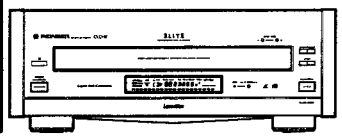
PIONEER®
The Art of Entertainment

Service Manual


CLD-97

ORDER NO.
ARP2743

CD CDV LD PLAYER

CLD-97
CLD-98

CLD – 97 AND CLD – 98 HAVE THE FOLLOWING :

Type	Model		Power Requirement	Remarks
	CLD – 97	CLD – 98		
KU/CA	○	–	AC120V only	
SD	–	○	AC110V, 120V – 127V, 220V, 240V (switchable)	

- **This manual is applicable to CLD – 97/KU/CA and CLD – 98/SD.**

CONTENTS

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1. SAFETY INFORMATION

This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

WARNING

Lead in solder used in this product is listed by the California Health and Welfare agency as a known reproductive toxicant which may cause birth defects or other reproductive harm (California Health & Safety Code, Section 25249.5).
When servicing or handling circuit boards and other components which contain lead in solder, avoid unprotected skin contact with the solder. Also, when soldering do not inhale any smoke or fumes produced.

NOTICE
(FOR CANADIAN MODEL ONLY)
Fuse symbols -▮▭- (fast operating fuse) and/or -▮▭⊠- (slow operating fuse) on PCB indicate that replacement parts must be of identical designation.

REMARQUE
(POUR MODÈLE CANADIEN SEULEMENT)
Les symboles de fusible -▮▭- (fusible de type rapide) et/ou -▮▭⊠- (fusible de type lent) sur CCI indiquent que les pièces de remplacement doivent avoir la même désignation.

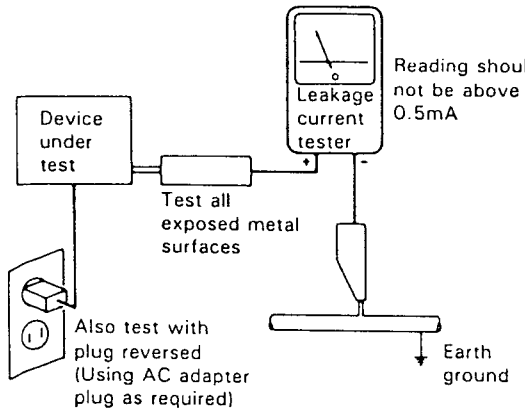
(FOR USA MODEL ONLY)

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.
The use of a substitute replacement component which dose not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

2. EXPLODED VIEWS, PACKING AND PARTS LIST

NOTES:

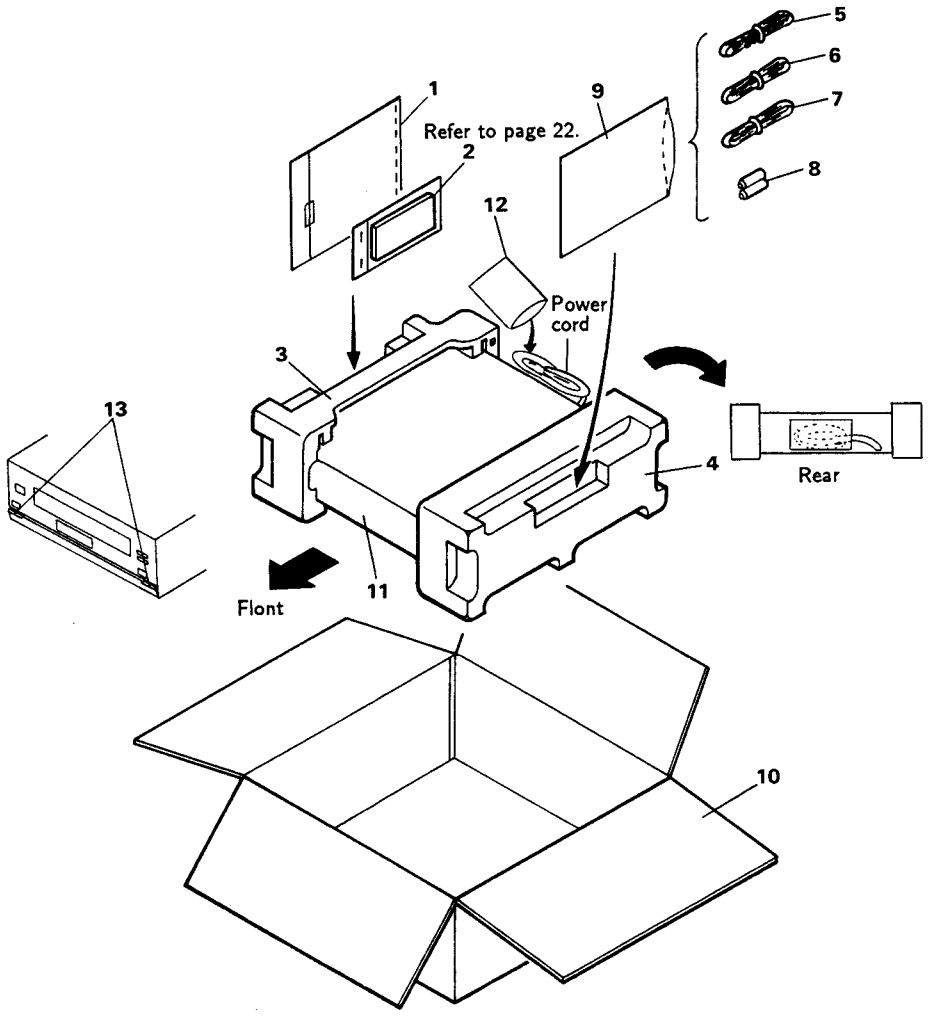
- *Parts marked by "NSP" are generally unavailable because they are not in our Master Spare Parts List.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

2.1 PACKING AND PARTS LIST

Parts List

Mark	No.	Description	Parts No.
	1	Operating instructions (CLD−97, English)	VRB1087
	1	Operating instructions (CLD−98, English)	VRB1088
	2	Remote control unit (CU−CLD090. CLD−97)	VXX1850
	2	Remote control unit (CU−CLD062. CLD−98)	VXX1672
	3	Pad(L)	VHA1101
	4	Pad(R)	VHA1102
	5	Cord with plag	PDE1003
	6	Video cable	VDE1003
	7	S Video cable	VDE1013
NSP	8	Battery (R03, AAA)	VEM−022

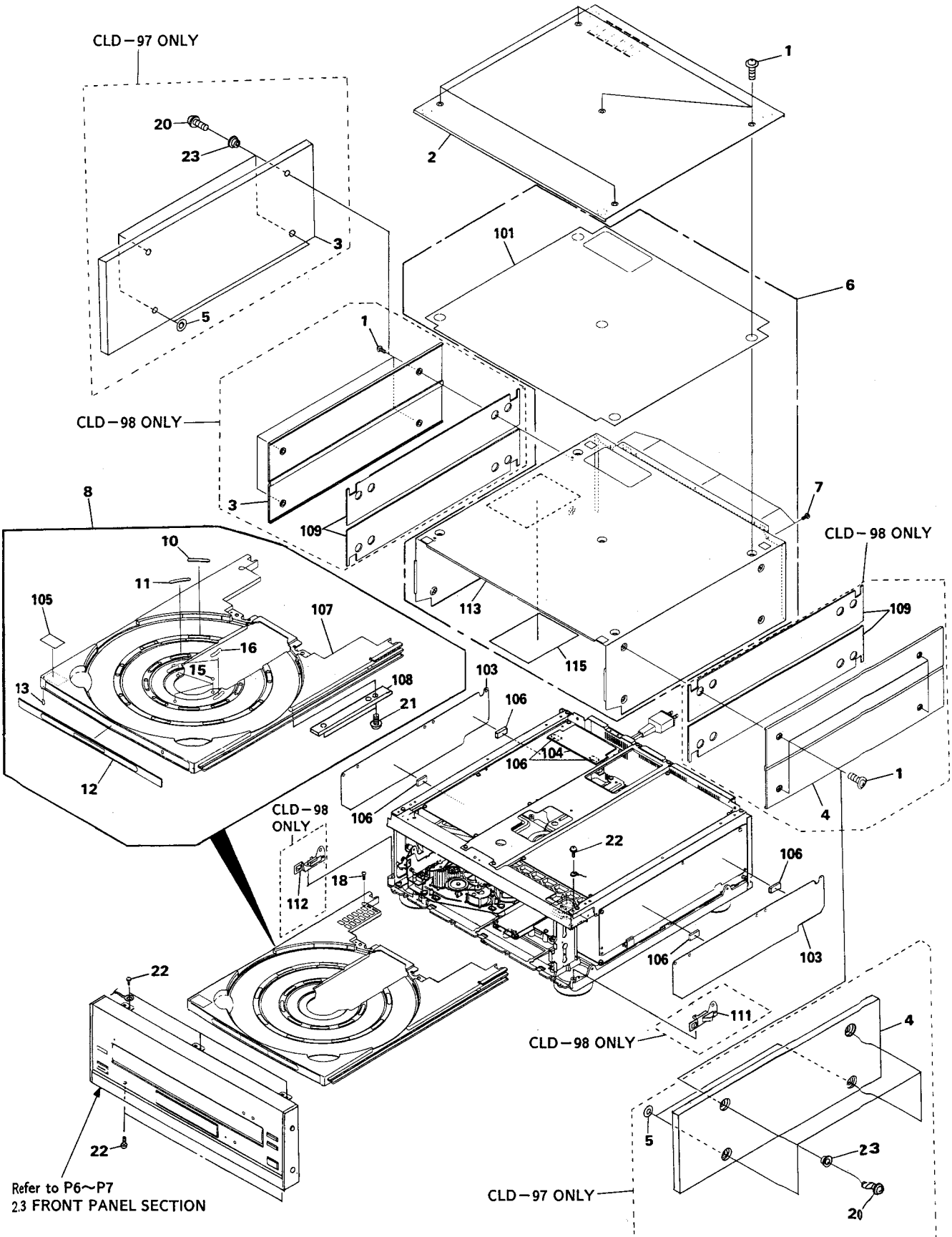
Mark	No.	Description	Parts No.
NSP	9	Polyethylene bag	Z21−029
	10	Carton case (CLD−97)	VHG1275
	10	Carton case (CLD−98)	VHG1276
	11	Mirror mat	VHL1018
	12	Mirror mat bag	VHL1004
	13	Mirror mat sheet	VHL1021



2.2 EXTERIOR SECTION

Parts List

Mark	No.	Description	Parts No.
	1	SH screw(FE) (CLD−97)	VBA1036
	1	SH screw(FE) (CLD−98)	VBA1037
	2	Top cover(AL) (CLD−97)	VAH1174
	2	Top cover(AL) (CLD−98)	VAH1154
	3	Side wood(L) (CLD−97)	VAP1022
	3	Side cover(AL)(L) (CLD−98)	VAH1151
	4	Side wood(R) (CLD−97)	VAP1023
	4	Side cover(AL)(R) (CLD−98)	VAH1152
	5	Side spacer (CLD−97 ONLY)	VEC1442
	6	Bonnet assembly−S (CLD−97)	VXX1863
	6	Bonnet assembly−S (CLD−98)	VXX1874
	7	Screw	BBT30P060FCC
	8	Carry assembly−S (CLD−97)	VXX1557
	8	Carry assembly−S (CLD−98)	VXX1873
	9	.....	
	10	Disc pad(L) (CLD−97)	VEC1462
	10	Disc pad(L) (CLD−98)	VEC1409
	11	Disc pad(S) (CLD−97)	VEC1463
	11	Disc pad(S) (CLD−98)	VEC1410
	12	Carry rubber (CLD−97)	VEB1158
	12	Carry rubber (CLD−98)	VEB1145
	13	Stopper rubber	VEB1119
	14	.....	
	15	Rubber Sheet D (CLD−97)	VEB1131
	15	Rubber Sheet F (CLD−98)	VEB1153
	16	Rubber Sheet C (CLD−97)	VEB1130
	16	Rubber Sheet E (CLD−98)	VEB1152
	17	.....	
	18	Screw	BPZ30P120FMC
	19	.....	
	20	Screw(CLD−97 ONLY)	IBZ40P200FZK
	21	Screw	IPZ30P060FCU
	22	Screw	IBZ30P060FCC
	23	Wood coller (CLD−97 ONLY)	PNW1238
NSP	101	Damp cushion	VEC1533
	102	.....	
NSP	103	Insulation sheet	VEC1303
	104	Insulation sheet D	VEC1556
NSP	105	Carry label	VRW1289
NSP	106	Insulation cushion	VEC1295
NSP	107	Carry assembly (CLD−97)	VXA1634
NSP	107	Carry assembly (CLD−98)	VXA1552
NSP	108	Tray reinforced plate	VNE1585
NSP	109	Side cushion (CLD−98 ONLY)	VEC1546
	110	.....	
NSP	111	Earth plate(R) (CLD−98 ONLY)	VNE1784
NSP	112	Earth plate(L) (CLD−98 ONLY)	VNE1783
NSP	113	Bonnet (CLD−97)	VNA1320
NSP	113	Bonnet (CLD−98)	VNA1240
	114	.....	
NSP	115	Bonnet sheet	VEC1572

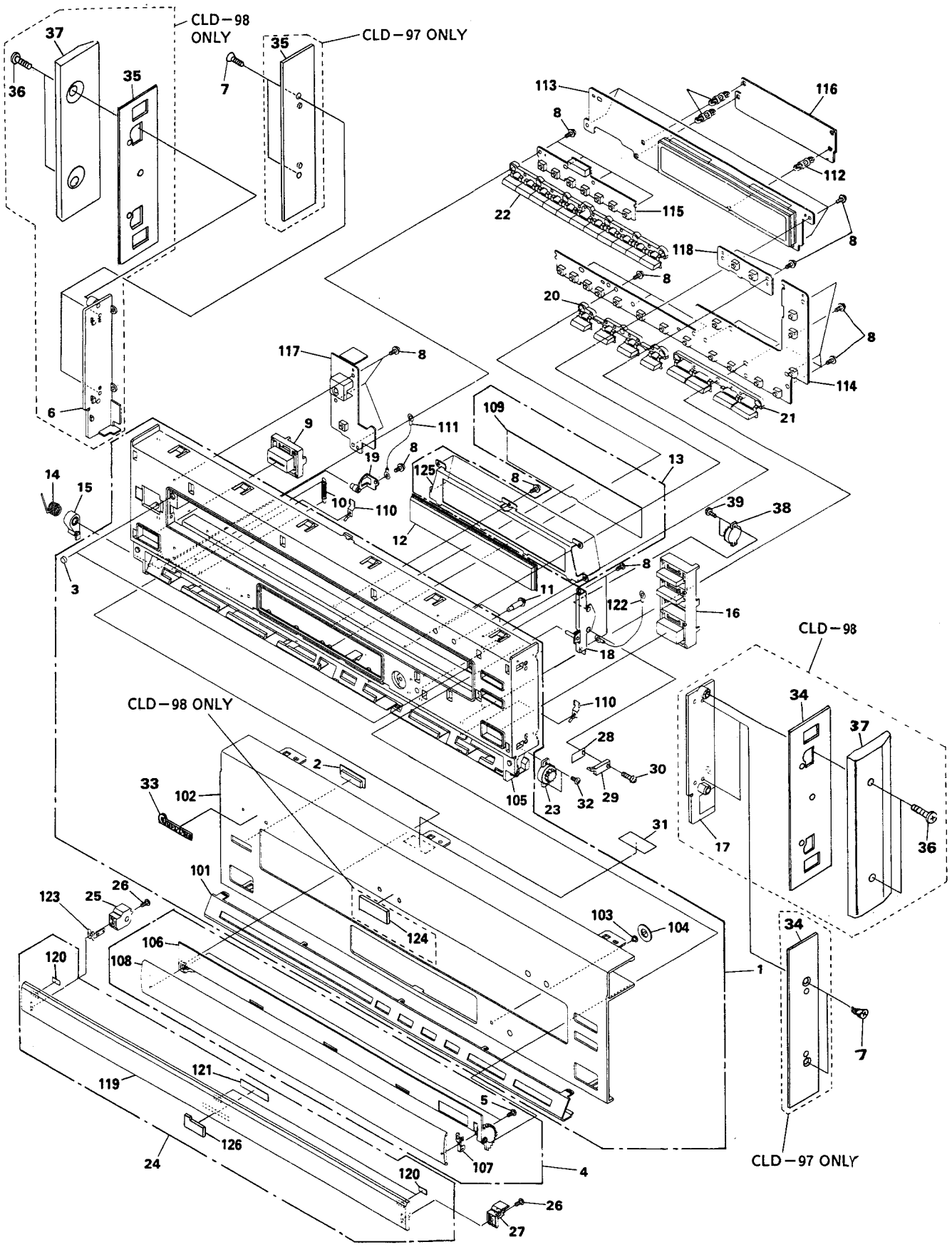


NOTE : Screws adjacent to ▼ mark on product are used for disassembly.

2.3 FRONT PANEL SECTION

Parts List

Mark	No.	Description	Parts No.
	1	Front panel assembly−S (CLD−97)	VXX1866
	1	Front panel assembly−S (CLD−98)	VXX1872
	2	Sensor acrilyc	VNK1566
	3	Door rubber(CLD−97)	VEB1157
	3	Door rubber(CLD−98)	VEB1144
	4	Door assembly−S(CLD−97)	VXX1864
	4	Door assembly−S(CLD−98)	VXX1827
	5	Screw(CLD−97)	BMZ20P030FZK
	5	Screw(CLD−98)	BMZ20P030FNI
	6	Side panel(L)(CLD−98 ONLY)	VNK2177
	7	Screw(CLD−97)	CPZ26P060FMC
	7	Screw(CLD−98)	IPZ26P080FMC
	8	Screw	IPZ26P060FCU
	9	Power button(CLD−97)	VNK1712
	9	Power button(CLD−98)	VNK2169
	10	Door spring	VBH1196
	11	Gold button	VLL1313
	12	FL panel	VEC1562
	13	Back plate assembly−S(CLD−97)	VXX1575
	13	Back plate assembly−S(CLD−98)	VXX1489
	14	Pocket spring	VBH1141
	15	Pocket lock	VNL1339
	16	Operate key(CLD−97)	VNK1713
	16	Operate key(CLD−98)	VNK2170
	17	Side panel(R)(CLD−98 ONLY)	VNK2176
	18	Damper plate assembly(CLD−97)	VXA1623
	18	Damper plate assembly(CLD−98)	VXA1545
	19	Pocket holder assembly	VXA1536
	20	Mode key(CLD−97)	VNK1710
	20	Mode key(CLD−98)	VNK2180
	21	Search key(CLD−97)	VNK1711
	21	Search key(CLD−98)	VNK2179
	22	Ten key(CLD−97)	VNK1709
	22	Ten key(CLD−98)	VNK2178
	23	Damper assembly	REC1013
	24	Pocket assembly−S(CLD−97)	VXX1865
	24	Pocket assembly−S(CLD−98)	VXX1828
	25	Pocket arm(L)(CLD−97)	VNK1714
	25	Pocket arm(L)(CLD−98)	VNK2171
	26	Screw	PMA26P060FMC
	27	Pocket arm(R)(CLD−97)	VNK1715
	27	Pocket arm(R)(CLD−98)	VNK2172
	28	Insulation sheet	DEC1238
	29	Door switch	VSK1014
	30	Screw	PMZ20P060FMC
	31	Case sheet	VEC1072
	32	Screw	BPZ20P060FCU
	33	Name plate(CLD−97)	RAN1008
	33	Name plate(CLD−98)	RAN1011
	34	Side mole(R)(CLD−97)	VAH1178
	34	Side mole(R)(CLD−98)	VEB1178
	35	Side mole(L)(CLD−97)	VAH1177
	35	Side mole(L)(CLD−98)	VEB1188
	36	Screw(CLD−98 ONLY)	VBA1028
	37	Side pole(CLD−98 ONLY)	VAH1153
	38	Damper assembly	VXA1053
	39	Screw	PMZ20P040FCU
NSP	101	Under plate(CLD−97)	VAH1175
NSP	101	Under plate(CLD−98)	VAH1170
NSP	102	Front aluminum assembly (CLD−97)	VXA1957
NSP	102	Front aluminum assembly (CLD−98)	VXA1958
NSP	103	LED collar	VNK1583
NSP	104	LED lens	VNK1582
NSP	105	Front panel(CLD−97)	VNK1708
NSP	105	Front panel(CLD−98)	VNK2175
NSP	106	Door holder assembly(CLD−97)	VXA1622
NSP	106	Door holder assembly(CLD−98)	VXA1917
NSP	107	Door earth	VNE1582
NSP	108	Door aluminum(CLD−97)	VAH1176
NSP	108	Door aluminum(CLD−98)	VAH1168
NSP	109	FL filter(CLD−97)	VEC1459
NSP	109	FL filter(CLD−98)	VEC1393
NSP	110	Under earth	VNE1583
NSP	111	Earth lug assembly	VDA1394
NSP	112	PC support	VEC1133
NSP	113	FLDB assembly	VWG1265
NSP	114	OPEB assembly	VWG1266
NSP	115	KEYB assembly	VWG1268
NSP	116	MODE assembly(CLD−97)	VWG1444
NSP	116	MODE assembly(CLD−98)	VWG1390
NSP	117	IRKB assembly	VWG1267
NSP	118	SIDE assembly	VWG1269
NSP	119	Pocket aluminum(CLD−97)	VAH1173
NSP	119	Pocket aluminum(CLD−98)	VAH1169
NSP	120	Pocket cushion(CLD−97)	VEC1460
NSP	120	Pocket cushion(CLD−98)	VEC1412
NSP	121	Pocket spacer(CLD−97)	VEC1461
NSP	121	Pocket spacer(CLD−98)	VEC1413
NSP	122	Earth lug assembly	VDA1393
NSP	123	Pocket earth	VNE1584
NSP	124	Regato badge(CLD−98 ONLY)	VAM1030
NSP	125	Back plate	VNE1579
NSP	126	Laser disc badge(CLD−97)	VAM1022
NSP	126	Laser disc badge(CLD−98)	VAM1028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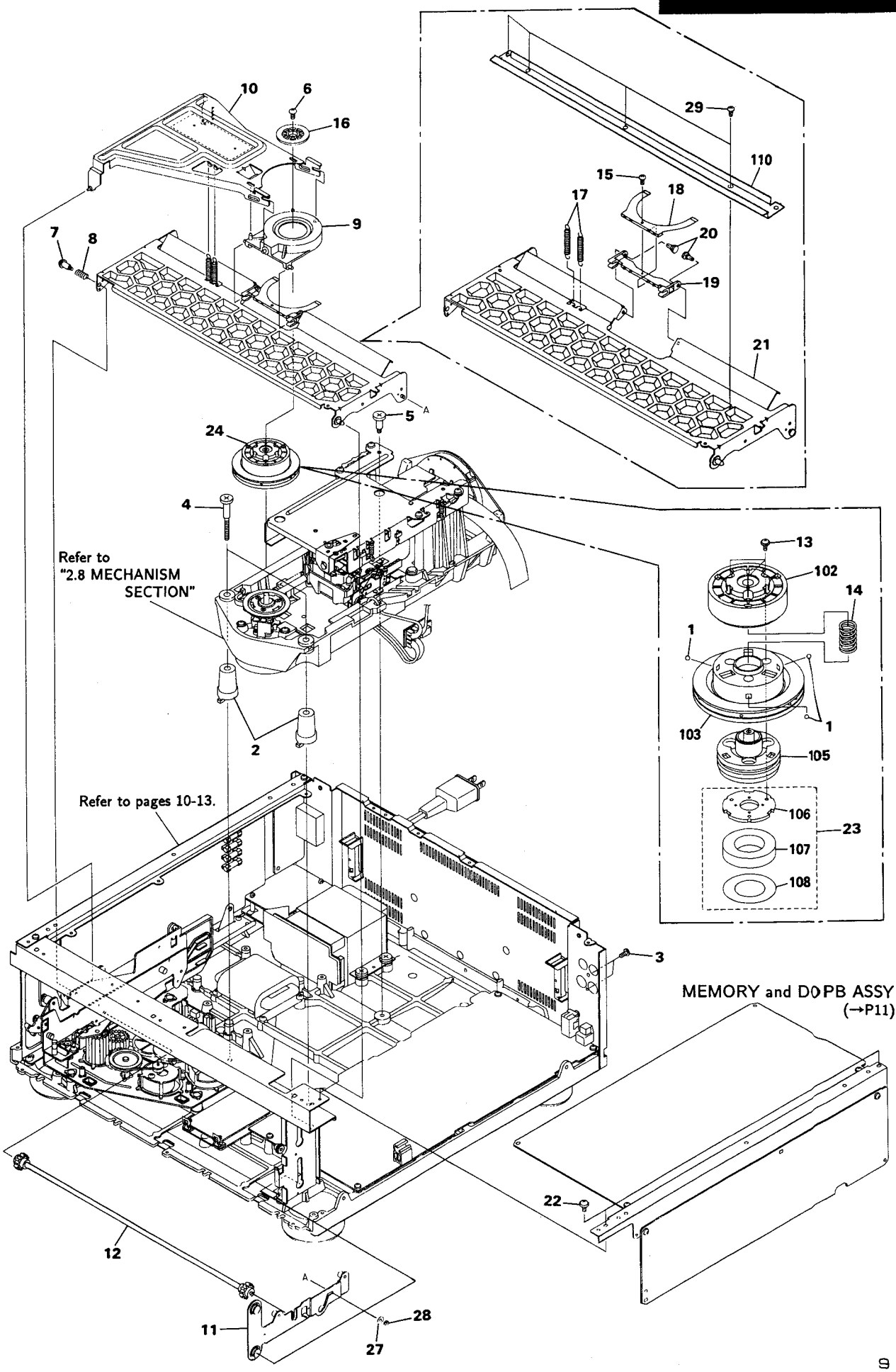
2.4 CLAMPER SECTION

Parts List

Mark	No.	Description	Parts No.
	1	Steel ball	VNX1006
	2	Mech. support	VNL1237
	3	Screw	BPZ30P080FCU
	4	Floating screw A	VBA1010
	5	Floating screw B	VBA1013
	6	Screw	PMB30P080FCU
	7	Screw(B)	VBA1008
	8	Arm spring	VBH1093
	9	Clamper holder assembly	VXA1344
	10	Clamper arm (B) assembly	VXA1415
	11	Roller plate(R) assembly	VXA1326
	12	Synchro gear assembly	VXA1329
	13	Screw	AMZ20P040FMC
	14	Centering spring(B)	VBH1097
	15	Screw	BPZ20P040FZK
	16	Clamper head	VNL1223
	17	Arm spring	VBH1099
	18	Plate spring	VNE1361
	19	Parallel link	VNL1246
	20	Plastic rivet	VEC1302
	21	Clamper arm(A) assembly	VXA1424
	22	Screw	IBZ30P060FCC
	23	Magnet assembly−S	VXX1333
	24	Clamper assembly−S	VXX1508
	25	.....	
	26	.....	
	27	Washer	WA32N080W050
	28	E ring	YE25FUC
	29	Screw	BBZ26P060FMC

Mark	No.	Description	Parts No.
	101	.....	
NSP	102	Clamper cover	VNL1225
NSP	103	Disc Clamper assembly	VXA1338
	104	.....	
NSP	105	Centering hub(B)	VNT1034
NSP	106	Yoke plate(B)	VNE1347
NSP	107	Magnet	VMG1010
NSP	108	Gap Sheet	VEC1561
	109	.....	
NSP	110	Arm reinforced plate	VNE1457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MEMORY and DOPB ASSY
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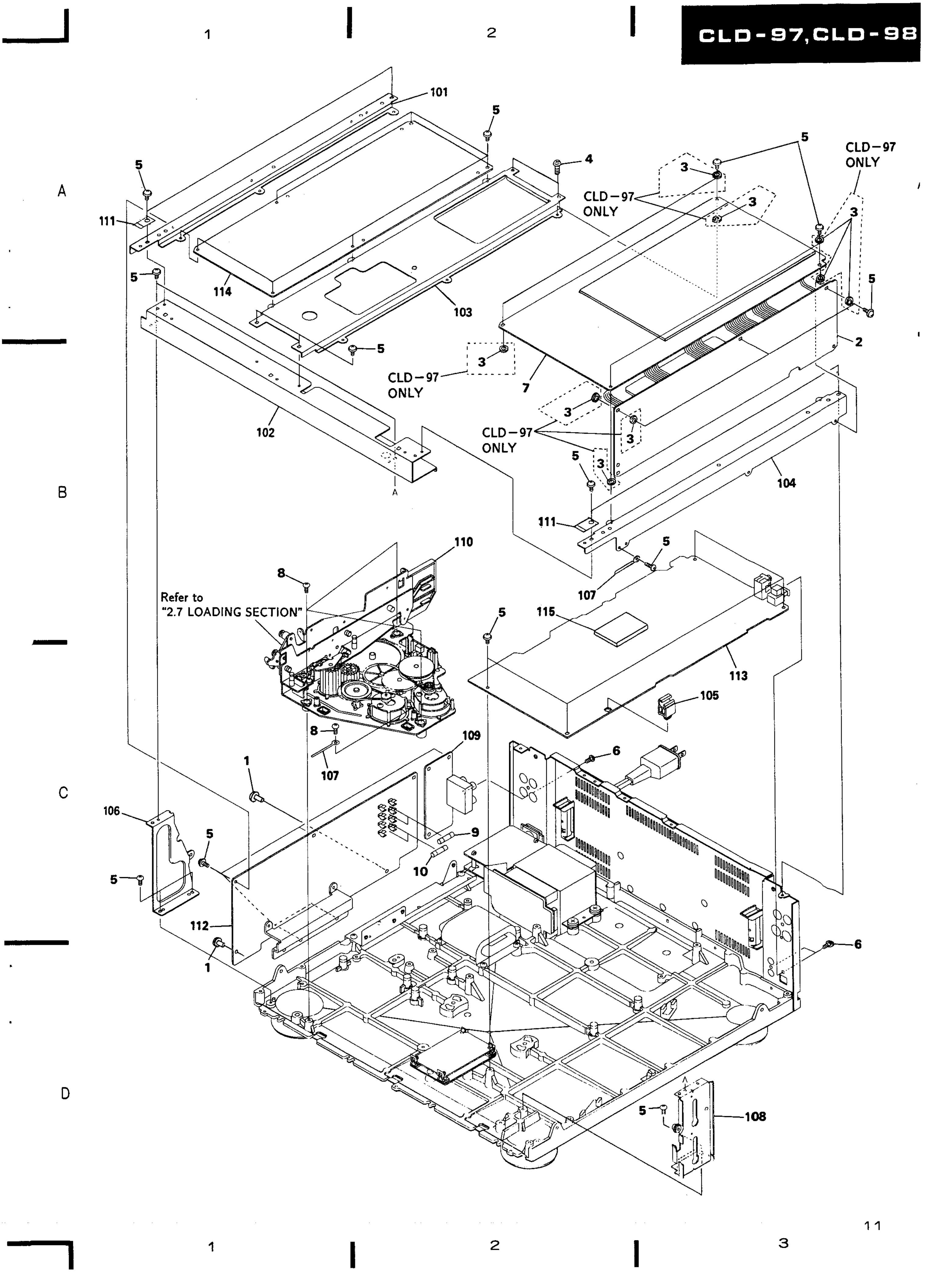
2.5 TOP SECTION

Parts List

Mark	No.	Description	Parts No.
	1	Plastic rivet	VEC−143
◉	2	DOPB assembly	VWV1240
	3	Spacer (CLD−97 ONLY)	VEC1575
	4	Screw	CBZ30P080FCC
	5	Screw	IBZ30P060FCC
	6	Screw	BPZ30P080FCU
◉	7	MEMORY assembly	VWS1113
	8	Screw	BBZ30P080FCC
⚠	9	Fuse(3A)(FU3, FU4)(CLD−97)	VEK1021
⚠	9	Fuse(T2.5A)(FU3, FU4)(CLD−98)	REK−104
⚠	10	Fuse(2A)(FU1, FU2)(CLD−97)	VEK1019
⚠	10	Fuse(T1.6A)(FU1, FU2)(CLD−98)	REK−102
NSP	101	Angle(L)	VNE1755
NSP	102	Front angle	VNE1754
NSP	103	Center holder	VNE1757
NSP	104	PCB holder	VNE1756
NSP	105	PCB hinge	VEC1175
NSP	106	Side stay(L)	VNE1586
NSP	107	Cord holder	VNF−069
NSP	108	Stay (R) assembly	VXA1550
NSP	109	PJAC assembly(CLD−97)	VWG1433
NSP	109	PJAC assembly(CLD−98)	VWG1481
NSP	110	Loading assembly	VWT1053
NSP	111	Earth plate	VNE1518
NSP	112	SYPS assembly(CLD−97)	VWR1113
NSP	112	SYPS assembly(CLD−98)	VWR1202
NSP	113	MAIN assembly(CLD−97)	VWX1155
NSP	113	MAIN assembly(CLD−98)	VWX1201
NSP	114	AUDB assembly(CLD−97)	VWG1445
NSP	114	AUDB assembly(CLD−98)	VWG1480
NSP	115	COMP assembly	VWV1247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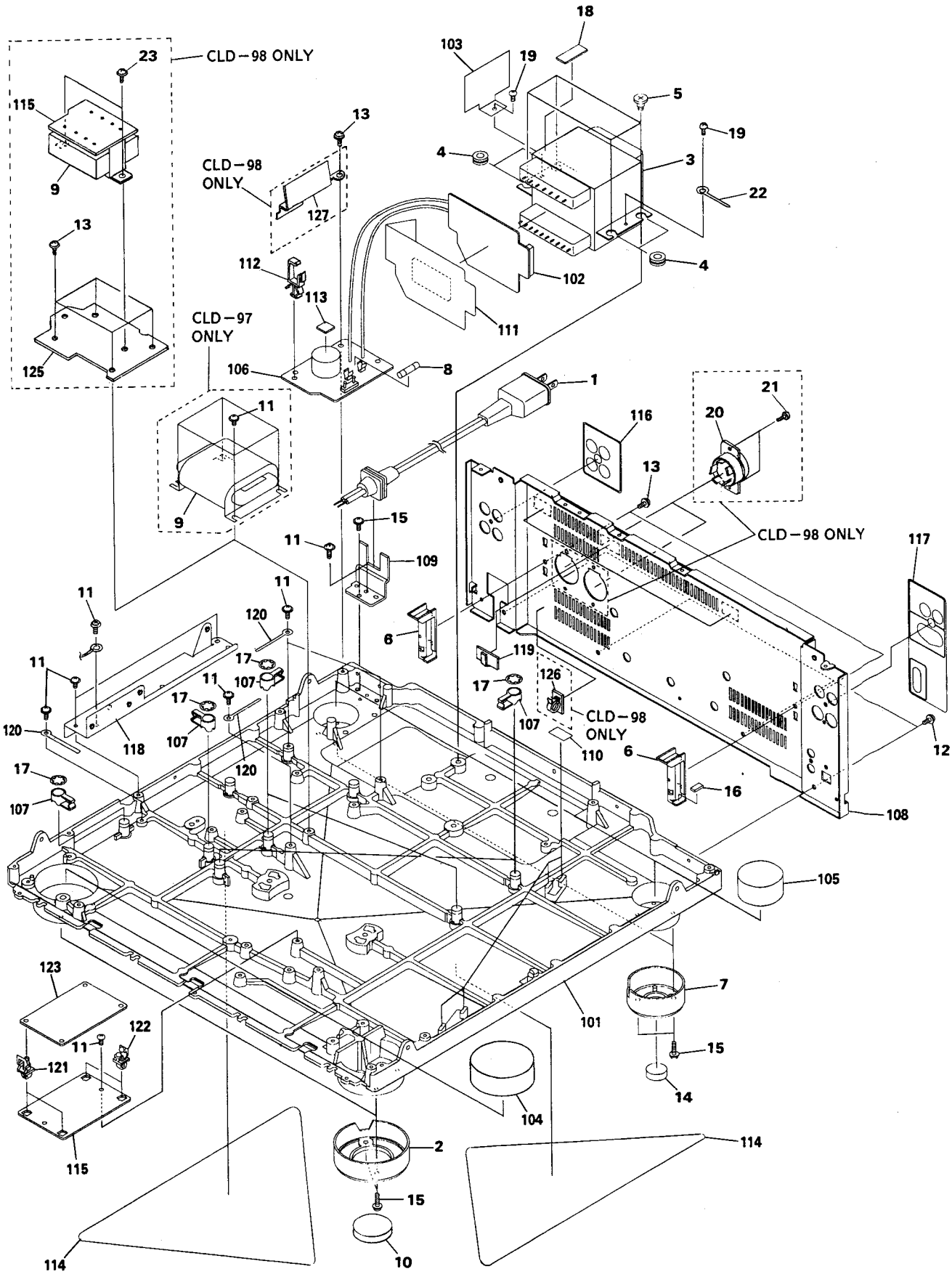
2.6 BASE SECTION

