

ONKYO SERVICE MANUAL**CD CDV LD
COMPATIBLE PLAYER
MODEL DX-V500****SAFETY-RELATED COMPONENT WARNING!!**

COMPONENTS IDENTIFIED BY MARK Δ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

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SPECIFICATIONS

General

System	LaserVision Disc system and Compact Disc digital audio system
Laser	Semiconductor laser wavelength 780 nm
Power requirement	AC 120/220 V, 50/60 Hz (automatic select)
Power consumption	37 W
Weight	7.7 kg
Dimensions	455 (W) x 407 (D) x 138 (H) mm
Operating temperature	+5°C ~ +35°C
Operating humidity	5% ~ 85%
(There should be no condensation of moisture.)	

Video characteristics (2 pairs)

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

S VIDEO output (2 pairs)

Y output level	1 Vp-p (75Ω)
C output level	286 mVp-p (75Ω)
Jacks	S VIDEO jacks

Audio characteristics (2 pairs)

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 (Stereo)

Digital Audio Characteristics

Frequency response	4 Hz - 20 kHz
SN ratio	115 dB (EIAJ)
Dynamic range	96 dB (EIAJ)
Total harmonic distortion	Below 0.0035%
Wow and flutter	Below measurable limit (± 0.001% W.PEAK) (EIAJ)

LD is in compliance with EIAJ.

Other terminals

Optical digital output	Optical digital jack
AC-3 RF OUT	RCA jack

Accessories

Remote control unit	1
Size "AAA" (IEC R03) dry cell batteries	2
Video cord	1
Audio cord	1
Power source plug adapter	1
Power cord	1
Instruction manual	1

NOTE :

The specifications and design of this product are subject to change without notice, due to improvement.

2. EXPLODED VIEWS, PACKING AND PARTS LIST

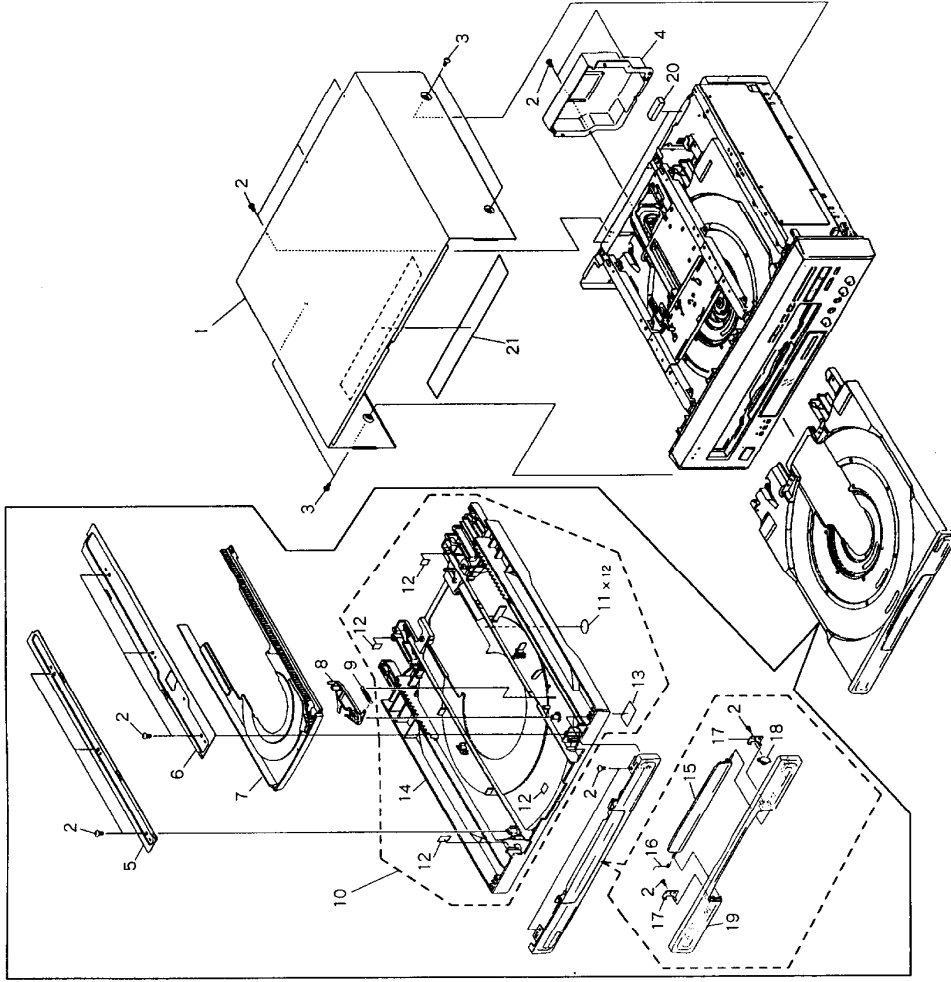
NOTES:

- 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 factory 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 EXTERIOR AND DISC TRAY SECTION

Parts List

Mark	No.	Description	Part No.	Mark	No.	Description	Part No.
NSP	1	Cover	28184611		11	Cushion	VEC1682
	2	Screw	BBZ30P080FMC		12	Damp cushion	VEC1683
	3	Screw	BCZ40P060FZK	NSP	13	Label	VRW1289
	4	Rear cover	VNK3504		14	LD tray ass'y	VXA2173
	5	Guide plate (R)	VNE1939	NSP	15	Door (CD) ass'y	28148328
	6	Guide plate (L)	VNE1983		16	Door spring	VBH1248
	7	CD tray	VNK3007		17	Door holder	VNE1967
	8	Lock plate	VNE1703		18	Damper ass'y	VXA1999
	9	Lock plate spring	VBH1188	NSP	19	Door (LD)	28148319
	10	Tray ass'y-S	VXX2307		20	Cushion	VEC1832
				NSP	21	Cushion	28140837

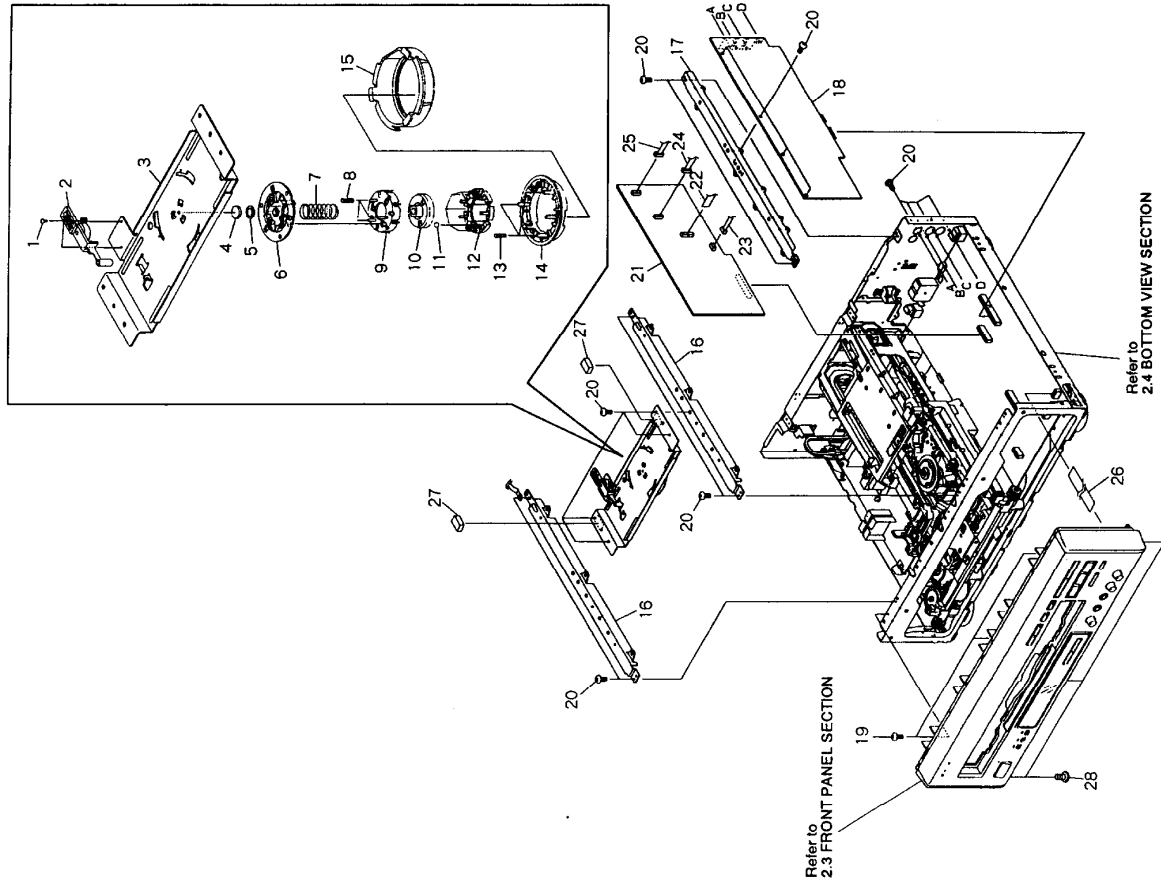


NOTE: Screws adjacent to ▼ mark on the product are used for disassembly.

2.2 TOP VIEW SECTION

Parts List

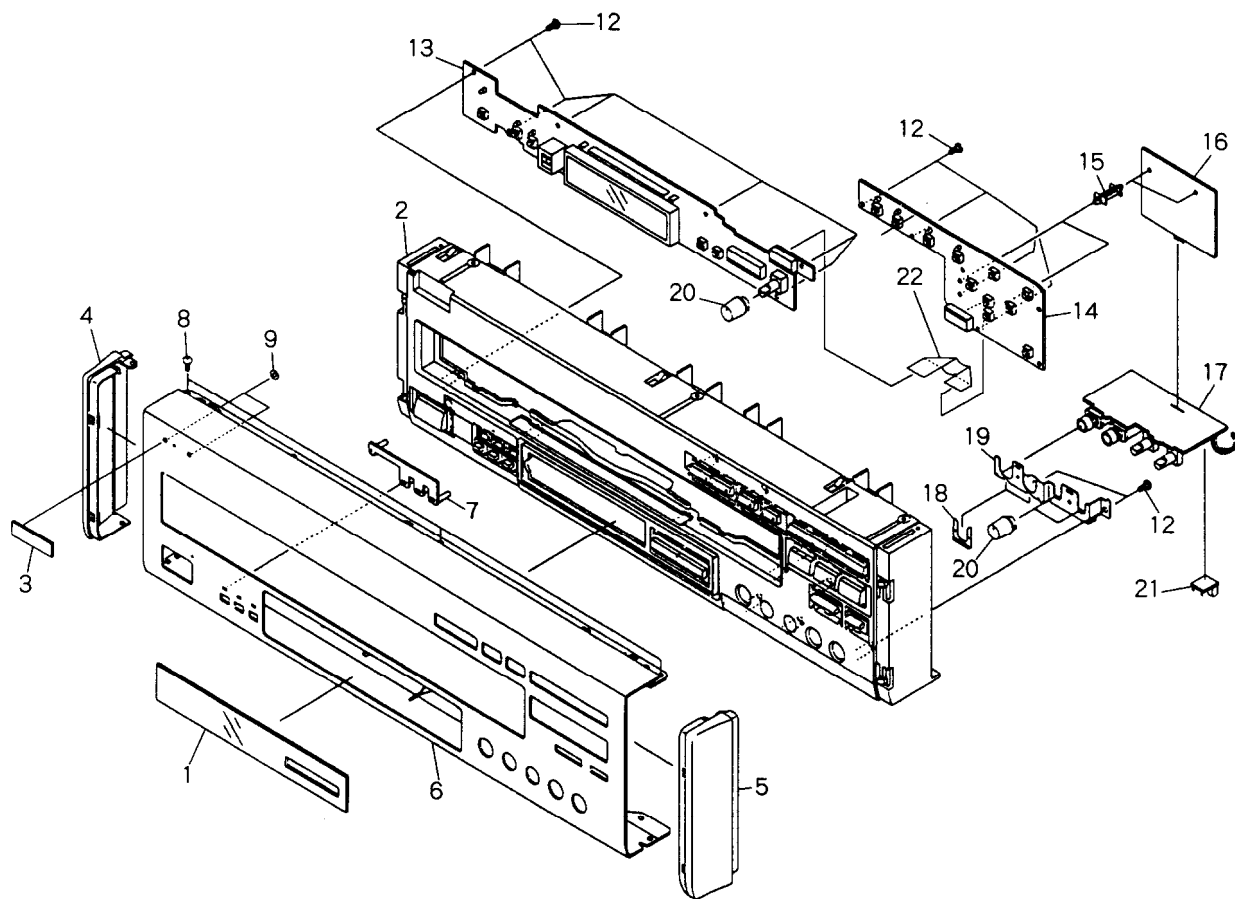
Mark No.	Description	Part No.	Mark No.	Description	Part No.
1	Screw	BPZ20P060FMC	16	Center bracket	VNE1965
2	D lever ass'y	VXA2205	17	PCB holder	VNE1964
3	Center plate	VNE1971	18	MYCB ass'y	VWV1412
4	Rubber mat	VEB1114	19	Screw	IBZ30P080FMC
5	Thrust holder	VNL1663	20	Screw	BEZ30P080FMC
6	Clamper head	VNL1603	21	BBKB ass'y	VWG1605
7	LD spring	VBH1240	22	Flat cable (4P)	D20PDY0430E
8	Cover spring	VBH1234	23	Connector	PF02PP-C15
9	Ball cover	VNL1602	24	Connector	PF03EE-C10
10	LD hab	VNT1047	25	Connector	PF03PP6C10
11	Ball	VNX1013	26	Flexible cable (7P)	VDA1468
12	Ball guide	VNL1616	27	Damp cushion	VEC1602
13	Clamper spring	VBH1239	28	Screw	BET30P100FZK
14	Clamper	VNL1604			
15	Clamper holder	VNL1680			



2.3 FRONT PANEL SECTION

Parts List

Mark	No.	Description	Part No.	Mark	No.	Description	Part No.
NSP	1	Clear PLT	28191722Y	NSP	16	ECOB assy	VWV1409
NSP	2	F bracket AS	27110887	NSP	17	MJBA assy	VWV1406
NSP	3	Badge	28135199Y	NSP	18	Snap plate	VNE1102
NSP	4	End cap (L)	28125291	NSP	19	Jack holder	VNE1966
NSP	5	End cap (R)	28125292	NSP	20	VR knob	VNK3558
NSP	6	F panel	27211737	NSP	21	Mini clamp	VEC1312
NSP	7	Facet (4)	28198824	NSP	22	Flexible cable 13P	VDA1496
	8	Screw	BBT30P100FZK				
	9	CS stopper	Z39-205				
	10	.....				
	11	.....				
	12	Screw	BBZ30P080FMC				
	13	FLKY assy	VWG1600				
NSP	14	KEYB assy	VWG1717				
NSP	15	Double locking spacer	VEC1742				



2.4 BOTTOM VIEW SECTION

Parts List			Part No.	Mark	No.	Description	Part No.
			VWS1212		16	Spacer	RBE1171
			BBZ30P080FMC		17	Flexible cable (21P)	VDA1465
	1	MOTHER ass'y	VWR1268		18	Flexible cable (22P)	VDA1486
	2	Screw	VKP2116	NSP	19	Panel holder	VNA1507
!	3	SYPS ass'y			20	Screw	BBZ30P100FMC
	4	AC inlet ass'y					
	5	. . . . .	VNL1657	NSP	21	Mechanism ass'y	VWT1128
			VNA1663		22	. . . . .
	6	Tray stopper	PNY-405		23	. . . . .
	7	Rear panel (R)	VEC-269		24	. . . . .
NSP	8	P plate holder	VEC1174	NSP	25	Rubber spacer	VEB1252
NSP	9	PC support					
NSP	10	PCB hinge	VEC1181		26	Screw	BCZ40P060FZK
			DXA1490	NSP	27	Bracket (side)	27130755
NSP	11	Wire clip (H)	VEC1708				
	12	Insulator ass'y	VNA1564				
	13	Card spacer A	VNA1662				
NSP	14	Chassis					
	15	Rear panel (L)					

A

A

B

B

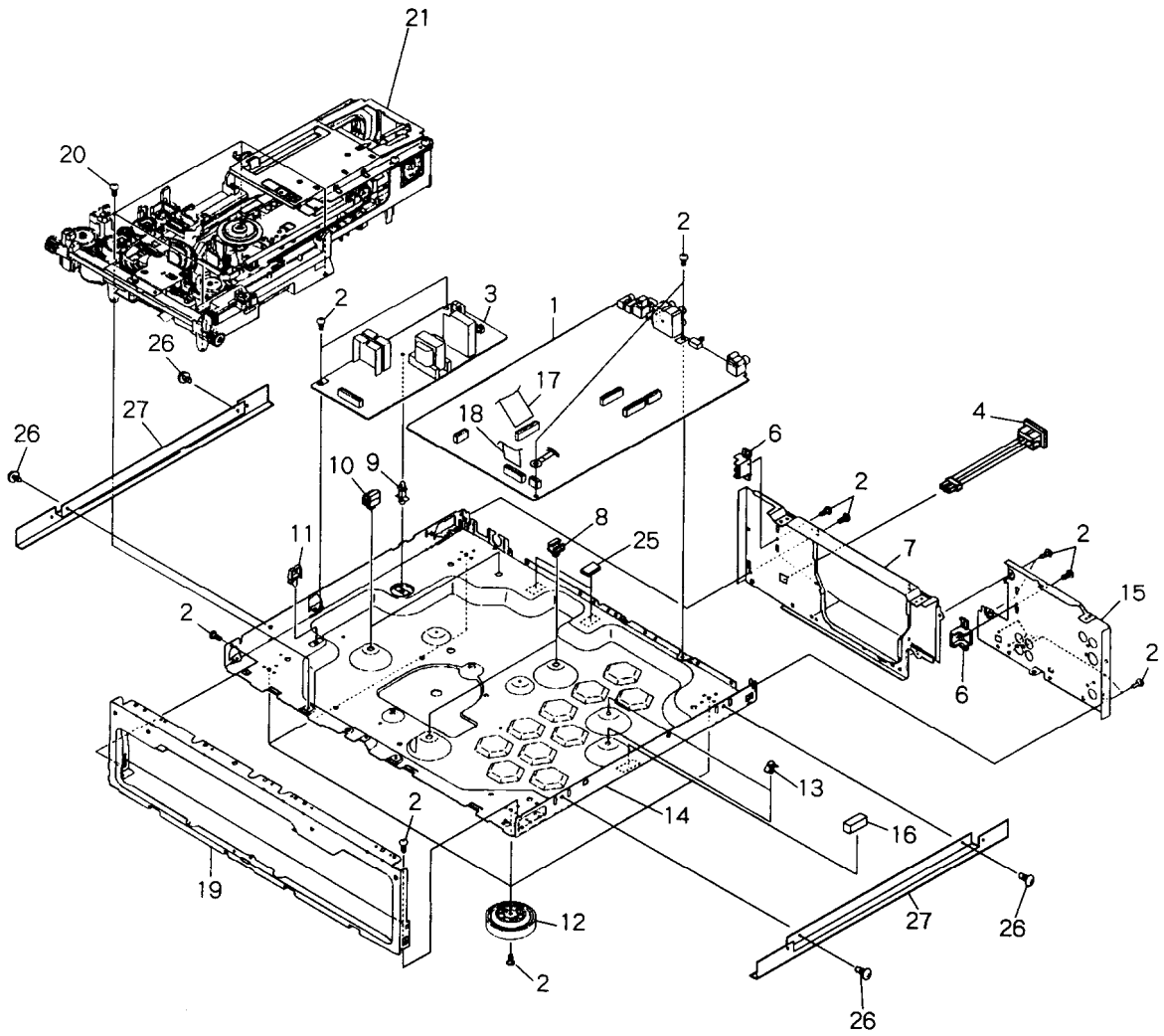
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D

