

SERVICE
MANUAL

PM-94



marantz

model PM-94

Stereo 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 equipment are generally available to our National Marantz Subsidiary or Agent.

ORDERING PARTS:

Parts can be ordered either by mail or by telex. In both cases, correct part number has to be specified. If you order by mail, fulfil MARANTZ order forms.

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

1. Complete address
2. Complete part numbers and quantities required
3. Description of parts
4. Model number for which part is required
5. Vlay of shipment
6. Signature: any order form or telex must be signed otherwise such part order will be considered as null and void.

TECHNICAL ASSISTANCE

Should you require any other technical support, do not hesitate to contact the Technical Department of P.M.A.
MARANTZ INTERNATIONAL
Quality & Service Dept.
80, Rue des Druux Carnes,
B-1070 Brussels
Belgium
Phone: 02/525.70.22 or 525.70.23
Telefax: 02/525.8160
Telex: 33550 OR
61511 (PHEMB) routing: BELDMZT

PARTS ORDERING

Parts may be ordered at the following addresses:

AUSTRIA HCRNYPHON Vertriebsgesellschaft Wienberggasse 1 A 1101 Wien Austria Telex: 132.332	FINLAND MARANTZ DIVISION OF OY PHILIPS AB Kälvokatu 8 00100 Helsinki Finland Telex: 124811	GREAT BRITAIN MARANTZ AUDIO U.K. Ltd Unit 15/16 Saxon Way Industrial Estate Moor Lane Hammondswoth UB7 0LW Great Britain Telex: 535195	SAUDI ARABIA AL ALAMIAH ELECTRONICS P.O. Box 1954 University Street Riyadh 11432 Saudi Arabia Telex: 201530	SWITZERLAND DYNAVOX ELECTRONICS Route de Vilars 105 1701 Fribourg Switzerland Telex: 442377
AUSTRALIA MARANTZ AUSTRALIA PTY. Ltd. 19 Chard Road Brookvale NSW 2100 Australia Telex: 24121	FRANCE MARANTZ FRANCE 92600 Asnières France Telex: 611651	GREECE SHERTON ELECTRONICS S.A. P.O. Box 21025 Hippokratia Street 188 Athens 11471 Greece Telex: 215.795	SOUTH AFRICA MARANTZ DIVISION OF PHILIPS S.A. Rainer House One Street, 10 Doomfontein Johannesburg Telex: 483.456	TURKEY DOGRUJOL Ltd. I.M.C. 6 Blok N°8310 Unkapani Istanbul Turkey Telex: 22085
BELGIUM SVD DIVISION MARANTZ Industrielaan 1 1720 Groot-Sijgaarden Belgium Telex: 24456	GERMANY MARANTZ GERMANY GmbH Max-Planck-Strasse 22 6072 Dreieich 1 Germany Telex: 529821	JAPAN MARANTZ JAPAN, Inc. 25-17-chome, Sagamono Sagamihara-shi, Kanagawa Japan	SPAIN PHONO S.A. Ignacio Iglesias 10 Badalona (Barcelona) Spain Telex: 59355	MALTA CACIHA & GALEA Republic Street, 68D Valletta Telex: 1682
CHILE MARANTZ DIVISION OF PHILIPS Av. Santa Maria, 0750 Casilla 2687 Santiago Telex: 240.239	THE NETHERLANDS Eijps D.v. De Limiet 3 4131 NR Vianen The Netherlands Telex: 47879	KUWAIT AL ALAMIAH ELECTRONICS Usama Building Fahd al Saleem Street P.O. Box 23781 Salah-Kuwait Telex: 22694	SWEDEN MARANTZ DIVISION OF PHILIPS Försljning AB Togelövsvägen 1 S-115 84 Stockholm Sweden Telex: 14060	U.S.A. MARANTZ COMPANY, Inc. National Service Department P.O. Box 577 Chatsworth, CA 91311 U.S.A.
DENMARK MARANTZ DIVISION OF PHILIPS SERVICE A/S Prags Boulevard 80 Postbox 1919 DK-2300 København S Denmark Telex: 31201	NORWAY MARANTZ DIVISION OF PHILIPS A/S Sandstuveien 40 Oslo 6 Norway Telex: 72940	ITALY MARANTZ ITALIANA S.P.A. Via Chesca, 74 20126 Milano Italy		

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.

In case of difficulties, do not hesitate to contact the Technical Department at abovementioned address.

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How to use this service manual

- The "Common parts" which Marantz Japan, Inc. has established are eliminated from this service manual.
- These "Common parts" are applied to all models in the service manuals arranged and issued by M.J.I.
- To indicate clearly the common parts in the schematic diagram, a line is drawn above or under the Ref. Desig. No. of applicable parts.
- "Common parts" can be supplied from the Marantz service center as ever.

In case of ordering, please establish the parts number of 10 figures following the procedure mentioned in this service manual "How to establish the parts number for common parts".

(NOTE)

When you order parts to the Marantz parts center, please take notice of the following points.

- 1) Please correctly write the parts number of 10 figures following the rule.
- 2) Since ordering parts by the Ref. Desig. No. or ratings indicated in the schematic diagram does not satisfy the above conditions, the Marantz parts supply system does not work properly.

As this case is apt to cause a trouble, please pay attention to it.



MODEL PM-94 STEREO AMPLIFIER

INTRODUCTION

This service manual was prepared for use by Authorized Warranty Stations and contains service information for the Marantz Model PM-94 Stereo Amplifier.

Service 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.

1. P.W. BOARDS

As can be seen from the circuit diagram the chassis of Model PM-94 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. Tone (L)mounted on P.W. Board PE01
- 2. Tone (R).....mounted on P.W. Board PE02
- 3. Flat Amp/Supplymounted on P.W. Board PG00
- 4. CD Direct/ Balance etcmounted on P.W. Board PN00
- 5. Power Transistor.....mounted on P.W. Board PL00
- 6. Comparator/Protect/ Supplymounted on P.W. Board PN00
- 7. Soft Start Assy.....mounted on P.W. Board PN50
- 8. Main Volume.....mounted on P.W. Board QG00
- 9. Speaker Muting Relaymounted on P.W. Board PR00
- 10. Phono/Speaker Selector.....mounted on P.W. Board PR50
- 11. Tone/Tape 1, 2/ VCR/Mutingmounted on P.W. Board PT00
- 12. Function Selectormounted on P.W. Board PV00
- 13. Tape Play/ Rce/VCR..... mounted on P.W. Board PW00
- 14. Function LED mounted on P.W. Board PY00
- 15. Tape/VCR/Muting Indicatormounted on P.W. Board PZ00
- 16. Phono Amp/ Input Selector mounted on P.W. Board P400
- 17. Power Amp (L).....mounted on P.W. Board P600
- 18. Power Amp (R).....mounted on P.W. Board P700

2. TEST EQUIPMENT REQUIRED FOR SERVICING

This table lists the test equipment required for servicing the Model PM-94 Stereo Amplifier.

Item	Use
Distortion Analyzer	Distortion measurements
Audio Oscillator	Sinewave and squarewave signal source
AC VTVM	Voltage measurements (AC)
Oscilloscope	Waveform analysis and trouble shooting and ASO alignment
Circuit Tester	Trouble shooting
DCVTVM	Voltage measurements (DC)
AC Wattmeter	Monitors primary power to amplifier
Line Voltmeter	Monitors potential of primary power to amplifier
Variable Autotransformer (0 - 140V AC, 10A)	Adjust level of primary power to amplifier
Shorting Plug	Shorts amplifier input to eliminate noise pickup

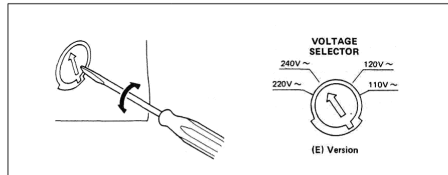
3. VOLTAGE CONVERSION

EUROPEAN MODEL ONLY

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.

Voltage Conversion Chart



Note on safety: Symbol Δ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol Δ . Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.

4. ADJUSTMENT PROCEDURE

1. Adjustment of output offset voltage

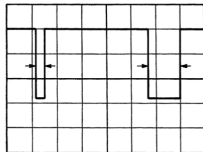
- 1) Remove the MAIN-IN and PRE-OUT plugs, and connect a digital voltmeter set to the DC range to the speaker terminals with no signal and no load on the unit.
- 2) Adjust R622 for L-ch and R722 for R-ch until the indication on the digital voltmeter is ± 10 mV.

2. Idling adjustment

- 1) With no signal or load on the unit, short TP-1 and TP-3 on the P.W. Board (PN00).
- 2) Connect a digital voltmeter set to the DC range between J607 and J707 and adjust J643 and J743 for 36 mV.
- 3) Remove the short between TP-1 and TP-3, and R642 and R742 so that the voltage between J607 and J707 is 180 mV.

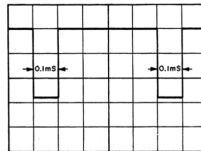
3. Adjustment of quarter "A"

- 1) Connect a DC voltmeter between the emitter and base of QL07 for L-ch. (The meter range is greater than 100 V, with the polarity of the emitter (+) and base (-).)
- 2) Connect the oscilloscope between TP-1 and TP-2 on the P.W. Board, and monitor the waveforms at TP-2 with TP-1 as the reference.
- 3) Connect an 8 ohm load to each of the speaker terminals, and input a 1 kHz to the L channel MAIN-IN. Adjust the input level so that the load on L-ch gives output of 17 V.
- 4) Rotate RN40 (RN41) on the P.W. Board (PN00) and monitor the waveforms on the oscilloscope.



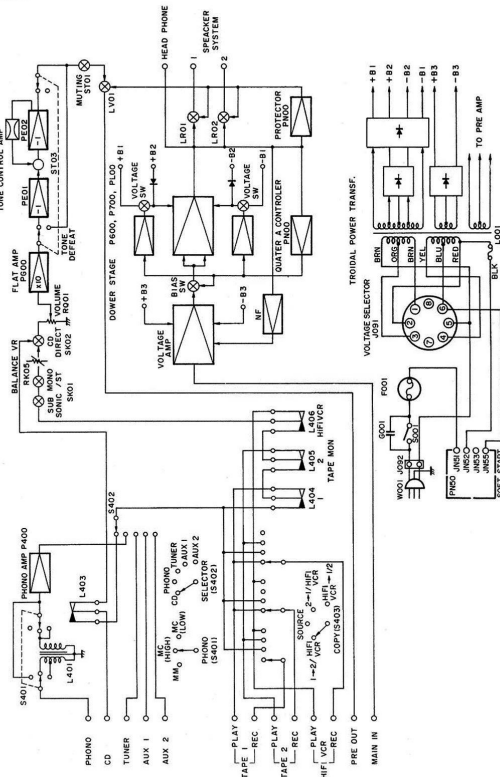
- 5) Adjust RN42 (RN43) so that the pulse width is the same.

- 6) Adjust RN40 (RN41) again to make the pulse width 0.1 ms. Confirm that the voltage at the emitter of Q107 is 63 V.



