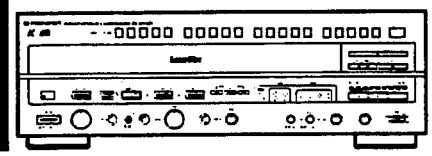
PIONEER®
The future of sound and vision.

Service Manual



ORDER NO.
ARP2096

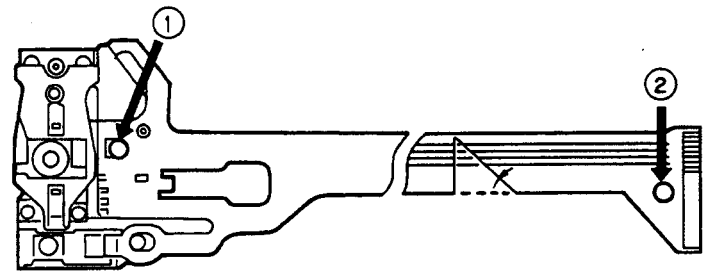
CD CDV LD PLAYER

CLD-1580K

- **As to the circuit and mechanism descriptions, refer to the CLD-1080 service guide (ARP2063).**
- **As to the adjustments, refer to the adjustments for CLD Players Vol. 1 (ARP2064).**
- **This manual is applicable to the S type.**

- The pre-pickup assembly (VXX1413) mounted on this player unit is not compatible with the pre-pickup assembly (VXX1274) used on the CLD-1070.
  Do not use the VXX1274 as a substitute for the VXX1413.

	①	②	Pre-pickup assembly	Slider assembly
CLD-1580K	Silver	I	VXX1413	VWT1060
CLD-1070	Brown	F	VXX1274	VWT1048



CONTENTS

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IFJ AUG. 1990 Printed in Japan

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 in solder, avoid unprotected skin contact with the solder. Also, when soldering do not inhale any smoke or fumes produced.

1. SAFETY INFORMATION

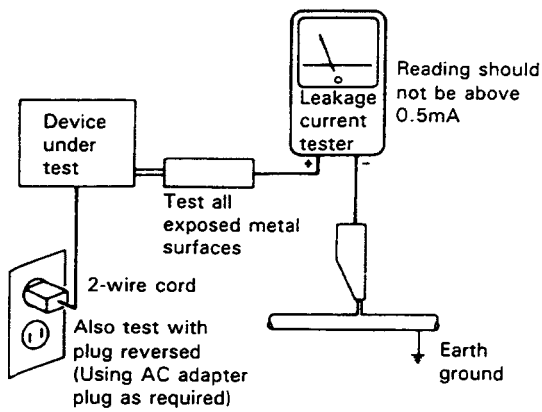
(FOR USA MODEL ONLY)

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.

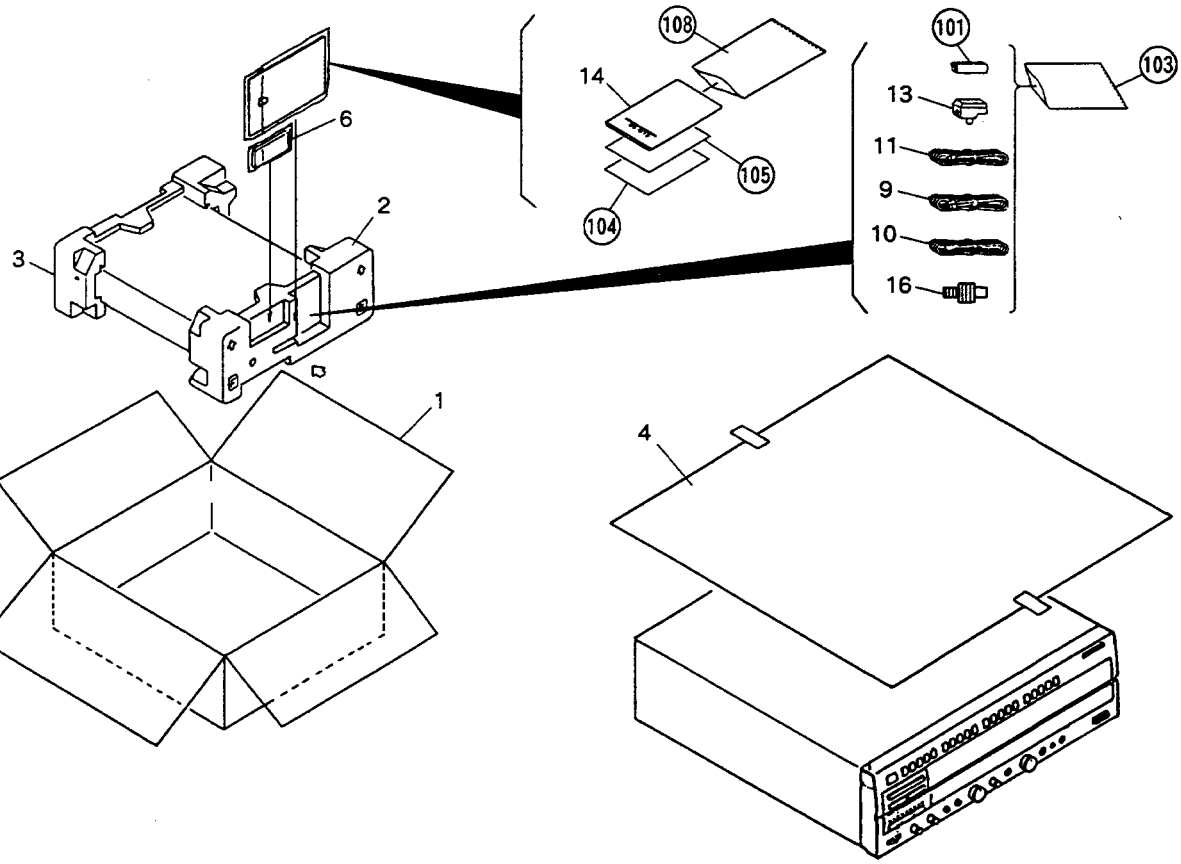
Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

2. PACKING

Parts List

Mark	No.	Part No.	Description
	1	VHG1109	Packing case
	2	VHA1059	Pad (F)
	3	VHA1060	Pad (R)
	4	VHL1012	Mirror mat
	5		• • • • •
	6	VXX1442	Remote control unit
	7		• • • • •
	8		• • • • •
	9	VDE-055	Connection cord
	10	VDE-056	Video cable
	11	VDE1001	RF antenna cable
	12		• • • • •
	13	VKX1003	Antenna adaptor
	14	VRB1039	Operating instructions (English)
	15		• • • • •
	16	VKX-017	F-IEC change plug

Mark	No.	Part No.	Description
	101		Battery UM-4
	102		• • • • •
	103		Polyethelene bag
	104		Caution card
	105		Caution card (UC)
	106		• • • • •
	107		• • • • •
	108		Polyethelene bag



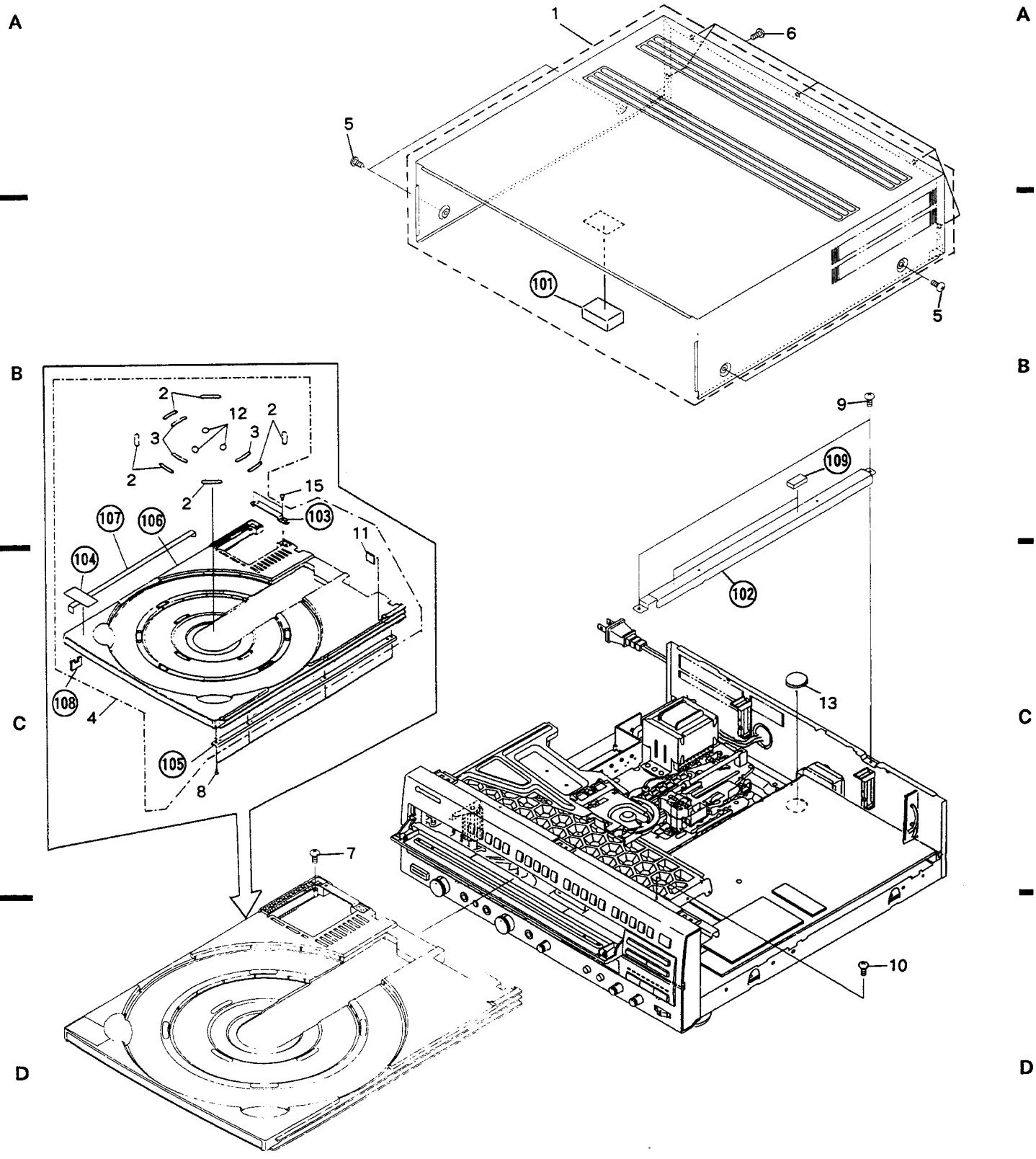
3. EXPLODED VIEWS AND PARTS LIST

NOTES :
- Parts without part number cannot be supplied.
- 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.

3.1 EXTERIOR SECTION

Parts List

Mark	No.	Part No.	Description
	1	VXX1458	Bonnet assembly S
	2	VEC1191	Disc pad (L)
	3	VEC1192	Disc pad (S)
	4	VXX1460	Tray assembly S
	5	BCZ40P060FZK	Screw
	6	BBZ30P080FZK	Screw
	7	BPZ30P140FMC	Screw
	8	BPZ30P080FMC	Screw
	9	BBZ30P060FMC	Screw
	10	PCZ30P080FMC	Screw
	11	VEB1089	Tray rubber
	12	VEC1252	CD pad
	13	VEC1177	Insulator pad
	14		• • • • •
	15	CPZ30P100FMC	Screw
	101		Bonnet cushion
	102		Center angle
	103		Tray angle
	104		Carry label
	105		Tray reinforced plate
	106		Tray
	107		Side plate
	108		Rack reinforced plate
	109		Bridge cushion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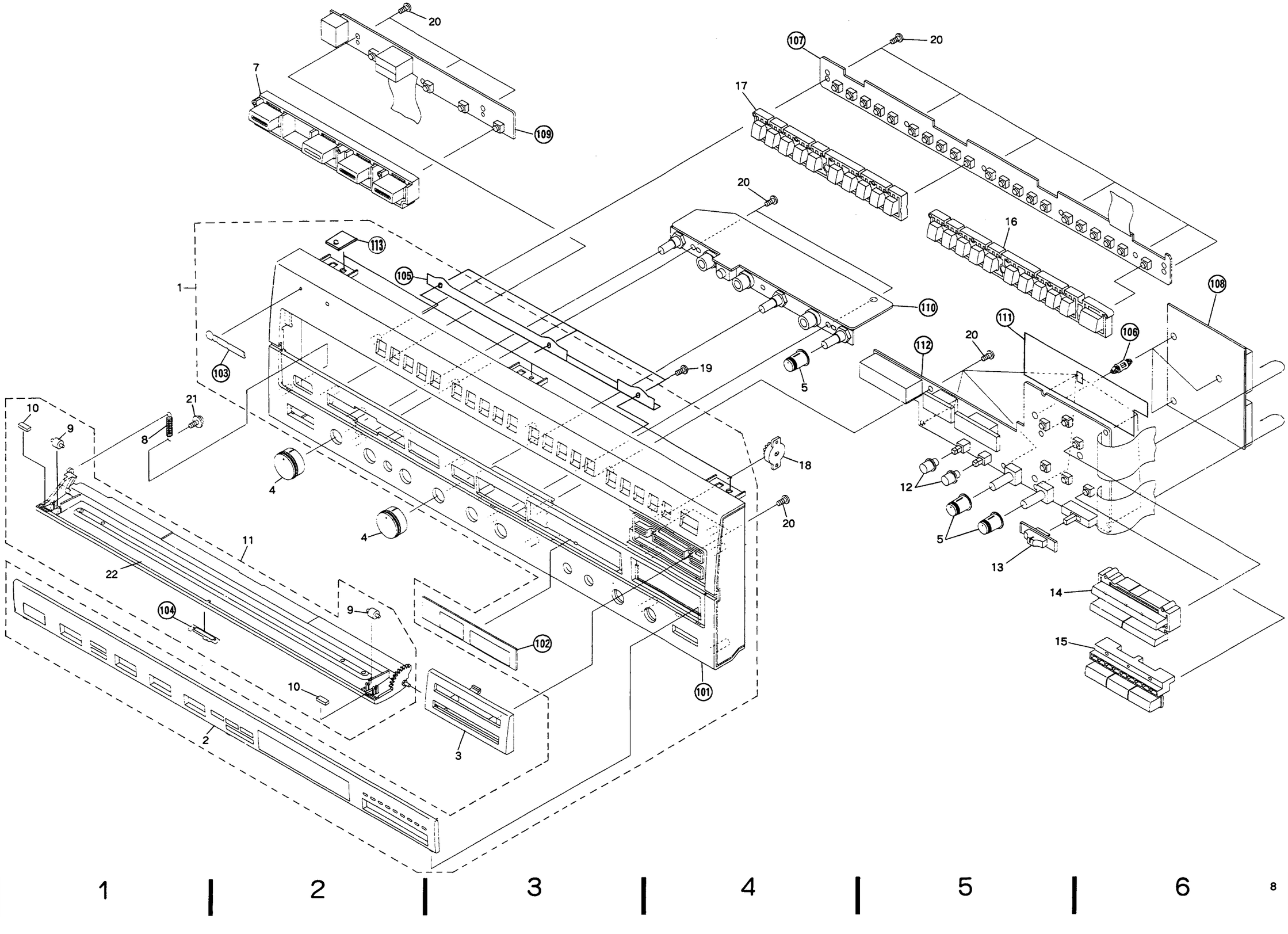
3.2 FRONT PANEL SECTION

Parts List

Mark	No.	Part No.	Description
	1	VXX1477	Front panel assembly S
	2	VNK1508	Acrylic display
	3	VNK1507	Sub panel
	4	VNK1516	Volume knob (A)
	5	VNK1517	Volume knob (B)
	6		• • • • •
	7	VXA1453	Change key assembly
	8	VBH1096	Door spring
	9	VNL1042	Roller
	10	VEB1033	Door dump rubber
	11	VXA1482	Door assembly
	12	VNK1515	Echo knob
	13	VNK1514	Slide knob
	14	VNK1510	Function key
	15	VNK1509	Key control button
	16	VNK1512	Music select key (A)
	17	VNK1513	Music select key (B)
	18	VXA1053	Dumper assembly
	19	BPZ20P040FZK	Screw
	20	BPZ26P080FMC	Screw
	21	IPZ26P060FMC	Screw
	22	VNE1482	Door plate
	101		Front panel
	102		Display sheet
	103		Name plate
	104		Laser disc badge
	105		Reinforced plate (FP)
	106		P.C.B holder
	107		KEYB assembly
	108		UCOM assembly
	109		INDB assembly
	110		MHVB assembly
	111		Black sheet
	112		DSPB assembly
	113		FP plate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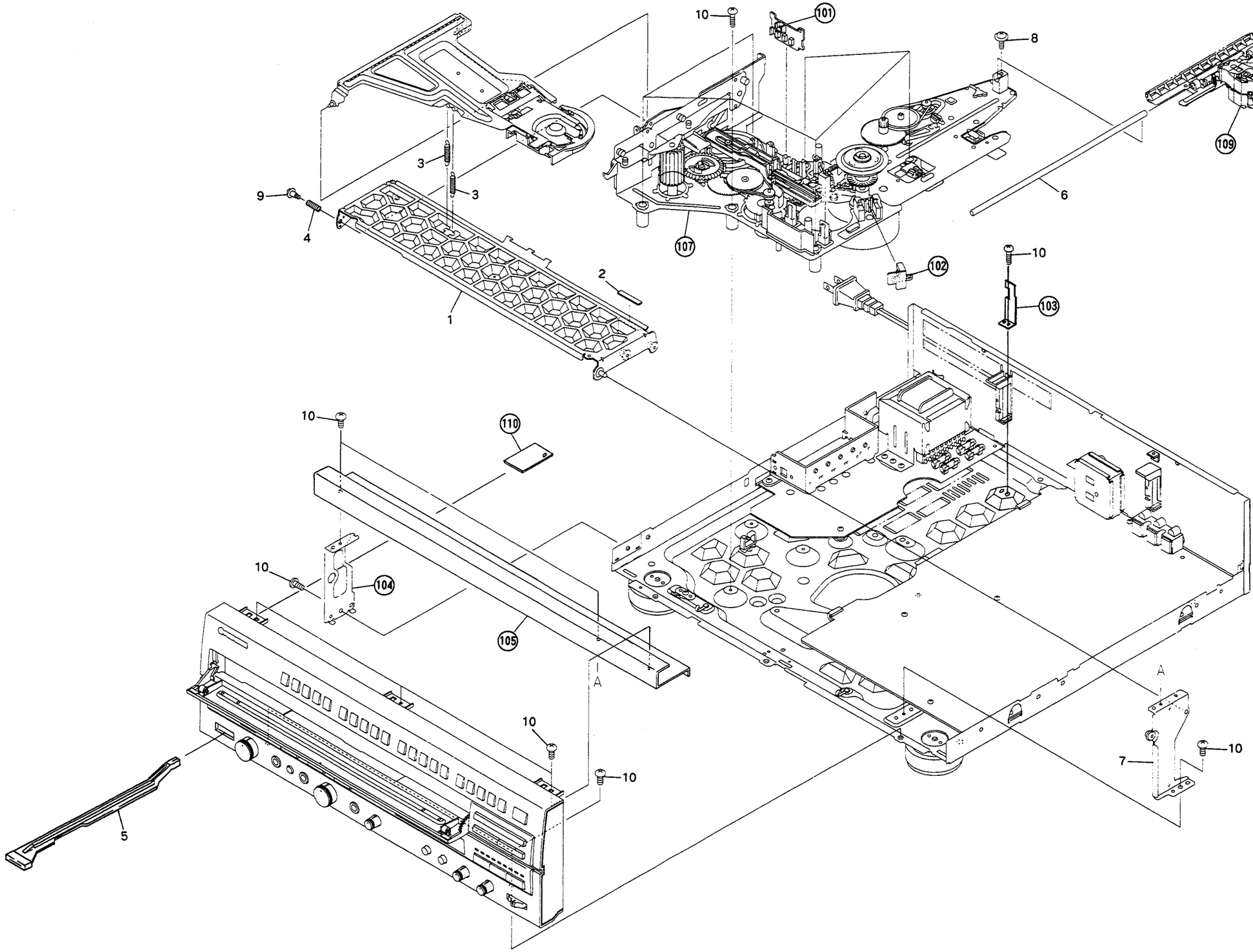
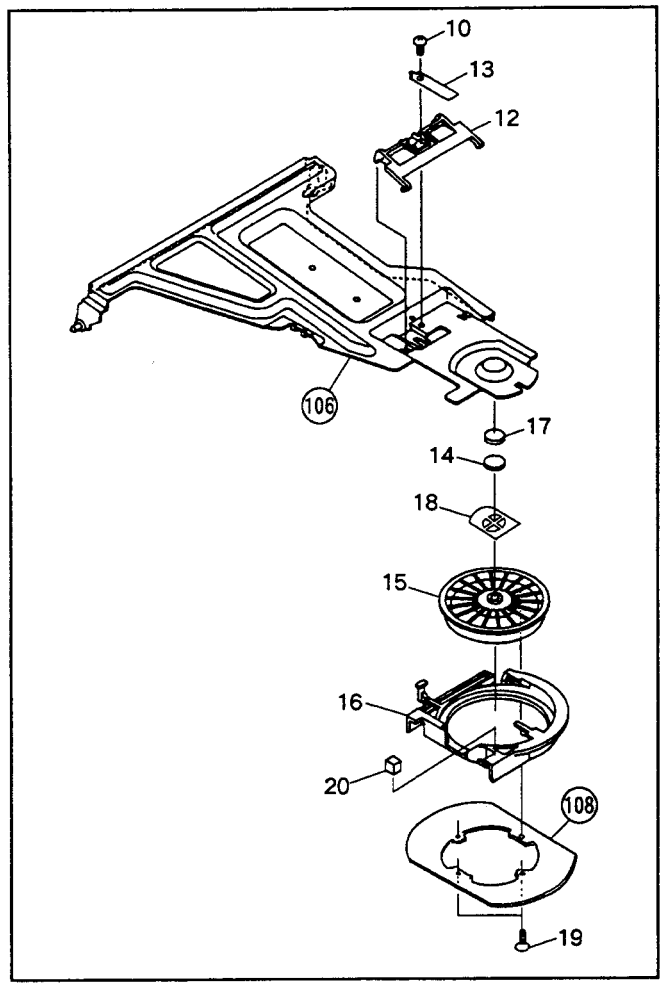
3.3 TOP VIEW SECTION





Parts List

Mark	No.	Part No.	Description
	1	VXA1319	Clamper arm (A) assembly
	2	VEB1084	Rubber (A)
	3	VBH1094	Clamper spring
	4	VBH1093	Arm spring
	5	VNK1511	Power knob
	6	VLL1177	Carriage shaft
	7	VXA1529	Side stay (R) assembly
	8	VBA1018	Screw
	9	VBA1008	Screw (B)
	10	BBZ30P060FMC	Screw
	11		• • • • •
	12	VNL1254	Parallel link
	13	VBK1014	Plate spring
	14	VNL1289	Ball holder
	15	VNL1248	Clamper S

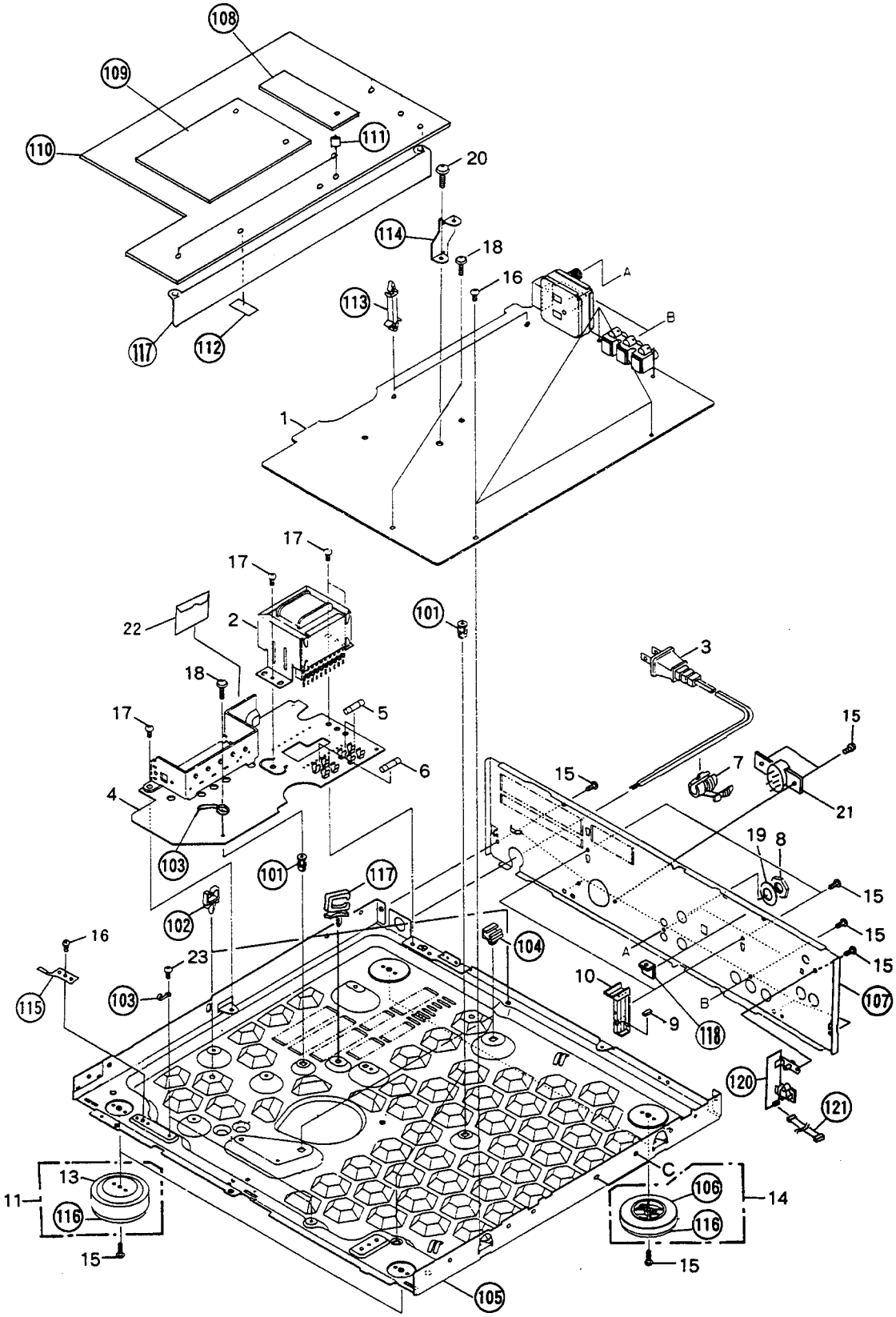
Mark	No.	Part No.	Description
	16	VNL1205	Clamper holder
	17	VEB1114	Rubber sheet
	18	VBK1018	Thrust holdrer
	19	CPZ20P050FMC	Screw
	20	VEC1271	Clamper cushion
	101		SW assembly
	102		FG assembly
	103		SM head stopper
	104		Side stay (L)
	105		Front angle
	106		Clamper arm (B)
	107		Mechanism assembly
	108		Stabilizer
	109		Rack assembly
	110		FP plate

3.4 BASE SECTION

Parts List

Mark	No.	Part No.	Description
◉	1	VWX1046	MAIN assembly
⚠	2	VTT1088	Power transformer
⚠	3	VDG1034	AC power cord
◉	4	VWR1070	SYPS assembly
⚠	5	VEK-018	Fuse (FU201,FU202) (3A)
⚠	6	VEK-022	Fuse (FU203,FU204) (2A)
⚠	7	CM-22	Strain relief
	8	VLL-082	F-nut
	9	VEB1033	Door dump rubber
	10	VNL1202	Tray stopper
	11	VXA1455	Insulator assembly
	12		• • • • •
	13	VNK1095	Insulator
	14	VXA1410	Insulator assembly
	15	BBZ30P080FZK	Screw
	16	BBZ30P060FMC	Screw
	17	BCZ40P080FZK	Screw
	18	IPZ30P160FMC	Screw
	19	WA96F130N050	Washer
	20	IPZ30P160FMC	Screw
⚠	21	VSB-002	Voltage selector
	22	VEC1265	Insulator sheet
	23	BBZ30P080FMC	Screw
	24	BCZ40P060FZK	Screw

Mark	No.	Part No.	Description
	101		P.C.B spacer
	102		Wire crip (B)
	103		Cord holder
	104		P plate holder
	105		Base chassis
	106		Insulator
	107		Rear panel
	108		SURB assembly
	109		KCNB assembly
	110		KFCB assembly
	111		PC support
	112		P.C.B hinge
	113		PC support
	114		P.C.B holder (C)
	115		Earth plate
	116		Cushion
	117		P.C.B holder (A)
	118		Rear angle
	119		Angle
	120		EXTB assembly
	121		Housing assembly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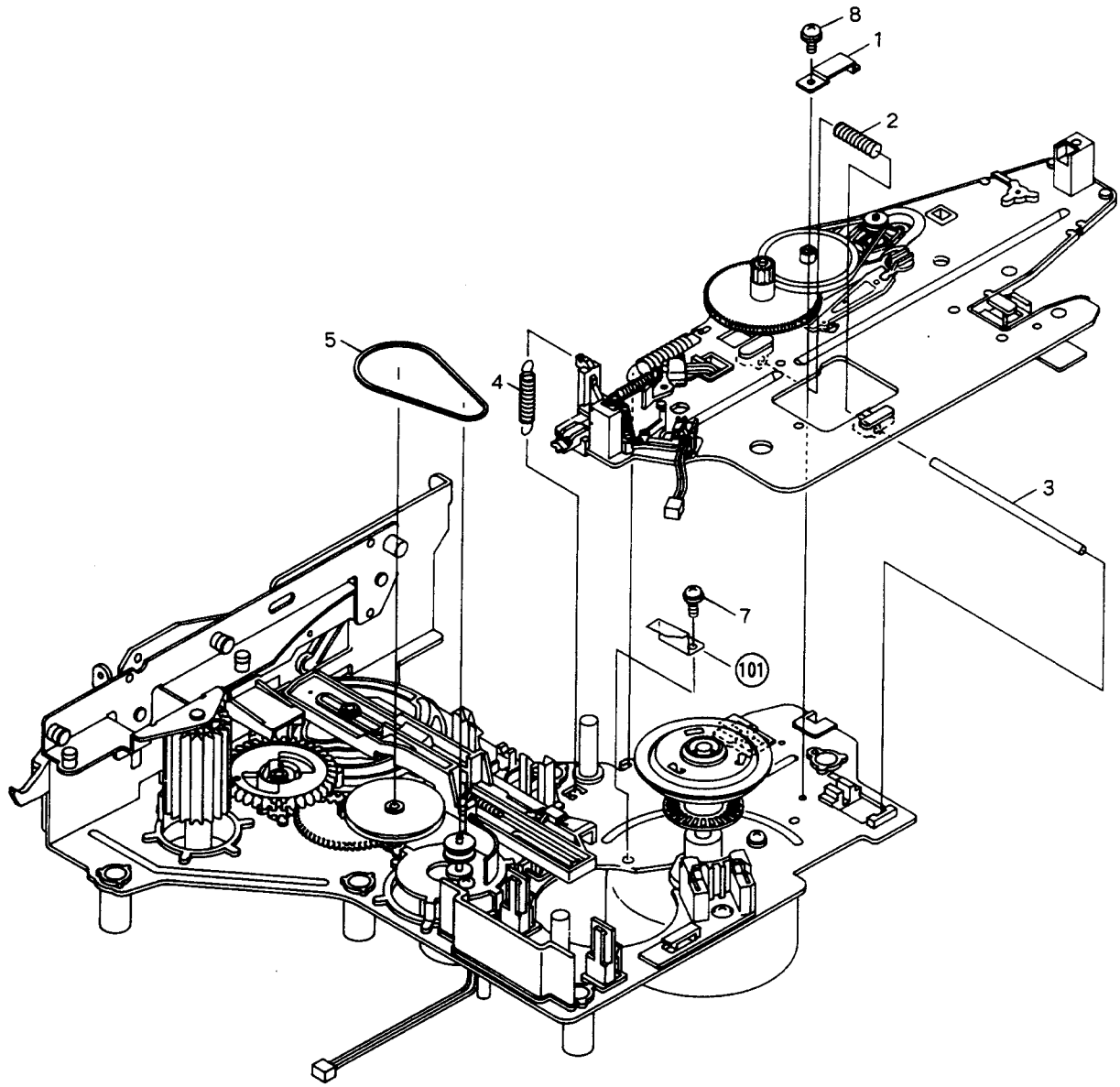
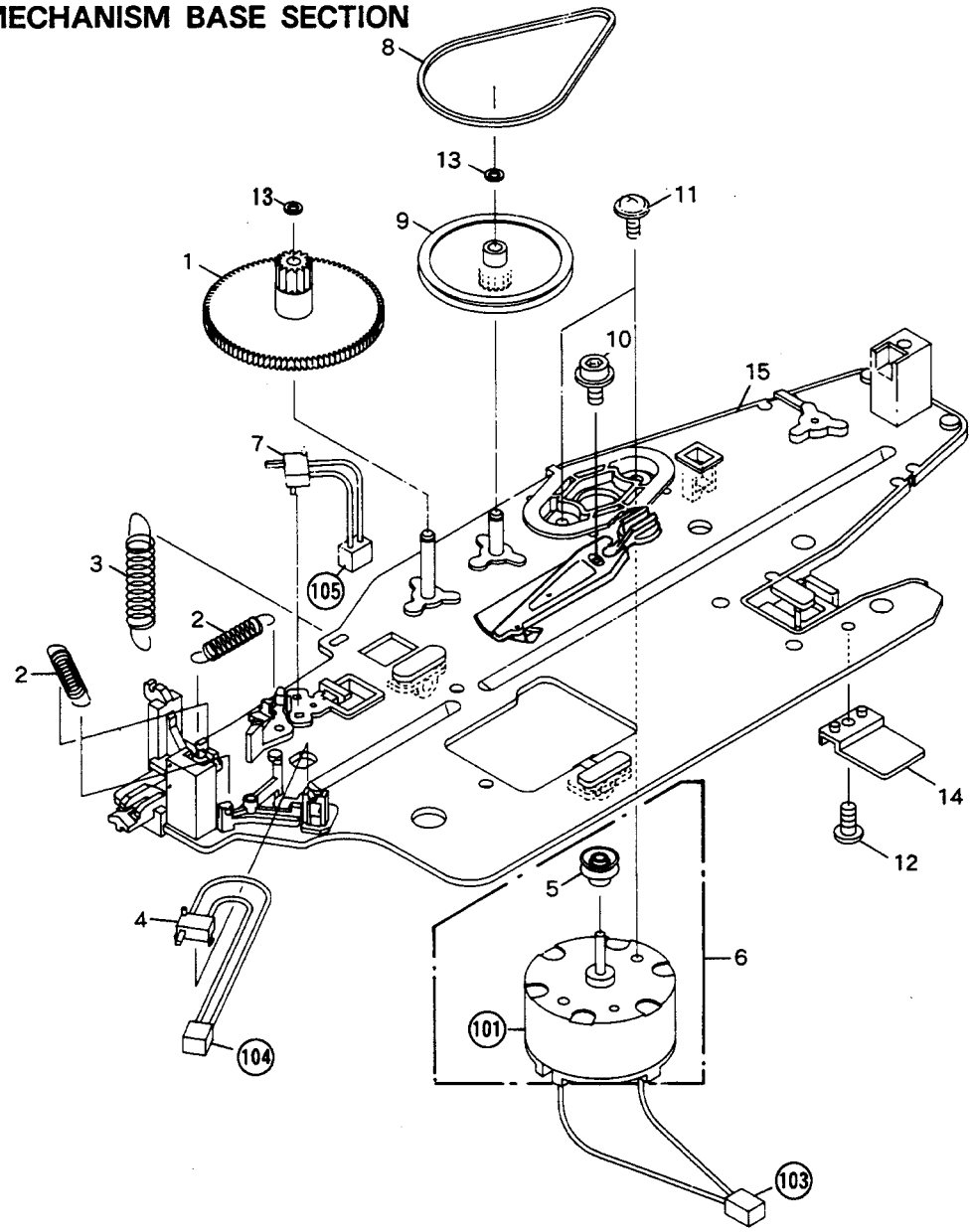
3.5 MECHANISM ASSEMBLY



Parts List

Mark	No.	Part No.	Description
	1	VBK1013	Plate spring
	2	VBH1073	Thrust spring
	3	VLL1175	Tilt shaft
	4	VBH1074	Tilt pulling spring
	5	PEB1013	Belt
	6		• • • • •
	7	PMA30P050FMC	Screw
	8	ABZ26P050FMC	Screw
	101		Cam head stopper

3.6 SERVO MECHANISM BASE SECTION



Parts List

Mark	No.	Part No.	Description
	1	VNL1196	CA gear (3)
	2	VBH1079	Switch pulling spring
	3	VBH1080	TC pulling spring
	4	PSH1003	Slide switch (S5)
	5	VNL1197	CA pulley (1)
	6	VXX1261	Carriage motor assembly
	7	PSH1003	Slide switch (S4)
	8	VEB1077	CA belt
	9	VNL1198	CA pulley (2)
	10	SMF30H080FBT	Screw
	11	PMM26P040FMC	Screw
	12	BPZ26P050FMC	Screw
	13	WT26D047D025	Washer
	14	VNL1210	FLE base
◉	15	VXA1273	Servo mechanism base