D

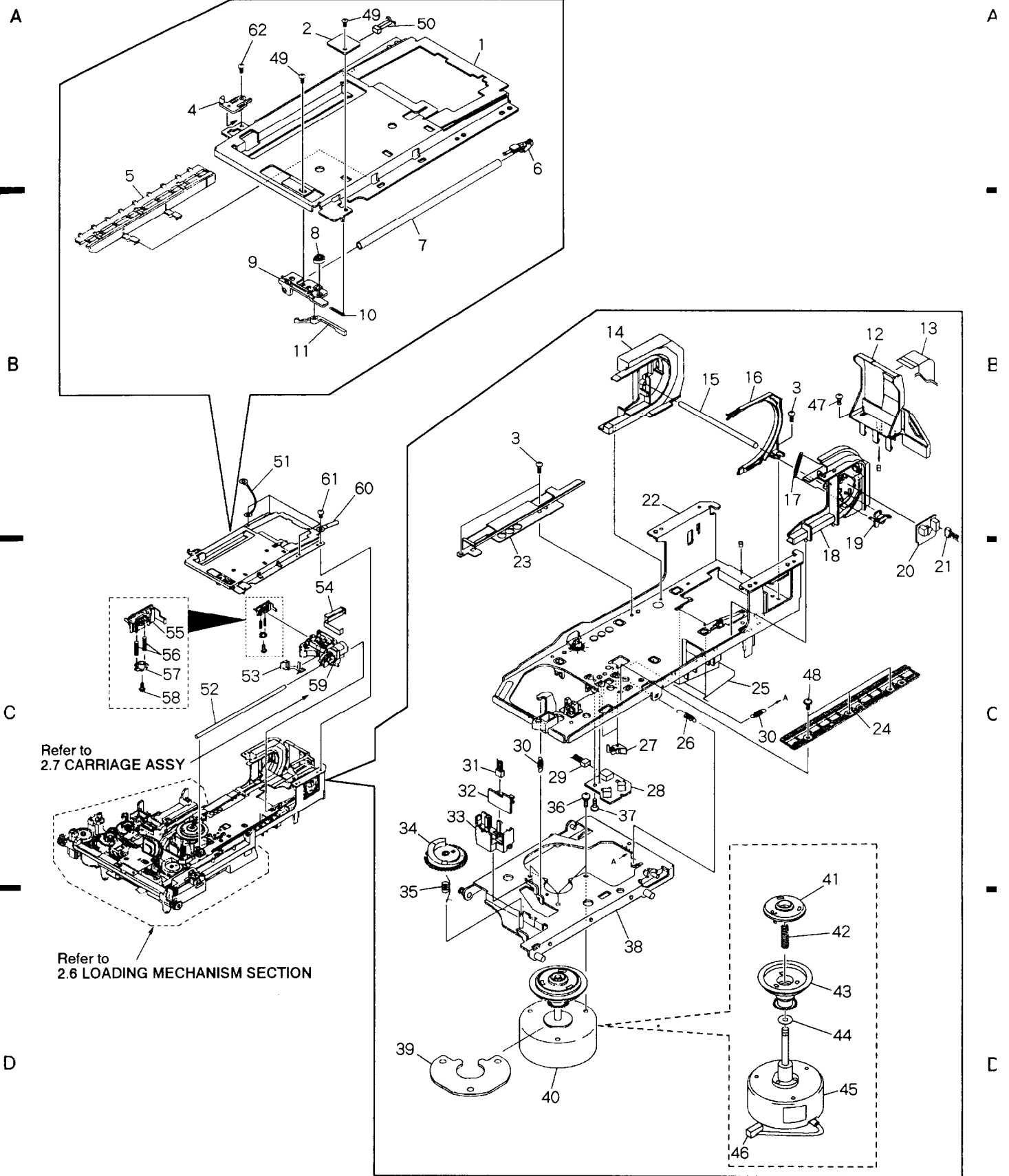
Refer to
2.5 SERVO MECHANISM SECTION



2.5 SERVO MECHANISM SECTION

Parts List

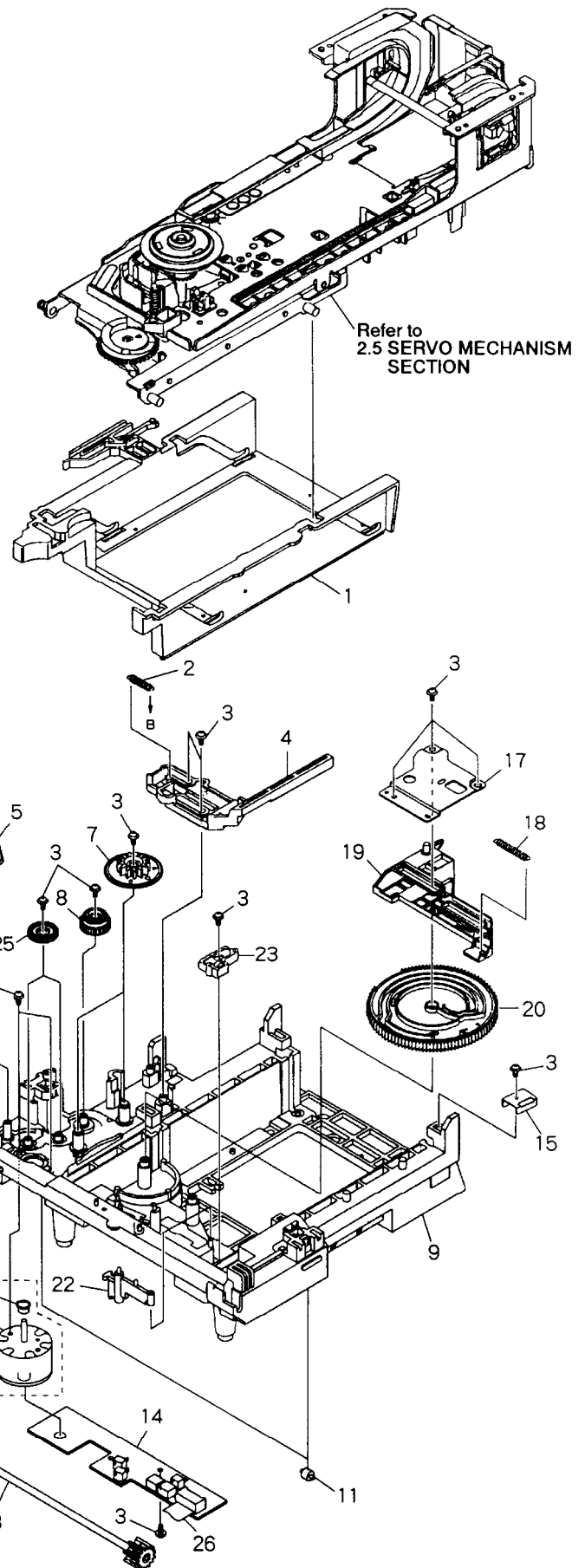
Mark	No.	Description	Part No.	Mark	No.	Description	Part No.
	1	Tilt base (upper)	VNE1969		31	Housing ass'y (3P)	VKP2046
NSP	2	BISB ass'y	VWG1558	NSP	32	FG ass'y	VWG1556
	3	Screw	BBZ30P060FMC		33	FG base	VNL1645
	4	A horn	VNL1689		34	Tilt cam	VNL1643
	5	Rack (upper)	VNL1679		35	Tilt cam spring	VBH1243
	6	Shaft stay	VNL1671		36	Screw	PMA30P070FMC
	7	Carriage shaft (upper)	VLL1478		37	Screw	IBZ26P120FMC
	8	B cam	VNL1673		38	Motor base	VNE1975
	9	Shaft support	VNL1672		39	Motor spacer	VNE2007
	10	Support spring	VBH1265		40	Spindle motor ass'y	VXA2208
	11	SW lever (B)	VNL1678		41	PRC hub	VNL1684
	12	Large hill	VNL1682		42	Centering spring	VBH1269
	13	Flexible cable (23P)	VDA1528	NSP	43	R turntable ass'y	VXA2225
	14	Turn guide	VNL1701	NSP	44	Oil stopper	VBH1002
	15	FFC style shaft	VLL1474	NSP	45	Spindle motor	VXM1061
	16	Guide	VNL1674		46	Housing ass'y (2P)	VKP2099
	17	Lever spring	VBH1266		47	Screw	BBZ30P060FMC
	18	Turn gear	VNL1702		48	Screw	IBZ26P060FMC
	19	SW lever (T)	VNL1695		49	Screw	BPZ20P040FZK
NSP	20	TNSB ass'y	VWG1557		50	Housing ass'y (2P)	VKP2060
	21	Housing ass'y(3P)	VKP2059	NSP	51	Earth lead unit	VDA1494
	22	Tilt base (under)	VNL1670		52	Carriage shaft (under)	VLL1458
	23	TAN guide	VNE1973		53	Body guard	VNL1681
	24	CA rack	VNL1674		54	FFC holder	VNL1706
	25	FFC style spring	VBH1270		55	CA guide	VNL1668
	26	Thrust spring	VBH1245		56	TAN spring (B)	VBH1264
	27	CA-SW lever	VNL1644		57	Tan lever (B)	VNL1669
NSP	28	PKSB ass'y	VWG1555		58	Screw	PMZ20P060FZK
	29	Housing ass'y (3P)	VKP2045		59	Carriage ass'y	VWT1110
	30	Tilt spring	VBH1263	NSP	60	Cord binder	BCZ-069Z
					61	Screw	BBZ30P080FMC
					62	Screw	BBZ26P060FMC



2.6 LOADING MECHANISM SECTION

Parts List

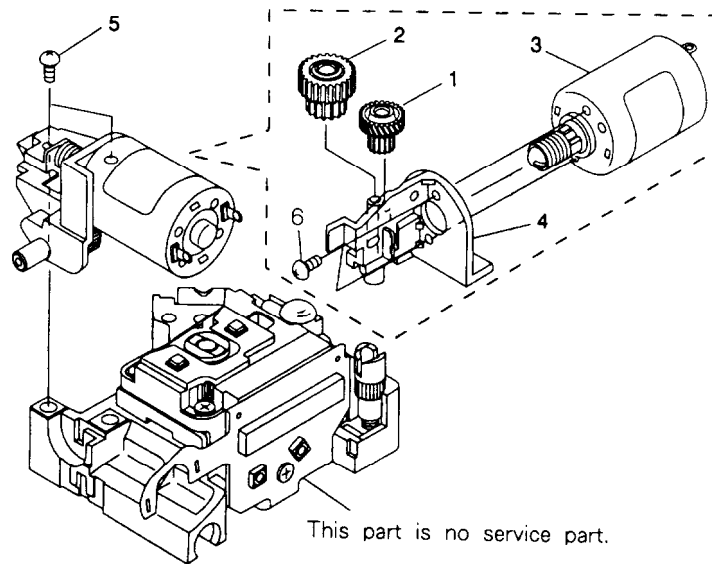
Mark	No.	Description	Part No.
	1	Clamp cam	VNL1633
	2	CDP spring	VBH1191
	3	Screw	Z39-019
	4	CD plate	VNL1685
	5	Rubber belt	VEB1184
	6	Gear pulley	VNL1662
	7	Twin gear	VNL1626
	8	Center gear	VNL1660
	9	Mechanism base	VNK3239
	10	Screw	BMZ26P040FMC
	11	Roller	VNL1042
NSP	12	Motor pulley	VNL1630
	13	Synchro gear assy	VXA2105
NSP	14	LMSB assy	VWG1612
	15	Cam holder	VNE2032
NSP	16	Carriage motor	VXM1033
	17	Shaft holder	VNE1942
	18	CAS spring	VBH1190
	19	Cam plate	VNL1631
	20	Cam gear	VNL1625
	21	Loading motor assy	VXX2045
	22	MB-SW lever	VNL1664
	23	Slider (R)	VNL1666
	24	Slider (L)	VNL1665
	25	Double gear	VNL1661
	26	Flexible cable (12P)	VDA1485



2.7 CARRIAGE ASSY

Parts List

Mark	No.	Description	Part No.
	1	CA gear (A)	VNL1638
	2	CA gear (B)	VNL1639
	3	Slider motor assy	VXX2082
	4	M holder	VNL1700
	5	Screw	PBZ20P060FMC
	6	Screw	PMZ20P030FMC



B

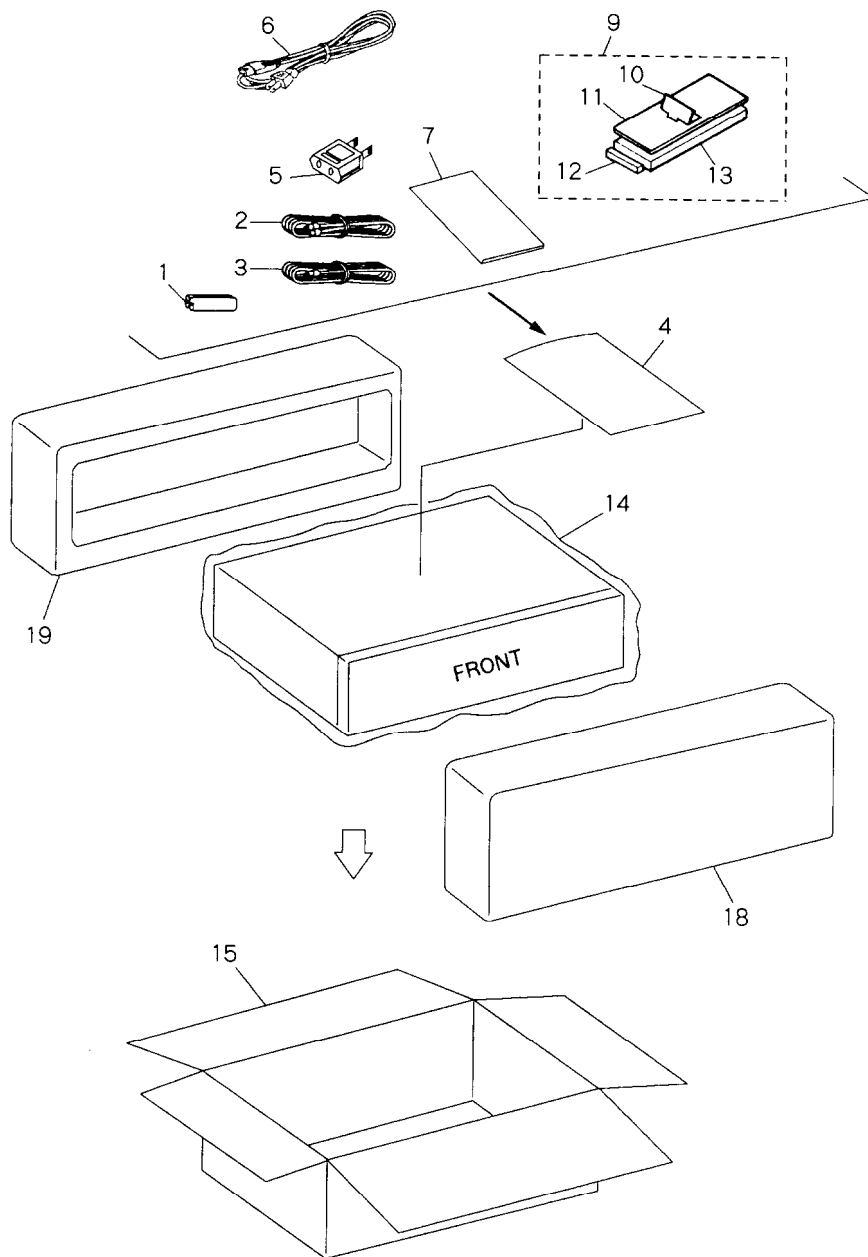
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D

2.8 PACKING

Parts List

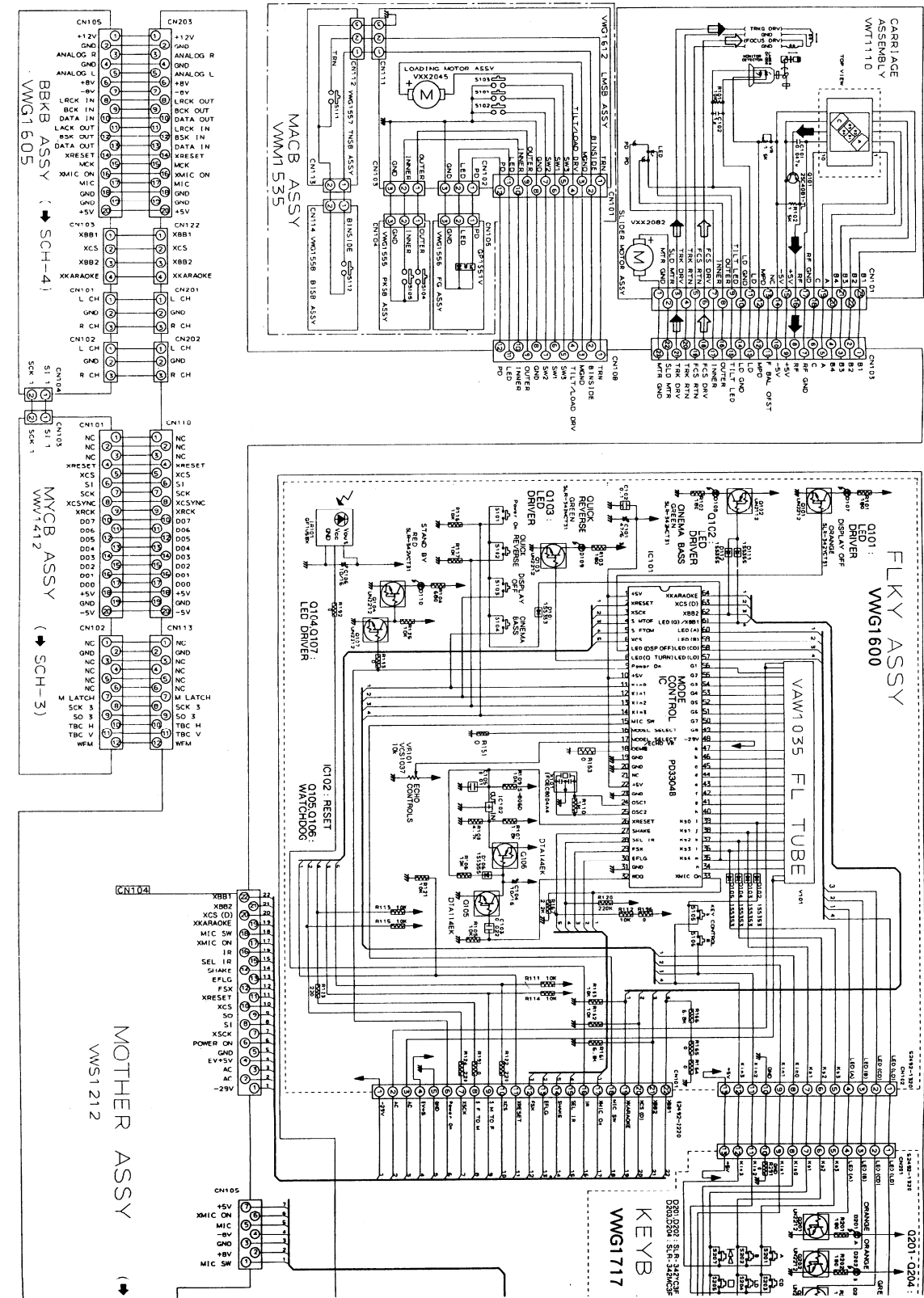
Mark	No.	Description	Part No.	Mark	No.	Description	Part No.
	1	Battery (R03,AAA)	VEM-022		11	Case(below)	VNK2062
	2	Video cord	DDE1090		12	Filter	VNK2063
	3	Audio cord	DDE1089		13	Case (upper)	VNK3559
	4	Poly bag	29100097-1Y		14	Protection sheet	VHL1012
	5	Plug adaptor	VKX1007		15	Packing case	VHG1517
	6	AC power cord	DDG1065		16	. . . . .
	7	Instruction manual	VRE1043		17	. . . . .
	8	. . . . .			18	Pad (F)	VHA1173
	9	Remote control unit	VXX2391		19	Pad (R)	VHA1174
	10	Battery cover	DNK2286				

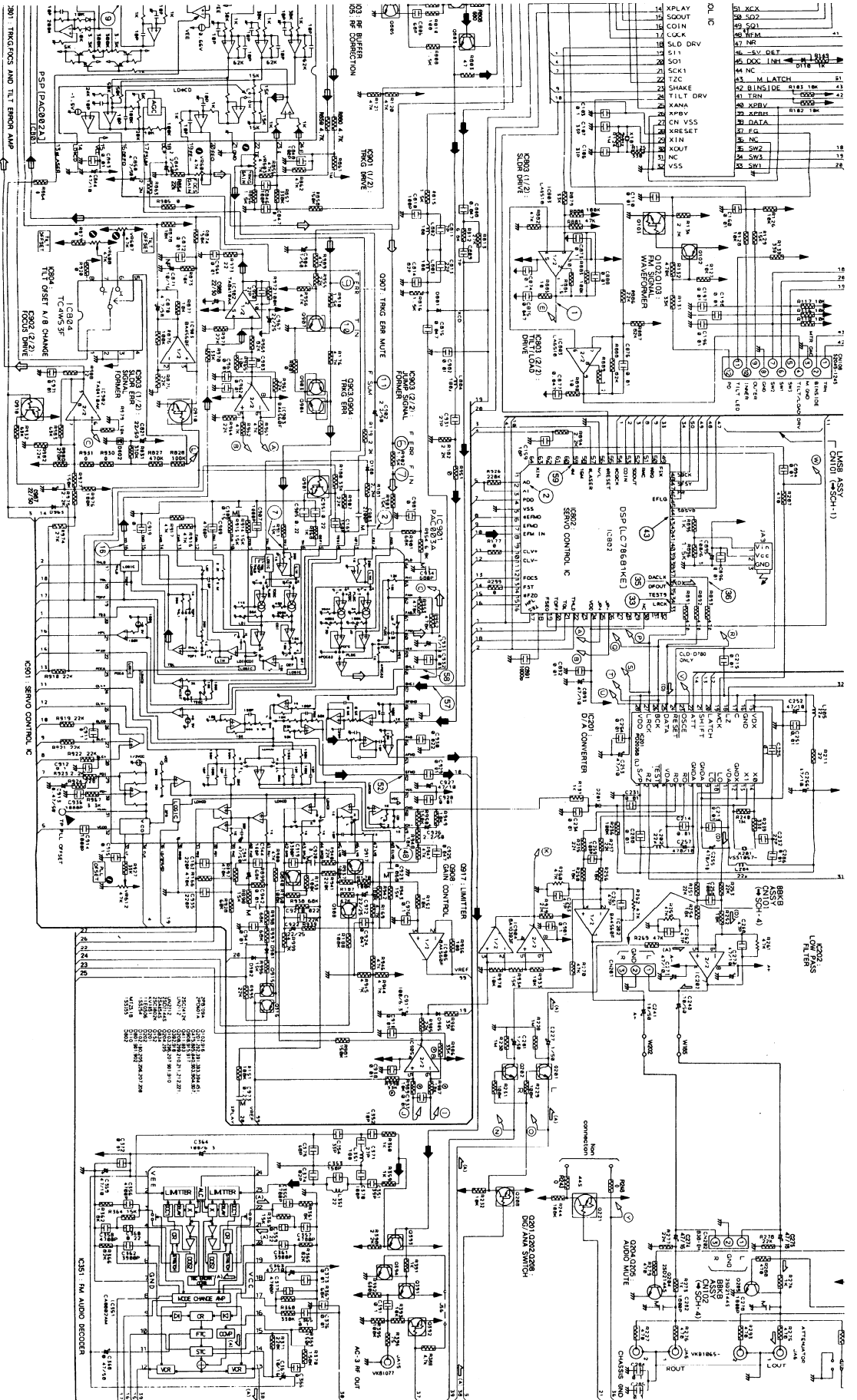


3. SCHEMATIC AND PCB CONNECTION DIAGRAMS

3.1 OVERALL CONNECTIONS, KEYB, FLKY, ECOB, MJBA, SYPS, PKSB, FG, TNSB, BISB AND LMSB ASSEMBLIES

- NOTE FOR SCHEMATIC DIAGRAMS** (Type 4A)
 1. When ordering service parts, be sure to refer to "PARTS LIST OF EXPLODED VIEWS" or "PCB PARTS LIST".
 2. Shown there are basic electrical series parts of them or the values of some components may be changed for improvement.
 3. RESISTORS:
 Unit: kΩ, MΩ, Ω unless otherwise noted.
 Rated power: 1/4W, 1/8W, 1/10W unless otherwise noted.
 Tolerance: ±1%, (Ω) ±2%, (k) ±2%, (M) ±2%, 20% or ±5% unless otherwise noted.
 4. CAPACITORS:
 Unit: pF, μF unless otherwise noted.
 Rated capacitor (μF) voltage (V) unless otherwise noted.
 Rated voltage: 50V except for electrolytic capacitor.
 5. COILS:
 Unit: milli or μH unless otherwise noted.
 6. VOLTAGE AND CURRENT:
 or mV or mA unless otherwise noted.
 DC current in PLAY mode unless otherwise noted.
 Value in () is DC current in STOP mode.
 7. OTHERS:
 ● or ○ : Adjusting point.
 ▲ : Measurement point.
 △ : Mark found on some component parts indicates the impedance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
 8. SCH - ON THE SCHEMATIC DIAGRAM:
 ● SCH - □ indicates the drawing number of the schematic diagram. (SCH status for schematic diagram).
 9. SWITCHES (underline indicates switch position):
 FLKY ASSY
 S101 : POWER ON/OFF/ANDBY
 S102 : QUICK TURN
 S103 : DISPLAY OFF
 S104 : THEATER BASS
 S105 : ♪
 S206 : ♪
 S207 : ♪
 S208 : ♪
 S209 : ♪
 S210 : ♪
 S211 : ONE TOUCH/KARAOKE
 LMSB ASSY
 S101 : SW1
 S102 : SW2
 S103 : SW3
 PKSB ASSY
 S104 : OUTER
 S105 : INNER
 TNSB ASSY
 S111 : THUN
 BISB ASSY
 S112 : B INSIDE





MOTHER ASSY

SCH-2

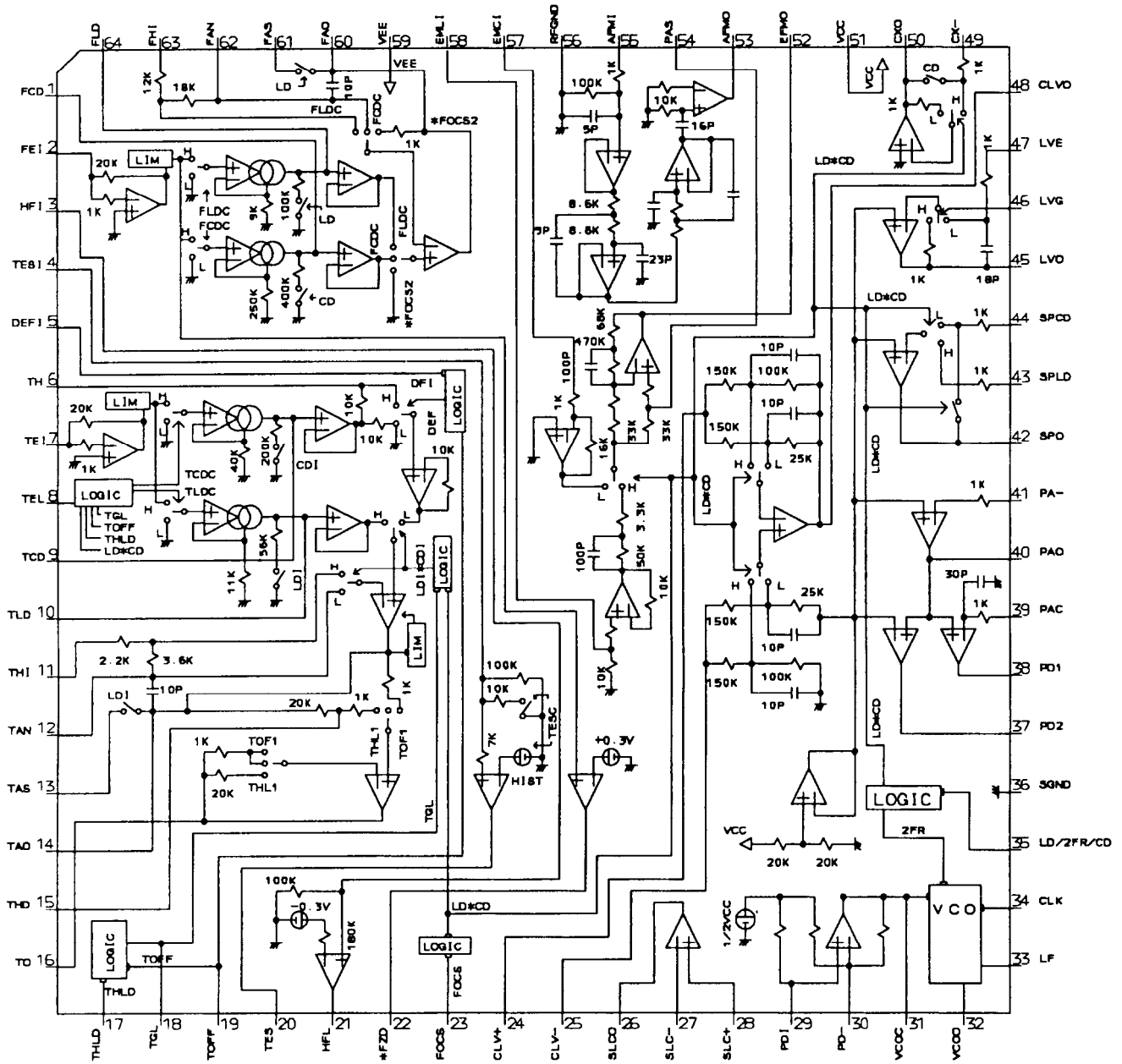
WAVEFORMS AND VOLTAGE MOTHER ASSY

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

Measurement condition : In case when (D. audio) is written, at time when disc that has digital audio recording is played.