Parts List

Mark	No.	Description	Parts No.
⚠	1	Power cord(CLD−97)	VDG1046
⚠	1	Power cord(CLD−98)	VDG1047
	2	Cap(F)(CLD−97)	VNK1593
	2	Cap(F)(CLD−98)	VNK2173
⚠	3	Power transformer(AC 120V, MAIN) (CLD−97)	VTT1126
⚠	3	Power transformer(AC 120V, MAIN) (CLD−98)	VTT1127
	4	Transformer rubber	VEB1100
	5	Transformer screw	VBA1011
	6	Tray stopper	VNL1202
	7	Cap(R)(CLD−97)	VNK1594
	7	Cap(R)(CLD−98)	VNK2174
⚠	8	Fuse(2A) FU5 (CLD−97)	VEK1019
⚠	8	Fuse(T1.6A) FU5 (CLD−98)	REK−102
⚠	9	Power transformer(AUDIO) (CLD−97)	VTT1128
⚠	9	Power transformer(AUDIO) (CLD−98)	VTT1129
	10	Cushion(F)	VEC1440
	11	Screw	IBZ30P060FCC
	12	Screw	BBT30P060FCC
	13	Screw	IBZ30P080FCC
	14	Cushion(R)	VEC1401
	15	Screw	BBZ30P080FCC
	16	Door damp rubber	VEB1033
	17	CS stop ring	YS80FBT
	18	Transformer cushion	VEC1445
	19	Screw (CLD−97)	BCZ30P050FMC
	19	Screw (CLD−98)	BCZ30P040FMC
	20	Voltage selector (CLD−98 ONLY)	VSB1002
	21	Screw	BBZ30P080FZK
	22	Cord clamper(CLD−98 ONLY)	VNF−069
	23	Screw(CLD−98 ONLY)	PMB40P080FMC

Mark	No.	Description	Parts No.
NSP	101	Under base	VNT1040
NSP	102	TRSB assembly (CLD−97)	VWR1112
NSP	102	TRSB assembly(CLD−98)	VWR1184
NSP	103	Insulation sheet(C)	VEC1548
NSP	104	Pad(F)	VEC1436
NSP	105	Pad(R)	VEC1437
NSP	106	LSFB assembly(CLD−97)	VWR1189
NSP	106	LSFB assembly(CLD−98)	VWR1190
NSP	107	Wire clip	VEC1541
NSP	108	Rear panel(CLD−97)	VNA1322
NSP	108	Rear panel(CLD−98)	VNA1326
NSP	109	Cord holder	VNE1589
NSP	110	Damp sheet	VEX1021
NSP	111	Insulation sheet(A)	VEC1540
NSP	112	Wire clip	VEC1626
NSP	113	Filter cushion	VEC1287
NSP	114	Sheet	VRW1193
NSP	115	TRSA assembly	VWR1186
NSP	116	Label(L)	VRW1321
NSP	117	Label(R)	VRW1322
NSP	118	Side Stay	VNE1774
NSP	119	Wire clump(B)	VNE1298
NSP	120	Cord holder	VNF−005
NSP	121	Card edge spacer	VEC1535
NSP	122	Pierce hold	VEC1536
NSP	123	BLMB assembly (CLD−97)	VWS1103
NSP	123	BLMB assembly (CLD−98)	VWS1114
	124	.....	
NSP	125	Transformer holder(AL) (CLD−98 ONLY)	VNE1877
NSP	126	Wire clamp(CLD−98 ONLY)	VEC1273
NSP	127	Guard plate(FE) (CLD−98 ONLY)	VNE1866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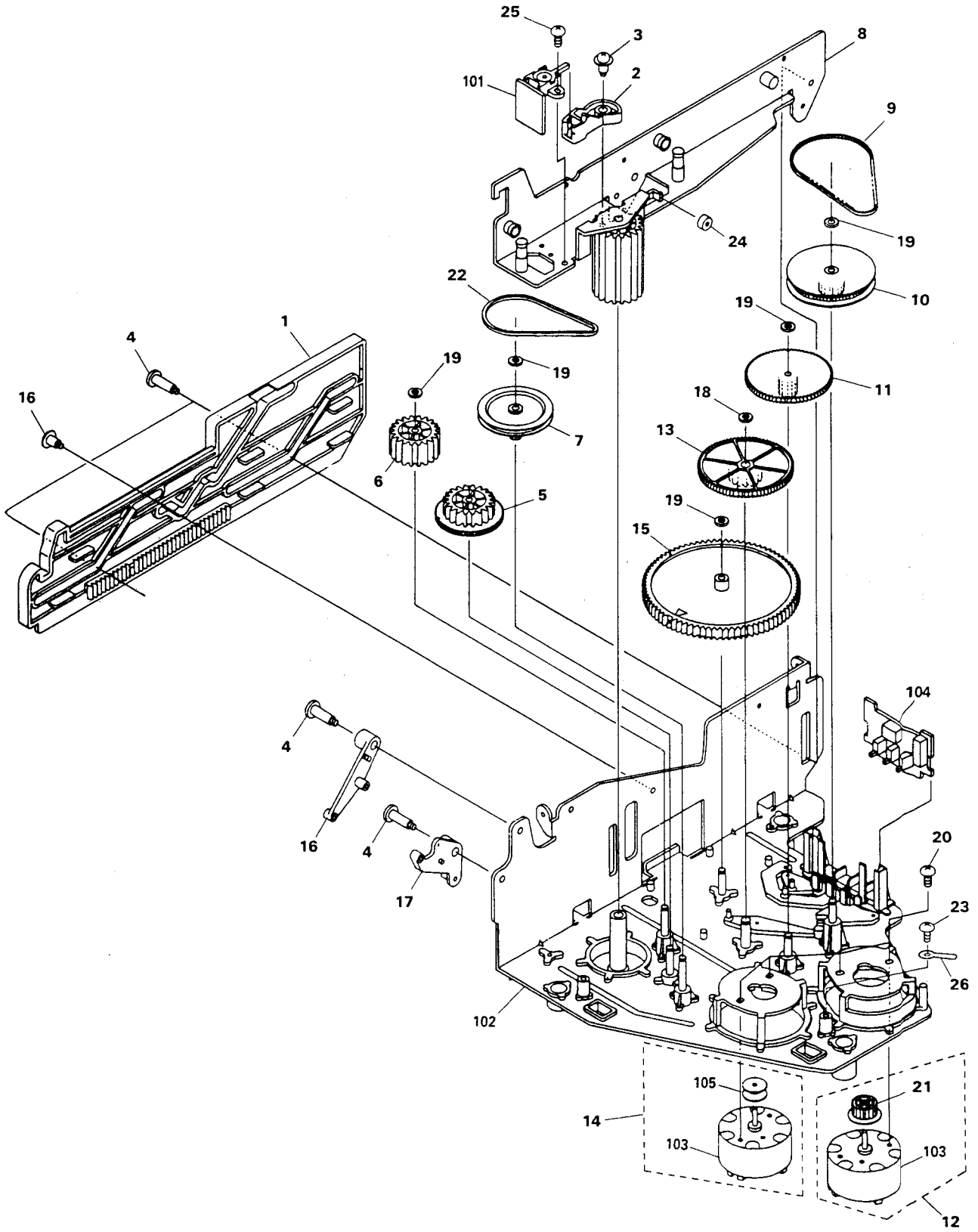
2.7 LOADING SECTION

Parts List

Mark	No.	Description	Parts No.
	1	Slide cam	VNL1231
	2	SW lever	VNL1239
	3	Screw(B)	VBA1008
	4	Screw(C)	VBA1014
	5	Gear(B)	VNL1229
	6	Follow gear	VNL1230
	7	Gear pulley	VNL1249
	8	Roller plate(L)assembly	VXA1532
	9	Synchro belt	VEB1069
	10	Timing pulley assembly	VXA1263
	11	Gear(D)	VNL1280
	12	Loading motor V assembly−S	VXX1324
	13	Gear(A)	VNL1141
	14	Loading motor H assembly−S	VXX1328
	15	Cam gear	VNL1228
	16	Lock arm	VNL1290
	17	Lever OC	VNL1247
	18	Washer	WT34D060D050
	19	Washer	WT26D047D025
	20	Screw	BMZ26P040FCU
	21	Motor pulley	VNL1148
	22	Belt	PEB1013
	23	Screw	BBZ30P080FMC
	24	Stop ring	VEB1091
	25	Screw	BMZ26P040FMC
	26	Binder	VEC−067
NSP	101	LHSB assembly	VWG1077
NSP	102	Loading base assembly	VXA1324
NSP	103	Carriage motor	VXM1033
NSP	104	LVSB assembly	VWG1078
NSP	105	Motor pulley	VLL1176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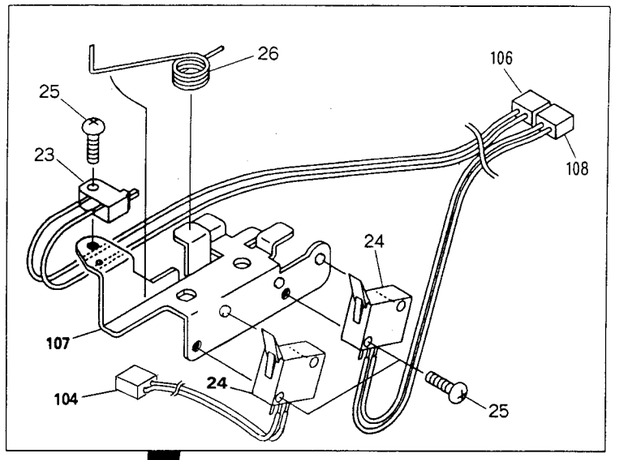
103
12
D

2.8 MECHANISM SECTION

Parts List

Mark	No.	Description	Parts No.
	1	Spindle motor	VXM1049
	2	Floating rubber A	VEB1095
	3	Plastic rivet	VEC1298
	4	.....	
	5	Damper	VEB1094
	6	Holder assembly	VXA1345
	7	Holder spring A	VBH1098
	8	Carriage shaft(B)	VLL1202
	9	Rack spring(B)	VBH1057
◉	10	Carriage assembly	VWT1054
	11	Sheet	VEC1332
	12	Yoke plate A	VNE1360
	13	Centering hub(A)	VNT1033
	14	Centering spring	VBH1024
	15	Cord guide	DNK2085
	16	Screw	ZMD30H050FBT
	17	Screw	BMZ30P160FCU
	18	Screw	PMB30P200FCU
	19	Screw	PMZ26P130FMC
	20	Screw	BPZ30P100FCU
	21	Screw	IPZ30P100FCU
	22	Screw	CBZ20P080FMC
	23	Push switch(CD INSIDE)(S2)	DSG1012
	24	Slide switch(CDV INSIDE) (CDV,LD A INSIDE)(S3)	VSK1003
	25	Screw	PMZ20P070FCU
	26	Holder spring B	VBH1104
	27	Carriage shaft(U)	VLL1201
	28	Rack Gear(U)	VNL1153
	29	Mech. chassis assembly(U)	VXA1334
	30	Rack spring(U)	VBH1058
	31	Screw	PMZ20P160FMC
	32	Screw	PMZ20P080FMC
	33	Slide switch(LD B INSIDE) (S4)	VSK1003
	34	Internal gear assembly	VXA1335
	35	G plate assembly	VXA1333
	36	Lever spring	VBH1072
	37	Lock lever	VNL1234
	38	R plate assembly	VXA1332
	39	Parallel cord(FFC)	VDA1207
	40	Harness guide	VNL1235
	41	Screw	BBZ26P060FCC
	42	Screw	BBZ30P140FCC
	43	Washer	WT36D072D050
	44	Rack Gear(B)	VNL1238
	45	Turntable assembly−S	DXX1759
	46	Cord clamper	VNF−069

Mark	No.	Description	Parts No.
NSP	101	Mech. chassis(B)	VNK1600
NSP	102	FGSB assembly	VWV1227
NSP	103	CNNB assembly	VWV1226
NSP	104	Housing assembly	VKP1894
NSP	105	Rubber sheet	VEB1035
NSP	106	Housing assembly	VKP1931
NSP	107	SW holder	VNE1510
NSP	108	Housing assembly	VKP1930
NSP	109	Caution label	VRW1073
NSP	110	PREB assembly	VWV1224
NSP	111	PRET assembly	VWV1225
NSP	112	Turntable assembly	VXA1677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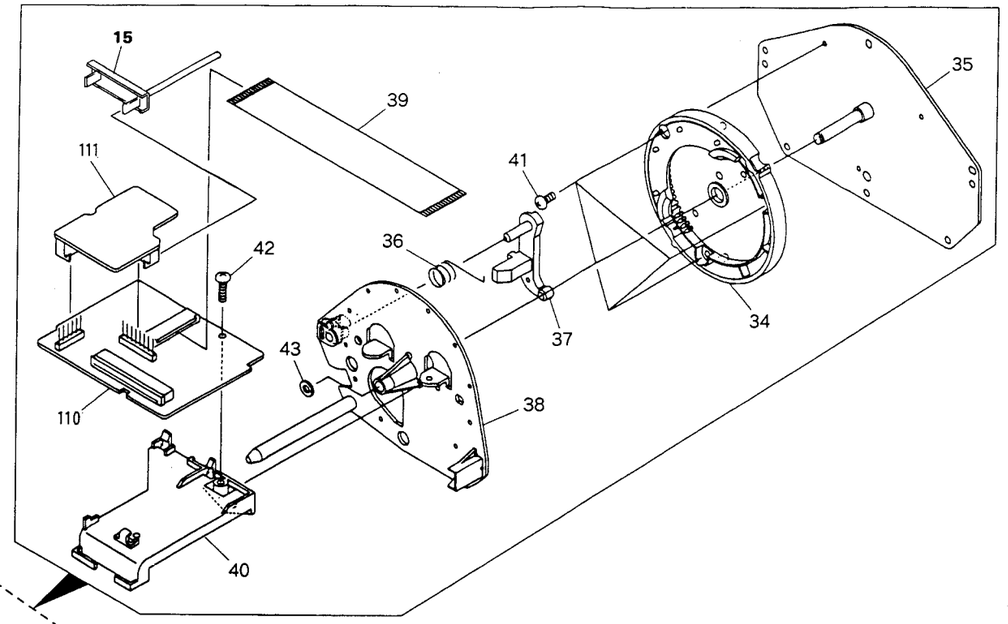
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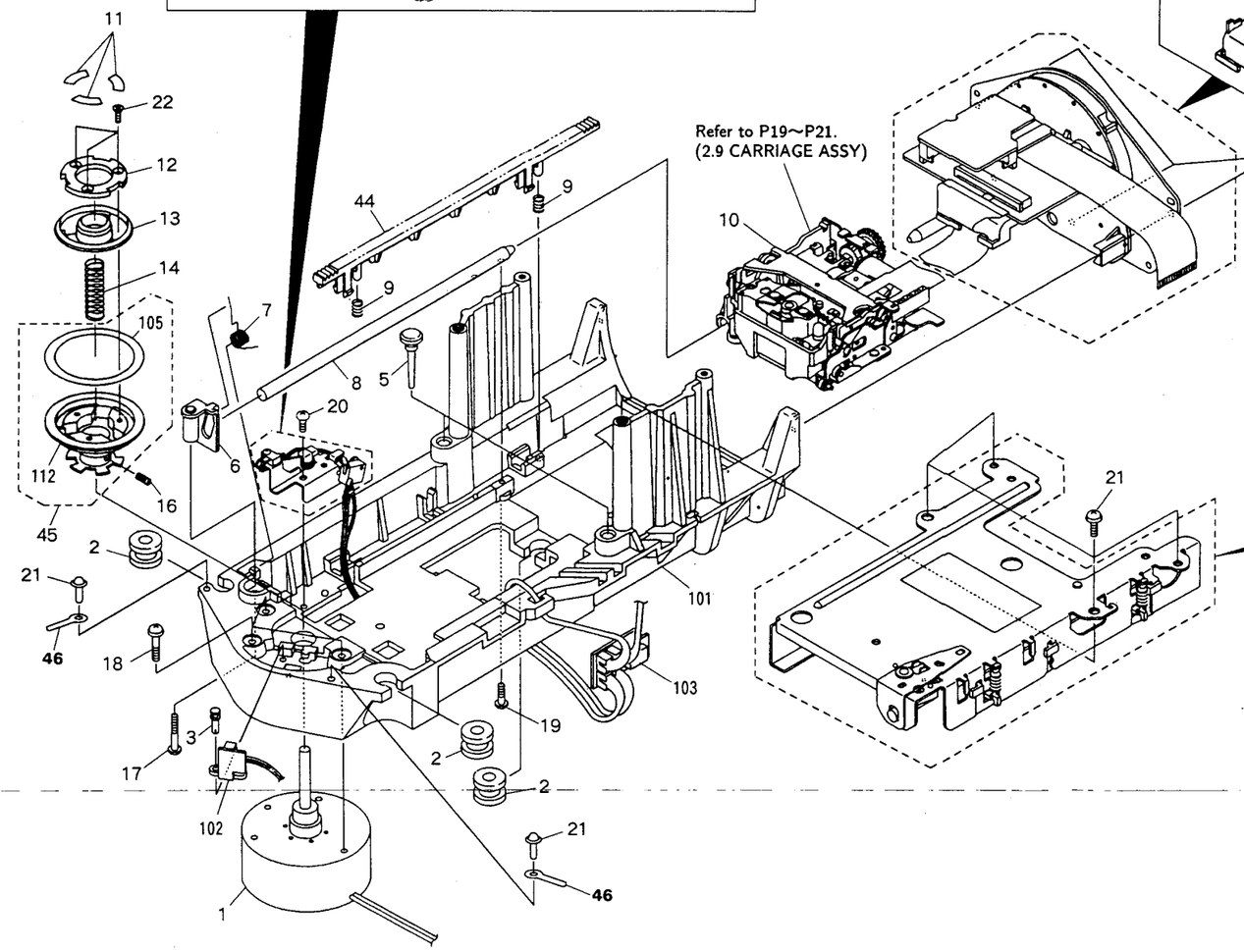
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Refer to P19~P21.
(2.9 CARRIAGE ASSY)
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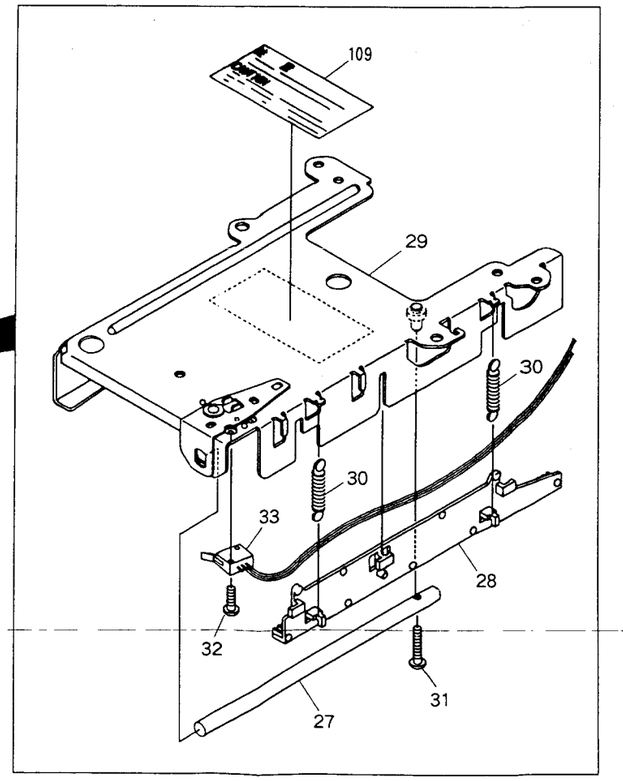
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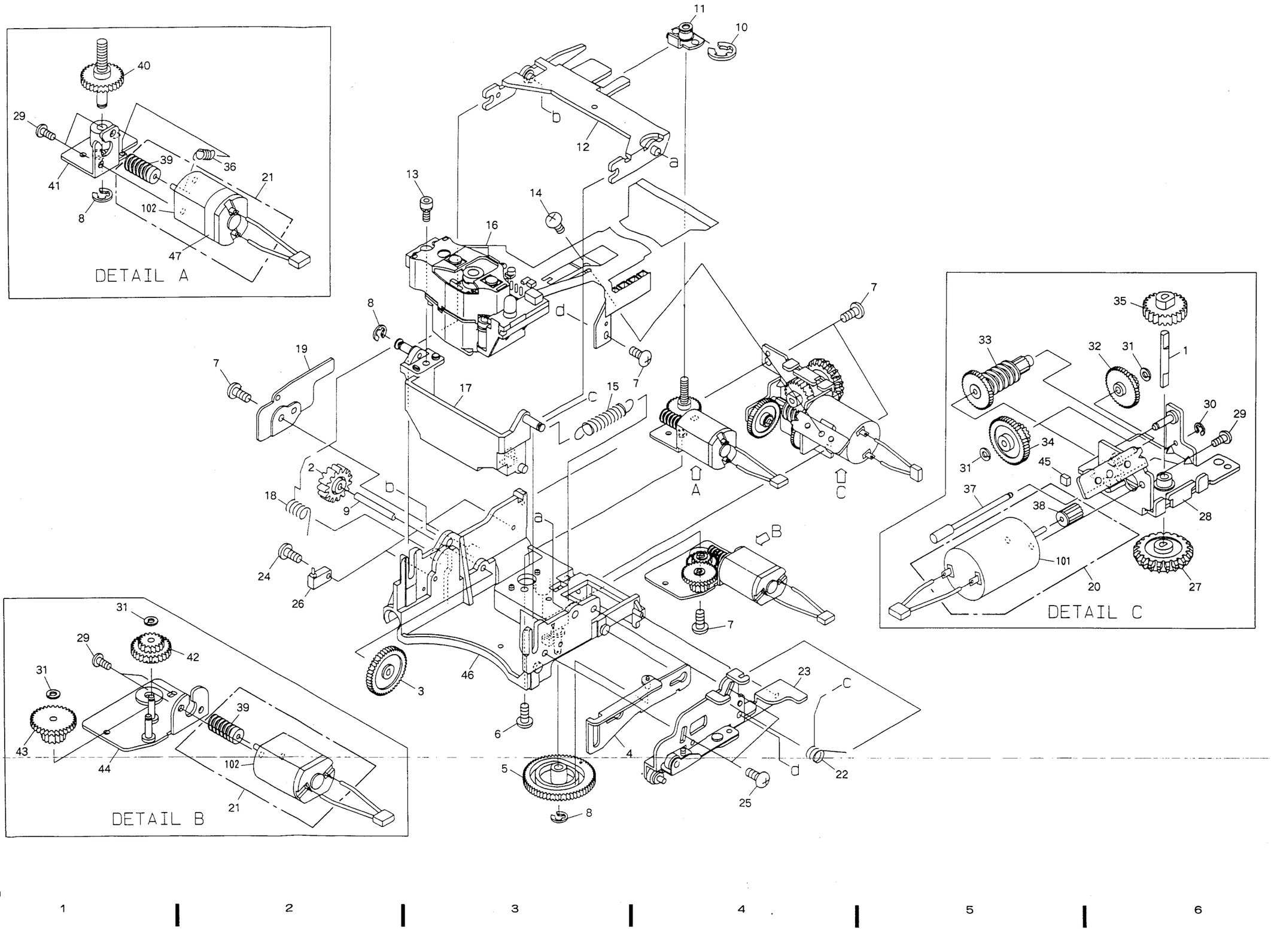
2.9 Carriage assembly



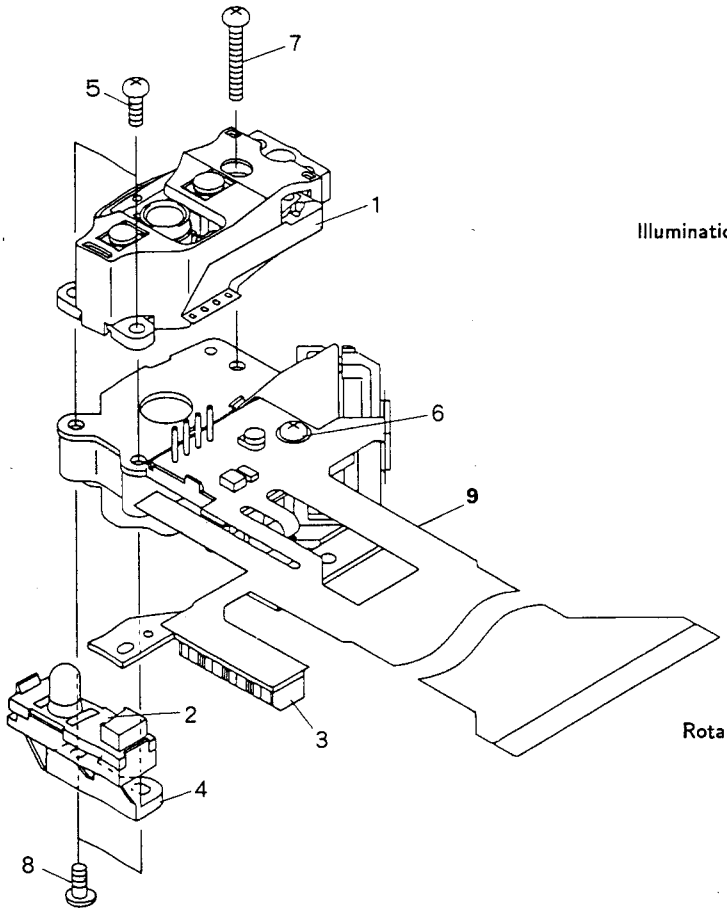
Parts List

Mark	No.	Description	Parts No.
	1	SL shaft(B)	VLL1152
	2	SL gear(F)	VNL1158
	3	SL gear(E)	VNL1253
	4	Slide plate assembly	VXA1243
	5	TL cam gear	VNL1166
	6	Screw	PMA26P050FMC
	7	Screw	BBZ26P050FCC
	8	E ring	YE20FUC
	9	SL shaft(C)	VLL1270
	10	Stop ring	YE40FUC
	11	AF plate assembly	VXA1259
	12	AF arm assembly	VXA1246
	13	Bolt 2.6×6	VLL1107
	14	Screw	PBZ26P040FCC
	15	Tilt spring	VBH1063
	16	Pickup assembly	VWY1019
	17	PU holder assembly	VXA1336
	18	AF spring(L)	VBH1061
	19	AF Stopper	VNE1284
	20	Slider motor assembly−S	VXX1329
	21	Tilt (height)motor assembly−S	VXX1227
	22	AF spring(R)	VBH1088
	23	TAN base assembly	VXA1331
	24	Screw	PBZ20P070FCC
	25	Screw	PMB26P050FCU
	26	Slide switch(S5) (HEIGHT UP, DOWN)	VSK1009
	27	SL gear(H)	VNL1163
	28	SL base assembly	VXA1241
	29	Screw	JGZ20P022FMC
	30	Stop ring	YE12FUC
	31	Washer	WT17D034D050
	32	SL gear(B)	VNL1251
	33	SL gear(C)	VNL1137
	34	SL gear(D)	VNL1252
	35	SL gear(G)	VNL1159
	36	M spring	VBH1122
	37	SL shaft(A)	VLL1151
	38	SL gear(A)	VNL1250
	39	AF warm	VNL1138
	40	AF gear assembly	VXA1244
	41	AF holder assembly	VXA1245
	42	TL gear(A)	VNL1164
	43	TL gear(B)	VNL1165
	44	TL base assembly	VXA1242
	45	Damp rubber	VEB1108
	46	Carriage assembly	VXA1219
	47	Damp Sheet	VEC1193
NSP	101	Slider motor	VXM1027
NSP	102	Tilt motor	VXM1028

2.10 PICKUP ASSEMBLY

Parts List

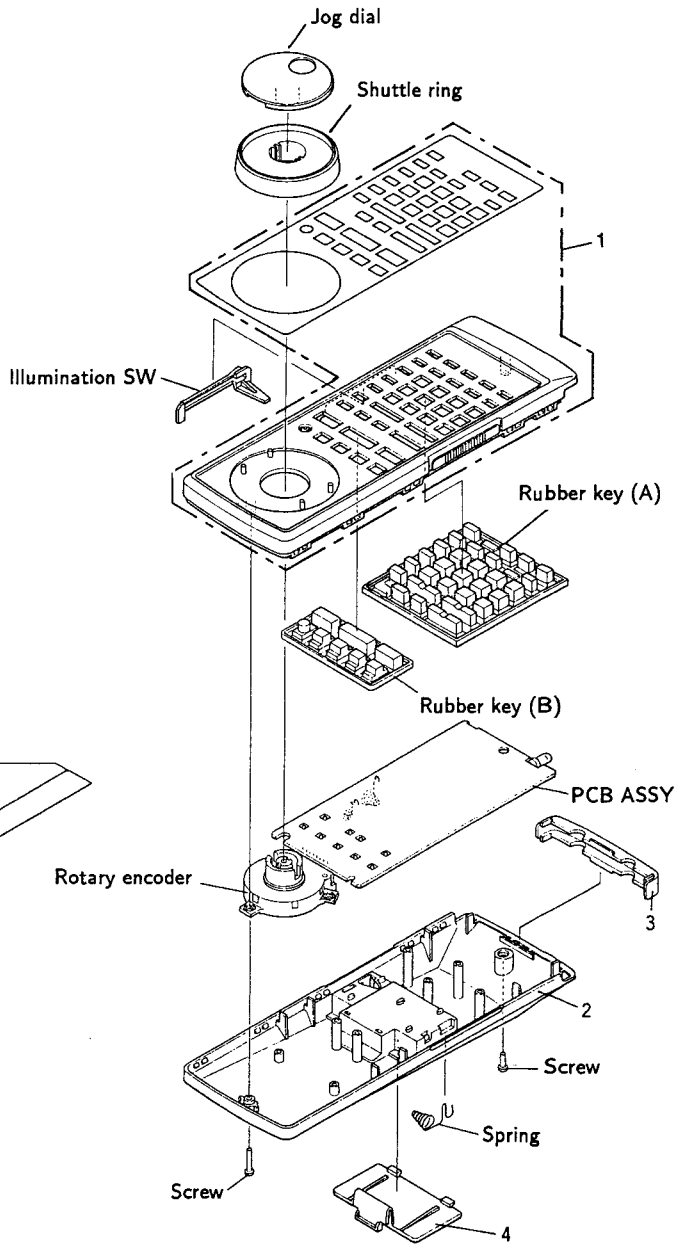
Mark	No.	Description	Parts No.
	1	Actuater assembly	VXX1552
	2	Sensor assembly	VEX1018
	3	Pre Pickup assembly	VXX1332
	4	Sensor Stay	VNH1020
	5	Screw	PMA20P060FMC
	6	Screw	PMA20P080FMC
	7	Screw	PMA20P160FMC
	8	Screw	PMB20P050FMC
NSP	9	HEAD assembly	VWV1089



2.11 REMOTE CONTROL UNIT

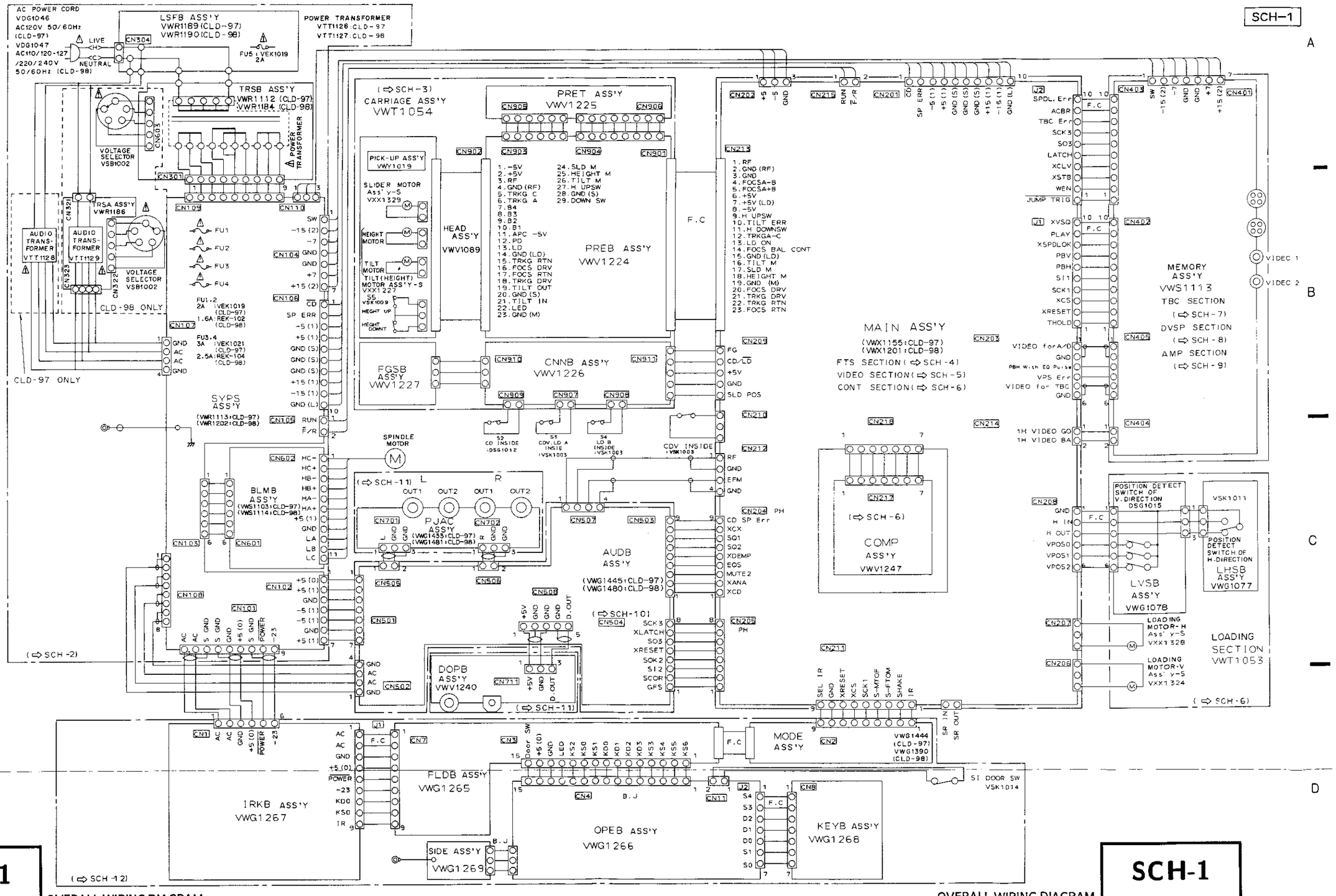
Parts List

Mark	No.	Description	Parts No.
	1	Case(U)(CLD−97)	VNK2269
	1	Case(U)(CLD−98)	VNK2115
	2	Case(L)(CLD−97)	VNK2062
	2	Case(L)(CLD−98)	VNK2117
	3	Filter	VNK2063
	4	Battery cover(CLD−97)	VNK2286
	4	Battery cover(CLD−98)	VNK1964

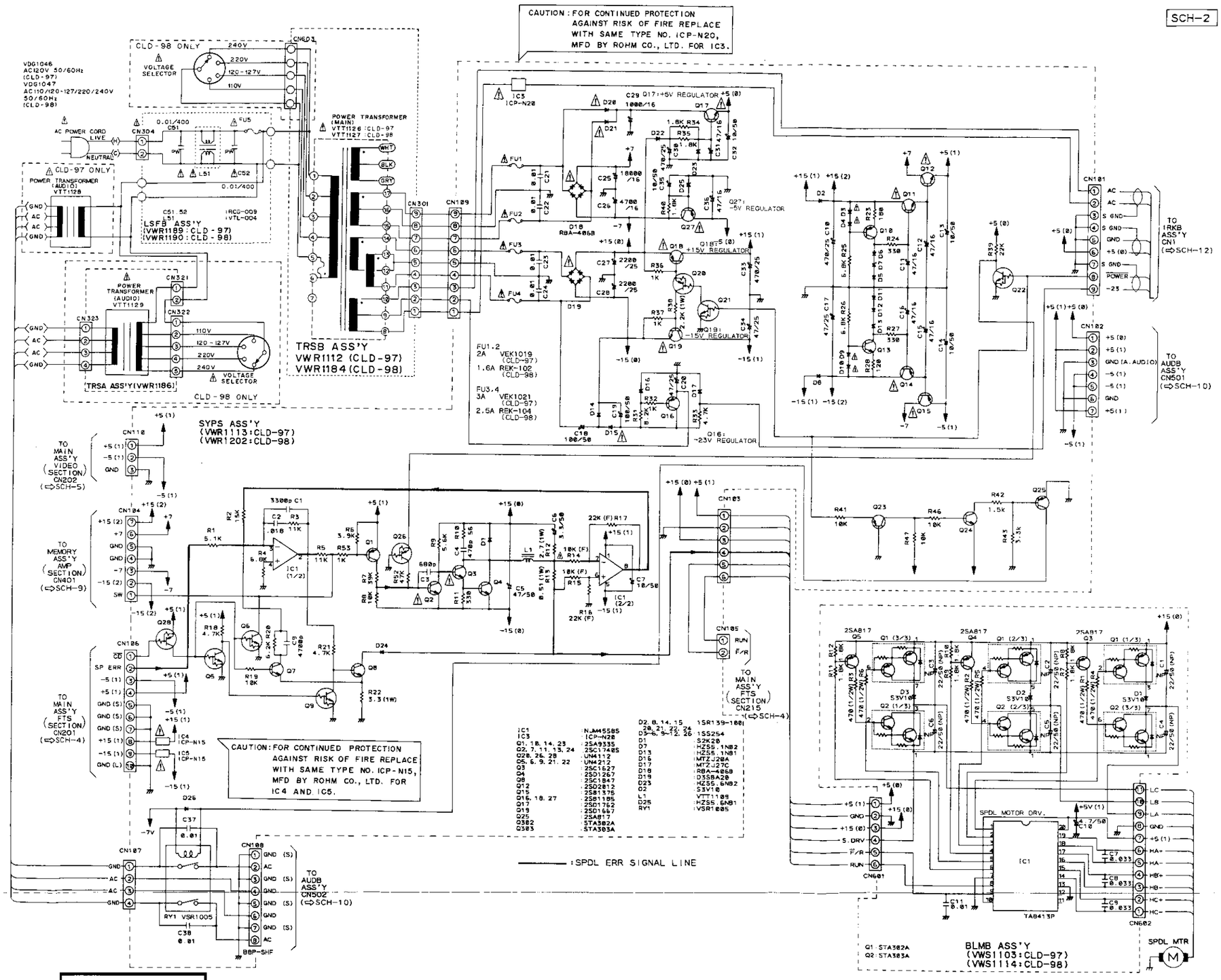


3. SCHEMATIC AND PCB CONNECTION DIAGRAMS

3.1 OVERALL WIRING DIAGRAM



3.2 SYPS, BLMB, LSFB, TRSB, AND TRSA ASSEMBLIES



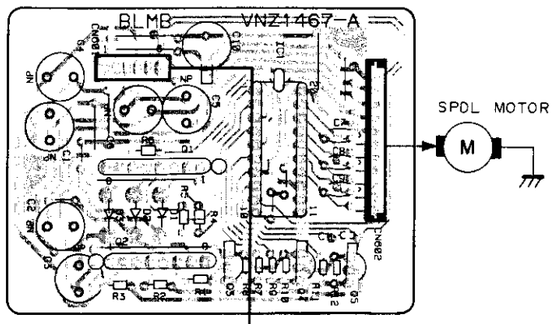
Note: (Type 4)

1. **When ordering service parts, be sure to refer to "PARTS LIST of EXPLODED VIEWS" or "PCB PARTS LIST".**
2. **Since these are basic circuits, some parts of them or the values of some components may be changed for improvement.**
3. **RESISTORS:**
   Unit: k:kΩ, M:MΩ, or Ω unless otherwise noted.
   Rated power: 1/4W, 1/6W, 1/8W, 1/10W unless otherwise noted.
   Tolerance: (F): ±1%, (G): ±2%, (K): ±10%, (M): ±20% or ±5% unless otherwise noted.
4. **CAPACITORS:**
   Unit: p:pF or μF unless otherwise noted.
   Ratings: capacitor (μF)/ voltage (V) unless otherwise noted.
   Rated voltage: 50V except for electrolytic capacitors.
5. **COILS:**
   Unit: m:mH or μH unless otherwise noted.
6. **VOLTAGE AND CURRENT:**
   □ : DC voltage (V) in PLAY mode unless otherwise noted.
   ⇨ mA or ← mA : DC current in PLAY mode unless otherwise noted.
   Value in ( ) is DC current in STOP mode.
7. **OTHERS:**
   - ➡ : Signal route.
   - ⊘ : Adjusting point.
   - ▼ (Red) : Measurement point.
   - The ⚠ mark found on some component parts indicates the importance of the safety factor of the parts. Therefore, when replacing, be sure to use parts of identical designation.
8. **SWITCHES** (Underline indicates switch position):
   OUTSIDE OF PCB ASSEMBLIES
   S 1 : DOOR OPEN-CLOSE
   S 2 : CD INSIDE
   S 3 : CDV,LD A INSIDE
   S 4 : LD B INSIDE
   S 5 : HEIGHT UP-DOWN
   IRKB Ass'y
   S 1 : POWER STANDBY/ON
   KEYB Ass'y
   S 2 : +10 ┐
   S 3 : 1 │
   S 4 : 2 │
   S 5 : 3 │
   S 6 : 4 │ DIRECT SEARCH
   S 7 : 5 │
   S 8 : 6 ┘
   OPEB Ass'y
   S 9 : 7 ┐
   S 10 : 8 │
   S 11 : 9 ┘
   S 12 : 0
   S 13 : PGM
   S 14 : AUTO PGM
   S 15 : PICTURE
   S 16 : RANDOM PLAY
   S 17 : ⏮ ─ SCAN
   S 18 : ⏭
   S 19 : ⏮ ─ SKIP
   S 20 : ⏭
   S 21 : FL & DISPLAY
   S 22 : PLAY/STILL(▶/⏯)
   S 23 : STOP(■)
   S 24 : OPEN/CLOSE(⏏)
   SIDE Ass'y
   S 25 : B ─ DISC SIDE
   S 26 : A
   LHSB Ass'y
   LEAF SWITCH : POSITION DETECT SWITCH OF H.DIRECTION
   LVSB Ass'y
   PUSH SWITCH : POSITION DETECT SWITCH OF V.DIRECTION
9. For SCH – □ on the schematic diagram
   SCH – □ indicates the drawing number of the schematic diagram.
   (SCH stands for schematic diagram.)