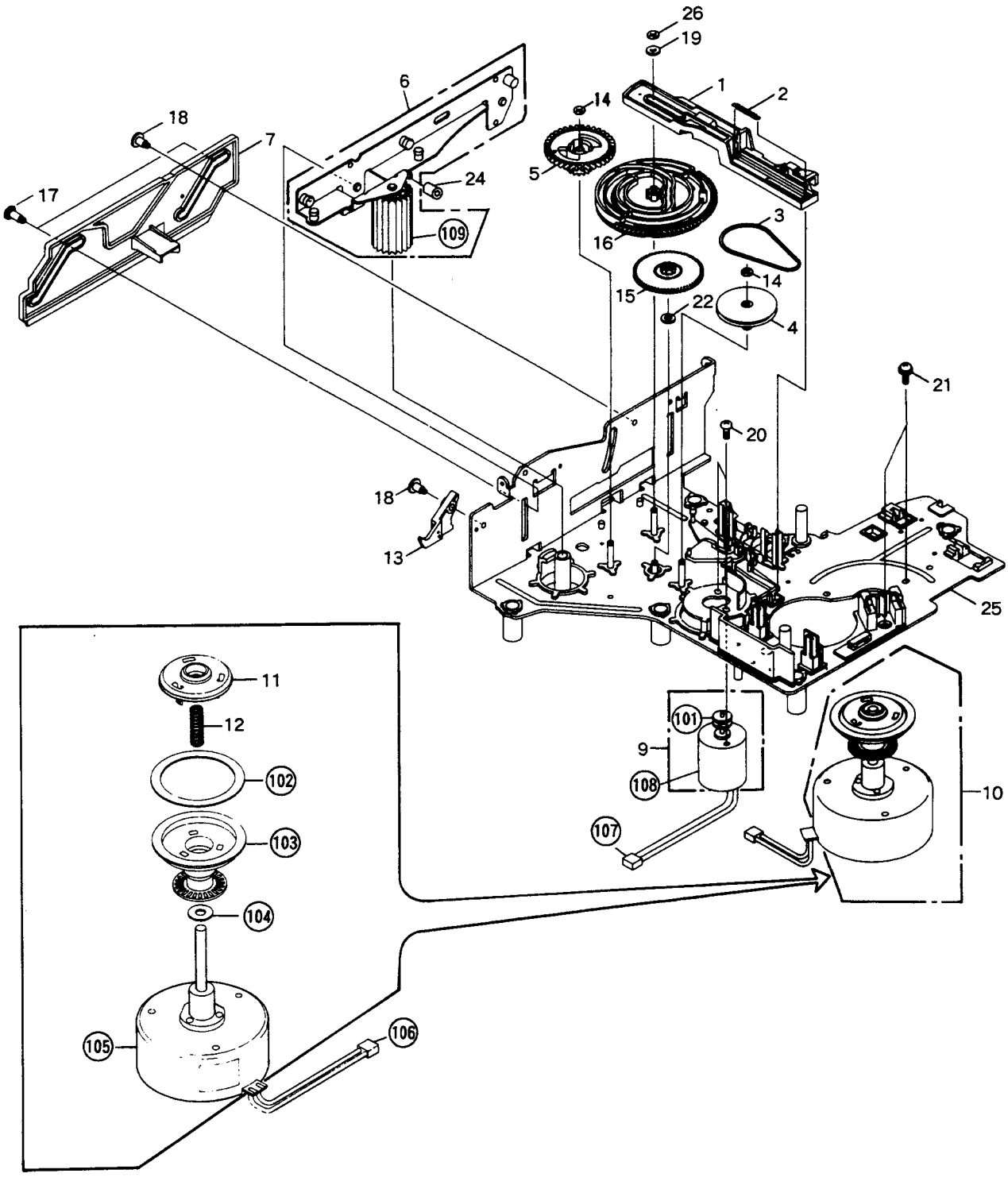
Mark	No.	Part No.	Description
	101		Carriage motor
	102		• • • • •
	103		Housing assembly
	104		Housing assembly
	105		Housing assembly

3.7 CHASSIS SECTION

Parts List

Mark	No.	Part No.	Description
	1	VNL1191	Spring slanting cam
	2	VBH1082	Cam spring
	3	PEB1013	Belt
	4	VNL1249	Gear pulley
	5	VNL1194	Follow gear
	6	VXA1531	Roller plate assembly
	7	VNL1188	Slide cam
	8		• • • • •
	9	VXX1262	Loading motor assembly
	10	VXA1474	Spindle motor assembly
	11	VNL1174	Centering hab
	12	VBH1083	Centering spring
	13	VNL1208	Door lever
	14	WT26D047D025	Washer
	15	VNL1193	Two stair gear
	16	VNL1190	Cam gear
	17	VBA1015	Screw (C)
	18	VBA1008	Screw (B)
	19	WA32N080W020	Nylon washer
	20	PMZ30P040FMC	Screw
	21	PMA30P050FMC	Screw
	22	WA32D060D025	Washer
	23		• • • • •
	24	VEB1091	Stop ring
◉	25	VXA1274	Chassis assembly
	26	YE23FUC	E ring

Mark	No.	Part No.	Description
	101		Motor pulley
	102		Rubber sheet
	103		Turn table assembly
	104		Oil stopped washer
	105		Spindle motor
	106		Housing assembly
	107		Housing assembly
	108		Loading motor
	109		Slider gear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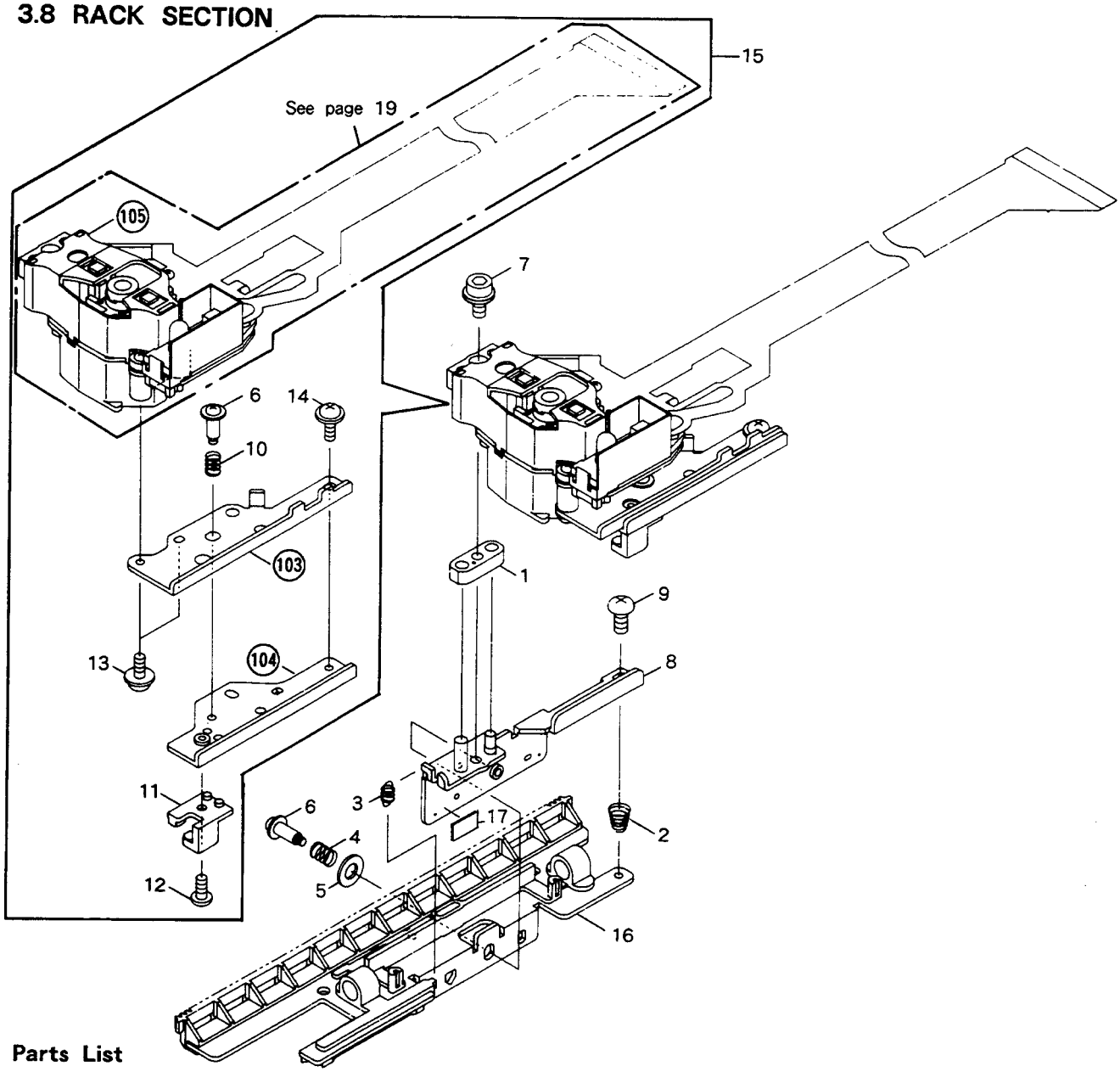
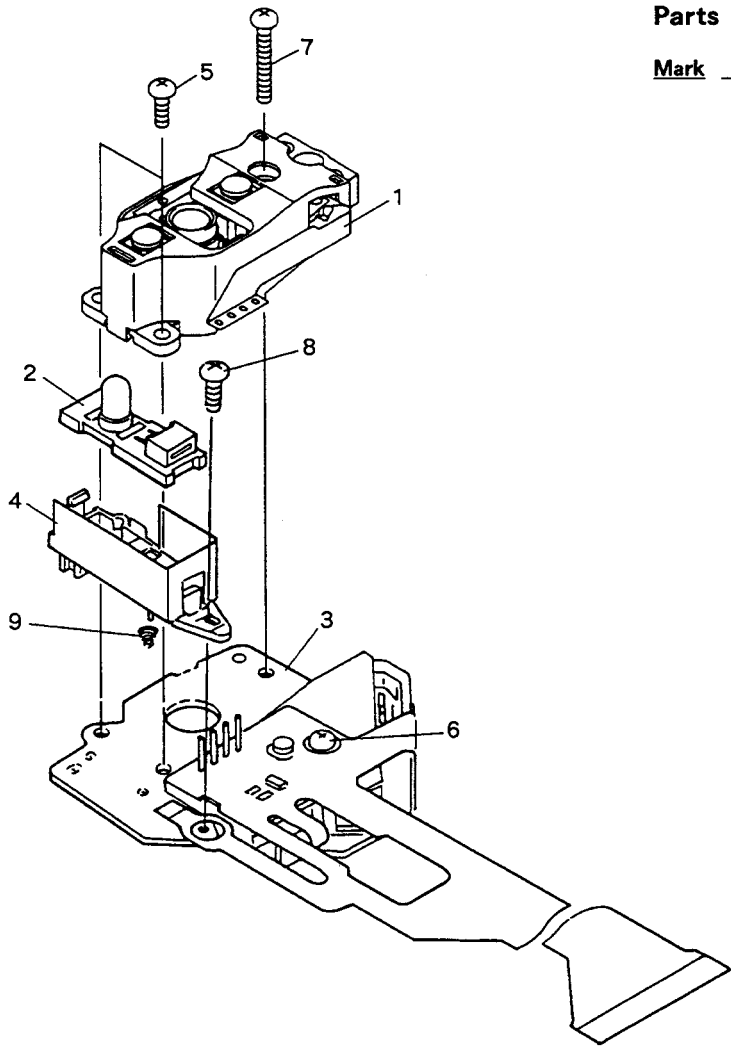
3.8 RACK SECTION



Parts List

Mark	No.	Part No.	Description
	1	VNL1209	PU base
	2	VBH1075	LP center spring
	3	VBH1089	PU pulling spring
	4	VBH1090	L-2 spring
	5	WC30FMC	Washer
	6	VBA1007	Screw
	7	VLL1192	Screw (2.6 × 10)
◉	8	VNL1186	Rack
	9	BMZ26P080FMC	Screw
	10	VBH1081	TAN spring
	11	VNL1199	TAN base
	12	PMZ20P040FMC	Screw
	13	PMA20P040FMC	Screw
	14	AMZ20P050FMC	Screw
	15	VWT1060	Slider assembly
	16	VXA1276	PU mount base assembly
	17	VEC1284	Spacer (S)
	101		• • • • •
	102		• • • • •
	103		TAN plate (2)
	104		TAN plate (1)
	105		Pickup assembly

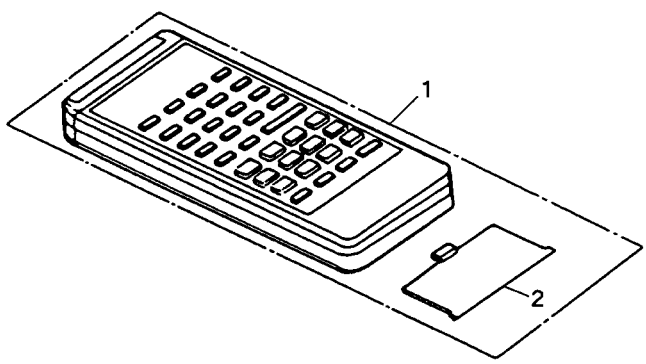
3.9 PICKUP ASSEMBLY



Parts List of Pickup assembly

Mark	No.	Part No.	Description
	1	VXX1266	Actuator assembly
	2	VEX1018	Sensor assembly
	3	VXX1413	Pre-pickup assembly
	4	VNH1024	Sensor stay
	5	PMA20P060FMC	Screw
	6	PMA20P080FMC	Screw
	7	PMA20P140FMC	Screw
	8	BMZ20P060FMC	Screw
	9	VBH1087	Sensor spring

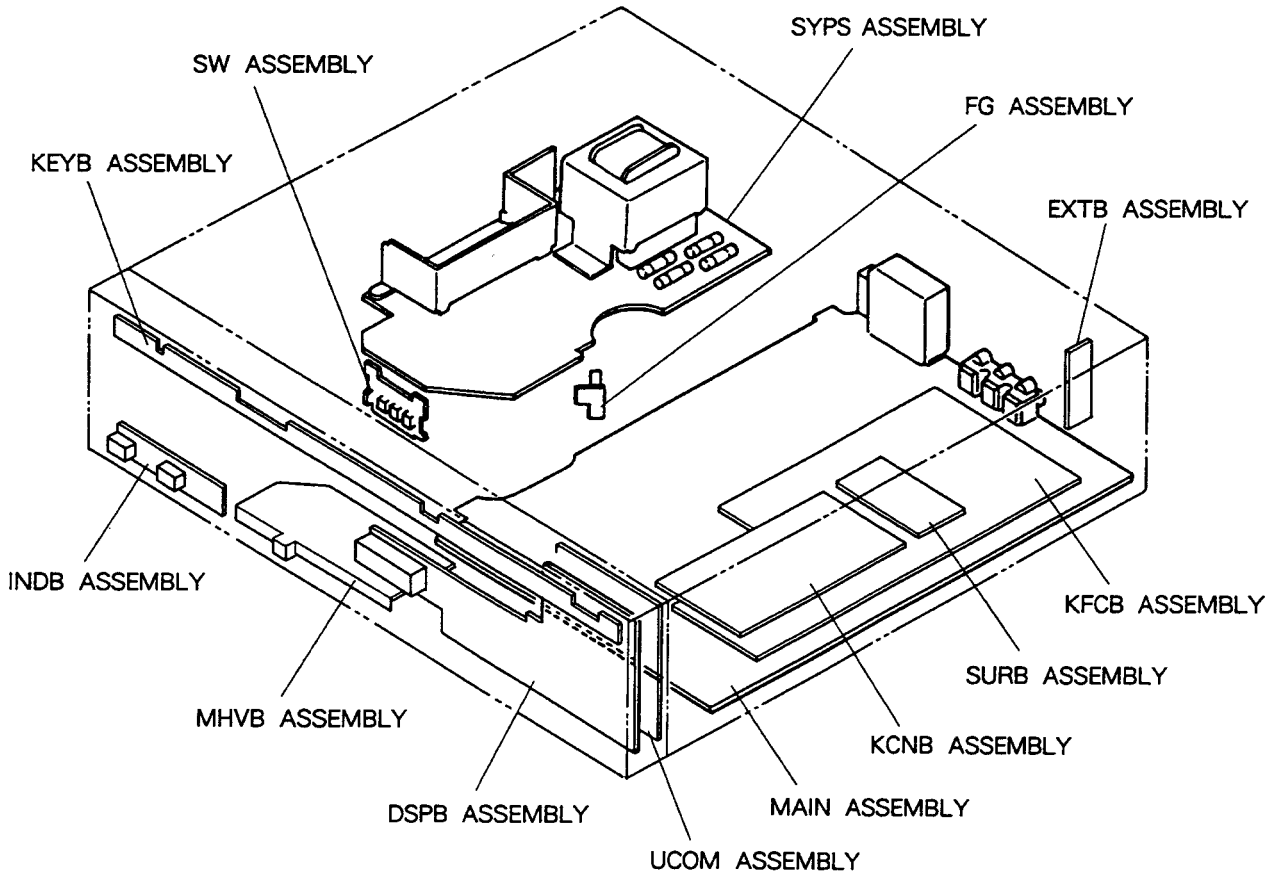
3.10 REMOTE CONTROL UNIT



Parts List of Remote control unit

Mark	No.	Part No.	Description
	1	VXX1442	Remote control unuit
	2	VNK1293	Battery cover

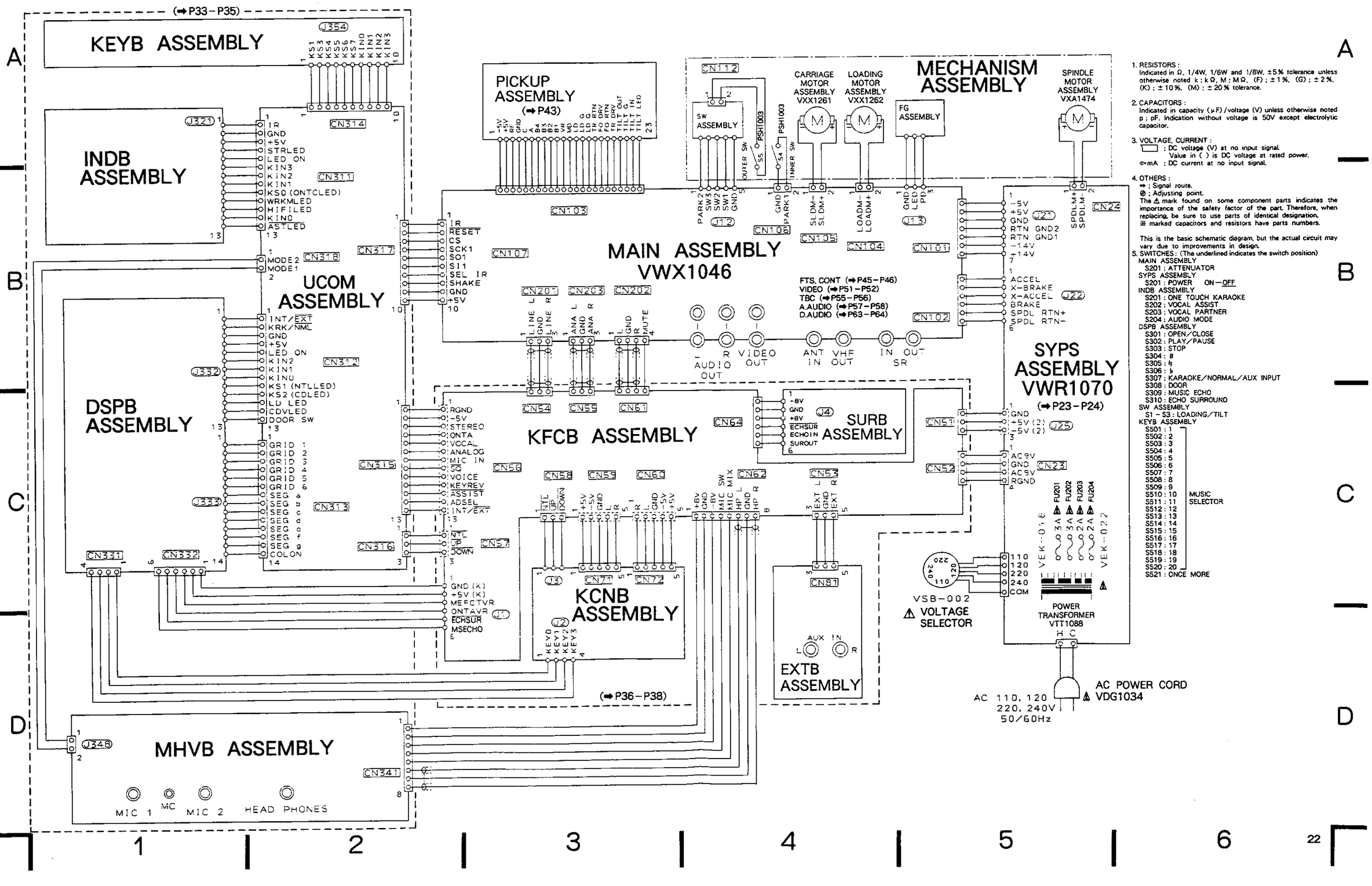
4. P. C. BOARDS LOCATION



MAIN : **MAIN** BOARD
SYPS : **SY**STEM **P**OWER **S**UPPLY
FG : **FG** COUNTER BOARD
SW : **SW** BOARD
KEYB : **KEY** BOARD
EXTB : **EXT**ERNAL **B**OARD
KFCB : **K**ARAOKE **F**UNCTION **B**OARD
KCNB : **K**EY **CON**TROLLER **B**OARD
SURB : **SUR**ROUND **B**OARD
UCOM : **U COM**PUTER
INDB : **IND**ICATOR **B**OARD
DSPB : **DISP**LAY **B**OARD
MHVB : **M**IC **H**EADPHONE **V**OLUME **B**OARD

5. SCHEMATIC AND P. C. BOARDS DIAGRAM

5.1 OVERALL WIRING DIAGRAM



1. RESISTORS :
Indicated in Ω, 1/4W, 1/6W and 1/8W, ±5% tolerance unless otherwise noted k : kΩ, M : MΩ, (F) : ±1%, (G) : ±2%, (K) : ±10%, (M) : ±20% tolerance.

2. CAPACITORS :
Indicated in capacity (μF) / voltage (V) unless otherwise noted p : pF. Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE, CURRENT :
▭ : DC voltage (V) at no input signal.
Value in ( ) is DC voltage at rated power.
⇨mA : DC current at no input signal.

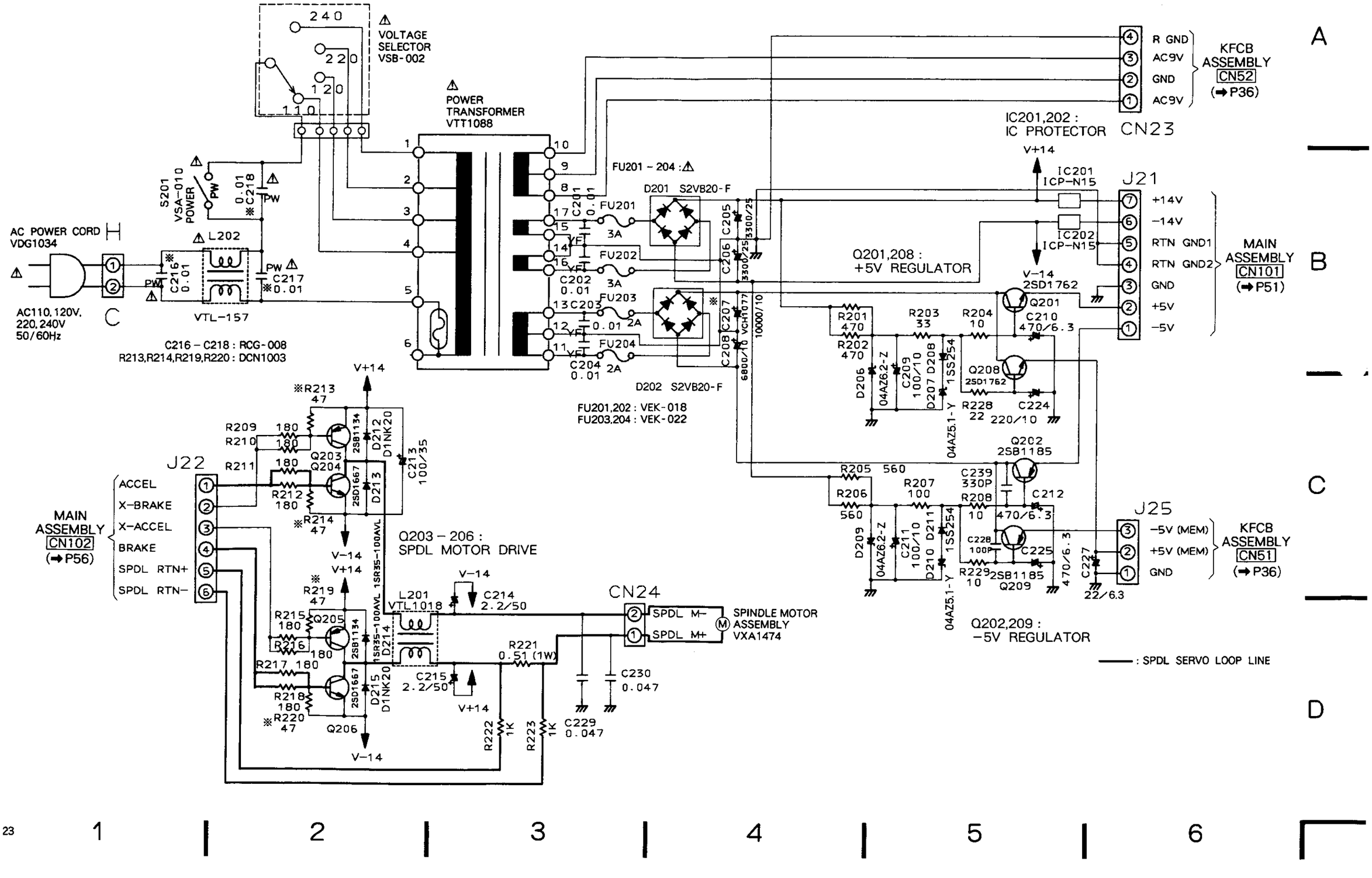
4. OTHERS :
➡ : Signal route.
Ø : Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
※ marked capacitors and resistors have parts numbers.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

5. SWITCHES : (The underlined indicates the switch position)
MAIN ASSEMBLY
S201 : ATTENUATOR
SYPS ASSEMBLY
S201 : POWER ON—OFF
INDB ASSEMBLY
S201 : ONE TOUCH KARAOKE
S202 : VOCAL ASSIST
S203 : VOCAL PARTNER
S204 : AUDIO MODE
DSPB ASSEMBLY
S301 : OPEN/CLOSE
S302 : PLAY/PAUSE
S303 : STOP
S304 : #
S305 : ♮
S306 : ♭
S307 : KARAOKE/NORMAL/AUX INPUT
S308 : DOOR
S309 : MUSIC ECHO
S310 : ECHO SURROUND
SW ASSEMBLY
S1 – S3 : LOADING/TILT
KEYB ASSEMBLY
S501 : 1
S502 : 2
S503 : 3
S504 : 4
S505 : 5
S506 : 6
S507 : 7
S508 : 8
S509 : 9
S510 : 10
S511 : 11
S512 : 12
S513 : 13
S514 : 14
S515 : 15
S516 : 16
S517 : 17
S518 : 18
S519 : 19
S520 : 20
S521 : ONCE MORE
MUSIC SELECTOR

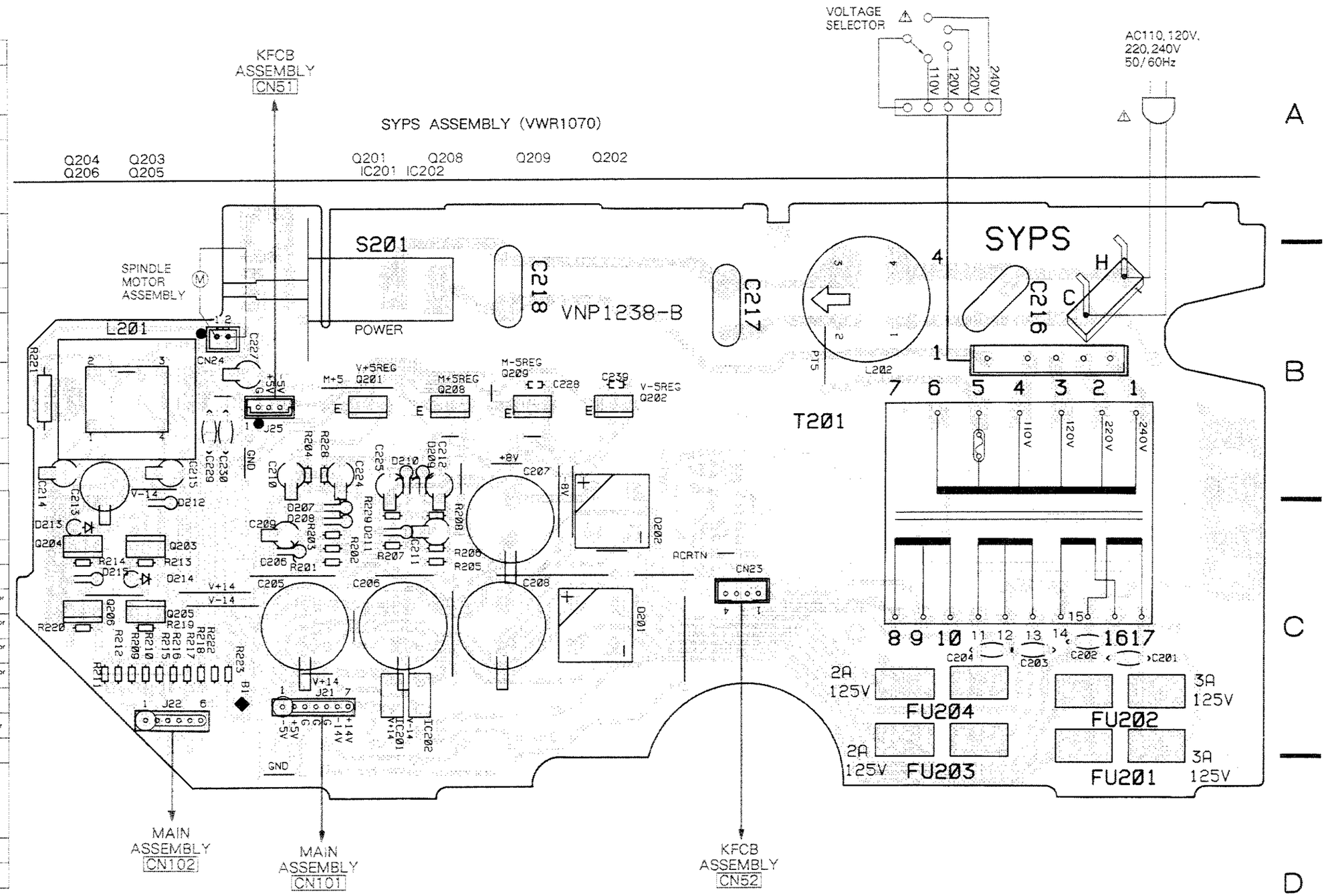
5.2 SYPS ASSEMBLY

SYPS ASSEMBLY (VWR1070)

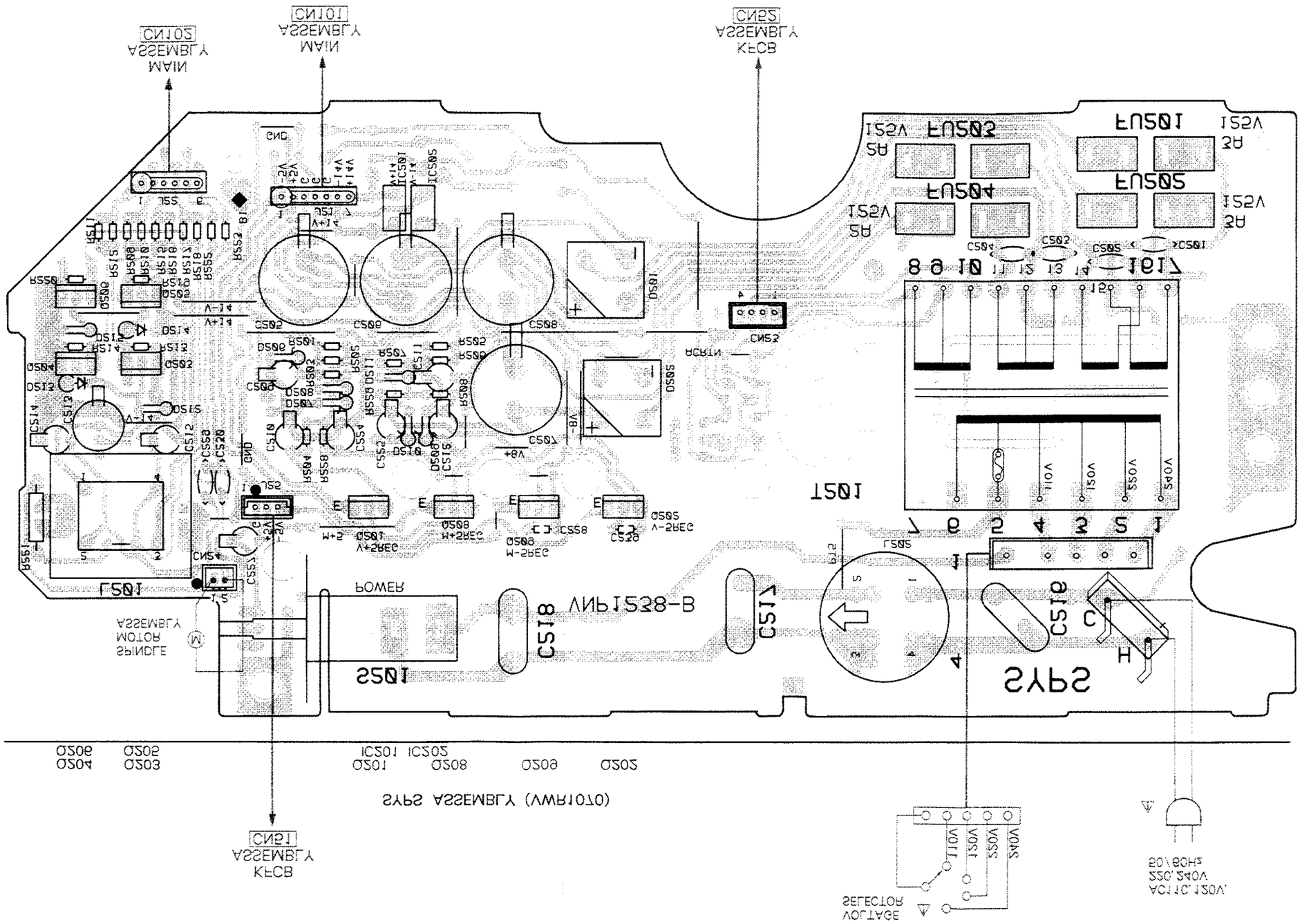


P.C.B. pattern diagram indication	Corresponding part symbol	Part name
		Transistor
		FET
		Diode
		Zener diode
		LED
		Varactor
		Tact switch
		Inductor
		Coil
		Transformer
		Filter
		Ceramic capacitor
		Mylar capacitor
		Styrol capacitor
		Electrolytic capacitor (Non polarized)
		Electrolytic capacitor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

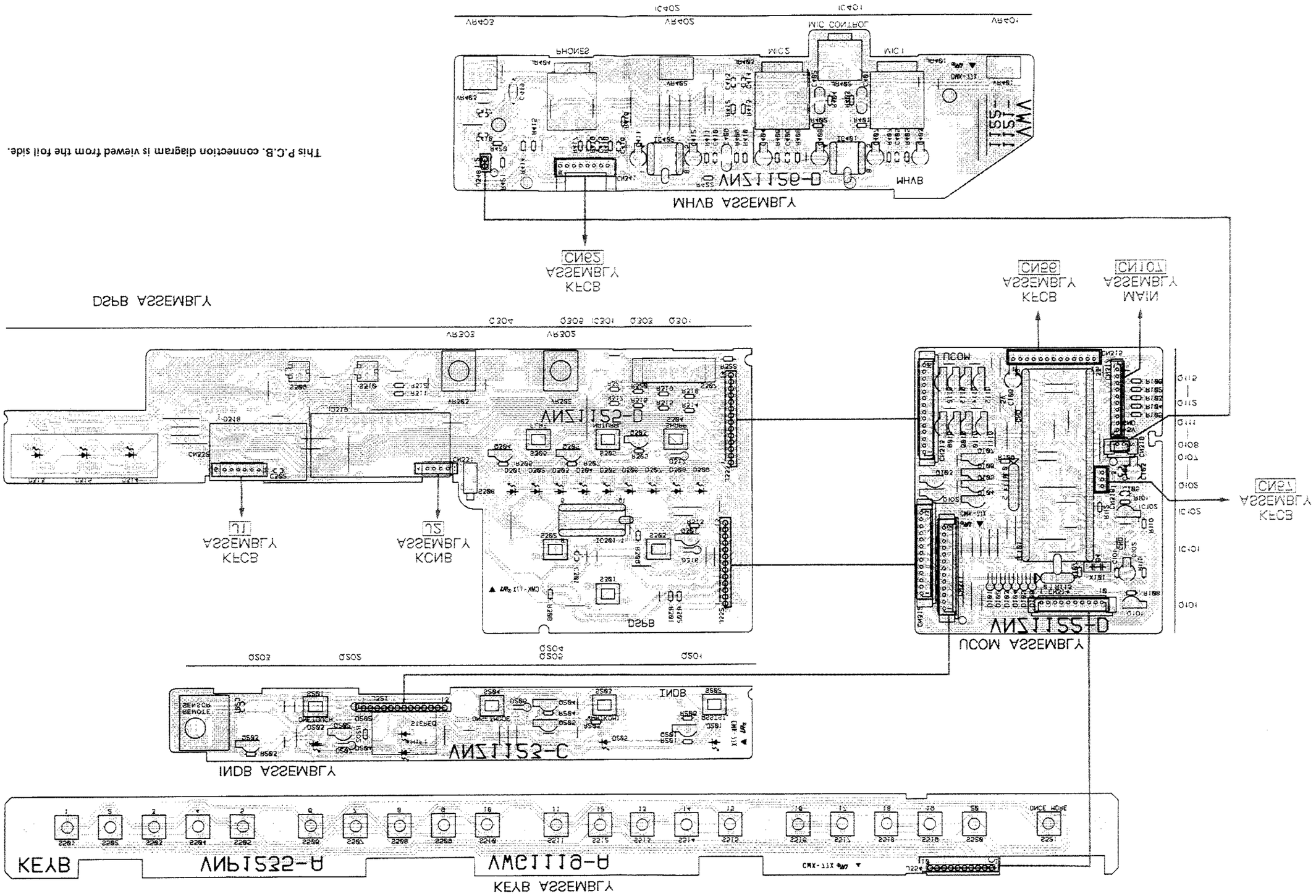
1. This P.C.B. connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the above Table.
3. The capacitor terminal marked with ▭ shows negative terminal.
4. The diode marked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



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



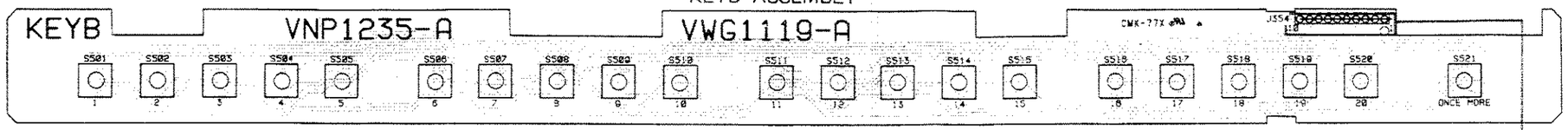
2-3 INDB, DSPB, WHAB, UCOM AND KEYB ASSEMBLIES



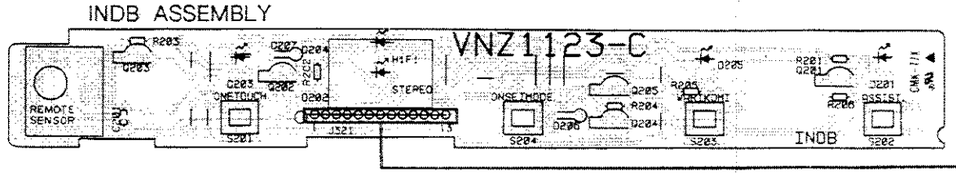
This P.C.B. connection diagram is viewed from the foil side.