IC801(PAC002A)	IC802(LC78681KE)	IC803(LA6510)	IC901(PAC003A)	CN106	IC400 (PAC005B)
<p>(2), (3) 1mS/Div. 16mVp-p</p> <p>AC mode</p>	<p>(2) 0.1μS/Div. 4.3Vp-p</p> <p>AC mode(D.audio)</p>	<p>(1) 2mS/Div. 1.8Vp-p</p> <p>DC mode</p>	<p>(2) 0.2mS/Div. 74mVp-p</p> <p>DC mode</p>	<p>(1), (2) 5mS/Div. 65mVp-p</p> <p>DC mode</p>	<p>(10) 1.52Vp-p</p> <p>0.55V V: 20mV/Div H: 10mS/Div</p>
<p>(7), (8) 1mS/Div. 67mVp-p</p> <p>DC mode</p>	<p>(33) 10μS/Div. 4.2Vp-p</p> <p>AC mode(D.audio)</p>		<p>(7) 0.2mS/Div. 74mVp-p</p> <p>DC mode</p>	<p>(3) 0.5mS/Div. 300mVp-p</p> <p>AC mode</p>	<p>(8) (TOP) 2.4V (11) (BOTTOM) 0.55V</p>
<p>(9) 5mS/Div. 0.1Vp-p</p> <p>DC mode</p>	<p>(35) 0.2μS/Div. 4.4Vp-p</p> <p>AC mode(D.audio)</p>		<p>(16) 0.2mS/Div. 0.61Vp-p</p> <p>DC mode</p>	<p>(4) 5mS/Div. 15Vp-p</p> <p>DC mode</p>	<p>(12) 1Vp-p</p> <p>1.65V V: 20mV/Div H: 10mS/Div</p>
	<p>(36) 0.2μS/Div. 4.5Vp-p</p> <p>AC mode(D.audio)</p>		<p>(48) 50μS/Div. 6.2Vp-p</p> <p>DC mode</p>	<p>(5) 5mS/Div. 5.8Vp-p</p> <p>DC mode</p>	<p>(14) 1Vp-p</p> <p>V: 20mV/Div H: 10mS/Div</p>
	<p>(43) 0.1μS/Div. 4.5Vp-p</p> <p>AC mode(D.audio)</p>		<p>(52) 0.2μS/Div. 2.1Vp-p</p> <p>AC mode</p>	<p>(6) 5mS/Div. 3.5Vp-p</p> <p>DC mode</p>	<p>(23) (No noise) (25) (With limiter noise)</p> <p>V: 20mV/Div Approx. H: 10mS/Div 330mVp-p</p>
	<p>(59) 0.1μS/Div. 2Vp-p</p> <p>AC mode(D audio)</p>		<p>(57) 1mS/Div. 0.53Vp-p</p> <p>DC mode</p>	<p>(9) 5mS/Div. 1.25Vp-p</p> <p>DC mode</p>	<p>(27) Approx. 1Vp-p</p> <p>0.5mS/Div</p>
			<p>(58) 0.2mS/Div. 0.32Vp-p</p> <p>DC mode</p>	<p>(11) 10mS/Div. 1.7Vp-p</p> <p>DC mode</p>	

• **The inside block diagram of IC901 (PAC003A)**

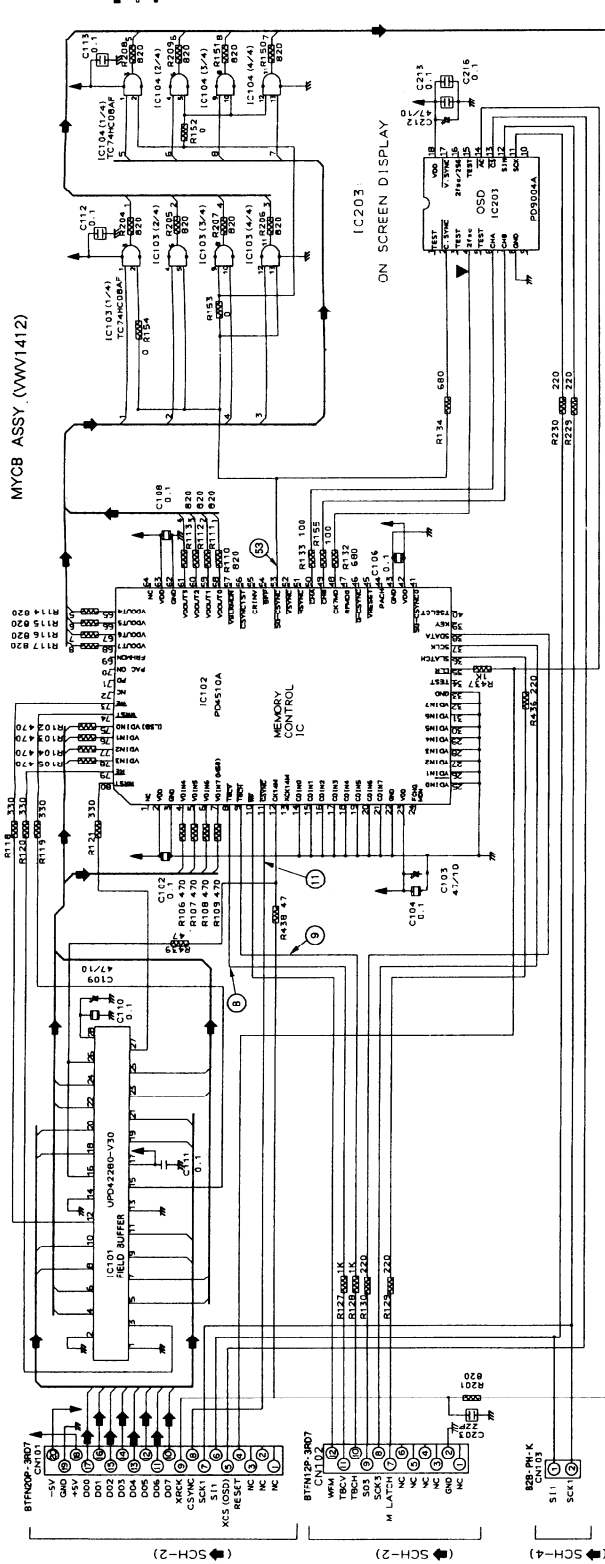


WAVEFORMS AND VOLTAGE MYCB ASSY

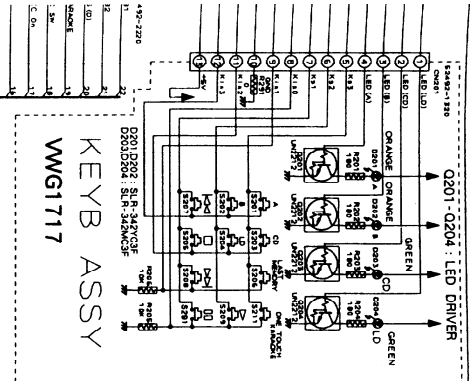
Note : (N) in the table correspond to the pin number.

Measurement condition: Where (Color bars) & vertical time when color bar is written, all time of 20k.

IC102 (PD4510A)	(5) V-2V/div, H:5ms/div.
IC301 (CXD2023C)	(31) 10μs/Div, 2Vpp
IC102 (PD4510A)	(6) V-2V/div, H:20 μS/div.
IC301 (CXD2023C)	(32) 5ns/Div, 0.7Vpp
IC102 (PD4510A)	(7) V-2V/div, H:50 μS/div.
IC301 (CXD2023C)	(33) 10μs/Div, 2Vpp
IC102 (PD4510A)	(8) V-2V/div, H:20 μS/div.
IC301 (CXD2023C)	(34) 5ns/Div, 0.7Vpp
IC102 (PD4510A)	(9) V-2V/div, H:50 μS/div.
IC301 (CXD2023C)	(35) 10μs/Div, 2Vpp
IC102 (PD4510A)	(10) V-2V/div, H:20 μS/div.
IC301 (CXD2023C)	(36) 5ns/Div, 0.7Vpp
IC102 (PD4510A)	(11) V-2V/div, H:50 μS/div.
IC301 (CXD2023C)	(37) 10μs/Div, 2Vpp
IC102 (PD4510A)	(12) V-2V/div, H:20 μS/div.
IC301 (CXD2023C)	(38) 5ns/Div, 0.7Vpp
IC102 (PD4510A)	(13) V-2V/div, H:50 μS/div.
IC301 (CXD2023C)	(39) 10μs/Div, 2Vpp
IC102 (PD4510A)	(14) V-2V/div, H:20 μS/div.
IC301 (CXD2023C)	(40) 5ns/Div, 0.7Vpp
IC102 (PD4510A)	(15) V-2V/div, H:50 μS/div.
IC301 (CXD2023C)	(41) 10μs/Div, 2Vpp
IC102 (PD4510A)	(16) V-2V/div, H:20 μS/div.
IC301 (CXD2023C)	(42) 5ns/Div, 0.7Vpp
IC102 (PD4510A)	(17) V-2V/div, H:50 μS/div.
IC301 (CXD2023C)	(43) 10μs/Div, 2Vpp
IC102 (PD4510A)	(18) V-2V/div, H:20 μS/div.
IC301 (CXD2023C)	(44) 5ns/Div, 0.7Vpp
IC102 (PD4510A)	(19) V-2V/div, H:50 μS/div.
IC301 (CXD2023C)	(45) 10μs/Div, 2Vpp
IC102 (PD4510A)	(20) V-2V/div, H:20 μS/div.
IC301 (CXD2023C)	(46) 5ns/Div, 0.7Vpp
IC102 (PD4510A)	(21) V-2V/div, H:50 μS/div.
IC301 (CXD2023C)	(47) 10μs/Div, 2Vpp
IC102 (PD4510A)	(22) V-2V/div, H:20 μS/div.
IC301 (CXD2023C)	(48) 5ns/Div, 0.7Vpp
IC102 (PD4510A)	(23) V-2V/div, H:50 μS/div.
IC301 (CXD2023C)	(49) 10μs/Div, 2Vpp
IC102 (PD4510A)	(24) V-2V/div, H:20 μS/div.
IC301 (CXD2023C)	(50) 5ns/Div, 0.7Vpp
IC102 (PD4510A)	(25) V-2V/div, H:50 μS/div.
IC301 (CXD2023C)	(51) 10μs/Div, 2Vpp
IC102 (PD4510A)	(26) V-2V/div, H:20 μS/div.
IC301 (CXD2023C)	(52) 5ns/Div, 0.7Vpp
IC102 (PD4510A)	(27) V-2V/div, H:50 μS/div.
IC301 (CXD2023C)	(53) 10μs/Div, 2Vpp
IC102 (PD4510A)	(28) V-2V/div, H:20 μS/div.
IC301 (CXD2023C)	(54) 5ns/Div, 0.7Vpp
IC102 (PD4510A)	(29) V-2V/div, H:50 μS/div.
IC301 (CXD2023C)	(55) 10μs/Div, 2Vpp
IC102 (PD4510A)	(30) V-2V/div, H:20 μS/div.
IC301 (CXD2023C)	(56) 5ns/Div, 0.7Vpp

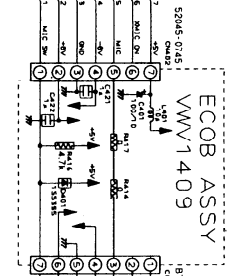


▲ VIDEO SIGNAL LINE
 ▼ Y SIGNAL LINE
 ▲ C SIGNAL LINE

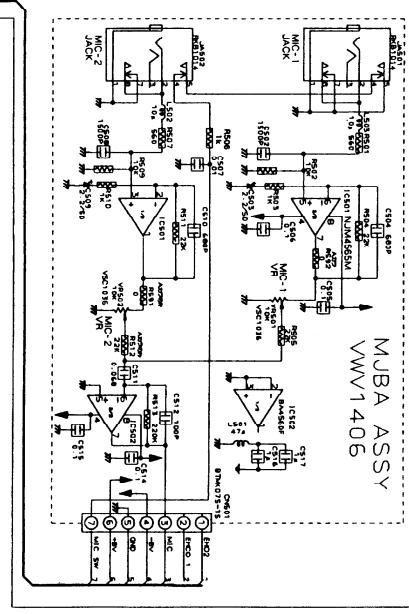


FLKB ASSY WVM1655

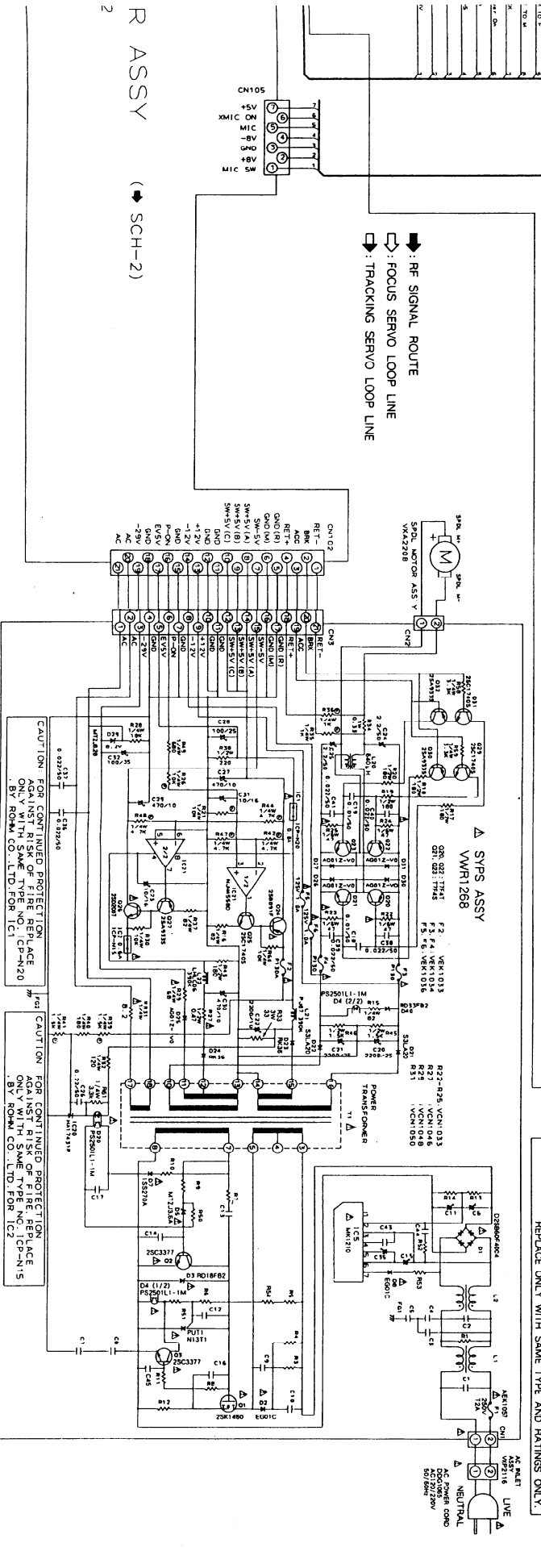
KEYB ASSY
WG1717



EC0B ASSY
WV1409



MJBA ASSY
WV1406



R ASSY
(SCH-2)

- ➔ RF SIGNAL ROUTE
- ⇨ FOCUS SERVO LOOP LINE
- ⇨ TRACKING SERVO LOOP LINE

Caution on repair the primary side parts of the SYPS assy)
 During repair, those other than the specified parts cannot be used to prevent the occurrence of an accident.
 Mark ✓ must be written in MC on the board when the primary part of the power block is repaired.
 During part replacement, follow the order of disassembly so that the specified parts do not touch other parts.

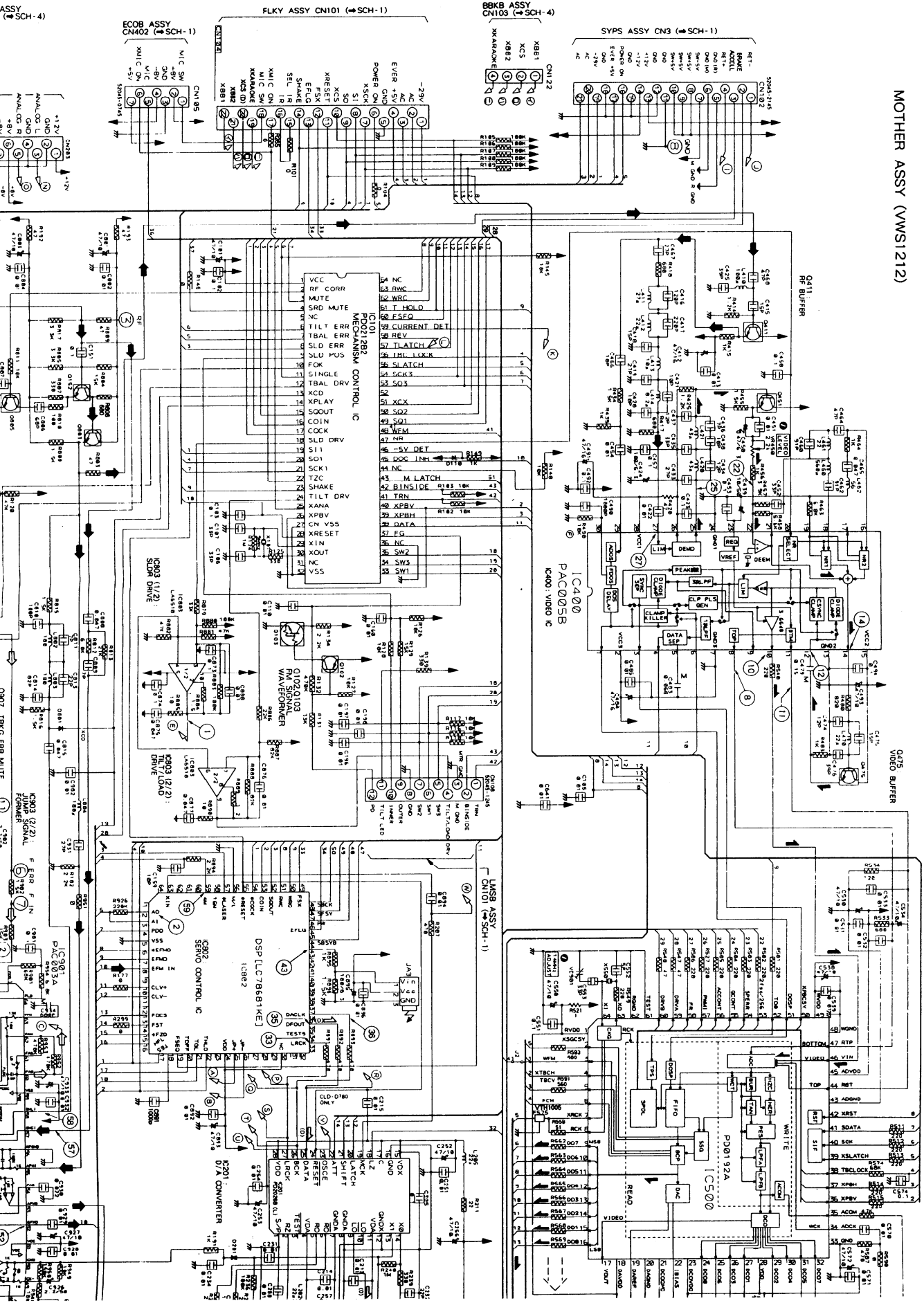
• NOTE FOR FUSE REPLACEMENT
**CAUTION - FOR CONTINUED PROTECTION AGAINST RISK OF FIRE,
 REPLACE ONLY WITH SAME TYPE AND RATINGS ONLY.**

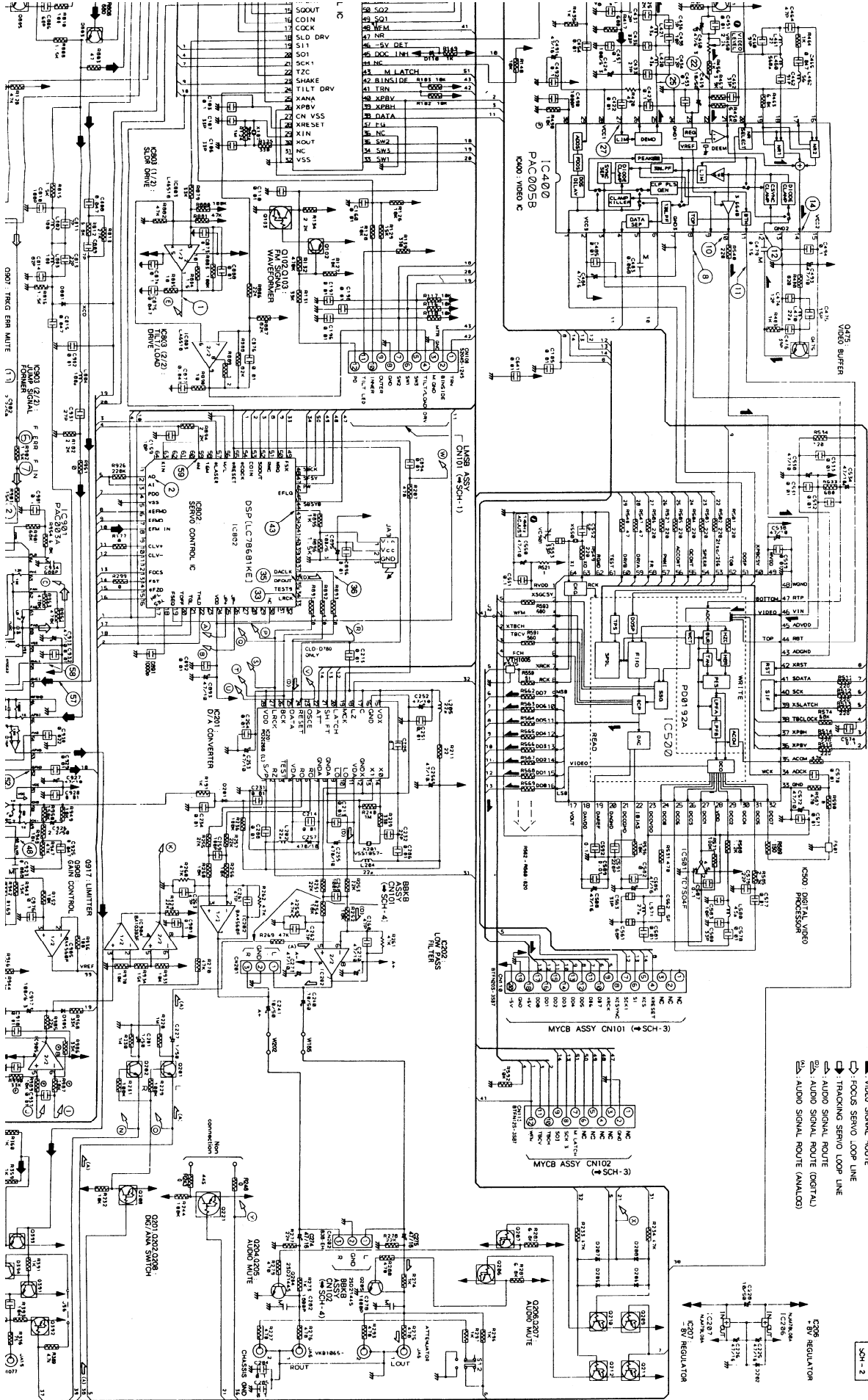
CAUTION FOR CONTINUED PROTECTION AGAINST RISK OF FIRE REPLACE ONLY WITH SAME TYPE NO. ICP-N20 BY KONM CO., LTD FOR IC1.