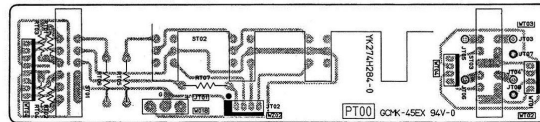
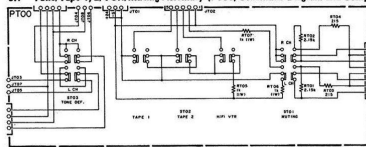
- 7) Lower the input signal and confirm that the voltage at the speaker terminal is 15 V — 16.5 V and the voltage at the emitter of QL07 is 29 V at the point where the pulse disappears.
- 8) Next, connect the DC voltmeter between the emitter and base of QL08 for R-ch. (The meter range is greater than 100 V, with the polarity of the emitter (-) and base (+).)
- 9) Input ± 1 kHz to the R channel MAIN-IN. Adjust the input level so that the load on R-ch gives output of 17 V.
- 10) Adjust items 4 to 7 in the same manner as L-ch. The adjustment locations are those shown in parenthesis.

5. BLOCK DIAGRAM

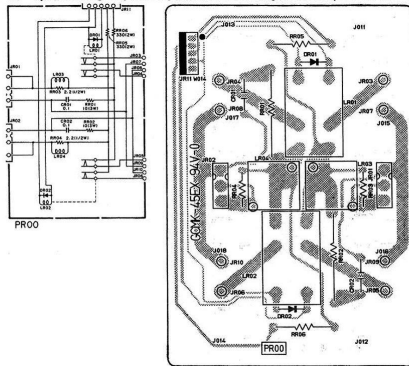


6. SCHEMATIC DIAGRAM AND COMPONENT LOCATIONS

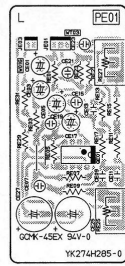
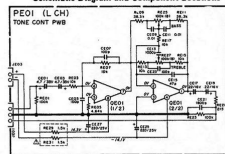
6.1 Tone/Tape 1, 2/VCR/Muting Assembly (PT00) Schematic Diagram and Component Locations



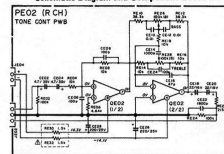
6.2 Speaker Muting Relay Assembly (PR00) Schematic Diagram and Component Locations



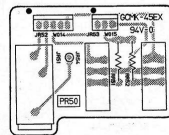
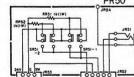
6.3 Tone (L) Assembly (PE01)
Schematic Diagram and Component Locations



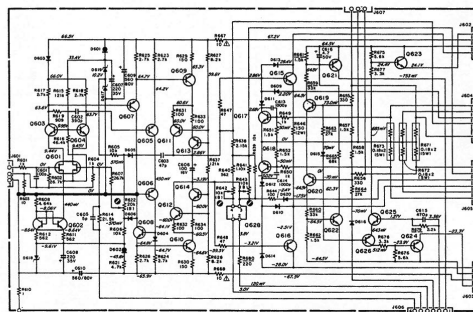
6.4 Tone (R) Assembly (PE02)
Schematic Diagram and Component Locations



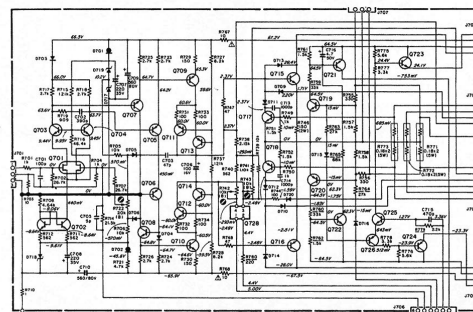
6.5 Phone/Speaker Selector Assembly (PR50) Schematic Diagram and Component Locations



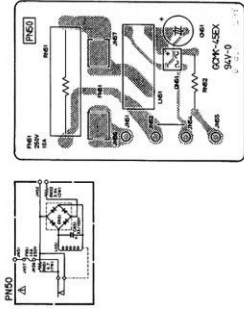
6.6 Power Amp.(L) Assembly (P600) Schematic Diagram and Component Locations
P600 (CH-L) (CLASS A)



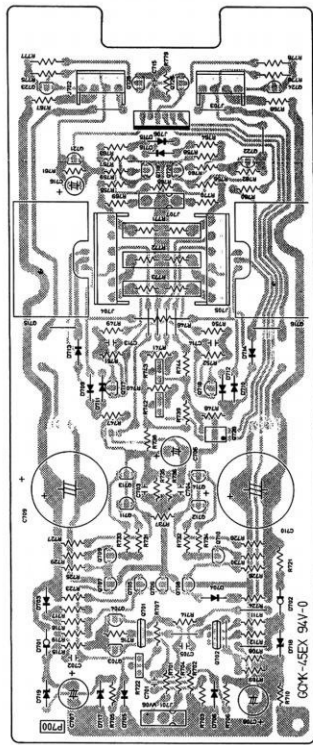
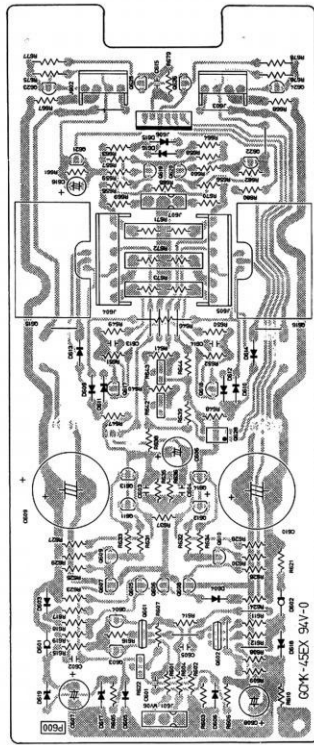
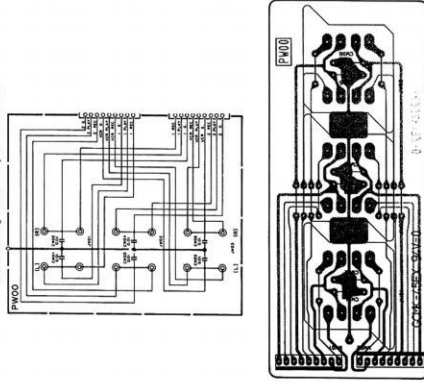
6.7 Power Amp.(R) Assembly (P700) Schematic Diagram and Component Locations
P700 (CH-R) (CLASS B)



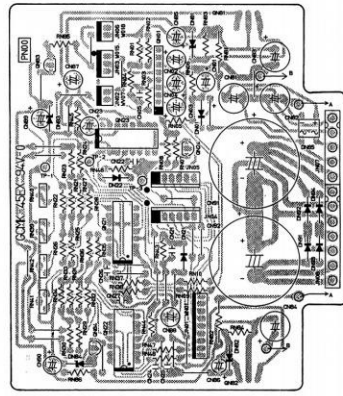
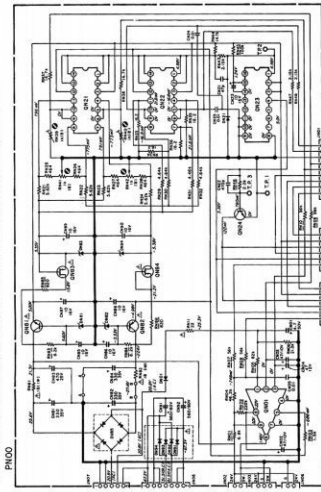
6.8 Soft Start Assembly (PMS0) Schematic Diagram and Component Locations



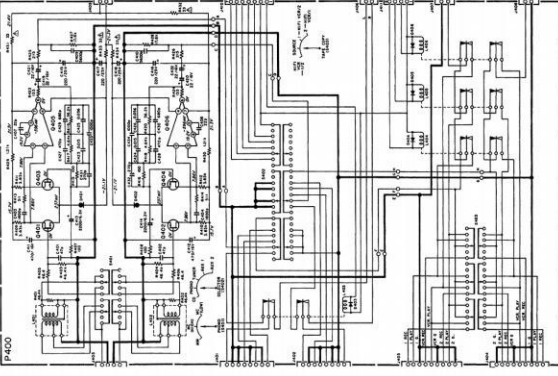
6.9 Tape Play/Rev/NCR Assembly (PMD0) Schematic Diagram and Component Locations



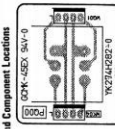
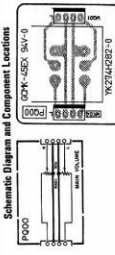
6.10 Comperator/Frame/Supply Assembly (P100) Schematic Diagram and Component Locations

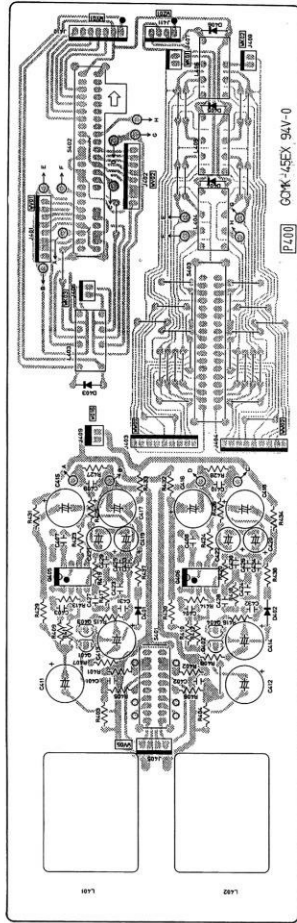


6.12 Phono Amp/Input Selector Assembly (P400) Schematic Diagram and Component Location

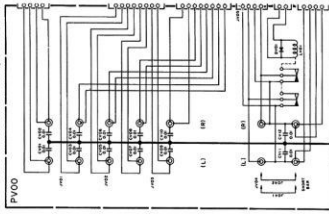


6.11 Main Volume Assembly (P010) Schematic Diagram and Component Locations

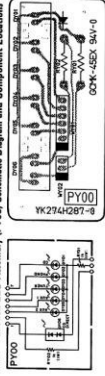




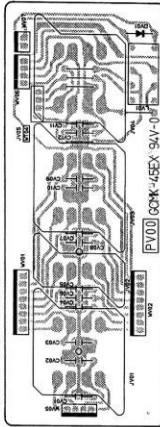
6.13 Function Selector Assembly (PY00) Schematic Diagram and Component Locations



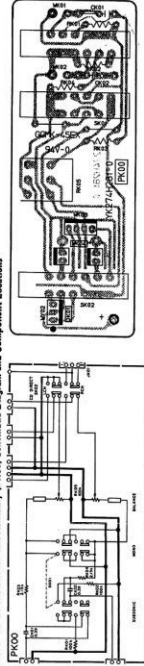
6.14 Function LED Assembly (PY00) Schematic Diagram and Component Locations