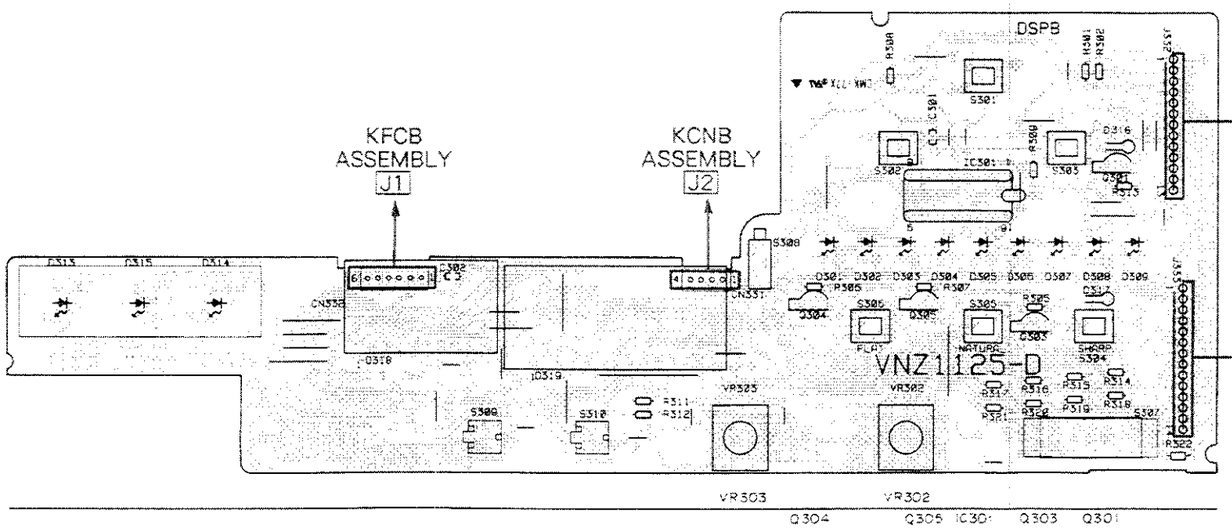
5.3 INDB, DSPB, MHVB, UCOM AND KEYB ASSEMBLIES

KEYB ASSEMBLY

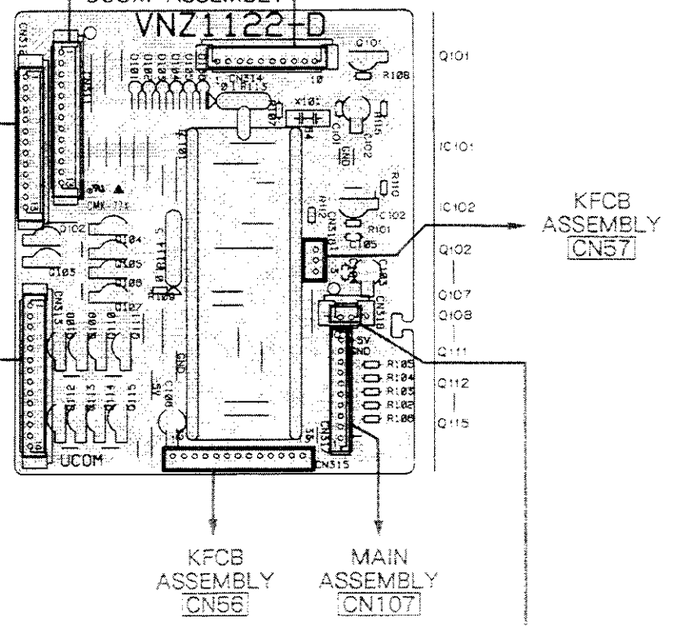


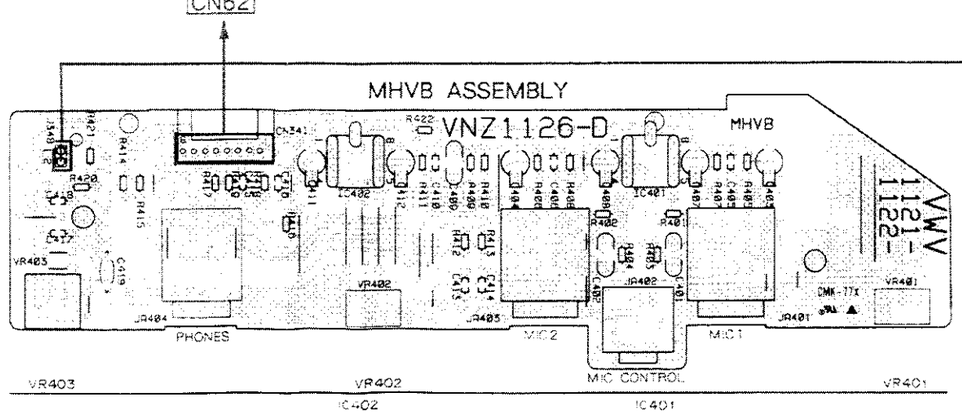
INDB ASSEMBLY

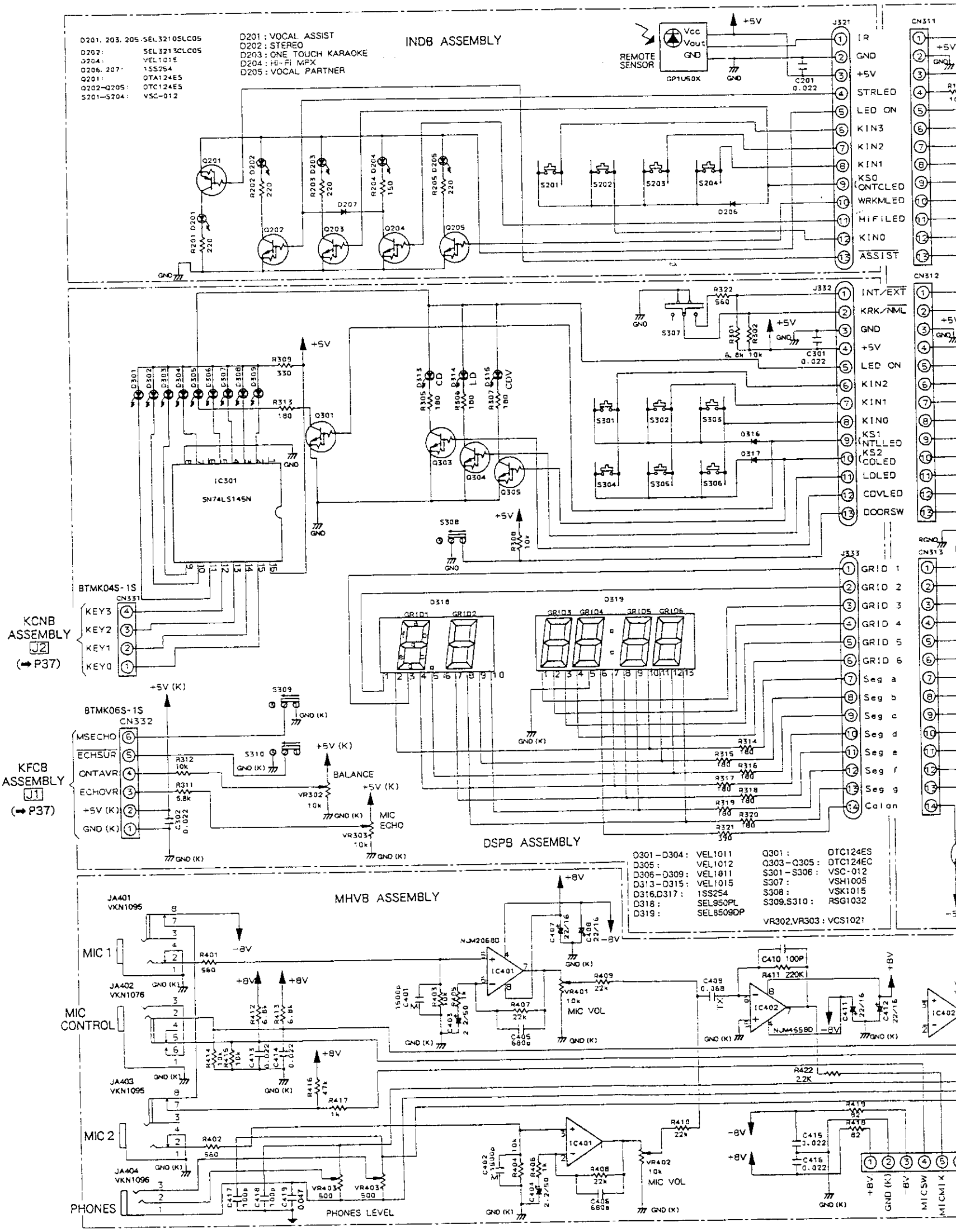


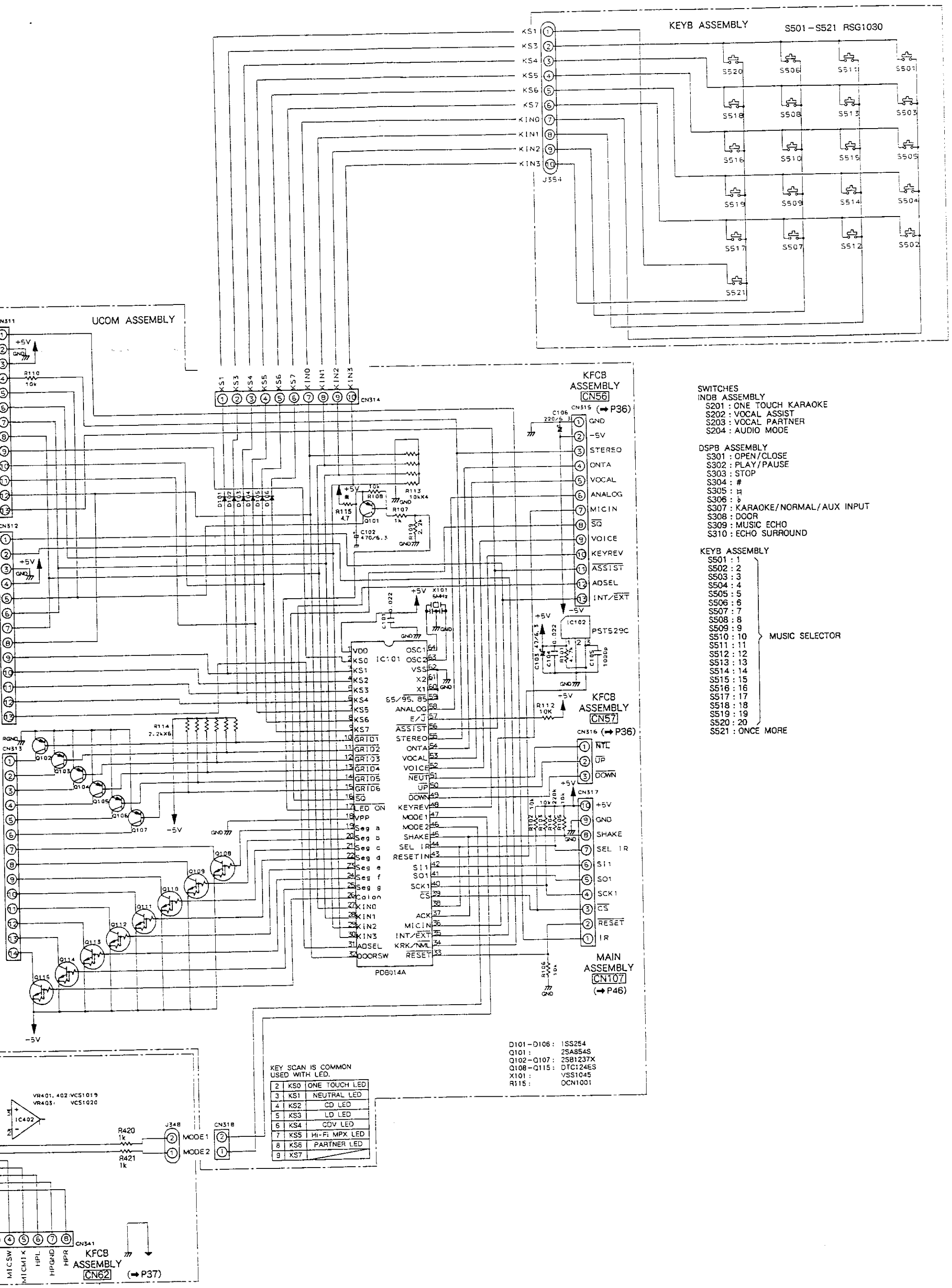


DSPB ASSEMBLY






D201, 203, 205 : SEL3210SLC0S
D202 : SEL3213CLC0S
D204 : VEL1013
D206, 207 : 1SS254
Q201 : DTA124ES
Q202–Q205 : DTC124ES
S201–S204 : VSC-012
D201 : VOCAL ASSIST
D202 : STEREO
D203 : ONE TOUCH KARAOKE
D204 : Hi-Fi MFX
D205 : VOCAL PARTNER
INDB ASSEMBLY
REMOTE SENSOR
GP1U50X
Vcc
Vout
GND
+5V
C201 0.022
J321
IR
GND
+5V
STRLED
LED ON
KIN3
KIN2
KIN1
KS0 (ONTCLED)
WRKMLED
HiFiLED
KIN0
ASSIST
CN311
CN312
CN313
J332
INT/EXT
KRK/NML
LED ON
KIN2
KIN1
KIN0
KS1 (NTLLED)
KS2 (COLED)
LDLED
COVLED
DOORSW
J333
GRID 1
GRID 2
GRID 3
GRID 4
GRID 5
GRID 6
Seg a
Seg b
Seg c
Seg d
Seg e
Seg f
Seg g
Colon
IC301
SN74LS145N
BTMK04S-1S
CN331
KEY3
KEY2
KEY1
KEY0
KCNB ASSEMBLY
J2
(➡P37)
BTMK06S-1S
CN332
MSECHO
ECHSUR
ONTAVR
ECHOVR
+5V (K)
GND (K)
KFCB ASSEMBLY
J1
(➡P37)
BALANCE
MIC ECHO
DSPB ASSEMBLY
D301–D304 : VEL1011
D305 : VEL1012
D306–D309 : VEL1011
D313–D315 : VEL1015
D316,D317 : 1SS254
D318 : SEL950PL
D319 : SEL8509DP
Q301 : DTC124ES
Q303–Q305 : DTC124EC
S301–S306 : VSC-012
S307 : VSH1005
S308 : VSK1015
S309,S310 : RSG1032
VR302,VR303 : VCS1021
MHVB ASSEMBLY
JA401 VKN1095
JA402 VKN1076
JA403 VKN1095
JA404 VKN1096
MIC 1
MIC 2
MIC CONTROL
PHONES
PHONES LEVEL
MIC VOL
NJM2068D
NJM4558D
+8V
-8V
MICSW
MICMIX



SWITCHES
INDB ASSEMBLY
- S201 : ONE TOUCH KARAOKE
- S202 : VOCAL ASSIST
- S203 : VOCAL PARTNER
- S204 : AUDIO MODE

DSPB ASSEMBLY
- S301 : OPEN/CLOSE
- S302 : PLAY/PAUSE
- S303 : STOP
- S304 : #
- S305 : ♮
- S306 : ♭
- S307 : KARAOKE/NORMAL/AUX INPUT
- S308 : DOOR
- S309 : MUSIC ECHO
- S310 : ECHO SURROUND

KEYB ASSEMBLY
- S501 : 1
- S502 : 2
- S503 : 3
- S504 : 4
- S505 : 5
- S506 : 6
- S507 : 7
- S508 : 8
- S509 : 9
- S510 : 10
- S511 : 11
- S512 : 12
- S513 : 13
- S514 : 14
- S515 : 15
- S516 : 16
- S517 : 17
- S518 : 18
- S519 : 19
- S520 : 20

} MUSIC SELECTOR

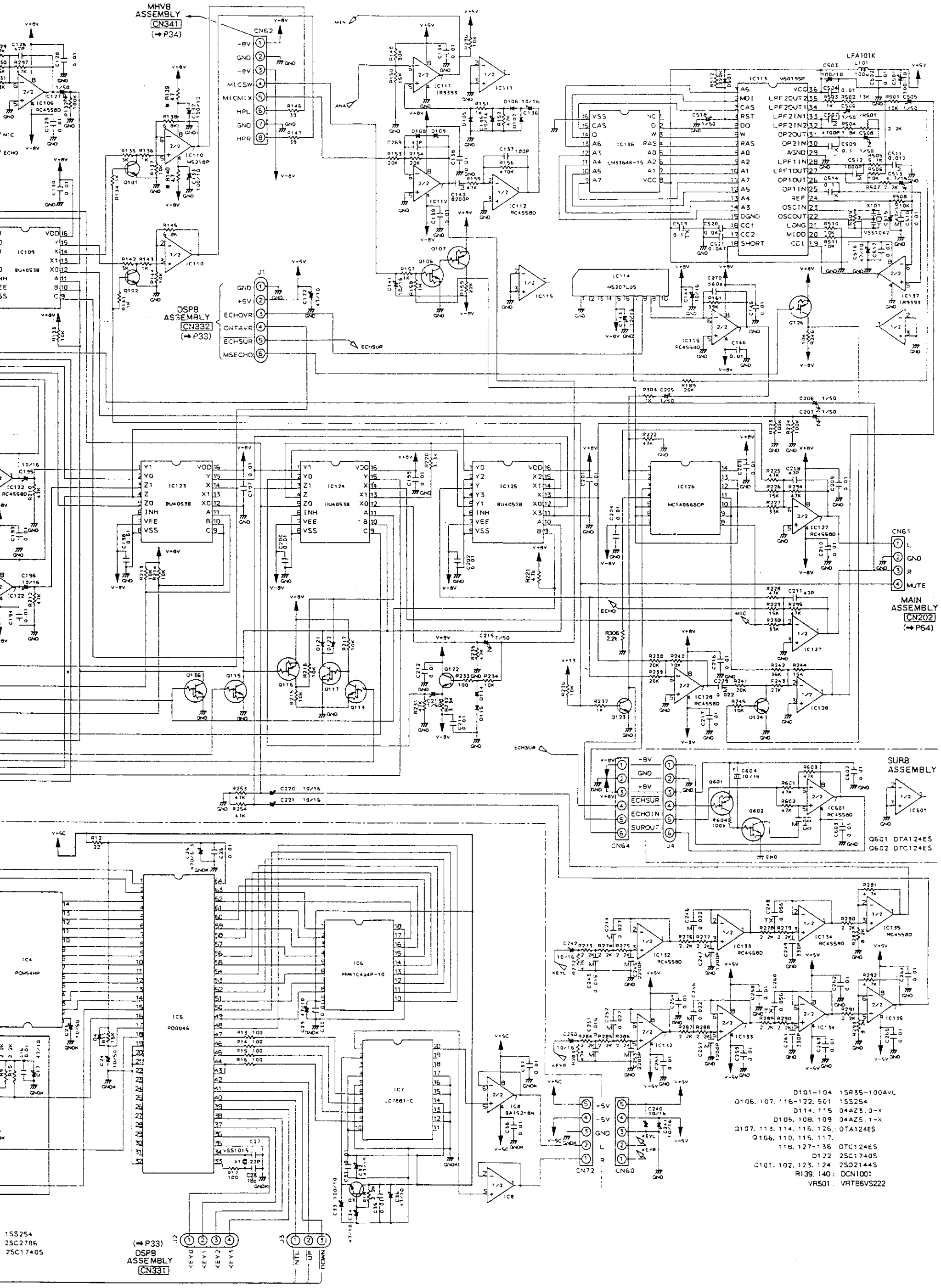
- S521 : ONCE MORE

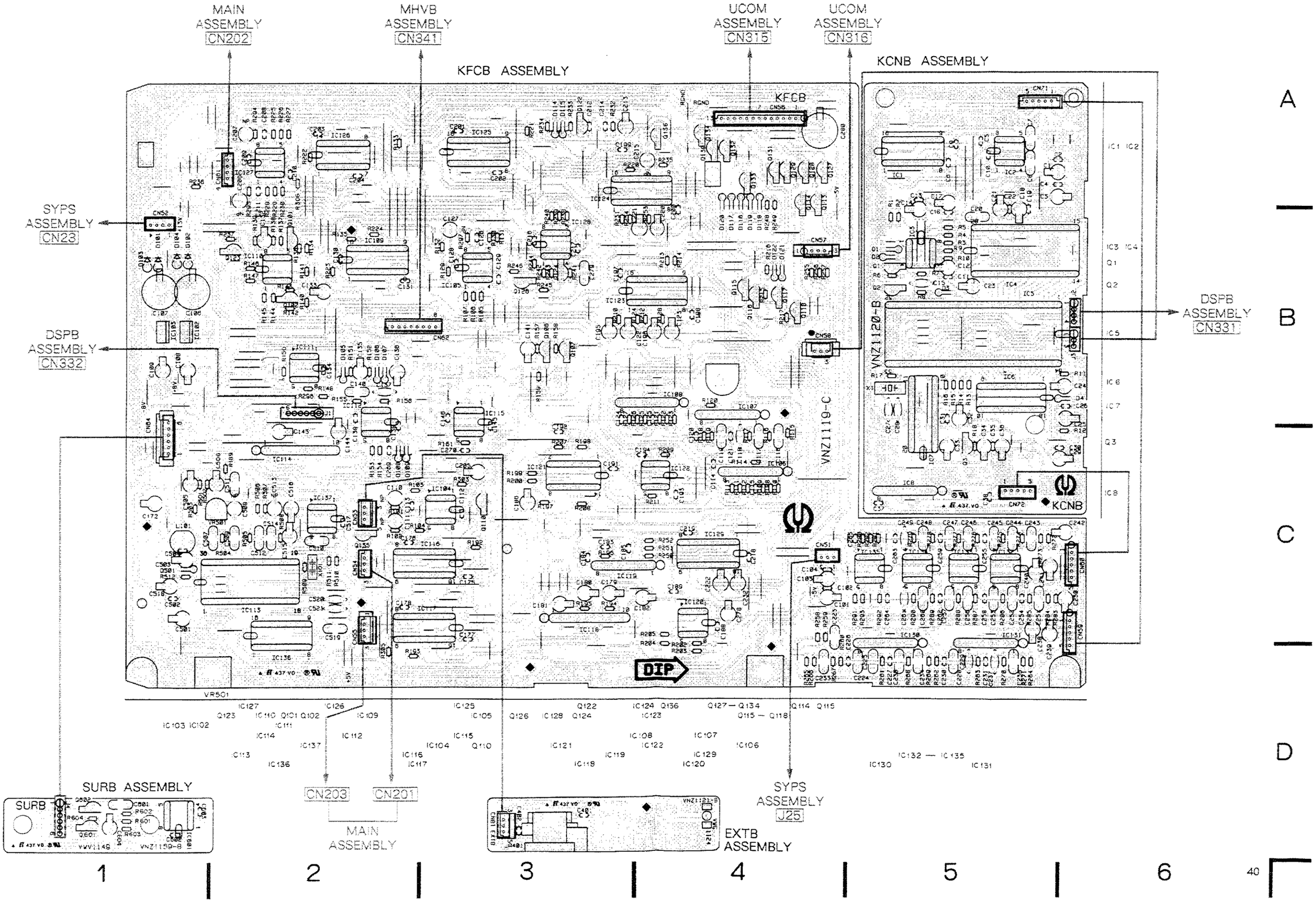
D101-D106 : 1SS254
Q101 : 2SA854S
Q102-Q107 : 2SB1237X
Q108-Q115 : DTC124ES
X101 : VSS1045
R115 : DCN1001

KEY SCAN IS COMMON USED WITH LED.

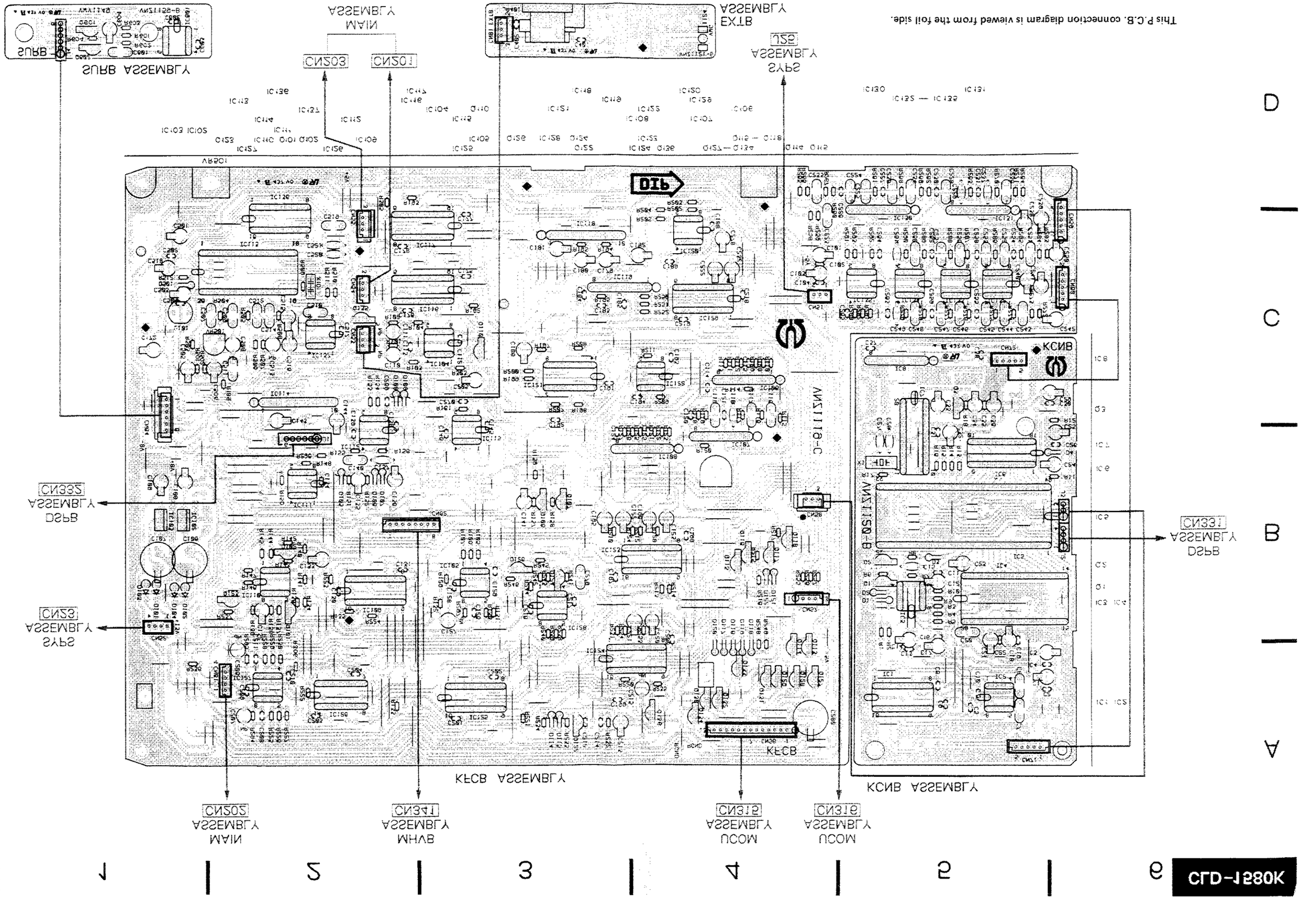
2	KS0	ONE TOUCH LED
3	KS1	NEUTRAL LED
4	KS2	CD LED
5	KS3	LD LED
6	KS4	CDV LED
7	KS5	Hi-Fi MPX LED
8	KS6	PARTNER LED
9	KS7	

5.4 KFCB, EXTB, KCNB AND SURB ASSEMBLIES

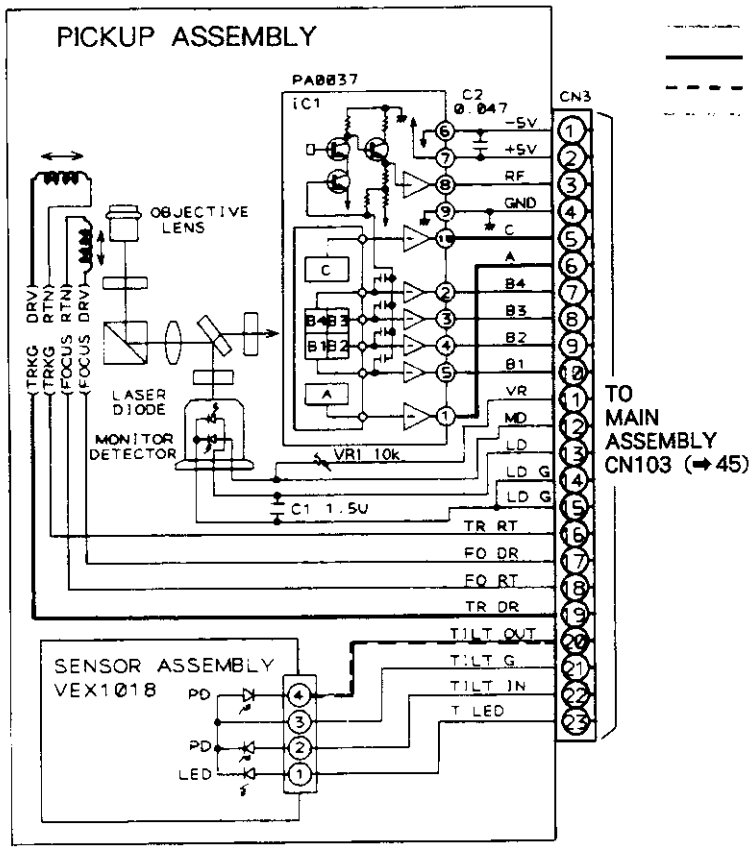

MHV8 ASSEMBLY
CN341
(→P34)
CN62
-8V
GND
-9V
MICSW
MICMIX
HPL
GND
HPR
GIN
ANA
LFA101K
IC115 M50795P
IC136 LM5364K-15
IC111 IR9393
IC112 RC4558D
IC110 M5218P
IC109 BU4053B
IC123 IC124 IC125 BU4053B
IC114 M5207L05
IC126 MC14066BCP
IC127 IC128 IC135 RC4558D
IC132 IC133 IC134 RC4558D
IC115 RC4558D
IC137 IR9393
IC1 IC2 IC3 IC4 PQM54HP
IC5 PQ0046
IC6 KM41C464P-10
IC7 LC7881-C
IC8 BA15218N
IC601 RC4558D
Q101 Q102 Q106 Q107 Q115 Q116 Q117 Q119 Q121 Q122 Q123 Q124 Q126 Q136
Q601 DTA124ES
Q602 DTC124ES
DSPB ASSEMBLY
CN332
(→P33)
J1
GND
+5V
ECHOVR
ONTAVR
ECHSUR
MSECHO
ECHSUR
ECHO
MIC
SURB ASSEMBLY
CN64
J4
-8V
GND
+8V
ECHSUR
ECHOIN
SUROUT
MAIN ASSEMBLY
CN202
(→P64)
CN61
L
GND
R
MUTE
CN72
CN60
+5V
-5V
GND
L
R
(→P33)
DSPB ASSEMBLY
CN331
J2
KEY0
KEY1
KEY2
KEY3
J3
NTL
UP
DOWN
D101-104 1SR35-100AVL
D105, 107, 116-122, 501 1SS254
D114, 115 04AZ3.0-X
D105, 108, 109 04AZ5.1-X
Q107, 113, 114, 116, 126 DTA124ES
Q106, 110, 115, 117, 118, 127-136 DTC124ES
Q122 2SC1740S
Q101, 102, 123, 124 2SD2144S
R139, 140 : DCN1001
VR501 : VRT86VS222
1SS254
2SC2786
2SC1740S


MAIN ASSEMBLY CN202
MHVB ASSEMBLY CN341
UCOM ASSEMBLY CN315
UCOM ASSEMBLY CN316
KFCB ASSEMBLY
KCNB ASSEMBLY
KFCB
KCNB
SYPS ASSEMBLY CN23
DSPB ASSEMBLY CN332
DSPB ASSEMBLY CN331
VNZ1120-B
VNZ1110-C
DIP
VR501
SURB ASSEMBLY
SURB
CN203
CN201
MAIN ASSEMBLY
EXTB ASSEMBLY
SYPS ASSEMBLY J25

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



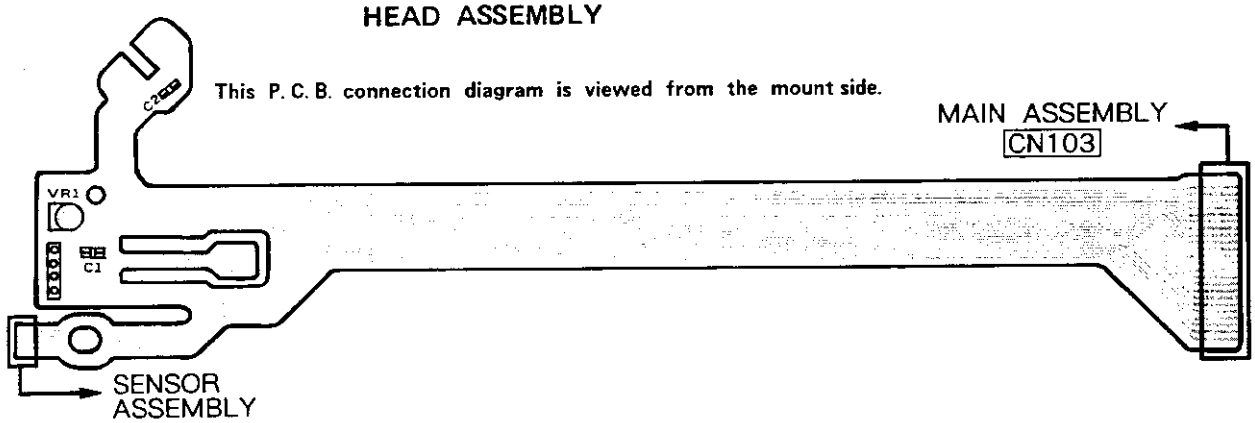
5.5 PICKUP ASSEMBLY

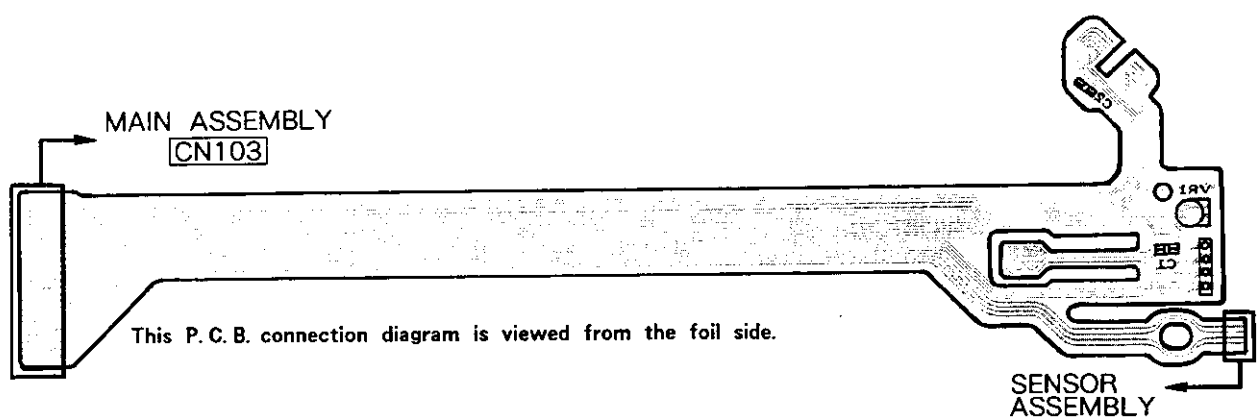


: FOCS SERVO Loop Line
: TRKG SERVO Loop Line
: TILT SERVO Loop Line
: RF Signal Line

HEAD ASSEMBLY

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





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

Note : Waveforms and voltages are at the PLAY state.