CAUTION FOR CONTINUED PROTECTION AGAINST RISK OF FIRE REPLACE ONLY WITH SAME TYPE NO. ICP-N15 BY KONM CO., LTD FOR IC2.

3.2 MOTHER ASSY

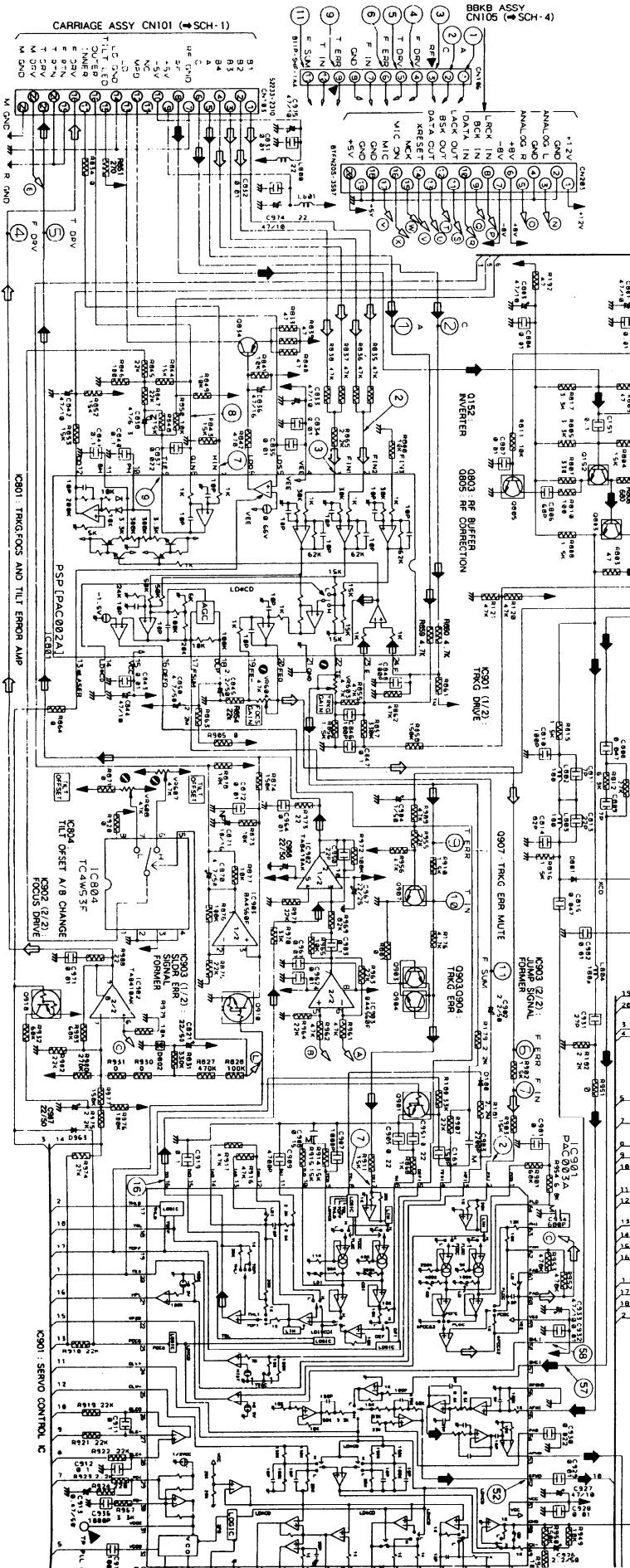
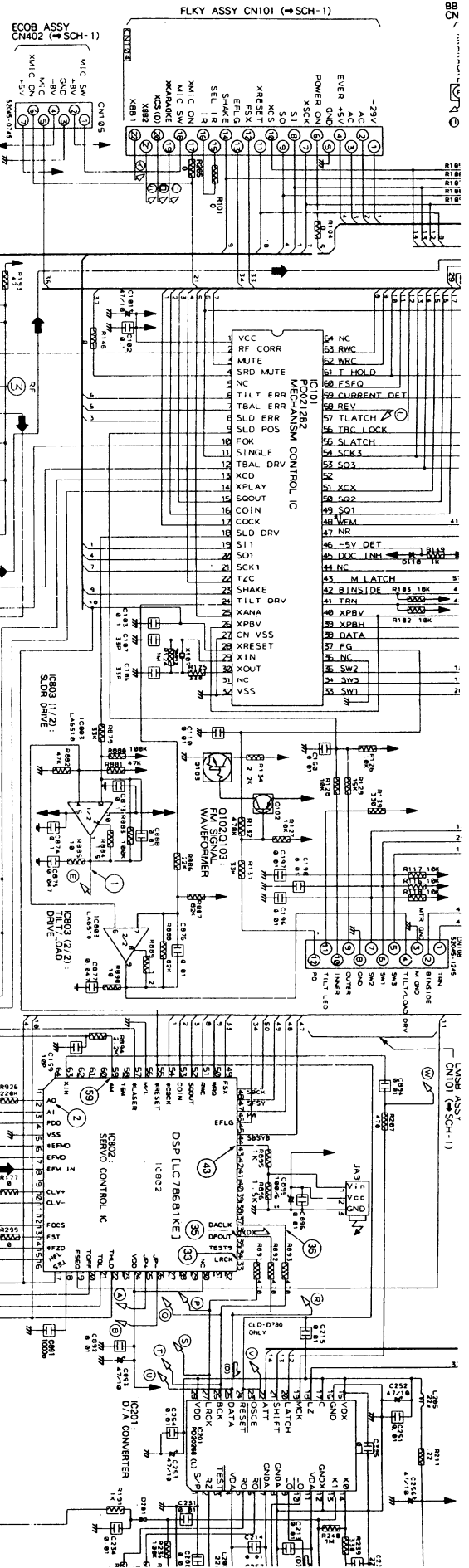
MOTHER ASSY (WMS1212)





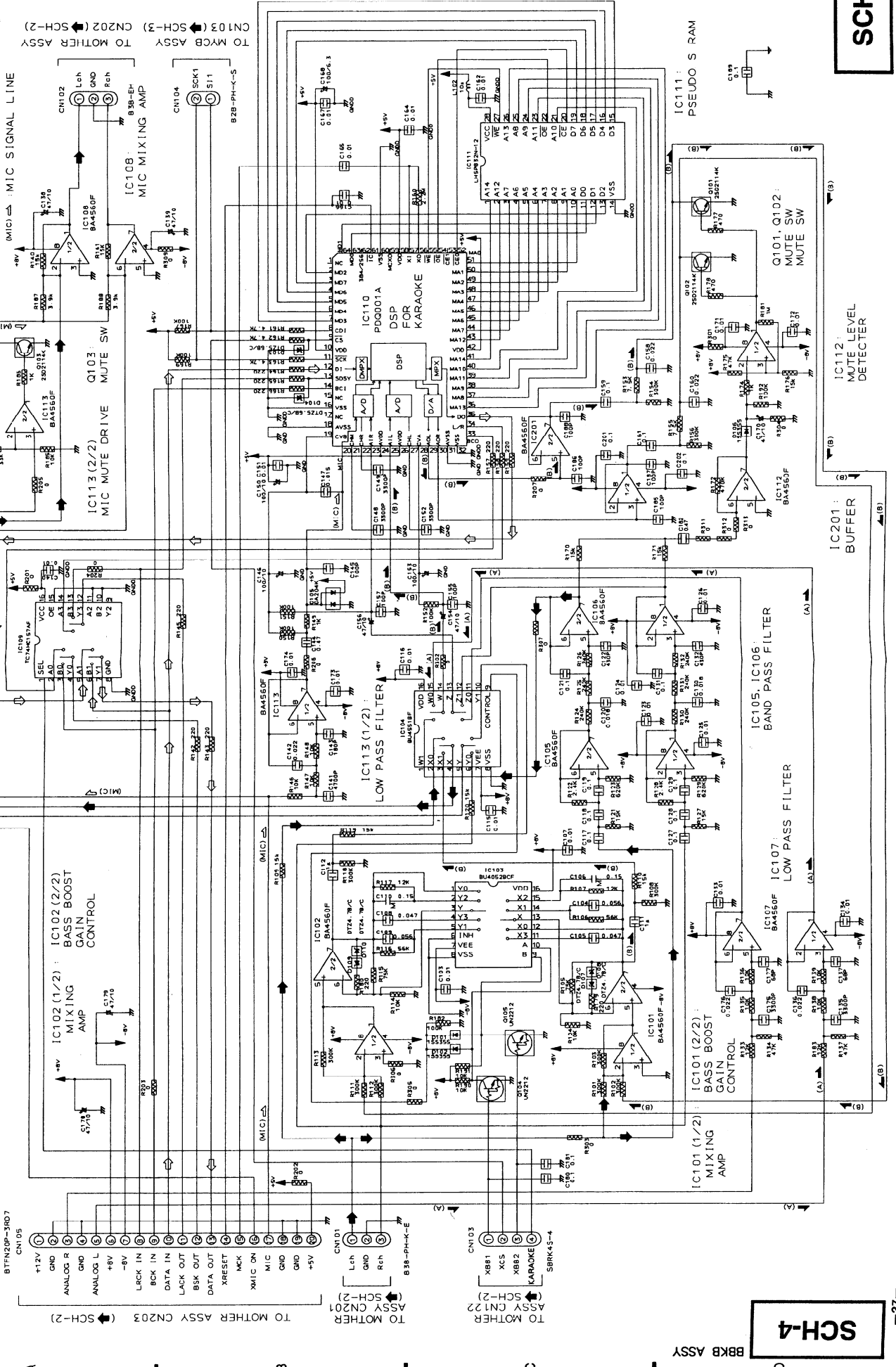
- ➔ RF SIGNAL ROUTE
- ➔ VIDEO SIGNAL ROUTE
- ➔ FOCUS SERVO LOOP LINE
- ➔ TRACKING SERVO LOOP LINE
- ➔ AUDIO SIGNAL ROUTE
- ➔ AUDIO SIGNAL ROUTE (DIGITAL)
- ➔ AUDIO SIGNAL ROUTE (ANALOG)

SCH-2



BBK ASSY (VWIG1605)

0101 102 106
0105 104
0106 104
0107 0108 0109 0110
0124 76-C
0124 76-C



▲ : AUDIO SIGNAL LINE
 ◻ : AUDIO DIGITAL DATA LINE
 (A) : ANALOG AUDIO SIGNAL LINE
 (B) : BASS BOOST SIGNAL LINE
 (C) : MIC SIGNAL LINE

TO MOTHER ASSY CN203 (SCH-2)
 TO MOTHER ASSY CN202 (SCH-2)
 TO MOTHER ASSY CN203 (SCH-3)
 TO MOTHER ASSY CN202 (SCH-2)

4. PCB PARTS LIST

NOTES:

●Parts marked by "NSP" are generally unavaible because they are not in our Master Spare Parts List.

●The ! mark found on some component parts indicates the importance of the safety factory 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 unavaible.

MARK	CIRCUIT NO.	DESCRIPTION	PART NO.	MARK	CIRCUIT NO.	DESCRIPTION	PART NO.
LIST OF ASSEMBLIES				SYPS ASSY(VWR1268)			
		MACB ASSY	VWM1535	ICS			
		— PWSB ASSY	VWG1555	!	IC1	Protector	ICP-N20
		— FG ASSY	VWG1556	!	IC2	Protector	ICP-N15
		— TNSB ASSY	VWG1557		IC5		MK1210
		— BISB ASSY	VWG1558		IC20	Regulator	HA17431P
		— LMSB ASSY	VWG1612		IC21	Operation	NJM4558D
				TRANSISTORS			
!		SYSB ASSY	VWR1268		Q1	MOS FET	2SK1460
					Q2		2SC3377
		MACB ASSY	VWM1655		Q20,Q22		T7F4T
		— KEYB ASSY	VWG1717		Q21,Q23		T7F4S
		— FLKY ASSY	VWG1600	!	Q24		2SB891F
		— ECOB ASSY	VWV1409		Q25,Q29,Q31		2SC1740S
		— NJBA ASSY	VWV1406	!	Q26		2SD2007
					Q27,Q30,Q32		2SA933S
		MOTHER ASSY	VWS1212		Q33		2SC3377
		MYCB ASSY	VWV1412	DIODES			
		BBKB ASSY	VWG1605		D1		D2SB60F4004
					D2,D8		EG01C
		PSKB ASSY(VWG1555)			D21,D22		RL4Z
		SWITCHES			D23,D24		RK36
		S104,S105	DSG1017		D25~D27		AG01Z-VO
					D29		MTZJ8.2B
		FG ASSY(VWG-1556)			D3		RD18FB2
		DIODE			D30,D31		AG01Z-VO
		D101	GP1S24		D4,D20		PS2501L1-1M
					D40		RD33FB2
		TNSB ASSY(VWG1557)			D5		MTZJ3.6A
		SWITCH			D7		1SS270A
		S111	DSG1017		PUT1		N13T1
		BISB ASSY(VWG1558)		RESISTORS			
		SWITCH		!	R22~R25	Fuse(47Ohm,1/6W)	VCN1033
		S112	DSG1017	!	R27	Fuse(0.47Ohm,1/2W)	VCN1046
				!	R29	Fuse(68Ohm,1/4W)	VCN1048
		LMSB ASSY(VWG1612)		!	R31	Fuse(8.2Ohm,1/4W)	VCN1050
		CONNECTOR		FUSES			
		CN101	52044-1245	!	F1	FUSE(T2A)	AEK1057
		SWITCHES		!	F2	Thermal	VEK1033
		S101~S103	DSG1017	!	F3,F4	Thermal	VEK1034
				!	F5,F6	Micro(1.0A/125V)	VEK1036

MARK CIRCUIT NO.	DESCRIPTION	PART NO.	MARK CIRCUIT NO.	DESCRIPTION	PART NO.
KEYB ASSY(VWG1717)			ECOB ASSY(VWV1409)		
TRANSISTORS			DIODE		
Q201~Q204		UN2212	D401		1SS355
DIODES			COIL		
D201,D202	LED(YELLOW)	SLR-342YC3F	L401		LFA100J
D203,D204	LED(GREEN)	SLR-342MC3F	CAPACITORS		
SWITCHES			C401	Elect.	CEAS101M10
S201~S209	Tact	RSG1030	C421,C422		CKSYF105Z16
S211,S291	Tact	RSG1030	RESISTOR		
RESISTORS			R416		RS1/10S472J
R205,R206		RS1/10S103J	OTHERS		
R201~R204		RS1/10S181J	CN401	Plug	BTMK07P-1R
CONNECTOR			CN402	7P connector	52045-0745
CN201	13P Connector	52492-1320			
			MJBA ASSY(VWV1406)		
FLKY ASSY(VWG1600)			ICS		
ICS			IC501	Operation	NJM4565M
IC101	Microprocessor	PD3304B	IC502		BA4560F
IC102	Reset	S-806D	COILS		
TRANSISTORS			L501		LFA470J
Q101,Q103		UN2212	L502,L503		LFA100J
Q102		UN2112	CAPACITORS		
Q104,Q107		UN2212	C502,C508		CKSQYB152K50
Q105		DTC114EK	C503,C509	Elect.	CEJA2R2M50
Q106		DTA144EK	C504,C510		CKSQYB681K50
DIODES			C505,C506		CKSQYF104Z25
D108,D109	LED(GREEN)	SLR-342MCT31	C507		CKSQYF103Z50
D110	LED(RED)	SLR-342VCT31	C511		CKSQYB683K25
D107	LED(YELLOW)	SLR-342YCT31	C512		CCSQCH101J50
D101~D106		1SS353	C514,C515		CKSQYF104Z25
D111,D112		1SS353	C516,C517		CKSYF105Z16
SWITCHES			RESISTORS		
S101~S106	Tact	RSG1030	R503,R506,R510		RS1/10S102J
RESONATOR			R502,R509		RS1/10S103J
X101	Ceramic	EFOEC8004A4	R504,R505		RS1/10S223J
CAPACITORS			R511,R512		RS1/10S223J
C101	Elect.	CEAL470M6R3	R501,R507		RS1/10S561J
C102		CKSQYF104Z25	VR501,VR502	Volume(10KB)	VCS1036
C103		CKSQYF223Z50	OTHERS		
C104,C106	Elect.	CEAL100M16	CN501	Connector	BTMK07S-1S
C105		CKSQYF103Z50	JA501,JA502	jack	RKB1014
RESISTORS			MOTHER ASSY(VWS1212)		
R101~R103,R107		RS1/10S181J	ICS		
R104		RS1/10S681J	IC101	Mecha. microprocessor	PD0212B2
R105,R106,R109		RS1/10S103J	IC201	D/A converter	PD2026B(L)
R108		RS1/10S472J	IC202,IC903,IC905	IC	BA4560F
R110		RS1/10S105J	IC206	Regulator	NJM78L08A
R111~R117,R121		RS1/10S103J	IC207	Regulator	NJM79L08A
R120		RS1/10S224J	IC351	Audio	CA0002AM
R122~R124		RS1/10S221J	IC400	Video	PAC005B
R125,R162,R163		RS1/10S103J	IC500	D-video processor	PD0192A
R161,R166		RS1/10S682J	IC501	L-MOS	TC7S04F
R167		RS1/10S222J	IC801	Preamp.(PSP)	PAC002A
VR101	Volume(10KB)	VCS1037	IC802	Servo control	LC78681KE
OTHERS			IC803	Operation	LA6510
CN101	22P connector	52492-2220	IC804	Analog	TC4W53F
CN102	13P connector	52492-1320	IC901	Servo control(ASP)	PAC003A
V101	FL tube	VAW1035	IC902	Operation	TA8410AK
	Remote sensor	GPU58X	IC904	Comparator	BA10393F
	Spacer	VEC1599			
	FL holder	VNF1087			

MARK CIRCUIT NO.	DESCRIPTION	PART NO.	MARK CIRCUIT NO.	DESCRIPTION	PART NO.
TRANSISTORS			CAPACITORS		
Q102,Q916		2PB709A	C962,C964,C971		CKSQYF103Z50
Q103,Q206,Q207		UN2212	C968,C987	Elect.	CEHAQ220M50
Q152		2SC3802K	C972	Elect.	CEANP220M10
Q201,Q202,Q391		2PD601A	C973	Mylar	CQMA224J50
Q204,Q205		2SD2144S	C974,C975	Elect.	CEAS470M10
Q208*Q212,Q221		UN2112	C976,C981,C983		CKSQYF104Z25
Q392,Q918		UN2112	C982		CKSQYF103Z50
Q393,Q394,Q451		2PD601A	VC901	Trim(20P)	VCM-008
Q411,Q803		2SC2412K	RESISTORS		
Q475,Q805,Q840		2PD601A	R102,R103,R126		RS1/10S103J
Q834		2SA854S	R105*R109,R145		RS1/10S104J
Q901,Q910		UN2212	R116*R118,R128		RS1/10S103J
Q903,Q904,Q907		2PD601A	R120,R121,R187		RS1/10S473J
Q908,Q915,Q917		2PD601A	R124,R228,R230		RS1/10S105J
DIODES			R125,R139,R239		RS1/10S331J
D110	Zener	MTZJ5.1B	R127,R129,R363		RS1/10S153J
D180,D205*D208		1SS254	R131,R148,R152		RS1/10S103J
D201	Variable capacitor	KV1851	R132,R166,R827		RS1/10S474J
D202		11EQS06	R134,R179,R182		RS1/10S222J
D801,D901,D902		1SS254	R881,R882	Metal oxide	RN1/10SE473D
D802		1SS355	R149,R191,R273		RS1/10S102J
D905,D963		1SS254	R151,R159,R160		RS1/10S104J
COILS			R169,R176,R389		RS1/10S472J
L413		LAU100J	R170,R188,R229		RS1/10S104J
L410		LAU101J	R177,R889		RS1/10S1R2J
L351,L802*L804		LAU181J	R180,R927,R968		RS1/10S333J
L202,L204,L205		LAU220J	R181,R863		RS1/10S225J
L352,L412,L461		LAU220J	R192,R193,R547		RS1/10S470J
L470,L800,L801		LAU220J	R207,R227,R275		RS1/10S471J
L411,L571		LAU270J	R211,R973,R988		RS1/10S220J
L420,L421,L580		LAU430J	R231,R236,R244		RS1/10S104J
L462		LAU560J	R232,R393,R592		RS1/10S103J
L414		LAU8R2J	R233,R234,R269		RS1/10S473J
L460		LFA561J	R240,R861		RS1/10S105J
FILTERS			R251,R253,R255		RS1/10S223J
F501,F575	14.3MHz	VTF1055	R2521,R254,R256		RS1/10S183J
CAPACITORS			R257,R277,R278		RS1/10S223J
C101,C252,C253	Elect.	CEAS470M10	R258,R948		RS1/10S183J
C102,C103,C151		CKSQYF104Z25	R259*R262	Carbon	RD1/6PM473J
C105,C110,C160		CKSQYF103Z50	R270,R577,R855		RS1/10S473J
C106,C107,C354		CCSQCH330J50	R274,R296,R297		RS1/10S102J
C159,C420,C421		CCSQCH100D50	R276,R279,R280		RS1/10S471J
C161,C353,C812		CCSQCH151J50	R281,R282,R463		RS1/10S682J
C162,C417,C591	Ceramic	CCSQCH221J50	R293,R531,R587		RS1/10S471J
C196*C198,C231		CKSQYF103Z50	R359,R360,R391		RS1/10S102J
C213*C215,C234		CKSQYF103Z50	R361,R632		RS1/10S182J
C225,C226,C274	Elect.	CEAL470M16	R364,R804,R843		RS1/10S153J
C227,C281,C904	Elect.	CEAS010M50	R365,R366		RS1/10S823J
C228,C240,C241	Elect.	CEAS100M50	R367,R574,R899		RS1/10S683J
C232,C579,C813	Ceramic	CCSQCH220J50	R368,R831,R857		RS1/10S334J
C251,C254,C286		CKSQYF103Z50	R369,R370,R858		RS1/10S154J
C255,C257	Elect.	CEAS471M10	R371,R926,R941		RS1/10S224J
C256,C270,C271	Elect.	CEAS470M10	R392,R417,R418		RS1/10S681J
C258,C259,C370		CCSQCH101J50	R395,R571,R828		RS1/10S104J
C260*C263,C464		CCSQCH470J50	R396,R480		RS1/10S750J
C275,C412,C484	Elect.	CEAL470M16	R398,R585,R865		RS1/10S222J
C278,C282	Mylar	CQMA182J50	R414,R425,R588		RS1/10S122J
C284,C285,C305		CKSQYF104Z25	R415,R435,R456		RS1/10S102J
C288,C372,C373		CKSQYF103Z50	R420	Carbon	RD1/6PM470J
C351,C425,C476		CCSQCH390J50	R434,R455,R808		RS1/10S152J
C352,C552		CCSQCH180J50	R457		RS1/10S392J
C355*C358,C377		CKSQYB472K50	R458		RS1/10S562J
C359,C360		CKSQYF224Z25	R464,R483,R868		RS1/10S102J
C361,C362		CKSQYB392K50	R490,R987,R989	Metal oxide	RN1/10SE103D
C363,C369,C493	Elect.	CEAS470M10	R501*R506,R527		RS1/10S221J
C364,C424	Elect.	CEAS101M10	R511*R515,R540		RS1/10S221J
C365,C366,C391		CKSQYF104Z25	R521	Carbon	RD1/6PM010J
			R533,R593,R806		RS1/10S681J