6.15 CD Direct/Release etc. Assembly (PK00) Schematic Diagram and Component Locations

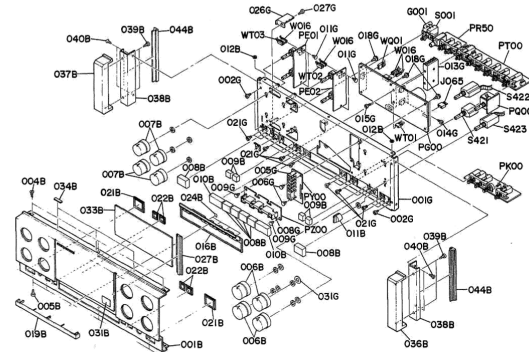


6.16 CD Direct/Release etc. Assembly (PK00) Schematic Diagram and Component Locations



7. EXPLODEDVIEW AND PARTS LIST

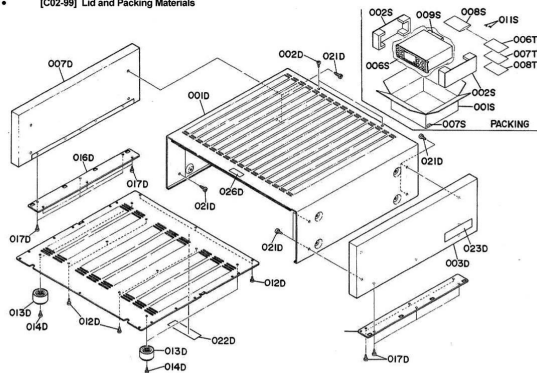
• [C01-99] Front Panel and Chassis



REF. DESIG.	PART NO.	DESCRIPTION
A	274H248400	Front Panel Assembly
01B	274H048510	Front Panel, K.
018B	274H259510	Bushing, K.
018B	274H050310	Cover, Tape Monitor
021B	242H259120	Bushing, Power/CD Direct
022B	242H259130	Bushing, SPK./Subsonic/Mono
027B	274H158010	Window, Function
031B	274H251010	Badge, MOS-FET
033B	274H120030	Insulator
044B	51280308M0	B.H. Tapped Screw B3 x 8
005B	51280306M0	B.H. Tapped Screw B3 x 6
006B	242H154210	Knob, Volume/Function
007B	242H154220	Knob, Tone
008B	242H270110	Button, Power/CD/Tape Monitor
009B	242H270120	Button, SPK./Subsonic/Mono
010B	274H270010	Button, Tape/Muting
011B	283H154130	Knob, Balance
012B	2232119300	Spacer
024B	274H151010	Introducer
034B	032C056010	Buffer
036B	274H063010	Escutcheon, Side (R)
037B	274H063020	Escutcheon, Side (L)
038B	274H160050	Bracket, Side Escutcheon
038B	51280308M0	B.H. Tapped Screw B3 x 8
040B	51280306M0	B.H. Tapped Screw B3 x 6
044B	274H067010	Cap, Side

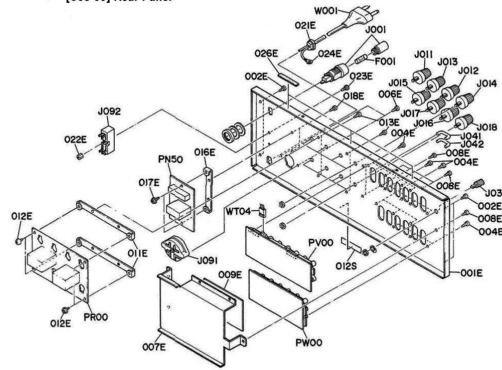
REF. DESIG.	PART NO.	DESCRIPTION
001G	274H105020	Chassis, Front
002G	51280308M0	B.H. Tapped Screw B3 x 8
005G	274H271010	Holder, Selector LED
006G	2276005050	Damper, Selector P.W. Board
008G	274H271020	Holder, Tape Monitor LED
009G	2276005050	Damper, Tape Monitor P.W. Board
011G	2276005050	Damper, Tape P.W. Board
013G	274H287030	Headset, Front P.W. Board
014G	51280308M0	B.H. Tapped Screw B3 x 8
015G	51280306M0	B.H. Tapped Screw B3 x 6
016G	51280306M0	B.T. Screw B3 x 6
021G	51100306M0	B.H.M. Screw B3 x 6
026G	274H109030	Shield, Power Switch
027G	51280308M0	B.H. Tapped Screw B3 x 8
031G	274H012010	Washer, Volume
031G	8F19400060	Cap, Composite
ΔS001	SP01010820	Push Switch, Power
J065	YJ06001040	Jack, 3P
VE06	YB00560030	Connective Cord
WT01	YB00160230	Connective Cord, 4P
WT02	YB00220210	Connective Cord, 3P
WT03	YB00300920	Connective Cord, 3P
VQ001	YB00430020	Connective Cord, 4P
S421	SR04030380	Rotary Switch Assembly, Phone
S422	SR06060230	Rotary Switch Assembly, Selector
S423	SR06040220	Rotary Switch Assembly, Tape Copy

• [C02-99] Lid and Packing Materials



REF. DESIG.	PART NO.	DESCRIPTION	REF. DESIG.	PART NO.	DESCRIPTION
001D	274H257010	Lid, Top Cover	001S	274H801020	PACKING
002D	274H010010	Screw	002S	274H895030	Packing Case
003D	274H249530	Side Panel, Wood (K) [R]	006S	9091111030	Cushion, (K)
007 D	274H249540	Side Panel, Wood (K) [L]	007S	9525019060	Polyethylene Sheet Serial No. Card
011D	274H257020	Lid, Bottom Cover	008S	9012540010	Polyethylene Bag
012D	51280308M0	B.H. Tapped Screw B3 x 8	009S	2864804010	Sleeve
013D	238H057010	Leg	011S	Y001000020	Shoe Plug
014D	51280412M0	B.H. Tapped Screw B4 x 12	006T	274H851310	User Manual
016D	274H160070	Bracket	007T	274H851320	User Manual Spec.
017D	51280508M0	B.H. Tapped Screw B3 x 8	008T	274H856010	Circuit Diagram
021D	51280412M0	B.H. Tapped Screw B3 x 8			
022D	2911861110	Label			
023D	2911861140	Label			
026D	222H861020	Label, Caution			

• [C03-99] Rear Panel



REF. DESIG.	PART NO.	DESCRIPTION	REF. DESIG.	PART NO.	DESCRIPTION
001E	274H250020	Rear Panel	F001	F510500800	Fuse, 5A
002E	51230305M0	B.H. Tapped Screw B3 x 8	J001	YJ08000290	Jack, Fuse Holder
004E	51290308M0	B.H. Tapped Screw B3 x 8	J011	YT01010100	Terminal, Speaker 1; CH(L)+
005E	51290308M0	B.H. Tapped Screw B3 x 8	J012	YT01010100	Terminal, Speaker 1; CH(R)+
007E	274H109010	Shield	J013	YT01010110	Terminal, Speaker 1; CH(L)-
008E	51290308M0	B.H. Tapped Screw B3 x 8	J014	YT01010110	Terminal, Speaker 1; CH(R)-
009E	274H120020	Insulator	J015	YT01010100	Terminal, Speaker 2; CH(L)+
011E	274H160030	Bracket, Speaker P.W. Board	J016	YT01010100	Terminal, Speaker 2; CH(R)+
012E	51480308M0	F. Washer Screw F3 x 6	J017	YT01010110	Terminal, Speaker 2; CH(L)-
013E	51100308M0	B.H.M. Screw B3 x 6	J018	YT01010110	Terminal, Speaker 2; CH(R)-
019E	274H160040	Bracket, Soft Start P.W. Board	J031	YT01010150	Terminal, GND
017E	51480308M0	F. Washer Screw F3 x 6	J041	YQ01000070	Shote Plug
018E	51100308M0	B.H.M. Screw B3 x 6	J042	YQ01000070	Shote Plug
021E	1455259050	Bushing, AC Power Cord	J091	BY05080050	Voltage Selector
022E	274H101030	Support	J093	YU06060020	Terminal
023E	51100308M0	B.H.M. Screw B3 x 6	AW001	YC01900090	AC Power Cord
024E	62030049W0	Lug	WT04	YB00740010	Connective Cord
026E	096118010	Spacer			
012S	2112265110	Indicator Serial No.			

REF. DESIG.	PART NO.	DESCRIPTION	REF. DESIG.	PART NO.	DESCRIPTION
001F	274H105010	Chassis, Main	Δ.C001	E118908010	Elect. Cap. 18000 μF 80V
002F	51280412M0	B.H. Tapped Screw B4 × 12	Δ.C002	E127905010	Elect. Cap. 27000 μF 50V
003F	51280405M0	B.H. Tapped Screw B4 × 5	Δ.D001	HE20014290	Diode S10VB-20
004F	51280412M0	B.H. Tapped Screw B4 × 12	Δ.D002	HE20015290	Diode S4VB-20
005F	51280312M0	B.T. Screw B3 × 12	J061	YB00250330	Connective Cord, 7P
006F	274H120000	Insulator, Power Transformer	J062	YB00270130	Connective Cord, 7P
007F	274H123010	Connector, Earth	J063	YJ00001290	Jack, 3P
008F	51100408M0	B.H.M. Screw B4 × 8	J064	YJ00001390	Jack, 7P
009F	274H118010	Spacer	J066	YJ00001040	Jack, 3P
010F	54020401M0	Flat Washer, P.	J067	YJ00001040	Jack, 3P
011F	274H180010	Bracket, (L)	J068	YJ00001040	Jack, 3P
012F	274H180020	Bracket, (R)	J069	YJ00001040	Jack, 3P
013F	51280306M0	B.T. Screw B3 × 6	Δ.L001	TS40601020	Power Transformer
014F	51280308M0	B.H. Tapped Screw B3 × 8	Q615	HT328823A0	Transistor 2SC2082(P, O, R)
015F	51280308M0	B.H. Tapped Screw B3 × 8	Q616	HT111423A0	Transistor 2SA1142(P, O, R)
018F	422005040	Clamper	Q715	HT328823A0	Transistor 2SC2882(P, O, R)
021F	274H125010	Slit	Q716	HT111423A0	Transistor 2SA1142(P, O, R)
022F	51280405M0	B.H. Tapped Screw B4 × 5	W016	YB00560030	Connective Cord
023F	100H056010	Buffer	W018	YB00500210	Connective Cord, 2P
026F	274H105030	Chassis, Side (R)	W019	YB00280310	Connective Cord, 2P
027F	51280308M0	B.H. Tapped Screw B3 × 8	W020	YB00240100	Connective Cord, 2P
028F	2270000500	Clamper, Phono Amp P.W. Board	W022	YB00202040	Connective Cord, 4P
029F	51280308M0	B.T. Screw B3 × 8	W023	YB00202190	Connective Cord, 6P
030F	51100205E0	B.H.M. Screw B2 × 5	W001	YB00400510	Connective Cord, 8P
031F	274H109020	Shield, Side	W002	YB00400600	Connective Cord, 8P
032F	51280308M0	B.H. Tapped Screw B3 × 8	W005	YB00140200	Connective Cord, 4P
033F	60303049W0	Lug, Earth	W007	YB00180240	Connective Cord, 2P
036F	274H105040	Chassis, Side (L)	WW01	YB00340050	Connective Cord, 6P
037F	51280308M0	B.H. Tapped Screw B3 × 8	WW02	YB00280300	Connective Cord, 6P
038F	274H005010	Clamper	L401	TI11606010	Input Transformer, CH-L
041F	274H056010	Buffer	L402	TI11606010	Input Transformer, CH-R
042F	51280308M0	B.T. Screw B3 × 8			
046F	203H295020	Bushing			
001L	274H026710	Heatsink, Main			
003L	274H101010	Support, Power Transformer P.W. Board			
004L	51480300M0	F. Washer Screw F3 × 6			
006L	274H101020	Support, Power Amp P.W. Board			
007L	51480300M0	F. Washer Screw F3 × 6			
009L	51280312M0	B.T. Screw B3 × 12			
010L	51280308M0	B.H. Tapped Screw B3 × 8			
011L	274H104010	Retainer, 1, Heatsink			
012L	274H104020	Retainer, 2, Heatsink			
013L	274H120010	Insulator, 1, Heatsink			
014L	223H256020	Bushing			
015L	51280312M0	B.T. Screw B3 × 12			
018L	51280308M0	B.H. Tapped Screw B3 × 8			
021L	274H026720	Heatsink, Transistor			
022L	51280308M0	B.H. Tapped Screw B3 × 8			
023L	51280308M0	B.H. Tapped Screw B3 × 8			
026L	274H104110	Retainer, 3, Heatsink			
027L	274H104120	Retainer, 4, Heatsink			
028L	274H120020	Insulator, 2, Heatsink			
031L	274H056320	Cover, Transistor			

8. ELECTRICAL PARTS LIST

ASSIGNMENT OF COMMON PARTS CODES.