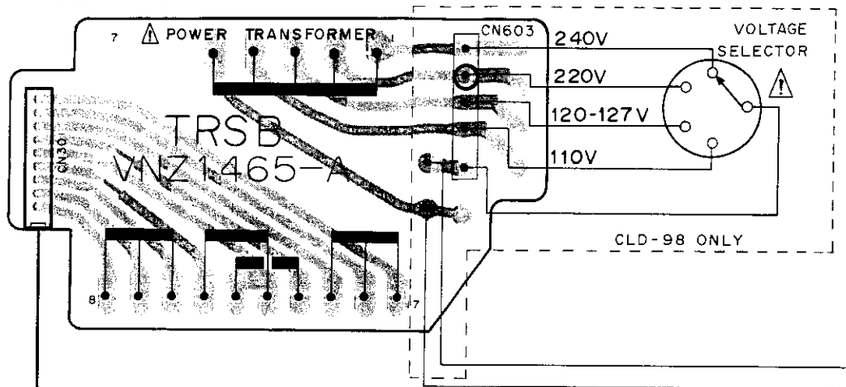
SCH-2
SYPS, BLMB, LSFB, TRSB, TRSA ASSY

PCB-1

BLMB ASS'Y



TRSB ASS'Y



P.C.B. pattern diagram indication	Corresponding part symbol	Part name	P.C.B. pattern diagram indication	Corresponding part symbol	Part name
		Transistor			Ceramic capacitor
		FET			Mylar capacitor
		Diode			Styrol capacitor
					Electrolytic capacitor (Non polarized)
					Electrolytic capacitor (Nonetsa)
		Zenner diode			Electrolytic capacitor (Polarized)
					Electrolytic capacitor (Polarized)
		LED			Power capacitor
		Varactor			Semi-fixed resistor
		Tact switch			Resistor array
		Inductor			Resistor
		Coil			Resonator
		Transformer			Thermistor
		Filter			

1. This P.C.B. connection diagram is viewed from the parts mounted side
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the above Table.
3. The capacitor terminal marked with ▭ shows negative terminal
4. The diode marked with ○ shows cathode side
5. The transistor terminal marked with ⟂ shows emitter

TO MAIN ASS'Y CN201

TO AUDB ASS'Y CN501

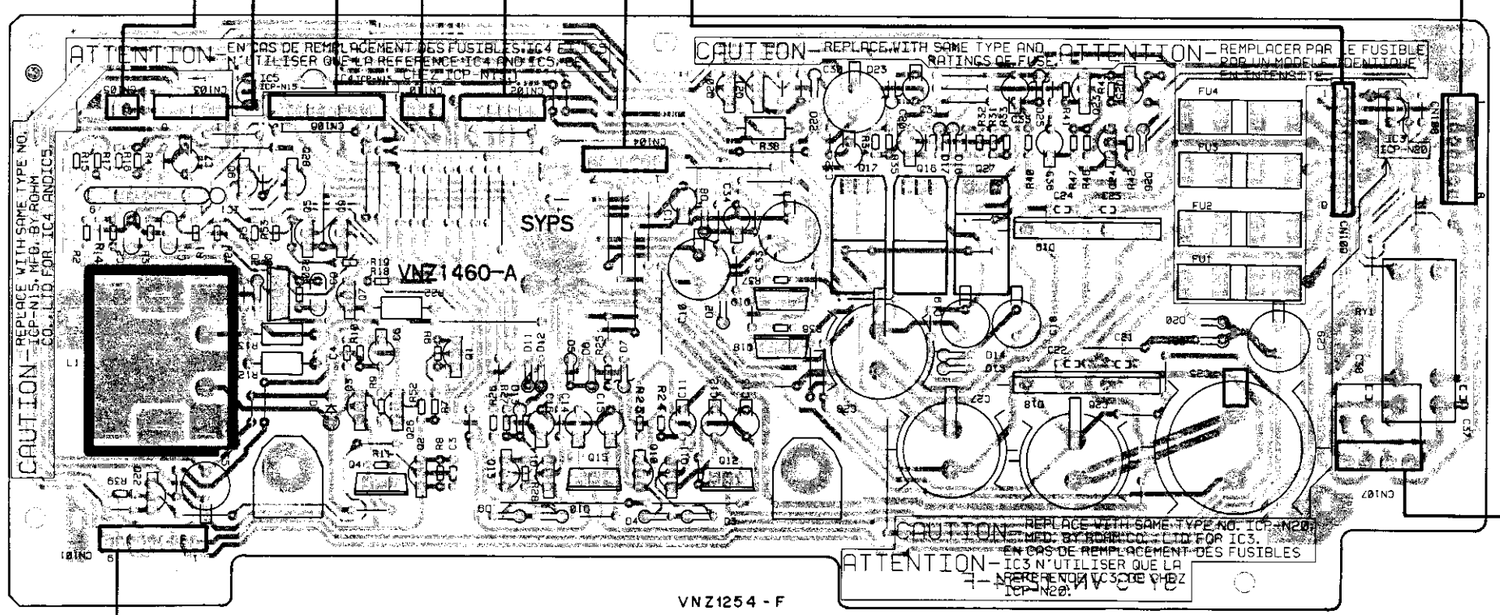
TO MAIN ASS'Y CN215

TO MAIN ASS'Y CN202

TO MEMORY ASS'Y CN401

TO AUDB ASS'Y CN502

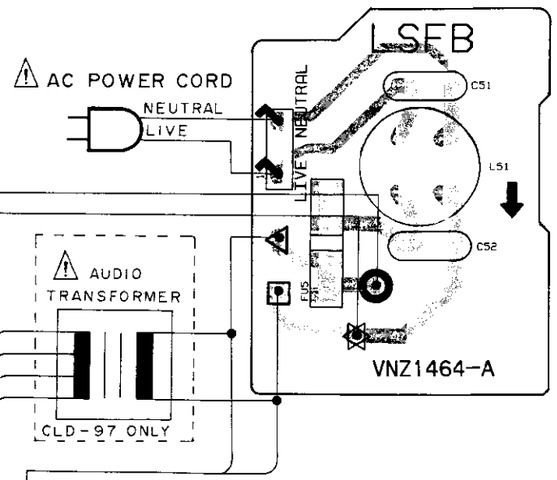
SYPS ASS'Y



IC1 Q6 Q28 IC4 Q26 Q1 Q20 Q21 Q17 Q16 Q27 Q23 Q25
Q22 IC5 Q5 Q9 Q13 Q14 Q15 Q10 Q11 Q12 Q19 Q24
Q8 Q7 Q18
Q3 Q4 Q2

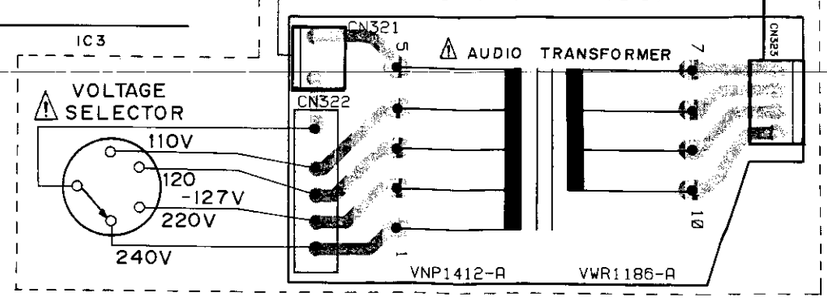
TO IRKB ASS'Y CN 1

LSFB ASS'Y



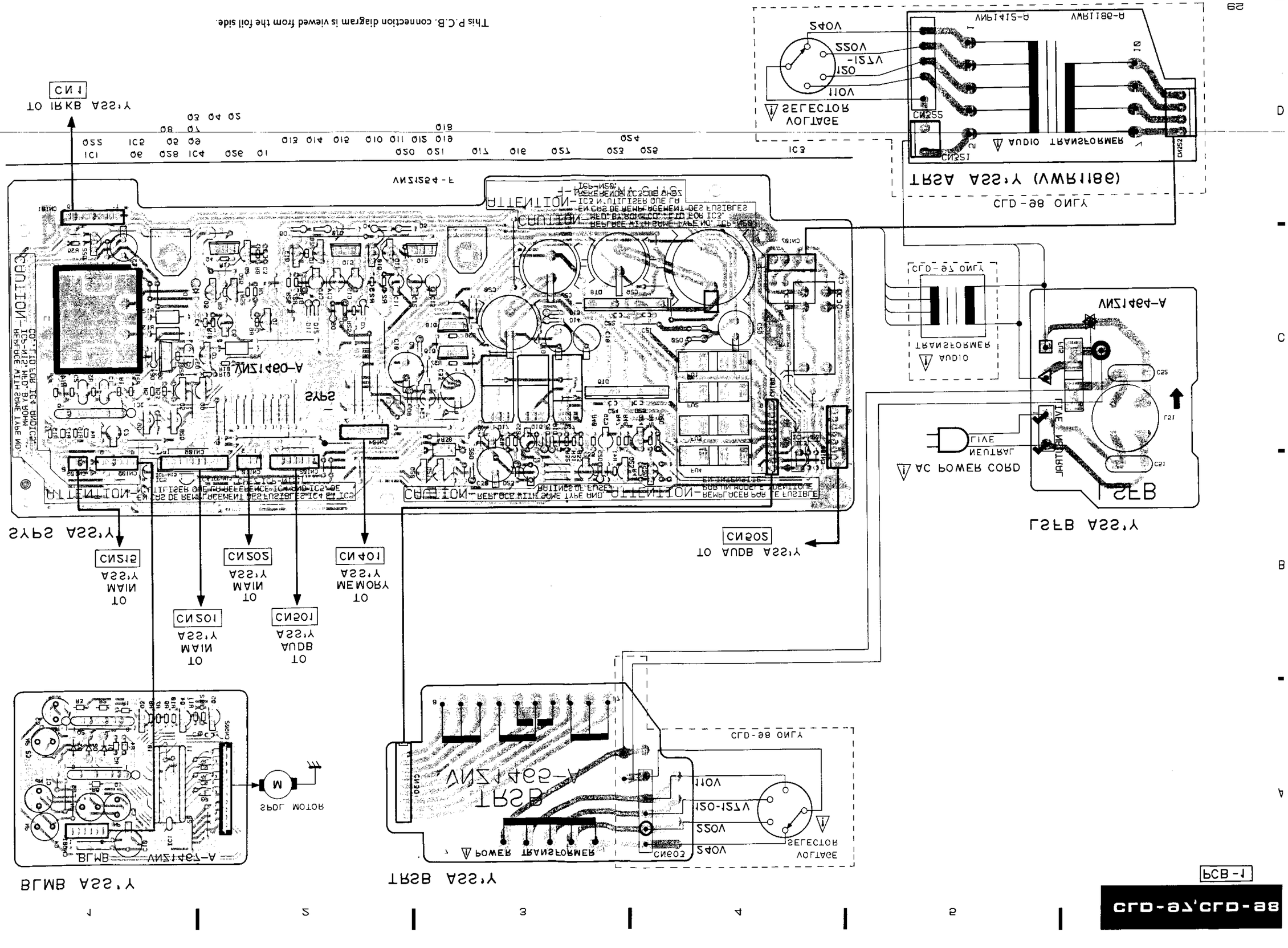
CLD-98 ONLY

TRSA ASS'Y (VWR1186)



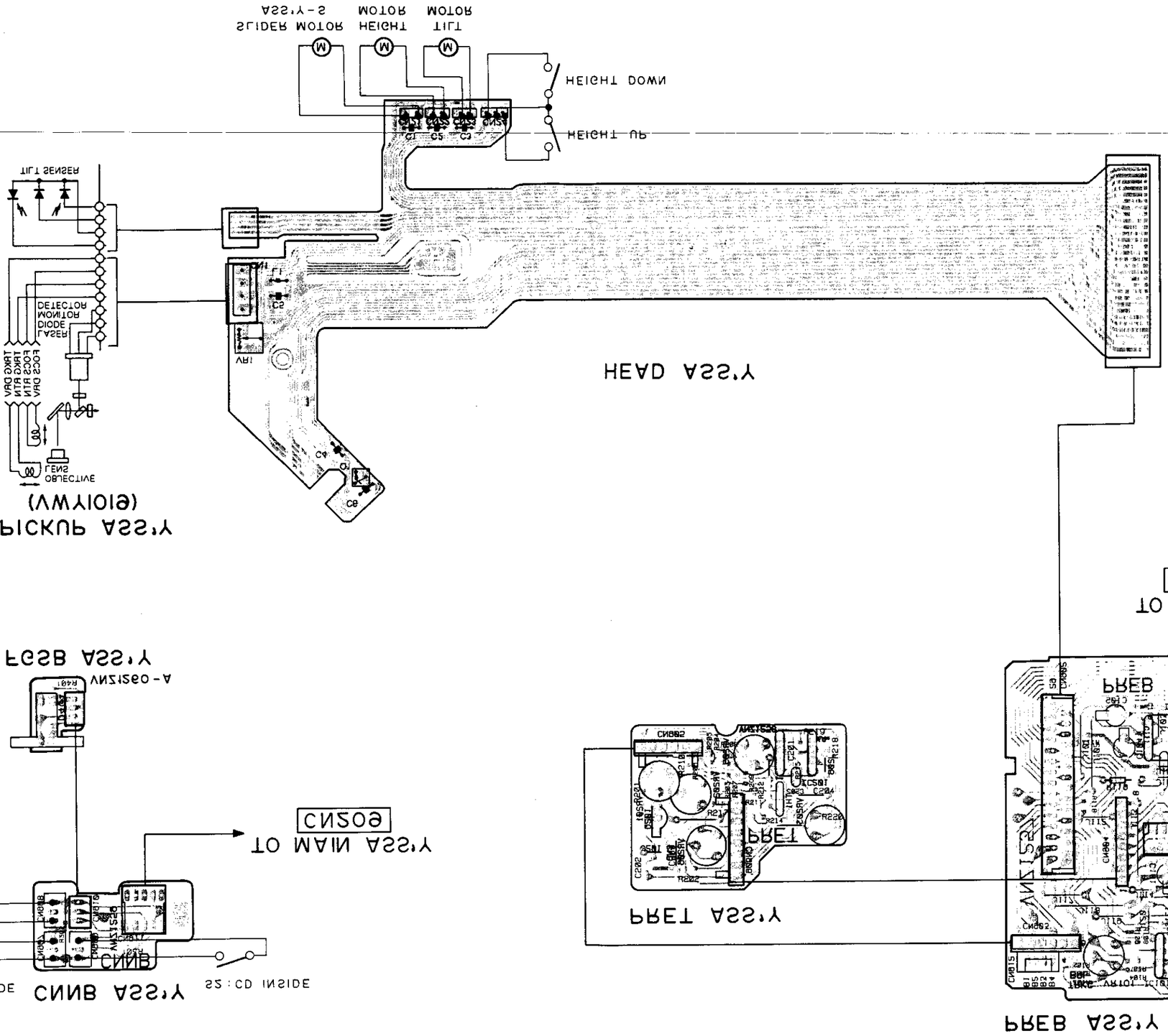
This P.C.B. connection diagram is viewed from the parts mounted side.

This P.C.B. connection diagram is viewed from the foil side.



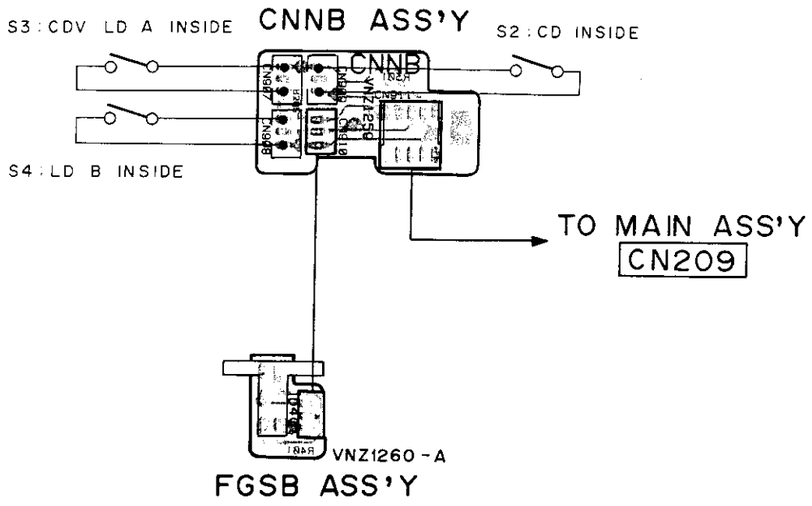
3.3 PICKUP, PRET, PREB, PCSB, AND CMNB ASSEMBLIES

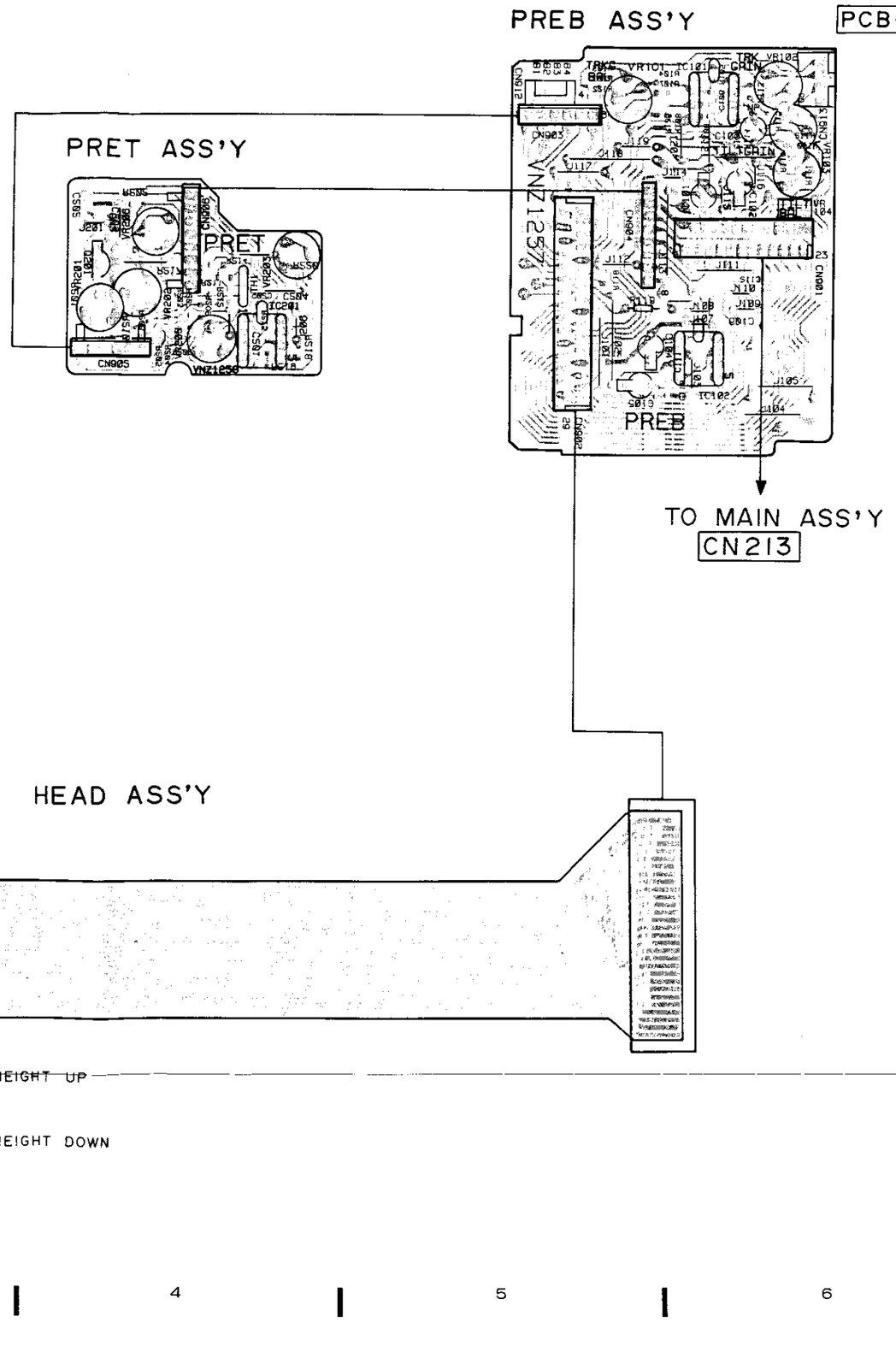
This P.C.B. connection diagram is viewed from the foil side.



3.3 PICKUP, PRET, PREB, FGSB, AND CNNB ASSEMBLIES

This P.C.B. connection diagram is viewed from the parts mounted side.





SCH-3

PREB ASS'Y(VWV1224)

PRET ASS'Y(VWV1225)

FGSB ASS'Y(VWV1227)

CNNB ASS'Y (VWV1226)

HEAD ASS'Y (VWV1089)

PICKUP ASS'Y (VWY1019)

IC201:FOCS ERROR AMP

IC101:TRKG ERROR AMP

IC101:TILT ERROR AMP

FOCS SERVO LINE

TRKG SERVO LINE

TILT ERR

LD POWER

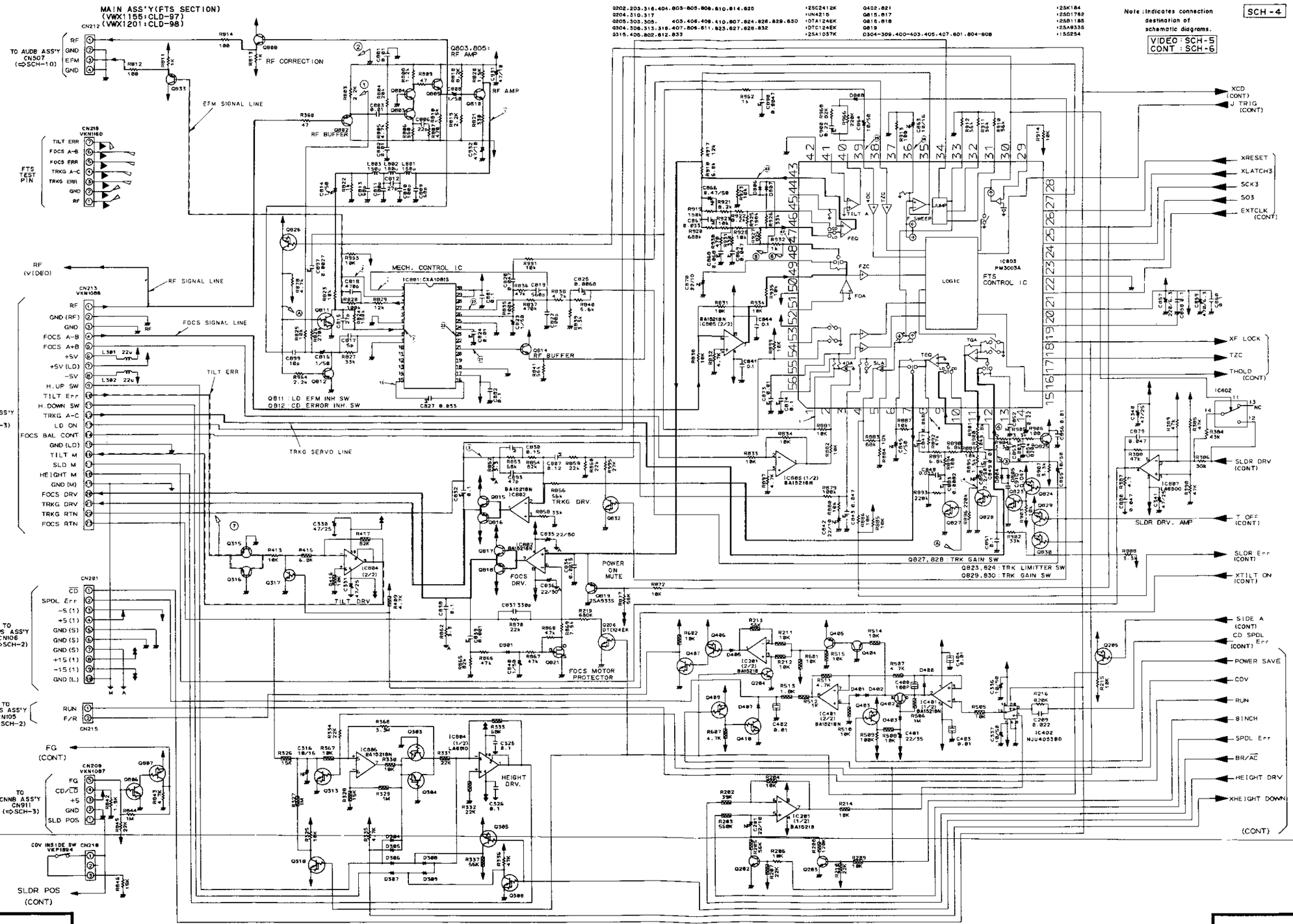
FOCS SUM

TO MAIN ASS'Y (FTS SECTION) CN209 (⇨SCH-4)

TO MAIN ASS'Y (FTS SECTION) CN213 (⇨SCH-4)

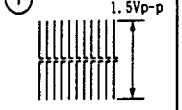
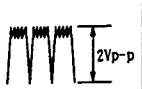
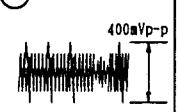
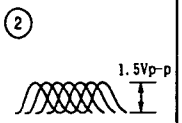
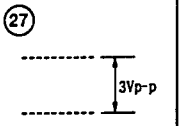
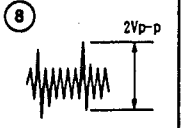
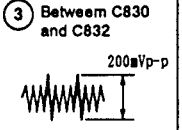
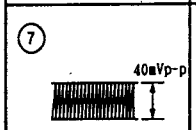
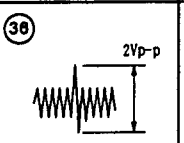
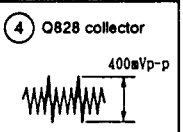
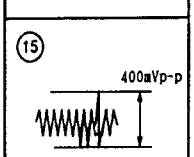
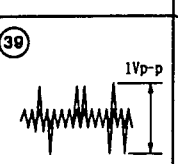
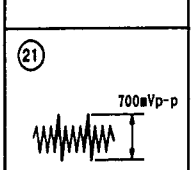
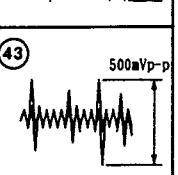
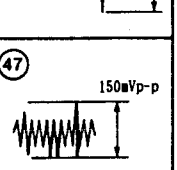
IC 101, 201 : BA15218
IC 102 : IR3C02A
D 401 : GP1551
Q 201 : 2SC1740S
Q 202 : 2SC2412K

3.4 MAIN ASSEMBLY (1/3) (FTS section)



Waveforms of FTS Section

Note : (No.) in the table correspond to the pin number.

IC801 (CXA1081S)		IC803 (PM3003A)	Other Points
① 	㉓ 	① 	① Q810 collector 
② 	㉗ 	⑧ 	③ Betweem C830 and C832 
⑦ 		㊱ 	④ Q828 collector 
⑮ 		㊴ 	
㉑ 		㊸ 	
		㊼ 	

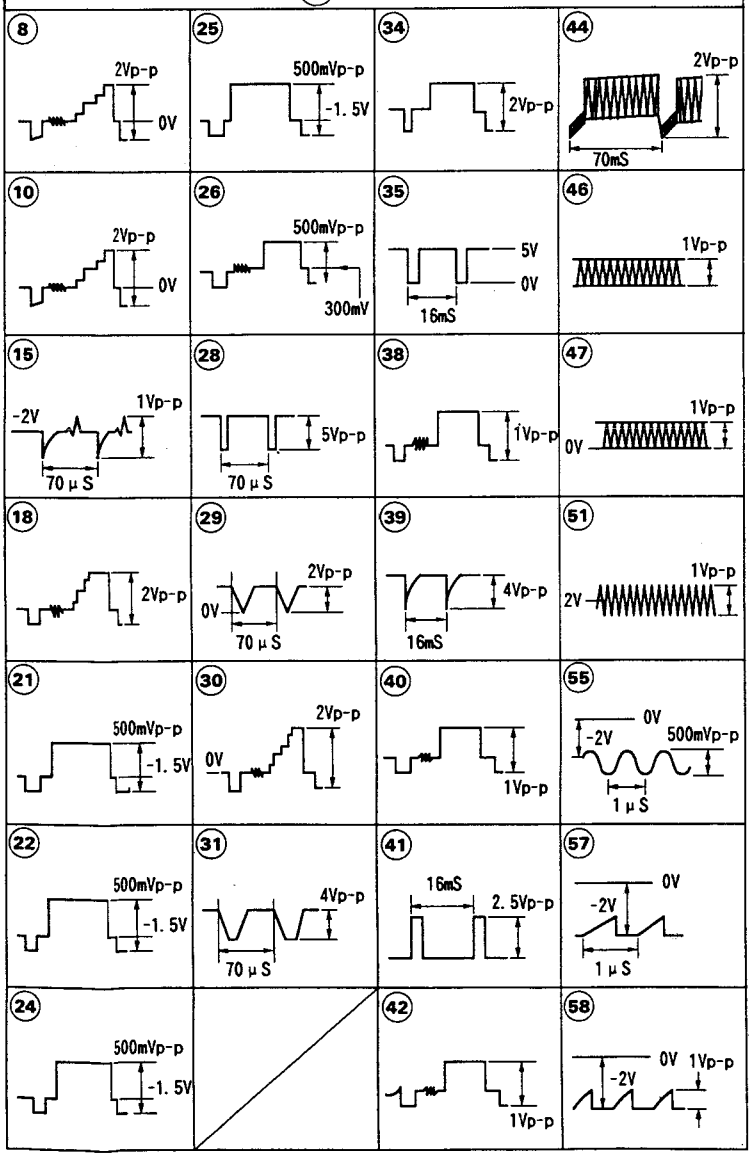
Waveforms and Voltages of VIDEO Section

IC101 <PA5010> *: Refer to waveforms

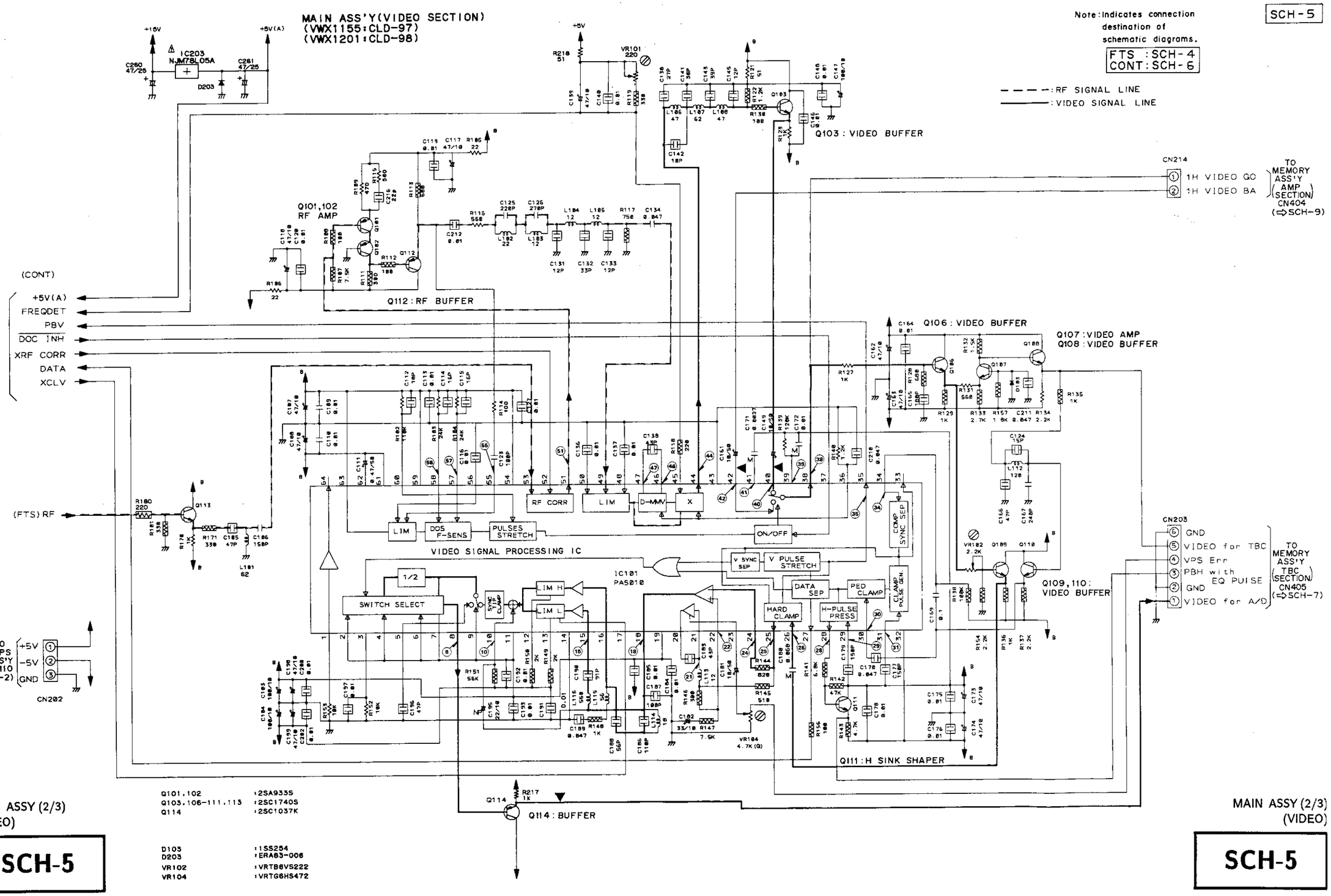
Pin No.	Voltage [V]	Pin No.	Voltage [V]	Pin No.	Voltage [V]	Pin No.	Voltage [V]
1	−1.2	17	0	33	*	49	−1.7
2	5	18	*	34	*	50	−1.7
3	−1	19	5	35	*	51	*
4	5	20	1	36	1	52	0
5	1	21	*	37	5	53	−2
6	5	22	*	38	*	54	5
7	5	23	−2.5	39	*	55	*
8	*	24	*	40	*	56	−2
9	5	25	*	41	*	57	*
10	*	26	*	42	*	58	*
11	5	27	0.5	43	0	59	5
12	−5	28	*	44	*	60	3.8
13	−5	29	*	45	5	61	−5
14	0	30	*	46	*	62	−3.2
15	*	31	*	47	*	63	5
16	−2	32	−5	48	−1.7	64	

Note : Waveforms and voltages are at the PLAY mode.