MARK CIRCUIT NO. RESISTORS	DESCRIPTION	PART NO.	MARK CIRCUIT NO. OTHERS	DESCRIPTION	PART NO.
R534		RS1/10S121J	CN110,CN203	20P connector	BTFN20S-3SB7
R548,R803,R809		RS1/10S470J	CN113	12P connector	BTFN12S-3SB7
R549,R807		RS1/10S331J	CN122	4P connector	SBRK04S-4
R559		RS1/10S510J	S12	Slide switch	VSH1009
R562~R569		RS1/10S821J	JA8	Opto. module	GP1F32T
R589		RS1/10S151J	JA6	4P pin jack	VKB1065
R591		RS1/10S561J	JA15	1P pin jack	VKB1077
R596,R800,R811		RS1/10S103J	X101	Ceramic resonator	VSS1040
R805,R817,R967		RS1/10S332J	X201	Crystal resonator(16MI	VSS1057
R810,R846,R936		RS1/10S101J	X550	Crystal resonator	VSS1073
R812,R954		RS1/10S682J			
R813,R974		RS1/10S273J			
R815,R816,R856		RS1/10S152J			
R833,R839,R840		RS1/10S470J			
R836~R838,R862		RS1/10S473J			
R841,R849,R850		RS1/10S103J			
R842,R891~R893		RS1/10S471J			
R844,R848,R852		RS1/10S153J			
R845,R847,R854		RS1/10S223J			
R851		RS1/10S271J			
R853,R898,R903		RS1/10S153J			
R859,R860,R944		RS1/10S472J			
R873,R877,R878		RS1/10S103J			
R874,R950,R977		RS1/10S154J			
R875,R886,R907		RS1/10S223J			
R876,R937,R972		RS1/10S104J			
R879,R986,R990	Metal oxide	RN1/10SE333D			
R880,R883	Metal oxide	RN1/10SE104D			
R884		RS1/10S1R5J			
R885,R890		RS1/10S100J			
R887,R888,R969		RS1/10S823J			
R892,R902,R910		RS1/10S152J			
R894,R923,R975		RS1/10S222J			
R895		RS1/10S102J			
R897,R952,R953		RS1/10S474J			
R900,R906,R916		RS1/10S473J			
R901,R928,R932		RS1/10S683J			
R911,R914,R915		RS1/10S153J			
R917,R946,R947		RS1/10S473J			
R918,R919,R921		RS1/10S223J			
R922,R929,R939		RS1/10S223J			
R924		RS1/10S221J			
R933,R949,R965		RS1/10S103J			
R934,R943,R996		RS1/10S153J			
R938,R983,R997		RS1/10S683J			
R940,R955,R963		RS1/10S223J			
R942		RS1/10S184J			
R945,R999		RS1/10S472J			
R956,R961,R962		RS1/10S473J			
R964,R971,R982		RS1/10S223J			
R970		RS1/10S333J			
R976		RS1/10S104J			
R978,R979		RS1/10S103J			
R980		RS1/10S274J			
R981		RS1/10S154J			
R985,R995		RS1/10S223J			
R998		RS1/10S683J			
VR450	Trim EVNCYA A03BE4	PCP1025			
VR603	Trim EVN CYA A03 BQ3	PCP1028			
VR604,VR607	Trim EVN CYA A03 BQ4	PCP1031			
VR608,VR612	Trim EVN CYA A03 BQ4	PCP1031			
OTHERS					
CN102	21P connnector	52045-2145			
CN103	23P connector	52233-2310			
CN104	22P connector	52045-2245			
CN105	7P connector	52045-0745			
CN106	11P plug	B11P-SHF-1AA			
CN108	12P connector	52045-1245			
			MYCB ASSY(VWV1412)		
			ICS		
			IC101	Buffer	UPD42280V-30
			IC102	Memory	PD4510A
			IC103,IC104	AND gate	TC74HC08AF
			IC203	On screen display	PD9004A
			IC301	3 Line filter	CXD2023Q
			IC401	FM	TA7302P
			IC402	Video amp	MC14577CP
			TRANSISTORS		
			Q401,Q403		2PD601A
			Q402,Q404,Q405		2PB709A
			Q408		2SC1740S
			COILS		
			L401~L403		LFA220J
			L404		LFA470J
			CAPACITORS		
			C404		CCSQCH060D50
			C415	Ceramic	CCSQCH150J50
			C203,C403,C406	Ceramic	CCSQCH220J50
			C432		CCSQCH390J50
			C405		CCSQCH560J50
			C412		CCSQCH910J50
			C420	Elect.	CEAS330M16
			C103,C109,C212	Elect.	CEAS470M10
			C302,C305,C310	Elect.	CEAS470M10
			C315,C408,C410	Elect.	CEAS470M10
			C423,C425	Elect.	CEAS470M10
			C301		CKSQYB102K50
			C416~C418		CKSQYF103Z50
			C102,C104,C106		CKSQYF104Z25
			C108,C110~C113		CKSQYF104Z25
			C213,C216.C303		CKSQYF104Z25
			C304,C306~C309		CKSQYF104Z25
			C311~C314,C316		CKSQYF104Z25
			C303,C401,C402		CKSQYF104Z25
			C419,C421,C422		CKSQYF104Z25
			C424,C426,C429		CKSQYF104Z25
			RESISTORS		
			R102~R109		RS1/10S471J
			R110~R117,R150		RS1/10S821J
			R118~R121,R410		RS1/10S331J
			R127,R128,R405		RS1/10S102J
			R129,R130,R229		RS1/10S221J
			R132,R134,R402		RS1/10S681J
			R133,R155,R426		RS1/10S101J
			R151,R201		RS1/10S821J
			R204~R209		RS1/10S821J
			R230,R436		RS1/10S221J
			R301,R302,R307		RS1/10S103J
			R303,R305	Metal oxide	RN1/10SE271D
			R304,R306	Metal oxide	RN1/10SE472D
			R401		RS1/10S392J
			R403,R412		RS1/10S182J
			R404,R407,R409		RS1/10S332J
			R408		RS1/10S152J
			R411		RS1/10S103J
			R413		RS1/10S330J
			R415,R450,R452	Metal oxide	RN1/10SE332D

MARK CIRCUIT NO.	DESCRIPTION	PART NO.	MARK CIRCUIT NO.	DESCRIPTION	PART NO.
RESISTORS			RESISTORS		
R416,R417	Metal oxide	RN1/10SE222D	R149,R174,R186		RS1/10S102J
R418,R419,R422	Metal oxide	RN1/10SC750D	R104,R114,R135		RS1/10S103J
R423,R425		RS1/10S750J	R136,R138,R139		RS1/10S103J
R424	Metal oxide	RN1/10SC750D	R146,R148,R185		RS1/10S103J
R427,R433		RS1/10S681J	R190,R191		RS1/10S103J
R429		RS1/10S101J	R150,R152,R167		RS1/10S104J
R437		RS1/10S102J	R169,R182,R192		RS1/10S104J
R438,R439		RS1/10S470J	R181		RS1/10S105J
R451	Metal oxide	RN1/10SE562D	R107,R117,R133		RS1/10S123J
R453	Metal oxide	RN1/10SE392D	R183		RS1/10S123J
OTHERS			RESISTORS		
CN101	20P connector	BTFN20P-3RD7	R109,R110,R119		RS1/10S153J
JA101	Pin jack	DKB1028	R140,R141,R170		RS1/10S153J
JA102,JA103	DIN socket	VKN1072	R171,R176		RS1/10S221J
BBKB ASSY(VWG1605)			RESISTORS		
ICS			RESISTORS		
IC101,IC102,IC112		BA4560F	R142,R143,R145		RS1/10S221J
IC105,IC108,IC113		BA4560F	R157,R159,R179		RS1/10S221J
IC201		BA4560F	R164,R166,R180		RS1/10S225J
IC103	LOGIC IC	BU4052BCF	R160		RS1/10S225J
IC104		BU4551BF	R122,R128		RS1/10S242J
IC111	SRAM(32KX8)	LH5P832N-12	R124,R126		RS1/10S244J
IC110	DSP IC	PDQ001A	R130,R132		RS1/10S244J
IC109	H-CMOS	TC74HC157AF	R101,R103,R108		RS1/10S304J
TRANSISTORS			RESISTORS		
Q101~Q103		2SD2114K	R111,R113,R118		RS1/10S304J
Q104,Q105		UN2212	R154,R156		RS1/10S304J
DIODES			RESISTORS		
D101,D102,D106		1SS355	R184		RS1/10S333J
D103,D104		DTZ5.6B/C	R187,R189		RS1/10S392J
D105		DA204K	R177,R178		RS1/10S471J
D107~D110	Zener	DTZ4.7B/C	R161,R163		RS1/10S472J
COIL			RESISTORS		
L102		LFA100J	R134,R137,R175		RS1/10S473J
CAPACITORS			RESISTORS		
C185~C188		CCSQCH101J50	R172		RS1/10S474J
C143		CCSQCH181J50	R106,R116		RS1/10S563J
C122,C132		CCSQCH431J50	R123,R129		RS1/10S624J
C137,C177		CCSQCH680J50	R153,R155		RS1/10S752J
C145		CCSQSL101J50	R105,R115		RS1/10S753J
C155,C157		CCSQSL101J50	OTHERS		
C168	Elect.	CEAL101M6R3	CN102	Plug	B3B-EH
C138,C139	Elect.	CEAL470M10	CN103	Connector	SBRK4S-4
C146,C150,C153	Elect.	CEAS101M10	CN105	20P connector	BTFN20P-3RD7
C154,C156,C170	Elect.	CEAS470M10			
C178,C179	Elect.	CEAS470M10			
C106,C110	Film	CFTXA154J50			
C165,C166		CKSQYB103K50			
C117~C119,C121		CKSQYB104K25			
C127~C129,C131		CKSQYB104K25			
C159,C161		CKSQYB104K25			
C147		CKSQYB153K50			
C120,C130		CKSQYB183K50			
C136,C142,C158	Ceramic	CKSQYB223K50			
C160,C176	Ceramic	CKSQYB223K50			
C135,C148,C149		CKSQYB332K50			
C152,C175		CKSQYB332K50			
C141		CKSQYB472K50			
C105,C108		CKSQYB473K25			
C104,C109		CKSQYB563K25			
C103,C107,C115		CKSQYF103Z50			
C116,C123~C126		CKSQYF103Z50			
C133,C134,C140		CKSQYF103Z50			
C151,C162,C164		CKSQYF103Z50			
C167,C171~C174		CKSQYF103Z50			
C201,C202		CKSQYF103Z50			
C180,C181,C189		CKSQYF104Z50			
C144,C182		CKSQYF474Z16			

5. SELF-DIAGNOSTIC FUNCTIONS

5.1 SELF-DIAGNOSTIC FUNCTIONS

The self-diagnostic functions automatically display an error code on the TV screen and front panel fluorescent display section when there is an error. The customer checks the error code and conveys it to the service personnel to make repairs more efficient.

After an error occurs, even if the error code goes off, you can display the error code again by holding down the **CLEAR** key for 10 seconds (except a loading error **L *** display). At that time, partial error is displayed with the mechanism switch information. However, if the power cord is unplugged, the error code information is lost.

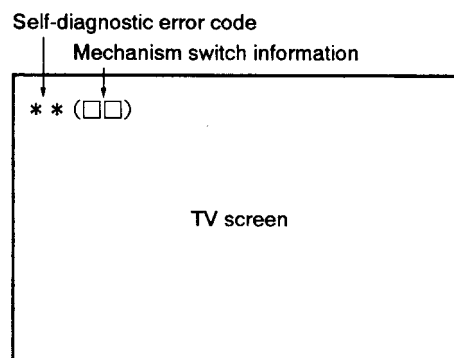


Fig. 1 TV screen display

This table explains the information for analyzing the cause when an error occurs with the CLD player.

Self-diagnostic error code	Contents	Conditions	Probable cause
H0	Spindle overcurrent detection error.	In the play state, overcurrent was detected in the spindle motor. Monitoring starts 5 seconds after the start of play or special playback mode, this error is detected if the overcurrent port is "L" for 4 seconds.	<ul style="list-style-type: none"> • Motor NG • Clamper rubbing
U0	FG abnormality error	<ol style="list-style-type: none"> ① At LD start-up, the rate of rotation calculated from the FG was less than 15 rpm for 5 consecutive seconds from the spindle run command. ② At CD start-up, there was less than 1/8th rotation even after 5 seconds had passed since the end of acceleration. ③ During play search, CD : subcodes are being read/LD : Phillips codes are being read and the spindle is locked, but a state in which the rate of rotation calculated from the FG was less than 15 rpm continued for 5 seconds or more. In the above case, it is judged that an abnormality has occurred in the FG sensor and that accurate rotation rate calculation has become impossible. 	<ul style="list-style-type: none"> • FG sensor abnormality, FG signal not coming to mechanism controller • FG sensor clogged • Rubbing between FG sensor and slit • Turntable dropped • FG slit deposition NG
H1	Partial short error	<ol style="list-style-type: none"> ① At LD start-up, the speed did not reach 1200 rpm within a certain time (12 seconds) after the spindle run command. ② At CD start-up, a certain speed (313 rpm) was not reached within 6 seconds from the end of spindle acceleration. 	<ul style="list-style-type: none"> • Spindle motor NG • Commutator NG • Bearing too tight • Power supply NG
H2 A0	Power supply abnormality error	<p>– 5V power supply abnormality detected.</p> <p>The power supply abnormality port is constantly monitored and if its signal stays high for about 1 second consecutively, the power supply is judged to be abnormal.</p>	<ul style="list-style-type: none"> • – 5V not fed from SYPS assy • Parts shorted
L *	Loading error	<ol style="list-style-type: none"> ① When loading operation goes over time (approx. 10 sec.). ② When assist at disc sense entry ends and is not tilt neutral. ③ When assist at set up entry ends and is not tilt neutral. 	<ul style="list-style-type: none"> • Tilt switch 1, 2, 3 abnormal, so tilt/loading state not read in correctly • Tilt/loading mechanism mechanically locked • Drive IC NG • Power supply NG
E *	Slider error	During slider movement, a time over-run occurred (track count search 20 seconds, mandatory movement 10 seconds)	<ul style="list-style-type: none"> • Slider ceased being able to run • The slider mechanism is mechanically locked and can no longer move to its target. • Slider position switch NG • Flexible cable pulled out • Drive IC NG • Power supply abnormal
U1	Miss clamp error	<ol style="list-style-type: none"> ① During LD setup, after 1/8th rotation, the track count during 1/8 rotation exceeded 511. ② During start-up, the focus was lost once and refocusing was attempted, but the focus could not be locked. ③ Two FG pulses did not come within 800 ms from from the start of LD start-up. ④ The disc clamp operation did not end within 5 seconds. 	<ul style="list-style-type: none"> • Disc sandwiched • Disc shifted • Spindle motor NG • Disc scratched or dirty defocused during start-up • Two discs loaded • PU actuator NG • Tilt sensor NG • Tilt neutral NG (tilt base NG)

Self-diagnostic error code	Contents	Conditions	Probable cause
P *	Spindle error	① During TOC reading with an LD, the spindle servo was not locked within 60 seconds from the start of the spindle run. ② When CAV/CLV determination is not finished within 60 seconds from spindle servo lock. ③ The codes could not be read for 10 – 15 seconds consecutively for an LD or 7 – 10 seconds for a CD/CDV and the spindle servo was not locked. ④ The speed exceeded 2100 rpm during LD start up.	P0:•PH code, SUB-Q code can not be read •VCO, PLL offset out of adjustment •Disc defect P5:•PAL disc, mirror disc, etc. PLAY •No RF P6:•Spindle servo does not lock •Spindle motor NG
F *	Focus error	① "In the "no disc" state, a setup command was received from the mode controller. ② When LD is out of focus when slider is moved to starting position during set up. In case of CD/CDV is NG even after three focus tries. ③ During start-up, the maximum slider servo duty continued for 3 loops or more.	F5:•CD, LD on top of each other •LD scratched or dirty defocused during slider movement •Disc NG •Slider position switch NG F6:•Inner edge of disc scratched or dirty •Slider ran into inner edge mechanical stopper

* Besides the above errors, there is the "U2" communications error (the mode controller could not communicate normally with the mechanism controller)
 The probable cause is a defective mechanism controller, disconnected cable, etc..

* Mechanism mode contents (meaning of * for L * etc.)

- | | | |
|----------------|----------------------------|---------------------|
| 0 : Play | 5 : Setup (rotation start) | 9 : Side A → Side B |
| 1 : Open | 6 : TOC read | A : Side B → Side A |
| 2 : Standby | 7 : Play | |
| 3 : Clamp | 8 : Search | |
| 4 : Disc sense | | |

5.2 FORMAT OF THE MECHANISM SWITCH INFORMATION WHICH IS TRANSMITTED TO THE MODE CONTROL IN THE ERROR OCCURRENCE

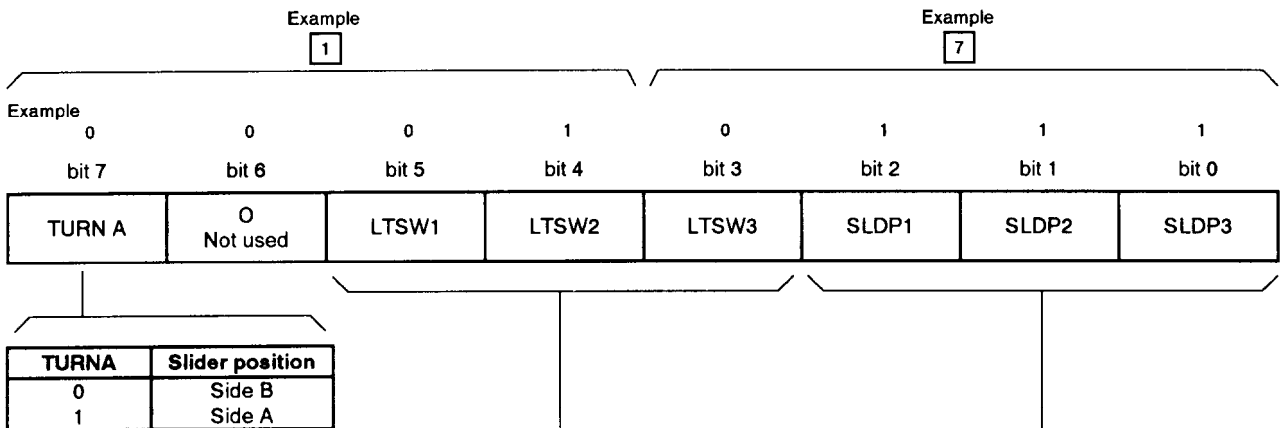
Example

• Mechanism switch information (1 7)

Mechanism control → Mode control

Communication byte address 5 (COMBUF5)

(Mode control displays this value as it is.)



Example of 1 7 is indicated as follows.

(Slider : Side B
 Tilt : Tilt +
 Position : B-INSIDE)

LTSW			Loading/tilt position
1	2	3	
0	1	1	Open (Tray open state)
0	0	1	Loading (During move the tray horizontally)
1	0	1	Standby (Tray close & spindle down state)
1	0	0	Clamp (Durring spindle up or down)
0	0	0	Tilt - (Clamp state)
0	1	0	Tilt + (Clamp state)
1	1	0	Tilt limit (Clamp state)

SLDP			Slider position
1	2	3	
1	0	0	CD active position
1	0	1	CDV active position
1	1	0	LD active position
0	1	1	CD inside position
1	1	1	Side B inside position

6. ADJUSTMENTS

6.1 TEST MODE

1)How to start the test mode

On the MOTHER ASSY, Short circuit the test mode JP W490 and W491, the test mode is started by pressing the power switch ON. (Fig. 1)

After confirming that all FL indicators are lit, remove test mode jumper wire and GND connection.

2)How to cancel the test mode

Turn power switch OFF.

3)Functions and key control when in test mode

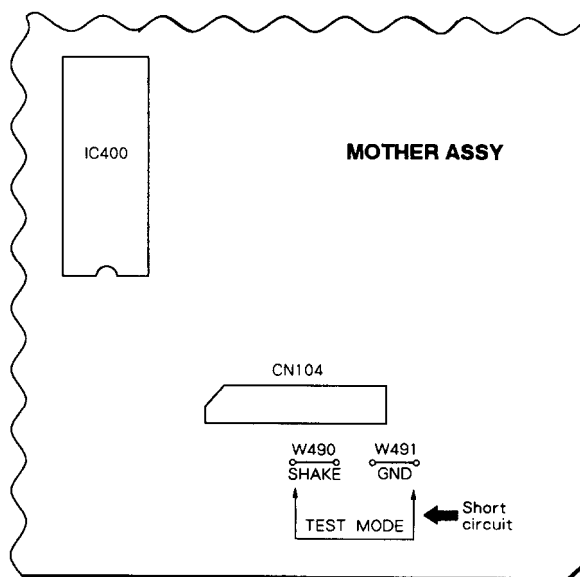


Fig. 1

Note : When you open the tray in test mode, the screen displays goes out. To display the screen again, press the **DISPLAY** key.

• Key Operation In the Test Mode

Player Status	Key Operation	Function	TV Screen Display
Tray Open	◀◀/▶▶ SKIP (Refer to Note 1)	◀◀ : Shifts the tray in the closed direction and also raises the turn table while pressing the key. ▶▶ : Shifts the tray in the open direction and also lowers the turn table while pressing the key.	
Tray Open	▶ PLAY	Clamps	
Clamp	▶ PLAY	Turns the disc through TRK Servo OFF	TRK - OFF
TRK Servo OFF	▶ PLAY	TRK Servo ON	TRK - ON
TRK Servo ON	▶ PLAY	TRK Servo OFF	TRK - OFF
TILT Neutral	+ MULTI- SPEED	TILT Servo ON	T-□:ON
TILT ON	- MULTI- SPEED	TILT Neutral	T-□:N
TILT Neutral or ON	◀◀/▶▶ SKIP	Setting TILT Servo to OFF, can force TILT to move.	T- 1 to T- E
Clamp	◀◀/▶▶ SCAN	Can force the slider to move	S- LD S- BIN S- CDV S- CD S- IN
Play	|| PAUSE	Still	
Play	■ STOP	Stop	
Stop	▲ OPEN	Open	
Play	<div style="text-align: center;"> +10 ↓ 0 to 9 ↓ ▶ PLAY </div>	Set to SEARCH lead address input mode. Designates the SEARCH lead address through keys 0 to 9. Press the CLEAR C key if the designated address is incorrect. Searches the designated address upon pressing the PLAY key.	

Note 1 : Press SKIP (◀◀/▶▶) keys after the tray is set to open state by pressing OPEN (▲) key.

Because, in tray open state, pressing PLAY (▶) key causes is to set to clamp state and SKIP (◀◀/▶▶) keys can not function properly.

**• Player Operation in the Test Mode
(Disc tray is removed)**

Operate the player by selecting a test mode function with the keys on the player or on the remote control unit.

• CD PLAYBACK

- ① Place the CD disc on the turn table.

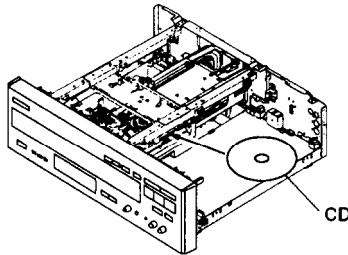


Fig. 2

- ② Press the PLAY (▶) key once.
(Twin gear starts to move.)
- ③ Push the cam plate (Fig. 3) in the direction of the arrow and wait until the CD disc is clamped.