IC601
<MA1152WNT>

Pin No.	Voltage	Pin No.	Voltage	Pin No.	Voltage
1	-5	15	0	29	"
2	0	16	0	30	"
3	2	17	"	31	"
4	0	18	"	32	"
5	0	19	0	33	0
6	0	20	"	34	-4
7	0	21	0	35	500mV
8	0	22	0	36	0
9	0	23	"	37	0
10	"	24	0	38	0
11	"	25	"	39	0
12	"	26	"	40	0
13	0	27	"	41	0
14	0	28	"	42	5

IC602
<NJM4558S>

Pin No.	Voltage
1	5
2	2.5
3	0
4	0
5	-5
6	0
7	0
8	0

IC603
<BA13218N>

Pin No.	Voltage
1	"
2	0
3	0
4	-5
5	0
6	0
7	0
8	5

IC604
<LA6500>

Pin No.	Voltage
1	0
2	-15
3	15
4	0
5	0

IC605
<IR3C02A>

Pin No.	Voltage
1	3
2	0
3	-3.5
4	-5
5	5
6	5
7	3.5
8	5

IC606
<TA8410AK>

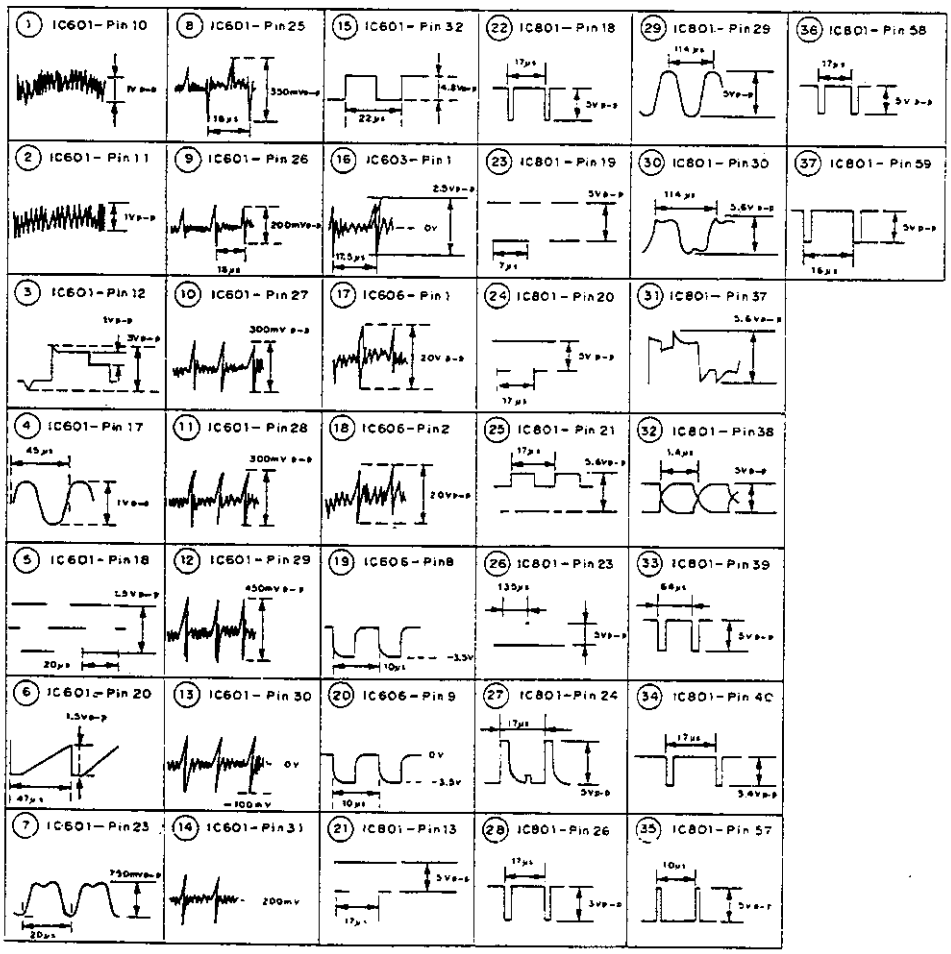
Pin No.	Voltage
1	"
2	"
3	0
4	0
5	-15
6	0
7	0
8	0
9	0
10	15

IC801
<PD0071>

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

IC802
< TA7291P >

Pin No.	Voltage
1	0
2	0.56
3	0
4	4
5	5
6	5
7	5
8	12
9	0
10	0.56



5.6 MAIN (CONT, FTS SECTION) AND SW ASSEMBLIES

MAIN ASSEMBLY (VWX1046)

D601 - 605,802	1SS254
D803	04AZ10-Y
R806	VCN1025
X801	VSS1040
VR601	VRTB6VS102
VR602 - 605,608	VRTB6VS472
VR606	VRTB6VS222
VR607	VRTB6VS104

NOTE: ⊥ Indicate +5 V pull up by chip resistor. (R810~R813, R815~R830)

CARRIAGE MOTOR ASSEMBLY VXX1261

LOADING MOTOR ASSEMBLY VXX1262

SW ASSEMBLY

S1 - 3 : PSH1008

S5 : PSH1003

S4 : PSH1003

: FOCS SERVO Loop Line
: SLDR SERVO Loop Line
: TRKG SERVO Loop Line
: TILT SERVO Loop Line
: RF Signal Line

7 8 9 10 11 12

IC,Q Q213 Q212 Q214 Q564 IC212 IC405 Q563 Q562 Q614 IC606 IC603 IC209 IC208 IC214 IC604 IC213 IC403 IC404 IC207 Q208 IC602 Q522 Q482 Q483 Q481 IC605 Q484 Q485 IC402 IC202 Q486 Q442 Q443 IC206 IC401 IC606 Q441 IC601 IC205 Q401 Q402 Q403 Q206 IC204 Q202 Q524 Q523 Q203 Q205 Q211 Q201 Q204 Q910 IC904 IC903 Q914 Q912 Q911 Q913 IC802 IC801 IC351 IC901 IC902 Q352 Q351

ADJ. VR603 VR601 VR602 VR481 VR604 VR607 VR482 VR441 VR605 VR606 VR521 VR608 VC901

KFCB ASSEMBLY CN61

KFCB ASSEMBLY CN54

ATTENUATOR

AUDIO OUT

VIDEO OUT

SYPS ASSEMBLY J21

PICKUP ASSEMBLY

CONTROL

DSP

AFM

TBC

VIDEO

CONT

VNP1204-D

MAIN ASSEMBLY (VWX1046)

KFCB ASSEMBLY CN55

FG ASSEMBLY

SYPS ASSEMBLY J22

UCOM ASSEMBLY CN317

S4 INNER SW

SW ASSEMBLY

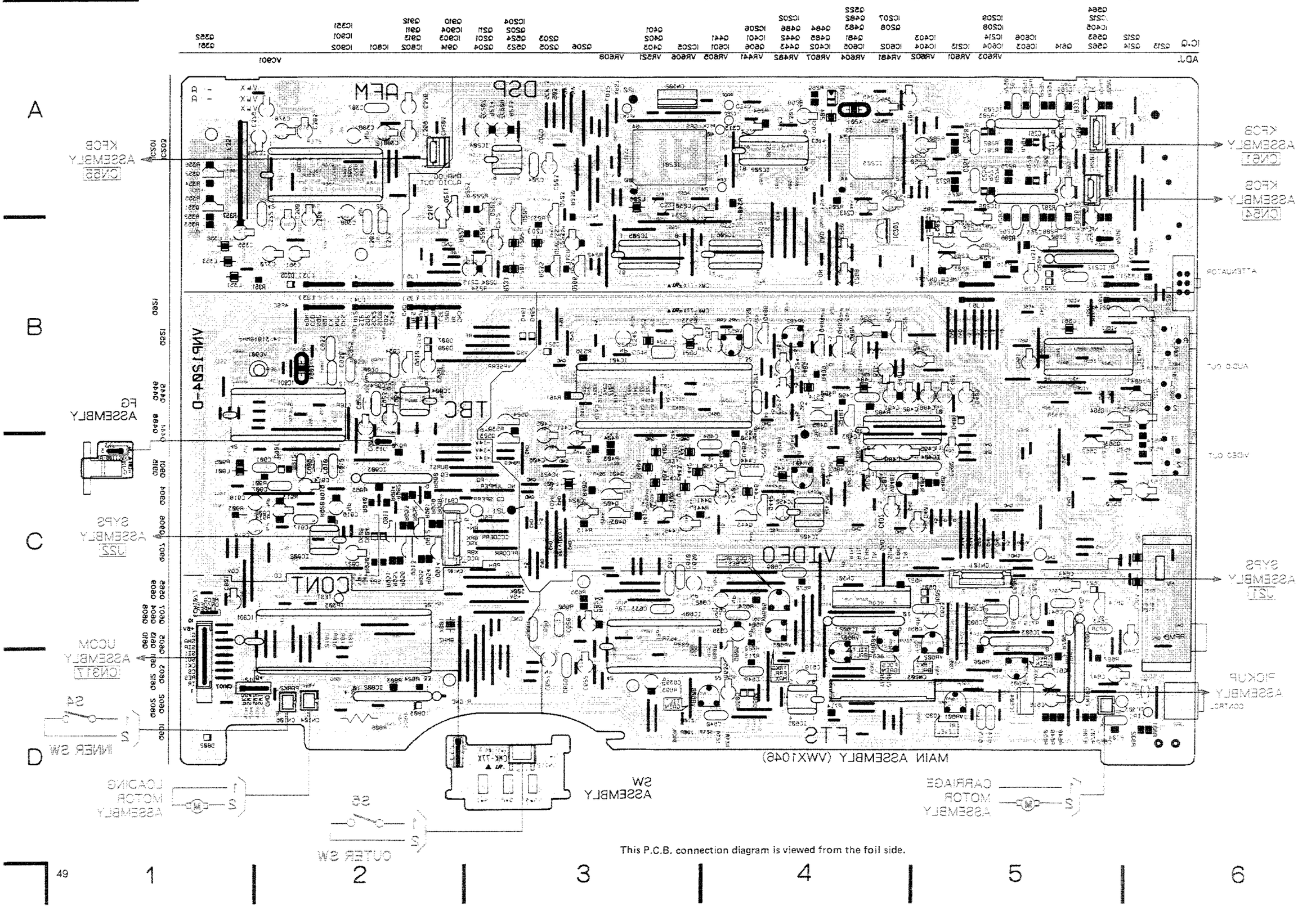
S5 OUTER SW

CARRIAGE MOTOR ASSEMBLY

LOADING MOTOR ASSEMBLY

A B C D

7 8 9 10 11 12



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

5.7 MAIN ASSEMBLY (VIDEO SECTION)

MAIN ASSEMBLY (VWX1046)

D461,462,481,521	1SS254
L401	LAU560J
L402,403	LAU220J
L404,405,521	LAU120J
L441	LAU430J
L442	LAU620J
L443,523,561	LAU390J
L444	LFA471J
L445,446	LAU221J
L484	LAU180J
L485	LAU121J
L486	LAU820J
L524	LRA561K
L562,563	LAU100J
VR441	VRTB6VS222
VR481,482	VRTB6VS472
VR521	VRTG6VS472

TO SYPS ASSEMBLY J21 (➡P24)

FROM FTS (➡P45)

TO CONT (➡P46)

TO TBC (➡P55) (➡P56)

TO TBC (➡P55) (➡P56) (➡P55)

FROM CONT (➡P46)

TO D.AUDIO (➡P64)

: VIDEO Signal Line

- - - - - : RF Signal Line

Note : Waveforms and voltages are at the PLAY state.

IC401
<PA5010>

Pin No.	Voltage	Pin No.	Voltage	Pin No.	Voltage	Pin No.	Voltage
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	0.2

IC402
<PM0001>

Pin No.	Voltage
1	-5
2	*
3	-2
4	-2
5	*
6	0
7	5
8	*

IC403
< CXL1009P >

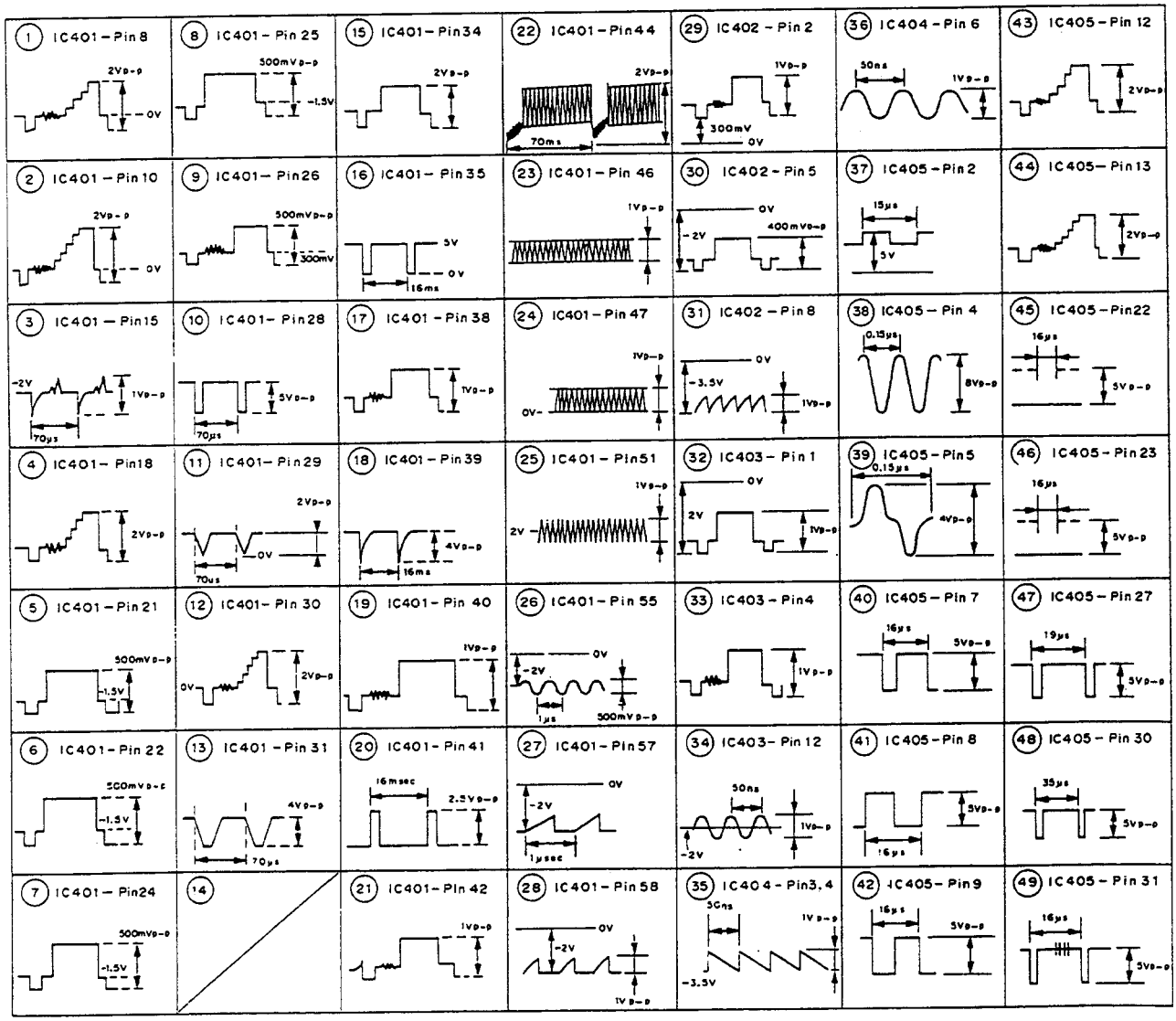
Pin No.	Voltage
1	*
2	4.2
3	-2
4	*
5	-3.5
6	1
7	-5
8	0
9	-5
10	4.2
11	-5
12	*
13	0
14	-5
15	0.3
16	-3.8
17	0.8
18	-2
19	4.2
20	-5

IC404
<PA0017>

Pin No.	Voltage
1	-5
2	0
3	*
4	*
5	-5
6	*
7	-5
8	0.2

IC405
< M50554-132SP >

Pin No.	Voltage	Pin No.	Voltage
1	0	17	0.8
2	*	18	5
3	5	19	0
4	*	20	0
5	*	21	0
6	5	22	*
7	*	23	*
8	*	24	0
9	*	25	0
10	5	26	0
11	0	27	*
12	*	28	2
13	*	29	2
14	0.6	30	*
15	3.5	31	*
16	0.6	32	5



Note : Waveforms and voltages are at the PLAY state.

IC901
<HD49403NT>

Pin No.	Voltage	Pin No.	Voltage	Pin No.	Voltage
1	*	15	*	29	*
2	*	16	*	30	2.5
3	*	17	*	31	2.5
4	*	18	2.5	32	*
5	0	19	2.5	33	2.5
6	*	20	*	34	2.5
7	0	21	2.5	35	5
8	*	22	*	36	*
9	*	23	*	37	*
10	0	24	2.5	38	*
11	0	25	5	39	*
12	5	26	*	40	*
13	0	27	2.5	41	*
14	0	28	*	42	*

IC902
<NJM4558D>

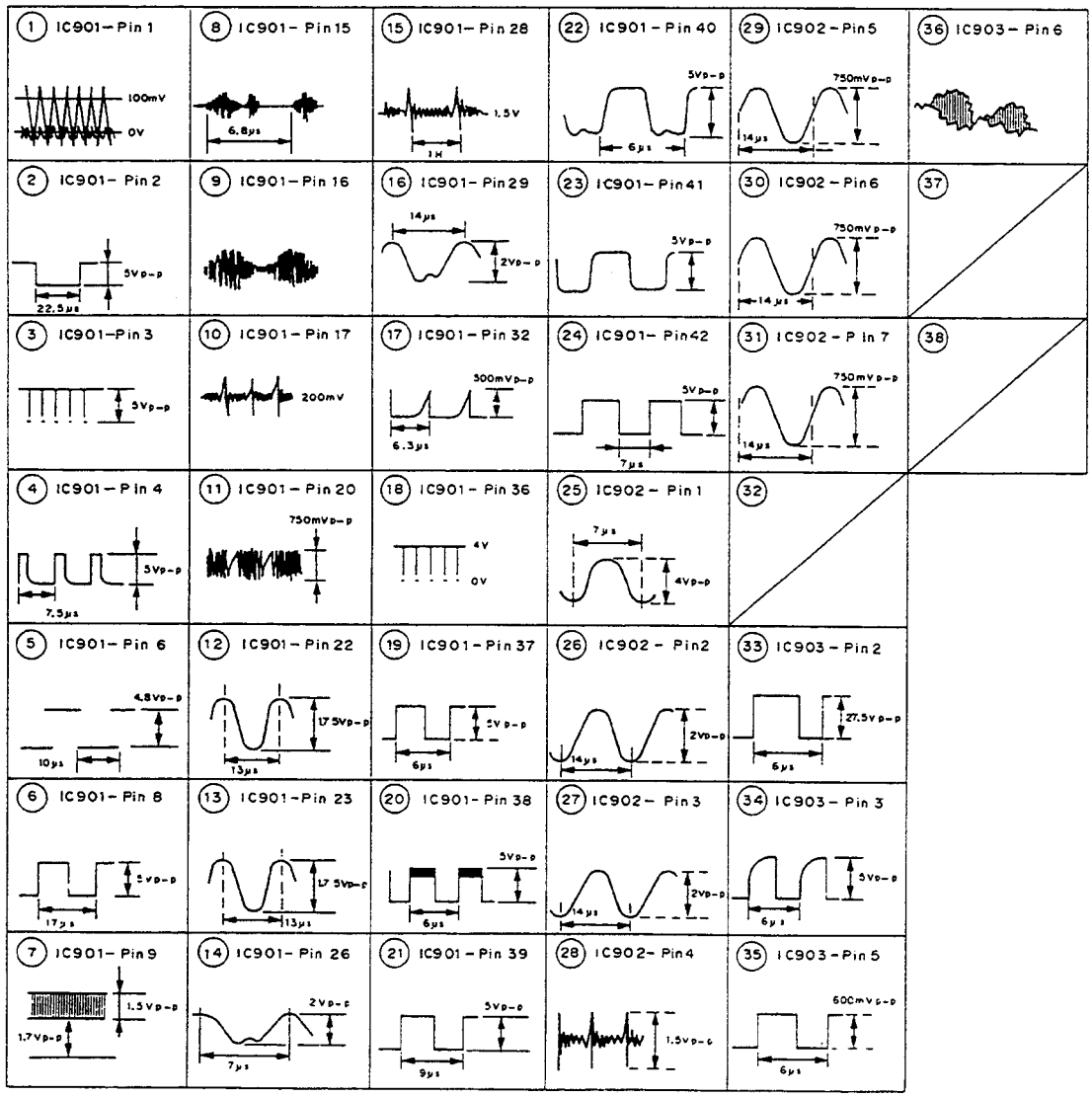
Pin No.	Voltage
1	*
2	*
3	*
4	*
5	*
6	*
7	*
8	0

IC903
<NJM4558S>

Pin No.	Voltage
1	*
2	*
3	*
4	0
5	*
6	*
7	*
8	*

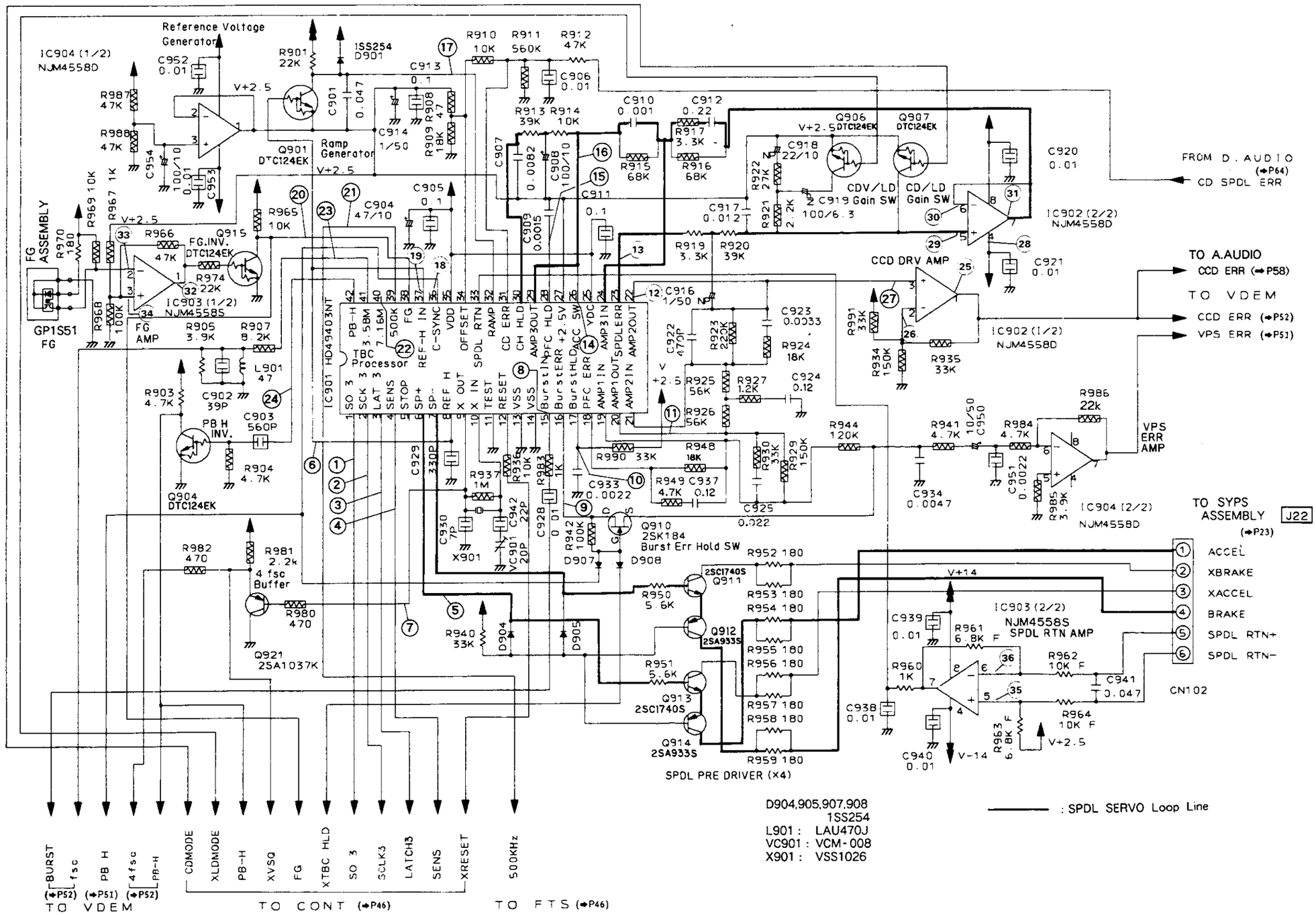
IC904
< NJM4558D >

Pin No.	Voltage
1	2.4
2	2.4
3	2.4
4	-2.4
5	0
6	0
7	0
8	0



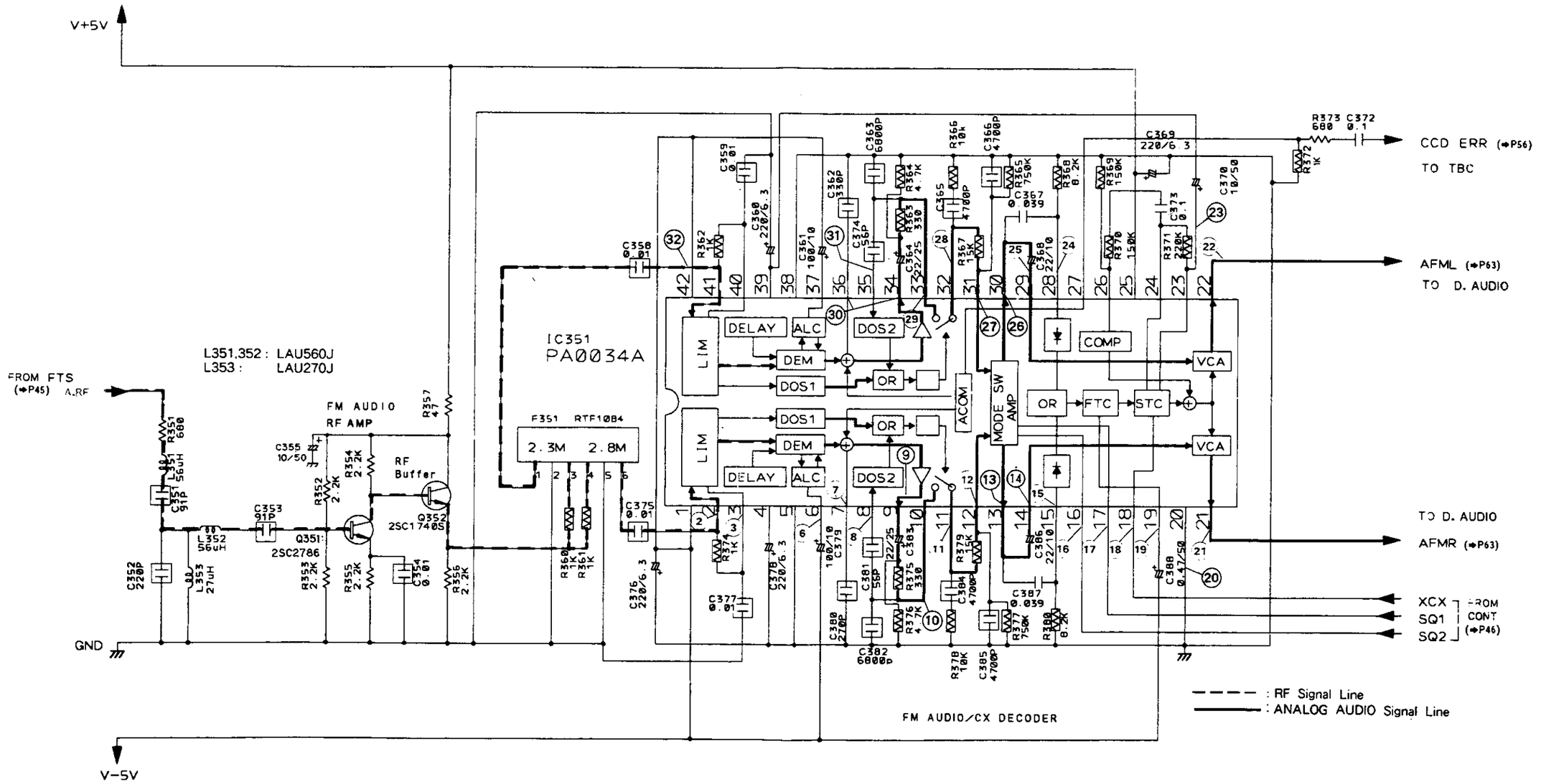
5.8 MAIN (TBC SECTION) AND FG ASSEMBLIES

MAIN ASSEMBLY (VWX1046)



5.9 MAIN ASSEMBLY (A. AUDIO SECTION)

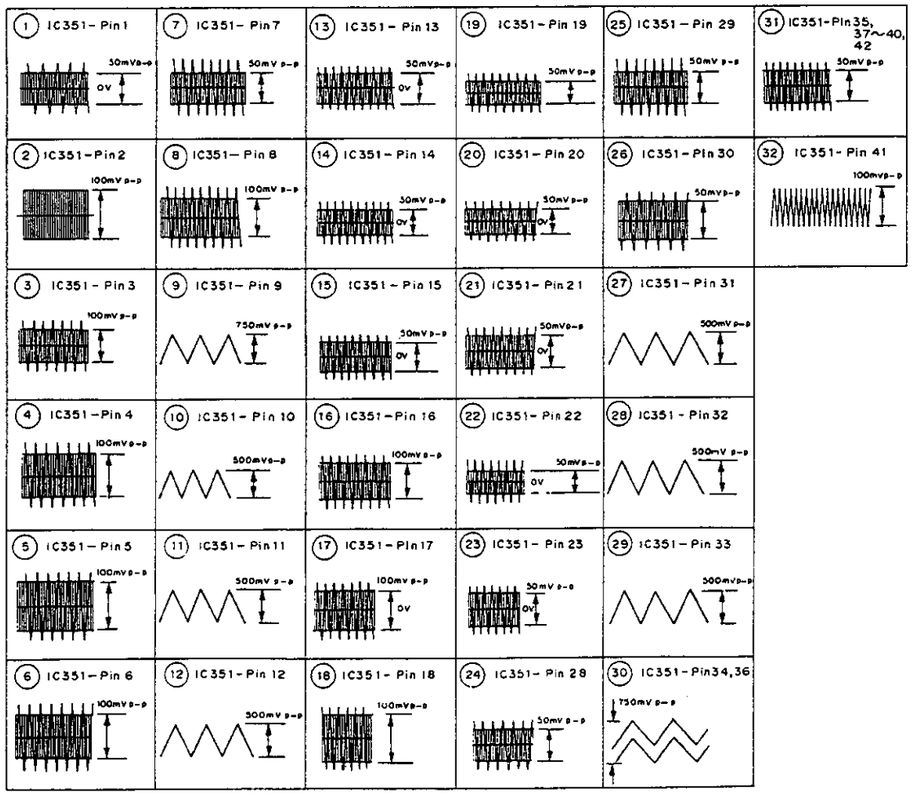
MAIN ASSEMBLY (VWX1046)



Note : Waveforms and voltages are at the PLAY state.

IC351
<PA00344>

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



Note : Waveforms and voltages are at the PLAY state.

IC201 <CXD2500Q>

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

IC202 <SM5840AP>

Pin No.	Voltage
1	5
2	"
3	"
4	"
5	0
6	"
7	"
8	5
9	5
10	"
11	"
12	"
13	"
14	5
15	"
16	"
17	"
18	"

IC203 <SM5866BF>

Pin No.	Voltage	Pin No.	Voltage	Pin No.	Voltage
1	4.8	16	0	31	"
2	4.8	17	0	32	0
3	4.8	18	"	33	0
4	0	19	"	34	0
5	0	20	4.8	35	4.8
6	4.8	21	4.8	36	0
7	4.8	22	"	37	0
8	"	23	0	38	"
9	0	24	0	39	4.8
10	0	25	"	40	"
11	"	26	4.8	41	"
12	4.8	27	4.8	42	"
13	4.8	28	0	43	"
14	"	29	0	44	4.8
15	"	30	"		

IC204 < M5218AP >

Pin No.	Voltage
1	-1.6
2	2.5
3	2.5
4	-5
5	2.7
6	2.8
7	2.8
8	5

IC205 <BU4053B>

Pin No.	Voltage
1	0
2	3.6
3	0
4	-1.5
5	0
6	0
7	-5
8	0
9	0
10	0
11	0
12	"
13	"
14	"
15	"
16	5

IC206 < TC74HCU04AP >

Pin No.	Voltage
1	"
2	"
3	2.5
4	2.5
5	2.5
6	2.5
7	0
8	"
9	"
10	"
11	"
12	"
13	"
14	5

IC207 <MJM78L05A>

Pin No.	Voltage
1	5
2	0
3	+8

IC208 < NJM4580L >

Pin No.	Voltage
1	"
2	"
3	"
4	-8
5	0
6	0
7	"
8	8

IC209 < NJM4580L >

Pin No.	Voltage
1	"
2	"
3	"
4	-8
5	0
6	0
7	"
8	8

IC212 <M5218L>

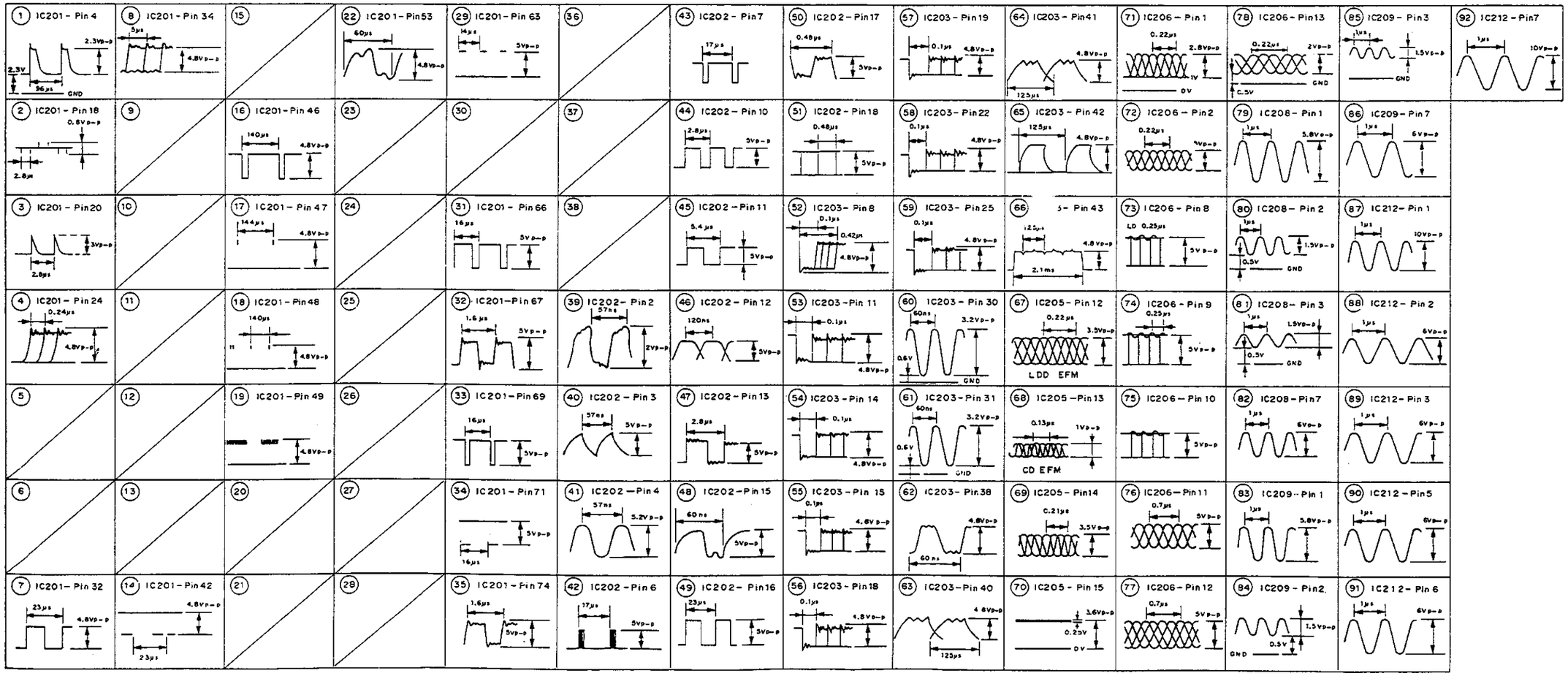
Pin No.	Voltage
1	"
2	"
3	"
4	-8
5	"
6	"
7	"
8	8

IC213 < NJM78L08A >

Pin No.	Voltage
1	8
2	0
3	11

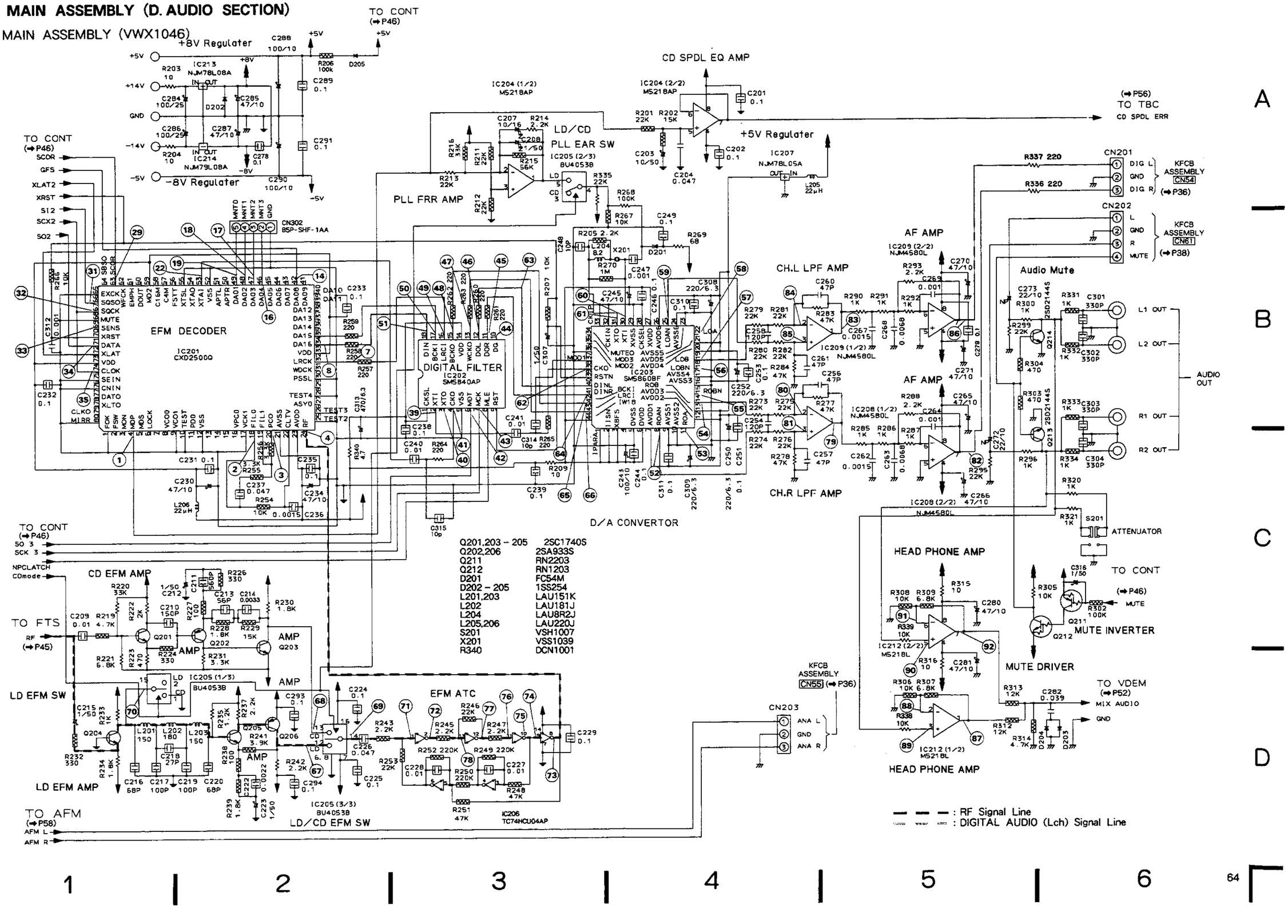
IC214 < NJM79L08A >

Pin No.	Voltage
1	0
2	-11.5
3	-8



5.10 MAIN ASSEMBLY (D. AUDIO SECTION)

MAIN ASSEMBLY (VWX1046)