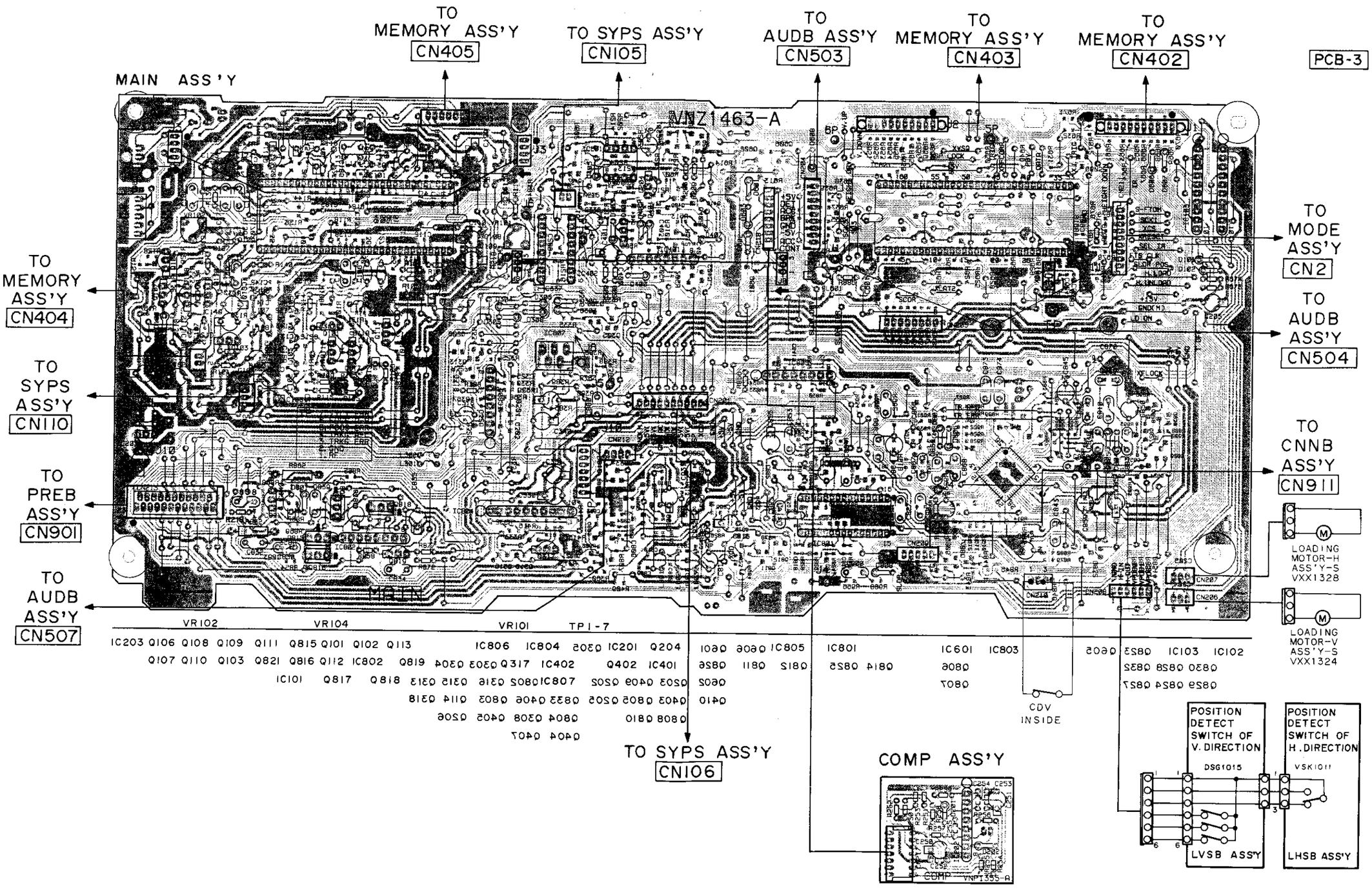
IC101 (PA5010) Note : (No.) in the table correspond to the pin number.



3.5 MAIN ASSEMBLY (2/3) (VIDEO section)



This P.C.B. connection diagram is viewed from the parts mounted side.



TO MEMORY ASS'Y AMP SECTION CN404 ⇨SCH-9

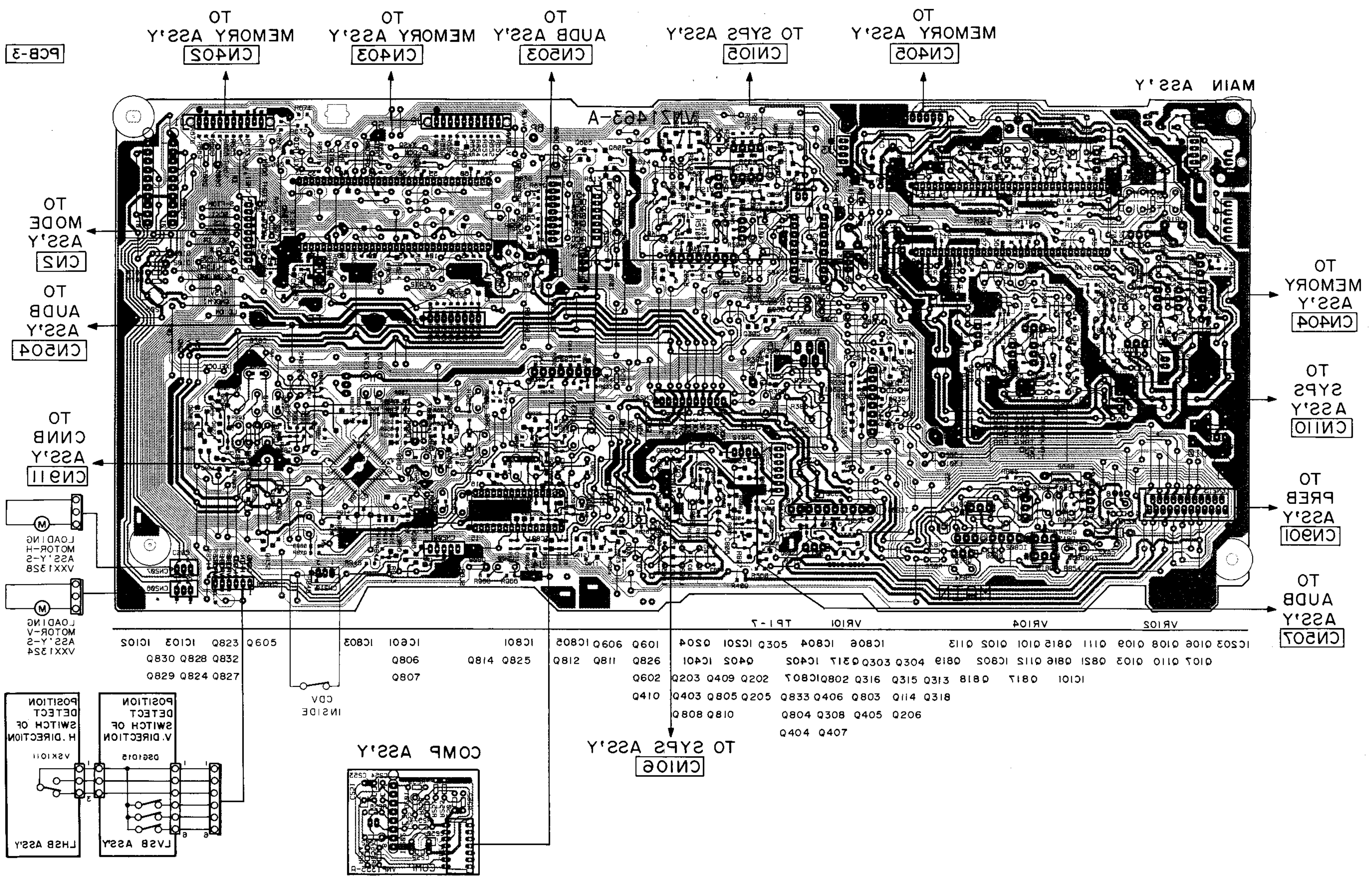
TO MEMORY ASS'Y TBC SECTION CN405 ⇨SCH-7

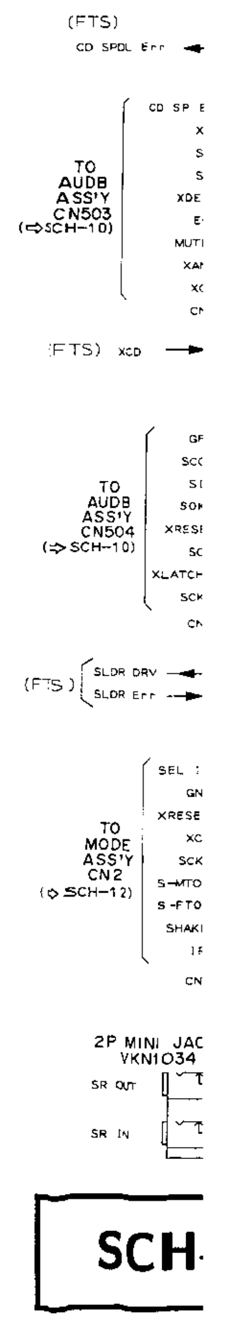
SCH-5

SSY (2/3) (VIDEO)

-5

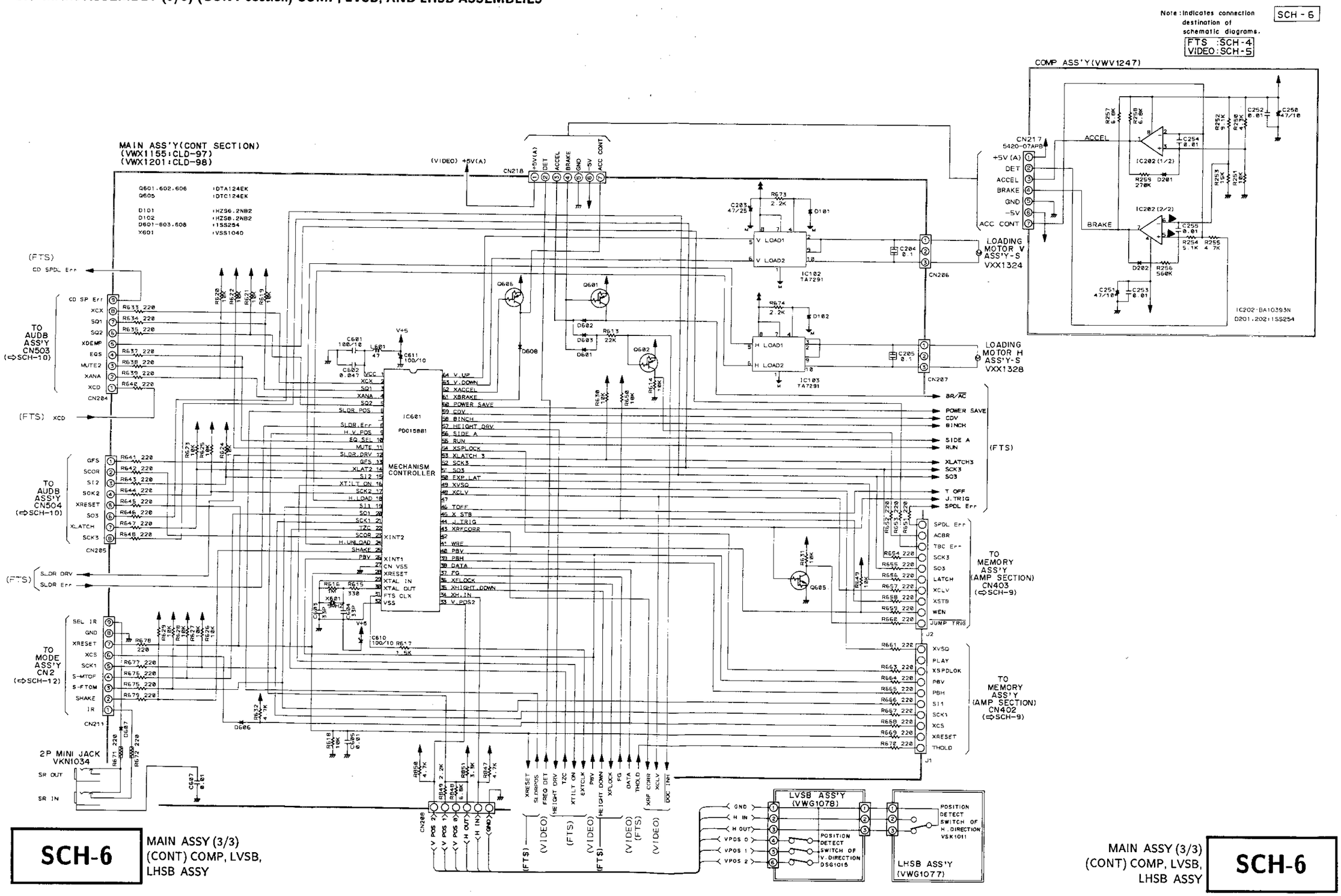
3.6 MAIN AS





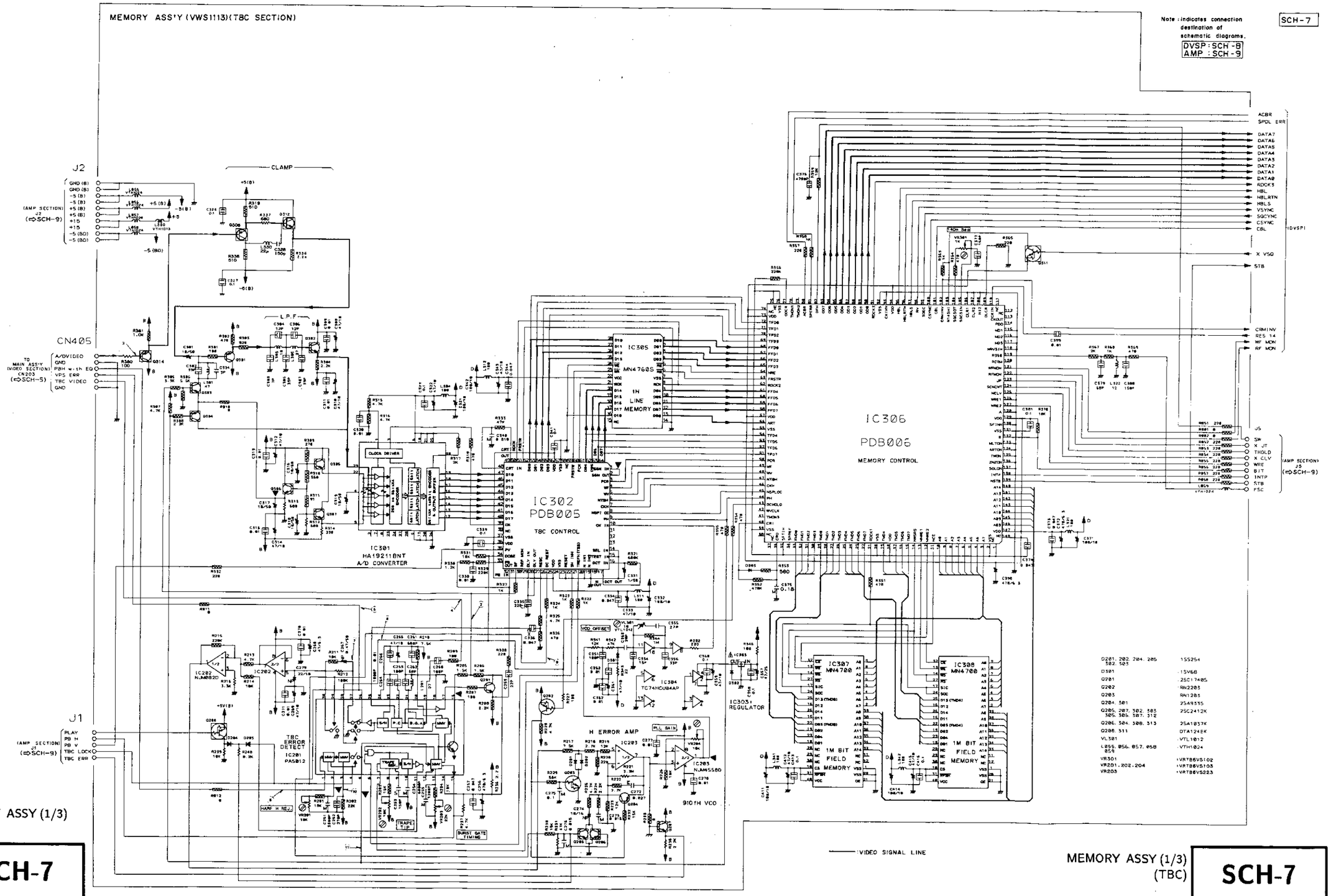
This P.C.B. connection diagram is viewed from the foil side.

3.6 MAIN ASSEMBLY (3/3) (CONT section) COMP, LVSB, AND LHSB ASSEMBLIES



SCH-6
MAIN ASSY (3/3) (CONT) COMP, LVSB, LHSB ASSY

3.7 MEMORY ASSEMBLY (1/3) (TBC section)



D MEMORY ASSY (1/3) (TBC)

SCH-7

MEMORY ASSY (1/3) (TBC)

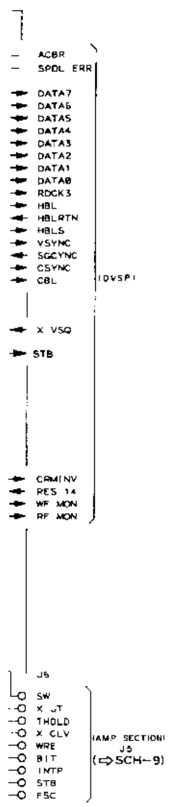
SCH-7

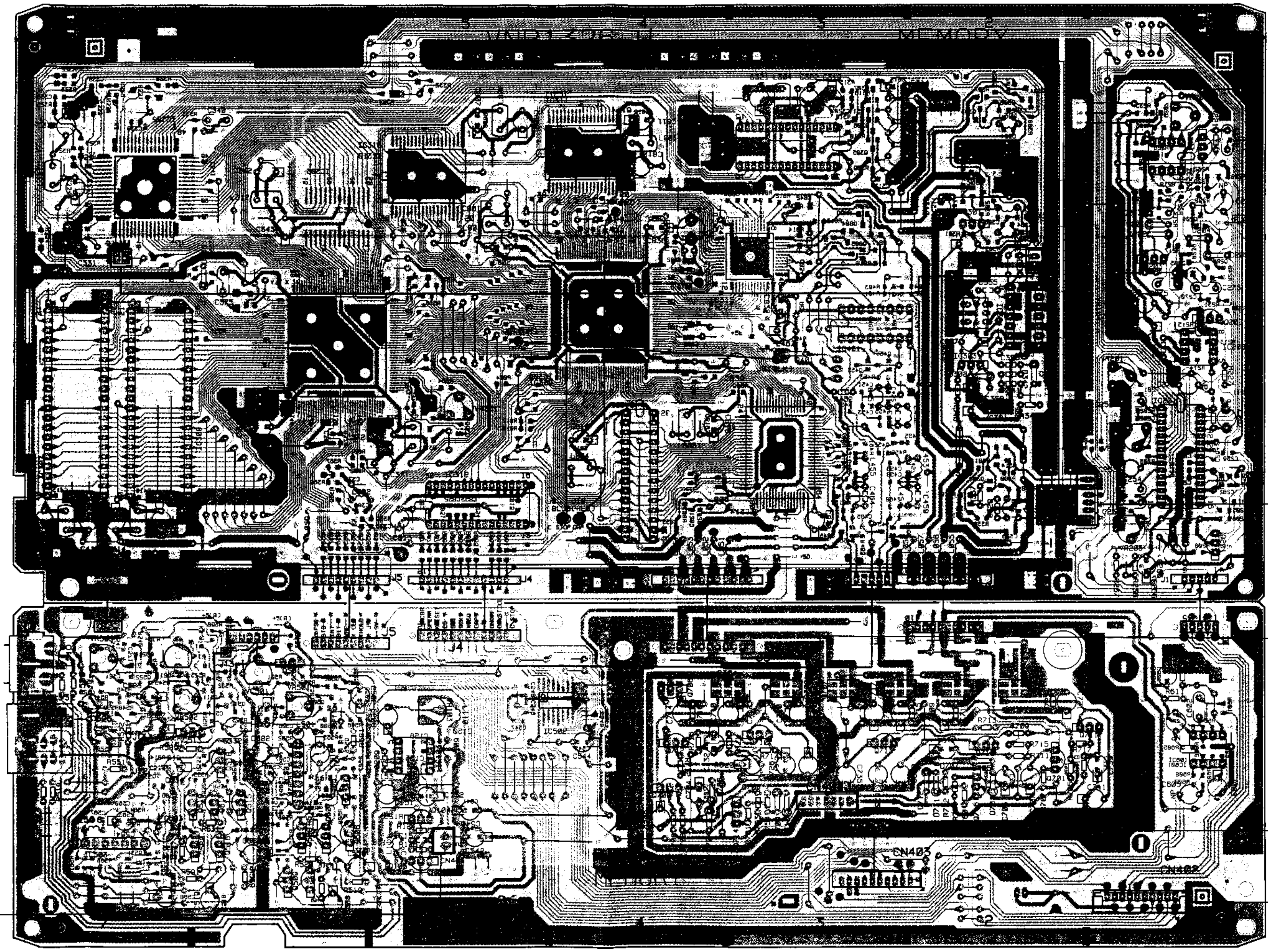
This P.C.B. connection diagram is viewed from the parts mounted side.

SCH-7

PCB-4

MEMORY ASS'Y (VWS1113)





VR503 VC502 VR502 VC501 VR501 VR103 VR301 VC801 VL301 VR201 – VR203 VR204

IC307 Q513 Q511 Q501 Q505 IC310 IC312 IC502 IC309 Q706 Q704 Q710 IC301 Q705 Q703 Q715 IC304 Q711 IC203 Q204 Q202

IC503 IC308 Q519 Q512 IC501 Q507 IC305 IC103 IC313 Q712 Q714 Q708 Q707 Q713 Q301 Q716 Q709 Q203 IC202 Q201

IC302 Q520 Q518 Q515 Q508 Q506 Q104 Q702 IC401 IC303 Q701 IC201 IC601

Q521 Q523 Q517 Q516 Q509 Q510 IC306 Q105 IC311 IC315 Q307 Q451 Q304 Q207

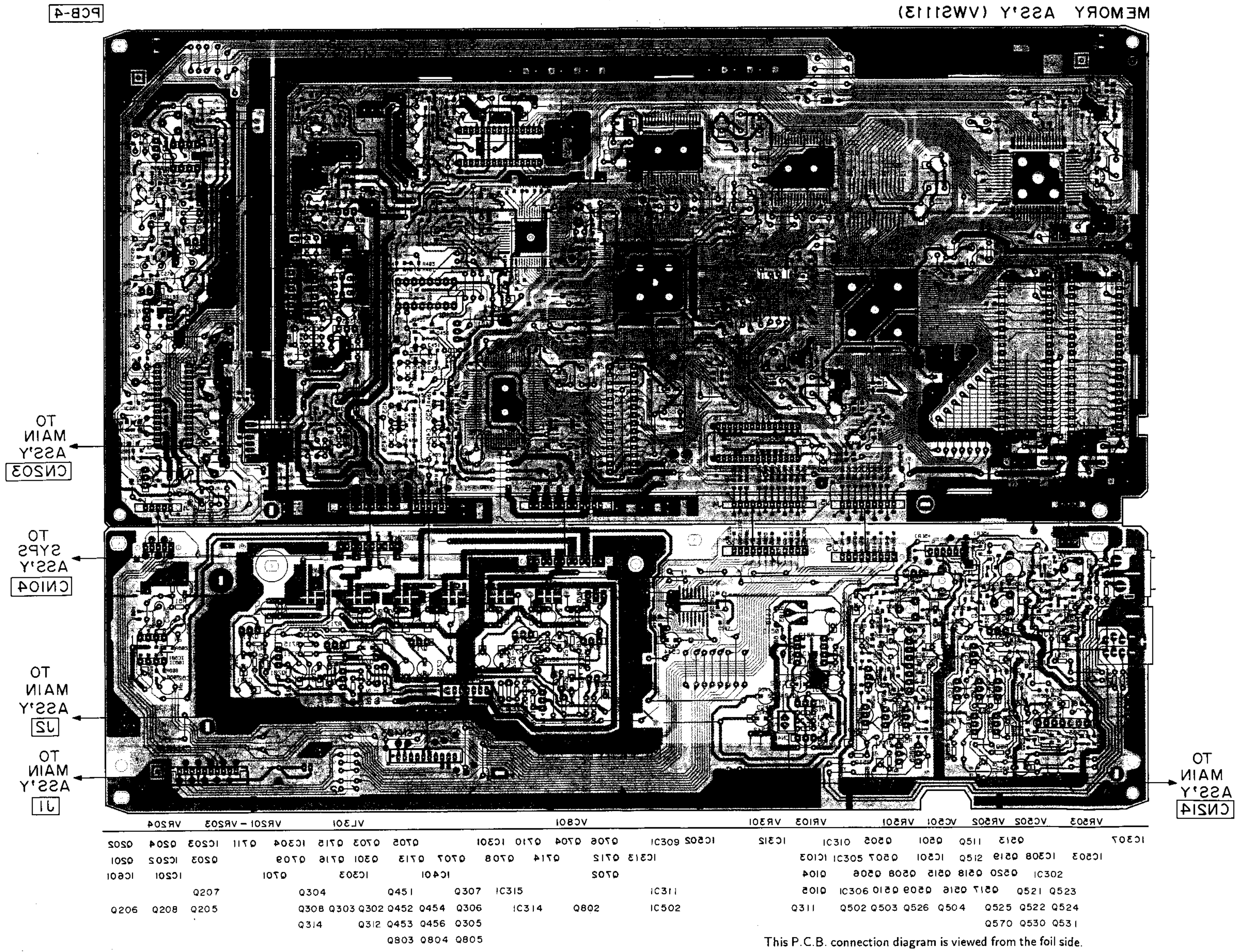
Q525 Q522 Q524 Q504 Q502 Q503 Q526 Q311 IC502 Q802 IC314 Q306 Q454 Q452 Q302 Q303 Q308 Q205 Q208 Q206

Q570 Q530 Q531 Q305 Q456 Q453 Q312 Q314

Q803 Q804 Q805

A B C D

CH-7

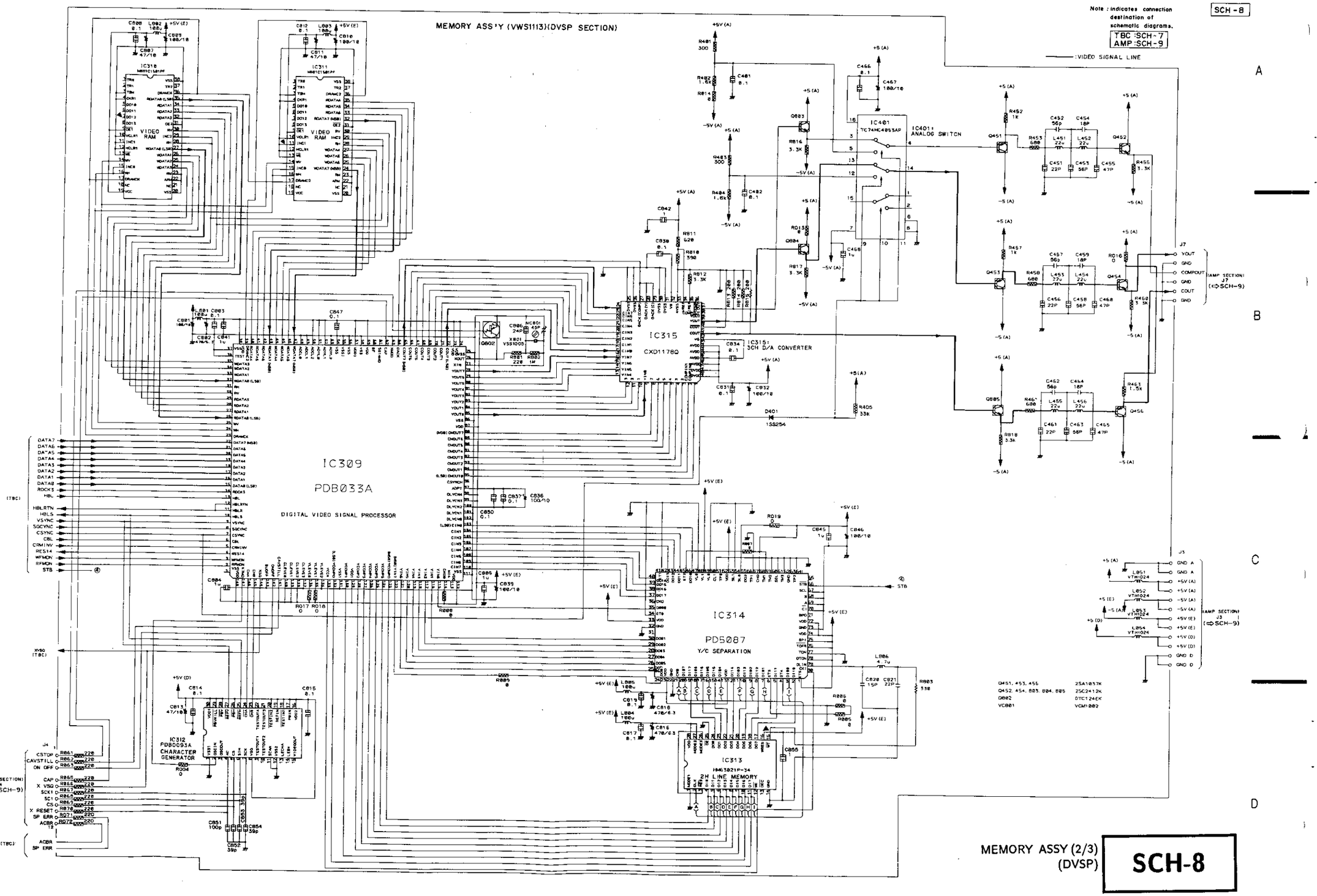


This P.C.B. connection diagram is viewed from the foil side.

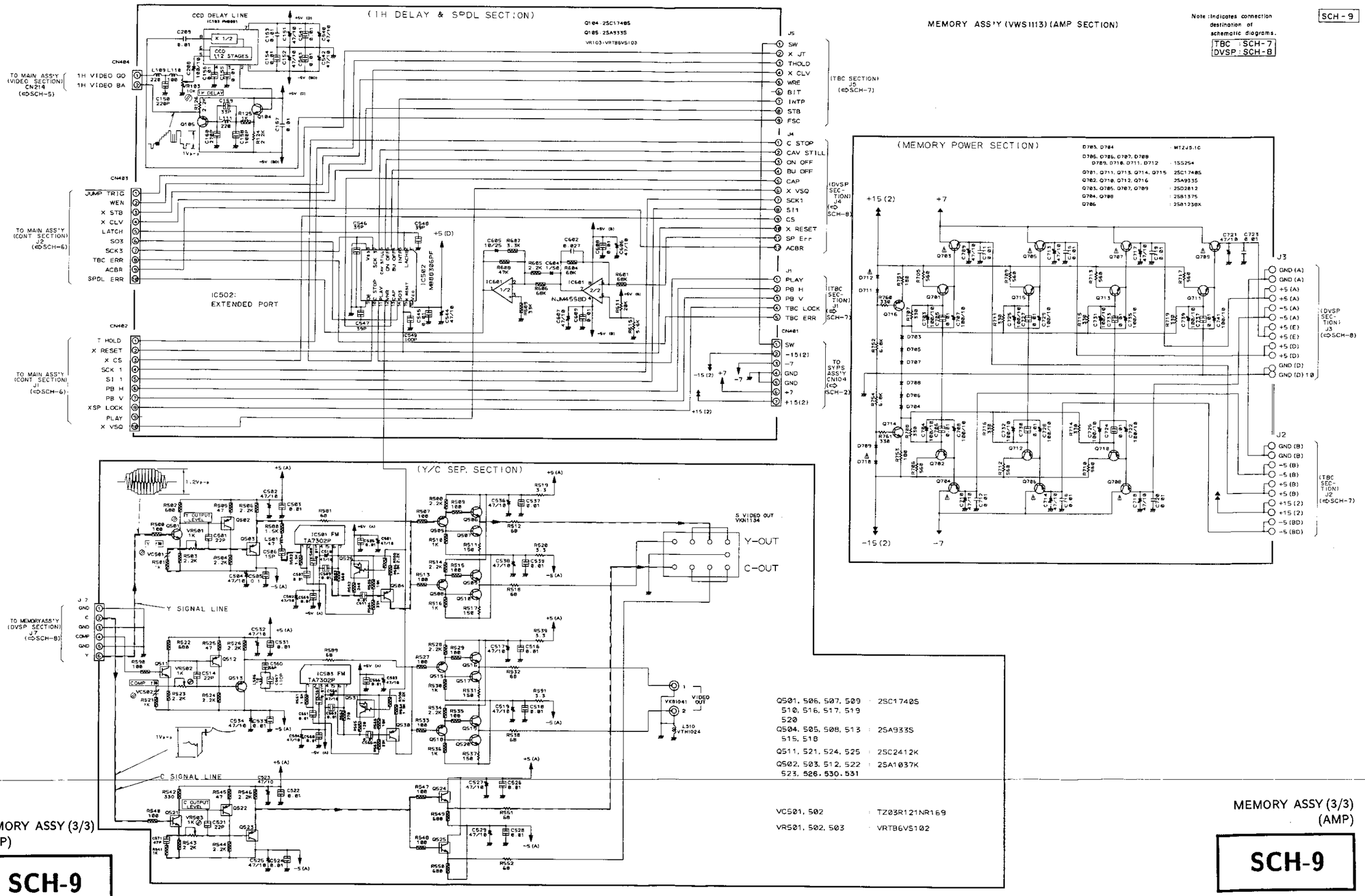
MEMORY ASSY (
(DVSP)

SCH-8

3.8 MEMORY ASSEMBLY (2/3) (DVSP section)



3.9 MEMORY ASSEMBLY (3/3) (AMP section)



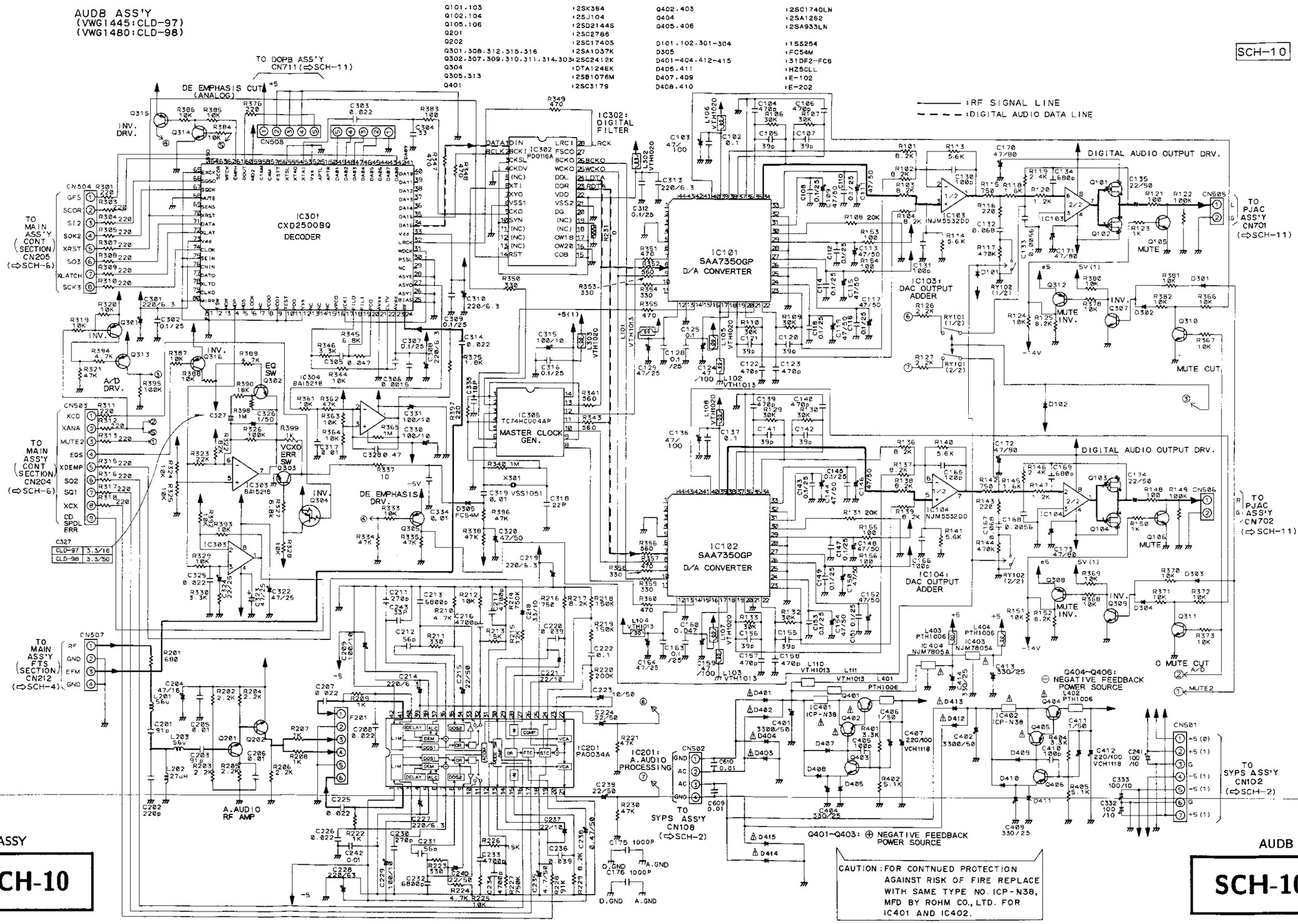
MEMORY ASSY (3/3) (AMP)

SCH-9

MEMORY ASSY (3/3) (AMP)

SCH-9

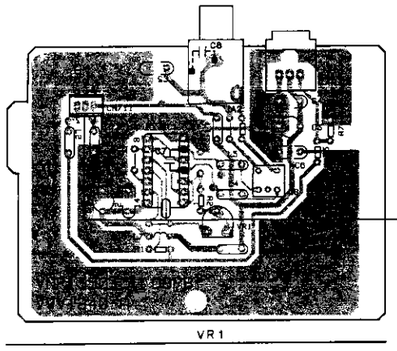
3.10 AUDB, PJAC, AND DOPB ASSEMBLIES

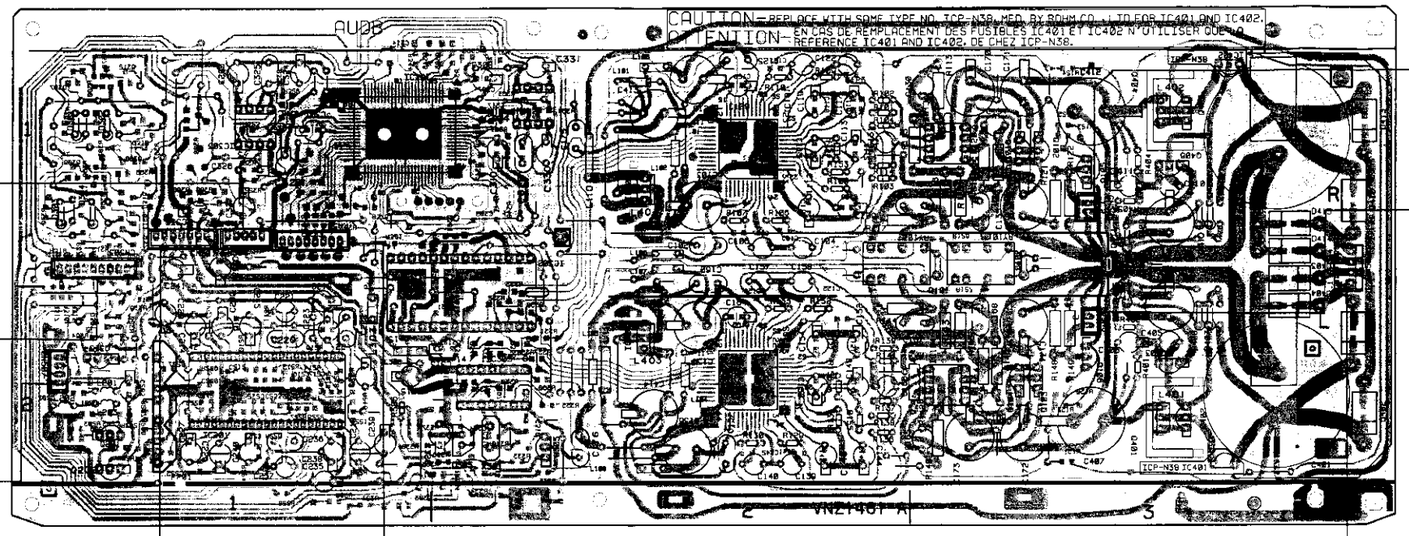


AUDB ASS'Y

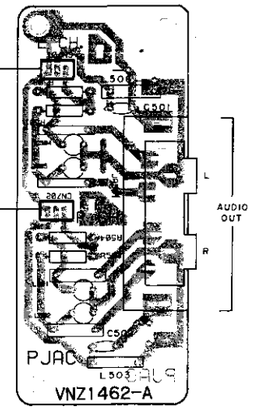
This P.C.B. connection diagram is viewed from the parts mounted side.