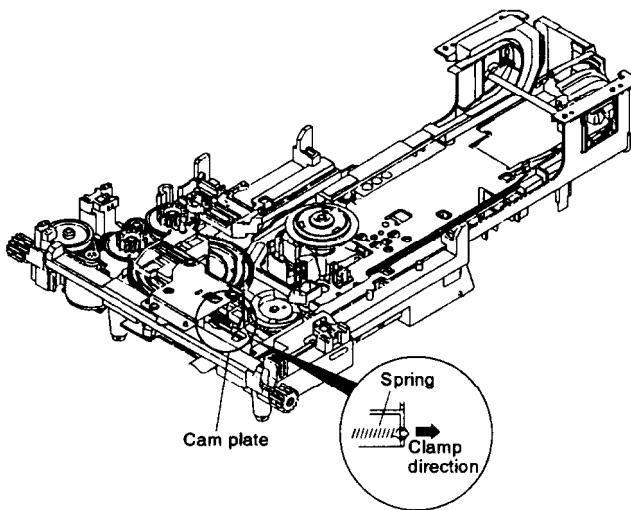
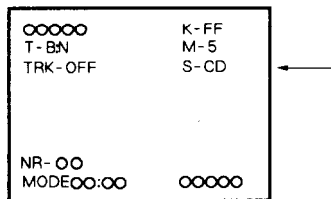


Fig. 3

- ④ Press the ◀◀ or ▶▶ keys to appear "S - CD" on the TV screen display.



TV screen display

Fig. 4

- ⑤ Press the PLAY (▶) key twice, disc will be normally playbacked.

• LD PLAYBACK

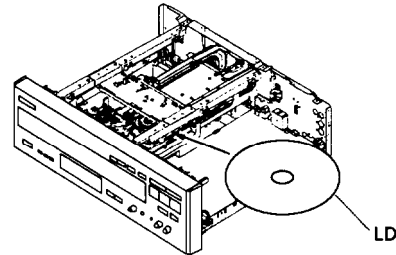
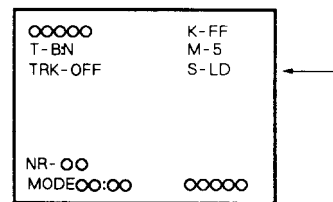


Fig. 5

- ① Press the SKIP REV (◀◀) key to raise the turn table (spindle motor section) while pressing the cam plate (Fig. 3) in the direction of the arrow. Raise it to the position where the LD disc can be easily placed on the turn table. If the turn table is raised too high, lower it with the SKIP FWD (▶▶) key.
- ② Place the LD disc on the turn table and press the PLAY (▶) key once to clamp the disc.
- ③ Press the ◀◀ or ▶▶ keys to appear "S - LD" on the TV screen display.



TV screen display

Fig. 6

- ④ Press the PLAY (▶) key twice, disc will be normally playbacked.

6.2 ADJUSTMENT PRECAUTIONS

• Equipment and jigs needed for adjustment

- CD test disc (YEDS - 7)
- LD test disc (GGV1012)
- Medium-sized blade screwdriver
- Small blade screwdriver
- Large Phillips screwdriver
- Medium-sized Phillips screwdriver
- Two-channel oscilloscope (with delay)
- Frequency counter
- TV monitor

• Preparation for Adjustment

1. Disc tray removal

1. Remove the seven screws (A) fastening the cover and remove the cover.
2. With the power supply on, press the OPEN/CLOSE (LD) button and put the disc tray in the open position.
3. While pushing the hooks (B) on both sides of the rear of the disc tray inwards, pull out the disc tray.

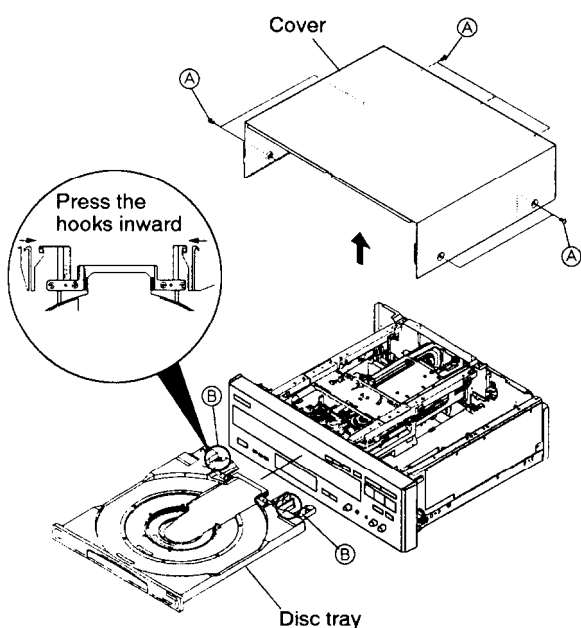


Fig. 7

Note: The adjustments other than "Electrical Adjustments 3. PLL OFFSET Adjustment" can be carried out with the disc tray mounted.

2. Diagnostic method of MOTHER assy

1. Remove the four screws (C) fastening the rear panel (L). (Fig. 8)

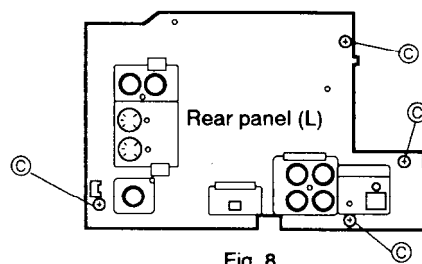


Fig. 8

2. Remove a screw (D) fastening the front side of PCB holder. (Fig. 9)
3. Remove the two screws (E) fastening the MOTHER assy. (Fig. 9)

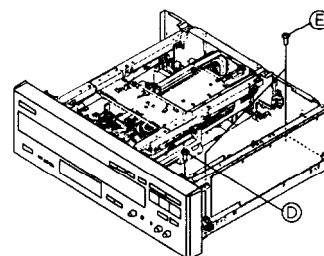


Fig. 9

4. Loosen the binder for fixing flat cable in the MOTHER assy.
5. While pulling up the rear panel (L) toward the rear, MOTHER assy will be removed with the rear panel (L). Then MOTHER assy can be diagnosed by standing it as shown in Fig. 10.

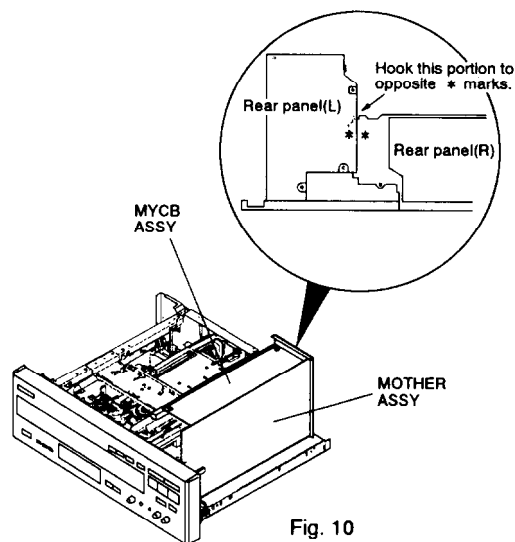


Fig. 10

Note 1: The MOTHER assy can be diagnosed with the disc tray mounted.

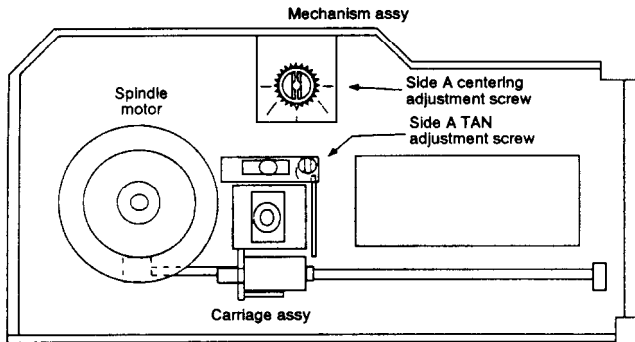
Note 2: When inserting the disc tray, please hold down the flat cable without hanging to the tray.

● **Before adjusting mechanism system**

● **Centering adjustment screw and TAN adjustment screw**

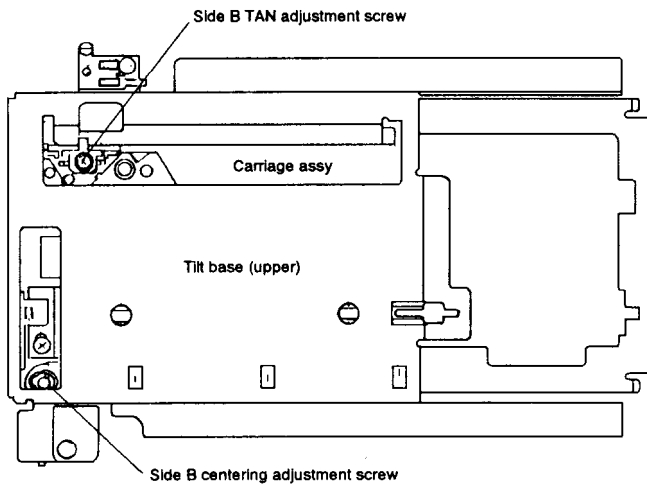
Note: Be careful not to turn centering adjustment screw and TAN adjustment screw past their adjustment range.

After the adjustments, apply the lock-tight to centering and TAN adjustment screws.



Do not turn the centering and TAN adjustment screws past their ranges, which are $\pm 0.75\text{mm}$ and $\pm 80^\circ$ from center. Apply the lock-tight after the adjustment.

Fig. 11 Mechanism assy adjustment (side A)



Centering adjustment range $\pm 90^\circ$
 TAN adjustment range \pm two turns

Fig. 12 Mechanism assy adjustment (side B)

● The mechanical adjustments can all be carried out with disc tray mounted.

● **Notes when adjusting centering**

If waveform S/N is bad and difficult to observe in “3 and 8. SPDL motor centering adjustment” use the low pass filter in diagram. (Fig. 13)

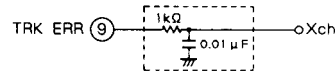


Fig. 13 Low pass filter

● **Carriage assy position when adjusting centering**

When moving slider to inner position to adjust the innermost track of disc during centering adjustment, be careful not to keep the mechanism stopper and carriage assy from bumping each other. (Fig. 14)

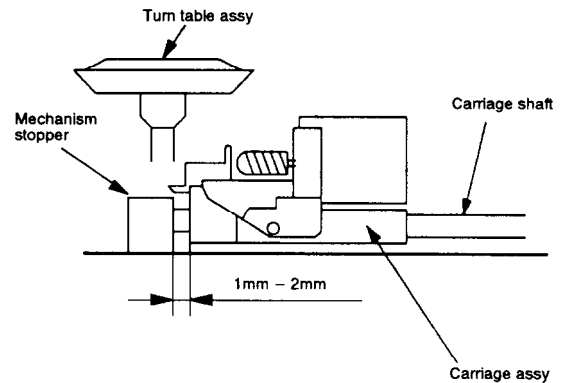


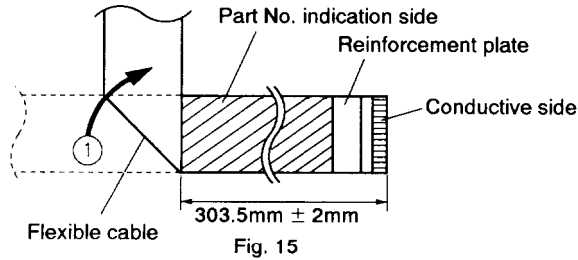
Fig. 14

● **Notes when adjusting pickup assy**

Please clean lens first when readjusting the pickup assy that is on this product. Also, when changing pickup assy, change whole carriage assy (VWT1110).

6.3 HOW TO INSTALL THE FLEXIBLE CABLE

1. Bend the flexible cable as shown in Fig. 15.



2. Put the bended portion in step 1 to hook (A) of the flexible holder (large hill) in the rear of mechanism assy. (Fig. 16)
3. Bend the flexible cable along the wall of flexible holder.

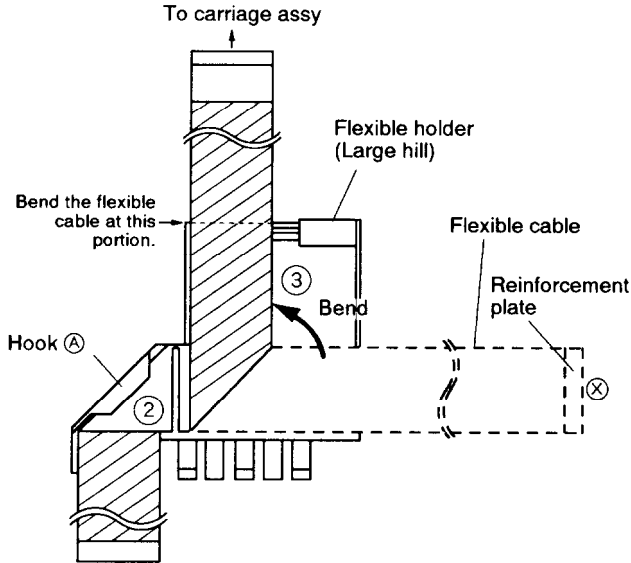


Fig. 16 Rear view of the flexible holder

4. Pull the flexible cable not to slackened after passing the (X) edge side of flexible cable through the flexible holder as shown in Fig. 17.

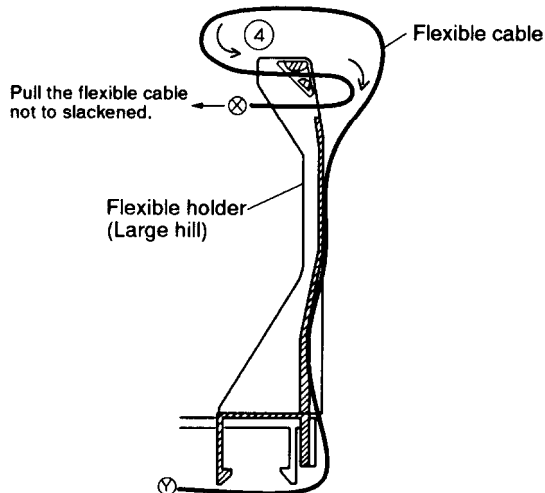


Fig. 17 Sectional plan of the flexible holder

5. Put the flexible cable to hook (B) after the (Y) edge side of flexible cable is bended along the hook (B) position of the tilt base (lower) in the bottom section of mechanism assy, then insert to connector CN103 of the MOTHER assy.

Caution: Be sure to insert the MOTHER assy side of flexible cable first of all for prevent the damage of laser diode by the static electricity.

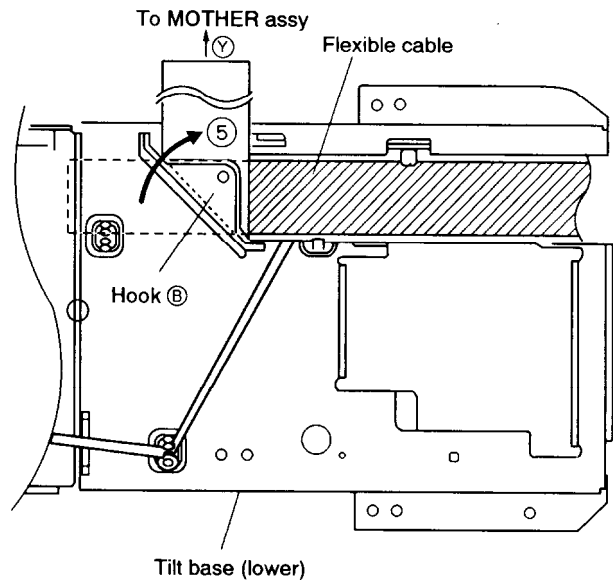


Fig. 18 Bottom view of the tilt base (lower)

6. Insert the (X) edge side of flexible cable to connector of the carriage assy after passing through the Cable holder. (Fig. 19)
7. Move the Cable holder to touch the connector, lock the Cable holder to turn up the flexible cable to lower side.

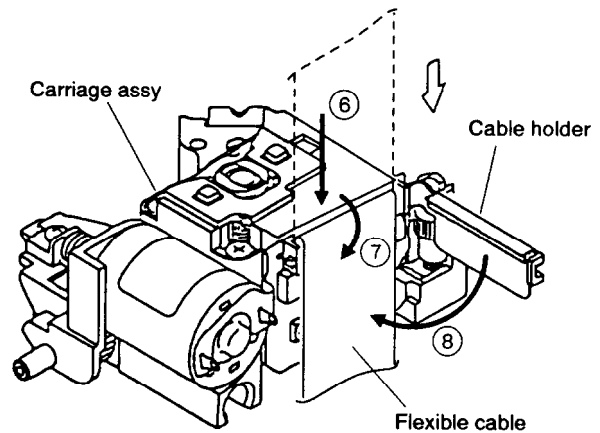


Fig. 19

6.4 ADJUSTMENT LOCATION

- VR607: Side A tilt offset adjustment
- VR608: Side B tilt offset adjustment
- VR604: Focus servo loop gain adjustment
- VR603: Tracking servo loop gain adjustment
- VC901: Master clock adjustment
- VR450: Output video level adjustment
- VR612: PLL offset adjustment
(Orderin adjustment)

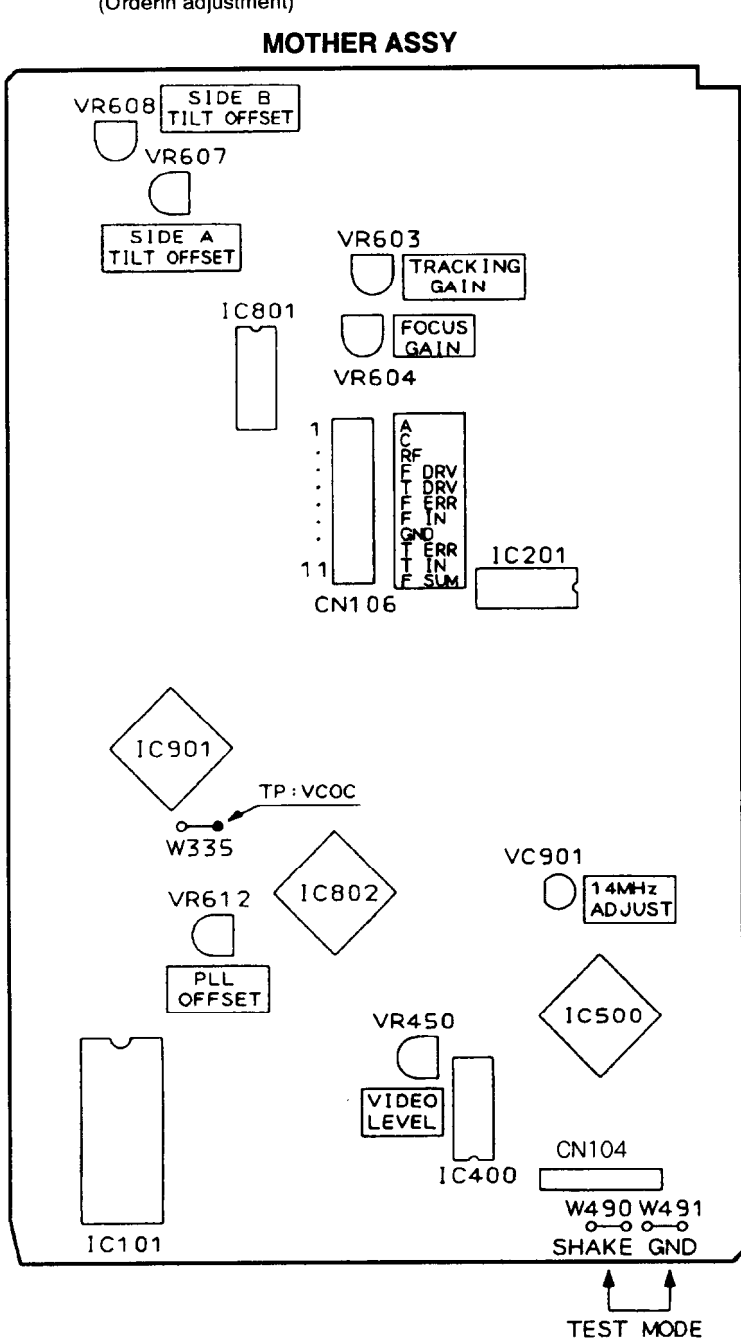


Fig. 20 Adjustment diagram of MOTHER assy

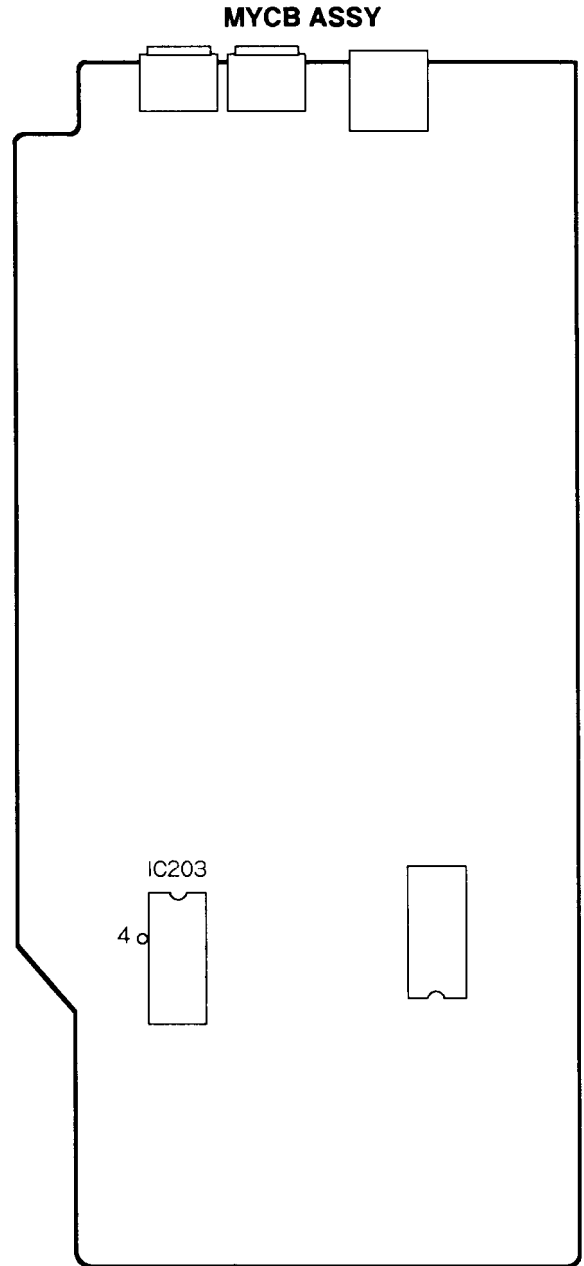


Fig. 21 Adjustment diagram of MYCB assy

6.5 ADJUSTMENT METHOD

● Mechanical adjustment

Step	Adjustment name	Adjustment point	Measuring point and measuring mode	Player condition	Adjustment procedure	Waveform and connection diagram
1	Tilt offset adjustment	MOTHER assy VR607, VR608 (TILT OFFSET)		Test mode Disc not installed	Check the positions of VR607 and VR608 to the mechanical center with eyes. If there positions are shifted, set to the center.	
2	Tangential direction angle adjustment (side A)	Carriage assy TAN adjustment screw (side A)	CN106-3 (RF)	CD test disc outer track play (See position for TAN adjustment screw) TRKG-ON, TILT-ON	Adjust so that the amplitude of the RF waveform reaches its maximum and the envelope is very clear. Apply the lock-tight after the adjustment.	
3	Spindle motor centering adjustment (side A)	Mechanism assy Centering adjustment screw (side A)	CN106-9 (TRKG error)	CD test disc inner track play (CD inside position in the program area) TRKG-OFF, TILT-ON	Adjust so that the amplitude of the tracking error waveform reaches its maximum and the envelope is very clear. Apply the lock-tight after the adjustment.	
4	Crosstalk check and tilt offset re-adjustment (side A)	MOTHER assy VR607 (side A) (TILT OFFSET)	TV monitor Crosstalk monitor check	LD test disc #115 still TRKG-ON, TILT-ON	If the crosstalk is pronounced, adjust VR607 until the crosstalk is not noticeable.	
5	Focus servo loop gain adjustment	MOTHER assy VR604 (FOCUS GAIN)	CN106-6 (FOCUS error) CH2 "X-Y mode"	LD test disc (PLAY STANDBY) Short CN106-7 (F IN) and B (GND), then press the PLAY key (disc not turn)	Adjust VR604 until the waveform level is $4.8 \pm 0.5V$.	
6	Tracking servo loop gain adjustment	MOTHER assy VR603 (TRACKING GAIN)	CN106-9 (TRKG error) CH2 "X-Y mode"	LD test disc #115 still TRKG-ON, TILT-ON	Adjust VR603 until the waveform level is $1.8 \pm 0.2V$.	
7	Tangential direction angle adjustment (side B)	Carriage assy TAN adjustment screw (side B)	CN106-3 (RF)	LD test disc #115 still TRKG-OFF, TILT-ON	Adjust so that the amplitude of the RF waveform reaches its maximum and the envelope is very clear. Apply the lock-tight after the adjustment.	
8	Spindle motor centering adjustment (side B)	Mechanism assy Centering adjustment screw (side B)	CN106-9 (TRKG error)	LD test disc #115 still TRKG-OFF, TILT-ON	Loosen a black screw beside the centering adjustment screw (side B). Adjust so that the amplitude of the tracking error waveform reaches its maximum and the envelope is very clear. After adjustment is complete, tighten the black screw and apply the lock-tight.	
9	Crosstalk check and tilt offset re-adjustment (side B)	MOTHER assy VR608 (side B) (TILT OFFSET)	TV monitor Crosstalk monitor check	LD test disc #115 still TRKG-ON, TILT-ON	If the crosstalk is pronounced, adjust VR608 until the crosstalk is not noticeable.	