6. ELECTRICAL PARTS LIST

NOTES :
- Parts without part number cannot be supplied.
- Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- 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.
- 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 ····· RD1/4PS 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 ····· RN1/4SR 5 6 2 1 F

Miscellaneous Parts

Mark	Symbol & Description	Part No.
	KCNB assembly	
◉	MAIN assembly	VWX1046
	MHVB assembly	
	FG assembly	
◉	SYPS assembly	VWR1070
	EXTB assembly	
	DSPB assembly	
	HEAD assembly	
	KFCB assembly	
	SW assembly	
	SURB assembly	
	INDB assembly	
	UCOM assembly	
	KEYB assembly	
⚠	FU201,FU202 Fuse (3A)	VEK-018
⚠	FU203,FU204 Fuse (2A)	VEK-022
	S4,S5 Slide switch (INNER, OUTER)	PSH1003
⚠	Strain relief	CM-22
⚠	AC power cord	VDG1034
⚠	Power transformer	VTT1088
⚠	Voltage selector	VSB-002
	Spindle motor assembly	VXA1474
	Carriage motor assembly	VXX1261
	Loading motor assembly	VXX1262
	Pre-pickup assembly	VXX1413
	Remote control unit	VXX1442

KCNB Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC8	BA15218N
	IC1	BU4053B
	IC6	KM41C464P-10
	IC7	LC7881-C
	IC3	NJM360D
	IC4	PCM54HP
	IC5	PD0046
	IC2	RC4558D
	Q3	2SC1740S
	Q1,Q2	2SC2786
	D1 – D4	1SS254

CAPACITORS

Mark	Symbol & Description	Part No.
	C27	CCCCH220J50
	C28	CCCCH180J50
	C15	CCCSL331J50
	C33	CEAS101M10
	C1,C3,C12,C14,C17,C29,C32, C34,C36	CEAS470M10
	C25	CEAS471M6R3
	C18,C21,C23,C24	CEJA100M16
	C20	CFTXA563J50
	C2,C4 – C6,C9 – C11,C13,C16,C19, C22,C26,C30,C31,C35,C37,C38	CKPUYY103N16
	C7,C8	CQMA102J50

RESISTORS

Mark	Symbol & Description	Part No.
	All resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	X1 X'TAL	VSS1015

◉MAIN Assembly (VWX1046)

VIDEO Section

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC403	CXL1009P
	IC405	M50554-132SP
	IC404	PA0017
	IC401	PA5010
	IC402	PM0001
	Q524	RN1203
	Q488,Q565	2SA1037K
	Q401 – Q403,Q443,Q481,Q522, Q562,Q564	2SA933S
	Q441,Q442,Q482 – Q486,Q523, Q563	2SC1740S
	Q444 – Q446,Q521	2SC2412K
	D461,D462,D481,D521	1SS254

COILS

Mark	Symbol & Description	Part No.
	L562,L563	LAU100J
	L404,L405,L521	LAU120J
	L485	LAU121J
	L484	LAU180J
	L402,L403	LAU220J
	L445,L446	LAU221J
	L443,L523,L561	LAU390J
	L441	LAU430J
	L401	LAU560J
	L442	LAU620J
	L486	LAU820J
	L444	LFA471J
	L524	LRA561K

CAPACITORS

Mark	Symbol & Description	Part No.
	C421	CCCCH151J50
	C514	CCCSL241J50
	C412,C445	CCSQCH070D50
	C441,C505,C568,C569	CCSQCH100D50
	C436,C451,C461,C535	CCSQCH101J50
	C432,C516,C517	CCSQCH120J50
	C414,C415,C422,C513	CCSQCH150J50
	C429,C528,C538	CCSQCH151J50
	C468	CCSQCH181J50
	C498	CCSQCH220J50
	C428	CCSQCH221J50
	C430,C442	CCSQCH270J50
	C463	CCSQCH271J50
	C462	CCSQCH330J50
	C431,C444,C506	CCSQCH390J50
	C435,C532	CCSQCH430J50
	C420,C443,C512,C545	CCSQCH470J50
	C507	CCSQCH820J50
	C539	CCSQCH910J50
	C529	CCSQSL561J50
	C542	CEANP220M10
	C411	CEASR47M50
	C489	CEAS010M50
	C531	CEAS100M50
	C448,C452,C470,C561,C575	CEAS101M10
	C486	CEAS220M25
	C491,C492,C495	CEAS3R3M50
	C533	CEAS330M16
	C450	CEAS4R7M50
	C405,C406,C423,C424,C483,C500, C501,C519,C523,C524,C549,C550, C570,C571	CEAS470M10
	C401,C402,C485	CEAS471M6R3
	C465	CFTXA103J50
	C521	CFTXA104J50
	C490	CFTXA224J50
	C530	CFTXA683J50
	C416,C418,C419,C427,C434, C453 – C455,C458,C459,C467, C497,C565,C566	CKSQYF103Z50
	C403,C404,C425,C426,C449,C487, C488,C525,C526,C548,C572,C573	CKSQYF104Z25
	C407 – C410,C413,C417,C433, C446,C466,C469,C484,C493,C494, C496,C502 – C504,C508 – C511, C515,C518,C522,C527,C534,C536, C540,C541,C543,C544,C546,C551, C552,C562,C564,C574,C582,C584	CKSQYF473Z50
	C464	CQMA272J50

RESISTORS

Mark	Symbol & Description	Part No.
	VR441 Semi-fixed (2.2kΩ)	VRTB6VS222
	VR481,VR482 Semi-fixed (4.7kΩ)	VRTB6VS472
	VR521 Semi-fixed (4.7kΩ)	VRTG6VS472
	R402,R405,R412,R413,R441,R461, R481,R482,R485,R486,R490,R499, R539,R541,R571,R572,R574,R575	RD1/6PM□□□J
	R403,R404,R448,R450,R536	RN1/6PQ□□□□F
	Other resistors	RS1/10S□□□J

OTHERS

Mark	Symbol & Description	Part No.
	RFMD	VWL1016

TBC Section

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC901	HD49403NT
	IC902,IC904	NJM4558D
	IC903	NJM4558S
	Q901,Q904,Q906,Q907,Q915	DTC124EK
	Q921	2SA1037K
	Q912,Q914	2SA933S
	Q911,Q913	2SC1740S
	Q910	2SK184
	D901,D904,D905,D907,D908	1SS254

COIL

Mark	Symbol & Description	Part No.
	L901	LAU470J

CAPACITORS

Mark	Symbol & Description	Part No.
	VC901 Ceramic trimmer (20p)	VCM-008
	C922	CCCSL471J50
	C930	CCSQCH070D50
	C942	CCSQCH220J50
	C902	CCSQCH390J50
	C929	CCSQSL331J50
	C903	CCSQSL561J50
	C916	CEANP010M50
	C919	CEANP101M6R3
	C918	CEANP220M10
	C914	CEAS010M50
	C950	CEAS100M50
	C908,C954	CEAS101M10
	C904	CEAS470M10
	C917	CFTXA123J50
	C924,C937	CFTXA124J50
	C909	CFTXA152J50
	C925	CFTXA223J50
	C912	CFTXA224J50
	C934	CFTXA472J50
	C901,C941	CFTXA473J50
	C910	CKCYB102K50
	C951	CKSQYB222K50
	C906,C920,C921,C928, C938 – C940,C952,C953	CKSQYF103Z50
	C905,C911,C913	CKSQYF104Z25
	C933	CQMA222J50
	C923	CQMA332J50
	C907	CQMA822J50

RESISTORS

Mark	Symbol & Description	Part No.
	R901,R903,R905,R912 – R914, R919,R920,R940,R950 – R960, R970	RD1/6PM□□□J
	R961 – R964	RN1/6PQ□□□□F
	Other resistors	RS1/10S□□□J

OTHERS

Mark	Symbol & Description	Part No.
	X901 Crystal resonator	VSS1026

CONT Section

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC801	PD0071
	IC802	TA7291P
	Q802	DTC124EK
	D803	04AZ10-Y
	D802	1SS254

CAPACITORS

Mark	Symbol & Description	Part No.
	C803,C804	CCSQCH330J50
	C801	CEAS220M25
	C812	CKCYF103Z50
	C805	CKSQYF103Z50
	C802	CKSQYF104Z25

RESISTORS

Mark	Symbol & Description	Part No.
	R806 Fusible resistor	VCN1025
	R803,R824,R831,R832	RD1/6PM□□□J
	Other resistors	RS1/10S□□□J

OTHERS

Mark	Symbol & Description	Part No.
	X801 Ceramic resonator	VSS1040

D. AUDIO Section

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC205	BU4053B
	IC201	CXD2500Q
	IC204	M5218AP
	IC212	M5218L
	IC208,IC209	NJM4580L
	IC207	NJM78L05A
	IC213	NJM78L08A
	IC214	NJM79L08A
	IC202	SM5840AP
	IC203	SM5860BF
	IC206	TC74HCU04AP
	Q212	RN1203
	Q211	RN2203
	Q202,Q206	2SA933S
	Q201,Q203 – Q205	2SC1740S
	Q213,Q214	2SD2144S
	D201	FC54M
	D202 – D205	1SS254

SWITCH

Mark	Symbol & Description	Part No.
	S201 Slide switch (ATTENUATOR)	VSH1007

COILS

Mark	Symbol & Description	Part No.
	L204	LAU8R2J
	L201,L203	LAU151K
	L202	LAU181J
	L205,L206	LAU220J

CAPACITORS

Mark	Symbol & Description	Part No.
	C254,C258	CCCCH121J50
	C256,C257,C260,C261	CCPUSL470J50
	C217,C219	CCSQCH101J50
	C248,C314,C315	CCSQCH100D50
	C210	CCSQCH151J50
	C218	CCSQCH270J50
	C213	CCSQCH560J50
	C216,C220	CCSQCH680J50
	C301 – C304	CCSQSL331J50
	C211	CCSQSL561J50
	C208	CEANP010M50
	C207	CEANP100M16
	C272,C273	CEANP220M10
	C212,C215,C223,C307,C316	CEAS010M50
	C203	CEAS100M50
	C243,C288,C290	CEAS101M10
	C284,C286	CEAS101M25
	C250,C252,C308,C309	CEAS221M6R3
	C230,C234,C245,C265,C266,C270, C271,C280,C281,C285,C287	CEAS470M10
	C313	CEAS471M6R3
	C264,C269	CFTXA102J50
	C262,C267	CFTXA152J50
	C282	CFTXA393J50
	C204	CFTXA473J50
	C263,C268	CFTXA682J50
	C247,C312	CKSQYB102K50
	C236	CKSQYB152K50
	C222	CKSQYB222K50
	C214	CKSQYB332K50
	C209,C227,C228,C240,C241	CKSQYF103Z50
	C201,C202,C224,C225,C229, C231 – C233,C235,C238,C239, C244,C246,C249,C251,C253,C278, C279,C289,C291,C293,C294,C310, C311	CKSQYF104Z25
	C226,C237	CKSQYF473Z50

RESISTORS

Mark	Symbol & Description	Part No.
	R340 Fusible resistor (4.7Ω)	DCN1001
	R203,R204,R209,R213,R214, R220 – R223,R230,R231, R233 – R235,R237,R242,R264, R268,R269,R273 – R288, R290 – R293,R295,R296,R299, R300,R305,R315,R316,R320,R321, R336,R337	RD1/6PM□□□J
	Other resistors	RS1/10S□□□J

OTHERS

Mark	Symbol & Description	Part No.
	CN 5P Top post (NH)	B5P-SHF-1AA
	X201 Crystal resonator (16MHz)	VSS1039
	JA 6P Pin jack	VKB1020
	JA2 2P Mini jack	VKN-183

FTS Section

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC603	BA15218N
	IC601	HA11529NT
	IC605	IR3C02A
	IC604	LA6500
	IC602	NJM4558S
	IC606	TA8410AK
	Q612	DTA124EK
	Q604,Q607,Q609,Q615	DTC124EK
	Q611,Q613	2SA1037K
	Q601 – Q603,Q605,Q608,Q610	2SC2412K
	Q606,Q614	2SK184
	D601 – D605	1SS254

CAPACITORS

Mark	Symbol & Description	Part No.
	C615	CCCCH560J50
	C650	CCSQCH680J50
	C611,C642	CCSQSL331J50
	C634	CCSQSL561J50
	C627	CEANPR47M50
	C632,C636	CEANP100M16
	C639	CEANP220M10
	C644	CEAS010M50
	C630,C635	CEAS100M50
	C616,C617,C619,C622,C624,C647, C648	CEAS220M25
	C645	CFTXA102J50
	C606,C614,C631,C649	CFTXA104J50
	C651	CFTXA124J50
	C641	CFTXA152J50
	C605,C633	CFTXA184J50
	C637	CFTXA223J50
	C640	CFTXA224J50
	C629	CFTXA333J50
	C607,C628	CFTXA473J50
	C608,C626	CFTXA683J50

Mark	Symbol & Description	Part No.
	C643,C652	CGCYF473Z25
	C646	CKSQYB222K50
	C601,C602,C618,C620,C621	CKSQYF104Z25
	C638	CKSQYF223Z50
	C603,C604,C612,C613,C623,C625	CKSQYF473Z50
	C653	CQMA102J50
	C609	CQMA222J50
	C610	CQMA332J50

RESISTORS

Mark	Symbol & Description	Part No.
	VR601 Semi-fixed (1kΩ)	VRTB6VS102
	VR607 Semi-fixed (100kΩ)	VRTB6VS104
	VR606 Semi-fixed (2.2kΩ)	VRTB6VS222
	VR602 – VR605,VR608 Semi-fixed (4.7kΩ)	VRTB6VS472
	R608,R627,R648 – R650,R655, R660,R670,R672,R674,R684,R687, R693,R704 – R706,R709,R714, R715,R719,R722	RD1/6PM□□□J
	Other resistors	RD1/10S□□□J

OTHERS

Mark	Symbol & Description	Part No.
	CN103 23P Top connector	VKN1073

A. AUDIO Section

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC351	PA0034A
	Q352	2SC1740S
	Q351	2SC2786

COILS AND FILTER

Mark	Symbol & Description	Part No.
	L353	LAU270J
	L351,L352	LAU560J
	F351 BPF (2.30, 2.81MHz)	RTF1084

CAPACITORS

Mark	Symbol & Description	Part No.
	C352	CCSQCH221J50
	C380	CCSQCH271J50
	C374,C381	CCSQCH560J50
	C351,C353	CCSQCH910J50
	C362	CCSQSL331J50
	C368,C386	CEANP220M10
	C388	CEASR47M50
	C355,C370	CEAS100M50
	C361,C379	CEAS101M10
	C364,C383	CEAS220M25
	C360,C369,C376,C378	CEAS221M6R3
	C372,C373	CFTXA104J50
	C367,C387	CFTXA393J50
	C365,C366,C384,C385	CKSQYB472K50
	C363,C382	CKSQYB682K50
	C354,C358,C359,C375,C377	CKSQYF103Z50

RESISTORS

Mark	Symbol & Description	Part No.
	R351 – R357	RD1/6PM□□□J
	Other resistors	RS1/10S□□□J

MHVB Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC401	NJM2068D
	IC402	NJM4558D

CAPACITORS

Mark	Symbol & Description	Part No.
	C403,C404	CEJA2R2M50
	C407,C408,C411,C412	CEJA220M16
	C409	CFTXA683J50
	C419	CGCYX473K25
	C410,C417,C418	CKPUYB101K50
	C405,C406	CKPUYB681K50
	C413 – C416	CKPUYF223Z25
	C401,C402	CQMA152J50

RESISTORS

Mark	Symbol & Description	Part No.
	VR401,VR402 Rotary volume (10kΩ) (MIC VOL)	VCS1019
	VR403 Rotary volume (500Ω) (PHONES LEVEL)	VCS1020
	Other resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	JA402 Stereo mini jack (MIC CONTROL)	VKN1076
	JA401,JA403 Mic jack (MIC 1,2)	VKN1095
	JA404 Stereo headphone jack (PHONES)	VKN1096

FG Assembly

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
	Photo interrupter	GP1S51

◉SYPS Assembly (VWR1070)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC201,IC202	ICP-N15
	Q203,Q205	2SB1134
	Q202,Q209	2SB1185
	Q204,Q206	2SD1667
	Q201,Q208	2SD1762
	D212,D215	D1NK20
	D201,D202	S2VB20-F
	D207,D210	04AZ5.1-Y
	D206,D209	04AZ6.2-Z
	D213,D214	1SR35-100AVL
	D208,D211	1SS254

SWITCH

Mark	Symbol & Description	Part No.
⚠	S201 Power switch (POWER)	VSA-010

COILS

Mark	Symbol & Description	Part No.
⚠	L202 Line filter	VTL-157
	L201 Coil (10MH)	VTL1018

CAPACITORS

Mark	Symbol & Description	Part No.
	C209,C211	CEAS101M10
	C213	CEAS101M35
	C214,C215	CEAS2R2M50
	C227	CEJA220M6R3
	C224	CEAS221M10
	C205,C206	CEAS332M25
	C210,C212,C225	CEAS471M6R3
	C208	CEAS682M10
	C229,C230	CGCYX473M25
	C228	CKPUYB101K50
	C239	CKPUYB331K50
	C201 – C204	CKPUYF103Z25
⚠	C216 – C218 (0.01μ/AC250V)	RCG-008
	C207 (10000/10)	VCH1077

RESISTORS

Mark	Symbol & Description	Part No.
	R213,R214,R219,R220 (47Ω)	DCN1003
	R221	RS1PMFR51J
	Other resistors	RD1/6PM□□□J

EXTB Assembly

CAPACITORS

Mark	Symbol & Description	Part No.
	C401,C402	CKPUYB331K50

OTHERS

Mark	Symbol & Description	Part No.
	JA401 2P Pin jack	VKB1022

DSPB Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC301	SN74LS145N
	Q301,Q303 – Q305	DTC124ES
	D318	SEL950PL
	D319	SEL8509DP
	D301 – D304,D306 – D309	VEL1011
	D305	VEL1012
	D313 – D315	VEL1015
	D316,D317	1SS254

SWITCHES

Mark	Symbol & Description	Part No.
	S309,S310 Push switch (MUSIC ECHO, ECHO SURROUND)	RSG1032
	S301 – S306 Tact switch (OPEN/CLOSE, PLAY/PAUSE, STOP, #, ♮, ♭)	VSC-012
	S307 Slide switch (KARAOKE/NORMAL /AUX INPUT	VSH1005
	S308 Push switch (DOOR)	VSK1015

CAPACITORS

Mark	Symbol & Description	Part No.
	C301,C302	CKPUYF223Z25

RESISTORS

Mark	Symbol & Description	Part No.
	VR302,VR303 Rotary volume (10kΩ) (BALANCE, MIC ECHO)	VCS1021
	Other resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	CN331 2MM pitch bottom connector	BTMK04S-1S
	CN332 2MM pitch bottom connector	BTMK06S-1S
	FL spacer	VEB1080
	7 segment spacer	VEB1129

HEAD Assembly

CAPACITORS

Mark	Symbol & Description	Part No.
	C1	CKSQYF473Z50
	C5	CKSYF105Z16

RESISTORS

Mark	Symbol & Description	Part No.
	VR1 Semi-fixed (10kΩ)	VCP1010

KFCB Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC106 – IC108,IC119,IC130,IC131	BA15218N
	IC125	BU4052B
	IC109,IC116,IC117,IC123,IC124, IC129	BU4053B
	IC111,IC137	IR9393
	IC136	LM3364K-15
	IC121,IC126	MC14066BCP
	IC113	M50195P
	IC114,IC118	M5207L05
	IC110	M5218P
	IC102	NJM78M08FA
	IC103	NJM79M08FA
	IC104,IC105,IC112,IC115,IC120, IC122,IC127,IC128,IC132 – IC135	RC4558D
	Q107,Q113,Q114,Q116,Q126	DTA124ES
	Q106,Q110,Q115, Q117,Q118,Q127 – Q136	DTC124ES
	Q122	2SC1740S
	Q101,Q102,Q123,Q124	2SD2144S
	D114,D115	04AZ3.0-X
	D105,D108,D109	04AZ5.1-X
	D101 – D104	1SR35-100AVL
	D106,D107,D116 – D122,D501	1SS254

COIL

Mark	Symbol & Description	Part No.
	L101	LFA101K

CAPACITORS

Mark	Symbol & Description	Part No.
	C137	CCCSL181J50
	C249,C261	CCCSL331J50
	C229,C237	CCCSL561J50
	C118	CCCSL681J50
	C126,C183,C208,C211,C269	CCPUSL470J50
	C101,C103,C108,C109,C132, C133,C501,C503	CEAS101M10
	C280	CEAS102M6R3
	C172,C278,C515,C516	CEAS470M10
	C106,C107	CEAS471M16
	C110,C111,C127,C206,C207,C215, C508	CEJANP010M50
	C513	CEJANP4R7M16
	C205,C213,C505,C506,C518	CEJA010M50
	C122,C123,C135,C136,C141,C143, C144,C179 – C182,C186,C195, C196,C220 – C222,C232, C238 – C242,C250	CEJA100M16
	C509,C514,C519	CFTXA104J50
	C117	CFTXA184J50
	C248,C260	CFTXA563J50
	C520,C521	CGCYX473K25
	C102,C104,C112 – C115,C120, C121,C124,C125,C128 – C131, C134,C138,C139,C145,C146, C175 – C178,C184,C185,C188, C189,C191 – C194,C197 – C204, C209,C210,C212,C214, C216 – C219,C226,C227,C230, C231,C254,C255,C258,C259, C262 – C265,C502,C504,C517	CKPUYY103N16
	C270	CKPUYB561K50
	C512	CQMA102J50
	C119,C223,C233,C510	CQMA103J50
	C247,C257	CQMA122J50
	C511	CQMA123J50
	C225,C235	CQMA152J50
	C243,C251	CQMA153J50
	C245,C253	CQMA222J50
	C224,C234,C246,C256,C279	CQMA223J50
	C116,C244,C252	CQMA273J50
	C228,C236	CQMA333J50
	C507	CQMA472J50
	C140	CQMA822J50

RESISTORS

Mark	Symbol & Description	Part No.
	VR501 Semi-fixed (2.2kΩ)	VRTB6VS222
	R139,R140 (4.7Ω)	DCN1001
	Other resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	X101 Ceramic resonator (3.00MHz)	VSS1042

SW Assembly

SWITCHES

Mark	Symbol & Description	Part No.
	S1 – S3 Push switch (LOADING/TILT)	PSH1008

SURB Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC601	RC4558D
	Q602	DTC124ES
	Q601	DTA124ES

CAPACITORS

Mark	Symbol & Description	Part No.
	C602,C603	CKPUYY103N16
	C601	CQMA103J50
	C604	CEJA100M16

RESISTORS

Mark	Symbol & Description	Part No.
	R601 – R604	RD1/6PM□□□J

INDB Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	Q201	DTA124ES
	Q202 – Q205	DTC124ES
	D201,D203,D205	SEL3210SLC05
	D202	SEL3213CLC05
	D204	VEL1015
	D206,D207	1SS254

SWITCHES

Mark	Symbol & Description	Part No.
	S201 – S204 Tact switch (ONE TOUCH KARAOKE, VOCAL ASSIST, VOCAL PARTNER, AUDIO MODE, STEREO, Hi-Fi MPX)	VSC-012

CAPACITOR

Mark	Symbol & Description	Part No.
	C201	CKPUYF223Z25

RESISTORS

Mark	Symbol & Description	Part No.
	All resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	Remote control sensor	GP1U50X

UCOM Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC101	PDB014A
	IC102	PST529C
	Q108 – Q115	DTC124ES
	Q101	2SA854S
	Q102 – Q107	2SB1237X
	D101 – D106	1SS254

CAPACITORS

Mark	Symbol & Description	Part No.
	C106	CEAS221M6R3
	C102	CEAS471M6R3
	C103	CEJA470M6R3
	C105	CKPUYB102K50
	C101,C104	CKPUYF223Z25

RESISTORS

Mark	Symbol & Description	Part No.
	R115 Fusible resistor (4.7Ω)	DCN1001
	R113 Resistor array	RA4T103J
	R114 Resistor array	RA6T222J
	Other resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	X101 Ceramic resonator	VSS1045

KEYB Assembly

SWITCHES

Mark	Symbol & Description	Part No.
	S501–S521 Tact switch 5MM (1–20, ONCE MORE)	RSG1030

7. DISASSEMBLY

7.1 REMOVING THE BONNET AND FRONT PANEL (Fig. 7-1-3)

① Remove six screws Ⓐ to remove the bonnet.

② To remove the front panel assembly, remove three screws Ⓑ and lift the claws as shown in the figure and lower the front panel toward the front. Disconnect five connectors as shown in Fig. 7-2 and remove the front panel.

③ To remove the power knob, insert the flat-blade screwdriver into the slit on the side of the chassis as shown in Fig. 7-3, and push the protrusion of the knob. You can now remove the power knob easily. (Check that the power switch is in the OFF position before removal.

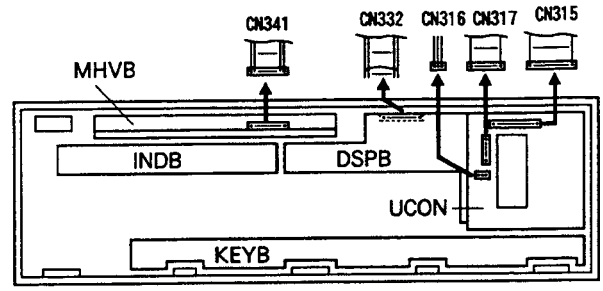


Fig. 7-2

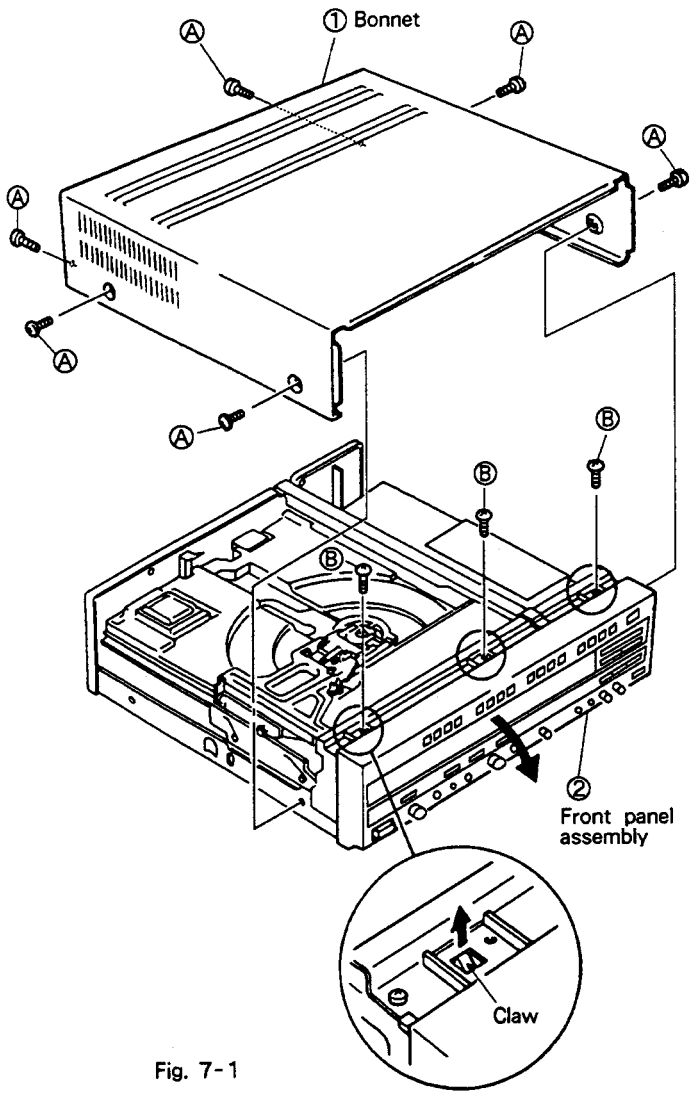


Fig. 7-1

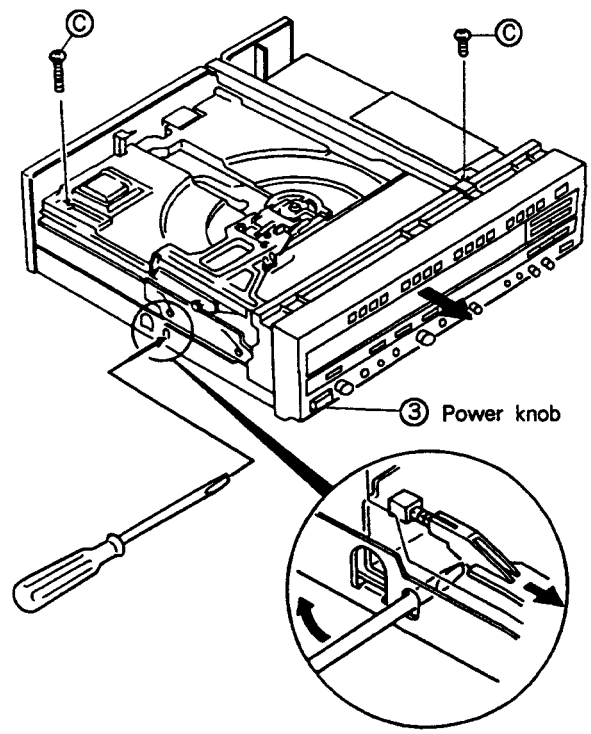


Fig. 7-3

7.2 REMOVING THE TRAY (Fig. 7-3, 4)

① Remove two stopper screws Ⓒ shown in Fig. 7-3. When the power can be turned ON, press the OPEN button then pull the tray out from the player.

② When the power cannot be turned ON, remove the front panel (Fig. 7-1), and turn the gear pulley shown in Fig. 7-4 counterclockwise, and the tray will slide out toward the front.

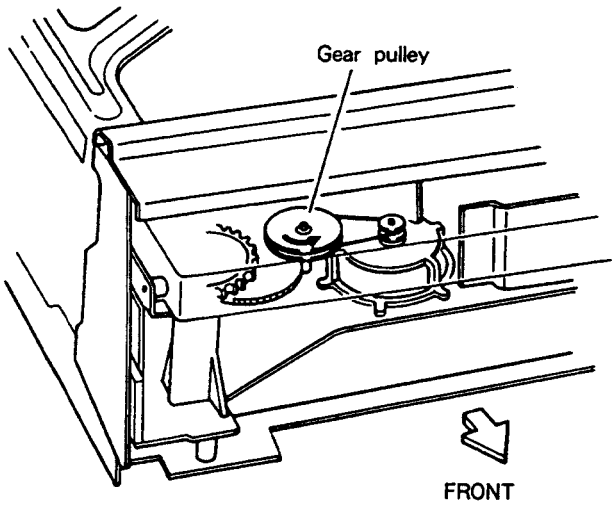


Fig. 7-4

7.3 REMOVING THE KCNB, KFCB AND MAIN ASSEMBLIES (Fig. 7-5, 6)

• After removing the center angle, remove by the following procedure.

7.3.1 REMOVING THE KCNB ASSEMBLY

① Remove three PCB holders and disconnect two connectors CN71 and CN72.

7.3.2 REMOVING THE KFCB ASSEMBLY

① Remove three screws Ⓑ and two PCB holders.

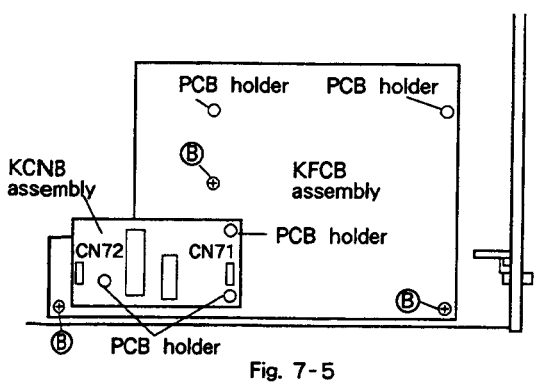


Fig. 7-5

7.3.3 REMOVING THE MAIN ASSEMBLY

• After removing the main binders, remove by the following procedure :

① Remove five screws Ⓑ holding the MAIN assembly, and remove two screws Ⓒ on the sides of the rear panel with their nuts and washers.

② Remove the flexible board from the connector.

③ Remove the reinforced plate at the right side.

④ Pull the MAIN assembly in the direction of the arrow.

⑤ While sliding the MAIN assembly to the right, lift it upward in the direction of the arrow.

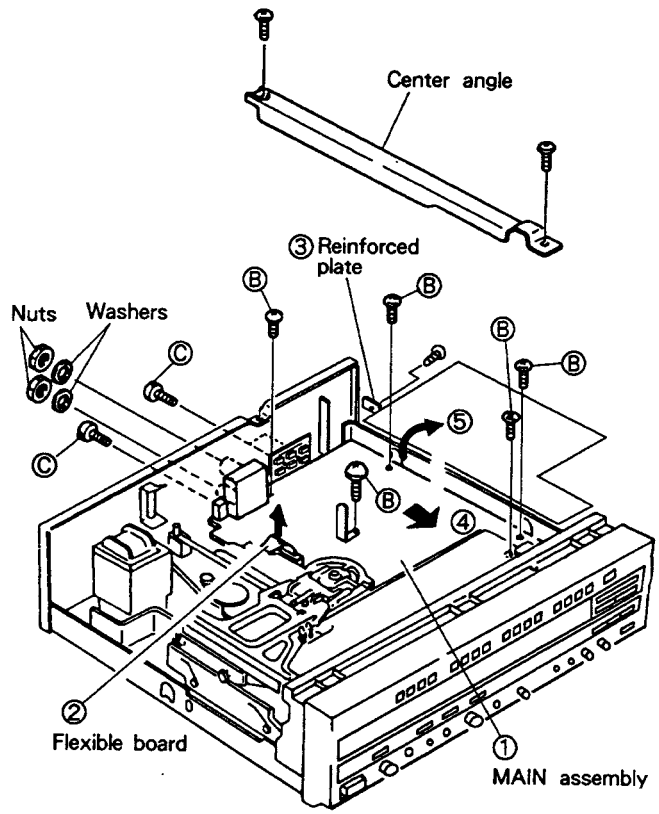
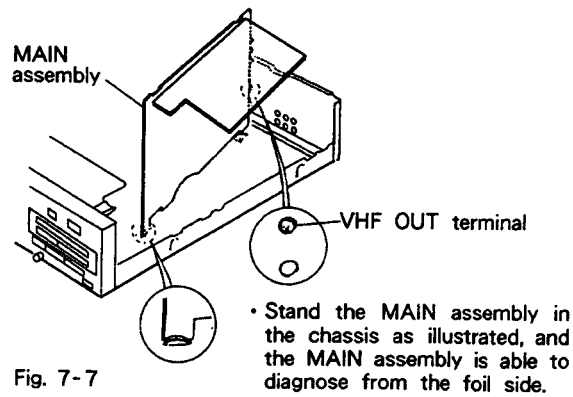


Fig. 7-6

● Diagnosis of the MAIN assembly



• Stand the MAIN assembly in the chassis as illustrated, and the MAIN assembly is able to diagnose from the foil side.

Fig. 7-7

7.4 REMOVING THE CLAMPER ARM (B) AND CLAMPER ARM (A) ASSEMBLY (Fig. 7-8)

Set the player with the tray moved up.

① Remove two clamper springs and raise clamper arm (B).

② Clamper arm (B) can be removed by pulling it in the direction of the arrow.

③ Remove a screw Ⓐ with a arm spring holding the clamper arm (A) assembly.

④ Remove the clamper arm (A) assembly by pulling it in the direction of the arrow.

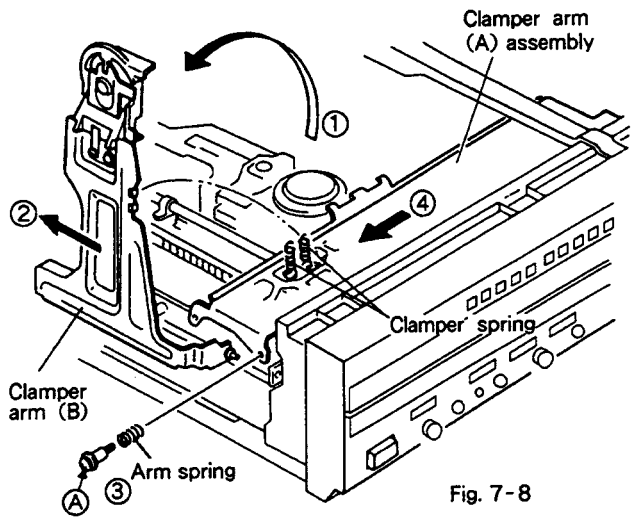


Fig. 7-8

7.5 REMOVING THE CLAMPER (Fig. 7-9)

① Remove the plate spring by unscrewing screw Ⓐ.

② Remove the parallel link by sliding it in the direction of the arrow. (Be careful not to damage the claw located on one side of the link.)

③ The clamper can be removed by sliding the clamper holder in the direction of the arrow.