DOPB ASS'Y (VWVI240)





PJAC ASS'Y



TO MAIN ASS'Y
CN204

TO MAIN ASS'Y
CN212

TO SYPS ASS'Y
CN102

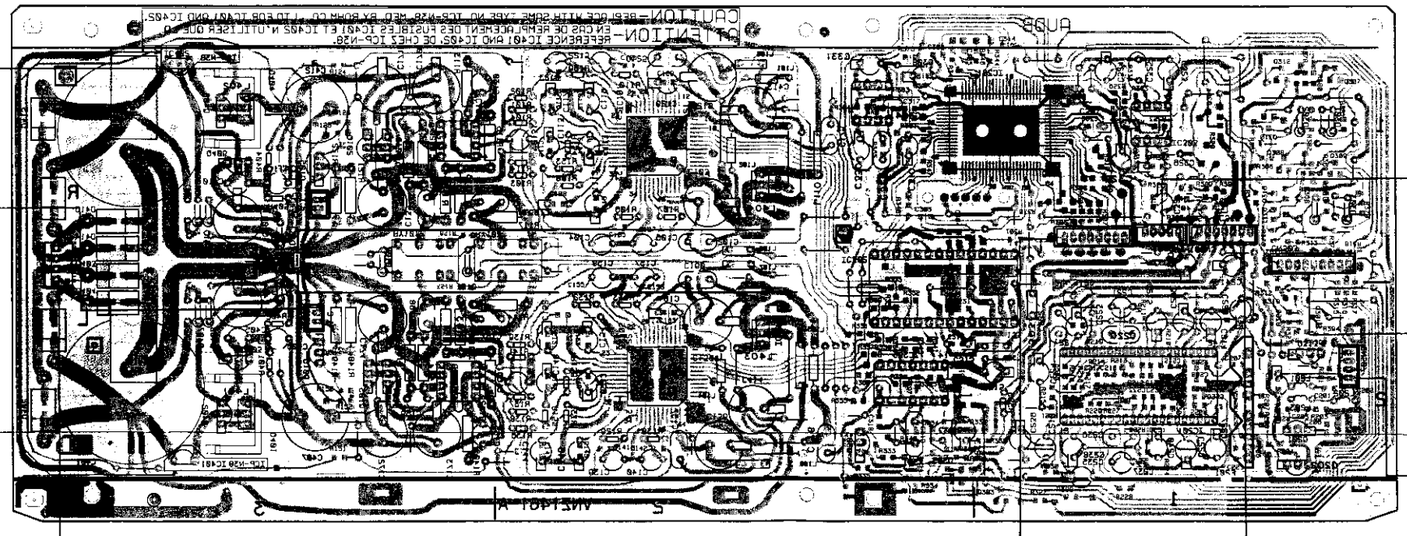
TO MAIN ASS'Y
CN205

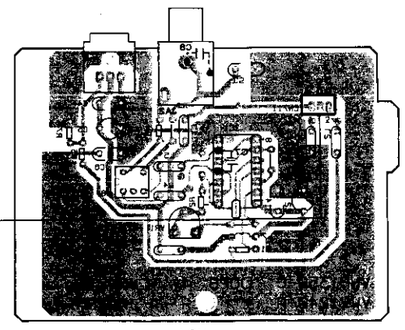
TO SYPS ASS'Y
CN108

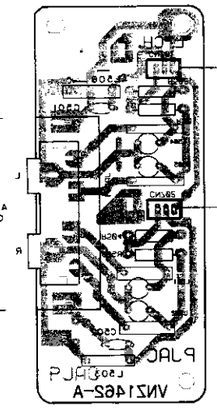
AUDB ASS'Y

DOPB ASS'Y (VWVI240)

PJAC ASS'Y







TO MAIN ASS'Y
CN204

TO MAIN ASS'Y
CN212

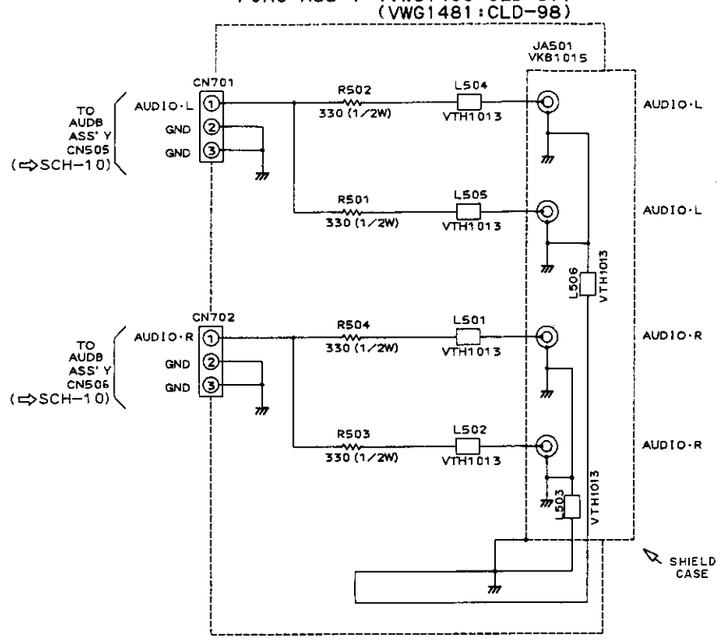
TO SYPS ASS'Y
CN108

TO MAIN ASS'Y
CN205

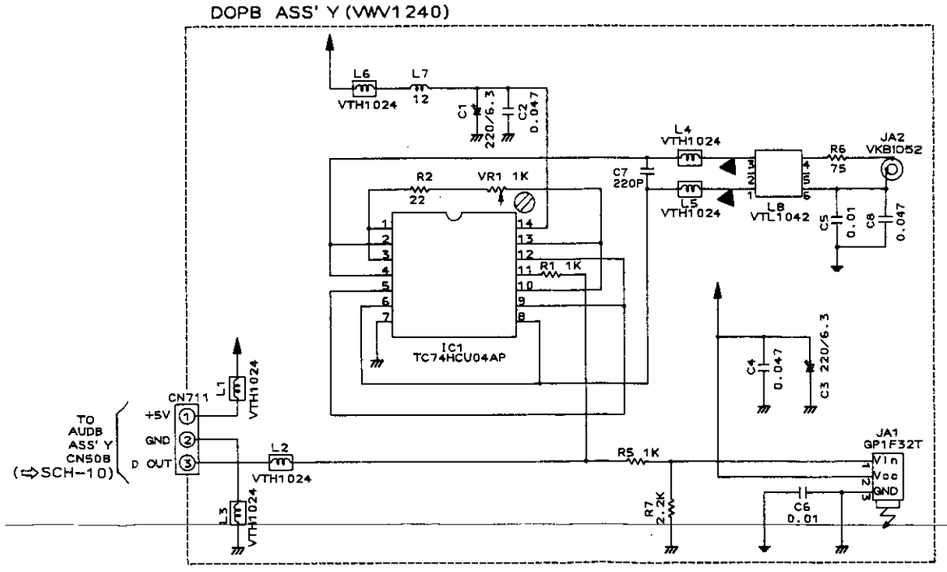
TO SYPS ASS'Y
CN102

This P.C.B. connection diagram is viewed from the foil side.

PJAC ASS'Y (VWG1433:CLD-97)
(VWG1481:CLD-98)



DOPB ASS'Y (VWV1240)



SCH-11 **Waveforms and Voltages of AUDB Ass'y**

Note : Waveforms and voltages are at the PLAY mode.

IC301 (CXD2500BQ)

Pin No.	Voltage [V]	Pin No.	Voltage [V]	Pin No.	Voltage [V]	Pin No.	Voltage [V]	Pin No.	Voltage [V]	Pin No.	Voltage [V]
1	0	15	0	29	0	43	*	57	*	71	*
2	0	16	4.8	30	0	44	0	58	*	72	5
3	0	17	0	31	*	45	4.8	59	5	73	5
4	*	18	*	32	*	46	*	60	*	74	*
5	0	19	2.4	33	4.8	47	*	61	5	75	0
6	4.8	20	*	34	*	48	*	62	*	76	0
7	0	21	0	35	*	49	*	63	*	77	*
8	4.8	22	2.3	36	*	50	*	64	*	78	*
9	0	23	4.8	37	*	51	*	65	0	79	*
10	0	24	*	38	*	52	0	66	*	80	0
11	0	25	0	39	0	53	*	67	*		
12	0	26	0	40	4.8	54	*	68	0		
13	0	27	*	41	*	55	0	69	*		
14	0	28	0	42	*	56	*	70	5		

*: Refer to waveforms

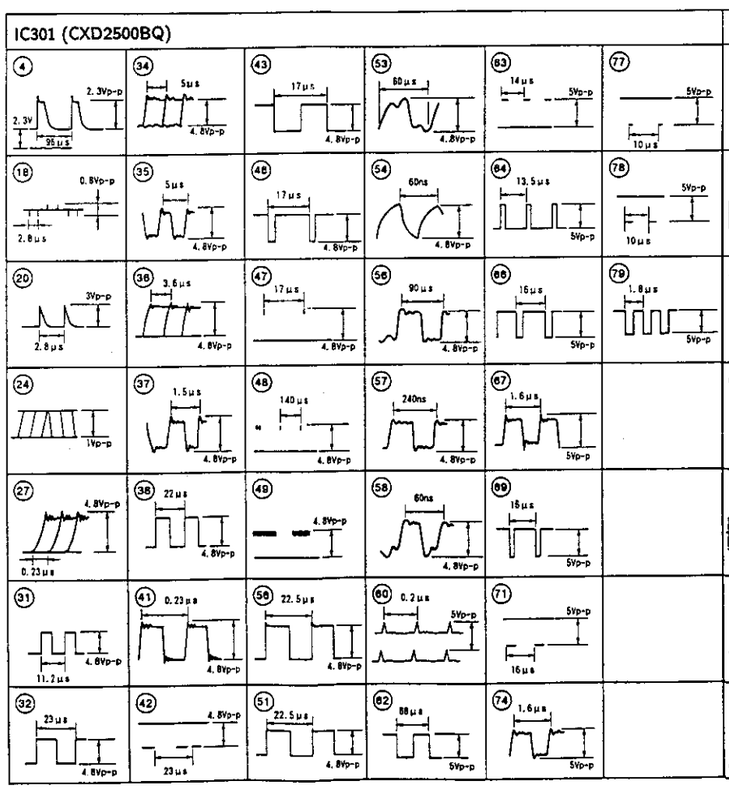
IC201 (PA0034A)

Pin No.	Voltage [V]	Pin No.	Voltage [V]	Pin No.	Voltage [V]
1	- 5V	15	*	29	*
2	*	16	*	30	*
3	*	17	*	31	*
4	—	18	*	32	*
5	—	19	*	33	*
6	*	20	0	34	*
7	*	21	*	35	*
8	*	22	*	36	*
9	*	23	*	37	—
10	*	24	0	38	—
11	*	25	5V	39	—
12	*	26	0	40	—
13	*	27	0	41	*
14	*	28	*	42	- 5V

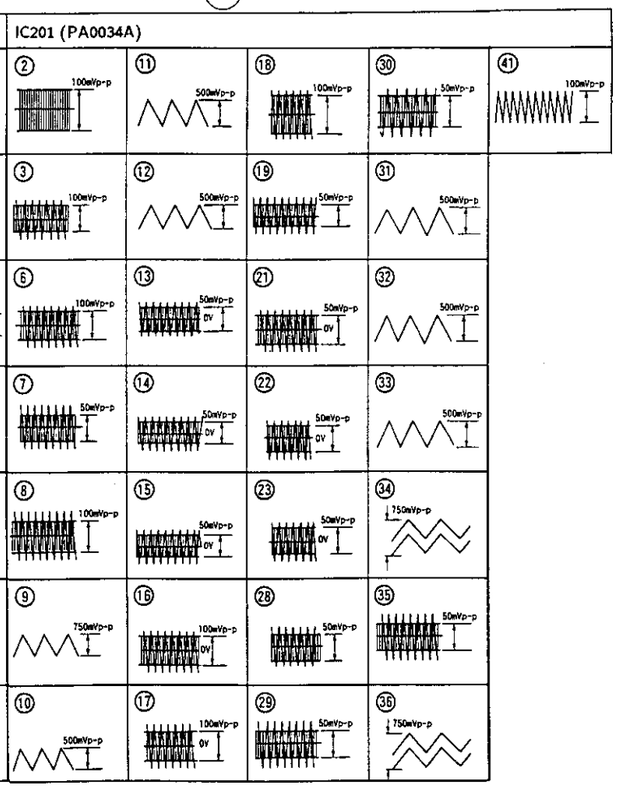
*: Refer to waveforms

Note : (No.) in the table correspond to the pin number.

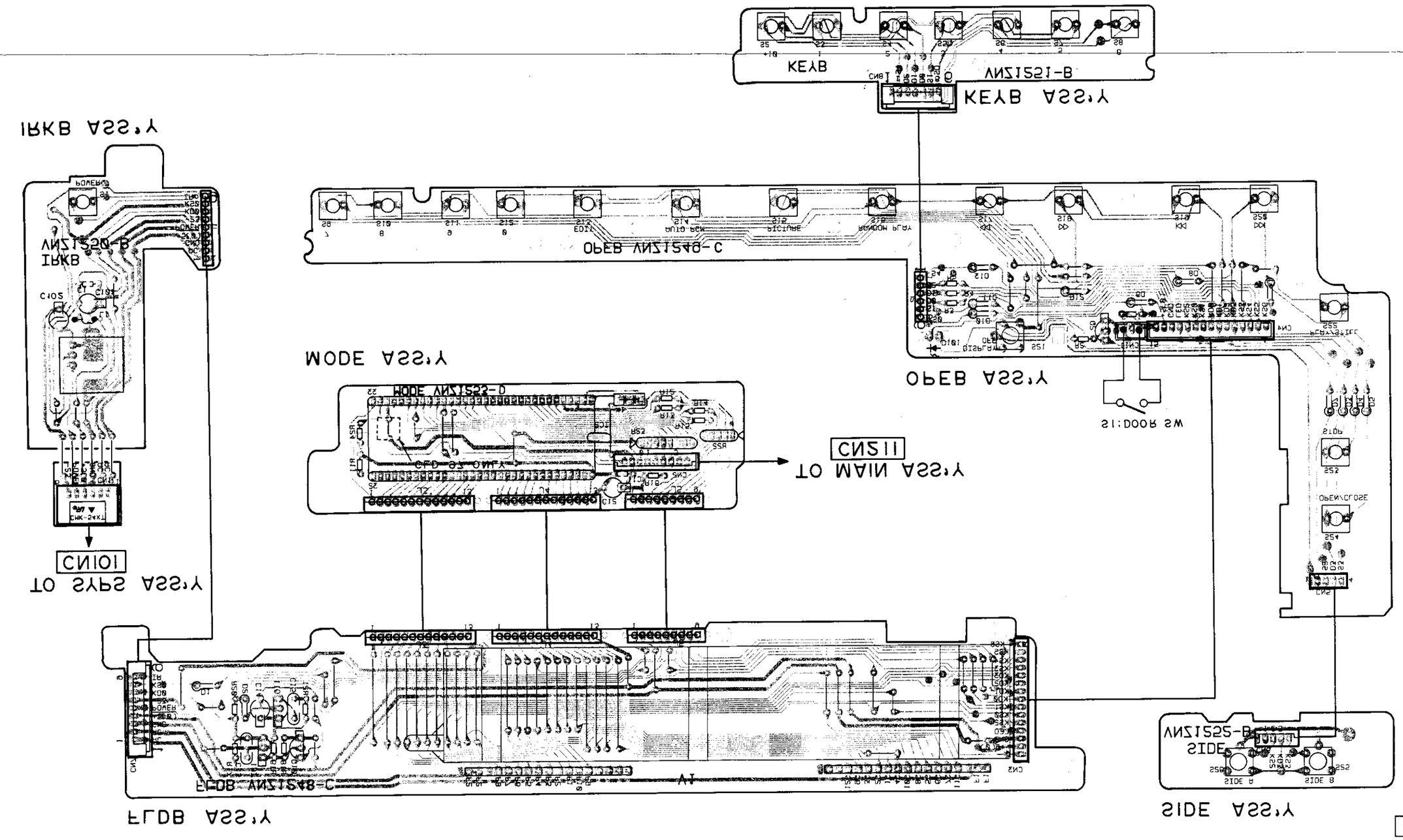
IC301 (CXD2500BQ)



IC201 (PA0034A)



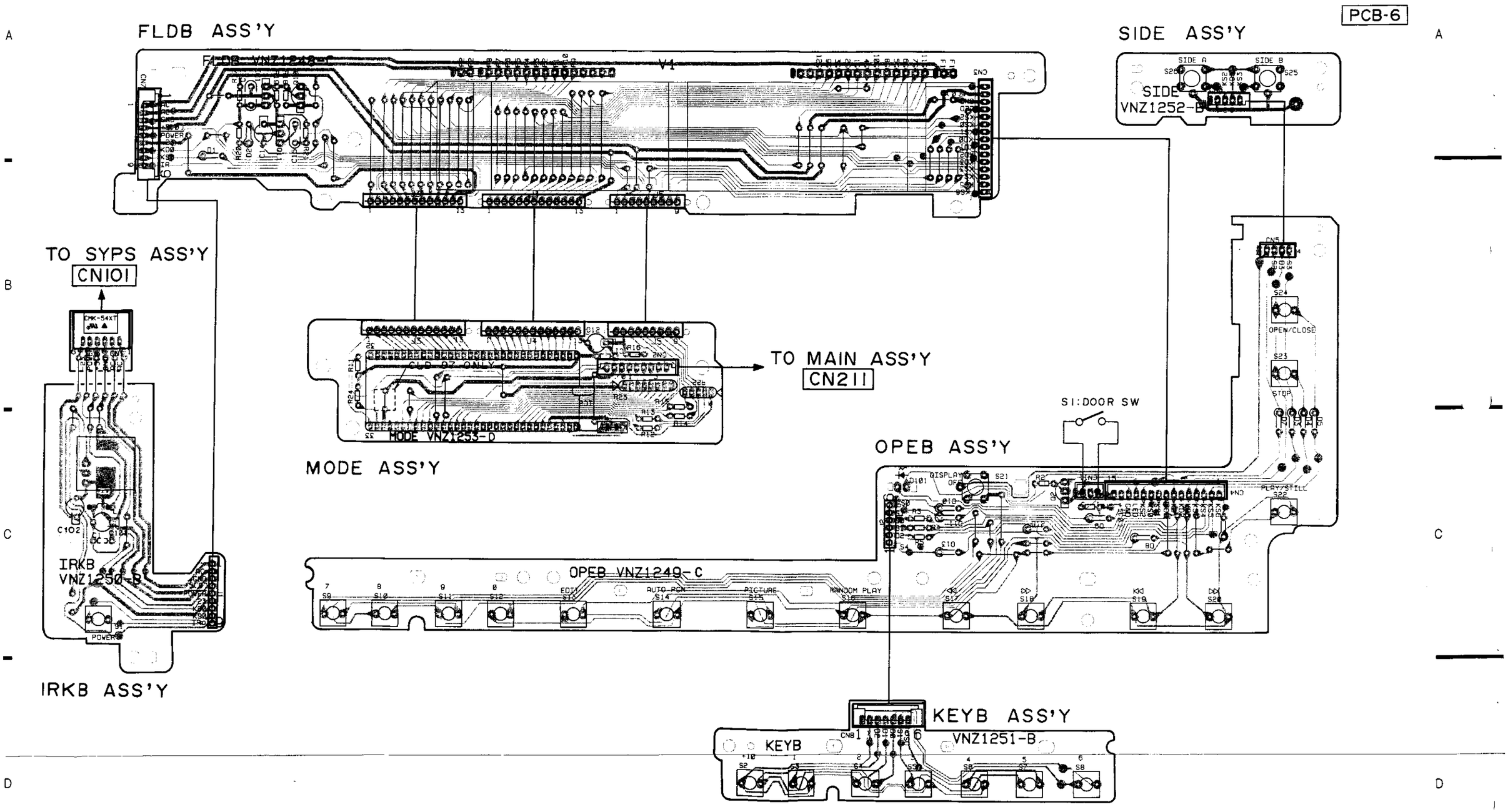
3.11 IRKB, MODE, LEDB, KEYB, SIDE, AND OPEB ASSEMBLIES



This P.C.B. connection diagram is viewed from the foil side.

3.11 IRKB, MODE, FLDB, KEYB, SIDE, AND OPEB ASSEMBLIES

This P.C.B. connection diagram is viewed from the parts mounted side.



SCH-12

IRKB ASS' Y
(VWG1267)

TO SYPS ASS'Y CN101 (⇨SCH-2)
AC
AC
GND
+5 (Ø)
POWER
-23

CN1 — J1 — CN7

VTH1026
L1
C101 47/6.3
C1 0.01
C102 10/35
S1
REMOTE SENSOR GP1U50X
D1 1SS252

S1 : POWER STANDBY/ON RSG1030

FLDB ASS' Y
(VWG1265)

V1 VAW1016

KS0
KS1
KS2
KS3
KS4
KS5
KS6

C12 100/10
C11 0.022
IC2 PD8077A
X1 VSS1055
R12 1K
R13 1K
R14 1K
R15 1K
R22 4.7K*4
R16 4.7K

R1 10K
DOOR SW
CN11
D101 SLH-56YC3H
R2 300
Q2 UN4212

CN3 — CN4

CN5 — CN6
SIDE ASS' Y
(VWG1269)

S13 : PGM
S14 : AUTO PGM EDIT
S15 : VIDEO NR
DNR(CLD-97)
PSC(CLD-98)
S16 : RANDOM PLAY
S17 : ⏮] SCAN
S18 : ⏭]
S19 : ⏮] SKIP
S20 : ⏭]
S21 : DISPLAY OFF
S22 : PLAY/STILL ▶/⏸
S23 : STOP (□)
S24 : OPEN/CLOSE (⏏)
S25 : B
S26 : A

MODE ASS' Y
(VWG1444 : CLD-97)
(VWG1390 : CLD-98)

R11 220K
R24 10K
CLD-97 ONLY

CN2
TO MAIN ASS'Y (CONT SECTION) CN211 (⇨SCH-6)
SEL IR
GND
XRESET
XCS
SCKI
S-MTOF
S-FTOM
SHAKE
IR

R23 100K*7

IC1 PST529C
R17 10K
R18 1.8K
R19 4.7K
R20 10K
Q10 DTA144ES
Q11 DTC114ES
D2 1SS252
C13 0.001
C14 10/16
C15 0.022
R21 10K

OPEB ASS' Y
(VWG1266)

D3-13 1SS252
S9—20 : RSG1030
S22-24 : RSG1030
S21, 25, 26 : VSC-010

KEYB ASS' Y
(VWG1268)

CN7 — CN8

S2-8 : RSG1030

S2 : +10
S3 : 1
S4 : 2
S5 : 3
S6 : 4
S7 : 5
S8 : 6
S9 : 7
S10 : 8
S11 : 9
S12 : 0
DIRECT SEARCH

S2-12 : RSG1030

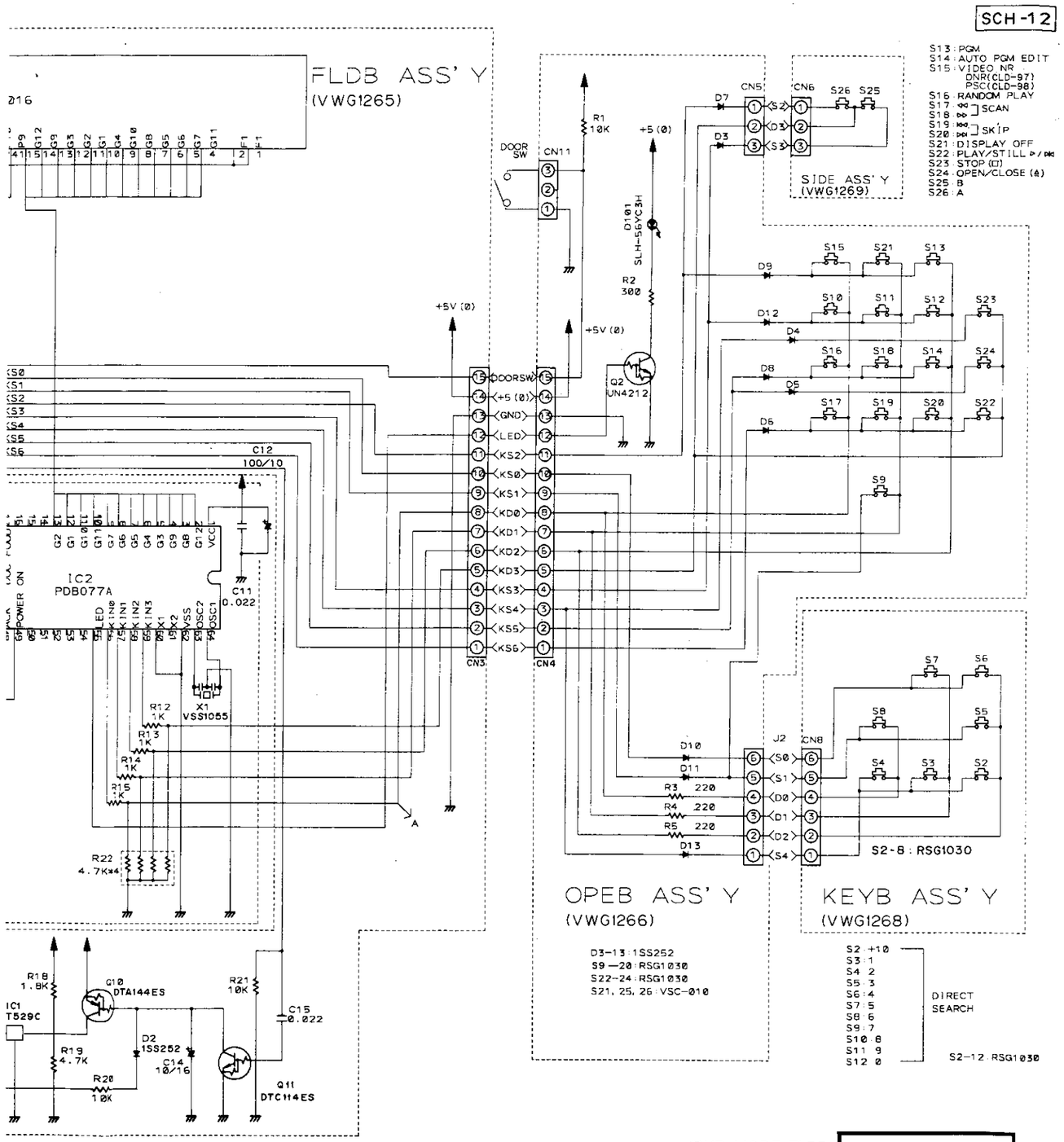
FLKB ASS' Y

IRKB, MODE, FLDB, KEYB, SIDE, OPEB ASSY

SCH-12

IRKB, MODE, FLDB, KEYB, SIDE, OPEB ASSY

SCH-12



IRKB, MODE, FLDB,
KEYB, SIDE, OPEB
ASSY

SCH-12

• FL DISPLAY TUBE (V1 : VAW1016)

PIN CONNECTION

PIN NO.	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
CONNECTION	F2	F2	NP	P8	P7	P6	P5	P4	P3	P2	P1	P10	P9	NC	NC	NC	NC	NP

PIN NO.	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18
CONNECTION	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP

PIN NO.	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
CONNECTION	NC	NC	12G	9G	3G	2G	1G	4G	10G	8G	5G	6G	7G	11G	NP	F1	F1

1) F1,F2 --- Filament
2) NP ------ No pin
3) NC ------ No connection
4) 1G~12G --- Grid

GRID ASSIGNMENT

ANODE CONNECTION

	12G	11G	10G	9G	8G	7G	6G	5G	4G	3G	2G	1G
P1	(DISC SIDE-A)	EDIT	▷	a	a	a	a	a	a	a	TIME	(DISC SIDE-B)
P2	DISC SIDE-A	REPEAT	b	b	b	b	b	b	b	b	TOTAL	DISC SIDE-B
P3	(DISC SIDE-A)	SIDE	c	c	c	c	c	c	c	c	REMAIN	(DISC SIDE-B)
P4	PGM	A	d	d	d	d	d	d	d	d	FRAME	VIDEO NR
P5	RANDOM	–	e	e	e	e	e	e	e	e	1/L	ONE-SHOT MEMORY
P6	DIGITAL SOUND	B	f	f	f	f	f	f	f	f	2/R	18
P7	1	⊔	6	g	g	g	g	g	g	g	⟲	19
P8	2	4	7	9	10	11	12	13	14	15	16	⬄
P9	3	5	8	TRACK	CHAP	upper ⁄	–	∨	–	–	17	–
P10	–	–	PLAY	–	–	lower ⁄	–	–	–	–	–	–

3. PCB PARTS LIST

NOTES:

- *Parts marked by "NSP" are generally unavailable because they are not in our Master Spare Parts List.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω → 56 × 10¹ → 561 ..... RD1/8PM[5][6][1]J
47kΩ → 47 × 10³ → 473 ..... RD1/4PS[4][7][3]J
0.5Ω → 0R5 ..... RN2H[0][R][5]K
1Ω → 010 ..... RS1P[0][1][0]K

Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ→ 562 × 10¹ →5621 ..... RN1/4PC[5][6][2][1]F

Mark	No.	Description	Parts No.
LIST OF ASSEMBLIES			
◉		FLKB ASSY (CLD-97)	VWM1393
NSP		├── FLDB ASSY	VWG1265
NSP		├── OPEB ASSY	VWG1266
NSP		├── IRKB ASSY	VWG1267
NSP		├── KEYB ASSY	VWG1268
NSP		├── SIDE ASSY	VWG1269
NSP		└── MODE ASSY (*1)	VWG1444
◉		FLKB ASSY(CLD-98)	VWM1333
NSP		├── FLDB ASSY	VWG1265
NSP		├── OPEB ASSY	VWG1266
NSP		├── IRKB ASSY	VWG1267
NSP		├── KEYB ASSY	VWG1268
NSP		├── SIDE ASSY	VWG1269
NSP		└── MODE ASSY (*1)	VWG1390
◉		MEMORY ASSY	VWS1113
◉		DOPB ASSY	VWV1240
◉		MOTHER ASSY(CLD-97)	VWM1413
NSP		├── LSFB ASSY (*2)	VWR1189
NSP		├── TRSB ASSY (*3)	VWR1112
NSP		├── BLMB ASSY (*4)	VWS1103
NSP		├── MAIN ASSY	VWX1155
NSP		└── COMP ASSY	VWV1247
◉		MOTHER ASSY(CLD-98)	VWM1433
NSP		├── LSFB ASSY (*2)	VWR1190
NSP		├── TRSB ASSY (*3)	VWR1184
NSP		├── BLMB ASSY (*4)	VWS1114
NSP		├── MAIN ASSY	VWX1201
NSP		└── COMP ASSY	VWV1247
◉		SYAB ASSY(CLD-97)	VWM1394
NSP		├── PJAC ASSY (*5)	VWG1433
NSP		├── AUDB ASSY	VWG1445
NSP		└── SYPS ASSY (*6)	VWR1113
◉		SYAB ASSY(CLD-98)	VWM1432
NSP		├── PJAC ASSY (*5)	VWG1481
NSP		├── AUDB ASSY	VWG1480
NSP		└── SYPS ASSY (*6)	VWR1202
◉		LSWB ASSY	VWM1049
NSP		├── LHSB ASSY	VWG1077
NSP		└── LVSB ASSY	VWG1078
◉		MACB ASSY	VWM1213
NSP		├── PREB ASSY	VWV1224
NSP		├── PRET ASSY	VWV1225
NSP		├── CNNB ASSY	VWV1226
NSP		└── FGSB ASSY	VWV1227
◉		TRSA ASSY(CLD-98/SD ONLY)	VWR1186
NSP		HEAD ASSY	VWV1089

*1 Although VWG1390 and VWG1444 are different in part number, they have the same service parts.

*2 Although VWR1190 and VWR1189 are different in part number, they have the same service parts.

*3 Although VWR1184 and VWR1112 are different in part number, they have the same service parts.

*4 Although VWS1114 and VWS1103 are different in part number, they have the same service parts.

*5 Although VWG1481 and VWG1433 are different in part number, they have the same service parts.

*6 Although VWR1202 and VWR1113 are different in part number, they have the same service parts.