RESISTOR
 (1) GD05 ... 140, Carbon film fixed resistor, ±5%, 1/4 W
 (2) GD05 ... 150, Carbon film fixed resistor, ±5%, 1/8 W

Resistance value

Examples

Resistance value

0.1 Ω ... 001 10 Ω ... 100 1 kΩ ... 102 100 kΩ ... 104
 0.5 Ω ... 005 10 Ω ... 150 2.7 kΩ ... 272 500kΩ ... 504
 1 Ω ... 010 100 Ω ... 101 10 kΩ ... 103 1 MΩ ... 105
 5.6Ω ... 068 300 Ω ... 301 22 kΩ ... 223 4.7MΩ ... 475

(Note) Please distinguish 1/4W from 1/8W by the shape of parts used actually.

CERAMIC CAP.
 (1) DD1 ... 370, Ceramic condenser
 Disc type
 Temp. coeff. P350 ~ N1000, 50V

Capacity value

Examples

Tolerance (Capacity deviation)

±0.25 μF ... 0
 ±0.5 μF ... 1
 ±5% ... 5

* Tolerance of COMMON PARTS handled here are as follows:

0.5 μF ... ±5%
 1 μF ... ±5%
 5 μF ... ±5%
 10 μF ... ±5%
 12 μF ... ±5%
 500 μF ... ±5%

Capacity value

0.5 μF ... 005 3 pF ... 030 100 pF ... 101
 1 pF ... 010 10 pF ... 100 220 pF ... 221
 15 pF ... 015 47 pF ... 470 500 pF ... 501

CERAMIC CAP.
 (1) DK18 ... 300, High dielectric constant ceramic condenser
 Disc type
 Temp. coeff. ZB4, 50V

Capacity value

100 μF ... 101 1000 pF ... 102 10000 pF ... 103
 470 pF ... 471 2200 pF ... 222

ELECTROLYTIC CAP. (E), FILM CAP. (F)
 (1) EA ... 10, Electrolytic condenser
 One-way lead type, Tolerance ±20%

Dielectric strength

Capacity value

Examples

Capacity value

0.1 μF ... 004 4.7 μF ... 475 100 μF ... 107
 0.33 μF ... 334 10 μF ... 106 330 μF ... 337
 1 μF ... 105 22 μF ... 228 1100 μF ... 108
 2200 μF ... 228

Working voltage

6.3 V ... 006 25 V ... 025
 10 V ... 010 35 V ... 035
 16 V ... 016 50 V ... 050

(2) DF15 ... 350, Plastic film condenser
 One-way type, Mylar ±5%, 50 V

Capacity value

Examples

Capacity value

0.001 μF ... 002 0.1 μF ... 104
 0.0018 μF ... 182 0.39 μF ... 394
 0.01 μF ... 103 0.1 μF ... 105
 0.015 μF ... 153

REF. DESIG.	PART NO.	DESCRIPTION
P400	YZ074H1310 ZZZ74H310	P400PHONO AMPINPUT SELECTOR CIRCUIT BOARD P.W. Board Phono AmpInput Selector P.W. Board Assembly
C401	DF56470530	Film 47 pF ±10% 125 V
C402	DF56470520	Film 47 pF ±10% 125 V
C403	OF5182520	Film 1800 pF ±5% 125 V
C404	OF5182520	Film 1800 pF ±5% 125 V
C407	DF56220520	Film 22 pF ±10% 125 V
C408	DF56220520	Film 22 pF ±10% 125 V
C409	OF15662520	Film 5600 pF ±5% 100 V
C410	OF15662520	Film 5600 pF ±5% 100 V
C411	OA47701650	Elect 470 μF 16 V
C412	OA47701650	Elect 470 μF 16 V
C413	OA22800610	Elect 2200 μF 6.3 V
C414	OA22800610	Elect 2200 μF 6.3 V
C415	OA22702550	Elect 220 μF 25 V
C416	OA22702550	Elect 220 μF 25 V
C417	OA25702550	Elect 220 μF 25 V
C418	OA22702550	Elect 220 μF 25 V
C419	EA22601660	Elect 22 μF 16 V
C420	EA22601660	Elect 22 μF 16 V
C421	EA22601660	Elect 22 μF 16 V
C422	EA22601660	Elect 22 μF 16 V
C423	OF1515320	Film 0.015 μF ±5% 100 V
C424	OF1515320	Film 0.015 μF ±5% 100 V
C425	OF1566320	Film 0.056 μF ±5% 100 V
C426	OF1566320	Film 0.056 μF ±5% 100 V
C337	DF5471520	Film 470 pF ±5% 125 V
C428	DF5471520	Film 470 pF ±5% 125 V
C429	DF56681520	Film 680 pF ±5% 125 V
C430	OF56681520	Film 680 pF ±5% 125 V
C431	DF56271520	Film 270 pF ±5% 125 V
C432	DF56271520	Film 270 pF ±5% 125 V
C433	OF15102520	Film 1000 pF ±5% 100 V
C434	OF15102520	Film 1000 pF ±5% 100 V
R401	GM21446420	46.4 kΩ
R402	GM21446420	46.4 kΩ
R403	GM21446420	46.4 kΩ
R404	GM21446420	46.4 kΩ
R405	GM21446420	46.4 Ω
R406	GM21446420	46.4 Ω
R407	GM21410000	100 Ω
R408	GM21410000	100 Ω
R409	GM21438310	3.83 kΩ
R410	GM21438310	3.83 kΩ
R411	GM21438310	3.83 kΩ
R412	GM21438310	3.83 kΩ
R413	GM21451100	511 Ω
R414	GM21451100	511 Ω
R415	GM21410000	100 Ω
R416	GM21410000	100 Ω
R417	GM21446410	4.64 kΩ
R418	GM21446410	4.64 kΩ
R419	GM21456220	56.2 kΩ
R420	GM21456220	56.2 kΩ

REF. DESIG.	PART NO.	DESCRIPTION	REF. DESIG.	PART NO.	DESCRIPTION
R423	GM21413300	133D	C814	OF15102520	Film 1000 pF ±5% 100V
R424	GM21413300	133 D	C815	OF15222620	Film 0.0022 µF ±5% 100V
R425	GM21421500	215 D	C816	OA47505010	Elect 4.7 µF 50V
R426	GM21421500	215 D	P800-RESISTORS		
R427	GM21417820	17.8 kD	(All Resistors are ±2% and WW)		
R428	GM21417820	17.8 kD	R801	GM21410010	1 kD
R429	GM21412110	1.21 kD	R802	GM21428720	28.7 kD
R430	GM2141211D	1.21kD	R803	GM21410000	10 D
ΔR431	GG05330140	33 D ±5%	R804	GM21410010	1 kD
ΔR432	GG05330140	33 D ±5%	R805	GM21410020	10 kD
ΔR433	GG05330140	33 D ±5%	R806	GM21410020	10 kD
ΔR434	GG05330140	33 D ±5%	R807	GM21428720	28.7 kD
P800-SEMICONDUCTORS			R808	GM21448410	4.84 kD
D401	H060007100	Diode, C.R. 10YD4 SC	R810	GG05010140	1 D ±5%
D402	H020007100	Diode, C.R. 10YD4 SC	R811	GM21495200	562 D
D403	H020011050	Diode 1S1555	R812	GV121456200	562 D
D404	H020011050	Diode 1S1555	R814	GM21421520	21.5 kD
D405	H020011050	Diode 1S1555	R815	GM21412130	121 kD
D406	H020011051	Diode 1S1555	R816	GM21448420	48.4 kD
Q401	HF203991BQ	F.E.T. 28K399(BL)	R817	GG05272140	2.7 kD ±5%
Q402	HF203991BQ	F.E.T. 28K399(BL)	R818	GG05272140	2.7 kD ±5%
Q403	HF203991BQ	F.E.T. 28K399(BL)	R819	GM21490900	909 D
Q404	HF203991BQ	F.E.T. 28K399(BL)	R821	GG05472140	4.7 kD ±5%
Q405	HC10027090	IC 5534D	R822	RA02052090	20 kΩ(B) Trimming
Q406	HC10027090	IC 5534D	R823	GG05272140	2.7 kD ±5%
P800-MISCELLANEOUS			R824	GG05272140	2.7 kD ±5%
J401	YP01001080	Plug 8P	R825	GG05272140	2.7 kD ±5%
J402	YP01001090	Plug 9P	R826	GG05272140	2.7 kD ±5%
J403	YP01001090	Plug 9P	R827	GG05822140	8.2 kD ±5%
J404	YP01001090	Plug 9P	R828	GG05822140	8.2 kD ±5%
J405	YP01001040	Plug 4P	R829	GG05151140	150 D ±5%
J406	YP01001020	Plug 4P	R830	GG05151140	150 D ±5%
J407	YP01001020	Plug 4P	R831	GG05101140	100 D ±5%
J408	YP01001020	Plug 4P	R832	GG05101140	100 D ±5%
J409	YP01001030	Plug	R833	GG05101140	100 D ±5%
J410	YJ07001670	Jack, 4P	R834	GG05101140	100 D ±5%
J411	YJ07001640	Jack, 4P	R837	GM21412130	121 kD
L401	TI11609010	Input Transformer, CH-L	R838	GM21421510	2.15 kD
L402	TI11609010	Input Transformer, CH-R	R840	GM21456200	562 D
L403	LY20240230	Relay	R841	GM2141010	1.1 kD
L404	LY20240230	Relay	R842	RA01030720	10 kΩ(B) Trimming
L405	LY20240230	Relay	R843	RA01030720	10 kΩ(B) Trimming
L406	LY20240230	Relay	R844	GM21410000	100 D
S401	SS04020230	Slide Switch, Phono Select	R846	GA05101020	150 D ±5%
S402	SS06060100	Slide Switch, Function	R847	GG05470140	4.7 D ±5%
S403	SS06040050	Slide Switch, Tape Monitor	R848	GG05470140	4.7 D ±5%
P800-POWER AMP., CH-L			R849	GG05102140	1 kD ±5%
P800	YKZ74H8610	P.W. Board, Power Amp, CH-L	R850	GG05102140	1 kD ±5%
	ZZZ74H8610	P.W. Board Assembly	R851	GG05152140	1.5 kD ±5%
			R852	GG05152140	1.5 kD ±5%
			R855	GG05331140	330 D ±5%
			R856	GG05331140	330 D ±5%
P800-CAPACITORS			R857	GG05152140	1.5 kD ±5%
C601	OF55101520	Film 100 pF ±5% 125 V	R858	GG05152140	1.5 kD ±5%
C602	OF55391520	Film 390 pF ±5% 125 V	ΔR867	GG05100140	10 D ±5%
C603	OF56470520	Film 47 pF ±10% 125 V			
C605	OF56050520	Film 5 pF ±10% 125 V	ΔR868	GG05100140	10 D ±5%
C606	OA10701650	Elect 100 µF 16 V	R871	BW10000080	0.18 D-2 ±10% 8W
C607	CA22703550	Elect 220 µF 35 V	R872	BW10000080	0.18 D-2 ±10% 8W
C608	CA22703550	Elect 220 µF 35 V	R873	BW10000080	0.18 D-2 ±10% 8W
C609	EB95708010	Elect 580 µF 80 V	R875	GG0582120	5.8 kD ±5%
C610	EB95708010	Elect 580 µF 80 V	R876	GG0582120	5.8 kD ±5%
C613	OF15102520	Film 1000 pF ±5% 100 V	R877	GG05332120	3.3 kD ±5%
			R878	GG05332120	3.3 kD ±5%