(NOTE) • This adjustment can be thought to be about the same adjustment as on the manufacturing line with differing adjustment tools. Follow the adjustment procedures even for checking the adjustments.
 • When you open the tray in test mode, the screen displays goes out. To display the screen again, press the **DISPLAY** key.
 • The mechanical adjustment can be all carried out with disc tray mounted.

• Electrical adjustment

Step	Adjustment name	Adjustment point	Measurement point	Player condition	Adjustment procedure	Waveform and connection diagram
1	Master clock adjustment	MOTHER assy VC901	MYCB assy IC203-4 (2 fsc)	Power ON	Adjust VC901 so that frequency with power on is $7.159090\text{MHz} \pm 20\text{Hz}$. Connect video output terminal and oscilloscope. (Video output terminal is terminated with 75Ω .)	
2	Output video level adjustment	MOTHER assy VR450 (VIDEO LEVEL)	Video output terminal	Normal mode LD test disc #19,900 still	Adjust VR450 so that level from video signal sync tip to 100% white becomes $1\text{Vp-p} \pm 5\%$. (It's possible to terminate video output terminal with 75Ω by connecting TV monitor)	
3	PLL OFFSET adjustment	MOTHER assy VR612 (PLL OFFSET)	MOTHER assy W335 (PLL OFFSET TP)	Test mode CD test disc play TRKG servo OFF/ON	Note: Before adjusting remove disc tray. With the tracking servo off, playback digital audio and roughly adjust VR612 so that the sound is audible. Connect W335 and a DC voltmeter and while playing back digital audio, switch the tracking servo on and off and adjust VR612 so that the difference between the DC voltage when the tracking servo is on and when it is off is no greater than $0 \pm 0.1\text{V}$.	

7. IC INFORMATION

- The information shown in the list is basic information and may not correspond exactly to that shown in the schematic diagrams.

■ PD3304B (FLKY ASSY IC101)

• MODE CONTROL IC

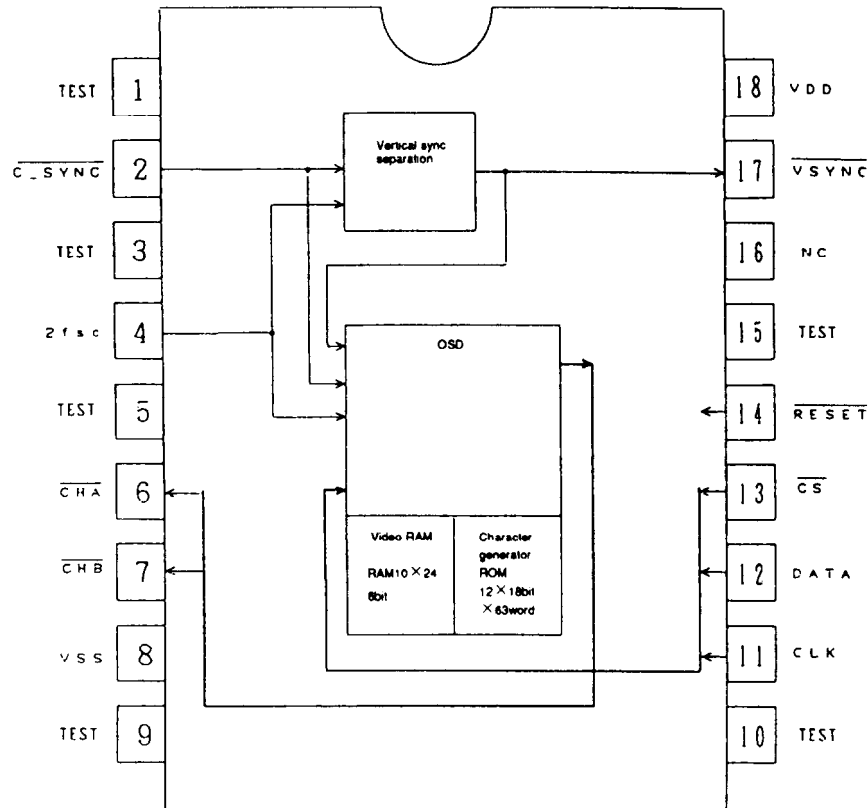
• Pin Function

No.	Mark	Pin Name	I/O	Function	No.	Mark	Pin Name	I/O	Function
1	VCC	———	I	+5V	33	P46	XMIC ON	O	MIC MIX L : ON, H : OFF
2	P90	xRESET OUT	O	Mother board reset output.	34	P45	SEG N	O	Display segment output.
3	SCKI	xS - CLOCK	I/O	Serial communication clock. (Mech. control and character generator)	35	P44	KSCAN4/SEG M	O	Key scan output / Display segment output.
4	SI1	S - MTOF	I	Serial communication data input. (Mech. control)	36	P43	KSCAN3/SEG L	O	
5	SO1	S - FTOM	O	Serial communication data output. (Mech. control and character generator)	37	P42	KSCAN2/SEG K	O	
6	P94	xCS	O	Character generator (PD0175A, PD9004A) CS output. (L : enable)	38	P41	KSCAN1/SEG J	O	
7	P95	LED(DISPOFF)	O	LED output : Display OFF indication.	39	P40	KSCAN0/SEG I	O	Display segment output.
8	P96	LED(Q TURN)	O	LED output : Quick turn indication.	40	P50	SEG H	O	
9	P97	POWCTL	O	Mother board power supply SW output.	41	P51	SEG G	O	
10	AVCC	———	I	+5V	42	P52	SEG F	O	
11	P00	KIN0	I	Key data input.	43	P53	SEG E	O	
12	P01	KIN1	I		44	P54	SEG D	O	
13	P02	KIN2	I		45	P55	SEG C	O	
14	P03	KIN3	I		46	P56	SEG B	O	
15	P04	KARXNOR	I	MIC SW L : OFF normal mode H : ON karaoke mode	47	P57	SEG A	O	
16	P05	Not used	I	GND	48	VDISP	———	I	- 27V
17	P06	ECHVOL	I	Echo volume.	49	P60	G8	O	Display grid output.
18	P07	OEMSEL	I	OEM selection port. L : PIONNER, H : YAMAHA	50	P61	G7	O	
19	AVSS	———	I	GND	51	P62	G6	O	
20	TEST	Not used	I	GND	52	P63	G5	O	
21	X2	Not used	O	NC (OPEN)	53	P64	G4	O	
22	X1	Not used	I	+5V	54	P65	G3	O	
23	VSS	GND	I	GND	55	P66	G2	O	LED output : LD indication
24	OSC1	———	I	Main system clock oscillation (8MHz)	57	P70	LED(LD)	O	
25	OSC2	———	O		58	P71	LED(CD)	O	LED output : CD indication
26	xRST	xRESET IN	I	CPU reset (L : reset)	59	P72	LED(SIDE B)	O	LED output : Side B indication
27	IRQ0	SHAKE	I/O	Mech. control serial communication requirement.	60	P73	LED(SIDE A)	O	LED output : Side A indication
28	IRQ1	SEL IR	I	Remote control input.	61	P74	BASBST1	O	Bus boost switch. (OFF : P74=H and P75=H, ON : others)
29	P14	FSX	I	For measuring the error rate.	62	P75	BASBST2	O	Bus boost switch.
30	P15	EFLG	I	For measuring the error rate.	63	P76	XDSPCS	O	DSP (PDQ001A) CS output. (L : enable)
31	P16	Not used	I	GND	64	P77	XDSP ON	O	DSP L : ON, H : Through
32	P47	DOGFOOD	O	Pulse output for watch dog.					

■ PD9004A (MYCB ASSY IC203)

• OSD IC

● Block Diagram

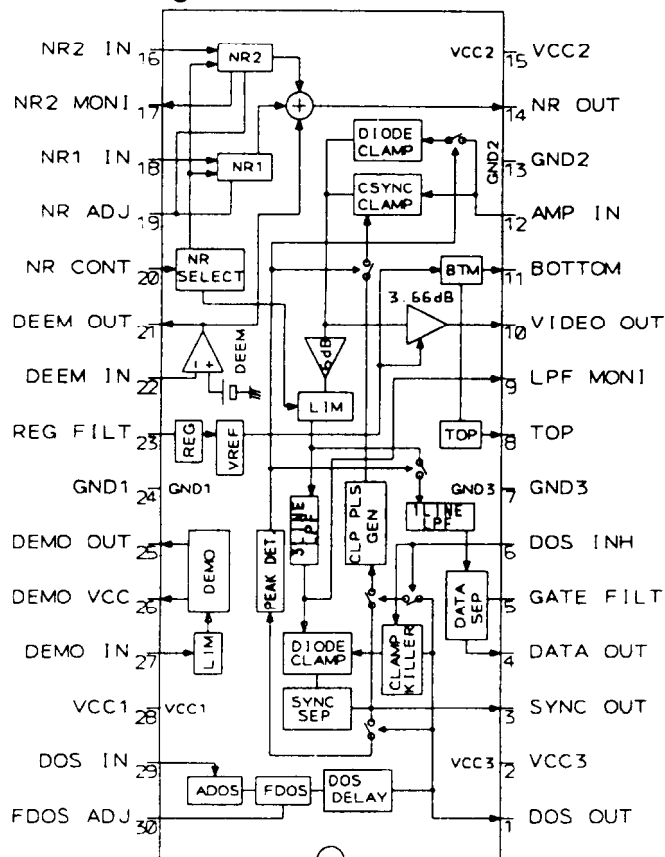


● Pin Function

Pin No	Code	I/O	Logic	Function
1	TEST	—	—	Do not connect any external components.
2	$\overline{\text{CSYNC}}$	I	Negative	Composite sync signal input
3	TEST	—	—	Do not connect any external components.
4	2fsc	I	—	Color subcarrier frequency $2 \times$ clock input (NTSC about 7.14 MHz PAL about 8.8 MHz)
5	TEST	—	—	Do not connect any external components.
6	$\overline{\text{CHA}}$	O	Negative	Character timing output
7	$\overline{\text{CHB}}$	O	Negative	Blanking timing output
8	VSS	—	—	Connected to system ground
9	TEST	—	—	Do not connect any external components.
10	TEST	—	—	Do not connect any external components.
11	CLK	I	↑	Data read-in clock input pin; the data applied to the Data pin is read-in at the rising edge of the clock.
12	DATA	I	Positive	Control data input pin; the data is read-in synchronized with the clock applied to the CLK pin.
13	$\overline{\text{CS}}$	I	Negative	Low for serial communications
14	$\overline{\text{RESET}}$	I	Negative	Hardware reset with pull-up resistance
15	TEST	—	—	Do not connect any external components.
16	NC	—	—	Not connected
17	$\overline{\text{VSYNC}}$	O	Negative	Signal with V sync separated from C sync
18	VDD	—	—	Power supply (+5V) pin

■ PAC005B (MOTHER ASSY IC400) -VIDEO IC

● Block Diagram



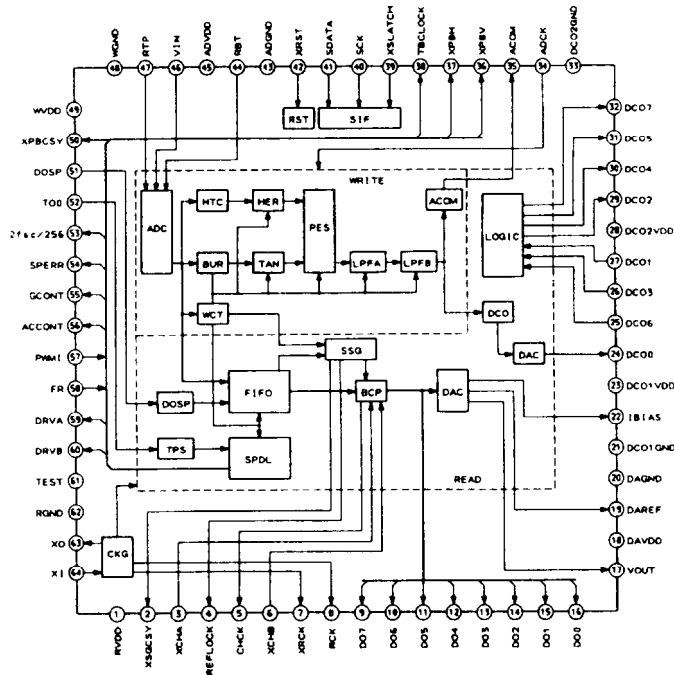
● Pin Function

No.	Pin Name	Function
1	DOS OUT	Drop out pulse output.
2	VCC3	VCC for SYNC SEP section.
3	SYNC OUT	Composite sync output.
4	DATA OUT	Data pulse output.
5	GATE FILT	Connect a capacitor for Gate - Gate.
6	DOS INH	Clamp pulse and clamp killer control.
7	GND3	GND for SYNC SEP section.
8	TOP	Reference DC (TOP) for A/D.
9	LPF MONI	Monitor the LPF for SYNC SEP.
10	VIDEO OUT	Signal output for A/D.
11	BOTTOM	Reference DC (BOTTOM) for A/D.
12	AMP IN	Sync chip clamp input.
13	GND2	GND for VIDEO.
14	NR OUT	Noise reduction output.
15	VCC2	VCC for VIDEO section.
16	NR2 IN	Signal input (2) for noise reduction.
17	NR2 MONI	Limiter output for noise reduction.
18	NR1 IN	Signal input (1) for noise reduction.
19	NR ADJ	Limiter level adjusting pin for noise reduction.
20	NR CONT	Noise reduction (1, 2) select and limiter control.
21	DEEM OUT	De-emphasis output.
22	DEEM IN	De-emphasis input.
23	REG FILT	Connect a capacitor for regulator.
24	GND1	GND for RF section.
25	DEMO OUT	Demodulation output of RF signal.
26	DEMO VCC	VCC for FM demodulation output.
27	DEMO IN	RF input for FM demodulation.
28	VCC1	VCC for RF section.
29	DOS IN	RF input for DOS.
30	FDOS ADJ	FDOS sensitivity adjustment.

PD0192A (MOTHER ASSY IC500)

• DIGITAL VIDEO PROCESSOR

• Block Diagram



• Pin Function

No.	Pin Name	Function	
1	RVDD	Power pin for reference system. Connect to +5V.	
2	XSGCSY	Reference composite sync. is output at negative logic. Delay can be controlled by serial command.	
3	WFM	MEMSYS : 1	Field monitor output for write system. Outputs "H" when in odd field.
	XCHA	MEMSYS : 0	Character input pin. Inputs "L" during character insertion.
4	XTBCH	MEMSYS : 1	TBC H sync. output. Outputs time base-corrected (TBC) H sync. at negative logic.
	REFLOCK	MEMSYS : 0	SSG phase detection signal output. Outputs "H" when phase difference of H, V sync. between Playbacksystem (after TBC) and SSG system is small enough.
5	XTBCV	MEMSYS : 1	TBC V sync. output. Outputs time base-corrected V sync. at negative logic.
	GHCK	MEMSYS : 0	Clock output for character generator. Output 2fsc.
6	FCH	MEMSYS : 1	Field change input. Switches field of SSG when "H".
	XCHB	MEMSYS : 0	Character frame input pin. Inputs "L" when character frame is inserted.
7	XRCK	Reference CLK is reversed and output.	
8	RCK	Reference CLK output.	
9	DO7	Data output 7	Outputs TBC (time base-corrected) video signal to support memory. This setting performs by serial command. DO7 is MSB, DO0 is LSB.
10	DO6	Data output 6	
11	DO5	Data output 5	
12	DO4	Data output 4	
13	DO3	Data output 3	
14	DO2	Data output 2	
15	DO1	Data output 1	
16	DO0	Data output 0	
17	VOUT	DAC output of TBC video signal.	
18	DAVDD	Power pin for D/A converter. Connect to +5V.	
19	DAREF	D/A converter reference for video. Normally connect to DAGND via 0.1 μ F of laminated ceramic capacitor.	
20	DAGND	Ground pin for D/A converter. Connect to GND.	
21	DCO1GND	Ground pin for DCO. Connect to GND.	
22	IBIAS	Current setting pin of bias circuit. Normally connect to DAGND via external resistor (10k Ω).	
23	DCO1VDD	Power pin for DCO. Connect to +5V.	

No.	Pin Name	Function
24	DCO0	DCO output pin. ADCK is generated by multiplying this signal by 4.
25	DCO6	Waveform shaping input pin 6. Inputs signal of DCO5 output signal that is delayed 35 ns (self-biased).
26	DCO3	Waveform shaping input pin 3. Inputs signal of DCO2 output signal that is delayed 70 ns (self-biased).
27	DCO1	Waveform shaping input pin 1. Inputs DCO0 signal via band-pass filter of fsc (self-biased).
28	DCO2VDD	Power supply pin for multiplied by 4 section. Connect to +5V.
29	DCO2	Waveform shaping output pin 2. Outputs signal of waveform of DCO1 signal that is shaped.
30	DCO4	Waveform shaping output pin 4. Outputs signal of waveform of DCO3 signal that is shaped.
31	DCO5	Waveform shaping output pin 5. Outputs signal multiplied by 2.
32	DCO7	Waveform shaping output pin 7. Outputs signal multiplied by 4.
33	DCO2GND	Ground pin for multiplied by 4 section. Connect to GND.
34	ADCK	CLK input pin for write system. Inputs signal of DCO7 output signal that is filtered through 4 fsc ceramic filter. (self-biased)
35	ACOM	Jitter correction signal output for analog audio. Used to cancel the jitter of analog audio.
36	XPBV	V sync. output for playback system. Outputs signal that has V sync. separated from pin 50 (XPBCSY) signal at negative logic.
37	XPBH	H sync. output for playback system. Outputs signal that has H sync. separated from pin 50 (XPBCSY) signal at negative logic.
38	TBCLOCK	PLL LOCK detection signal output. Outputs "H" when spindle servo loop and TBC servo loop are locked.
39	XSLATCH	Serial interface latch signal input. Generates timing to latch data that was input to serial interface. (latched at L Schmitt trigger input)
40	SCK	Serial interface CLK input. CLK input for serial interface. SDATA value is read at rising edge. (Schmitt trigger input)
41	SDATA	Serial interface data input. Inputs data to serial interface. (Schmitt trigger input)
42	XRST	System reset input. Initializes internal registers of IC at negative logic. (Schmitt trigger input)
43	ADGND	Ground pin for A/D converter. Connect to GND.
44	RBT	A/D converter bottom reference input. Inputs bottom reference voltage of A/D converter.
45	ADVDD	Power supply pin for A/D converter. Connect to +5V.
46	VIN	A/D converter input. Inputs composite video signal.
47	RTP	A/D converter top reference input. Inputs top reference voltage of A/D converter.
48	WGND	Ground pin for write system. Connect to GND.
49	WVDD	Power pin for write system. Connect to +5V.
50	XPBCSY	Composite sync. input for playback system. Inputs composite sync. for playback system at negative logic. (Schmitt trigger input)
51	DOSP	Drop out pulse input. Inputs drop out detection pulse at positive logic. (Schmitt trigger input)
52	TOO	Tracking open pulse input. Inputs tracking open pulse at positive logic. (Schmitt trigger input)
53	XI/512	Master clock 512 division output. Outputs clock of master clock (4fsc) that is divided by 512.
54	SPERR	Spindle error PFD error output. Outputs result after performing PFD on PBH and RefH at tri-state.
55	GCONT	Spindle gain control output. Outputs PWM signal according to set value (GD0 – GD3), using serial instructions.
56	ACCNT	Accelerated control output. Outputs acceleration/deceleration signal by forced acceleration/deceleration and PBH sync. frequency detection at tri-state.
57	PWMI	Spindle error PWM input. Inputs signals that have voltage compared between spindle errors that passed through a loop filter and chopping waves. (Schmitt trigger input)
58	FR	Spindle error direction component input. Inputs signals that have voltage compared between spindle errors that passed through a loop filter and target voltage. (Schmitt trigger input)
59	DRVA	Transistor control signal output pin for spindle motor drive. This setting is performed by the interface corresponding to the brush motor and brushless motor.
60	DRVB	Transistor control signal output pin for spindle motor drive. This setting is performed by the interface corresponding to the brush motor and brushless motor.
61	TEST	Input pin for IC test. Fixed to "L".
62	RGND	Ground pin for reference system. Connect to GND.
63	XO	Oscillation output. Connect the X'tal (4 fsc) for oscillation.
64	XI	Oscillation input. Connect the X'tal (4 fsc) for oscillation.