Mark	No.	Description	Parts No.
FLDB ASSY			
SEMICONDUCTORS			
	IC1		PST529C
	Q10		DTA144ES
	Q11		DTC114ES
	D1,D2		1SS252
CAPACITORS			
	C14		CEJA100M16
	C13		CKPUYB102K50
	C15		CKPUYF223Z25
RESISTORS			
		All Resistors	RD1/6PM□□□J
OTHER			
	V1	FL DISPLAY TUBE	VAW1016
OPEB ASSY			
SEMICONDUCTORS			
	Q2		UN4212
	D3-D13		1SS252
	D101		SLH-56YC3H
SWITCHES			
	S9-S20,S22-S24		RSG1030
	S21		VSC-010
RESISTORS			
		All Resistors	RD1/6PM□□□J
IRKB ASSY			
SWITCH			
	S1		RSG1030
COIL			
	L1		VTH1026
CAPACITORS			
	C102		CEJA100M35
	C101		CEJA470M6R3
	C1		CKPUYY103N16
OTHERS			
		REMOTE SENSOR	GP1U50X
KEYB ASSY			
SWITCHES			
	S2-S8		RSG1030
SIDE ASSY			
SWITCHES			
	S25,S26		VSC-010

Mark	No.	Description	Parts No.
MODE ASSY			
SEMICONDUCTOR			
	IC2		PDB077A
CAPACITORS			
	C12		CEAS101M10
	C11		CKPUYF223Z25
RESISTORS			
	R22	(4.7K)	RA4T472J
	R23	(100K1/10W)	RA7T104J
		Other Resistors	RD1/6PM□□□J
OTHER			
	X1	CERAMIC RESONATOR (5.50MHz)	VSS1055
MEMORY ASSY			
SEMICONDUCTORS			
	IC315		CXD1178Q
	IC301		HA19211BNT
	IC313		HM63021P-34
	IC310,IC311		MB81C1501PF
	IC502		MB88306PF
	IC307,IC308		MN4700
	IC305		MN4760S
	IC202		NJM082D
	IC203,IC601		NJM4558D
⚠	IC303		NJM78L05A
	IC201		PA5012
	IC312		PD0093A
	IC314		PD5087
	IC302		PDB005
	IC306		PDB006
	IC309		PDB033A
	IC103		PM0001
	IC501,IC503		TA7302P
	IC401		TC74HC4053AP
	IC304		TC74HCU04AP
	Q206,Q304,Q308,Q314,Q451,Q453,Q456, Q456,Q502-Q504,Q512,Q522,Q523, Q526,Q530,Q531		2SA1037K
	Q105,Q204,Q301,Q505,Q508,Q513,Q515, Q518,Q702,Q710,Q712,Q716		2SA933S
⚠	Q706		2SB1238X
⚠	Q704,Q708		2SB1375
	Q104,Q201,Q501,Q506,Q507,Q509,Q510, Q516,Q517,Q519,Q520,Q701,Q711, Q713-Q715		2SC1740S
	Q205,Q207,Q302,Q303,Q305-Q307, Q312,Q452,Q454,Q511,Q521, Q524,Q525,Q803-Q805		2SC2412K
⚠	Q703,Q705,Q707,Q709		2SD2012
	Q208,Q311		DTA124EK
	Q802		DTC124EK
	Q203		RN1203
	Q202		RN2203

Mark	No.
⚠	D201,D20
	D401,D70
	D301
	D703,D70
COILS, FILTE	
	VL301
	L110
	L322
	L303,L506
	L330,L451
	L201,L305
	L301,L501
	L806
	L109,L111
	L350
	L51-L59,
	L304,L311
	L341,L342
CAPACITORS	
	VC801
	VC501,VC
	C454,C45
	C353
	C355
	C324
	C452,C45
	C303
	C158,C26
	C567
	C304,C30
	C354,C50
	C377,C38
	C259,C33
	C514,C52
	C150
	C806
	C160,C25
	C159,C35
	C302,C30
	C852-C8
	C455,C46
	C453,C45
	C262,C37
	C261
	C267
	C604
	C274
	C605
	C279
	C331
	C301,C31
	C208,C32
	C467,C70
	C726,C72
	C741,C80
	C846

Mark	No.	Description	Parts No.
FLDB ASSY			
SEMICONDUCTORS			
	IC1		PST529C
	Q10		DTA144ES
	Q11		DTC114ES
	D1,D2		1SS252
CAPACITORS			
	C14		CEJA100M16
	C13		CKPUYB102K50
	C15		CKPUYF223Z25
RESISTORS			
		All Resistors	RD1/6PM□□□J
OTHER			
	V1	FL DISPLAY TUBE	VAW1016
OPEB ASSY			
SEMICONDUCTORS			
	Q2		UN4212
	D3−D13		1SS252
	D101		SLH−56YC3H
SWITCHES			
	S9−S20,S22−S24		RSG1030
	S21		VSC−010
RESISTORS			
		All Resistors	RD1/6PM□□□J
IRKB ASSY			
SWITCH			
	S1		RSG1030
COIL			
	L1		VTH1026
CAPACITORS			
	C102		CEJA100M35
	C101		CEJA470M6R3
	C1		CKPUYY103N16
OTHERS			
		REMOTE SENSOR	GP1U50X
KEYB ASSY			
SWITCHES			
	S2−S8		RSG1030
SIDE ASSY			
SWITCHES			
	S25,S26		VSC−010

Mark	No.	Description	Parts No.
MODE ASSY			
SEMICONDUCTOR			
	IC2		PDB077A
CAPACITORS			
	C12		CEAS101M10
	C11		CKPUYF223Z25
RESISTORS			
	R22	(4.7K)	RA4T472J
	R23	(100K1/10W)	RA7T104J
		Other Resistors	RD1/6PM□□□J
OTHER			
	X1	CERAMIC RESONATOR (5.50MHz)	VSS1055
MEMORY ASSY			
SEMICONDUCTORS			
	IC315		CXD1178Q
	IC301		HA19211BNT
	IC313		HM63021P−34
	IC310,IC311		MB81C1501PF
	IC502		MB88306PF
	IC307,IC308		MN4700
	IC305		MN4760S
	IC202		NJM082D
	IC203,IC601		NJM4558D
⚠	IC303		NJM78L05A
	IC201		PA5012
	IC312		PD0093A
	IC314		PD5087
	IC302		PDB005
	IC306		PDB006
	IC309		PDB033A
	IC103		PM0001
	IC501,IC503		TA7302P
	IC401		TC74HC4053AP
	IC304		TC74HCU04AP
	Q206,Q304,Q308,Q314,Q451,Q453,Q456, Q456,Q502−Q504,Q512,Q522,Q523, Q526,Q530,Q531		2SA1037K
	Q105,Q204,Q301,Q505,Q508,Q513,Q515, Q518,Q702,Q710,Q712,Q716		2SA933S
⚠	Q706		2SB1238X
⚠	Q704,Q708		2SB1375
	Q104,Q201,Q501,Q506,Q507,Q509,Q510, Q516,Q517,Q519,Q520,Q701,Q711, Q713−Q715		2SC1740S
	Q205,Q207,Q302,Q303,Q305−Q307, Q312,Q452,Q454,Q511,Q521, Q524,Q525,Q803−Q805		2SC2412K
⚠	Q703,Q705,Q707,Q709		2SD2012
	Q208,Q311		DTA124EK
	Q802		DTC124EK
	Q203		RN1203
	Q202		RN2203

Mark	No.	Description	Parts No.
⚠	D201,D202,D204,D205,D302,D303, D401,D705−D712		1SS254
	D301		1SV68
	D703,D704		MTZJ5.1C
COILS, FILTERS			
	VL301	(10UH)	VTL1012
	L110		LAU101J
	L322		LAU120J
	L303,L506		LAU180J
	L330,L451−L456		LAU220J
	L201,L305		LAU270J
	L301,L501		LAU470J
	L806		LAU4R7K
	L109,L111		LFA221J
	L350		VTH1013
	L51−L59,L510		VTH1024
	L304,L311,L312,L321, L341,L342,L801−L805	(100UH)	VTL1006
CAPACITORS			
	VC801	(45P)	VCM1002
	VC501,VC502	(50P NR)	VCM1004
	C454,C459,C464		CCPUCH180J50
	C353		CCPUCH200J50
	C355		CCPUUJ270J50
	C324		CCSQCH030C50
	C452,C457,C462		CCSQCH060D50
	C303		CCSQCH070D50
	C158,C260,C263,C351,C549,C851		CCSQCH101J50
	C567		CCSQCH111J50
	C304,C306		CCSQCH120J50
	C354,C506,C820		CCSQCH150J50
	C377,C380		CCSQCH151J50
	C259,C335,C451,C456,C461,C501, C514,C521,C821		CCSQCH220J50
	C150		CCSQCH221J50
	C806		CCSQCH240J50
	C160,C252		CCSQCH271J50
	C159,C356		CCSQCH330J50
	C302,C305,C307,C546−C548, C852−C854		CCSQCH390J50
	C455,C460,C465,C571		CCSQCH470J50
	C453,C458,C463,C560		CCSQCH560J50
	C262,C379		CCSQCH680J50
	C261		CCSQSL681J50
	C267		CEALNPR47M50
	C604		CEANP010M50
	C274		CEANP100M16
	C605		CEANP100M25
	C279		CEANP220M10
	C331		CEAS010M50
	C301,C316−C319		CEAS100M50
	C208,C321,C332,C342,C371,C411,C414, C467,C703,C704,C707,C708,C722,C725, C726,C728,C729,C731,C732,C735,C739, C741,C801,C809,C810,C832,C836,C839, C846		CEAS101M10

Mark	No.	Description	Parts No.
	C151,C152,C265,C268,C269,C308,C310, C312,C314,C322,C333,C343,C359,C361, C412,C415,C502,C504,C510,C517,C519, C523,C525,C527,C529,C532,C534,C536, C538,C540,C542,C544,C564,C581−C584, C606,C607,C709,C710,C713,C714,C717,		CEAS470M10
	C718,C721,C807,C811,C813		CEAS470M10
	C357		CEAS470M25
	C256,C372,C398,C802,C816,C818		CEAS471M6R3
	C275		CFTXA104J50
	C340		CFTXA183J50
	C375		CFTXA184J50
	C602		CFTXA273J50
	C328		CKPUYB151K50
	C153,C157,C209,C711,C712,C715, C716,C719,C720,C723		CKPUYY103N16
	C264		CKSQYB102K50
	C376		CKSQYB472K50
	C154−C156,C266,C270,C271, C277,C278,C309,C311,C313,C315,C320, C338,C352,C362,C399,C507−C509, C511,C516,C518,C522,C524,C526,C528, C531,C533,C535,C537,C539,C541,C543, C545,C561−C563,C565,C566,C568, C569,C608,C609,C705,C706,C724,C727, C730,C733,C737		CKSQYF103Z50
	C323,C326,C327,C339,C341,C358,C360, C381,C401,C402,C413,C416,C466,C503, C505,C803,C808,C812,C814,C815,C817, C819,C830,C831,C834,C837,C847		CKSQYF104Z25
	C257,C334,C336,C344,C373,C374		CKSQYF473Z25
	C468,C804,C805,C841,C842,C845, C850,C855		CKSYF105Z16
	C255		CQMA122J50
	C273,C276		CQMA153J50
	C272		CQMA273J50
	C251		CQMA332J50
	C254		CQMA682J50
	C253	(150P)	VCE1022
RESISTORS			
	VR103,VR301,VR501−VR503	(1K)	VRTB6VS102
	VR201,VR202,VR204		VRTB6VS103
	VR203	(22k)	VRTB6VS223
	R611		RN1/6PQ2002F
	R615		RN1/6PQ5601F
	R236	(2.2, 1/4W)	VCN1022
		Chip Resistors	RS1/10S□□□J
		Other Resistors	RD1/6PM□□□J
OTHERS			
		JACK(2P)	VKB1041
		S TERMINAL (8P)	VKN1134
	X801	CRYSTAL RESONATOR (14.3MHz)	VSS1005

Mark	No.	Description	Parts No.
DOPB ASSY			
SEMICONDUCTOR			
	IC1		TC74HCU04AP
COILS			
	L7		LAU120J
	L1−L6		VTH1024
	L8		VTL1042
CAPACITORS			
	C7		CCDSL221J50
	C1,C3		CEAS221M6R3
	C2,C4		CGCYX473M25
	C8		CGDYX473M25
	C5,C6		CKCYB103K50
RESISTORS			
	VR1		VRTG6VS102
		Other Resistors	RD1/6PM□□□J
OTHERS			
	JA1	OPTICAL OUTPUT JACK	GP1F32T
	JA2	JACK	VKB1052
LSFB ASSY			
COIL			
⚠	L51		VTL−004
CAPACITORS			
⚠	C51,C52	(0.01/400)	RCG−009
TRSB ASSY			
	TRSB assembly has no service parts.		
BLMB ASSY			
SEMICONDUCTORS			
	IC1		TA8413P
	Q3−Q5		2SA817
	Q1		STA302A
	Q2		STA303A
	D1−D3		S3V10−4002P7.5
CAPACITORS			
	C1−C6		CEANP220M50
	C10		CEAS4R7M50
	C11		CKPUYF103Z25
	C7−C9		CQMA333J50
RESISTORS			
	R1−R6		RD1/2PM471J
		Other Resistors	RD1/6PM□□□J
MAIN ASSY			
SEMICONDUCTORS			
	IC201		BA15218
	IC401,IC802,IC805,IC806		BA15218N
	IC801		CXA1081S
	IC807		LA6500
	IC804		LA6510

Mark	No.	Description	Parts No.
⚠	IC203		NJM78L05A
	IC402		NJU4053BD
	IC101		PA5010
	IC601		PD0158B1
	IC803		PM3003A
	IC102,IC103		TA7291P
	Q114,Q315,Q405,Q802,Q812,Q833		2SA1037K
	Q101,Q102,Q112,Q819		2SA933S
	Q816,Q818		2SB1185
	Q103,Q106−Q111,Q113		2SC1740S
	Q202,Q203,Q316,Q404,Q803−Q805, Q808,Q810,Q814,Q825		2SC2412K
	Q815,Q817		2SD1762
	Q402,Q821		2SK184
	Q205,Q303,Q305,Q403,Q406,Q409,Q410, Q601,Q602,Q606,Q807,Q824,Q826,Q829, Q830		DTA124EK
	Q206,Q304,Q308,Q313,Q318,Q407,Q605, Q806,Q811,Q823,Q827,Q828,Q832		DTC124EK
	Q204,Q317		UN4215
	D103,D304−D309,D400−D403, D405,D407,D601−D603 D606−D608,D801,D804−D808		1SS254
	D203		ERA83−006
	D101		HZS6.2NB2
	D102		HZS8.2NB2
COILS			
	L103−L105,L113		LAU120J
	L112		LAU121J
	L801,L803		LAU151J
	L114		LAU180J
	L802		LAU181J
	L102,L301,L302		LAU220J
	L106,L108,L601		LAU470J
	L115		LAU560J
	L101,L107		LAU620J
	L116		LFA561K
CAPACITORS			
	C123		CCCCH101J50
	C106		CCCCH151J50
	C167		CCCSL241J50
	C817		CCSQCH050C50
	C142,C899		CCSQCH100D50
	C187,C400,C810,C811,C822		CCSQCH101J50
	C186		CCSQCH111J50
	C131,C133,C145		CCSQCH120J50
	C124		CCSQCH150J50
	C177,C179		CCSQCH151J50
	C114,C115		CCSQCH160J50
	C112		CCSQCH180J50
	C165		CCSQCH181J50
	C216,C806		CCSQCH220J50
	C125		CCSQCH221J50
	C130,C812,C815		CCSQCH270J50
	C126		CCSQCH271J50
	C132,C603,C604		CCSQCH330J50
	C837		CCSQCH331J50
	C141		CCSQCH360J50

Mark	No.	Description	Parts No.
	C143		CCSQCH390J50
	C138,C183		CCSQCH430J50
	C105,C166,C196,C893		CCSQCH470J50
	C188		CCSQCH560J50
	C809,C813		CCSQCH680J50
	C190		CCSQCH910J50
	C818		CCSQSL471J50
	C819		CCSQSL561J50
	C182		CEAL330M10
	C814,C845		CEANP010M50
	C316,C863		CEANP100M16
	C195,C201,C842,C870		CEANP220M10
	C850		CEANP2R2M50
	C866		CEANPR47M50
	C808,C816,C823,C840		CEAS010M50
	C149,C161,C181,C336,C337,C855,C864		CEAS100M50
	C103,C104,C147,C601,C611		CEAS101M10
	C401		CEAS220M35
	C857		CEAS221M6R3
	C107,C108,C117,C118,C139,C162,C163, C173,C174,C198,C199,C931,C932		CEAS470M10
	C203,C260,C261		CEAS470M25
	C859		CEAS471M6R3
	C111		CEASR47M50
	C835,C836		CEHAQ220M50
	C330,C331,C340,C341		CEHAQ470M25
	C610		CEJA101M10
	C830 (CLD-97)		CFTNA154J50
	C830 (CLD-98)		CFTYA154J50
	C852,C900 (CLD-97)		CFTNA224J50
	C852,C900 (CLD-98)		CFTYA224J50
	C824,C849,C873		CFTXA103J50
	C169,C832,C838,C874		CFTXA104J50
	C807		CFTXA124J50
	C827,C848,C867		CFTXA333J50
	C843,C869,C880,C910		CFTXA473J50
	C825		CFTXA682J50
	C180,C847,C868		CFTXA683J50
	C883		CFTXA823J50
	C109,C110		CKPUYY103N16
	C854		CKSQYB821K50
	C113,C116,C119,C120,C127,C136,C137, C140,C146,C148,C164,C175,C176,C178, C184,C185,C191-C193,C197,C200, C202,C212,C402-C404,C605,C607, C801-C803,C856		CKSQYF103Z50
	C204,C205,C325,C326,C841,C844,C851, C858,C860,C881,C882		CKSQYF104Z25
	C209		CKSQYF223Z50
	C170,C189,C210,C211,C602,C820,C879		CKSQYF473Z25
	C839		CQMA102J50
	C172		CQMA103J50
	C834		CQMA152J50
	C171,C897		CQMA272J50
	C853		CQMA332J50
	C898		CQMA472J50
	C134		CQMA473J50

Mark	No.	Description	Parts No.
RESISTORS			
	VR101		VRTB6VS221
	VR102	(2.2K)	VRTB6VS222
	VR104		VRTG6HS472
	R152		RN1/6PQ1002F
	R102		RN1/6PQ1103F
	R140		RN1/6PQ1201F
	R139		RN1/6PQ1203F
	R103,R104		RN1/6PQ2402F
	R108,R112,R130,R156,R812,R814, R894,R906R906		RS1/10S101J
	R129,R135,R136,R148,R217,R512, R811,R813,R822,R932,R962		RS1/10S102J
	R153,R204,R211,R212,R214,R215,R325, R330,R330,R367,R413,R416,R505,R510, R514,R515,R601,R602,R614,R618-R631, R649,R650,R823,R830,R831,R833,R834, R880-R882,R884,R885,R887,R889, R899,R900,R903,R914,R923,R928, R929,R934,R935,R953,R991		RS1/10S103J
	R138,R828,R835,R879		RS1/10S104J
	R327,R329,R506,R616,R844		RS1/10S105J
	R122,R808		RS1/10S122J
	R829,R917		RS1/10S123J
	R208		RS1/10S124J
	R132,R617,R810,R820,R842,R895		RS1/10S152J
	R326,R846		RS1/10S153J
	R824,R919,R925		RS1/10S154J
	R157,R513,R901		RS1/10S182J
	R149,R150		RS1/10S202J
	R804		RS1/10S203J
	R118,R180,R633-R635,R637-R648, R651-R661,R663-R672,R675-R678		RS1/10S221J
	R137,R154,R803,R819,R849,R964		RS1/10S222J
	R207,R210,R331,R332,R334,R613,R845, R859,R860,R870		RS1/10S223J
	R893,R896,R966		RS1/10S224J
	R133		RS1/10S272J
	R995		RS1/10S273J
	R826		RS1/10S274J
	R146		RS1/10S301J
	R386		RS1/10S303J
	R101,R171,R615,R821,R931		RS1/10S331J
	R839,R851,R888,R904,R905,R907		RS1/10S332J
	R827,R902,R926		RS1/10S333J
	R368		RS1/10S335J
	R111		RS1/10S391J
	R202		RS1/10S393J
	R384		RS1/10S433J
	R360,R809		RS1/10S470J
	R807,R930		RS1/10S471J
	R143,R335,R409,R507,R511,R607,R632, R805,R832,R838,R843,R847,R850,R878, R897		RS1/10S472J
	R142,R336,R385,R388-R390,R836, R866-R868,R892		RS1/10S473J
	R837		RS1/10S474J

Mark	No.	Description	Parts No.
	R387		RS1/10S4R7J
	R145		RS1/10S511J
	R116,R806		RS1/10S561J
	R840		RS1/10S562J
	R151,R205,R213,R337,R841, R910−R912		RS1/10S563J
	R203		RS1/10S564J
	R113,R128		RS1/10S681J
	R141,R415,R848,R890,R891,R918		RS1/10S682J
	R333,R853,R883		RS1/10S683J
	R920		RS1/10S684J
	R117		RS1/10S751J
	R107,R147,R869		RS1/10S752J
	R144		RS1/10S821J
	R818,R921,R922		RS1/10S822J
	R417,R854,R865,R927,R968		RS1/10S823J
	R216		RS1/10S824J
	R852,R862		RS1LMF3R3J
		Other Resistors	RD1/6PM□□□J
OTHERS			
	CN218	(7P)	5428−07A
	CN209	(5P)	VKN1087
	CN213	CONNECTOR(23P)	VKN1088
		MINI JACK(2P)	VKN1034
	X601	CERAMIC RESONATOR (9.00MHz)	VSS1040

COMP ASSY

SEMICONDUCTORS			
	IC202		BA10393N
	D201,D202		1SS254
CAPACITORS			
	C250,C251		CEAS470M10
	C252−C255		CKPUYY103N16
RESISTORS			
	R251		RN1/6PQ1002F
	R253		RN1/6PQ1502F
	R250		RN1/6PQ4301F
	R252		RN1/6PQ9101F
		Other Resistors	RD1/6PM□□□J
OTHER			
	CN217	(7P)	5420−07APB

PJAC ASSY

COILS, FILTERS			
	L501−L506		VTH1013
RESISTORS			
	R501−R504		RDM1/2P331J
OTHER			
	JA501	JACK(4P)	VKB1015

Mark	No.	Description	Parts No.

AUDB ASSY

SEMICONDUCTORS			
	IC303,IC304		BA15218
	IC301		CXD2500BQ
⚠	IC401,IC402		ICP−N38
⚠	IC103,IC104		NJM5532DD
⚠	IC403,IC404		NJM7805A
	IC201		PA0034A
	IC101,IC102		SAA7350GP
	IC302		PD0116A
	IC305		TC74HCU04AP
⚠	Q405,Q406		2SA933LN
	Q301,Q308,Q312,Q315,Q316		2SA1037K
⚠	Q404		2SA1262
	Q305,Q313		2SB1076M
⚠	Q402,Q403		2SC1740LN
	Q202		2SC1740S
	Q302,Q303,Q307,Q309−Q311,Q314		2SC2412K
	Q201		2SC2786
⚠	Q401		2SC3179
	Q105,Q106		2SD2144S
	Q102,Q104		2SJ104
	Q101,Q103		2SK364
	Q304		DTA124EK
	D101,D102,D301−D304		1SS254
⚠	D401−D404,D412−D415		31DF2−FC6
	D407,D409		E−102
	D408,D410		E−202
	D305		FC54M/456
	D405,D411		HZ5CLL
RELAYS			
	RY101,RY102		VSR−005
COILS, FILTERS			
	L202		LAU270J
	L201,L203		LAU560J
	L401−L404		PTH1006
	L101−L104,L110,L111		VTH1013
	L105−L108,L302,L303		VTH1020
	F201	(2.30,2.81MHz)	VTF1047
CAPACITORS			
	C335		CCSQCH180J50
	C318		CCSQCH220J50
	C202		CCSQCH221J50
	C211,C230		CCSQCH271J50
	C243,C304		CCSQCH330J50
	C105,C107,C120,C121,C141,C142, C155,C156		CCSQCH390J50
	C212,C231		CCSQCH560J50
	C201,C203		CCSQCH910J50
	C326		CEANP010M50
	C221,C237		CEANP220M10
	C218		CEANP330M10
	C327 (CLD−97)		CEANP3R3M16
	C327 (CLD−98)		CEANP3R3M50
	C223		CEAS100M50
	C209,C229,C241,C315,C330−C333		CEAS101M10

Mark	No.	Description	Parts No.
	C324		CEAS220M25
	C215,C224,C239,C240		CEAS220M50
	C214,C219,C227,C228,C301,C308, C310,C313		CEAS221M6R3
	C204		CEAS470M16
	C322,C323		CEAS470M25
	C320		CEAS470M50
	C235		CEAS4R7M50
	C238		CEASR47M50
	C129,C164		CENA470M25
	C109,C111,C113,C115,C117,C119,C144, C146,C148,C150,C152,C154		CENA470M50
	C404,C409,C413,C414		CEYA331M25
	C102,C125,C137,C160,C222		CFTXA104J50
	C406,C411		CFTXA105J50
	C325		CFTXA223J50
	C220,C236		CFTXA393J50
	C104,C106,C122,C123,C139,C140, C157,C158		CFTXA471J50
	C328		CFTXA474J50
	C205,C206,C242,C317,C319,C334,C609, C610		CKSQYB103K50
	C306		CKSQYB152K50
	C216,C217,C233,C234		CKSQYB472K50
	C213,C232		CKSQYB682K50
	C108,C110,C112,C114,C116,C118, C128,C143,C145,C147,C149,C151, C153,C163,C302,C307,C309,C312, C316		CKSQYF104Z25
	C207,C208,C225,C226,C303,C314		CKSQYF223Z50
	C305		CKSQYF473Z25
	C175,C176		CQMA102J50
	C130,C131,C165,C166,C405,C410		CQSF101J50
	C134,C169		CQSF681J50
	C133,C168	(5600P)	VCE1008
	C132,C167	(0.068MF)	VCE1025
	C135,C174	(22/50NP)	VCH1038
	C170−C173	(47/80)	VCH1071
	C103,C124,C136,C159	(47μ/100V)	VCH1085
	C401	(3300/50)	VCH1105
	C402	(3300/50)	VCH1112
	C407,C412	(220/100)	VCH1118

RESISTORS

	R121,R148		RDM1/2P101J
	R122,R149		RDM1/2P104J
	R120,R147		RDM1/2P122J
	R118,R145		RDM1/2P162J
	R116,R143		RDM1/2P221J
	R119,R146		RDM1/2P242J
	R117,R144		RDM1/2P474J
	R113,R114,R140,R141		RDM1/2P562J
	R115,R142		RDM1/2P751J
	R153−R156		RDR1/4PM101J
	R231		RS1/10S000J
	R337		RS1/10S100J
	R383		RS1/10S101J
	R123,R150,R207−R209,R222,R399		RS1/10S102J
	R124,R151,R212,R225,R319,R320,R324, R325,R328,R329,R333,R344,R361,R363, R364,R366−R373,R378,R380−R382, R384,R386−R388,R392,R393		RS1/10S103J
	R326,R395		RS1/10S104J
	R340,R365,R398		RS1/10S105J
	R215		RS1/10S123J
	R213,R226	RS1/10S153J	
	R218,R219	RS1/10S154J	
	R375		RS1/10S182J
	R390		RS1/10S183J
	R220		RS1/10S204J
⚠	R301,R303−R305,R307−R313, R315−R318,R376,R397		RS1/10S221J
	R126,R127,R202−R206		RS1/10S222J
	R323		RS1/10S223J
	R211,R223,R350,R353,R354,R358,R359		RS1/10S331J
	R330,R346		RS1/10S332J
	R347−R349,R351,R355,R357,R360		RS1/10S471J
	R210,R224,R389,R394		RS1/10S472J
	R221,R230,R321,R334,R335,R338, R362,R396		RS1/10S473J
	R341,R343,R352,R356		RS1/10S561J
	R201		RS1/10S681J
	R327,R345		RS1/10S682J
	R216		RS1/10S751J
	R214,R227		RS1/10S754J
	R125,R152,R217,R229		RS1/10S822J
	R322		RS1/10S823J
	R228		RS1/10S913J
		Other Resistors	RD1/6PM□□□J

OTHERS

	CN502	TOP POST (4P)(NH)	B4P−SHF
	X301	CRYSTAL RESONATOR (16MHz)	VSS1051

SYPS ASSY

SEMICONDUCTORS

⚠	IC4,IC5	ICP−N15
⚠	IC3	ICP−N20
	IC1	NJM4558S
	Q25	2SA817
⚠	Q1,Q10,Q14,Q23	2SA933S
⚠	Q18	2SB1185
⚠	Q16,Q27	2SB1185−F8
⚠	Q15	2SB1375
⚠	Q3	2SC1627
⚠	Q2,Q7,Q11,Q13,Q24	2SC1740S
	Q8	2SC1847
	Q4	2SD1267
⚠	Q19	2SD1667
⚠	Q17	2SD1762−F8
⚠	Q12	2SD2012
	Q20,Q26,Q28	UN4112
	Q5,Q6,Q9,Q21,Q22	UN4212
⚠	D2,D8,D14,D15,D20−D22,D24	1SR139−100
⚠	D3−D6,D9−D12,D26	1SS254
⚠	D19	D3SBA20

Mark	No.	Description	Parts No.
	D13		HZS5.1NB1
	D7		HZS5.1NB2
	D25		HZS5.6NB1
	D23		HZS5.6NB2
	D16		MTZJ20A
	D17		MTZJ27C
⚠	D18		RBA−406B
	D1		S2K20
RELAY			
	RY1		VSR1005
COIL			
	L1		VTT1109
CAPACITORS			
	C7,C13,C14,C32,C35		CEAS100M50
	C18,C19		CEAS101M50
	C29		CEAS102M16
	C27,C28		CEAS222M25
	C6		CEAS3R3M50
	C11,C12,C15,C16,C31,C36		CEAS470M16
	C17,C20,C34		CEAS470M25
	C5		CEAS470M50
	C10,C30,C33		CEAS471M25
	C4		CKPUYB471K50
	C3		CKPUYB681K50
	C21−C24,C37,C38		CKPUYF103Z25
	C2		CQMA183J50
	C1		CQMA332J50
	C9		CQMA472J50
	C25	(18000/16)	VCH1110
	C26	(4700/16)	VCH1111
RESISTORS			
	R14,R15		RN1/6PQ1002F
	R16,R17		RN1/6PQ2202F
	R38		RS1LMF222J
	R12		RS1LMF2R7J
	R22		RS1LMF3R3J
	R13		RS1LMFR51J
		Other Resistors	RD1/6PM□□□J
OTHER			
	CN108	TOP POST(8P)(NH)	B8P−SHF

LHSB ASSY

SWITCH			
		LEAF SWITCH	VSK1011

LVSB ASSY

SWITCH			
	S	PUSH SWITCH	DSG1015

PREB ASSY

SEMICONDUCTORS			
	IC101		BA15218
	IC102		IR3C02A

Mark	No.	Description	Parts No.
CAPACITORS			
	C106		CCSQCH680J50
	C105		CEAL220M16
	C104		CEAS101M10
	C101,C102		CEJA101M10
	C103		CEJANP010M50
	C111		CKSQYF103Z50
	C107−C110,C112		CKSQYF104Z25
RESISTORS			
	VR104	(100k)	VRTB6VS104
	VR101−VR103	(4.7K)	VRTB6VS472
	R119		RD1/4PM100J
		Other Resistors	RS1/10S□□□J
OTHERS			
	CN913	TOP POST(4P)(NH)	B4P−SHF
	CN902	CONNECTOR(29P)	VKN1025
	CN901	CONNECTOR(23P)	VKN1079
	CN903	(6P)	VKN1080
	CN904	(8P)	VKN1081

PRET ASSY

SEMICONDUCTORS			
	IC201		BA15218
	Q201		2SC1740S
	Q202		2SC2412K
CAPACITORS			
	C201		CCSQSL331J50
	C202−C205		CKSQYF104Z25
RESISTORS			
	VR201	(1K)	VRTB6VS102
	VR206	(2.2K)	VRTB6VS222
	VR205	(3.3K)	VRTB6VS332
	VR202,VR203	(47K)	VRTB6VS472
		Other Resistors	RS1/10S□□□J
OTHERS			
	CN905	CONNECTOR (6P)	VKN1082
	CN906	CONNECTOR (8P)	VKN1083

CNNB ASSY

RESISTORS			
	R301		RS1/10S472J
	R302		RS1/10S682J
OTHER			
	CN911	CONNECTOR(5P)	VKN1086

FGSB ASSY

SEMICONDUCTORS			
	D401		GP1S51
RESISTOR			
	R401		RS1/10S221J

Mark No.	Description	Parts No.

TRSA ASSY

TRSA assembly has no service part.

HEAD ASSY

COIL

	L1	VTL1019

CAPACITORS

	C4,C6	CKSQYF104Z25
	C1−C3	CKSQYF223Z50
	C5	CKSYF105Z16

RESISTORS

	VR1	VCP1025

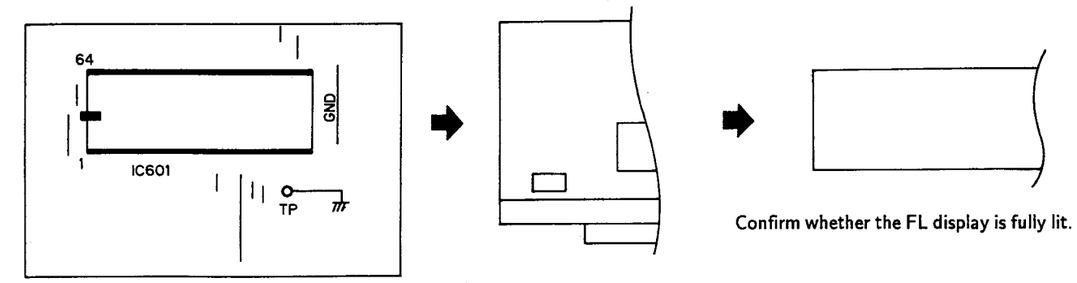
5. ADJUSTMENTS

5.1 TEST MODE

● Test Mode Initiation

1. Connect the TEST TP in CONT section of the MAIN assembly to GND. Then turn on the power switch.
2. Confirm whether the FL display is fully lit.
3. Disconnect the TEST TP from GND.

NOTE: When using the remote control unit (GGF 1067) for the test mode: Press the [TEST] key after pressing the [ESC] key while power is ON.

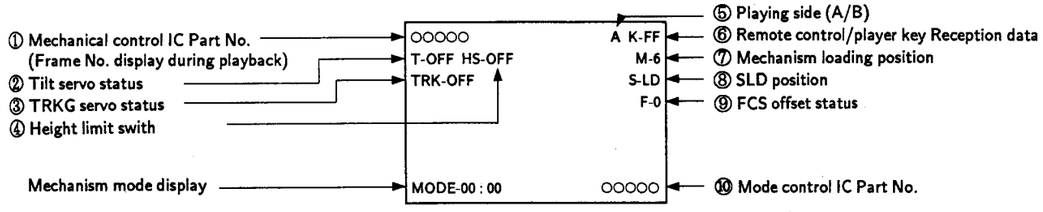


Connect TEST TP in the MAIN assembly and GND.

Turn on the power switch.

Confirm whether the FL display is fully lit.

● Displays in the Test Mode



① The Mechanical Control IC Part No. will be Displayed.

② Tilt Servo Status Display – Key operation –
ON ··· Tilt servo ON — RAND PLAY, Speed +
OFF ··· Tilt servo OFF — Skip F.R, Speed –

③ TRKG Servo Status Display – Key operation –
ON ··· TRKG servo ON — Step REV
OFF ··· TRKG servo OFF — Step FWD
Key Operation : ▶ (PLAY)
TRKG servo ON/OFF alternately.

④ Height Limit Switch Display
ON ··· Height limit switch ON
(On at the bottom end)
OFF ··· Height limit switch OFF
Key Operation : Durling Side A is clamped state :
CH SKIP +··· Height down
CH SKIP –··· Height up

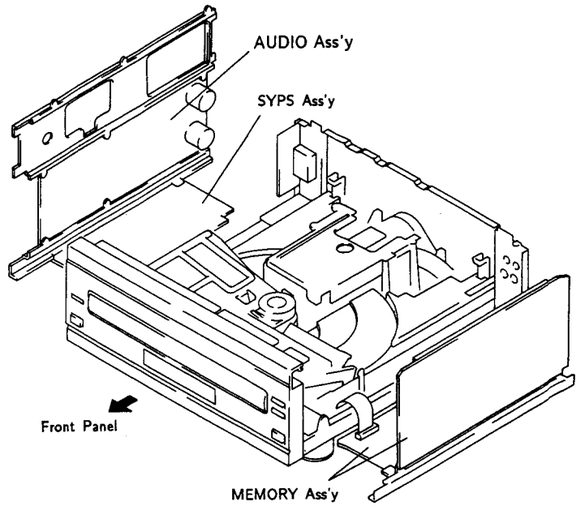
⑤ Playing Side
A ··· Durling playback Side A
B ··· Durling playback Side B
Key Operation : SIDE A ··· Side A Playback
SIDE B ··· Side B Playback

⑥ Remote Control/Player Key Reception Code No.