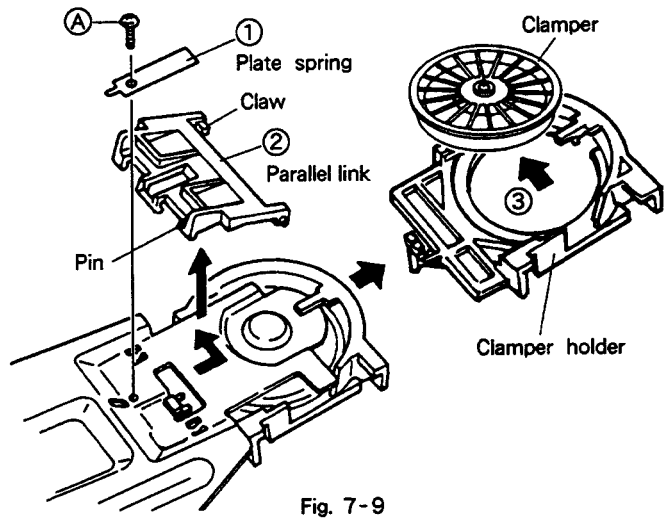


Fig. 7-9

7.6 REMOVING THE PICKUP ASSEMBLY (Fig. 7-10)

① Remove the flexible board from the connector and also remove the flexible board installed at section ⓐ.

② Remove a screw Ⓐ holding the carriage shaft.

③ Raise the shaft in the direction of the arrow to remove the rack assembly.

④ Remove a hexagonal screw Ⓑ and lift up the pickup assembly alightly and turn the pickup assembly in the direction of arrow ⑤.

⑤ Remove two screws Ⓒ on the back of the pickup assembly.

Note: Make sure that the rack assembly is not close to the turntable when it is removed.

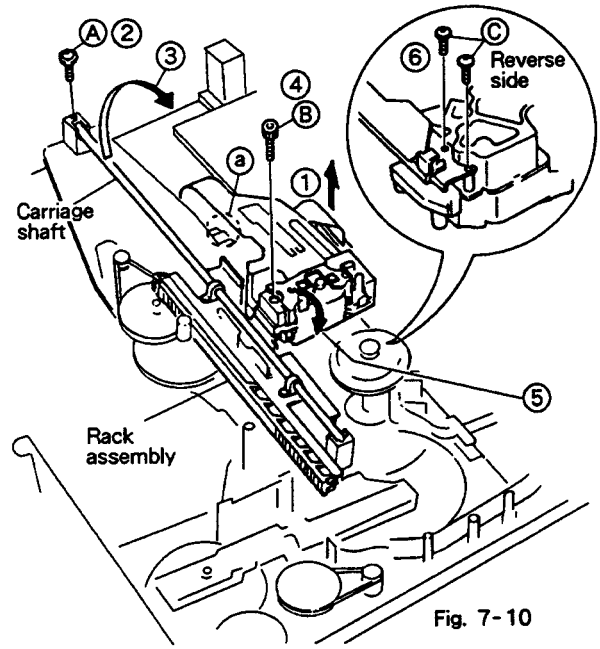


Fig. 7-10

7.7 REMOVING THE TILT SENSOR (Fig. 7-11)

① Remove the connector (arrow Ⓐ) of the flexible board and release the claw (arrow Ⓑ) to remove the tilt sensor.

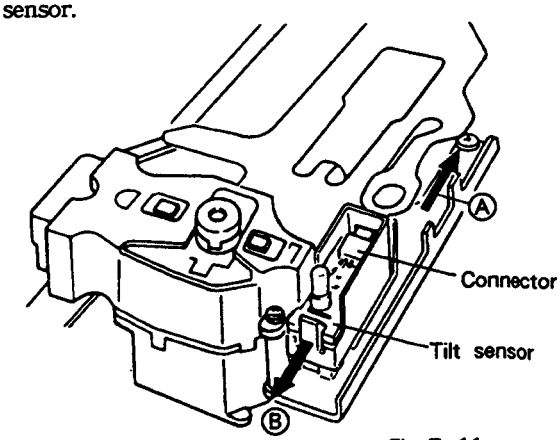


Fig. 7-11

7.8 REMOVING THE MECHANISM SECTION (Fig. 7-12)

Remove six screws Ⓐ, and the entire mechanism section can be removed.

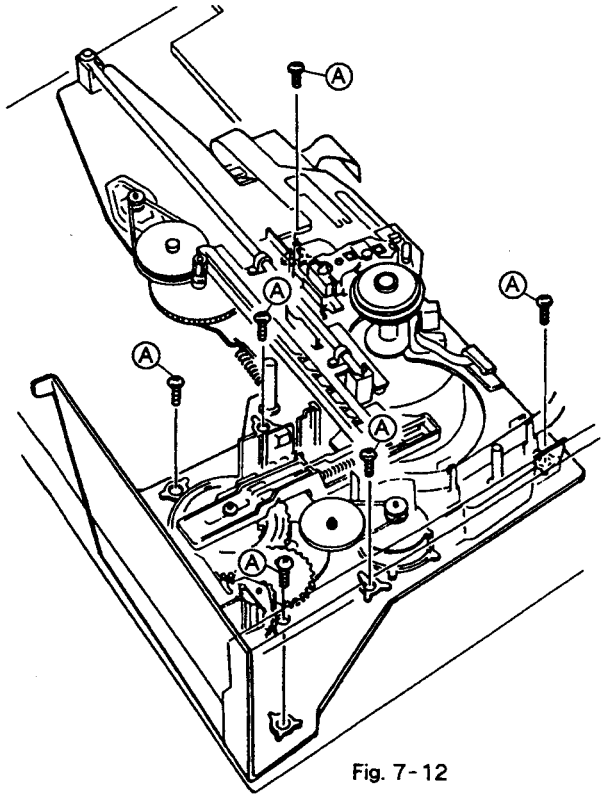


Fig. 7-12

7.9 REMOVING THE SLIDE CAM AND ROLLER PLATE ASSEMBLY(Fig. 7-13)

① Set the player with the tray down.
② Remove three screws Ⓐ and slide the slide cam toward the rear to remove it.
③ Remove the clamper arm (A) assembly (see page 75) after removing slide cam to remove the roller plate assembly.

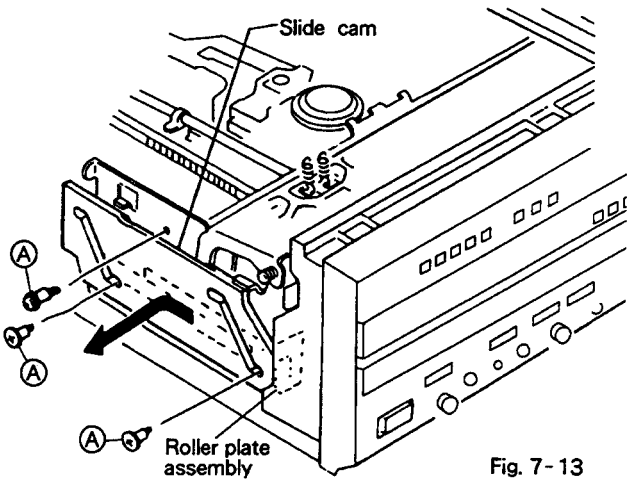


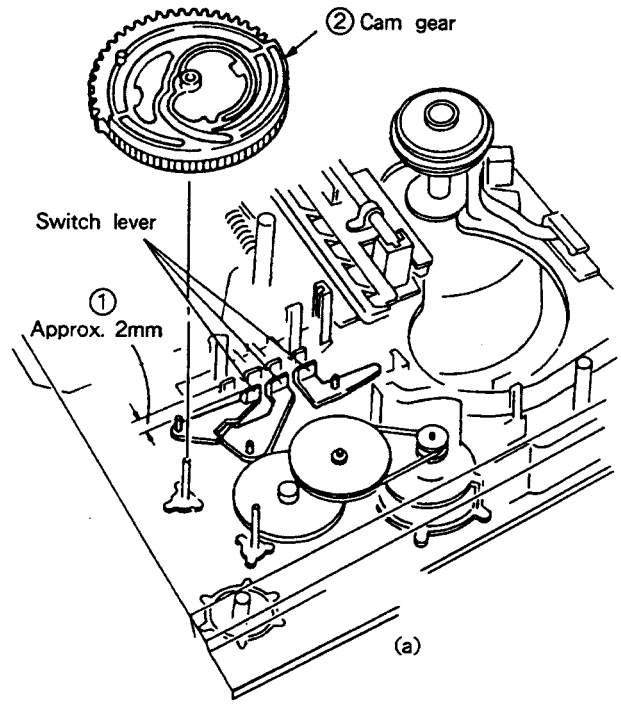
Fig. 7-13

7.10 ASSEMBLING THE MECHANISM SECTION

7.10.1. Positioning the gears

(Since the cam gears are used for the detection of all operation modes in this unit, the cam gears and the tray should be positioned correctly. Reassemble in the following procedure.)

① Position three switch levers so that they are nearly parallel (approx. 2mm), as shown in Fig. 7-14(a).
② Insert the cam gear so that the end of the spiral groove on the upper surface of the cam gear comes to the position nearest to the shaft located at the front, as shown in Fig. 7-14(b).
(In this case, the cam gear should be set in the position where the angle between the center line of the cam gear and the pin on the cam gear is 45°, by visual checking.)



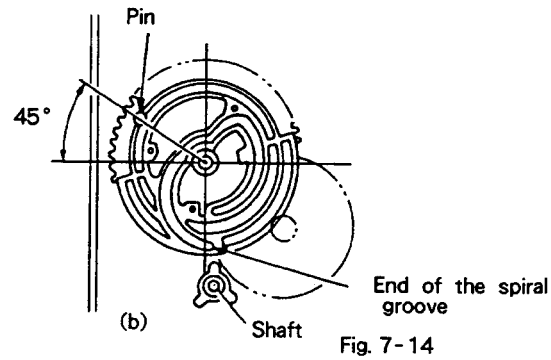


Fig. 7-14

③ Mount the spring slanting cam by raising the rack assembly in the direction of the arrow so that the tilt slide section comes under the rack assembly. Then, mount the cam spring. (Fig. 7-15 (a))

④ Insert the follow gear so that the "L" - shaped section of the follow gear comes to the end of the cam gear, as shown in Fig. 7-15 (b).

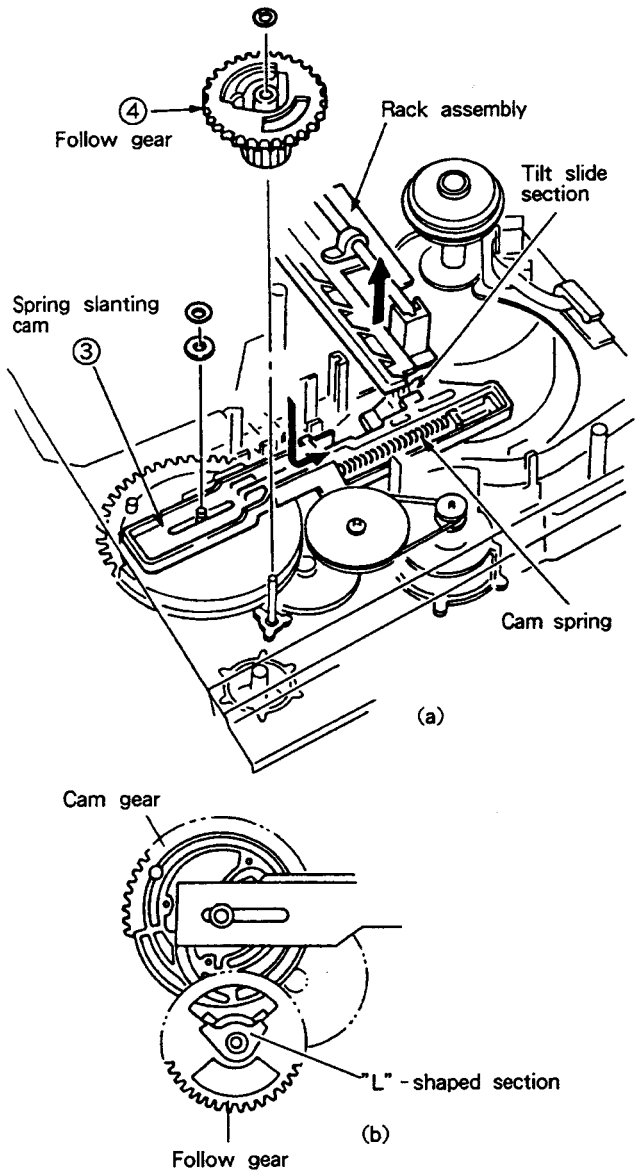


Fig. 7-15

⑤ Mount the roller plate assembly in the position where the tooth with the triangle mark (▼) of the follow gear is engaged with the dip of the gear with the short rib on the roller plate gear, as shown in Fig. 7-16.

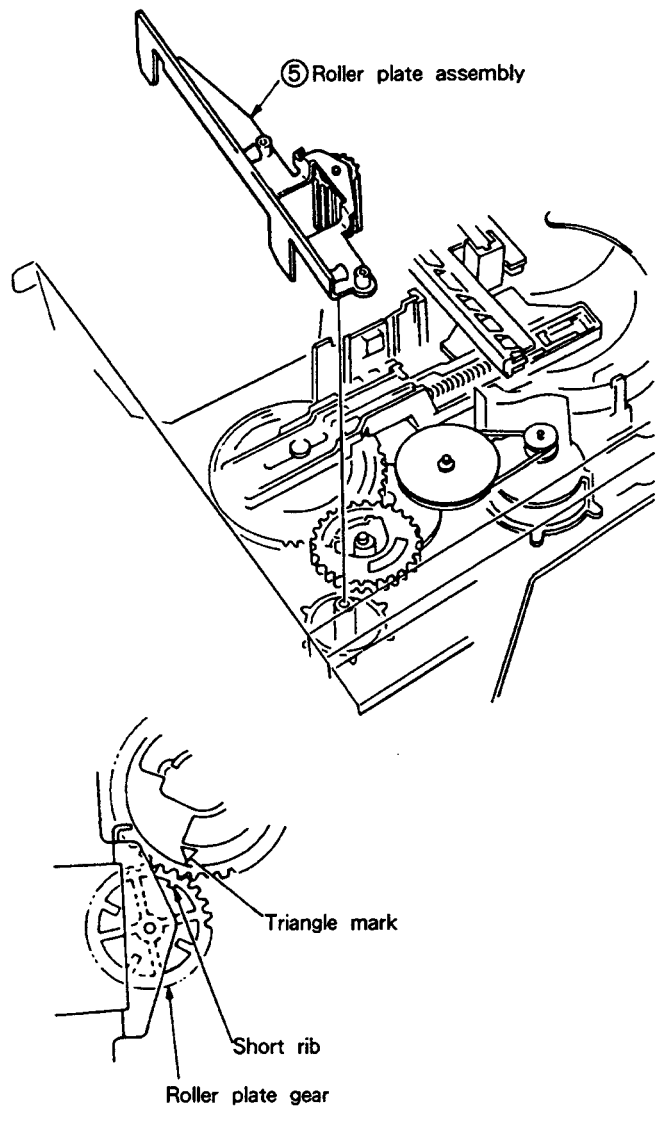


Fig. 7-16

7.10.2 Positioning the tray (Fig. 7-17)

① Set the player with the tray open.

② Set the roller plate gear so that the roller plate line intersects with the mid-point of missing tooth of the roller plate gear.
(At this time, adjust the position by the method shown in Fig. 7-17, or turn the power ON and use the SKIP (⏮, ⏭) buttons in the direction of OUT tilt it stops as shown in Fig. 7-17.)

③ Insert the tray.
At this time, the tray can be inserted only when the first missing tooth of the tray gear is engaged with the missing tooth section of the roller plate gear, as shown in the figure.
Tray is easier to insert by pushing upwards.

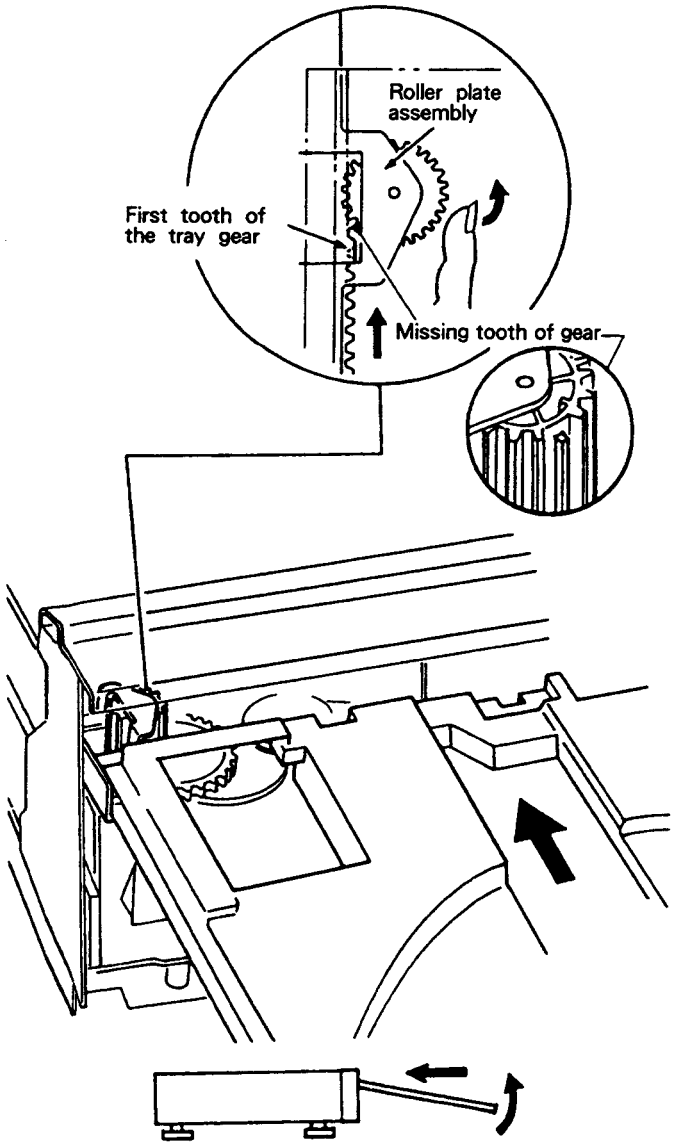


Fig. 7-17

7.10.3 Assembling the servo mechanism base assembly (Fig. 7-18)

When assembling the servo mechanism base assembly, pay special attention to the following points :

- After insertimg the tilt shaft in the position shown in Fig. 7-18-1 of mechanism chassis assembly, mount the servo mechanism base assembly in the direction of the arrow so that the tilt shaft does not come over the shaft holder as shown in Fig. 7-18-2.
- The thrust spring should not come over the shaft holder.
- Check that the end of the plate spring is inserted under the base.

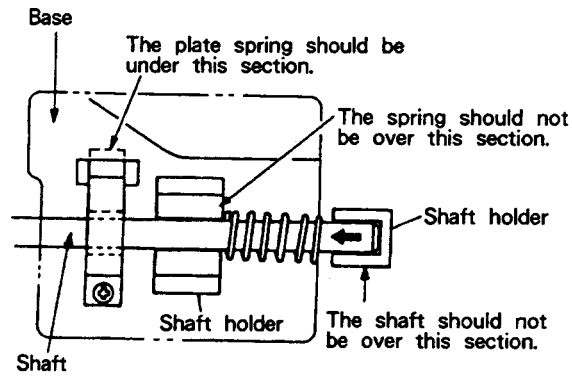


Fig 7-18-1

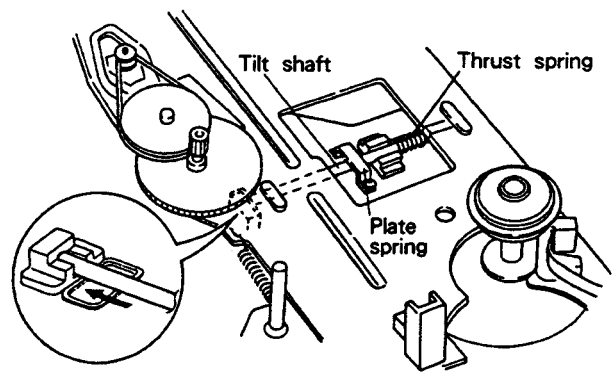


Fig. 7-18-2

7.10.4 Styling of the flexible board (Fig. 7-19)

① Bend the flexible board of the pickup assembly by about 45° at the ▲ mark.
② Insert the flexible board into the connector.
③ Set the flexible board under the protruding section.
④ Twist the flexible board by a half turn.
⑤ Insert the triangular section.
⑥ Further insert the flexible board under the protruding section.

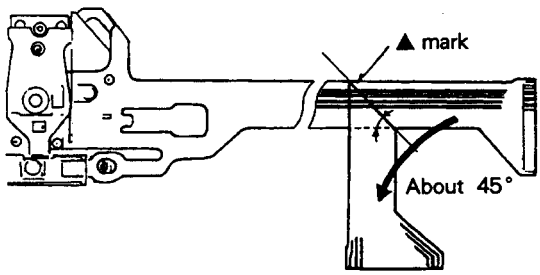


Fig. 7-19-1

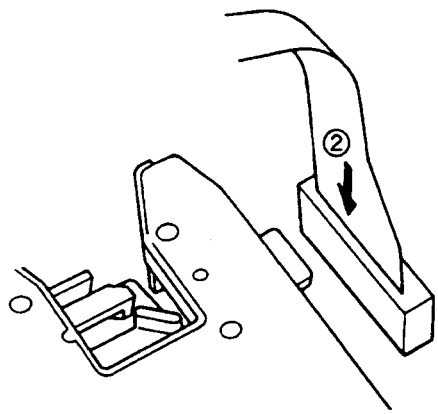


Fig. 7-19-2

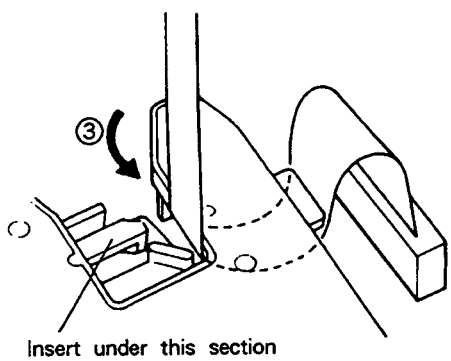


Fig. 7-19-3

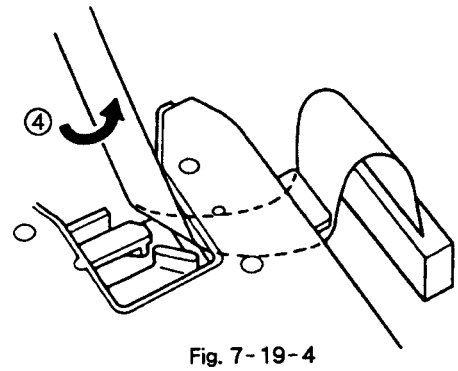


Fig. 7-19-4

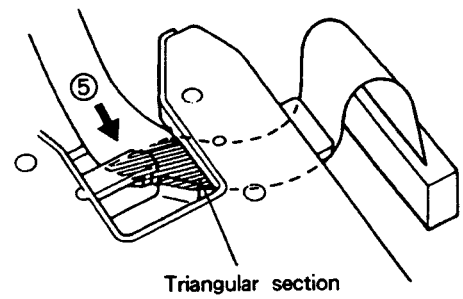


Fig. 7-19-5

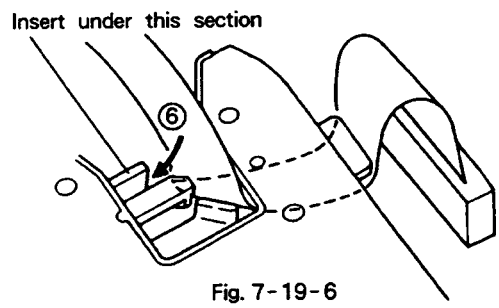


Fig. 7-19-6

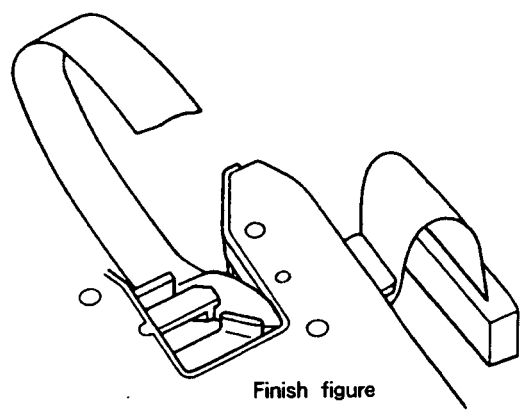


Fig. 6-19-7

7.11 DIAGNOSING THE SYPS ASSEMBLY (Fig. 7-20)

1. Remove the screw fixing the SYPS assembly and keep the SYPS assembly apart about 3cm from the base chassis (See Fig. 7-20-1).

2. Insert a soldering iron between the SYPS assembly and base chassis, alternately desolder the lapping pins of an AC power cord, and remove the lapping pins (See Fig. 7-20-1).

3. Solder the lapping pins through the foil side of the board with the SYPS assembly raised.
   The SYPS assembly can be diagnosed for component replacement through the foil side.
   (See Fig. 7-20-2).

Notes :
1. Interpose cloth for check so that the SYPS assembly does not touch the chassis.
2. Remove the rear panel when you are difficult to work.

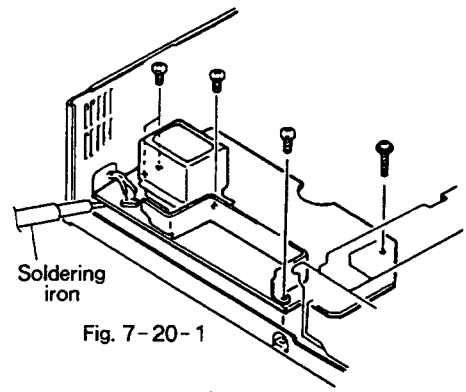


Fig. 7-20-1

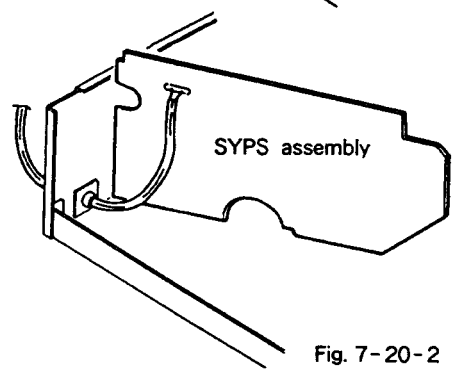


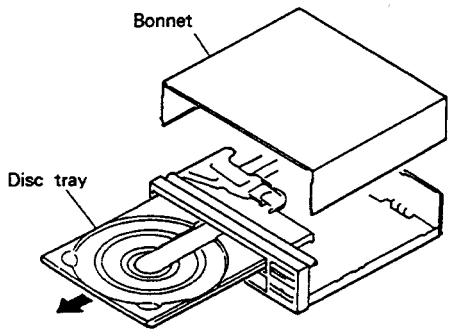
Fig. 7-20-2

8. TEST MODE

8.1 TEST MODE

The player has a test mode function which allows the user to check the player's status on the TV screen by executing the respective key operation.

Also, since the TRK servo opens and closes easily, the test mode is especially useful for mechanical adjustments.



8.2 TEST MODE INITIATION

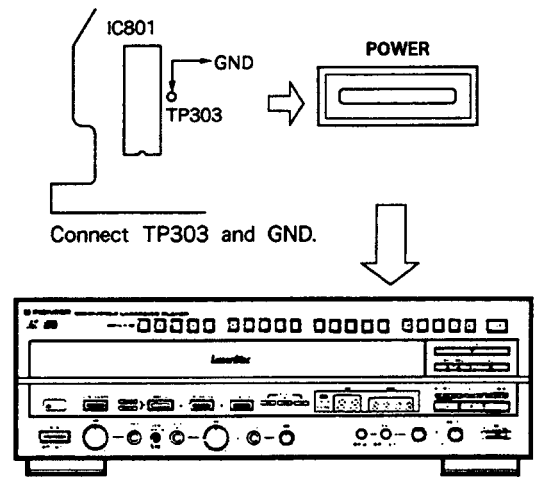
[**Procedure**]

1. Remove the bonnet and disc tray.
2. Connect the TP303 in the MAIN assembly to GND.
3. Turn on the power switch.

Notes :

After the Test Mode is activated, LEDs light except the REMOTE SENSOR and STEREO LEDs until operating the key.

LED of 7-segment display the Chapter display section "88", and Time display section "88:88".



8.3 TEST MODE CANCELLATION

Turn off the power switch.

8.4 PLAYER OPERATION IN THE TEST MODE

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

[**Sample Key Operation**]

< LD Mode >
Disc playback (Normal playback)

(In the Test Mode)

Disc placement → Close tray (▲) → Play (▶) → Close TRK Servo (▶)

Note : In the test mode, disc playback will start with the TRK servo open.

< CD Mode >
Disc playback (Normal playback)

(In the Test Mode)

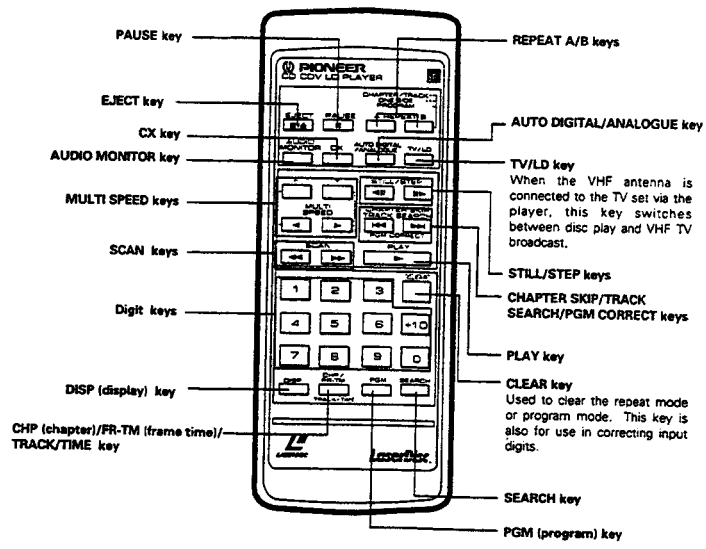
Disc placement → Close tray (▲) → Move SLD to CD Active area. (◀◀ (Remote control key)) → Close TRK Servo (▶) → Play (▶)

Note : In the test mode, disc playback will start with the TRK servo open.

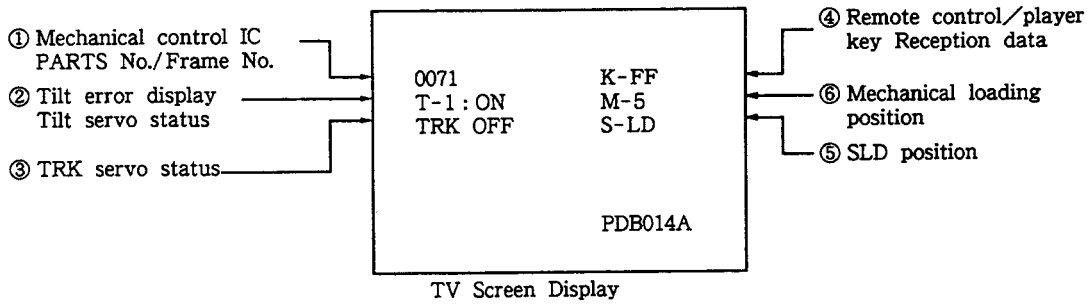
Table. Operation in the test mode

Function	Player Status	Key Operation	Remarks
Open Tray	STOP mode	▲	
Close Tray	Tray open	▲	
Stop	PLAY mode	■	
Play	Disc placement and tray closed.	▶	• Raise up with the TRK servo open. • Raise up with tilt neutral. • The disc type (LD/CD/CDV) is determined when playback starts at the SLDR position during raise up.
TRK Servo Open/Close	PLAY mode	▶	• Each time the PLAY button (▶) is pressed, the TRK servo will open or close.
Still	PLAY mode TRK servo closed.	❚❚	• Each time the STILL button (❚❚) is pressed, the player will switch between the PLAY and STILL modes.
SLDR REV SCAN	PLAY mode	◀◀ (* 1)	• Press and hold the keys. • With the TRK servo open, the pickup can be damaged if the SLD moves further inward than the lead-in area on the disc. Do not allow the SLD to move further inward than the lead-in area .
SLDR FWD SCAN	PLAY mode	▶▶ (* 1)	• Press and hold down the keys. • With the TRK servo open, the pickup can be damaged if the SLD moves further outward than the lead-in area on the disc. Do not allow the SLD to move further outward than the lead-in area.
TILT Neutral	POWER switch ON	⊟	• Speed down key of the remote control unit.
TILT Servo ON	PLAY mode	⊞	• Speed up key of the remote control unit.
TILT Minus TIRT Servo OFF	PLAY mode	⏮ (* 1)	• Press and hold down the keys.
TILT Plus TILT Servo OFF	PLAY mode	⏭ (* 1)	• Press and hold down the keys.
Screen Display ON/OFF	POWER switch ON	PGM key (* 1)	
Frame search	PLAY mode	+ 10 key ↓ 0-9 key ↓ ▶ (* 1)	• In the PLAY mode, press the + 10 key. (The player will standby for the frame No. entry.) • Use the numeric keys (0 – 9) to enter the frame No.. Then press the player's PLAY key to search. • After the search is completed, the player will return to the operation mode before the search was performed.
LOAD Motor Rotation Clockwise Counterclockwise	Tray open	⏭ ⏮ (* 1)	

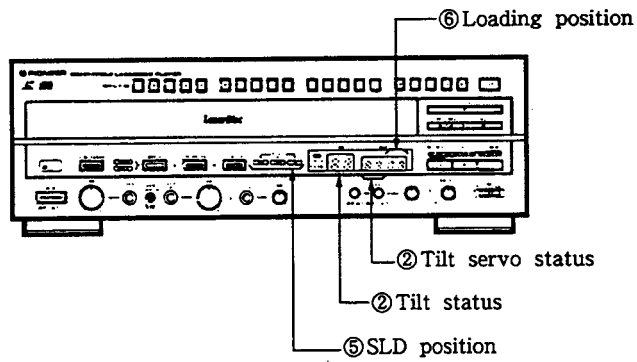
Note :
(* 1) : Remote control unit key



8.5 TV SCREEN AND LED DISPLAYS IN THE TEST MODE



TV Screen Display



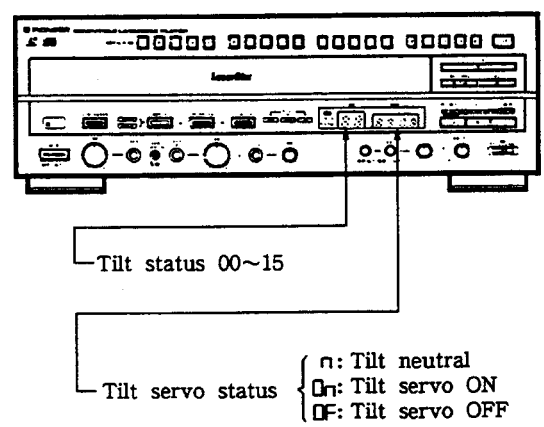
① The mechanical control IC (MAIN assembly) part No. will be displayed in the STOP status.

Frame No. input

Input frame No. except STOP status.

F□□□□ : Lead-in

E□□□□ : Lead-out



② Tilt servo status/Tilt error display

T-○ : ○○

Tilt servo status : N···Tilt neutral
ON···Tilt servo ON
OFF···Tilt servo OFF

Tilt error display : 0 Tilt −
Tilt neutral
F Tilt +

③ TRK servo status

TV screen display

TRK-○○○

ON···TRK servo close
OFF···TRK servo open

④Remote control/Player key reception data

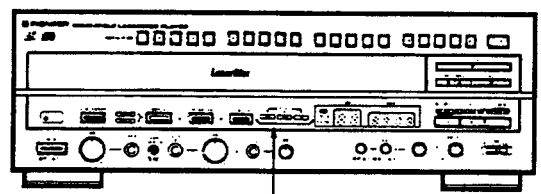
K-○○
└ See table below

Code	Function	Code	Function	Code	Function	Code	Function	Code	Function	Code	Function	Code	Function
00	0	10	F-SCAN	20		30	10	40	(CHAPT)	50	R-STEP	60	OPN/CLS
01	1	11	R-SCAN	21		31	11	41	(FRAME)	51		61	VC.MUTE
02	2	12		22		32	12	42	SEARCH	52	F-SKIP	62	VC.CHG
03	3	13	CHP/FRM	23		33	13	43	DISPLAY	53	R-SKIP	63	KC #
04	4	14		24		34	14	44	REPT-B	54	F-STEP	64	KC ♭
05	5	15		25		35	15	45	CLEAR	55	R-MULTI	65	KC ♮
06	6	16	STP/OPN	26		36	16	46	SPEED −	56		66	AUD.MOD
07	7	17	PLAY	27		37	17	47	SPEED +	57		67	V.ASIST
08	8	18	PAUSE	28		38	18	48	REPT-A	58		68	ONCEMO
09	9	19		29		39	19	49	(2/R)	59		69	PLY/PAUS
0A		1A		2A		3A	20	4A	(STEREO)	5A		6A	STOP
0B		1B		2B		3B		4B	(1/L)	5B		6B	
0C	DGT/ANL	1C		2C		3C		4C	PROGRAM	5C		6C	
0D		1D		2D		3D		4D		5D		6D	
0E	CX	1E	AUD.MON	2E		3E		4E		5E	TEST	6E	
0F	TV/LDP	1F	+10	2F		3F		4F		5F	ESC	6F	

⑤SLD position

TV screen display

S-○○○
└ CD ··· CD active area
CDV ··· CDV active area
LD ··· LD active area
IN ··· CD TOC area

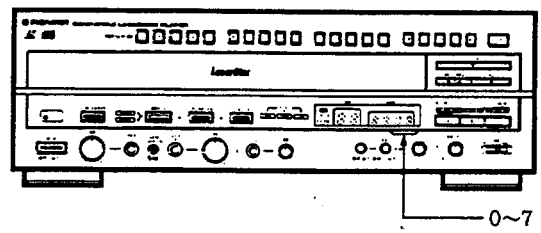


Three disc LEDs are not lighted : CD TOC area
CD LED light : CD active area
CDV LED light : CDV video area
LD LED light : LD active area

⑥Mechanical loading position

TV screen display

M-○
└ 0 ··· Tray open
1 ··· Loading
2 ··· Standby
3 ··· Clamped
4 ··· Tilt minus
5 ··· Tilt neutral
6 ··· Tilt plus
7 ··· Tilt limit



0~7

9. ADJUSTMENTS

9.1 KFCB ASSEMBLY ADJUSTMENT

ECHO LEVEL ADJUSTMENT

Note :

As to the adjustments, refer to the ADJUSTMENTS FOR CLD PLAYERS (ORDER No. ARP2064) except adjustment procedure which this service manual is mentioned.