■ PD0212B2 (MOTHER ASSY IC101)

・ MECHANISM CONTROL IC

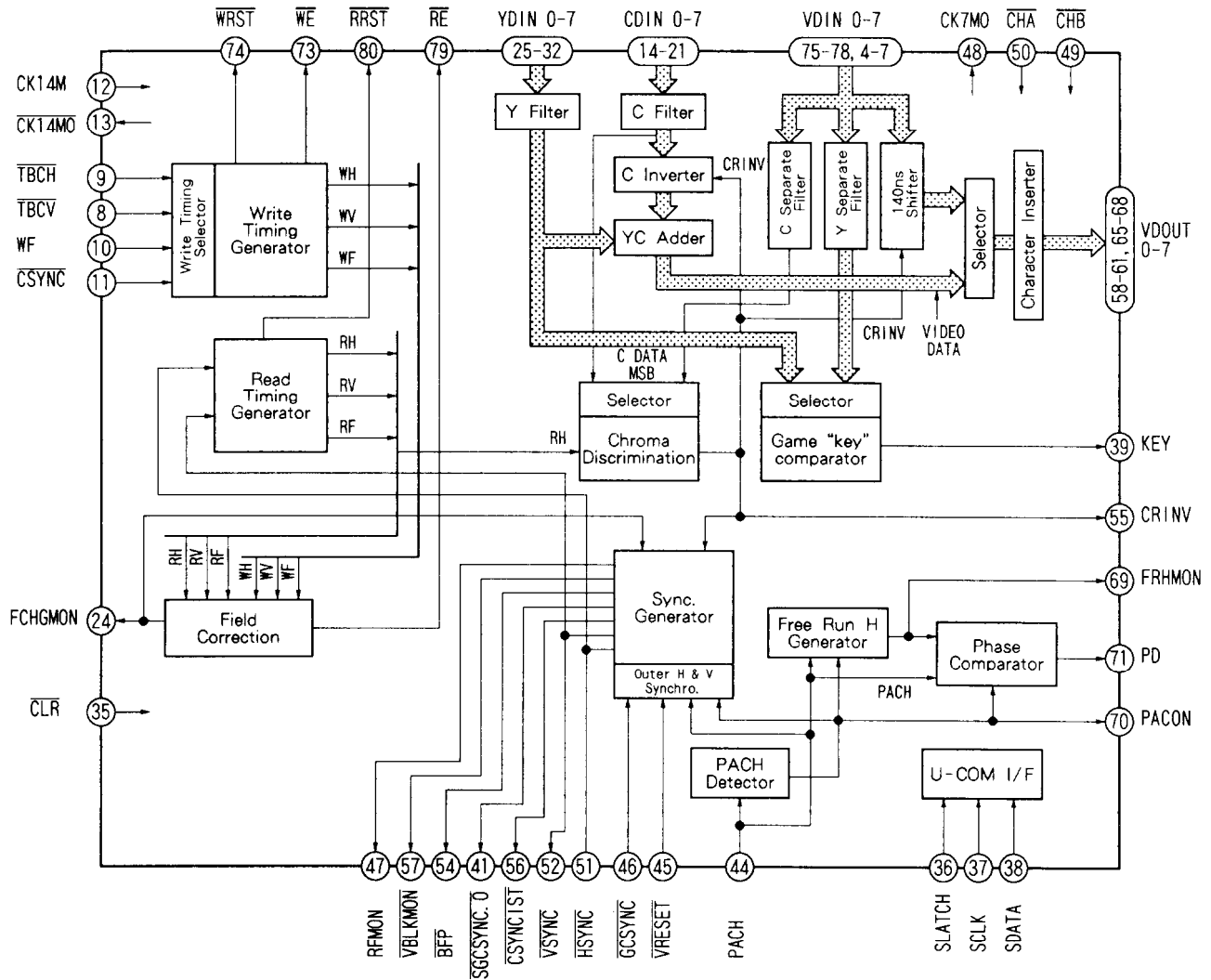
● Pin Function

No.	Pin Name	I/O	Function
1	VCC	I	Power supply pin. Apply 5V ± 10%.
2	RFCORR	O	RF correction switch signal output. "H" =gain UP CD,CDV – A:Low, CAV inner circuit gain up, others are High.
3	MUTE	O	Audio mute control signal output of audio system. L : Release MUTE , H : MUTE
4	SRDMUTE	O	Mute control signal output for AC3. Release MUTE during playback. L : Release MUTE, H : MUTE
5	TILT ON	O	(For debugging)Tilt operation information. H : during operation for checking tilt operation.
6	TILTERR	I A/D	This signal is A/D converted as the tilt servo control input. Control the tilt motor so that this signal becomes 2.5V.
7	TBALERR	I A/D	Tracking error balance signal input. This signal is A/D converted as the tracking offset control input.
8	SLDERR	I A/D	This signal is A/D converted as the slider servo control input. Control the tilt motor so that this signal becomes 2.5V.
9	SLDPOS	I A/D	Pickup position detection switch input. Detect the position by reading A/D input value which each switches are resistance divided.
10	XFOK	I	Focus servo lock signal input. L : Lock , H : Unlock Use for lock detection of focus servo.
11	SINGLE	I	ATT-SW of rear panel use for the single mode.This information transmit to mode control by communication. L : Single H : Normal
12	TBALDRV	O PWM	Output the tracking offset signal to PWM output, then use for auto tracking offset. 910 μsec period, tri-state control H, L, Z
13	XCD	O	LD/CD switch signal output pin. L : CD H : LD
14	XPLAY	O	Signal output during spindle servo. L : during servo H :during acceleration, brake and stop
15	SQOUT	I	Command data input from DSP. Read out SUBQ.
16	COIN	O	Command data output to DSP.
17	CQCK	O	DSP reading/writing command clock output pin. read at rising edge.
18	SLDDRV	O PWM	Slider control signal output pin. 5V=FWD, 0V=REV, 2.5V=STOP 910 μ sec period, tri-state control H, L, Z
19	SI1	I	Data input from the mode control IC.
20	SO1	O	Serial data output to the mode control IC.
21	SCK1	I/O	Clock for serial communication with the mode control IC. Becomes input mode without communicate with the mode control IC.
22	TZC	I INT	Tracking error zero cross signal input pin. Monitor this signal when searching track count in the miss clamp detection.
23	SHAKE	I/O	Hand shake signal for data communication with the mode control IC. Each microcomputer controls input/output by bilateral data line.
24	TILTDRV	I/O	LOAD/TILT control output pin. 0.5V – tray IN, OUT/tilt DOWN, UP 2.5V – STOP Use for tilt servo that tilt drive is PWM output.
25	XANA	O	Digital/Analog audio switch signal output. L : Analog H : Digital
26	XPBV	I	Playback vertical sync. signal input of LD/CDV. L :during vertical sync.
27	CNVss	I	Ground pin for A/D conversion.
28	XRESET	I	Reset signal input. L : Reset H : Release reset Mode control is controlled.
29	XIN	I	9MHz clock oscillation input pin.
30	XOUT	O	9MHzclock oscillation output pin.
31	N.C.	O	Not used.
32	GND	I	Ground.
33	SW1	I	Switch input for Loading/Tilt position detection
34	SW3	I	
35	SW2	I	

No.	Pin Name	I/O	Function
36	N.C.	I	Not used.
37	FG	I	Spindle motor FG signal input. 16 outputs per rotation. Used after dividing by 2 in microcomputer.
38	DATA	I	Input pin for Phillips code decoder with built in mechanism controller.
39	XPBH	I	Playback H- SYNC input for Phillips code decoder.
40	XPBV	I	Playback V- SYNC input for Phillips code decoder.
41	TURNA	I	Turn switch input. H : side A L : side B
42	BINSIDE	I	Side B inside switch input. L : Side B inside H : others
43	MEMLAT	O	Serial control latch output of memory control IC (PD4510A). Latches at falling edge.
44	MEMORY	I	Memory yes/no determination input pin. H :memory yes L : memory no
45	DOCINH	O	Control the clamp pulse and clamp killer by tri-state values.
46	DETPOW	I	Use for power abnormal signal input port. L : Normal H : Abnormal
47	NROFF	O	Control output of the noise reduction by VDEM. L : Normal H : Not NR
48	WFM	I	Field determination signal from DVP. L : EVEN H : ODD
49	SQ1	O	Analog audio switch signal output 1/L. L : squelch OFF H : squelch ON
50	SQ2	O	Analog audio switch signal output 2/R. L : squelch OFF H : squelch ON
51	XCX	O	Analog audio CX noise reduction switch signal output. L : CX ON H : CX OFF
52	XVCECAN	O	Voice cancel output. L : CANCEL ON , H : OFF
53	SO3	O	Serial 3 data signal output. Serial signal is commoned, signal distinguish by latch signal (DVPLAT, TLAT).
54	SCK3	O	Serial 3 clock signal output.
55	DVPLAT	O	PD0192A serial latch signal output pin. Latches at falling edge.
56	TBCLOCK	I	Spindle lock signal input pin. L : Unlock , H : Lock
57	TLATCH	O	DAC & digital filter PD2026B serial control latch signal output pin. Latches at falling edge.
58	XREV	O	Side A/side B switch pin. H : side A , L : side B
59	DETAMP	I	Spindle over-current detection signal input pin. L : over current , H : Normal
60	FSEQ	I	Subcode sync. conformity detection signal input pin. L : Not conformity , H : Conformity
61	THOLD	I	Track jump accelerating/decelerating signal input pin. L : other H : accelerating/decelerating
62	WRQ	I	Subcode Q reading OK signal input pin. L : NG , H : OK This pin will be H when Subcode Q data passed by CRC check.
63	RWC	O	DSP read/write command signal output pin. L : READ H : WRITE
64	RWC2	I	Set to input port without influence when this pin short-circuit to pin 63.

PD4510A (MYCB ASSY IC102)
• MEMORY CONTROL IC

• Block Diagram



• Pin Function

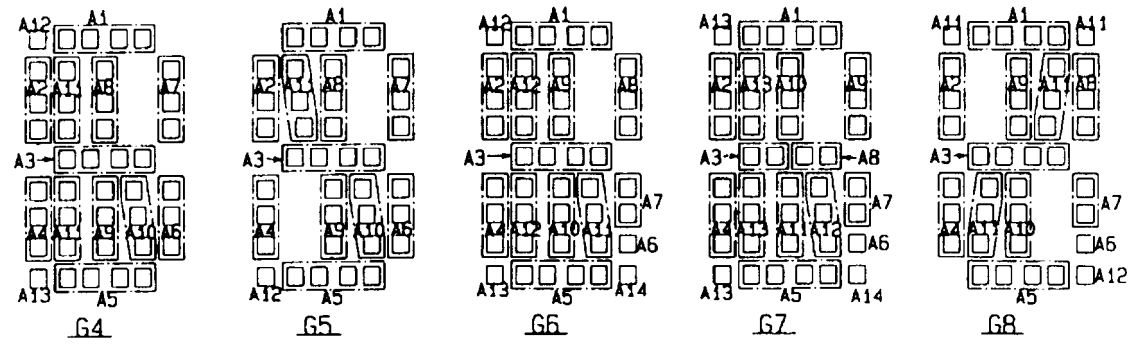
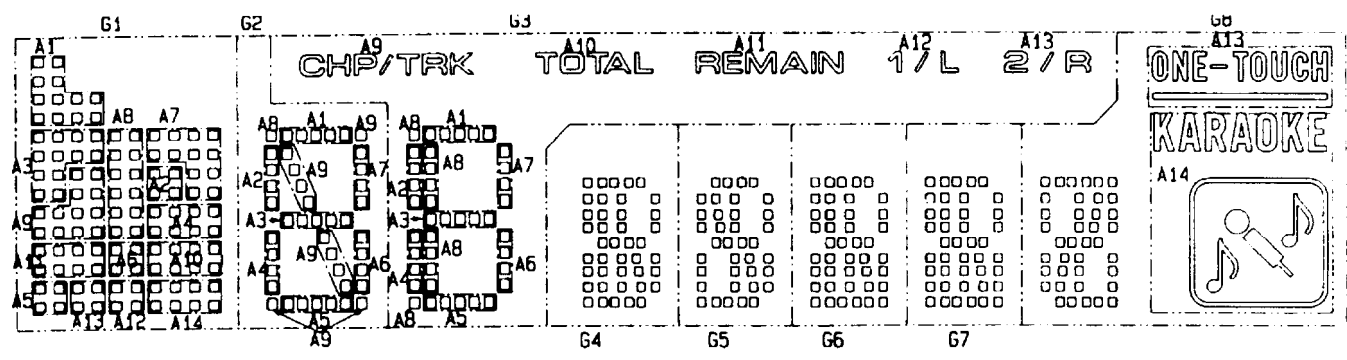
No.	Pin Name	Name	I/O	Function
1	NC	No connection	—	To be an open circuit.
2	VDD	Power supply	—	Connect to +5 V power supply voltage.
3	GND	Ground	—	Connect to GND.
4	VDIN4	Video input 4	I	Inputs of the upper 4 bits of the data output from field memory. VDIN0 (pin 75) is the LSB and VDIN7 is the MSB.
5	VDIN5	Video input 5		
6	VDIN6	Video input 6		
7	VDIN7	Video input 7		
8	TBCV	TBC V sync input	I	Negative-logic input of time-base-corrected V sync from DVP. Used to control a write operation to field memory.
9	TBCH	TBC H sync input	I	Negative-logic input of time-base corrected H sync from DVP. Used to control a write operation to field memory.
10	WF	Field input of write system	I	Input of the field monitor signal from DVP, "H" for odd fields and "L" for even fields. Used to control a write operation to field memory.
11	CSYNC	Composite sync input of reference system	I	Negative-logic input of reference composite sync from DVP. Used for write control at squelch. (Switching between the reference sync and TBC sync is performed through a command input to the serial interface.)

No.	Pin Name	Name	I/O	Function
12	CK14M	14MHz clock input	I	Clock input. Use the same clock as DVP. To superimpose a game picture, synchronizing with the game pack is required.
13	$\overline{\text{CK14M0}}$	14MHz reversing clock output	O	Clock output obtained by reversing CK14M input.
14	CDIN0	Chroma data input 0	I	Inputs of the chroma data output from the Y/C separation IC. CDIN0 is the LSB and CDIN7 is the MSB. When the output data is in 9 bits or more, input the upper 8 bits. To be fixed at "L" when no Y/C separation IC is used.
15	CDIN1	Chroma data input 1		
16	CDIN2	Chroma data input 2		
17	CDIN3	Chroma data input 3		
18	CDIN4	Chroma data input 4		
19	CDIN5	Chroma data input 5		
20	CDIN6	Chroma data input 6		
21	CDIN7	Chroma data input 7		
22	GND	Ground	—	Connect to GND.
23	VDD	Power supply	—	Connect +5 V power supply voltage.
24	FCHGMON	Field change signal monitor output	O	Monitor output of a field change signal which switches an even field to an odd field in the built-in sync generator block. (Do not connect to the FCHANGE input of DVP.)
25	YDIN0	Luminance data input 0	I	Input of the luminance data output from the Y/C separation IC. YDIN0 is the LSB and YDIN7 is the MSB. When the output data is in 9 bits or more, input the upper 8 bits. To be fixed at "L" when no Y/C separation IC is used.
26	YDIN1	Luminance data input 1		
27	YDIN2	Luminance data input 2		
28	YDIN3	Luminance data input 3		
29	YDIN4	Luminance data input 4		
30	YDIN5	Luminance data input 5		
31	YDIN6	Luminance data input 6		
32	YDIN7	Luminance data input 7		
33	GND	Ground	—	Connect to GND.
34	TEST	IC test input	I	For IC testing. To be open.
35	$\overline{\text{CLR}}$	Clear input	I	Input for IC initializing. When "L," all registers and counters in the IC are set to the default values.
36	SLATCH	Serial interface latch signal input	I	Supplies a timing to latch the data input to the serial interface. "Through" in the rise period. The register contents do not change in the L/H and fall periods.
37	SCLK	Serial interface clock input	I	Clock input for the serial interface. The value of SDATA is read at the rising edge.
38	SDATA	Serial interface data input	I	Provides the serial interface with data.
39	KEY	Luminance key signal output	O	Output of L or H level to indicate the result of comparison between the luminance level of the video data input or the luminance data input with the register contents. It will be "L" when the input is larger than the reference and "H" when smaller. Input selection and reference data can be specified by changing the register contents through the serial interface. This output is delayed for 1 clock cycle with respect to the video data output.
40	TSELECT	Test mode selection input	I	Used to select the IC test mode. To be open.
41	$\overline{\text{SGCSYNC0}}$	Composite sync output of read system (no 140ns shift)	O	Negative-logic output of composite sync from the built-in sync generator block. (For details, see pin 53.) No 140-ns shift is performed here.
42	VDD	Power supply	—	Connect +5 V power supply voltage.
43	GND	Ground	—	Connect to GND.
44	PACH	Game pack H sync input	I	Positive-logic input of the H sync from the game pack. To be open when not synchronizing with the game pack.
45	$\overline{\text{VRESET}}$	Game pack V reset input	I	Negative-logic input of the V reset signal from the game pack. To be open when not synchronizing with the game pack.
46	$\overline{\text{CGSYNC}}$	Game pack composite sync input	I	Negative-logic input of composite sync from the game pack. To be open when not synchronizing with the game pack.

No.	Pin Name	Name	I/O	Function
47	RFMON	Read field monitor output	O	Monitoring output of the field signal of the built-in sync generator block, "H" for odd fields and "L" for even fields. Fixed at "H" in vertical synchronization with the game pack.
48	CK7MO	7MHz clock output	O	Output of the clock obtained through 2-division processing on the CK14M input. It is reset at every falling edge of H sync of the read system. (When H sync falls, this clock also falls.) Used as clock input for the OSD IC.
49	$\overline{\text{CHB}}$	Character frame input	I	Connect the character frame output of the OSD IC when using the character superimpose function. When this is "L" and $\overline{\text{CHA}}$ is "H", the gray level is imposed on the video data. To be open when the character superimpose function is not used.
50	$\overline{\text{CHA}}$	Character input	I	Connect the character output of the OSD IC when using the character superimpose function. When this is "L," the white level is imposed on the video data. To be open when the character superimpose function is not used.
51	$\overline{\text{HSYNC}}$	H sync output of read system	O	Negative-logic output of H sync from the built-in sync generator block. When the built-in 140-ns shift function is enabled, the output is shifted for 140 ns when the CRINV signal is "H".
52	$\overline{\text{VSYNC}}$	V sync output of read system	O	Negative-logic output of V sync from the built-in sync generator block.
53	$\overline{\text{SGCSYNC}}$	Composite sync output of read system	O	Negative-logic output of composite sync from the built-in sync generator block. Read control from field memory is performed using this signal as the reference. The output is delayed for 1 clock cycle with respect to the video data output. It is in synchronization with $\overline{\text{HSYNC}}$ and $\overline{\text{VSYNC}}$. When the built-in 140-ns shift function is enabled, the output is shifted for 140 ns when the CRINV signal is "H". Synchronizing with the game pack requires signal inputs such as PACH, $\overline{\text{VRESET}}$ and $\overline{\text{GCSYNC}}$ as well as command input from the serial interface. In this case, the same 262H or 263 single field (noninterlace) mode with the composite sync of the game pack is selected. Interlace mode which uses only H sync and no V sync, can also be specified.
54	$\overline{\text{BFP}}$	Burst flag pulse output	O	Output of pulses to indicate the position of color burst on the video data output. It will be "L" for the position of color burst.
55	CRINV	Chroma invert output	O	Output of the result of the chroma continuity determination on the video data input or chroma data input. When "H," chroma data of the built-in Y/C data adder is inverted, or the video data output, $\overline{\text{HSYNC}}$ and $\overline{\text{SGCSYNC}}$ signals are shifted for 140 ns by the built-in 140-ns shift function. This can be used for equivalent functions on external devices.
56	$\overline{\text{CSYNCIST}}$	Sync output for insertion	O	Output to insert sync on the D/A-converted video signal. It is in complete synchronization with the $\overline{\text{SGCSYNC}}$ signal.
57	$\overline{\text{VBLKMON}}$	Monitor output of V blanking period	O	Negative-logic output of the V blanking period (half the H period) from the built-in sync generator block. For monitoring, but can be used on external devices.
58	VDOUT0	Video data output 0	O	Outputs of the lower 4 bits of the video data or data obtained by adding luminance data and chroma data. The output normally has a delay of 3 clock cycles with respect to the input. When the 140-ns shift function is enabled, the output is delayed for 5 clock cycles. VDOUT0 is the LSB and VDOUT7 (pin 68) is the MSB. Connect to the data input of the D/A converter.
59	VDOUT1	Video data output 1		
60	VDOUT2	Video data output 2		
61	VDOUT3	Video data output 3		
62	GND	Ground	—	Connect GND.
63	VDD	Power supply	—	Connect +5 V power supply voltage.
64	NC	No connection	—	To be an open circuit.
65	VDOUT4	Video data output 4	O	Outputs of the upper 4 bits of the video data input or the data obtained by adding the luminance data and chroma data. (For details, see pins 53 through 61.)
66	VDOUT5	Video data output 5		
67	VDOUT6	Video data output 6		
68	VDOUT7	Video data output 7		
69	FRHMON	Free-run H sync monitor output	O	H sync monitor output of the built-in free-run H sync generator block. When the PACH signal is being supplied, this output is compared with the PACH signal. After the PACON signal is set to "L," it continues providing 910-division clocks in free-run mode as long as "L" is not input to $\overline{\text{CLR}}$. It is not synchronized with the write or read timing. It can be used on external devices.

8. FL INFORMATION

■ VAW1035 (FLKY ASSY V101)
FL TUBE



ANODE GRID ASSIGNMENT & PIN ASSIGNMENT

	G1	G2	G3	G4	G5	G6	G7	G8
P1	A1	A1	A1	A1	A1	A1	A1	A1
P2	A2	A2	A2	A2	A2	A2	A2	A2
P3	A3	A3	A3	A3	A3	A3	A3	A3
P4	A4	A4	A4	A4	A4	A4	A4	A4
P5	A5	A5	A5	A5	A5	A5	A5	A5
P6	A6	A6	A6	A6	A6	A6	A6	A6
P7	A7	A7	A7	A7	A7	A7	A7	A7
P8	A8	A8	A8	A8	A8	A8	A8	A8
P9	A9	A9	CHP/TRK	A9	A9	A9	A9	A9
P10	A10		TOTAL	A10	A10	A10	A10	A10
P11	A11		REMAIN	A11	A11	A11	A11	A11
P12	A12		1/L	A12	A12	A12	A12	A12
P13	A13		2/R	A13		A13	A13	ONE-TOUCH
P14	A14					A14	A14	KARAOKE

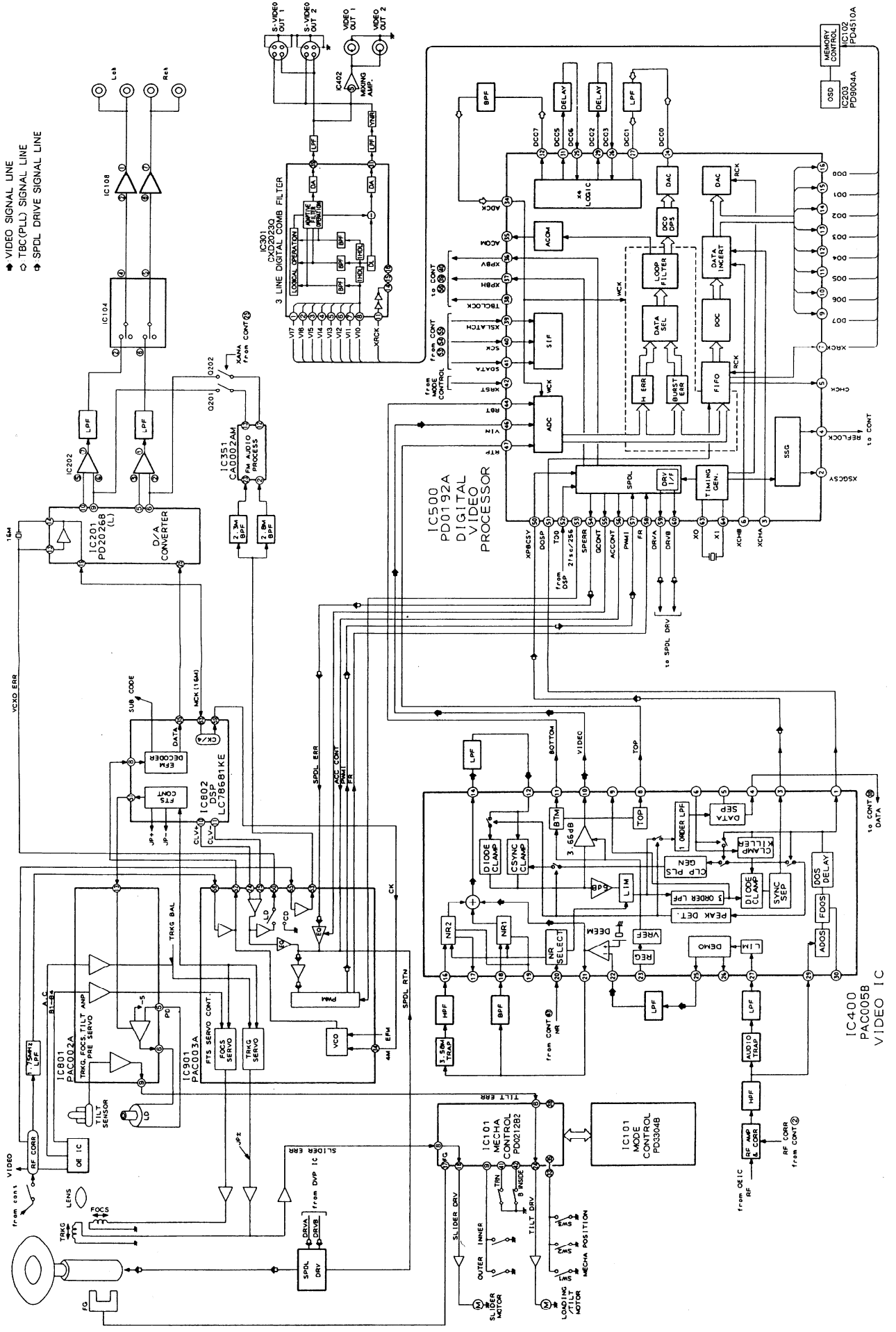
PIN ASSIGNMENT

Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Assignment	F	F	NP	NL	NL	NL	NL	G1	G2	G3	G4	G5	G6	G7	G8	P1	P2

Pin No.	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Assignment	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	NL	NL	NP	F	F

F:Filament G1-G8:Grid P1-P14:Anode NP:No pin NL:No Lead

9. BLOCK DIAGRAM



◆ VIDEO SIGNAL LINE
 ◊ TBC (PLL) SIGNAL LINE
 ⚡ SPDL DRIVE SIGNAL LINE