Code	Function	Code	Function	Code	Function	Code	Function
00	0	20	FJOG0	40	(CHAP/TRK)	60	
01	1	21	FJOG1	41	(FRAM/TIM)	61	
02	2	22	FJOG2	42	(SEARCH)	62	
03	3	23	FJOG3	43	DISPLAY	63	
04	4	24	RJOG0	44	REPEAT B	64	
05	5	25	RJOG1	45	CLEAR	65	
06	6	26	RJOG2	46	SPEED–	66	
07	7	27	RJOG3	47	SPEED+	67	
08	8	28	FSHTL0	48	REPEAT A	68	
09	9	29	FSHTL1	49	(2/R)	69	
0A		2A	FSHTL2	4A	(STEREO)	6A	
0B		2B	FSHTL3	4B	(1/L)	6B	
0C	DGT/ANL	2C	RSHTL0	4C	PROGRAM	6C	
0D		2D	RSHTL1	4D	SIDE A	6D	PLAY/PAUSE
0E	CX ON/OFF	2E	RSHTL2	4E	SIDE B	6E	STOP
0F		2F	RSHTL3	4F		6F	OPEN/CLOSE
10	F-SCAN	30		50	F-STEP	70	
11	R-SCAN	31		51		71	
12		32		52	F-SKIP	72	
13	CHAP/FRME	33		53	R-SKIP	73	
14		34		54	R-STEP	74	
15	SIDE	35		55	R-MULT	75	PICTURE SOFT
16	STOP/OPEN	36		56		76	
17	PLAY/SEARCH	37		57		77	
18	PAUSE	38		58	F-MULT	78	FL DISPLAY
19		39		59		79	
1A	(POW ON)	3A		5A	INTRO	7A	
1B	(POW OFF)	3B		5B	STROBO	7B	
1C	POW ON/OFF	3C		5C		7C	
1D	EDIT	3D		5D	ONE SHOT	7D	
1E	AUDIO	3E		5E	RANDOM(TST)	7E	
1F	+10	3F		5F	(ESC)	7F	

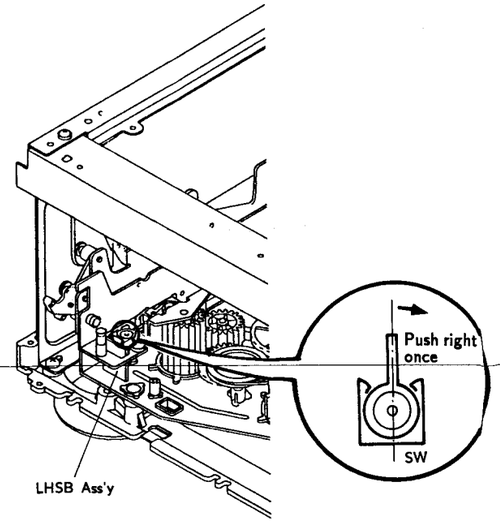
● Player Settings for Adjustment

Adjustment should be performed with AUDIO, SYPS and MEMORY assemblies are opened as shown in figure below.

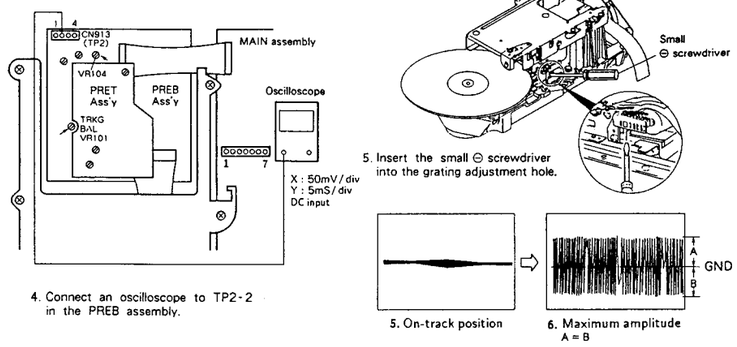
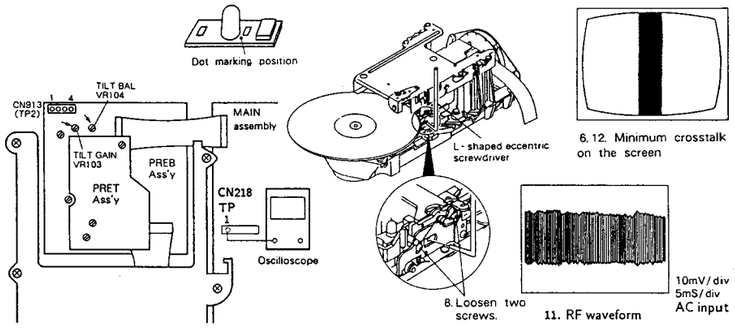
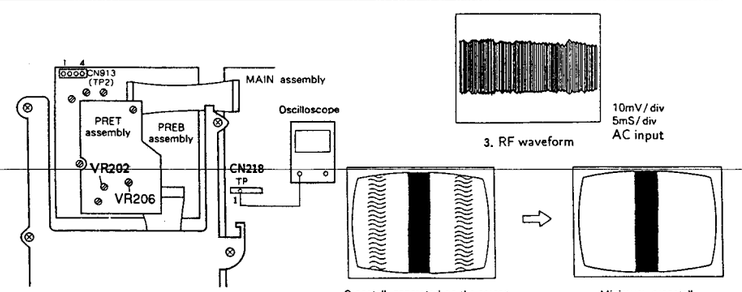


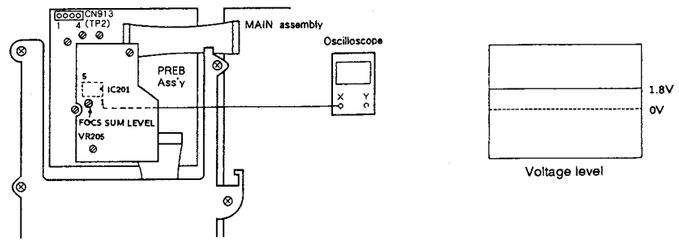
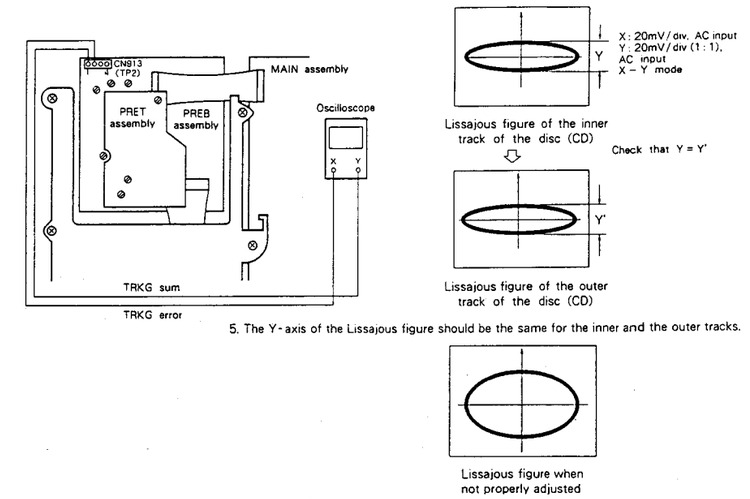
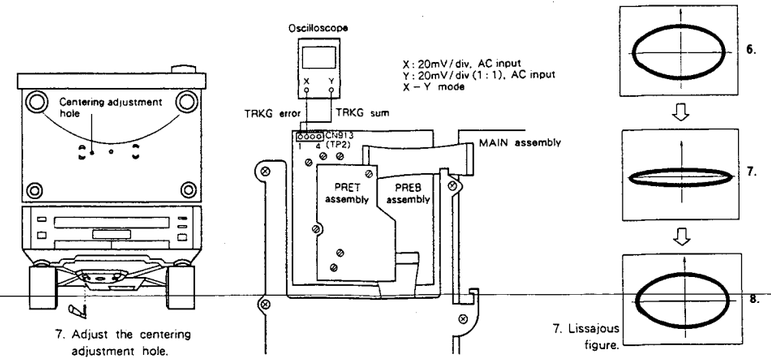
● Playing the disc without disc tray

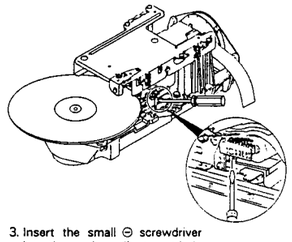
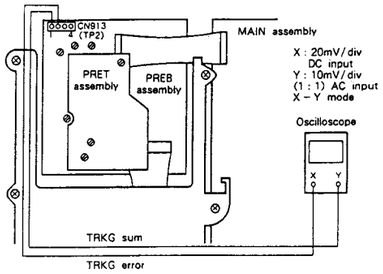
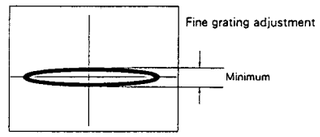
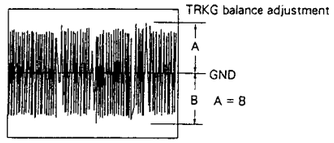
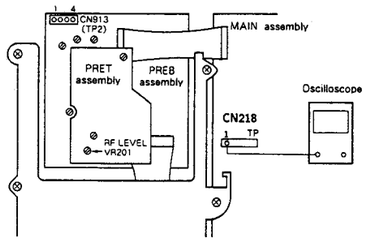
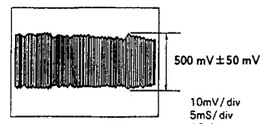
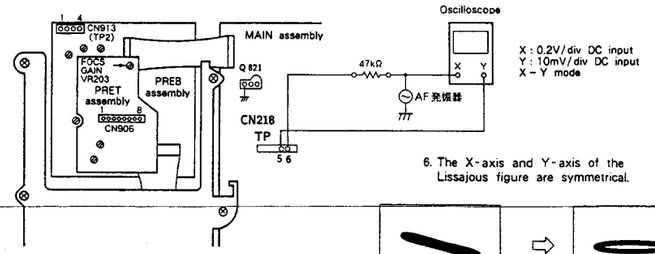
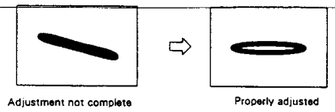
After pressing the PLAY key, push right the lever SW in the LHSB assembly once.

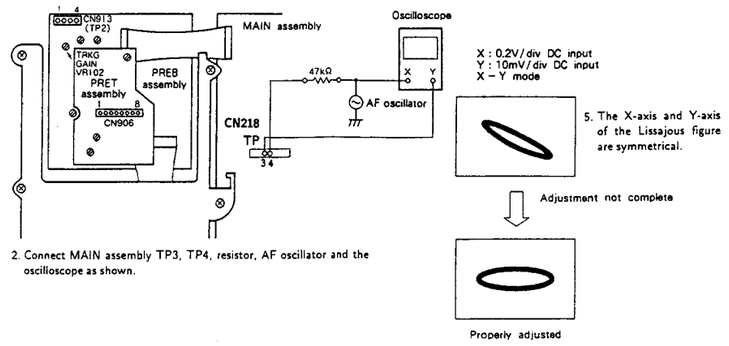
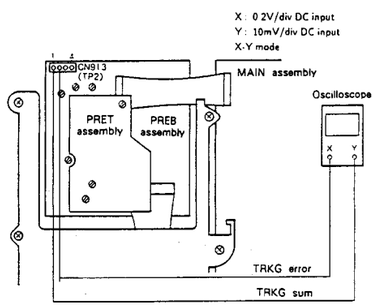
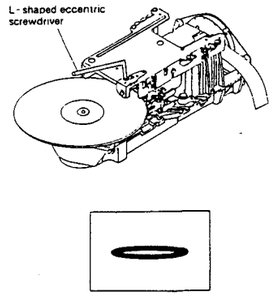
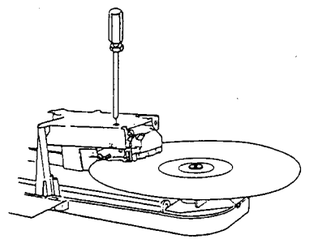
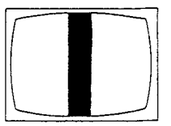


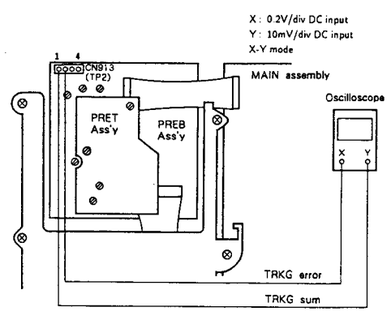
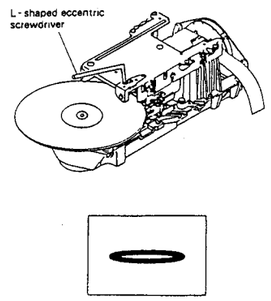
5.2 MECHANICAL ADJUSTMENT

	Adjustment name	Adjustment point	Measuring equipment and jigs	Measurement point	Player condition	Adjustment procedure		Waveform and connection diagram
1	Coarse grating and Tracking (TRKG) Balance Adjustment	· Grating adjustment hole (Coarse grating) · PREB assembly VR101 (TRKG balance)	· Small⊖ screwdriver (flat blade) · Oscilloscope · GGV1003	·PREB assembly TP2−2 (TRKG error)	· Test mode (TRKG servo OFF) · The carriage assembly should be in the forward state. · #6,500 still	<Coarse Grating Adjustment> 1. Play the LD test disc. 2. Move the pickup to frame #6,500 by scanning or searching. 3. OFF the TRKG servo. 4. Connect an oscilloscope to TP2−2 in the PREB assembly and observe the waveform. 5. Insert the small ⊖screwdriver into grating adjustment hole. Turning the grating will allow you to vary the amplitude of the TRKG error waveform. Find the position where the waveform amplitude becomes minimum with a smooth envelope. (This indicates that the 3−way split laser beams are directed onto the track. This is called the "on−track" position.) 6. Slowly turn the grating counterclockwise from the on track position until the waveform amplitude becomes maximum. 7. ON the TRKG servo and check that a normal picture is displayed on the TV screen. <TRKG Balance Adjustment> 1. Align the oscilloscope GND so that it comes to the center of the oscilloscope screen. 2. Adjust VR101 in the PREB assembly so that the positive and negative amplitude of the TRKG error waveform become equal. Note : If the tracking is so bad that it cannot be adjusted, set the PREB assembly's VR104 to the mechanical center. Then adjust the tracking.	
2 (1)	Crosstalk adjustment(1) (Tilt Gain adj.) Tilt servo balance adj. Pickup tangential inclination adj.	·PREB assembly VR103 (TILT GAIN) ·PREB assembly VR104 (TILT BAL.) ·Pickup tangential direction angle adjustment screw	· Oscilloscope · TV monitor · GGV1003 · Oscilloscope · L−shaped eccentric screwdriver · TV monitor · GGV1003	· Dot marking on the tilt sensor · MAIN assembly TP1(RF) (CN218) · MAIN assembly TP1(RF) (CN218)	·Power OFF ·#2,701still (#115still) ·TRKG servo ON ·#2,701still (#115still) ·TRKG servo ON	<TILT GAIN ADJUSTMENT> 1. Check the color of the dot marked on the top of the tilt sensor, at the side of the post. Some players have red and blue dots. According to the color of the dot, adjust the PREB assembly VR103 as follows : Red dot : Turn VR103 fully counterclockwise. Blue dot : Turn VR103 fully clockwise. No dot : Set VR103 to the center position. <TILT SERVO BALANCE ADJUSTMENT> (Pickup TRKG directional angle adjustment) 2. Make sure the TILT servo is ON. Set the TILT servo balance adjustment VR(VR104) to the mechanical center. 3. Connect TP1 to an oscilloscope. 4. Search for #2,701 and look at the RF waveform. 5. Adjust VR104 on the PREB assembly to maximize the waveform's amplitude. Turn VR104 slowly to allow the TILT servo to keep pace. (When VR104 is adjusted, the pickup assembly's TRKG directional angle will change.) 6. Search for #115 and make sure there is no conspicuous crosstalk on the TV monitor. 7. If the crosstalk on the TV monitor is conspicuous, do the following tangential adjustment. <PICKUP TANGENTIAL DIRECTION ANGLE ADJUSTMENT> 8. Loosen the two screws as shown in the connection diagram. 9. Search for #2,701 and look at the RF waveform. 10. Insert an L−shaped eccentric screwdriver into the pickup tangential direction angle adjustment hole. 11. While referring to the RF waveform, adjust the tangential direction to maximize the waveform's amplitude. 12. Search for #115 and make sure there is no conspicuous crosstalk on the TV monitor. 13. After completing the adjustment, tighten the two screws. Note : If the pickup tangential direction angle has been changed on the side A playback side, be sure to execute the following: "4. Spindle Motor Centering Check," "10. Centering Adjustment for Side B Play," and "11. Pickup Tangential Direction Angle Adjustment for Side B Play."	
2 (2)	Crosstalk adjustment(2) TRKG error level max adjustment LD FOCS error balance adjustment (RF level max adjustment)	·PRET assembly VR202 ·PRET assembly VR206	· Oscilloscope · GGV1003 · Oscilloscope · TV monitor · GGV1003	·PREB assembly TP2−2 ·MAIN assembly TP1	·#6,500still ·TRKG servo ON ·#2,701still ·#115still ·TRKG servo ON	<TRKG ERROR LEVEL MAX ADJUSTMENT> 1. Connect PREB assembly TP2−2 to an oscilloscope. 2. Search for #6,500 and OFF the TRKG servo. 3. Adjust VR202 to maximize the TRKG error waveform's amplitude.	<LD FOCS ERROR BALANCE ADJUSTMENT> 1. Connect TP1 to an oscilloscope. 2. Search for #2,701 and look at the RF waveform. 3. Adjust VR206 on the PRET assembly to maximize the waveform's amplitude. 4. Search for #115 and make sure there is minimal crosstalk on the TV monitor. If the crosstalk still exceeds the allowable amount even after VR206 is adjusted, execute "Pickup tangential direction angle adjustment" and "TILT servo balance adjustment." Note : Adjustment of VR206 must be performed after VR202 has adjusted.	

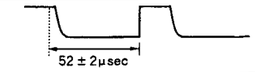
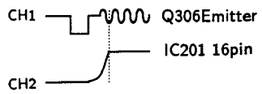
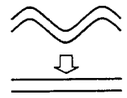
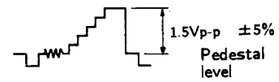
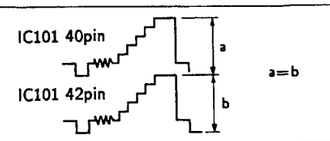
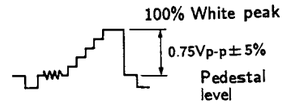
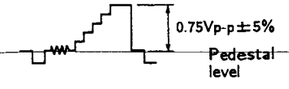
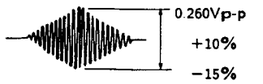
	Adjustment name	Adjustment point	Measuring equipment and jig	Measurement point	Player condition	Adjustment procedure	Waveform and connection diagram
3	FOCS SUM level adjustment	· PRET assembly VR205	· Oscilloscope · GGV1003	· PRET assembly IC201 1pin	·#15,000 still ·TRKG servo ON	1. Connect IC201−1 of PRET assembly to an oscilloscope. 2. Search for #15,000 and observe the voltage level. 3. Adjust VR205 so that the voltage level becomes 1.8Vp−p ±0.1V.	 3. Adjust VR205 in PRET Ass'y so that the voltage level becomes 1.8Vp-p±0.1V.
4	Spindle motor centering check	Check the lissajous figure	· Oscilloscope · GGV1003 · YEDS−7	· PREB assembly TP2−2 (TRKG error) TP2−1 (TRKG SUM)	·Test mode (TRKG servo OFF) ·The carriage assembly should be in the forward state. ·#22,000 still ·#100 still	Note: LD test disc F2 is not suitable for this adjustment because the recorded portion with a track pitch of 1.52μm is present only around inner tracks #1 to #500. 1. Play the 8−inch LD test disc. 2. Move the pickup to frame #22,000 by scanning or searching, then OFF the TRKG servo. 3. Connect TP2−2 in the PREB assembly to the X−input(CH−1)of the oscilloscope and TP2−1 to the Y−input(CH−2). Set the oscilloscope to the X−Y mode and observe the Lissajous figures of the TRKG error signal and the TRKG sum signal. 4. Write down the Y−axis amplitudes of the Lissajous figures. 5. ON the TRKG servo and search frame #100, then OFF the TRKG servo again to observe the Lissajous figure. At this time, check that the Y−axis amplitude of the Lissajous figure is the same as that noted in step 4. 6. Remove the 8−inch LD test disc from the player, then load the CD test disc and repeat the checking procedures steps 1 to 5. However, it is not necessary to specify the inner or outer track positions of the disc. If the Y−axis amplitude of the Lissajous figure is different for the inner and outer tracks, perform "5. Spindle Motor Centering Adjustment."	 5. The Y-axis of the Lissajous figure should be the same for the inner and the outer tracks.
5	Spindle motor centering adjustment	Spindle motor centering adjustment hole	·L−shaped phillips ⊕screwdriver · Oscilloscope · GGV1003 · YEDS−7	· PREB assembly TP2-2 (TRKG error) TP2-1 (TRKG SUM)	·Test mode (TRKG servo ON/OFF) ·The carriage assembly should be in the forward state. ·#22,000 still ·#100 still	Note 1: Before making the adjustment, remove the rear panel. Note 2: The LD test disc F2 is not suitable for this adjustment. 1. Connect TP2−2 in the PREB assembly to the X−input(CH−1) of the oscilloscope and TP2−1 to the Y−input(CH−2). 2. Play the 8−inch LD test disc and search frame #22,000. 3. OFF the TRKG servo and observe the Lissajous figures of the TRKG error signal and the TRKG sum signal. 4. Fine−adjust the grating so that the Y−axis amplitude of the Lissajous figure is minimized. 5. ON the TRKG servo and search frame #100. 6. OFF the TRKG servo again and observe the Lissajous figure and write the Y−axis amplitude. 7. Insert the L−shaped Philips screwdriver into the adjusting hole from the left bottom of the unit, and turn slowly so that the Y−axis amplitude of the Lissajous figure is reduced. 8. After the Y−axis amplitude of the Lissajous figure is minimized, turn the adjusting screw further until the amplitude becomes the same shape as that observed in procedure 6. 9. ON the TRKG servo, and move the pickup assembly to the outer track of the disc(#22,000). 10. OFF the TRKG servo again and observe the Lissajous figure to check that the Y−axis amplitude is minimum. If the Y−axis amplitude of the Lissajous figure is larger than specified, repeat the adjustment procedures from steps 3 to 8. 11. After adjustment is complete, perform the adjustment in "4. Spindle Motor Centering Check" item 6.	 7. Adjust the centering adjustment hole.

	Adjustment name	Adjustment point	Measuring equipment and jigs	Measurement point	Player condition	Adjustment procedure	Waveform and connection diagram
6	Fine grating adjustment	Grating adjustment hole	· Small⊖ screwdriver · Oscilloscope · GGV1003	·PREB assembly TP2-2 (TRKG error) TP2-1 (TRKG SUM)	·Test mode (TRKG servo OFF) ·The carriage assembly should be in the forward state. ·#6,500 still	1. Play the LD test disc and search frame #6,500, then OFF the TRKG servo. 2. Connect TP2-2 in the PREB assembly to the X-input(CH-1)of the oscilloscope and TP2-1 to the Y-input(CH-2). Set the oscilloscope to the X-Y mode and observe the Lissajous figures of the TRKG error signal and the TRKG sum signal. 3. Insert the small ⊖screwdriver into the grating adjustment hole, and fine-adjust the grating so that the Y-axis amplitude of the Lissajous figures is minimized. If the grating is turned too much and the optimum position can no longer be found, repeat the "Coarse Grating Adjustment". 4. Select the oscilloscope's X-input(CH-1) and check that the positive and negative amplitudes of the TRKG error signal are equal. If they are not, repeat the "Tracking Balance Adjustment". 5. ON the TRKG servo and check that the picture (image) on the TV screen is normal.	 3. Insert the small ⊖ screwdriver into the grating adjustment hole to fine adjust it.   3. Y-axis amplitude of Lissajous figure becomes minimum.  4. The positive and negative amplitude are equal.
7	RF gain adjustment	PRET assembly VR201(RF gain)	· Oscilloscope · GGV1003	· MAIN assembly TP1 (RF signal) (CN218)	·The carriage assembly should be in the forward state. ·#15,000 still (TRKG servo ON)	1. Play the LD test disc and search frame #15,000. 2. Connect an oscilloscope to MAIN assembly TP1(RF signal) and observe the RF signal. 3. Adjust PRET assembly VR201 so that the amplitude of the RF signal becomes 500mV±50mV.	  3.RF signal 2. Connect MAIN assembly TP1 to an oscilloscope.
8	FOCS servo loop gain adjustment	PRET assembly VR203	· Oscilloscope · AF oscillator · Resistor(47kΩ)	· MAIN assembly (CN218) TP5 (FOCS error) TP6	·The FOCS motor protection circuit is disabled. ·The carriage assembly should be in the forward state.	1. Ground the Q821 gate of the MAIN assembly to stop the function of the focus motor protection circuit. 2. Connect MAIN assembly TP6 to the oscilloscope's X-input(CH-1) via the resistor and AF oscillator, and TP5 to the Y-input(CH-2), as shown in the diagram. 3. Set the AF oscillator output to 1.7kHz/6Vp-p for GGV1003. (according to the test disc used.) 4. Play the 8-inch LD test disc and search frame #15,000(#15,000). 5. Set the oscilloscope to the X-Y mode and observe the Lissajous figure. 6. Adjust VR203 in the PRET assembly so that the Lissajous figure is symmetrical on both the X-axis and Y-axis of the oscilloscope. 7. Release the grounding from Q821 in the MAIN assembly. Note : If the AF oscillator output does not exceed 6Vp-p, reduce the value of the resistor (47k ohms) in the diagram, for easier observation of the Lissajous figure (not below 33k ohms).	 6. The X-axis and Y-axis of the Lissajous figure are symmetrical. 1. Ground the gate of MAIN assembly Q302 2. Connect MAIN assembly TP5, TP6, resistor, AF oscillator, and the oscilloscope as shown. 
			· GGV1003	(FOCS gain)	·#15,000 still (TRKG servo ON)		

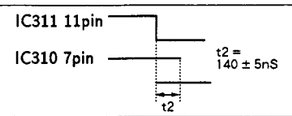
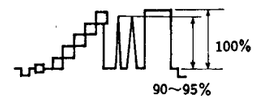
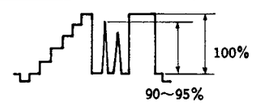
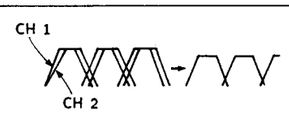
	Adjustment name	Adjustment point	Measuring equipment and jigs	Measurement point	Player condition	Adjustment procedure	Waveform and connection diagram
9	TRKG servo loop gain adjustment	PREB assembly VR102	· Oscilloscope · AF oscillator · Resistor(47kΩ) · GGV1003	· MAIN assembly (CN218) TP3 (TRKG error) TP4 (TRKG gain)	·The carriage assembly should be in the forward state. ·#15,000 still (TRKG servo ON)	1. Play the LD test disc and search frame #15,000. 2. Connect MAIN assembly TP4 to the oscilloscope's X−input(CH−1) via the resistor and AF oscillator, and TP3 to the Y−input(CH−2), as shown in the diagram. 3. Set the AF oscillator output to 3.0kHz/6Vp−p for GGV1003. (according to the test disc used.) 4. Set the oscilloscope to the X−Y mode and observe the Lissajous figure. 5. Adjust VR102 in the PREB assembly so that the Lissajous figure is symmetrical on both the X−axis and Y−axis of the oscilloscope. Note: If the AF oscillator output does not exceed 6Vp−p, reduce the value of the resistor (47k ohms) in the diagram, for easier observation of the Lissajous figure (not below 33k ohms).	 2. Connect MAIN assembly TP3, TP4, resistor, AF oscillator and the oscilloscope as shown. 5. The X-axis and Y-axis of the Lissajous figure are symmetrical.
10	Centering adjustment for side B play	Centering adjustment hole for side B play	· L−shaped eccentric screwdriver (GGV−129) · Oscilloscope · GGV1003	· PREB assembly TP2−2 (TRKG error) TP2−1 (TRKG SUM)	· Play · Test mode · #100 still (TRKG servo ON/OFF) · The carriage assembly should be in the reverse state.	1. Turn the LD test disc upside−down (change from side A to side B). 2. Set the oscilloscope to the X−Y mode, and connect PREB assembly TP2−2 (TRKG error) to the oscilloscope's X−input(CH−1) and TP2−1 (TRKG sum) to the Y−input(CH−2). 3. Play the LD test disc and search frame #100 then OFF the tracking servo. Note: If the center is too eccentric on side B of the disc, since searching will be impossible on side B, OFF the TRKG servo when the carriage assembly moves to the side B play position and searches around frame #100. 4. While observing the Lissajous figure on the oscilloscope, insert the eccentric screwdriver into the centering adjustment hole for side B and adjust it so that the X−axis amplitude of the Lissajous figure is minimized (on−track position). Then turn the eccentric screwdriver clockwise further until the X−axis amplitude of the Lissajous figure becomes maximum. Note: When "2 (1) Tangential Direction Angle Adjustment" is performed with the pickup in the forward state, perform "11. Pickup Tangential Direction Angle Adjustment for Side B Play" and "Centering Adjustment for Side B play".	 2. Centering adjustment for side B play.  4. X-axis of Lissajous figure maximum.
11	Pickup tangential direction angle adjustment for side B play	Pickup tangential direction angle adjustment screw	· TV monitor · Small philips ⊕screwdriver · GGV1003	·Monitor screen	· The carriage assembly should be in the reverse state. · #115 still	1. Play the LD test disc and search frame #115. 2. Check if crosstalk appears on the screen of the TV monitor, and adjust the pickup tangential direction angle adjustment screw to that the crosstalk is minimized. 3. After steps 1 and 2 have been completed, perform "10. Centering Adjustment for Side B Play" again. Note: When the pickup tangential direction angle for side B play is varied by this adjustment, the center of the disc for side B may be shifted slightly. As a countermeasure, perform the centering adjustment again.	  2. Minimum crosstalk

	Adjustment name	Adjustment point	Measuring equipment and jigs	Measurement point	Player condition	Adjustment procedure	Waveform and connection diagram
12	Fine centering adjustment for side B play	Centering adjustment hole for side B	· L-shaped eccentric screwdriver (GGV-129) · Oscilloscope · GGV1003	· PREB assembly TP2-2 (TRKG error) TP2-1 (TRKG SUM)	· Test mode (TRKG servo OFF) · The carriage assembly should be in the reverse state. · #100 still	1. Set the oscilloscope to the X-Y mode, and connect PREB assembly TP2-2 (TRKG error) to the oscilloscope's X-input (CH-1) and TP2-1 (TRKG sum) to the Y-input (CH-2). 2. Play the LD test disc and search frame #100. 3. OFF the TRKG servo. 4. While observing the Lissajous figure on the oscilloscope, insert the eccentric screwdriver into the centering adjustment hole for side B and adjust it so that the X-axis amplitude of the Lissajous figure becomes maximum.	 4. Centering adjustment for side B play.  4. X-axis of Lissajous figure maximum.

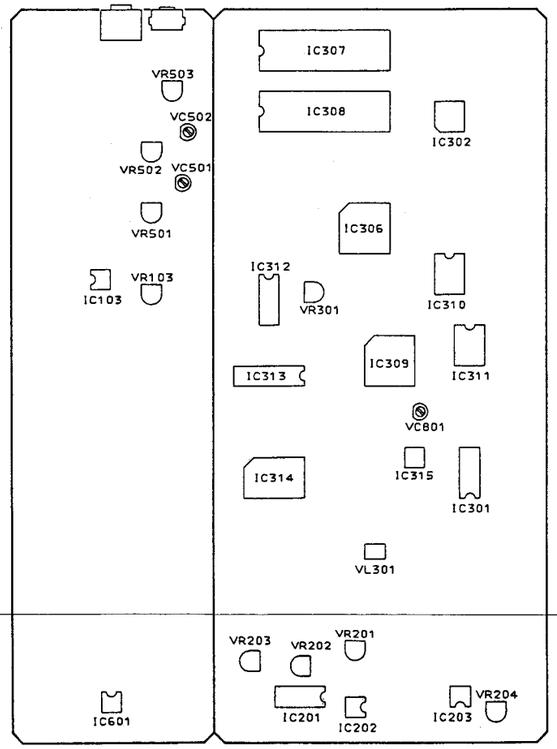
5.3 ELECTRICAL ADJUSTMENT

	Assembly Adjustment Name	Adjustment Point	Oscilloscope	Measurement Point	Player Condition	Adjustment Description	Waveform and connection diagram
1	Master clock adjustment	MEMORY ASSY(2/3) VC801	Frequency counter	MEMORY assembly (2/3) IC313 pin 15	Power ON	With the player's power ON, adjust VC801 so that IC313 pin 15 on the MEMORY assembly becomes 14.3181818MHz ±200Hz.	
2	VCO offset adjustment	MEMORY ASSY(1/3) VL301		MEMORY assembly (1/3) IC203 pin 1	LD disc playback	During LD disc playback, adjust VL301 so that IC203 pin 1's DC level becomes 0 ±100 mV.	0±100mV
3	Half H rejection adjustment	MEMORY ASSY(1/3) VR201	X : 2V/div Y : 10μsec/div	MEMORY assembly (1/3) IC201 pin 3	LD disc playback	During LD disc playback, adjust VR201 so that the pulse width of IC201 pin 3 becomes 52 ±2 μsec.	
4	Burst gate timing adjustment	MEMORY ASSY(1/3) VR203		MEMORY assembly (1/3) Q306 EMITTER IC201 pin 16	LD disc playback	During LD disc playback(SPDL Lock state : pin4 of IC201 is L), adjust VR203 so that the timing of IC 201 pin 16's pulse rising edge is the same as the timing of the first wave of Q306 Emitter video signal burst.	
5	Detection level adjustment	MAIN ASSY(2/3) VR101		COMP assembly IC202 pin 5 IC202 pin 6	Playback of #4,801 on LD test disc	During the playback of #4,801 on the LD test disc, adjust VR101 so that the voltage of IC202 pin 5 becomes pin 6's voltage of +218 mV ±20 mV.	Pin 5 voltage = Pin 6 voltage + 218 mV ±20 mV
6	Trapezoid inclination adjustment	MEMORY ASSY(1/3) VR202		MEMORY assembly (1/3) IC302 pin 1 IC201 pin 5	Memory WRITE PLL LOCK DC reset mode	While C279 is shorted, adjust VR202 so that the trailing point of IC201 pin 5 (PB−H) is in the center of IC302 pin 1's H section.	
7	PLL gain adjustment	MEMORY ASSY(1/3) VR204	10mV/div 5msec/div	Audio output terminals (L and R channels)	Cover the disc's center hole with cellophane tape to make the disc eccentric. Playback #2,701	· During the playback of #2,701 on an eccentric LD test disc, adjust VR204 to minimize the amplitude of the audio output terminal's waveform and to minimize the L and R level difference. · To make the LD DISC eccentric, cover the disc's center hole with cellophane tape.	
8	Video level adjustment	MAIN ASSY(2/3) VR102	20mV/div 10μsec/div	MAIN assembly(2/3) Q114 EMITTER	#19,801 still	During still playback of #19,801 on the LD test disc, refer to the video signal waveform and adjust VR102 so that the 100% white amplitude from the pedestal becomes 1.5 Vp−p ±5%.	
9	1H delay video level adjustment	MEMORY ASSY(3/3) VR103	CH1 : 20mV/div CH2 : 20mV/div 10μsec/div(Trigger)	MAIN assembly (2/3) IC101 pins 40 and 42	#19,801 still	During still playback of LD test disc frame #19,801, adjust VR103 to equalize the amplitude from the video signal sync tip to the white peak of IC101 pins 40 and 42.	
10	COMP output revel	MEMORY ASSY(3/3) VR502	20mV/div 10μsec/div(Trigger)	Video output terminal	#19,801 play 75Ω terminated	During still playback of #19,801 on the LD test disc refer to the VIDEO signal waveform at the VIDEO output terminal and adjust VR502 so that the white amplitude from the pedestal becomes 0.75Vp−p ±5% (75Ω terminated)	
11	Y output revel	MEMORY ASSY(3/3) VR501	20mV/div 10μsec/div(Trigger)	S video output terminal (Y output)	#19,801 still 75Ω terminated	During still playback of #19,801 on the LD test disc refer to the VIDEO signal waveform at S terminal output and adjust VR501 so that the white amplitude from the pedestal becomes 0.75Vp−p ±5% (75Ω terminated)	
12	C output level	MEMORY ASSY(3/3) VR503	20mV/div 10μsec/div(Trigger)	S video output terminal (C output)	#19,801 still	During still playback of #19,801 on the LD test disc refer to the VIDEO signal waveform at S terminal output and adjust VR503 so that the white amplitude from the pedestal becomes 0.75Vp−p ±5% (75Ω terminated)	

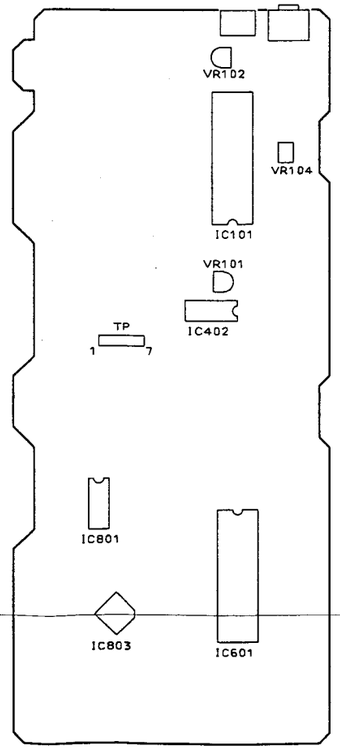
: Use all the Oscilloscope's probes at 10 : 1

	Assembly Adjustment Name	Adjustment Point	Oscilloscope	Measurement Point	Player Condition	Adjustment Description	Waveform and connection diagram
13	VPS error level adjustment	MAIN ASSY(2/3) VR104		Monitor screen	#7,201 still	During still playback (magenta screen) of LD test disc frame #7,201, adjust VR104 to minimize the color irregularity on the screen.	
14	140 nsec adjustment	MEMORY ASSY(1/3) VR301		MEMORY ASSY(2/3) IC311 pin 11 IC310 pin 7	#7,201 still	Look at the waveforms for IC311 pin 11 and IC310 pin 7 and adjust VR301 so that t2 in the diagram becomes 140 nsec ±5 nsec for IC311 pin 11's trailing edge.	
15	COMP freq. response adjustment	MEMORY ASSY(1/3) VC502	50mV/div	Video output terminal	#19,801 still	During still playback of LD test disc frame #19,801, terminate a video output terminal of two at 75 ohm. Look at the composite video signal on the oscilloscope and adjust VC502 so that the white level of the diagram right is 90 to 95 % (0.675 to 0.712Vp−p) within 100% white level.	
16	Y freq. response adjustment	MEMORY ASSY(3/3) VC501	50mV/div	S video output terminal (Y output)	#19,801 still	During still playback of LD test disc frame #19,801, terminate a S video output terminal of two at 75 ohm. Look at the composite video signal on the oscilloscope and adjust VC501 so that the white level of the diagram right is 90 to 95 % (0.675 to 0.712Vp−p) within 100% white level.	
17	Digtal audio output data adjustment	DOPB ASSY VR1		DOPB assembly foots of L4 and L5	CD(LDD)playback	Playback CD (LDD) disc. Connect L4 of DOPB to the CH−1 of the oscilloscope and L5 to the CH−2. (Connect further side foot of L4 and L5 from IC1.) Adjust VR1 so that the phase of CH−1 and CH−2 are identical when CH−2 set to invert mode.	