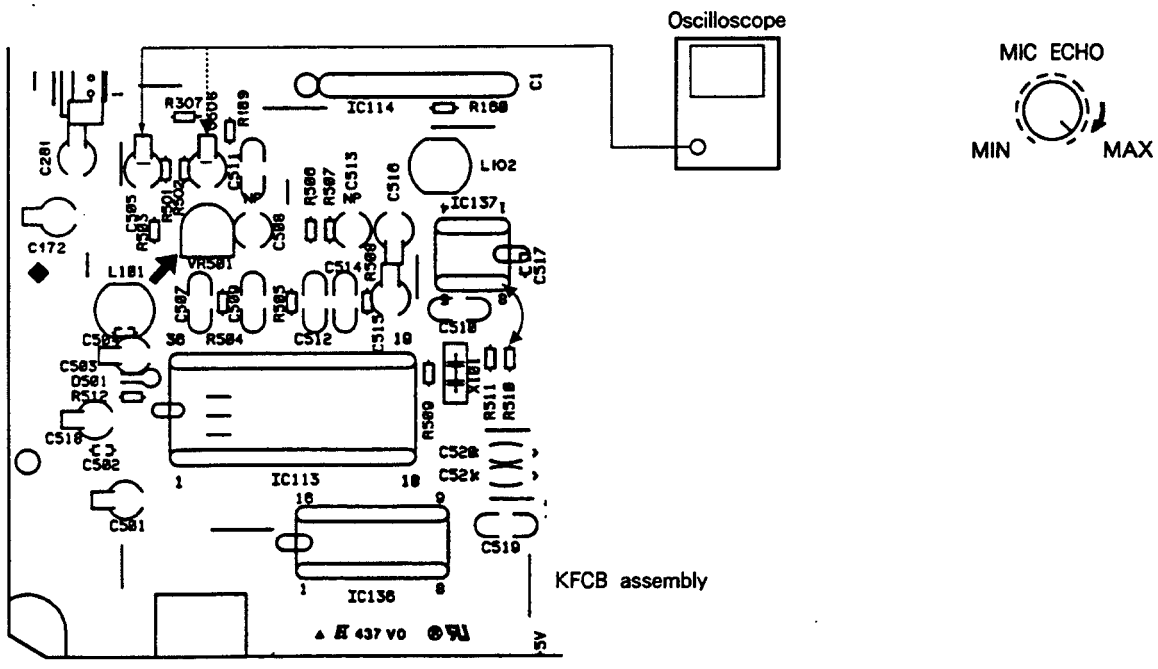
- Purpose : Setting the optimum echo level.
- Symptom when incorrectly adjusted : Sound is interrupted or distorted when playing with echo effect.

Measurement equipment and jigs	Measurement equipment connecting point	Player condition	Adjusting points
• Oscilloscope • Test disc (GGV1002)	• KFCB assembly Lead wires of C505 and C506 (Minus side)	• Normal mode • Play	• KFCB assembly VR501

Adjustment procedure

1. Turn the POWER switch OFF.
2. Connect the lead wire (IC113 side) of R510 and pin 8 (+5V) of IC137 in the KFCB assembly, pin 21 of IC113 will be pulled up to +5V.
3. Turn the POWER switch ON.
4. Set the MIC ECHO volume to maximum.
5. Play for chapter 1 through 3 on the test disc, Adjust VR501 so that the minus side level of C505 and the minus side level of C506 becomes equal.

Adjustment diagram



10. SPECIFICATIONS

1. General

System ..... LaserVision Disc system and Compact Disc digital audio system
Laser ..... Semiconductor laser wavelength 780 nm
Power requirements ..... AC 110V/120V/220V/240V (Switchable), 50/60 Hz
Power consumption 39W
Weight ..... 8.3 kg (18 lbs 5 oz)
Dimensions ..... 420 (W) x 421 (D) x 136.5 (H) mm
16-9/16 (W) x 16-9/16 (D) x 5-3/8 (H) in
Operating temperature ..... +5°C ~ +35°C (41°F - 95°F)
Operating humidity ..... 5% ~ 90%
(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
Liner 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
Jack ..... RCA jack (2 systems)
VHF output
Channel ..... Channel 3 or 4 (switchable)
Impedance ..... 75Ω unbalanced
Terminal ..... F-type jack

4. 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 (2 systems)
Number of channels 2

5. Other Terminals

Control input/output ..... Both miniature jacks
AUX ..... RCA jacks
Number of channels 2

6. Accessories

Remote control unit (CU-CLD030) 1
Size "AAA" (IEC R03) dry cell batteries 2
RF antenna cable 1
Video cord 1
Audio cord 1
Antenna adaptor
(75Ω/300Ω → 75Ω F-type plug) 1
F-type jack – IEC plug adaptor 1
Operating instructions 1

7. Functions

Remote control unit operations (CU-CLD030)

	Function	Standard play Disc (CAV)	Extended play Disc (CLV)	Compact Disc with Video	Compact Disc
Basic Functions	Single-side play	YES	YES	YES	YES
	Pause	YES	YES	YES	YES
	Stop	YES	YES	YES	YES
	Eject	YES	YES	YES	YES
Search	Fast forward (forward and reverse)	YES	YES	YES	YES
	Chapter/Track skip	YES	YES	YES	YES
	Direct chapter/Track number search	YES	YES	YES	YES
	Frame number search	YES	NO	NO	NO
	Time number search	NO	YES	YES	YES
	Absolute time search	NO	NO	NO	YES
Program	Chapter/Track program play	YES	YES	YES	YES
	Program correction	YES	YES	YES	YES
Repeat	Repeat between 2 points	YES	YES	YES	YES
	Memory repeat	YES	YES	YES	YES
	Chapter/Track repeat	YES	YES	YES	YES
	One-side repeat	YES	YES	YES	YES
	Program repeat	YES	YES	YES	YES
Trick play	Still/Step	YES	NO	NO	NO
	Multi-speed (Forward/reverse 9-level variable)	YES	NO	NO	NO
Time display	Elapsed time display	NO	YES	YES	YES
	Absolute time display	YES*1	NO	NO	YES
	Remaining track time display	NO	NO	YES*4	YES
	Remaining total time display	YES*1	YES*1	YES	YES
	Total number of selections, total time display	YES*1	YES*1	YES	YES
Others	CX system ON/OFF	YES*2	YES*2	—	—
	AUTO DIGITAL/ANALOG switch	YES*3	YES*3	—	—
	Audio channel selection (Stereo, 1/L, 2/R)*5	YES	YES	YES	YES

*1 Only discs with TOC

*2 Valid for analog sound playing a disc with the CX mark.

*3 Can only be used with discs with digital sound tracks.

*4 Audio part only

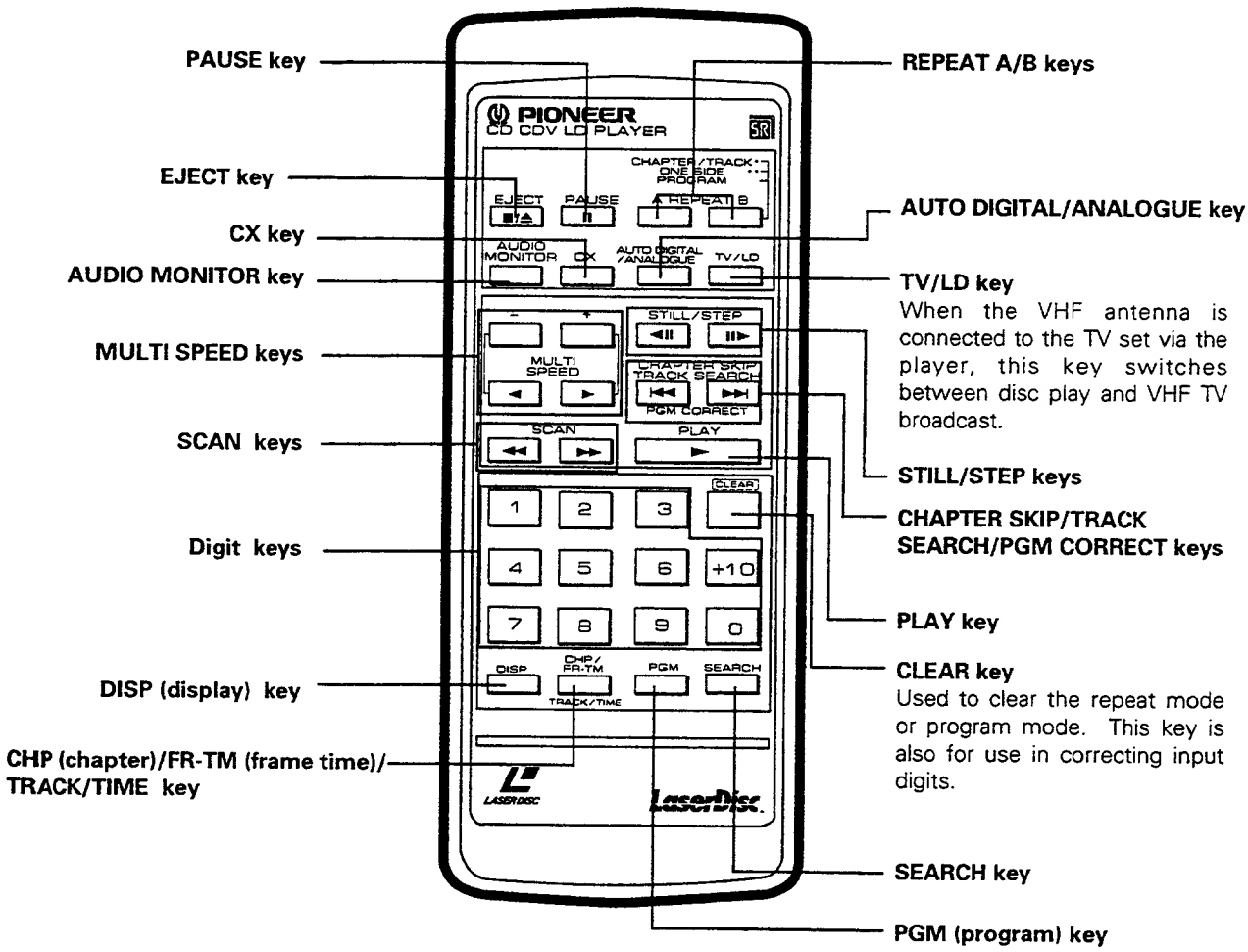
*5 Except for KARAOKE mode

NOTE:

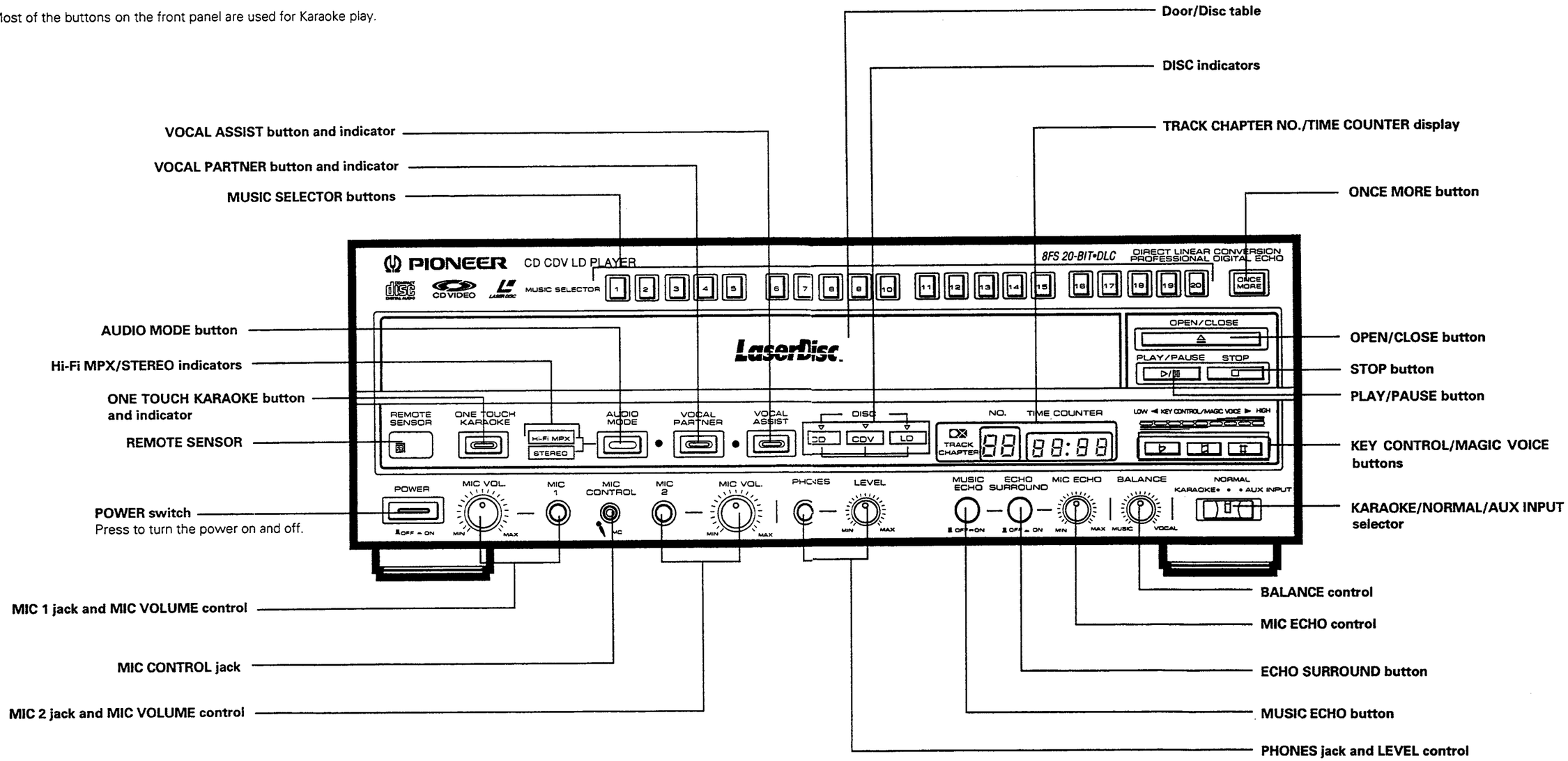
The specifications and design of this product are subject to change without notice, due to improvement.

11. PANEL FACILITIES

- Remote control keys with the same names or marks as buttons on the front panel of the player control the same operations as the corresponding front panel buttons.



- Most of the buttons on the front panel are used for Karaoke play.



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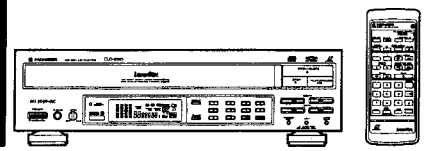
Service Manual



SERVICE GUIDE

ORDER NO.
ARP2063

CD CDV LD PLAYER

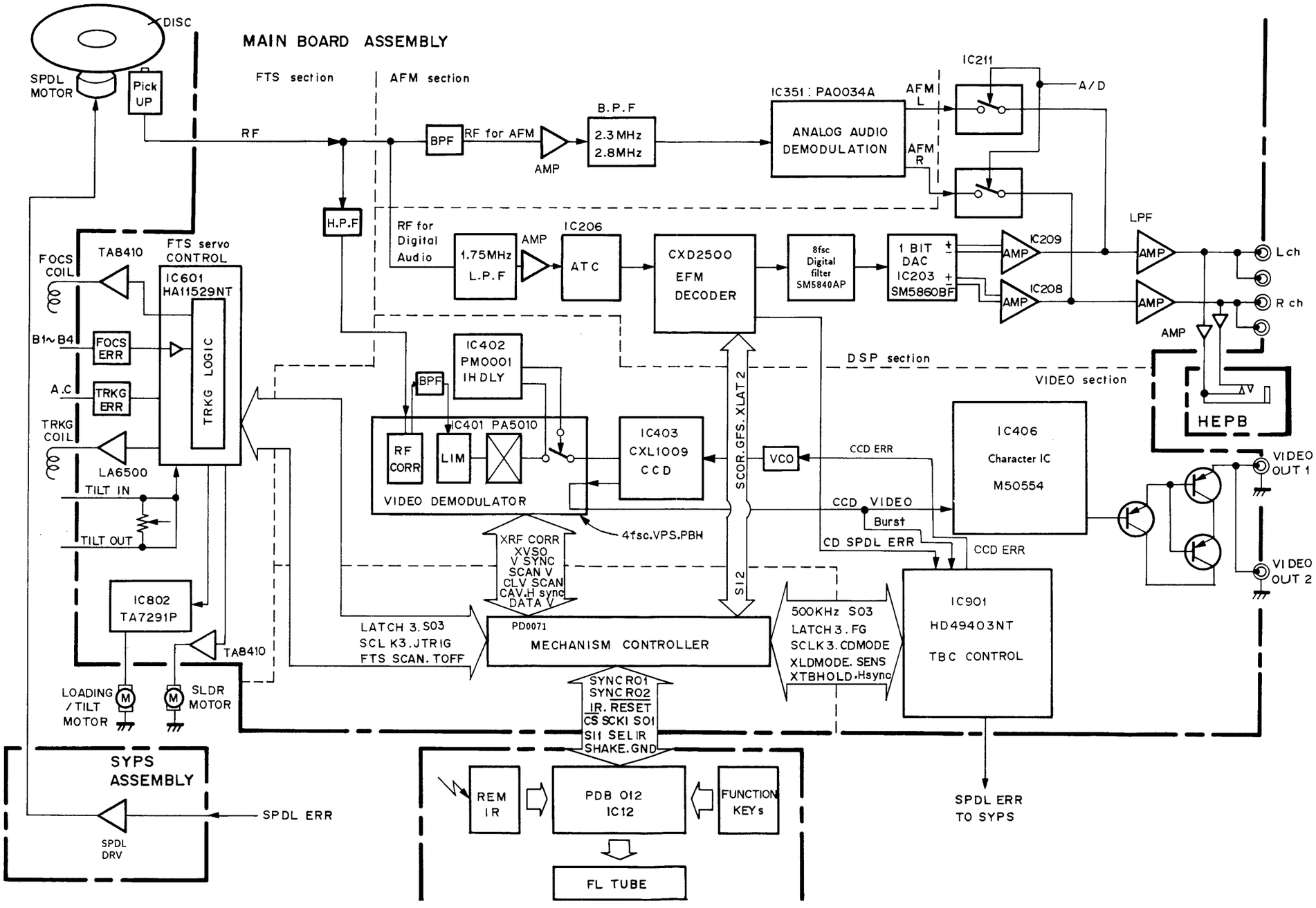
CLD-1080

CONTENTS

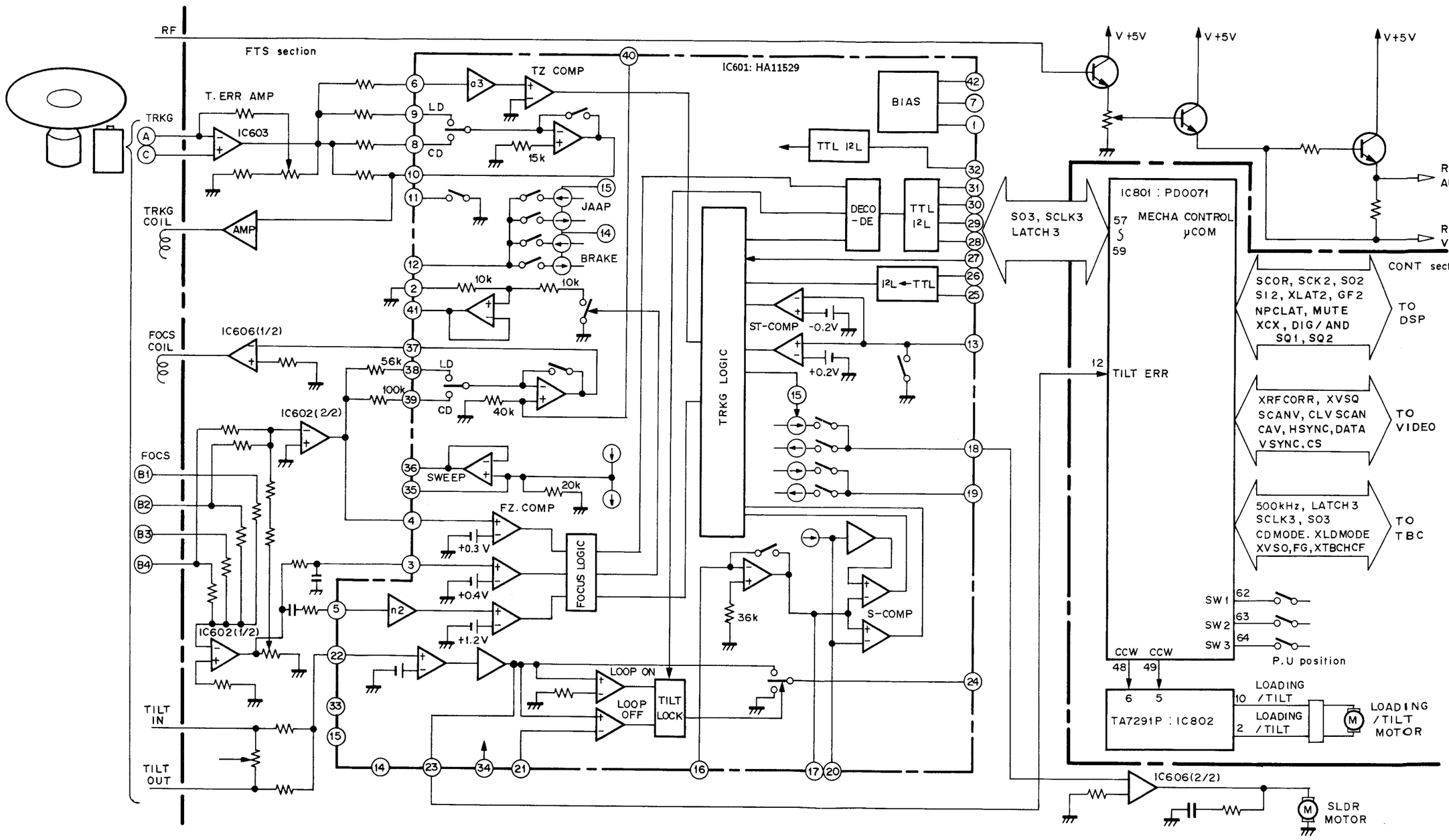
PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS SERVICE INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.
PIONEER ELECTRONICS OF CANADA, INC. 505 Cochrane Drive, Markham, Ontario L3R 8E3 Canada
PIONEER ELECTRONIC [EUROPE] N.V. Keetberglaan 1, 2740 Beveren, Belgium
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia TEL: [03] 580-9911

FJ MAY. 1990 Printed in Japan

1. OVERALL BLOCK DIAGRAM



FTS BLOCK DIAGRAM (FCS, TRK, SLDR Servo)



2. FOCUS (FCS), TRACKING (TRKG), AND SLIDER (SLDR) SERVOS (Description of HA11529)

(1) Outline

The HA11529 is an analog/digital bipolar IC. It is used by the FTS servos (FOCS, TRKG, and SLDR servos) and has the following functions :

1. FOCS servo control. (It controls the leading-in to the FOCS servo loop. Gain control.)
2. TRKG servo control (loop ON/OFF, track jumping, and brake control during SCAN).
3. SLDR servo control (loop ON/OFF, variable-speed playback, and motor PWM drive).
4. TILT servo control (loop ON/OFF).
5. CD/LD servo characteristic switching. (FOCS, TRKG)
6. The above functions are controlled by the 8-bit serial data which passes through the serial buses (DATA, CLK, LATCH).

The 8-bit serial data's commands are as follows.

MODE	ADDRESS				DATA			
	D7	D6	D5	D4	D3	D2	D1	D0
SCAN MODE CONT	1	0	0	0	SCAN SPEED 1	SCAN SPEED 2	SCAN SPEED 3	1:SCAN ON 0:SCAN OFF
SERVO MODE CONTROL 1	1	0	0	1	FOCS 1:ON 0:OFF	DIRECTION 1:FWD 0:RVS	TILT 1:ON 0:OFF	1: LD 0:CD
SERVO MODE CONTROL 2	1	0	1	0	TRKG Zero cross output 1:1/256 0:Through	TRKG 1:OFF 0:ON	TEST 1:TEST 0:NORMAL	

(2) HA11529 Terminal Functions

Pin No.	Pin Function
1	Vee: −5V
2	FOCS ERROR signal input: OP AMP input to which a SW is connected for gain control during SCAN operation.
3	FOCS SUM input: For DISC detection. Comparator input threshold is + 0.4V.
4	Comparator input threshold for the FOCS S-curve detection is +0.3V.
5	Comparator input threshold for MAIN BEAM ON/OFF track detection is +1.2V. FOCS SUM input.
6	TRKG ERROR input: Comparator input threshold for TRKG ERROR zero cross detection is 0V.
7	GND
8	TRKG ERROR AMP for CD input
9	TRKG ERROR AMP for LD input
10	TRKG ERROR AMP output. TRKG servo phase compensation is connected between this pin and pin 8.
11	Output for switching the TRKG servo loop characteristics during track jump. (Open or Close)
12	Outputs the actuator drive and brake pulse during track jump and the actuator brake pulse during SCAN.
13	Window comparator input to detect the amount of movement in the TRKG actuator during SCAN. Threshold voltage is 0.2V. Actually, an FTS SCAN signal is being input.
14	Current setting terminal for TRKG actuator brake.
15	Current setting terminal for pins other than pin 14.
16	TRKG RTN input : TRKG RTN input for SLDR servo.
17	SLDR servo amp output: During play, the SLDR motor is PWM driven and at that time this pin becomes the window comparator input.
18	SLDR drive signal output during play or when high speed slider is in operation.
19	SLDR drive signal output when SLDR in operating at low or mid speeds. (Not used.)
20	Capacitor connected pin for setting the slope of the reference triangular wave for the SLDR motor PWM drive during play.
21	Resistor connected to set comparator threshold for turning off the TILT servo drive.
22	TILT ERROR input: OP amp input.
23	A VR is connected for setting the TILT servo gain with the output of the OP amp from pin 22.
24	Output for TILT motor drive.
25	T-CROSS output : TRKG ERROR zero cross count output. Depending on the serial data command, output may be divided by 256.
26	F-LOCK output: "Low" when FOCS lock activated.
27	J-TRIG input: Triggered at startup. "Low" under normal operating conditions.
28	RESET input:
29	LATCH input: Serial interface bus to the system CPU.(pins 29,30,31) Data is latched on the trailing edge.
30	SDATA input: 8-bit serial command data input.
31	SCLK input: clock for serial data transmission.
32	500kHz input: internal logic clock input. About 450kHz.
33	TEST pin: Normal state is "Low". (Not used.)
34	Pin for setting the injection current used by internal I^2L logic.
35	Capacitor connected pin for setting the lens UP/DOWN cycle when FOCS ON is activated.
36	Drive voltage output for lens UP/DOWN.
37	FOCS ERROR amp output: FOCS servo phase compensation is connected between pins 38 and 39.
38	FOCS ERROR amp LD input.
39	FOCS ERROR amp CD input.
40	Pin with connected offset adjustment VR that uses the uninverted FOCS Error amp input.
41	Op amp output for FOCS gain control. (Not used.)
42	Vcc: +5V.

(3) Function Description

FOCS System

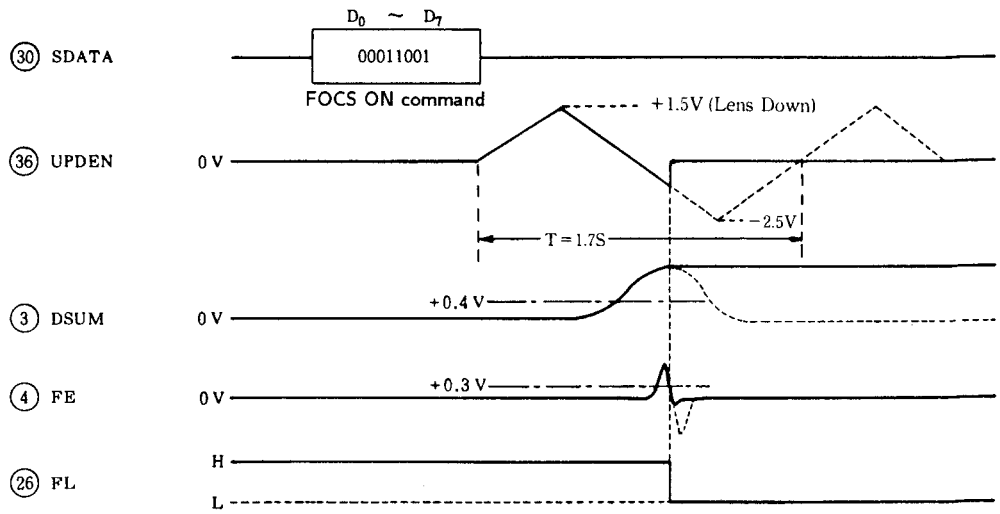
1. FOCS leading-in operation

The FOCS servo leading-in operation is executed when the objective lens is moved UP or DOWN and the DSUM (pin 3) and the FE (pin 4) inputs turn ON the FOCS loop when the FOCS lock conditions are met.

If defocusing occurs due to disc scratches, etc., a voltage of +0.6 V will be output to output pin 36 for about 0.5S when the FOCS servo loop is turned OFF. The lens will then switch to the UP operation again.

2. FOCS down and leading-in again

During playback, if the DSUM (pin 3) input falls to +0.4 V or less due to disc scratches, external vibration, etc., the abnormal condition will be detected and the FOCS servo loop will turn OFF. At the same time, the objective lens will go UP or DOWN automatically and turn ON the FOCS servo loop when the conditions described in "1." are met.



* The dotted line indicates the waveform when the FOCS servo loop is not ON.

Fig. FOCS servo pull in Timing Chart

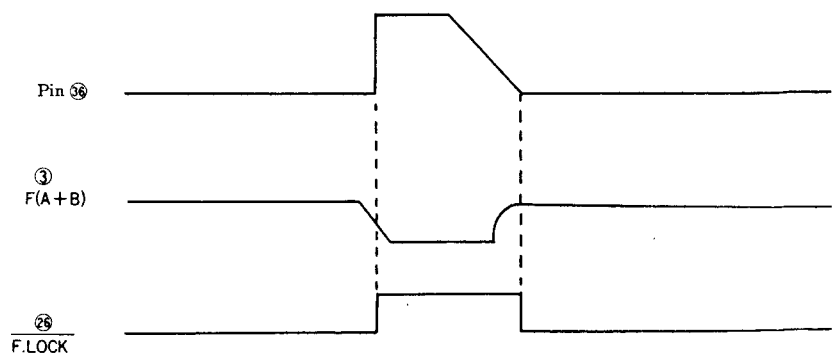
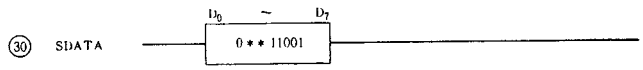


Fig. Defocus Timing Chart

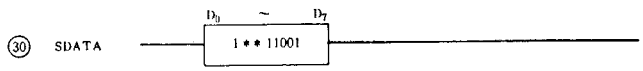
3. CD/LD switching

The FOCS servo's loop gain and phase compensation characteristics are switched depending on the type of disc (CD or LD) being played back. The serial data bit for switching between CD and LD is in the same address as the FOCS ON command bit. Both can be set with a single transfer.

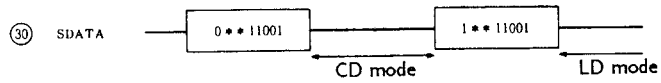
i) Focus ON command when the CD mode is set.



ii) FOCS ON command when the LD mode is set.



iii) When the CD/LD mode is switched during playback (CD mode → LD mode).



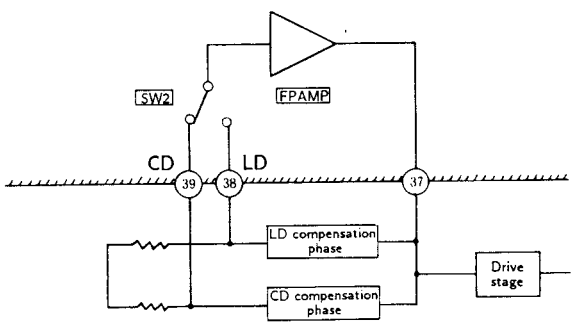


Fig. CD/LD switching

TRKG System

1. Track jump operation

The track jump starts when the jump trigger input's startup edge is received from JUMP (pin 27). The acceleration/deceleration pulse is switched by looking at the tracking error's zero cross. Also, SW12 and SW24 will operate in concert during the jump period. SW12 is used for switching the TRKG loop characteristic and SW24 is used for the TRKG error's zero cross phase adjustment.

The forward jump or reverse jump is switched by the serial data transfer.

The jump trigger signal controls the input signal to 6P so that it becomes advanced in phase.

i) Forward Jump

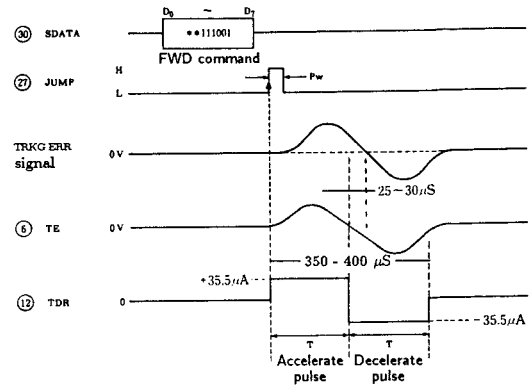
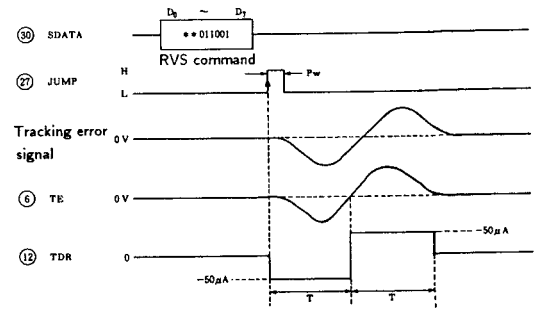


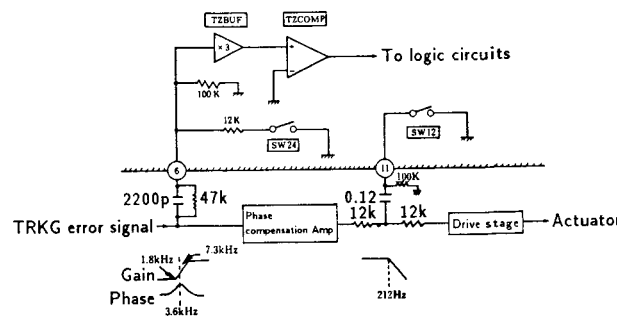
Fig. FWD JUMP Timing Chart

ii) Reverse Jump



Note: The jump trigger signal is normally LOW. The pulse width of Pw is set at 30μS.

Fig. Reverse jump Timing Chart



2. Scan operation

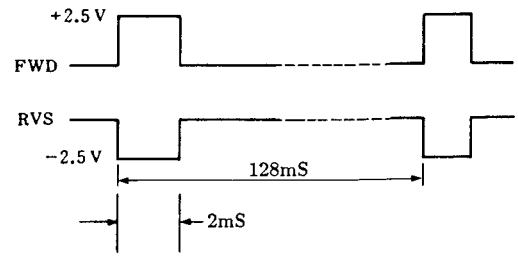
During low- to medium-speed scanning, the TKRG servo detects the actuator's displacement with the ST (pin 13) input. Then it turns OFF the loop and turns it ON again when TE's (pin 6) error signal falls below the stipulated frequency.

During the loop OFF period, the brake pulse will be output from TDR (pin 12) based on the timing chart below. The polarity of the timing pulse will be determined by the polarity of the signal that is input to ST (pin 13), rather than by the serial data transfer's direction setting. The brake pulse's duty is automatically set to five steps (50% - 100%) according to the actuator speed detected by TE (pin 6). Also, the adjustment of the brake current IB is enabled by BEST (pin 14).

In order for the system controller to determine the TRKG servo loop's open and closing timing during SCAN for 13P, the FTS SCAN signal below is input.

This signal is input to pin 12. Since its polarity is reverse that of the brake pulse, it improves the convergence during braking.

The FTS SCAN signal's cycle will be 128 mS.



i) Forward scan

T.OFF changes FOCS BAL signal to optimize TRKG open/close during SCAN mode.