REF. DESIG.	PART NO.	DESCRIPTION	REF. DESIG.	PART NO.	DESCRIPTION
P600-SEMICONDUCTORS					
D601	HD00007100	Diode CR 10YD4 5C	C707	OA22703550	Elect 220 µF 35 V
D602	HD00007100	Diode CR 10YD4 5C	C708	OA22703550	Elect 220 µF 35 V
D603	HD00011050	Diode 1S1555	C709	EB56708B10	Elect 560 µF 80 V
D604	HD00011050	Diode 1S1555	C710	EB56708B10	Elect 560 µF 80 V
D605	HD00011050	Diode 1S1555	C715	OF15102520	Film 1000 pF ±5% 100 V
D606	HD00011050	Diode 1S1555	C714	OF15102520	Film 1000 pF ±5% 100 V
D609	HD00011050	Diode 1S1555	C715	OF15222520	Film 0.0022 µF ±5% 100 V
D610	HD00011050	Diode 1S1555	C716	OA47050510	Elect 4.7 µF 50 V
D611	HD00011050	Diode 1S1555			
D612	HD00011050	Diode 1S1555			
D613	HD00014010	Diode 1S581	R701	GM21410010	1 kΩ
D614	HD00014010	Diode 1S581	R702	GM21420720	28.7 kΩ
D615	HD00014010	Diode 1S581	R703	GM21410020	10 kΩ
D616	HD00014010	Diode 1S581	R704	GM21410010	1 kΩ
D617	HD00020810	Zener HZ11A-3L	R705	GM21410020	10 kΩ
D618	HD00020810	Zener HZ11A-3L	R706	GM21410020	10 kΩ
D619	HD00031010	Zener HZ22L-2	R707	GM21420720	28.7 kΩ
D620	HD00011050	Diode 1S1555	R708	GM21446410	4.64 kΩ
			R710	GG20510140	1 Ω ±5%
Q601	HT320392A0	F.E.T. 2SK399GR, BL	R712	GM21456200	562 Ω
Q602	HT320392A0	Transistor 2SC3381 (GR, BL)	R714	GM21421520	21.5 kΩ
Q603	HT322402A0	Transistor 2SC2240GR, BL	R716	GM21412130	121 kΩ
Q604	HT322402A0	Transistor 2SC2240GR, BL	R718	GM21446420	46.4 kΩ
Q605	HT109702A0	Transistor 2SA970GR, BL	R717	GG05272140	2.7 kΩ ±5%
Q606	HT109702A0	Transistor 2SA970GR, BL	R716	GG05272140	2.7 kΩ ±5%
Q607	HT109702A0	Transistor 2SA970GR, BL	R719	GM21456900	569 Ω
Q608	HT109702A0	Transistor 2SA970GR, BL	R721	GG05472140	4.7 kΩ ±5%
Q609	HT109702A0	Transistor 2SA970GR, BL	R722	RA02030200	20 kΩ(B), Trimming
Q610	HT322402A0	Transistor 2SC2240GR, BL	R723	GG05272140	2.7 kΩ ±5%
Q611	HT11145100	Transistor 2SA1145(O)	R724	GG05272140	2.7 kΩ ±5%
Q612	HT32705100	Transistor 2SC2705(O)	R725	GG05272140	2.7 kΩ ±5%
Q613	HT11145100	Transistor 2SA1145(O)	R726	GG05272140	2.7 kΩ ±5%
Q614	HT32705100	Transistor 2SC2705(O)	R727	GG05272140	2.7 kΩ ±5%
Q615	HT30822A0	Transistor 2SC282B(P, Q, R)	R728	GG05272140	2.7 kΩ ±5%
Q616	HT111423A0	Transistor 2SA1142(P, Q, R)	R729	GG05151140	150 Ω ±5%
Q617	HT318152A0	Transistor 2SC1815(O, Y)	R730	GG05151140	150 Ω ±5%
Q618	HT110151A0	Transistor 2SA1101(O, Y)	R731	GG05101140	100 Ω ±5%
Q619	HT329062B0	Transistor 2SC2906(S, T)	R732	GG05101140	100 Ω ±5%
Q620	HT112072B0	Transistor 2SA1207(S, T)	R733	GG05101140	100 Ω ±5%
Q621	HT109702A0	Transistor 2SA970GR, BL	R734	GG05101140	100 Ω ±5%
Q622	HT329062A0	Transistor 2SC2906(D, E)	R735	GM21412130	121 kΩ
Q623	HT132401B0	Transistor 2SC2240(BL)	R736	GM21421510	2.15 kΩ
Q624	HT109701B0	Transistor 2SA970(BL)	R740	GM21456200	562 kΩ
Q625	HT322402A0	Transistor 2SC2240GR, BL	R741	GM21411010	1.1 kΩ
Q626	HT109702A0	Transistor 2SA970GR, BL	R742	RA01030720	10 kΩ(B), Trimming
Q628	HW10006320	Photo Unit PC-817	R743	RA01030720	10 kΩ(B), Trimming
P600-MISCELLANEOUS			R744	GM21410000	100 Ω
J601	YP06001040	Plug, 3P	R746	GA05151020	150 Ω ±5%
J602	YP06003540	Plug, 4P	R747	GG05470140	47 Ω ±5%
J603	YP06003540	Plug, 4P	R748	GG05470140	47 Ω ±5%
J604	YJ06003550	Jack, 6P	R749	GG05102140	1 kΩ ±5%
J605	YJ06003550	Jack, 6P	R750	GG05102140	1 kΩ ±5%
J606	YJ07015950	Jack, 6P	R751	GG05152140	1.5 kΩ ±5%
J607	YP06001040	Plug, 3P	R752	GG05152140	1.5 kΩ ±5%
P600-POWER AMP, CHR			R753	GG0531140	330 Ω ±5%
CIRCUIT BOARD			R756	GG0531140	330 Ω ±5%
P700	PC3744H820	P.W. Board, Power Amp, CHR	R757	GG05152140	1.5 kΩ ±5%
	ZZZ744H820	P.W. Board Assembly	R758	GG05152140	1.5 kΩ ±5%
P700-CAPACITORS			ΔR767	GG05100140	10 Ω ±5%
C701	OF65101520	Film 100 pF ±5% 125 V			
C702	OF65391520	Film 390 pF ±5% 125 V			
C703	OF68470520	Film 47 pF ±10% 125 V			
C705	OF65050320	Film 5 pF ±10% 125 V			
C706	OA10701550	Elect 100 µF 16 V			

REF. DESIG.	PART NO.	DESCRIPTION	REF. DESIG.	PART NO.	DESCRIPTION
ΔR788	GG05100140	10 Ω ±5%			
R771	BW10000080	0.18 Ω ±2 ±10% 5W			
R772	BW10000080	0.18 Ω ±2 ±10% 5W			
R773	BW10000030	0.18 Ω ±2 ±10% 5W			
R775	GG05062120	5.6 kΩ ±5% 1/2W			
R776	GG05062120	5.6 kΩ ±5% 1/2W			
R777	GG05332120	3.3 kΩ ±5% 1/2W			
R773	GG05332120	3.3 kΩ ±5% 1/2W			
		P700-SEMICONDUCTORS			
D701	HD0007100	Diode CR 10V/4 SC			
D702	HD0007100	Diode CR 10V/4 SC			
D703	HD20011050	Diode 1S1555			
D704	HD20011050	Diode 1S1555			
D705	HD20011050	Diode 1S1555			
D706	HD20011050	Diode 1S1555			
D709	HD20011050	Diode 1S1555			
D710	HD20011050	Diode 1S1555			
D711	HD20011050	Diode 1S1555			
D712	HD20011050	Diode 1S1555			
D713	HD20014010	Diode 1S581			
D714	HD20014010	Diode 1S581			
D715	HD20014010	Diode 1S581			
D716	HD20014010	Diode 1S581			
D717	HD3 0028010	Zener K211A-3L			
D718	HD30028010	Zener K211A-3L			
D719	HD30031010	Zener K22L-2			
D720	HD20011050	Diode 1S1555			
Q701	HF203892AD	F.E.T. 2SK369(GR, BL)			
Q702	HT323310AD	Transistor 2SC3301(GR, BL)			
Q703	HT322402AD	Transistor 2SC2240(GR, BL)			
Q704	HT322402AD	Transistor 2SC2240(GR, BL)			
Q705	HT106702AD	Transistor 2SA870(GR, BL)			
Q706	HT106702AD	Transistor 2SA870(GR, BL)			
Q707	HT106702AD	Transistor 2SA870(GR, BL)			
Q708	HT322402AD	Transistor 2SC2240(GR, BL)			
Q709	HT106702AD	Transistor 2SA870(GR, BL)			
Q710	HT322402AD	Transistor 2SC2240(GR, BL)			
Q711	HT11145100	Transistor 2SA1145(O)			
Q712	HT32709100	Transistor 2SC2709(O)			
Q713	HT11145100	Transistor 2SA1145(O)			
Q714	HT32709100	Transistor 2SC2709(O)			
Q715	HT326823AD	Transistor 2SC2632(P, O, H)			
Q716	HT111421AD	Transistor 2SA1142(P, Q, R)			
Q717	HT318152AD	Transistor 2SC1815(O, Y)			
Q718	HT110152AD	Transistor 2SA11015(O, Y)			
Q719	HT32090980	Transistor 2SC20909(O, T)			
Q720	HT11207280	Transistor 2SA1207(S, T)			
Q721	HT109702AD	Transistor 2SA870(GR, BL)			
Q722	HT3 29092 AD	Transistor 2SC2909(O, E)			
Q723	HT32240180	Transistor 2SC2240(BL)			
Q724	HT10970180	Transistor 2SA870(BL)			
Q725	HT322402AD	Transistor 2SC2240(GR, BL)			
Q726	HT109702AD	Transistor 2SA870(GR, BL)			
Q725	HW10006320	Photo Unit PC-817			
		P700-MISCELLANEOUS			
J701	YP06001040	Plug, 3P			
J702	YP06003540	Plug, 4P			
J703	YP06003540	Plug, 4P			
J704	YJ06003550	Jack, 6P			
J705	YJ06003550	Jack, 6P			
J706	YJ07001550	Jack, 6P			
J707	YP06001040	Plug, 3P			
PE01	YK274H2860	PE01-TONE, CH-L CIRCUIT BOARD P.W. Board, Tone, CH-L P.W. Board Assembly			
CE01	EA47 503960	Elect 4.7 μF 35 V			
CE03	EA47503960	Elect 4.7 μF 35 V			
CE05	OF59101520	Film 100 pF ±5% 125 V			
CE07	OF59101520	Film 100 pF ±5% 125 V			
CE09	OF1 5103520	Film 0.01 μF ±5% 100 V			
CE11	OF 15103520	Film 0.01 μF ±5% 100 V			
CE13	OF1 5102520	Film 100 pF ±5% 100 V			
CE15	DF564 70590	Film 47 pF ±10% 125 V			
CE17	OA22601610	Elect 220 μF 16 V			
CE19	OA22601610	Elect 220 μF 16 V			
CE21	OF 1518230	Film 1800 pF ±5% 100 V			
CE23	DF59101530	Film 100 pF ±5% 125 V			
CE25	OA22702510	Elect 220 μF 25 V			
CE27	OA22702510	Elect 220 μF 25 V			
		PE01-RESISTORS (All Resistors are ±2% and 1/2W)			
RE01	GM21410030	100 kΩ			
RE03	GM21410020	10 kΩ			
RE05	GM21444610	4.64 kΩ			
RE07	GM21410020	10 kΩ			
RE09	GM21438320	38.3 kΩ			
RE11	GM21438320	38.3 kΩ			
RE13	GM21410020	10 kΩ			
RE18	GM21410020	10 kΩ			
RE17	GM21410020	10 kΩ			
RE21	GM21421500	215 Ω			
RE23	GM21410030	100 kΩ			
RE25	RK01040280	100 kΩ(B) Variable, Bass			
RE27	RK01040230	100 kΩ(B) Variable, Treble			
ΔRE29	GG05152140	1.5 kΩ ±5%			
ΔRE31	GG05152140	1.5 kΩ ±5%			
PE01	HC10021090	PE01-SEMICONDUCTOR IC4550DD			
JE01	YP01001030	PE01-MISCELLANEOUS Plug, 3P			
JE03	YP10001980	Plug, 2P			
PE02	YK274H2860	PE02-TONE, CH-R CIRCUIT BOARD P.W. Board, Tone, CH-R P.W. Board Assembly			
CE02	EA47503560	Elect 4.7 μF 35V			
CE04	EA47503560	Elect 4.7 μF 35V			
CE06	OF59101520	Film 100 pF ±5% 125V			
CE08	OF59101520	Film 100 pF ±5% 125V			
CE10	OF15103520	Film 0.01 μF ±5% 100V			
CE12	OF15103520	Film 0.01 μF ±5% 100V			
CE14	OF15102520	Film 100 pF ±5% 100V			
CE16	DF56470590	Film 47 pF ±10% 125V			
CE18	OA22601610	Elect 22 μF 16V			
CE20	OA22601610	Elect 22 μF 16V			

