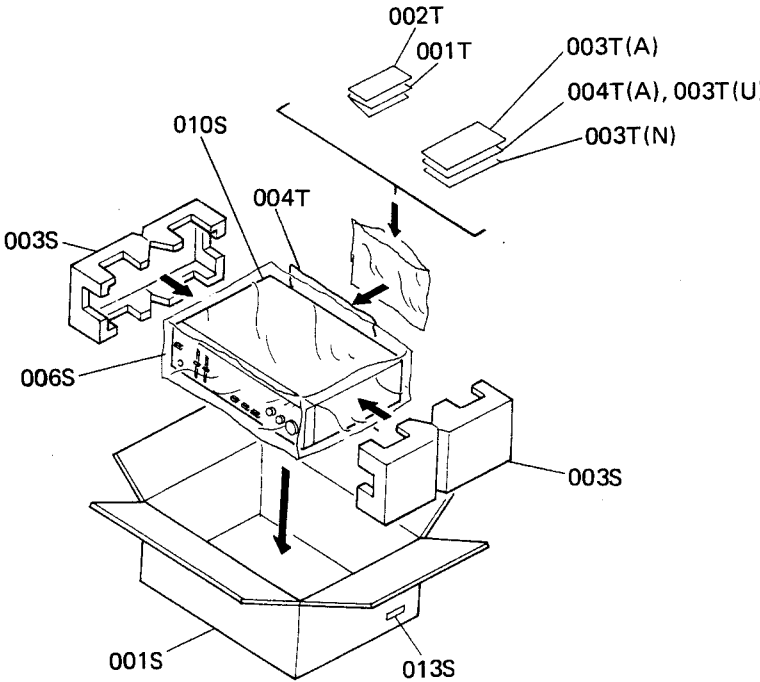
[P01-99] Front Chassis and General Parts

- 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		
001F	1	1	1	208H126010	Stay, Right	△G001			1	DK18103850	Ceramic Cap. 0.01μF
002F	1	1	1	208H126020	Stay, Left	△G001			1	DK18103840	Ceramic Cap. 0.01μF
003F	4	4	4	51280308B0	B.H. Tapped Screw B3 x 8	△G001	1			DK18103530	Ceramic Cap. 0.01μF
007F	2	2	2	51260308B0	B.T. Screw B3 x 8	△L001			1	TS16624030	Power Transformer
012F	1	1	1	208H004010	Table	△L001			1	TS16624010	Power Transformer
013F	2	2	2	51280308B0	B.H. Tapped Screw B3 x 8	△L001	1			TS16623010	Power Transformer
014F	2	2	2	51260308B0	B.T. Screw B3 x 8	△S001			1	SP01010390	Push Switch, Power
015F	4	4	4	51260408B0	B.T. Screw B4 x 8	△S001	1		1	SP01010420	Push Switch, Power
016F	2	2	2	2147056010	Buffer	JW06	1	1	1	YJ01001420	Jack, Head Phone
017F	2	2	2	208H118020	Spacer	S012	1	1	1	SR00030050	Rotary Switch
001G	1	1	1	208H160010	Bracket, Front Chassis	SS02	1	1	1	SS04040040	Slide Switch
002G	2	2	2	51100306A9	B.H.M. Screw B3 x 6	W701	1	1	1	YU03220240	Jumper Lead, 3P
003G	2	2	2	51100306A9	B.H.M. Screw B3 x 6	W702	1	1	1	YU03120260	Jumper Lead, 3P
004G	4	4	4	51100205A0	B.H.M. Screw B2 x 5	W703	1	1	1	YU03300240	Jumper Lead, 3P
016G	1	1	1	208H160030	Bracket, Power LED PWB	W704	1	1	1	YU02400240	Jumper Lead, 2P
017G	1	1	1	51280308B0	B.H. Tapped Screw B3 x 8	W705	1	1	1	YU05090260	Jumper Lead, 5P
018G	1	1	1	2276005050	Clamper	W706	1	1	1	YU04100260	Jumper Lead, 4P
001L	1	1	1	207H267010	Heatsink						
002L	4	4	4	51280308B0	B.H. Tapped Screw B3 x 8						
003L	4	4	4	51280308B0	B.H. Tapped Screw B3 x 8						
005L	1	1	1	62030039W0	Lug						
006L	1	1	1	51280308B0	B.H. Tapped Screw B3 x 8						