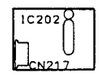
● ADJUSTMENT POINTS



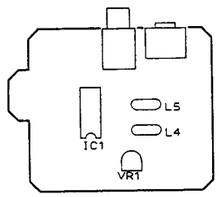
MEMORY ASS' Y



MAIN ASS' Y



COMP ASS' Y

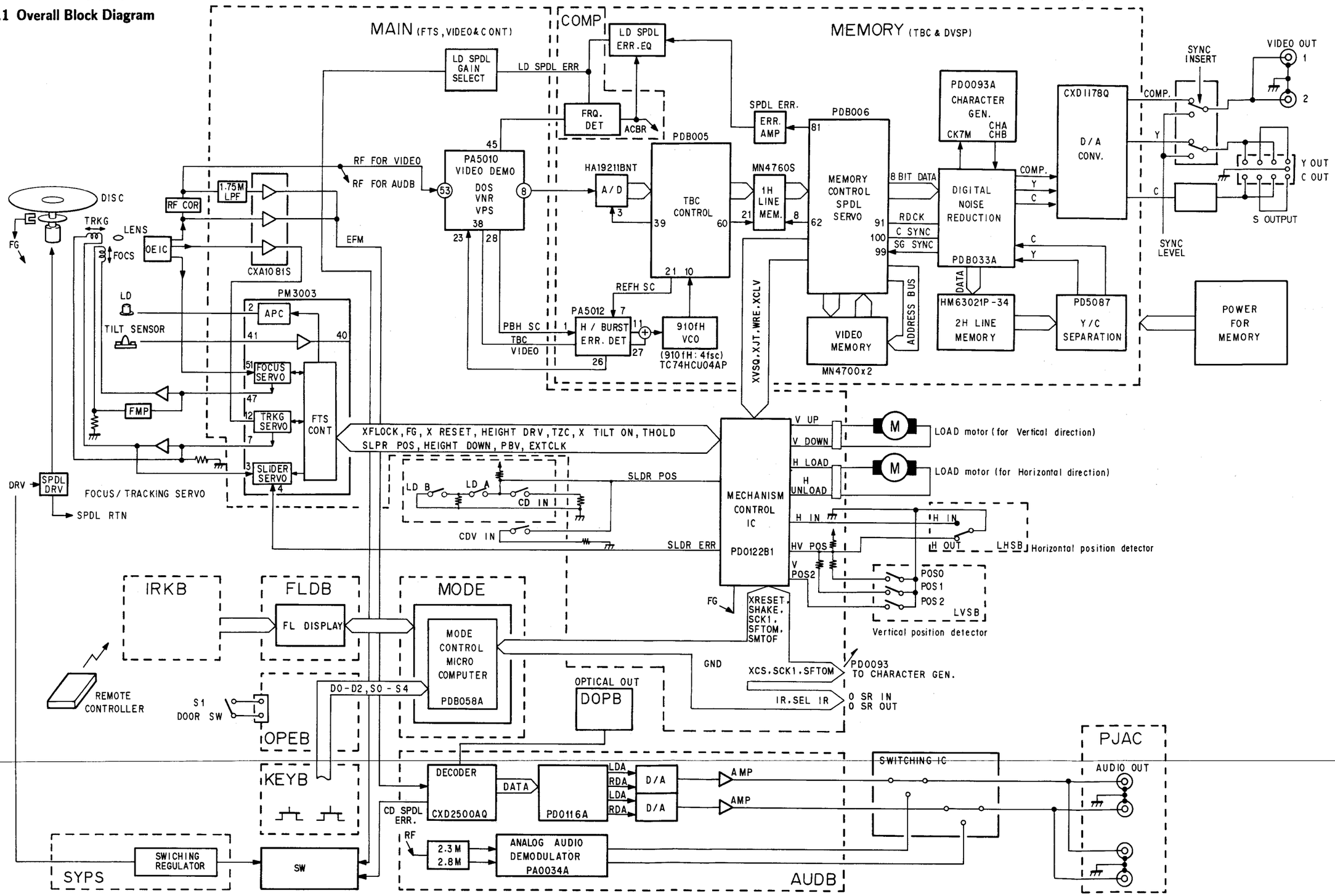


DOPB ASS' Y

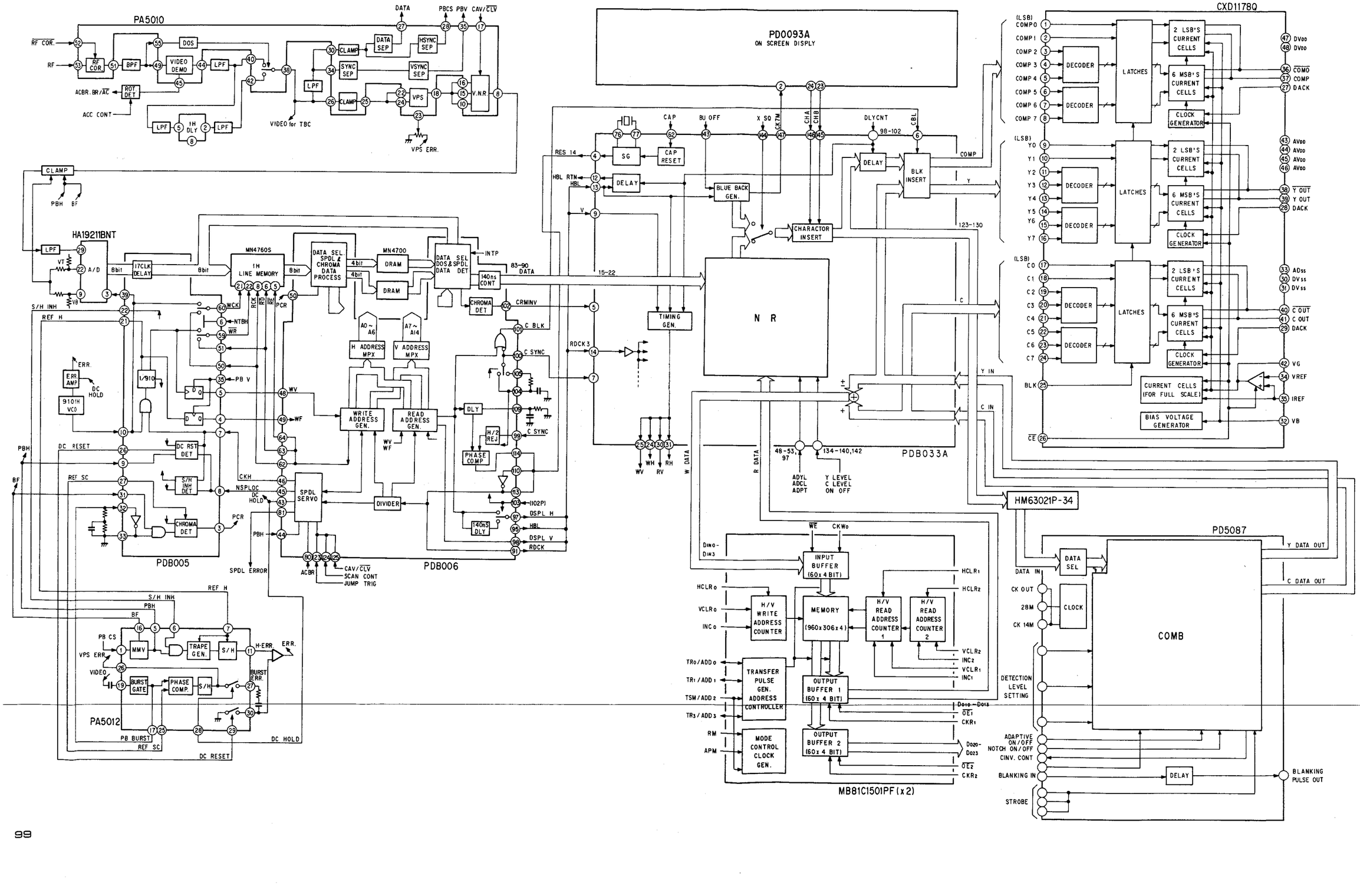
6. CIRCUIT DESCRIPTION

6.1 BLOCK DIAGRAM

6.1.1 Overall Block Diagram



6.1.2 Video Block Diagram



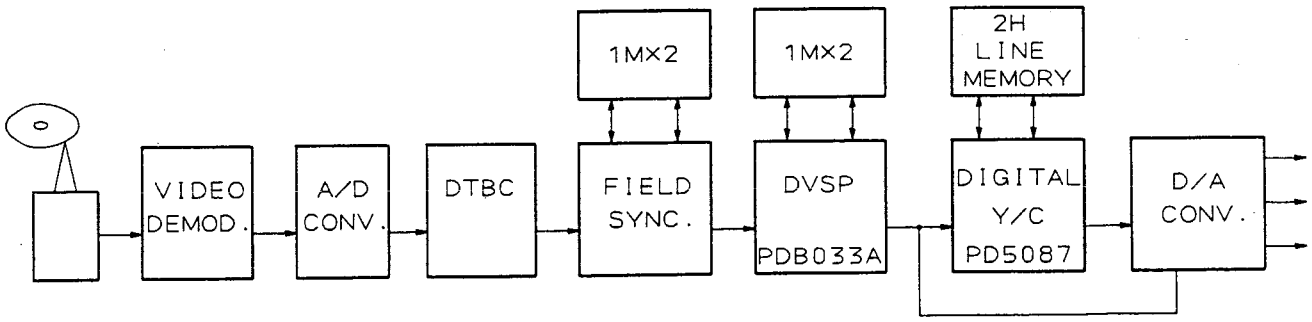
6.2 VIDEO NOISE REDUCTION SECTION

An advantage of digital processing of video signals is that an FIR filter can be used to obtain flat phase characteristics. And because S/N does not deteriorate even after processing several times, it is advantageous after A/D conversion of video signals with digital TBC to carry out processing as much as possible digitally and to lessen analog processing after D/A conversion to obtain better picture quality.

This unit employs the PDB033A as a high-quality field coefficient DVSP (Digital Video Signal Processor) in the last stage of the digital TBC system. This is directly connected to PD5087, a 3-line direct matrix digital Y/C separator IC. The DVSP acts as the core of this system. Because video signal processing as well as character displays is carried out digitally, it is possible to greatly reduce analog circuits. The D/A converter is a single chip 3 channel D/A converter which carries out D/A conversion of the Y and C signals as well as the composite signal. The analog circuits after D/A conversion are basically limited to the amplifier.

Description of the Video Noise Reduction Block Diagram

The 8 bits of video data output from pins 83 through 90 of PDB006 are input to the NR block via pins 15 through 22 of PD0093A. CHA and CHB from PD0093A cause the video data with characters to be output as YCCOMP data from pins 123 through 130 of PDB033A. This is input to the 2 H line memory and PD5087. A 1 H delay signal and 2 H delay signal are read from the 2 H line memory. These are both input to PD 5087 where 3-line correlated Y/C separation takes place.
The separated Y data and C data is input again to PDB033A where it is divided into two systems.
After the Y and C data is added, the data is input to MB81C1501PF (an 1 M DRAM) and written to the required address. The address of this DRAM is reset by WV and incremented one line at a time by WH. Reading of the data from the DRAM is done by incrementing the addresses in succession by RV and RH.
This is then input to the NR block.
Blanking is inserted in the Y data of the COMP data and the Y data of the Y/C data and these are both input to the D/A converter. The Y and COMP signals emerging from the D/A converter undergo sync-insert to complete processing.



Video Signal Processing Summary

6.3 DESCRIPTION OF PDB033A

6.3.1 Summary

PDB033A is an IC whose core is a noise reduction device for processing 8 bits of 4 fsc video data. It includes the following circuits :

1. SG circuit
2. Black back generation circuit
3. Character insertion circuit
4. Caption circuit

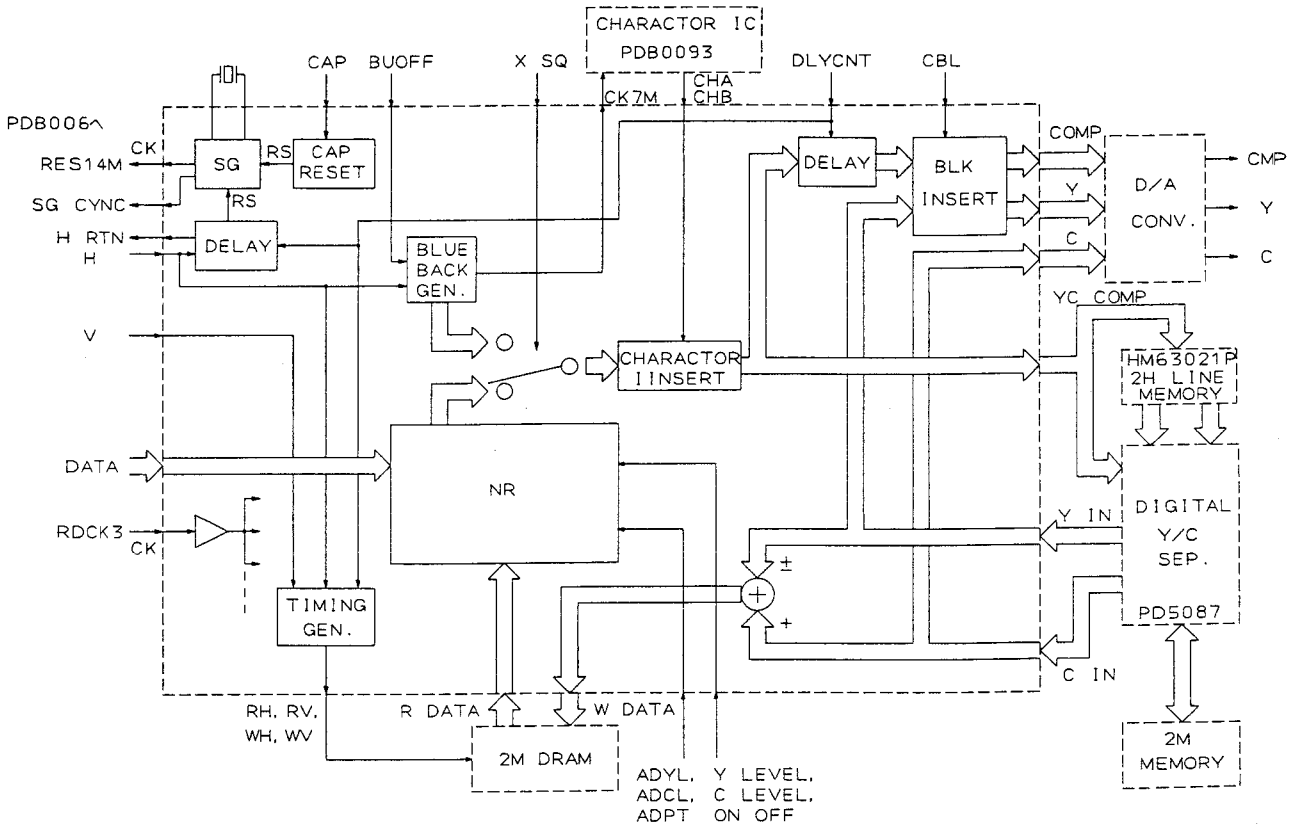
6.3.2 Functions

1) Digital Noise Reduction

It is possible with the Y signal and C signal to set independent reduction levels (limiter levels).

2) Sync-Insert

By inputting the CBL signal of PDB006, the pedestal level is inserted inside PDB033A as digital data during blanking.



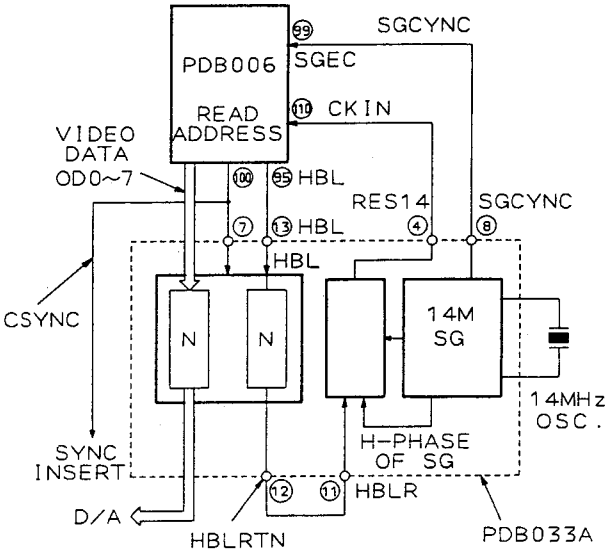
PDB033A block diagram

3) SG Circuit

With the original 14 M digital TBC the SG block was composed of a separately attached TC9015 and a sync-insert phase synchronizing circuit. With the PDB033A, this is included inside the IC. The 14 MHz oscillation circuit set on the SG block becomes the standard frequency for all blocks. The SGCYNC created by that block becomes the standard for reading of video data.

The SGCYNC operates the read address counter inside the PDB006.

An HBL indicating the position of the H-SYNC is output from this address counter and the output data from PDB006 is output synchronously with this. Because the output data undergoes N clock delay in the NR block, the HBL also undergoes delay for the same number of steps and is sent to the SG block. The RES 14 clock is stopped until the phase of H from HBLR and SGCYNC agree with each other. This controls the read address counter and matches the phase of C-SYNC of SG and the video data.



SG block

4) Black Back

For the black back screen, a counter reset with the HBL (13 pin) is used to set the pedestal, burst and luminance period. The 3.58 MHz reset with the HLS (10 pins) is used to change the setting value of the burst and luminance.

Black back data

5) Character Insert

Digital character insert is made possible by connecting the CHB and CHA outputs of PD0093A and PDB033A and supplying CK 7 Mϕ for the dot counter.

6) Clock Stop

With this unit, when "CD" and "FL & DISP are OFF", the unit goes to the CD Hi-Fi mode and the video clock goes off. This is done at memory substrate Q802 by shunting the oscillation circuit PDB033A. As a result, all the clocks of the reference 14 MHz (standard frequency system) go to a stop state.

7) Caption Reset

At PDB006, the field of the sync for insertion and the field of the video signal for reading are determined and output as WFMON and RFMON. If the sync and video field are different according to this information, PDB033A emits a field reversal command to the SG to constantly match the field of the synch and video signal.

This function operates when CAP is H. Caption decode is possible due to this function. (However, it can only be used for composite output.)

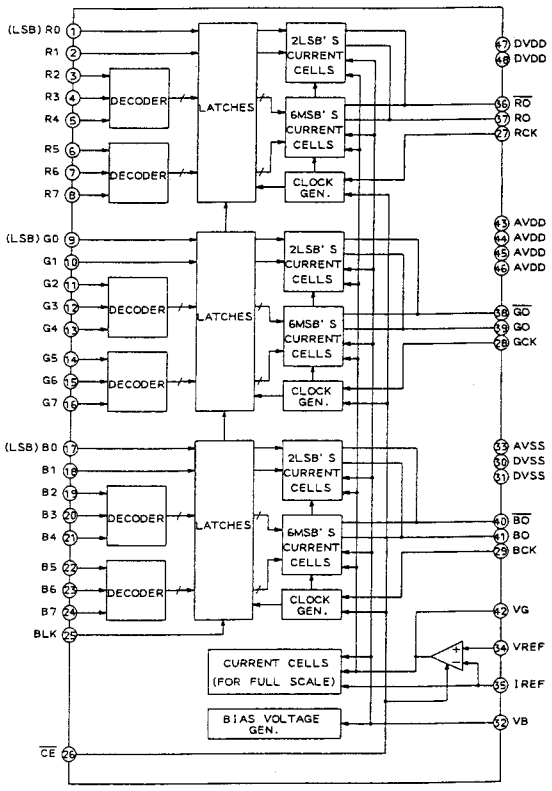
6.4 DESCRIPTION OF CXD1178Q

CXD1178Q is an 8-bit high-speed D/A converter for the video band. It includes input/output of 3 channels: Y,C and COMP.

It has the following features:

- 8-bit resolution
- Maximum conversion speed of 40 MSPS
- RBG (Y,C,COMP on this unit)
- 3-channel input/output
- 48 pin silicon gate CMOS

CXD1178Q block diagram



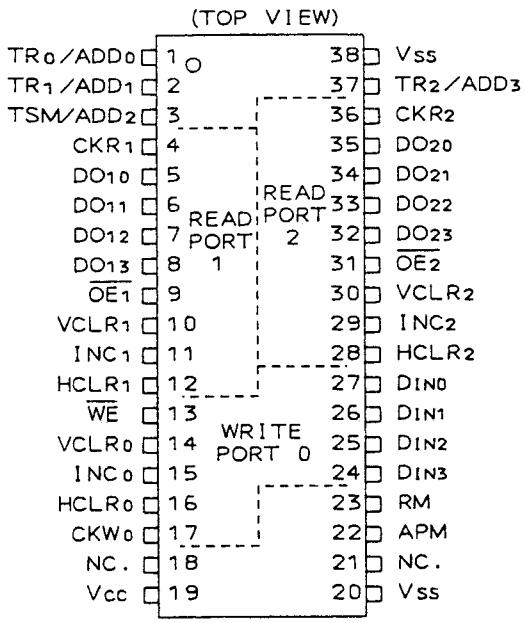
6.5 DESCRIPTION OF MB81C1501PF

The MB81C1501PF is a 3-port type 1 M bit field memory.

It has the following features:

- 293 x 760 word x 4 bits composition (serial write board)
- 293 x 760 word x 4 bits composition (serial read board)
- Silicon gate 3-layer CMOS

● Pin Assignment



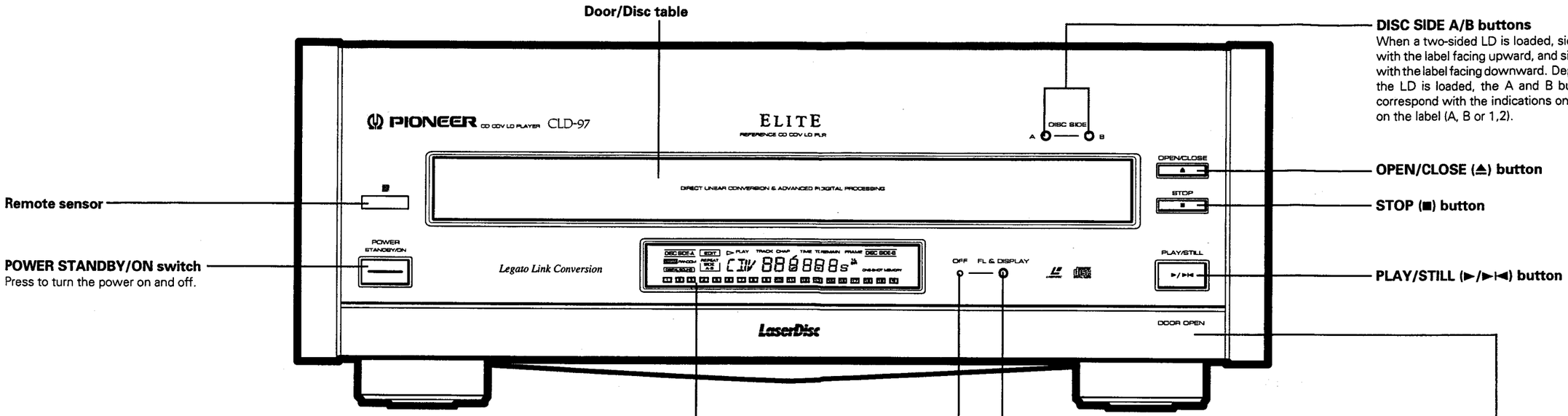
MB81C1501PF Pin assignment

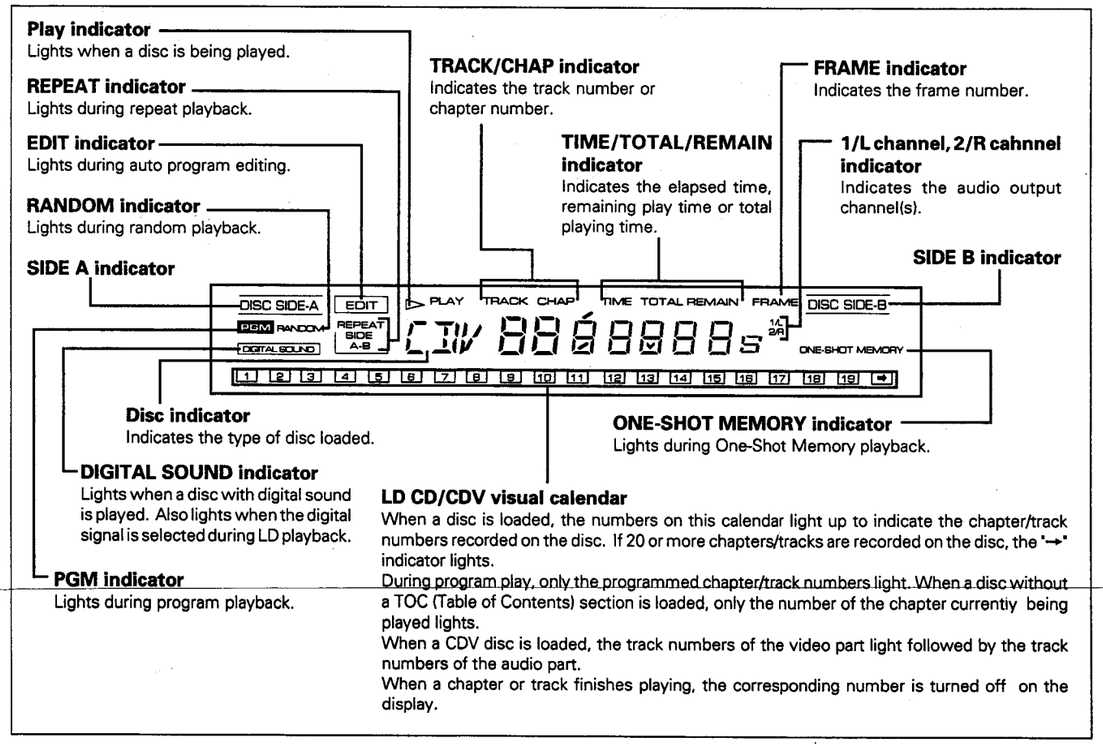
● Pin Function

Code	Pin Name	I/O
RM	Recursive mode enable	I
APM	Address preset mode enable	I
TSM	Transfer synchronous mode	I
TR 0	Write port 0 : Transfer synchronization signal	I/O
TR_1	Read port 1 : Transfer synchronization signal	I/O
TR_2	Read port 2 : Transfer synchronization signal	I/O
ADD_0 – ADD_2	Address input	I
CKW_0	Port 0 : Shift signal	I
$VCLR_0$	Port 0 : Vertical clear signal	I
$HCLR_0$	Port 0 : Horizontal clear signal	I
INC_0	Port 0 : Line increment signal	I
$\overline{WE}$	Port 0 : Write enable	I
D_{IN0} – D_{IN3}	Port 0 : Data input	I
CKR_1	Port 1 : Shift signal	I
$VCLR_1$	Port 1 : Vertical clear signal	I
$HCLR_1$	Port 1 : Horizontal clear signal	I
INC_1	Port 1 : Line increment signal	I
$\overline{OE_1}$	Port 1 : Output enable	I
D_{O10} – D_{O13}	Port 1 : Data output	O
CKR_2	Port 2 : Shift signal	I
$VCLR_2$	Port 2 : Vertical clear signal	I
HCLR 2	Port 2 : Horizontal clear signal	I
INC 2	Port 2 : Line increment signal	I
$\overline{OE_2}$	Port 2 : Output enable	I
D_{O10} – D_{O23}	Port 2 : Data output	O
V_{CC}	Power supply (+5 V)	
V_{SS}	Power supply (0 V)	
NC	No connection	

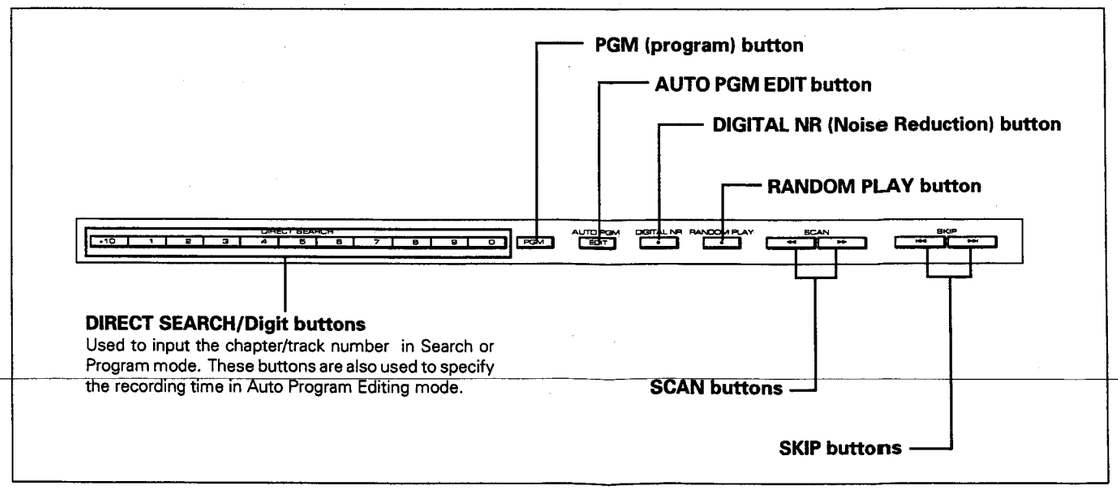
MB81C1501PF Pin function

7. PANEL FACILITIES





Control panel
The control panel can be opened by pushing on the section indicated by the "DOOR OPEN" label. To close the control panel, gently push the door in until it clicks.



8. SPECIFICATIONS

● CLD—97

1. General

System ..... LaserVision Disc system and Compact Disc digital audio system
Laser ..... Semiconductor laser wavelength 780 nm
Power requirements ..... AC 120 V, 60 Hz
Power consumption ..... 58 W
Weight ..... 17.0 kg (37 lbs 8 oz)
Dimensions ..... 459 (W) x 452 (D) x 174 (H) mm
18-1/16 (W) x 17-13/16 (D) x 6-7/8 (H) in
Operating temperature ..... +5°C ~ +35°C (41°F - 95°F)
Operating humidity ..... 5% ~ 85%
(There should be no condensation of moisture.)

2. Disc

LaserVision Discs

*Maximum playing times
12-inch standard play disc ..... 1 hour/both sides
12-inch extended play disc ..... 2 hours/both sides
8-inch standard play disc ..... 28 min/both sides
14 min/one side
8-inch extended play disc ..... 40 min/both sides
20 min/one side

Spindle motor speed
Standard play disc ..... 1,800 rpm
Extended play disc ..... 1,800 rpm (inner circumference) to 600 rpm (outer circumference)
(For a 12-inch disc)

Compact Discs

DISC ..... Diameter: 5-inch, 3-inch, Thickness: 1.2 mm
Rotation direction (pickup side) ..... Counterclockwise
Linear speed ..... 1.2 ~ 1.4m/sec
*Maximum playing time ..... 74 min. 5-inch discs
20 min. 3-inch discs
(For stereo playback)

Compact Discs with Video

Disc ..... Diameter: 5-inch, Thickness: 1.2 mm
Rotation direction (pickup side) ..... Counterclockwise
Linear speed ..... Audio portion: 1.2 ~ 1.4m/sec
Video portion: 11 ~ 12m/sec
*Maximum playing time ..... Video portion: 5 min. (CLV)
Audio portion: 20 min. (Digital)

** Actual playback time differs for each disc.*

3. Video characteristics

Format ..... NTSC specifications
Video output
Level ..... 1 Vp-p nominal, sync. negative, terminated
Impedance ..... 75Ω unbalanced
Jacks ..... Both RCA jacks

4. S-Video output

Y (luminance) - Output level ..... 1 Vp-p (75 Ω)
C (color) - Output level ..... 286 mVp-p (75 Ω)
Jacks ..... S-VIDEO jacks
Number of channels 2

5. Audio characteristics

Output level
During analog audio output ..... 200 mVrms (1 kHz, 40%)
During digital audio output ..... 200 mVrms (1 kHz, -20 dB)
Jacks ..... Both RCA jacks
Number of channels 2

Digital Audio Characteristics

Frequency response	4 Hz - 20 kHz
SN ratio	117 dB (EIAJ)
Dynamic range	99 dB (EIAJ)
Total harmonic distortion	0.0017% (EIAJ)
Wow and flutter	Limit of measurement (0.001% W.PEAK) or less (EIAJ)

6. Other Terminals

Control input/output ..... Both miniature jacks
Digital audio output ..... Optical digital jack and RCA jack (COAXIAL)

7. Accessories

Remote control unit (CU-CLD090) 1
"AAA" (IEC R03) dry cell batteries 2
Video cord 1
Audio cord 1
S-video cable 1
Operating instructions 1
Warranty card 1

● CLD—98

1. General

System ..... LaserVision Disc system and Compact Disc digital audio system
Laser ..... Semiconductor laser wavelength 780 nm
Power requirements ..... 110/120~127/220/240 V AC (switchable), 50/60 Hz
Power consumption ..... 58 W
Weight ..... 16.5 kg
Dimensions ..... 440 (W) x 452 (D) x 173 (H) mm
Operating temperature ..... +5°C ~ +35°C
Operating humidity ..... 5% ~ 85%
(There should be no condensation of moisture.)

2. Disc

LaserVision Discs

*Maximum playing times
30 cm standard play disc ..... 1 hour/both sides
30 cm extended play disc ..... 2 hours/both sides
20 cm standard play disc ..... 28 min/both sides
14 min/one side
20 cm extended play disc ..... 40 min/both sides
20 min/one side

Spindle motor speed
Standard play disc ..... 1,800 rpm
Extended play disc ..... 1,800 rpm (inner circumference) to 600 rpm (outer circumference)
(For a 12-inch disc)

Compact Discs

DISC ..... Diameter: 12 cm, 8 cm, Thickness: 1.2 mm
Rotation direction (pickup side) ..... Counterclockwise
Linear speed ..... 1.2 ~ 1.4m/sec
*Maximum playing time ..... 74 min. 5-inch discs
20 min. 3-inch discs
(For stereo playback)

Compact Discs with Video

Disc ..... Diameter: 12 cm, Thickness: 1.2 mm
Rotation direction (pickup side) ..... Counterclockwise
Linear speed ..... Audio portion: 1.2 ~ 1.4m/sec
Video portion: 11 ~ 12m/sec
*Maximum playing time ..... Video portion: 5 min. (CLV)
Audio portion: 20 min. (Digital)

** Actual playback time differs for each disc.*

3. Video characteristics

Format ..... NTSC specifications
Video output
Level ..... 1 Vp-p nominal, sync. negative, terminated
Impedance ..... 75Ω unbalanced
Jacks ..... Both RCA jacks

4. S-Video output

Y (luminance) - Output level ..... 1 Vp-p (75 Ω)
C (color) - Output level ..... 286 mVp-p (75 Ω)
Jacks ..... Both S-VIDEO jacks
Number of channels 2

5. Audio characteristics

Output level
During analog audio output ..... 200 mVrms (1 kHz, 40%)
During digital audio output ..... 200 mVrms (1 kHz, -20 dB)
Jacks ..... Both RCA jacks
Number of channels 2

Digital Audio Characteristics

Frequency response	4 Hz - 20 kHz
SN ratio	117 dB (EIAJ)
Dynamic range	99 dB (EIAJ)
Total harmonic distortion	0.0017% (EIAJ)
Wow and flutter	Limit of measurement (0.001% W.PEAK) or less (EIAJ)

6. Other Terminals

Control input/output ..... Both miniature jacks
Digital audio output ..... Optical digital jack and RCA jack (COAXIAL)

7. Accessories

Remote control unit (CU-CLD062) 1
"AAA" (IEC R03) dry cell batteries 2
S-video cable 1
Video cord 1
Audio cord 1
Operating instructions 1
Warranty card 1