REF. DESIG.	PART NO.	DESCRIPTION	REF. DESIG.	PART NO.	DESCRIPTION
JG01	YPO1001040	P000-MISCELLANEOUS Plug, 4P	JL01	YPO6003560	PL01-MISCELLANEOUS Plug, 7P
JG02	YPO1001040	Plug, 4P	JL02	YPO6003540	Plug, 4P
JG05	YPO6001040	Plug, 3P	JL03	YPO6003540	Plug, 4P
			JL04	YPO6003550	Plug, 6P
			JL05	YPO6003550	Plug, 6P
PK00	YK274H82810	PK00-SUB/MONO/BA LANCE/ CD DIRECT CIRCUIT BOARD P.W. Board, Sub/Mono/Balance/CD Direct ZZZ274H8810 P.W. Board Assembly	PNO0	YK274H83630	PNO0-COMPARATOR/PROTECTOR/ SUPPLY CIRCUIT BOARD Supply P.W. Board, Comparator/Protector/ P.W. Board Assembly
CK01	OF15384010	PK00-CAPACITORS Film 0.39 μ F \pm 5%			PNO0-CAPACITORS
CK02	OF15384010	Film 0.39 μ F \pm 5%	CN01	OA47505010	Elect 4.7 μ F 50V
RK01	GM21410030	PK00-RESISTORS 100 k Ω \pm 2% 1/4W	CN02	OA47601010	Elect 47 μ F 10V
RK02	GM21410030	100 k Ω \pm 2% 1/4W	CN03	OA47601010	Elect 47 μ F 10V
RK03	GM21421510	2.15 k Ω \pm 2% 1/4W	CN04	OA47601010	Elect 47 μ F 10V
RK04	GM21421510	2.15 k Ω \pm 2% 1/4W	CN05	OF15103220	Film 0.01 μ F \pm 5% 100V
RK05	RM01040890	100 k Ω , Variable, Balance	CN21	DF56470320	Film 47 pF \pm 10% 125V
			CN22	OF15471520	Film 470 pF \pm 5% 100V
			CN23	OA10001810	Elect 10 μ F 16V
			CN24	OF15103220	Film 0.01 μ F \pm 5% 100V
			CN25	OF15103220	Film 0.01 μ F \pm 5% 100V
JK01	YJ07001E30	PK00-MISCELLANEOUS Jack, 3P	CN81	OA33703510	Elect 330 μ F 35V
SK01	SP04020470	Push Switch, Subsonic/Mono	CN82	OA33703510	Elect 330 μ F 35V
SK02	SP04010500	Push Switch, CD Direct	CN83	OA47702510	Elect 470 μ F 25V
WK01	YB00280310	Connective Cord, 2P	CN84	OA33703510	Elect 330 μ F 35V
WK02	YB00240100	Connective Cord, 2P	CN85	OA10001610	Elect 10 μ F 16V
WK03	YB00203240	Connective Cord, 4P			
WK04	YB00150510	Connective Cord, 4P	CN90	OA10001610	Elect 10 μ F 16V
			CN91	EB56708010	Elect 560 μ F 80V
			CN92	EB56708010	Elect 560 μ F 80V
PL00	YF274H0010	PL00-POWER TRANSISTOR CIRCUIT BOARD P.W. Board, Power Transistor			PNO0-RESISTORS (All Resistors are 12% and 1/4W)
	ZZZ274H0010	P.W. Board Assembly	HN04	GM21448420	46.4 k Ω
			RM06	GM21421520	21.5 k Ω
ΔCL01	DF16105540	Film 1 μ F \pm 10% 100V	ΔRP11	NH05201440	220 Ω \pm 5%, Fusible
ΔCL02	DF16105540	Film 1 μ F \pm 10% 100V	RN21	GM21466210	5.62 k Ω
			BN22	GM21456210	5.62 k Ω
			BN23	GW121456210	5.62 k Ω
			BN24	GM21456210	5.62 k Ω
ΔRL01	NH05221140	220 Ω , Fusible	RN25	GM21466400	464 Ω
ΔRL02	NH05221140	220 Ω , Fusible	RN26	GM21466400	464 Ω
ΔRL03	NH05221140	220 Ω , Fusible	RN27	GW121464600	464 Ω
ΔRL04	NH05101140	100 Ω , Fusible	RN28	GM21466400	464 Ω
ΔRL05	NH05101140	100 Ω , Fusible	RN29	GM21466410	4.64 k Ω
ΔRL06	NH05101140	100 Ω , Fusible	RN30	GM21466410	4.64 k Ω
ΔRL07	GO95068140	6.8 Ω	RN31	GM21466410	4.64 k Ω
ΔRL08	GO95068140	6.8 Ω	RN32	GM21466410	4.64 k Ω
			RN33	GM21416200	16.2 Ω
			RN34	GM21416200	16.2 Ω
ΔDL01	HD20027100	Diode 30DF-2	RN35	GM21416200	16.2 Ω
ΔDL02	HD20027100	Diode 30DF-2	RM36	GM21416200	16.2 Ω
ΔQL01	HF20405100	F.E.T. 2SK405(C)	RM37	GM21414720	14.7 k Ω
ΔQL02	HF20405100	F.E.T. 2SK405(C)	RN38	GM21414720	14.7 k Ω
ΔQL03	HF20405100	F.E.T. 2SK405(C)	RN39	RA01020480	1 k Ω (B), Trimming
ΔQL04	HF10115100	F.E.T. 2SJ115(D)	RN40	RA01020480	1 k Ω (B), Trimming
ΔQL05	HF10115100	F.E.T. 2SJ115(D)	RN41	RA01020480	1 k Ω (B), Trimming
ΔQL06	HF10115100	F.E.T. 2SJ115(D)	RN42	RA01020480	1 k Ω (B), Trimming
ΔQL07	HT332620A0	Transistor 2SC2909(R, O)	RM43	GM21421510	2.15 k Ω
ΔQL08	HT113012A0	Transistor 2SA1301(R, O)	RV44	GM21414720	14.7 k Ω
ΔQL09	HT329S32A0	Transistor 2SC2983(O, Y)	RN47	GO95221440	2.2 k Ω
ΔQL10	HT112222A0	Transistor 2SA1225(O, Y)	RN48	GO95221440	2.2 k Ω
ΔQL11	HT334191Y0	Transistor 2SC3419(Y)	ΔRN81	GA05022010	2.2 Ω \pm 5% 1W
			ΔRN82	GA05180010	18 Ω \pm 5% 1W