[H01-99] Packing Materials



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

REF. DESIG.	Q'TY			PART NO.	DESCRIPTION
	U	N	A		
001S		1	1	207H801020	Packing Case
001S	1			207H801010	Packing Case
003S	2	2	2	001H809010	Cushion
006S	1	1	1	9090909040	Polyethylene Sheet
010S	1	1	1	2918107350	Sheet
013S			2	9526019030	Serial No. Card
013S		2		9526019060	Serial No. Card
013S				9526019010	Serial No. Card
019S		1		2731821010	Silicagel

REF. DESIG.	Q'TY			PART NO.	DESCRIPTION
	U	N	A		
001T	1		1	207H851010	Instruction
001T			1	207H851310	Instruction
002T	1		1	207H851020	Instruction
002T			1	207H851320	Instruction
003T			1	2205851040	Instruction
003T			1	207H856010	Circuit Diagram
003T	1			2818854020	Guarantee Card
004T			1	9631000090	Guarantee Card
004T	1			2918107390	Sheet

14. ELECTRICAL PARTS LIST

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

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

REF. DESIG.	Q'TY			PART NO.	DESCRIPTION
	U	N	A		
C717	1	1	1	DF17332350	Film 3300pF ±20%
C718	1	1	1	DF17332350	Film 3300pF ±20%
C719	1	1	1	DF17332350	Film 3300pF ±20%
C720	1	1	1	DF17332350	Film 3300pF ±20%
C721	1	1	1	DK16101550	Ceramic 100pF ±10%
C722	1	1	1	DK16101550	Ceramic 100pF ±10%
C725	1	1	1	DF16473540	Film 0.047μF ±10%
C726	1	1	1	DF16473540	Film 0.047μF ±10%
C727	1	1	1	DD15151370	Ceramic 150pF ±5%
C728	1	1	1	DD15151370	Ceramic 150pF ±5%
△C803	1	1	1	EB68803520	Elect 6800μF 35V
△C804	1	1	1	EB68803520	Elect 6800μF 35V
C805	1	1	1	EA10703530	Elect 100μF 35V
△C807	1	1	1	EA33603530	Elect 33μF 35V
△C808	1	1	1	EA33603530	Elect 33μF 35V
C811	1	1	1	EA10505030	Elect 1μF 50V
C812	1	1	1	EA10505030	Elect 1μF 50V
CN01	1	1	1	EA33700630	Elect 330μF 6.3V
CN02	1	1	1	EA10505030	Elect 1μF 50V
CN03	1	1	1	EA33603530	Elect 33μF 35V
P700-RESISTORS					
(All Resistors are ±5% and ¼W)					
R401	1	1	1	GD05154140	150kΩ
R402	1	1	1	GD05154140	150kΩ
R403	1	1	1	GD05683140	68kΩ
R404	1	1	1	GD05683140	68kΩ
R405	1	1	1	GD05222140	2.2kΩ
R406	1	1	1	GD05222140	2.2kΩ
R407	1	1	1	GD05471140	470Ω
R408	1	1	1	GD05471140	470Ω
R409	1	1	1	GD05223140	22kΩ
R410	1	1	1	GD05223140	22kΩ
R411	1	1	1	GD05274140	270kΩ
R412	1	1	1	GD05274140	270kΩ
R413	1	1	1	GD05103140	10kΩ
R414	1	1	1	GD05103140	10kΩ
R415	1	1	1	GG05101140	100Ω
R416	1	1	1	GG05101140	100Ω
R417	1	1	1	GD05271140	270Ω
R418	1	1	1	GD05271140	270Ω
R701	1	1	1	GD05471140	470Ω
R702	1	1	1	GD05471140	470Ω
R703	1	1	1	GD05683140	68kΩ
R704	1	1	1	GD05683140	68kΩ
R705	1	1	1	GD05103140	10kΩ
R706	1	1	1	GD05103140	10kΩ
R707	1	1	1	GD05393140	39kΩ
R708	1	1	1	GD05393140	39kΩ
R709	1	1	1	GD05391140	390Ω
R710	1	1	1	GD05391140	390Ω
R711	1	1	1	GD05104140	100kΩ
R712	1	1	1	GD05104140	100kΩ

- 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	GG05221120	220 Ω 1/4W
R746	1	1	1	GG05221120	220 Ω 1/4W
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 1/4W
R754	1	1	1	GG05022120	2.2 1/4W
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 1/4W
R762	1	1	1	GG05100120	10 Ω 1/4W

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 1/4W
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 BZ052

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

REF. DESIG.	Q'TY			PART NO.	DESCRIPTION
	U	N	A		
QN01	1	1	1	HT309452B0	Transistor 2SC945 P or Q
QN02	1	1	1	HT309452B0	Transistor 2SC945 P or Q
QN03	1	1	1	HD20015030	Diode DS135D
QN04	1	1	1	HT309452B0	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 100kΩx2
RS08	1	1	1	RK02040110	Variable Resistor 200kΩ
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	HT406133B0	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 10μF 35V
CE02	1	1	1	EA10603530	Elect 10μF 35V
CE03	1	1	1	DF16393300	Film 0.039μF ±10%
CE04	1	1	1	DF16393300	Elect 0.039μF ±10%
CE05	1	1	1	EA33405030	Elect 0.33μF 50V
CE06	1	1	1	EA33405030	Elect 0.33μF 50V
CE07	1	1	1	DK16181300	Ceramic 180pF ±10%
CE08	1	1	1	DK16181300	Ceramic 180pF ±10%
CE09	1	1	1	DF16122300	Film 1200pF ±10%
CE10	1	1	1	DF16122300	Film 1200pF ±10%
CE11	1	1	1	DF16123300	Film 0.012μF ±10%
CE12	1	1	1	DF16123300	Film 0.012μF ±10%
CE13	1	1	1	EA10405030	Elect 0.1μF 50V
CE14	1	1	1	EA10405030	Elect 0.1μF 50V

REF. DESIG.	Q'TY			PART NO.	DESCRIPTION
	U	N	A		
PE00-RESISTORS (All Resistors are ±5% and ¼W)					
RE01	1	1	1	GD05682140	6.8k
RE02	1	1	1	GD05682140	6.8k
RE03	1	1	1	RS05030350	Variable 50kΩx2
RE04	1	1	1	RS05030350	Variable 50kΩx2
RE05	1	1	1	GD05821140	820Ω
RE06	1	1	1	GD05821140	820Ω
RE07	1	1	1	GD05680140	68Ω
RE08	1	1	1	GD05680140	68Ω
RE09	1	1	1	GD05821140	820Ω
RE10	1	1	1	GD05821140	820Ω
RE11	1	1	1	GD05121140	120Ω
RE12	1	1	1	GD05121140	120Ω
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 ±10%
CS02	1	1	1	DK16271300	Ceramic 270pF ±10%
CS03	1	1	1	DF16683300	Film 0.068μF ±10%
CS04	1	1	1	DF16683300	Film 0.068μF ±10%
PS00-RESISTORS (All Resistors are ±5% and ¼W)					
RS01	1	1	1	GD05472140	4.7kΩ
RS02	1	1	1	GD05472140	4.7kΩ
RS03	1	1	1	GD05273140	27k Ω
RS04	1	1	1	GD05273140	27k Ω
RS05	1	1	1	GD05822140	8.2kΩ
RS06	1	1	1	GD05822140	8.2kΩ
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 330Ω ±5% 1W
RW02	1	1	1	GA05331010	Resistor 330Ω ±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 3.3μF 50V
CX02	1	1	1	EA33505030	Elect 3.3μF 50V
CX03	1	1	1	EA10505030	Elect 1μF 50V
CX04	1	1	1	EA10505030	Elect 1μF 50V
CX05	1	1	1	DF16103300	Film 0.01μF ±10%
CX06	1	1	1	DF16103300	Film 0.01μF ±10%

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

REF. DESIG.	Q'TY			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 µV
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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
(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.