REF DESIG.	PART NO.	DESCRIPTION	REF DESIG.	PART NO.	DESCRIPTION
		PR00-SEMI CONDUCTORS			PR00-RESISTORS
DN01	HD20016210	Diode 1SR35-209A	RR01	GA05100030	10 Ω ±5% 3 W
DN21	HD20011050	Diode 1S1555	RR02	GA05100030	10 Ω ±5% 3 W
DN51	HD30021010	Zener HZ6A-3L	RR03	GG05022120	2.2 Ω ±5% 1/2 W
DN62	HD30021010	Zener HZ6A-3L	RR04	GG05022120	2.2 Ω ±5% 1/2 W
DN83	HD30021010	Zener HZ6A-3L	RR05	GA05331020	330 Ω ±5% 2 W
DN84	HD30021010	Zener HZ6A-3L	RR06	GA05331020	330 Ω ±5% 2 W
ΔDN85	HC20020330	Diode 69810E			PR00-SEMICONDUCTORS
ΔDN91	HD20028080	Diode EPD1Z	DH01	HD20011050	Diode 1S1555
ΔDN92	HD20028080	Diode EPD1Z	DN02	HD20011050	Diode 1S1555
ΔDN93	HD20028080	Diode EPD1Z			PR00-MISCELLANEOUS
ΔDN94	HD20028080	Diode EPD1Z	JR01	YR00010400	Plug, 3P
QM01	HC10042050	IC 7A731PA	JR02	YF00010400	Plug, 3P
QN01	HC10009090	IC NJM2901	JR03	YB00060110	Connective Cord, 1P
QN22	HC10009090	IC NJM2901	JR04	YB00170160	Connective Cord, 1P
QN23	HC12301A0	IC H074LS123	JR05	YB00170150	Connective Cord, 1P
QN24	HT11815180	Transistor 2SC1815(Y)	JR06	YB00060100	Connective Cord, 1P
ΔQN81	HT134222A0	Transistor 2SC3422(O, Y)	JR07	YB00060090	Connective Cord, 1P
ΔQN82	HT113562A0	Transistor 2SA1356(O, Y)	JR08	YB00150400	Connective Cord, 1P
ΔQN83	HF202461D0	F.E.T. 2SK246(BL)	JR09	YB00150400	Connective Cord, 1P
ΔQN84	HF202461D0	F.E.T. 2SK246(BL)	JR10	YB00060090	Connective Cord, 1P
		PR00-MISCELLANEOUS	JR11	YJ07001550	Jack, 5P
JN01	YF01001090	Plug, 5P			PR00-PHONE/SPEAKER SELECT CIRCUIT BOARD
JN02	YF01001090	Plug, 5P	LR01	LY20240150	Relay, Speaker
JN03	YJ07001530	Jack, 3P	LH02	LY20240150	Relay, Speaker
JN06	YF10001980	Plug, 2P	LH03	LJ31115080	Col. Output
JN07	YF06000560	Plug, 5P	LR04	LJ31115080	Col. Output
JN08	YF06000560	Plug, 7P			PR00-TONE/TAPE 1, 2VCR/MUTING CIRCUIT BOARD
WN04	YU06180280	Jumper Lead, 6P	WN01	YB00220190	Connective Cord, 9P
WN05	YU06180280	Jumper Lead, 6P			PR00-PHONE/SPEAKER SELECT CIRCUIT BOARD
		PR00-50 FT START CIRCUIT BOARD	PR50	YK274H3640	P.W. Board, Phone/Speaker Select
PN50	YK274H3660	P.W. Board, Soft Start			PR00-TONE/TAPE 1, 2VCR/MUTING CIRCUIT BOARD
		PR00-50 FT START CIRCUIT BOARD	ZZ274H8940	ZZ274H8940	P.W. Board Assembly
ΔCN51	ZZ274H8960	P.W. Board Assembly	RR61	GA05102010	Resistor 1 kΩ ±5% 1 W
		PR00-MAIN VOLUME CIRCUIT BOARD	RH52	GA05102010	Resistor 1 kΩ ±5% 1 W
ΔRN61	GR05047050	Resistor 4.7Ω ±5% 7W	JR51	YJ01002080	Jack, Phone
ΔRN62	GA05472020	Resistor 4.7kΩ ±5% 2W	SR51	SP02002860	Push Switch, Speaker Select
ΔDN61	HE20004030	Diode DBS10C			PR00-TONE/TAPE 1, 2VCR/MUTING CIRCUIT BOARD
ΔFN61	F611000900	Fuse 10A 250V	PT00	YK274H2840	P.W. Board, Tone/Tape 1, 2VCR/Muting
JN06	YJ08000110	Jack, Fuse Holder			PT00-RESISTORS
JN57	YJ08000170	Jack, Fuse Holder	RT01	GM21421510	2.15 kΩ ±2% 1/2 W
ΔLN51	LY10480030	Relay	RT02	GM21421510	2.15 kΩ ±2% 1/2 W
		PR00-SPEAKER/MUTING RELAY CIRCUIT BOARD	RT03	GM21421500	215 Ω ±2% 1/2 W
PR00	YK274H3950	P.W. Board, Speaker/Muting Relay	RT04	GM21421500	215 Ω ±2% 1/2 W
		PR00-CAPACITORS	RT05	GA05102010	1 kΩ ±5% 1 W
CR01	DF16104510	Film 0.1μF ±10% 200V	RT06	GA05102010	1 kΩ ±5% 1 W
CR02	DF16104510	Film 0.1μF ±10% 200V	RT07	GA05102010	1 kΩ ±5% 1 W
					PT00-MISCELLANEOUS
			JT01	YF06001040	Plug, 3P
			JT02	YJ07001550	Jack, 5P
			ST01	SP04010460	Push Switch, Muting
			ST02	SP02040330	Push Switch, Tape 1, 2VCR
			ST03	SP04010460	Push Switch, Tone Delet
			WT01	YB00180250	Connective Cord, 4P
			WT02	YB00220210	Connective Cord, 3P
			WT03	YB00309620	Connective Cord, 3P
			WT04	YB00304810	Connective Cord, 5P

REF. QESIG.	PART NO.	DESCRIPTION			
		PV00-PHONO/CD/TUNER/AUX 1,2			
		CIRCUIT BOARD			
PV00	YK274H1320 ZZ274H8320	P.W. Board, Phono/CD/Tuner/AUX 1, 2 P.W. Board Assembly	PY00	YK274H2870 ZZ274H8870	PY00-FUNCTION IND. CIRCUIT BOARD P.W. Board, Function IND. P.W. Board Assembly
		PV00-CAPACITORS	RY01	GA05102D10	Resistor 1kΩ ±5% 1W
CV01	DA17103010	Ceramic 0.01µF ±20% 25 V	RY02	GA05102D10	Resistor 1kΩ ±5% 1W
CV12			DY01	H110048320	L.E.D. GL-3HD7, CD
			DY02	H110048320	L.E.D. GL-3HD7, Phono
			DY03	H110048320	L.E.D. GL-3HD7, Tuner
			DY04	H110048320	L.E.D. GL-3HD7, AUX 1
			DY05	H110048320	L.E.D. GL-3HD7, AUX 2
			DY06	H110037320	L.E.D. LT-6202N, CD Direct
DV01	HD200110E0	PV00-SEMICONDUCTORS Diode 1S1555	WY01	YU07250260	Jumper Lead, 7P
			WY02	YU05180260	Jumper Lead, 3P
					PZ00-TAPE/VCR/MUTING IND.
					CIRCUIT BOARD
JV01	YT02040570	PV00-MISCELLANEOUS Terminal, Phono/CD	PZ00	YK274H2880 ZZ274H8880	P.W. Board, Tape/VCR/Muting IND. P.W. Board Assembly
JV02	YT02020470	Terminal, Tuner	DZ01	H110048320	L.E.D. GL-3HD7, Tape 1
JV03	YT02040530	Terminal, AUX 1, AUX 2	DZ02	H110048320	L.E.D. GL-3HD7, Tape 2
JV04	YF00010580	Terminal, PH-OUT/Main-IN	DZ03	H110048320	L.E.D. GL-3HD7, VCR
JV05	YP00020210	Plug, 4P	DZ04	H110037320	L.E.D. LT-6202N, Muting
LV01	LY20240230	Relay, PH-OUT	WZ01	YU04260260	Jumper Lead, 4P
WW01	YB00440010	Connective Cord, 8P	WZ02	YU05100260	Jumper Lead, 5P
WW02	YB00480060	Connective Cord, 8P			
WW05	YB00140200	Connective Cord, 4P			
WW06	YB00670010	Connective Cord, 4P			
WW07	YB00180240	Connective Cord, 2P			
		PW00-TAPE PLAY/REC/VCR			
		CIRCUIT BOARD			
PW00	YK274H1330 ZZ274H8330	P.W. Board, Tape Play/Rec/VCR P.W. Board Assembly			
CW01	DA17103010	Ceramic Cap. 0.01µF ±20% 25V			
CV06					
JW01	YT02040580	Terminal, Tape 1			
JW02	YT02040580	Terminal, Tape 2			
JW03	YT02040580	Terminal, HFI VCR			
WW01	YB00340050	Connective Cord, 8P			
WW02	YB00280300	Connective Cord, 8P			

(V01-99)	Assembly and Wiring
(T01-99)	Adjustment
(X01-00)	Correction

NOTE ON SAFETY:
 Symbol Δ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol Δ. Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.

9. TECHNICAL SPECIFICATIONS

AUDIO SECTION

IHF Dynamic Power	
4 OHMS.....	310 W
8 OHMS	160 W

POWER OUTPUT PER CHANNEL	
DIN 4 OHMS AT 1 kHz.....	240 W
RMS 4 OHMS FTC.....	220 W
DIN 8 OHMS AT 1 kHz.....	150 W
RMS 8 OHMS FTC.....	140 W
TOTAL HARMONIC DISTORTION AT RMS 8 OHMS	0.01 %
I.M. DISTORTION.....	0.01 %
DAMPING FACTOR 8 OHMS (1 kHz).....	200

MAIN IN Sensitivity	1.5 V
MAIN IN Impedance.....	27 k ohms
Frequency Response (MAIN IN).....	10 Hz ~ 100 kHz
Signal to Noise Ratio, MAIN IN (A weighted) at 1 W Output.....	97 dB

MM CARTRIDGE INPUT

Frequency Response (IEC, RIAA).....	40.2 dB
Signal-to-Noise Ratio (A weighted).....	92 dB
Input Impedance.....	47 k ohms
Input Capacitance.....	100 pF
Input Sensitivity	2.5 mV
Equivalent Input Noise (A weighted)	0.07 µV
Dynamic Range.....	130 dB

MCCARTRIDGE INPUT

Input Sensitivity.....	125 (Low MC)/350 (High MC) µV
Input Impedance.....	3 (Low MC)/40 (High MC) ohms

CD, AUX. INPUT

Input Impedance	25 k ohms
Input Sensitivity.....	150 mV
Frequency Response.....	10 Hz ~ 70 kHz
Signal to Noise Ratio (A weighted).....	96 dB

OUTPUT VOLTAGE

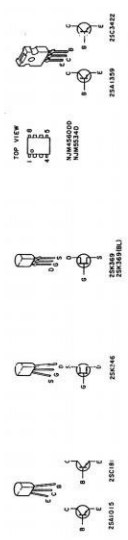
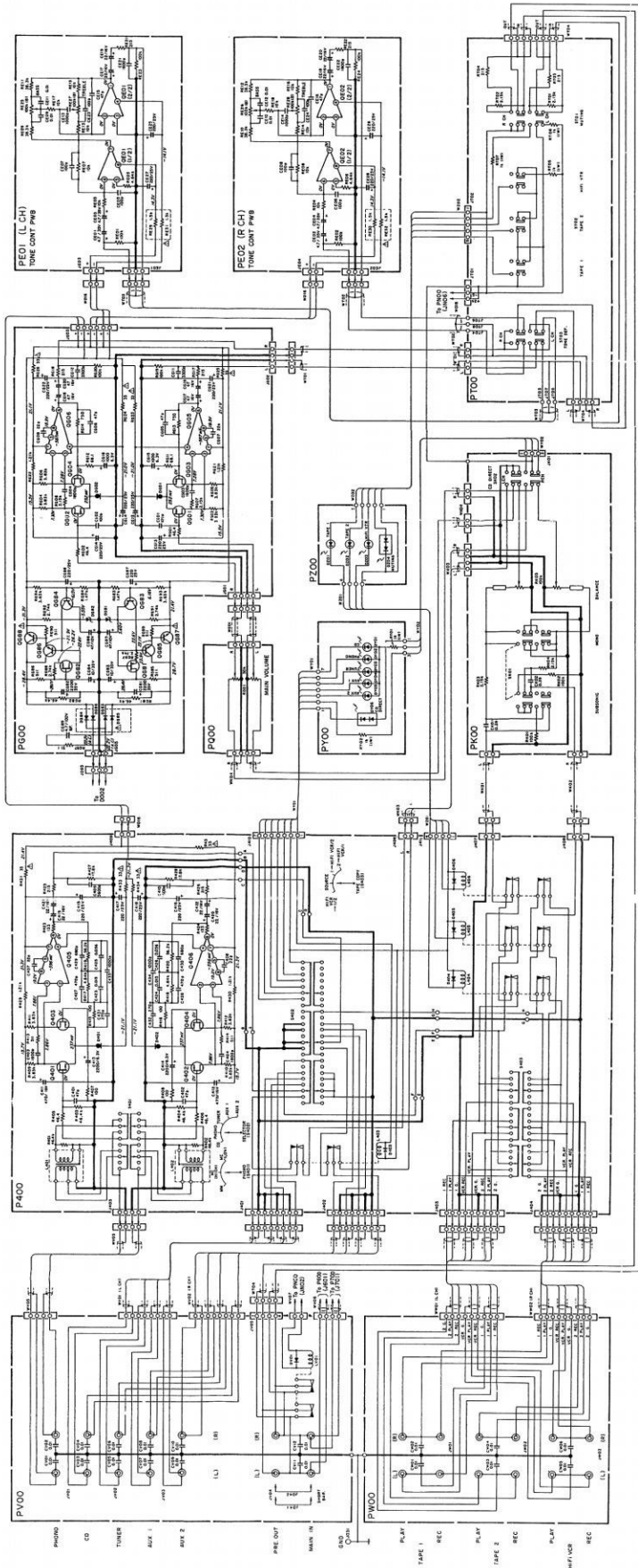
Tape Out [PHONO (MM) 7.75 mV 1 kHz Input].....	465 mV
Preamplifier Output [AUX, 150 mV 1 kHz Input].....	1.5 V

OUTPUT IMPEDANCE

Tape Out (at Phono Position).....	220 ohms
Preamplifier Output.....	220 ohms

GENERAL

Power Requirements (E Version).....	110/120/220/240 V AC, 50/60 Hz
Power Consumption at Rated Output, both Channels Operating at 8 ohms load	490 W
Dimensions	
Panel Width.....	465 mm
Panel Height.....	146 mm
Depth.....	410 mm
Weight	
Unit Alone	23 kg



*SERVICE INFORMATION IS FOR USE BY QUALIFIED PERSONNEL ONLY - ANY MISADJUSTMENT OR MISALIGNMENT MAY BE TREATED AS A NON-WARRANTY REPAIR BY ANY MARANTZ SERVICE CENTRE *

- Kind of Common Parts**
- RESISTOR** (1) EA.....10, Electrolytic condenser.
 (2) DF15...-350, Plastic film type, tolerance ±20%
 (3) DD1...-370, Carbon film fixed resistor, ±5% 1/8W
 (4) DD05...160, Carbon film fixed resistor, ±5% 1/6W
- CAPACITOR** (1) DD1...-370, Ceramic condenser, disc type (titanium)
 (2) DD1...-370, Ceramic condenser, disc type (titanium)
 (3) DD1...-370, Ceramic condenser, disc type (titanium)
 (4) DD1...-370, Ceramic condenser, disc type (titanium)
 (5) DD1...-370, Ceramic condenser, disc type (titanium)
 (6) DD1...-370, Ceramic condenser, disc type (titanium)
 (7) DD1...-370, Ceramic condenser, disc type (titanium)
 (8) DD1...-370, Ceramic condenser, disc type (titanium)
 (9) DD1...-370, Ceramic condenser, disc type (titanium)
 (10) DD1...-370, Ceramic condenser, disc type (titanium)

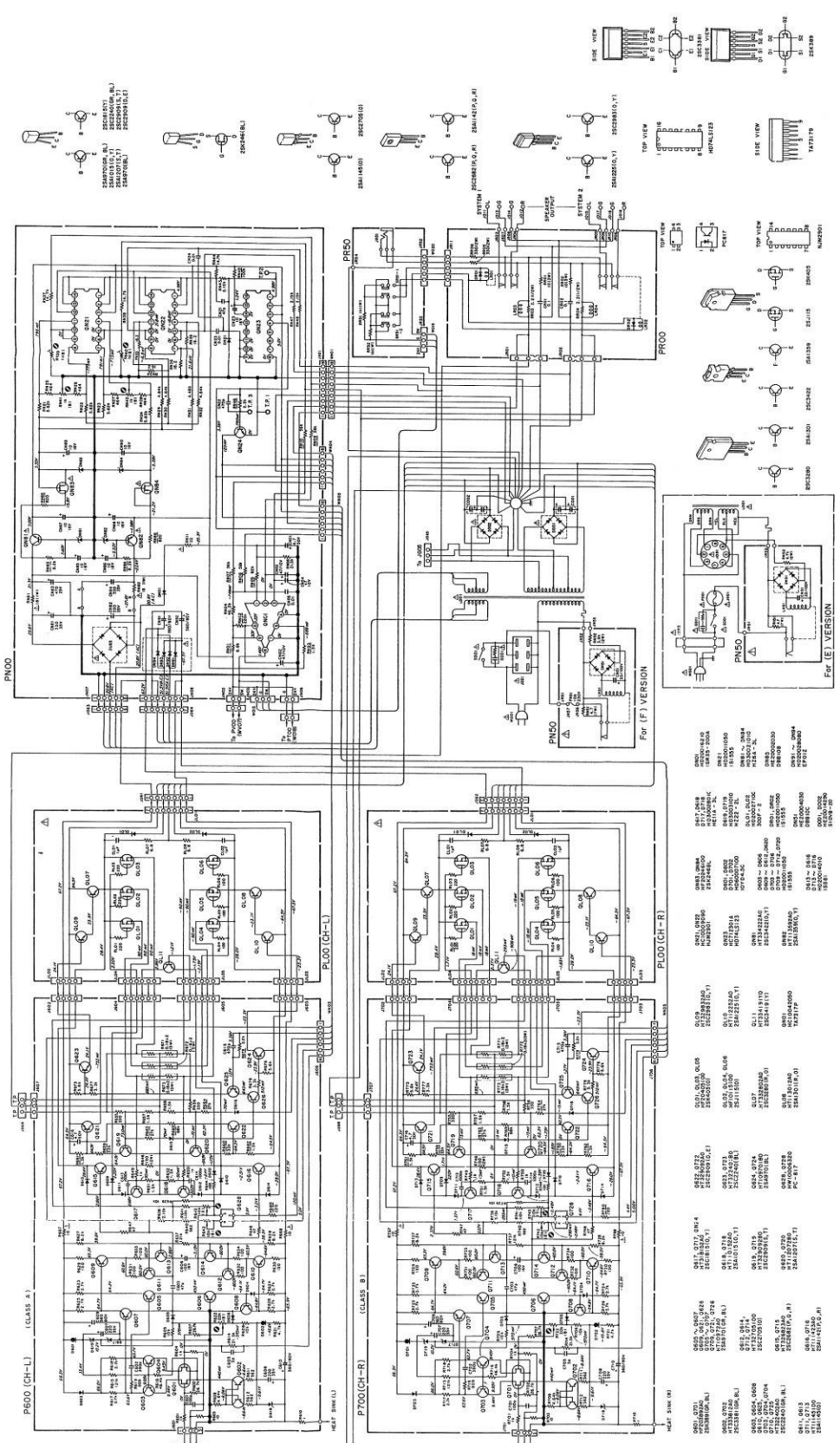
- RELAY** (1) DD1...-370, Ceramic condenser, disc type (titanium)
 (2) DD1...-370, Ceramic condenser, disc type (titanium)
 (3) DD1...-370, Ceramic condenser, disc type (titanium)
 (4) DD1...-370, Ceramic condenser, disc type (titanium)
 (5) DD1...-370, Ceramic condenser, disc type (titanium)
 (6) DD1...-370, Ceramic condenser, disc type (titanium)
 (7) DD1...-370, Ceramic condenser, disc type (titanium)
 (8) DD1...-370, Ceramic condenser, disc type (titanium)
 (9) DD1...-370, Ceramic condenser, disc type (titanium)
 (10) DD1...-370, Ceramic condenser, disc type (titanium)

- RELAY** (1) DD1...-370, Ceramic condenser, disc type (titanium)
 (2) DD1...-370, Ceramic condenser, disc type (titanium)
 (3) DD1...-370, Ceramic condenser, disc type (titanium)
 (4) DD1...-370, Ceramic condenser, disc type (titanium)
 (5) DD1...-370, Ceramic condenser, disc type (titanium)
 (6) DD1...-370, Ceramic condenser, disc type (titanium)
 (7) DD1...-370, Ceramic condenser, disc type (titanium)
 (8) DD1...-370, Ceramic condenser, disc type (titanium)
 (9) DD1...-370, Ceramic condenser, disc type (titanium)
 (10) DD1...-370, Ceramic condenser, disc type (titanium)

- RELAY** (1) DD1...-370, Ceramic condenser, disc type (titanium)
 (2) DD1...-370, Ceramic condenser, disc type (titanium)
 (3) DD1...-370, Ceramic condenser, disc type (titanium)
 (4) DD1...-370, Ceramic condenser, disc type (titanium)
 (5) DD1...-370, Ceramic condenser, disc type (titanium)
 (6) DD1...-370, Ceramic condenser, disc type (titanium)
 (7) DD1...-370, Ceramic condenser, disc type (titanium)
 (8) DD1...-370, Ceramic condenser, disc type (titanium)
 (9) DD1...-370, Ceramic condenser, disc type (titanium)
 (10) DD1...-370, Ceramic condenser, disc type (titanium)

NOTE ON SAFETY:
 Symbol Δ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol Δ. Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.

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



NOTE ON SAFETY:
 Symbol Δ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol Δ .
 Symbols Δ and ∇ indicate components whose replacement (type), may increase risk of fire or electrical shock hazard.

COMPONENTS AND WIRING ARE SUBJECT TO CHANGE FOR MODIFICATION KIT

Kind of Common Parts

RESISTOR
 R*** (1) GD05 ... 140, Carbon film fixed resistor, $\pm 5\%$ 1/4W
 R*** (2) GD05 ... 180, Carbon film fixed resistor, $\pm 5\%$ 1/8W

CAPACITOR
 C*** : CERAMIC CAP. Ceramic capacitor, disc type (titanium condenser)
 C*** : CERAMIC CAP. High dielectric constant ceramic condenser, disc type (titanium variable)
 Temp. coef. P250 ~ N1000 50V
 Temp. class: 2B - 50V

ELECTROLYTIC CAP. (E) / FILM CAP. (F)
 (1) EX ... 10, Electrolytic condenser, tolerance $\pm 20\%$
 (2) DF15 ... 350, Plastic film condenser, one-way type, Mylar, $\pm 5\%$ 50V

*** In case of ordering the common parts, please establish the correct common parts code by the procedure "ASSIGNMENT OF COMMON PARTS CODES"**

"SERVICE INFORMATION IS FOR USE BY QUALIFIED PERSONNEL ONLY - ANY MISADJUSTMENT OR MISALIGNMENT MAY BE TREATED AS A NON-WARRANTY REPAIR BY ANY MARANTZ SERVICE CENTRE ..."

- 011, 012, 013, 014, 015, 016, 017, 018, 019, 020, 021, 022, 023, 024, 025, 026, 027, 028, 029, 030, 031, 032, 033, 034, 035, 036, 037, 038, 039, 040, 041, 042, 043, 044, 045, 046, 047, 048, 049, 050, 051, 052, 053, 054, 055, 056, 057, 058, 059, 060, 061, 062, 063, 064, 065, 066, 067, 068, 069, 070, 071, 072, 073, 074, 075, 076, 077, 078, 079, 080, 081, 082, 083, 084, 085, 086, 087, 088, 089, 090, 091, 092, 093, 094, 095, 096, 097, 098, 099, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.