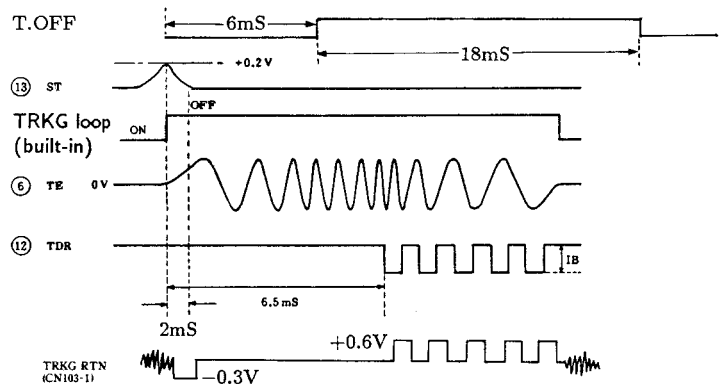


Fig. Forward Scan Timing Chart

ii) Reverse scan

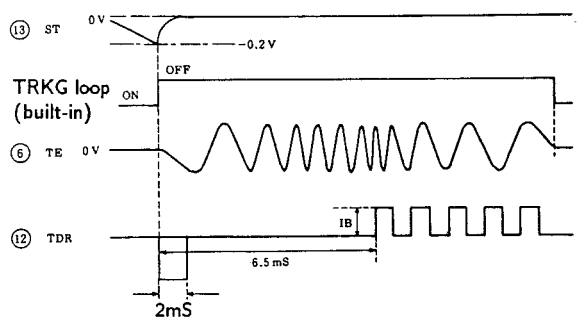
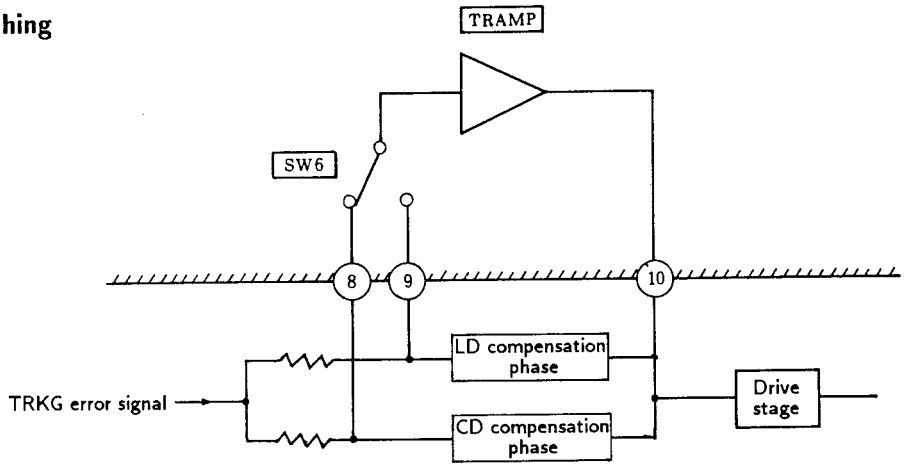


Fig. Reverse Scan Timing Chart

3. CD/LD switching

CD/LD switching can be done in the same way as for FOCS servo CD/LD switching.

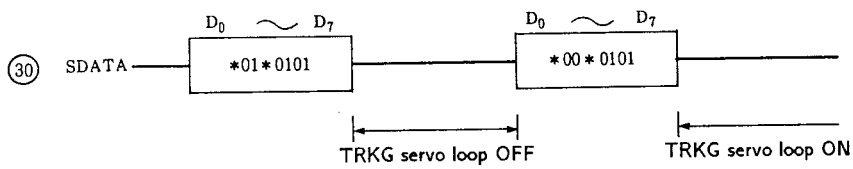
CD/LD switching



4. TRKG loop ON/OFF control

The TRKG loop can be switched ON or OFF by the serial data transfer.

TRKG servo loop ON/OFF



5. TRKG count

The track passing count during high-speed scanning which are counted by the FTS control IC are through output from TCNT(pin 25).

This signal is used for the misclamp detection when playback starts and the track count during CD search.

After playback starts, the misclamp detection sets the TRKG servo to an open loop. If there are 1,600 track passes (TRKG count, 5 passes : Approx. 1mm eccentricity) for one disc revolution (for FG24), it will be deemed normal. Any more track passes will be deemed as a misclamp and the disc will be ejected.

Slider System

1. Normal playback mode operation

During normal playback, the TRKG actuator drive current's DC component undergoes PWM modulation by SCOMP1 and SCOMP2. This PWM pulse turns ON SW16 and SW17 and outputs the drive signal.

The inclination of the standard triangular wave can be changed by the capacitor connected to SLP (pin 20).

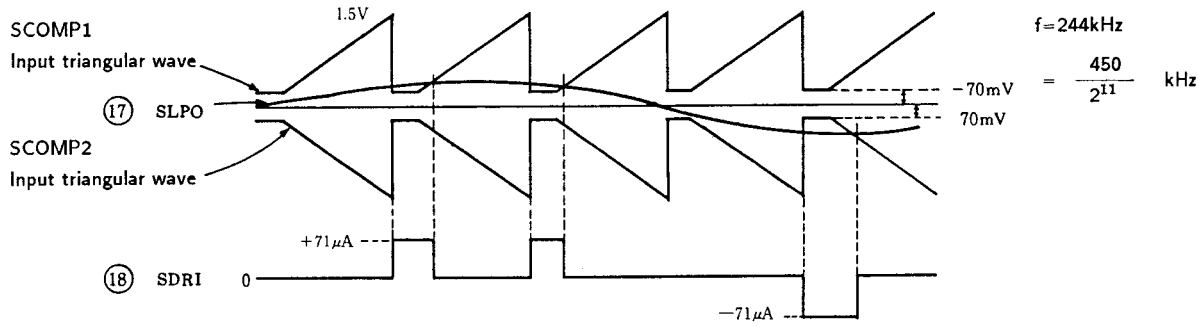


Fig. SLDR servo Operation

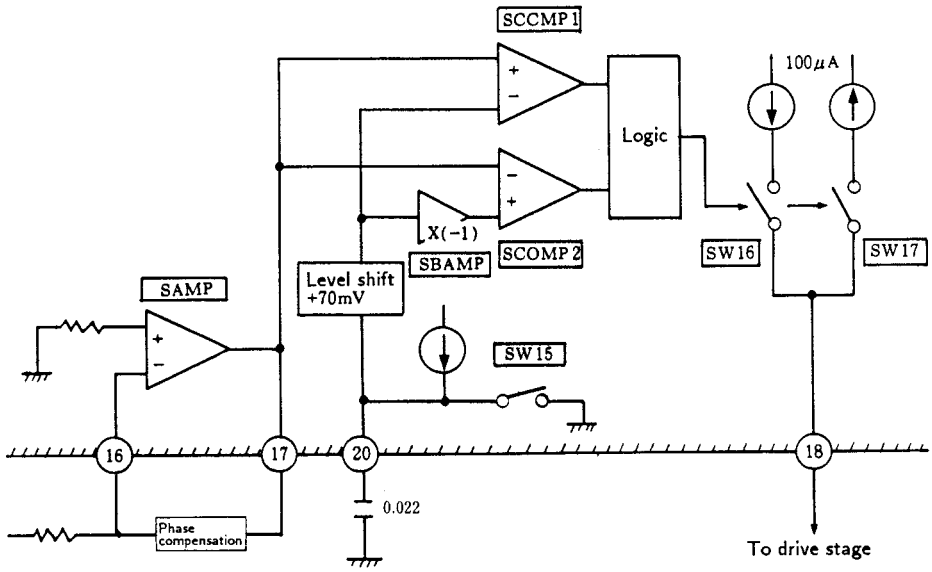


Fig. Serial Data transfer during Scan mode Operation

2. Scan mode operation

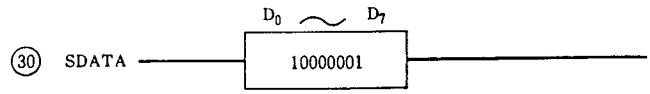
During a scan operation, the SLDR servo loop is turned OFF and the signal for the speed set by the serial data transfer is output from SDR1 (pin 18).

i) High-speed scanning

With the serial data transfer shown on the right, SW16 or SW17 can be turned ON. A $\pm 100\mu A$ drive signal is output from SDR1 (pin 18).

The direction will go according to the serial data transfer's direction setting.

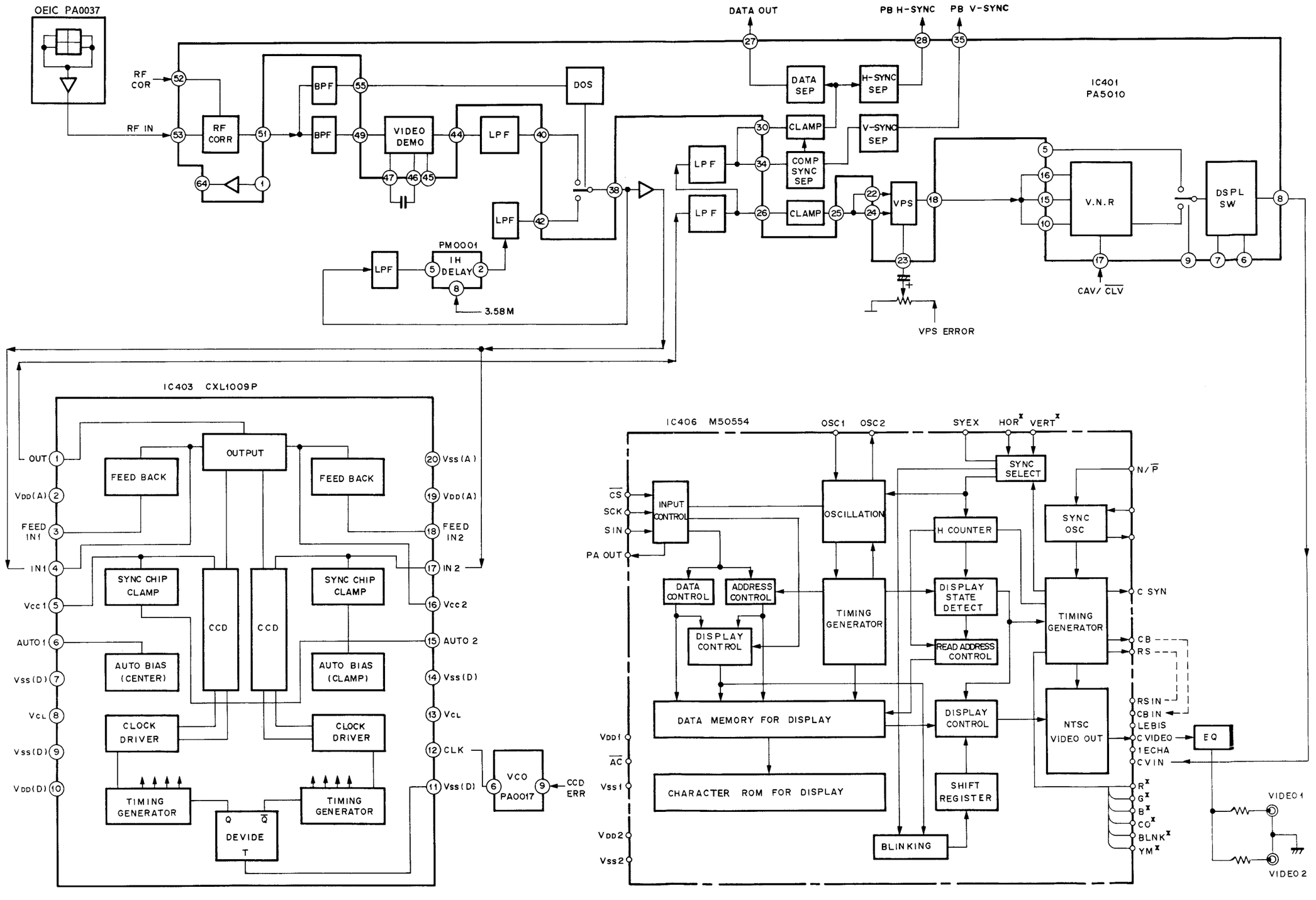
With the pairing of the 10000001 high-speed scan command and the 10001110 SLDR servo loop OFF command, the SLDR's drive voltage is controlled and the scan speed is set.



ii) Low- to medium-speed scanning

The player doesn't use HA11529 pin 19, so the scan speed is set by duty ratio. The same as the high-speed scanning described above.

VIDEO SIGNAL BLOCK DIAGRAM



3 VIDEO SIGNAL DESCRIPTION

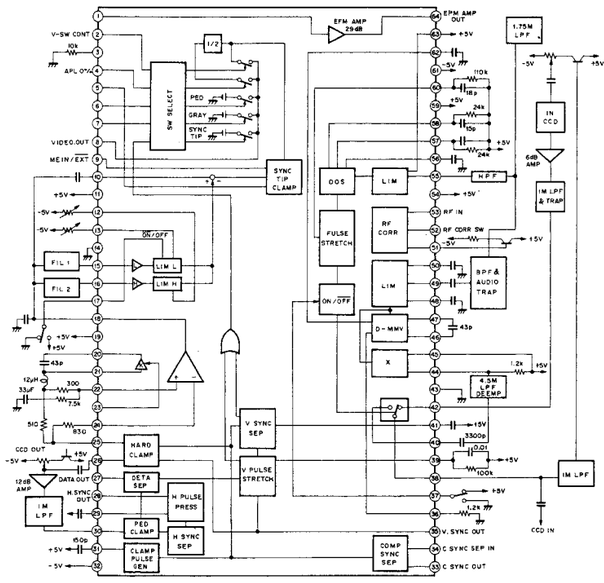
3. 1 PA5010 Description

After the RF signal (output from PA0037 on the pickup Ass'y) undergoes gain adjustment, it is input to pin 53 of PA5010. The signal undergoes RF correction. Then its waveform is shaped by the internal limiter circuit and the signal is demodulated. The demodulated video signal passes through the 5MHz low-pass filter and the de-emphasis circuit. Then it is re-input from pin 40. At the same time, it undergoes dropout detection by DOS (dropout sense). If there is any dropout, the internal SW is switched so that the 1H delayed video signal is inserted.

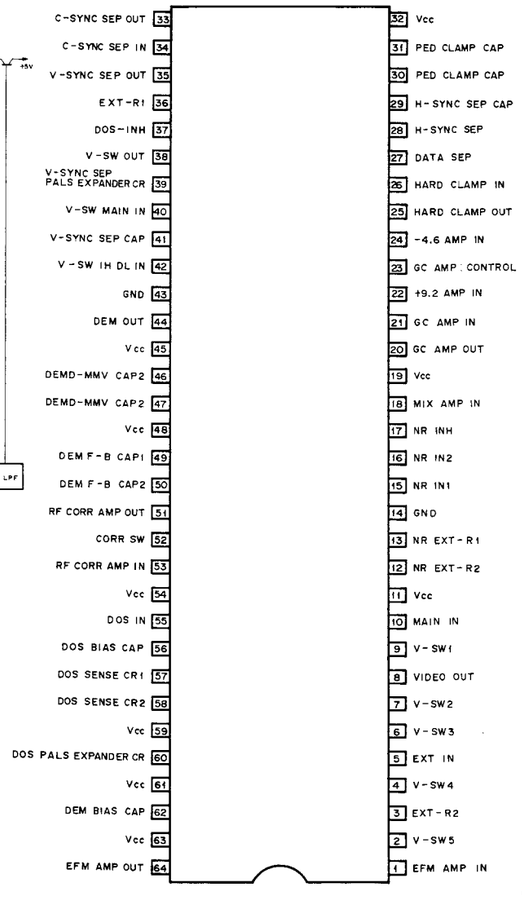
The video signal that is output from pin 38 of PA5010 is input to pins 4 and 17 of IC403 CXL1009. This is where the time base error's high-frequency component generated by the disc's eccentricity, etc., is removed.

The CCD video signal that is output from pin 1 of IC403 is input to pin 26 of IC401. The pedestal section is key clamped. Then after passing through the VPS (Video Phase Shifter) and VNR (Video Noise Reduction), the signal is output from pin 8. Also, the composite sync (PB-C sync), playback vertical synchronizing signal (PB-V Sync), playback horizontal synchronizing signal (PB-H Sync), and the V blanking period data (Philips code) are extracted from the video signal that is input from pin 34.

PA5010 Internal Block Diagram



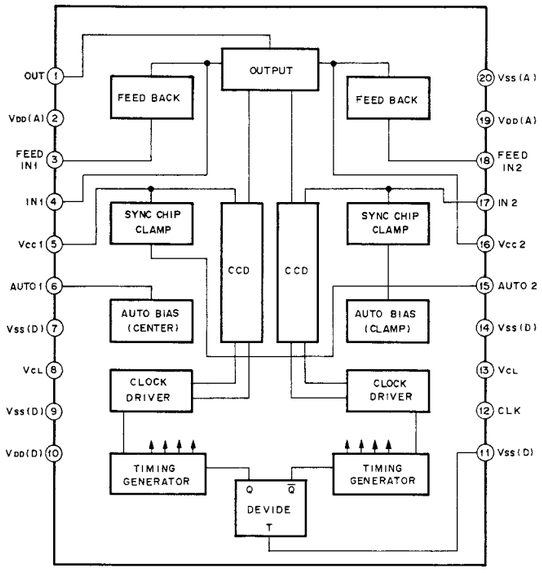
PA5010 External View



3. 2 CXL1009 Description

PA5010 output pin 38's video signal is input to pins 4 and 17 of CXL1009. CXL1009 is a CMOS CCD-dedicated IC. The clock time is controlled by the error signal obtained by the phase comparison between the burst signal and the reference signal (3.58MHz). The CCD variable delay line's delay time is thereby changed.

CXL1009 Internal Block Diagram



CXL1009 Pin Description

PIN No.	SYMBOL	I/O	PIN DESCRIPTION
1	OUT	O	OUTPUT
2	VDD (A)		Power supply input 1 (analog)
3	FEED IN1	I	Feedback input 1
4	IN1	I	Input 1
5	VCC1	I	Gate 1
6	AUTO1	O	Auto Bias 1
7	Vss(D)		GND (digital)
8	VCL		Power supply input 2(digital)
9	Vss(D)		GND (digital)
10	VDD(D)		Power supply input 1(digital)
12	CLK	I	Clock input
13	VCL		Power supply input 2(digital)
14	Vss(D)		GND(digital)
15	AUTO2	O	Auto Bias 2
16	VCC2	I	Gate 2
17	IN2	I	Input 2
18	FEED IN2	I	Feedback input 2
19	VDD(A)		Power supply input 1(analog)
20	Vss(A)		GND(analog)

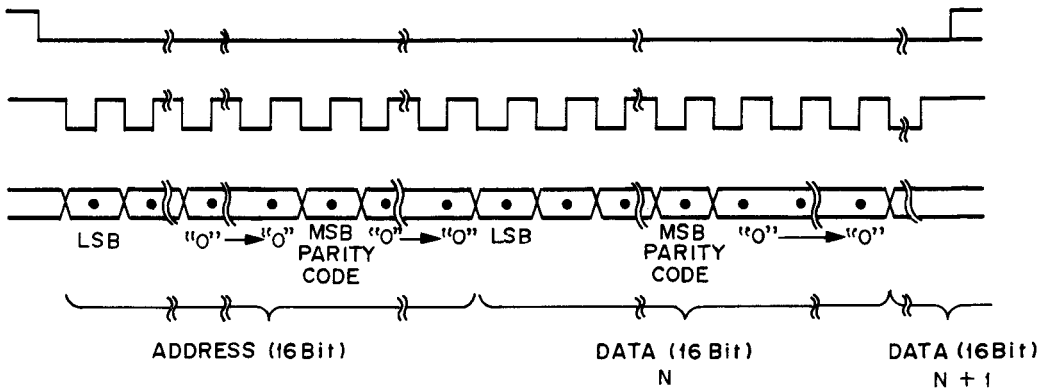
3. 3 M50554 Description

M50554 is an IC which uses the silicon gate CMOS process and controls the TV screen character and pattern displays. The video signal demodulated by PA5010 is input to pin 13 (CVIN) of M50554. During superimposition, it overlays the character output.

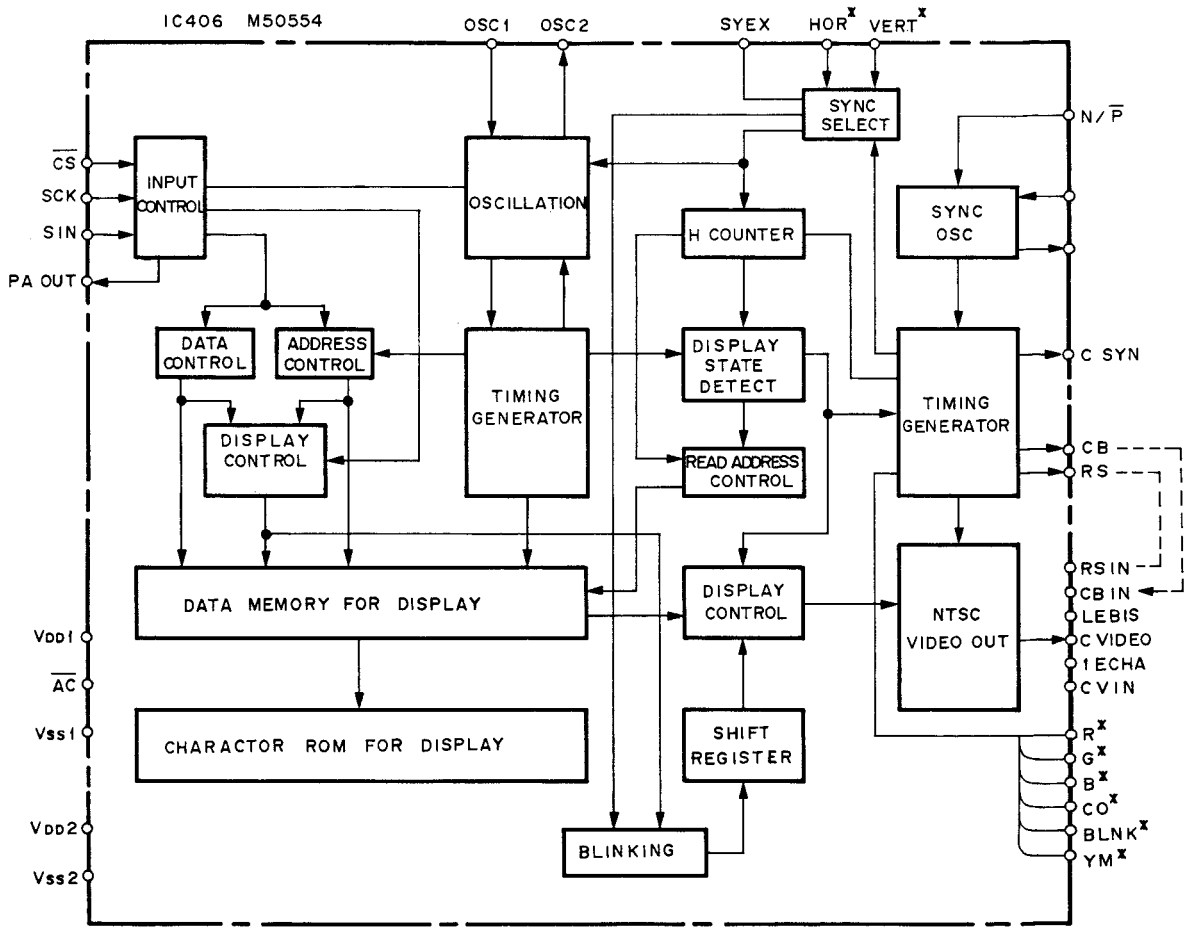
The character data consists of 16 bits. The lower 11 bits contain the data, the next bit contains the parity code, and the data of the remaining upper 4 bits are all 0. The character data is input from pin 8 (SIN) in serial.

The address consists of 16 bits. The lower 8 bits are the effective address. The next 3 bits are 0. The next bit is the parity code and the data of the remaining upper 4 bits is all 0. After CS signal shutdown, SCK's 16 bits become the address. For the input data thereafter, the address is incremented for every 16 bits.

M50554 Data Configuration



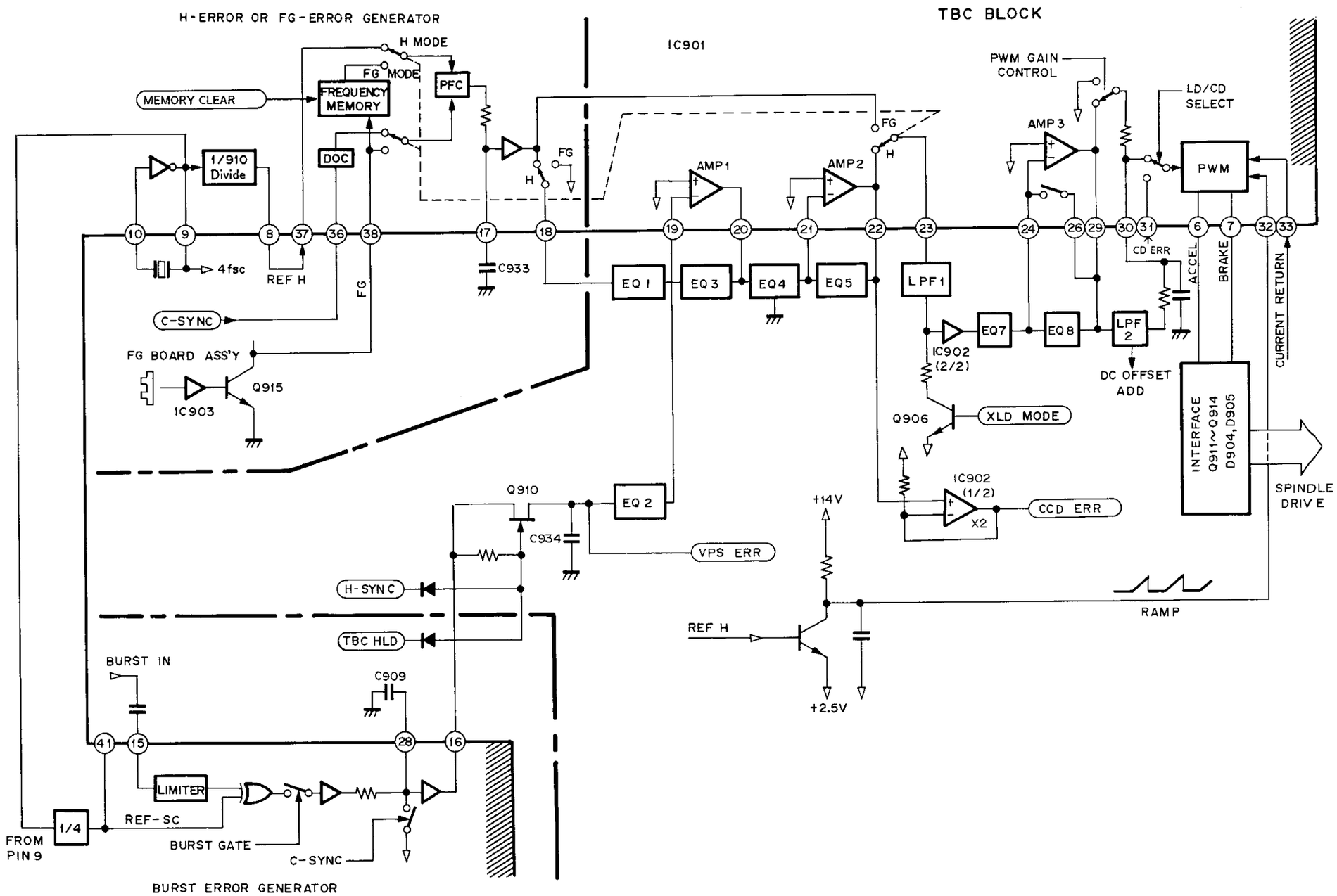
M50554 Internal Block Diagram



M50554 Pin Description

No.	SYMBOL	PIN NAME	DESCRIPTION
1	Vss1	Ground terminal	Connect to GND with the digital circuit's ground terminal.
2	SCK	Serial clock input	When the CS terminal is "Low", the SIN serial data will be taken when SCK starts up. Hysteresis input. Pull-up resistor is built-in.
3	AC	Auto clear input	When "Low" , the IC's internal circuit is reset. Pull-up resistor is built-in. Hysteresis input.
4 5	OSC1 OSC2	External oscillation circuit	These terminals are for an externally-attached oscillation circuit for the display. The standard oscillation frequency is about 7 MHz. This oscillation frequency determines the TV screen horizontal direction's display position and the character width.
6	N/P	NTSC/PAL switching input	This is a synchronizing signal generation switching terminal for NTSC or PAL. When "H", the NTSC synchronizing signal will be generated. And when it is "L", the PAL synchronizing signal will be generated. Pull-up resistor is built-in.
7	CS	Chip select input	This is the chip select terminal. It will be set to "L" for serial data transfers. Pull-up resistor is built-in.
8	SIN	Serial data input	The data and address of the display control register and the display data memory are input as serial. Pull-up resistor is built-in.
9	PAOUT	Parity output	This is an odd parity output which does 1 bit error detection on the SIN's 1 word.
10	SYEX	Synchronizing signal switching input	This is a switching terminal for the external synchronizing signal or the internal synchronizing signal. When "H," it will be set to the external synchronizing signal mode. And when "L," it will be set to the internal synchronizing signal mode. The SYEX consists of EX registers for addresses 2, 4, and 3 in the display control register, and the internal synchronizing priority's logical sum. Pull-up resistor is built-in.
11	Vss2	Ground terminal	Connect to GND with the analog circuit's ground terminal.
12	CVIDEO	Composite video output	This is the composite video signal's output terminal. It outputs a 2Vp-p composite video signal. During a superimposition, the signal is output after the character output, etc., is layered on the CVIN signal.
13	CVIN	Composite video input	This is the composite video signal's input terminal. During a superimposition, the character output, etc., is layered on the composite video signal.
14	LEBK	Blanking level	This is an input terminal which determines the video signal's blanking level.
15	LECHA	Character level input	This is an input terminal which determines the character output level in the video signal. The color of the characters will be white.
16	CBIN	Color burst signal input	The CB output is converted into the video signal's color burst signal level by the external circuit and then input.
17	RSIN	Character background carrier chrominance signal input	The RS output is converted into the video signal's carrier chrominance signal level by the external circuit and then input.
18	VDD2	Power terminal	Connect the analog circuit's power terminal to a +5 V power source.
19	RS	Character background carrier chrominance signal output	This is a carrier chrominance signal output for coloring the character background. It outputs a signal which has a phase angle with respect to the color burst signal CB. Amplitude is 5 V.
20	CB	Color burst signal output	A 3.58 kHz color burst signal is output for NTSC, and a 4.43 kHz color burst signal is output for PAL. Amplitude is 5 V.
21	YM	Luminance signal output	This is the luminance signal output. When the font ROM is determined, the polarity can be selected.
22	BLNK	Character background output	The character background signal is output. When the font ROM is determined, the polarity can be selected.
23	CO	Character output	The character signal is output. When the font ROM is determined, the polarity can be selected.
24	B	Blue output	This is the blue output terminal. When the font ROM is determined, the polarity can be selected.
25	G	Green output	This is the green output terminal. When the font ROM is determined, the polarity can be selected.
26	R	Red output	This is the red output terminal. When the font ROM is determined, the polarity can be selected.
27	CSYN	Composite synchronizing signal output	The NTSC or PAL composite synchronizing signal is output. The polarity is negative and the amplitude is 5 V.
28 29	OSCOUT OSCIN	Synchronizing signal generation oscillation	These terminals are for the external synchronizing signal generation oscillation circuit. It uses a 14.32 MHz oscillation frequency for NTSC and a 17.73 MHz oscillation frequency for PAL.
30	HOR	Horizontal synchronizing signal	The horizontal synchronizing signal is input. Hysteresis input. When the font ROM is determined, the polarity can be selected.
31	VERT	Vertical synchronizing signal	The vertical synchronizing signal is input. Hysteresis input. When the font ROM is determined, the polarity can be selected.
32	VDD1	Power supply input	Connect the digital circuit's power terminal to a +5 V power source.

TBC(Time Base Corrector) BLOCK DIAGRAM



4 TBC SECTION OUTLINE

The player's time base corrector corrects the playback signal's comparative low-frequency error component with the spindle servo. Also, it corrects the high-frequency component (due to the disc's eccentricity) with the CCD servo, and it corrects the residual jitter component with the CPC error detection circuit.

4. 1 Spindle Servo

The player's spindle servo uses the PFC (same as TC5081) to produce the H error. Compared to the trapezoid, the PFC phase detection precision is low. Therefore, the loop mainly consists of the burst error. The loop is thus comprised of the addition of the burst error and the H error.

Multiple phase lock points are created where the direct current output of both phase comparators is balanced. The error signal that goes to the CCD passes through IC901 (1/2) and makes the direct current before the IC901(1/2) as the spindle servo's error. As a result, when the CCD loop is opened at the compulsory point, the spindle servo's gain setting is thrown off, disabling the locking of the spindle servo.

4. 2 Spindle Motor Runaway Detection System

The player's runaway detection system is very different from that of previous models. The player's runaway detection system relies largely on the FG (frequency generator) signal obtained by the FG sensor which is attached to the spindle motor. When the spindle motor starts up, it accelerates to about 1600 rpm. It then reaches 1800 rpm by the FG servo and enters the H loop. For CAV discs, if the spindle motor is unlocked, it will reach 1800 rpm by the FG servo and enter the H loop.

For a CLV disc, the rpm's FG frequency when the spindle motor is locked is stored in memory. When the lock is released, the rpm before the unlocking by the FG servo is taken from memory and input to the H servo.

4. 3 Spindle Motor Gain Control

The spindle motor's gain control is also different from that of previous player models. It is dependent on the FG. For a CLV disc, the FG is read and the spindle error undergoes PWM (Pulse Width Modulation) by the chopper to change the gain. This is to obtain the spindle gain that corresponds to the rpm. The 8-inch disc's gain also switches the chopper according to the commands from the microcomputer.

Since IC901 is not compatible with the CDV disc's gain, an externally attached Q906 Tr switch is used for the switching. The switch between pins 29 and 30 of IC901 is the chopper switch. This chopper is attached to the spindle loop's last step. Therefore, since chopping is done up to the direct current error voltage (the voltage which rotates the spindle motor), the dynamic range at the outer periphery of the CLV disc will become inadequate. As a result, the direct current error voltage is bypassed by LPF2 to prevent offset.

4. 4 TBC Signal Flow

The TBC (Time Base Corrector) signal flow is described as follows. The quartz oscillator at pins 9 and 10 of IC901 produces a standard frequency of 14.31818 MHz. After 1/910 division, the REF-H is output to pin 8 and input to pin 37. The C-SYNC that is input to pin 36 undergoes dropout protection and becomes PB-H. Both signals are input to the PFC (Phase Frequency Comparator) and output from pin 17. Then they are smoothed by the C933 capacitor. After they pass through the buffer amplifier, the H error is output from pin 18. Meanwhile, the video signal whose chroma component had been removed by the BPF is input to pin 15 and undergoes waveform shaping by the limiter. Then the REF-SC (Reference Sub-carrier) which divided 14.31818 MHz into four undergoes phase comparison (EXOR circuit) and passes through the burst gate.

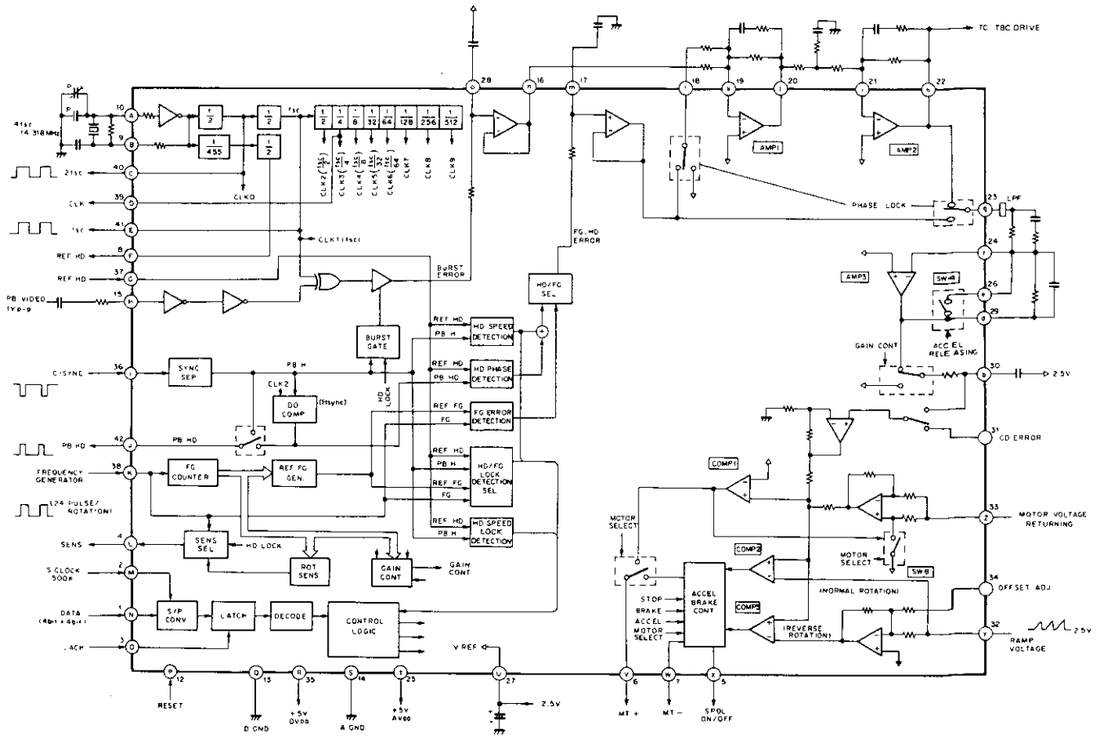
Next, the signal is smoothed by the C909 capacitor (IC901 pin 20) and it passes through the buffer amplifier. Then it is output from pin 16 as a burst error. The H error passes through EQ1 and the burst error passes through EQ2. Then they are mixed by AMP1. After passing through EQ3, EQ 4, and EQ5, it passes through IC902(1/2) and drives the CCD. IC901 operates while centering on an operation point of 2.5V of the built-in OP AMP. Whereas IC902(1/2) operates while centering on 0V. The CCD loop consists of EQ1 to EQ5 above.

In the CCD loop, the direct current error for the spindle servo has more control. Therefore this direct current component controls the spindle motor's rpm. The FG loop or H loop is selected by the switch between pins 22 and 23 of IC901. Then it is input to LPF1. The LPF1 removes the FG error's ripple. After passing through the IC902(2/2) buffer, it enters EQ7 and EQ8. Then it undergoes gain control by the chopper switch and it enters the PWM circuit. Pin 32 of IC902 is input with the RAMP signal that is produced by REF-H. The spindle error undergoes PWM(Pulse Width Modulation). Then it passes through the Q203 to Q206 switching drivers (in the power supply board assembly) and drives the spindle motor. The PWM circuit is built-in in IC901. The remaining jitter component which could not be removed by the TBC is suppressed by the VPS(in the video block) as with previous player models.

The player does not execute the 140 nS shift with TBC for every jump as previous models did. The reason is that since the loop relies on the burst error, it will be led into the 140 nS shifted phase for every jump in a short time. In order to make the lead-in smoother, the burst error is held by Q910 and C934 before and after the jump. Also, the ripple component of the burst error generated in IC901 may cause color irregularity. Therefore, with C-SYNC, Q910 does sample hold to suppress the ripple component.

These IC901 operations are controlled by the serial data from the microcomputer. From when the power is turned on to when the initial setting is completed by the microcomputer, D904 and D905 prevent the PWM circuit's output pins 6 and 7 from becoming high and also prevent all the spindle driver's (on the power supply board Ass'y) transistors from turning ON.

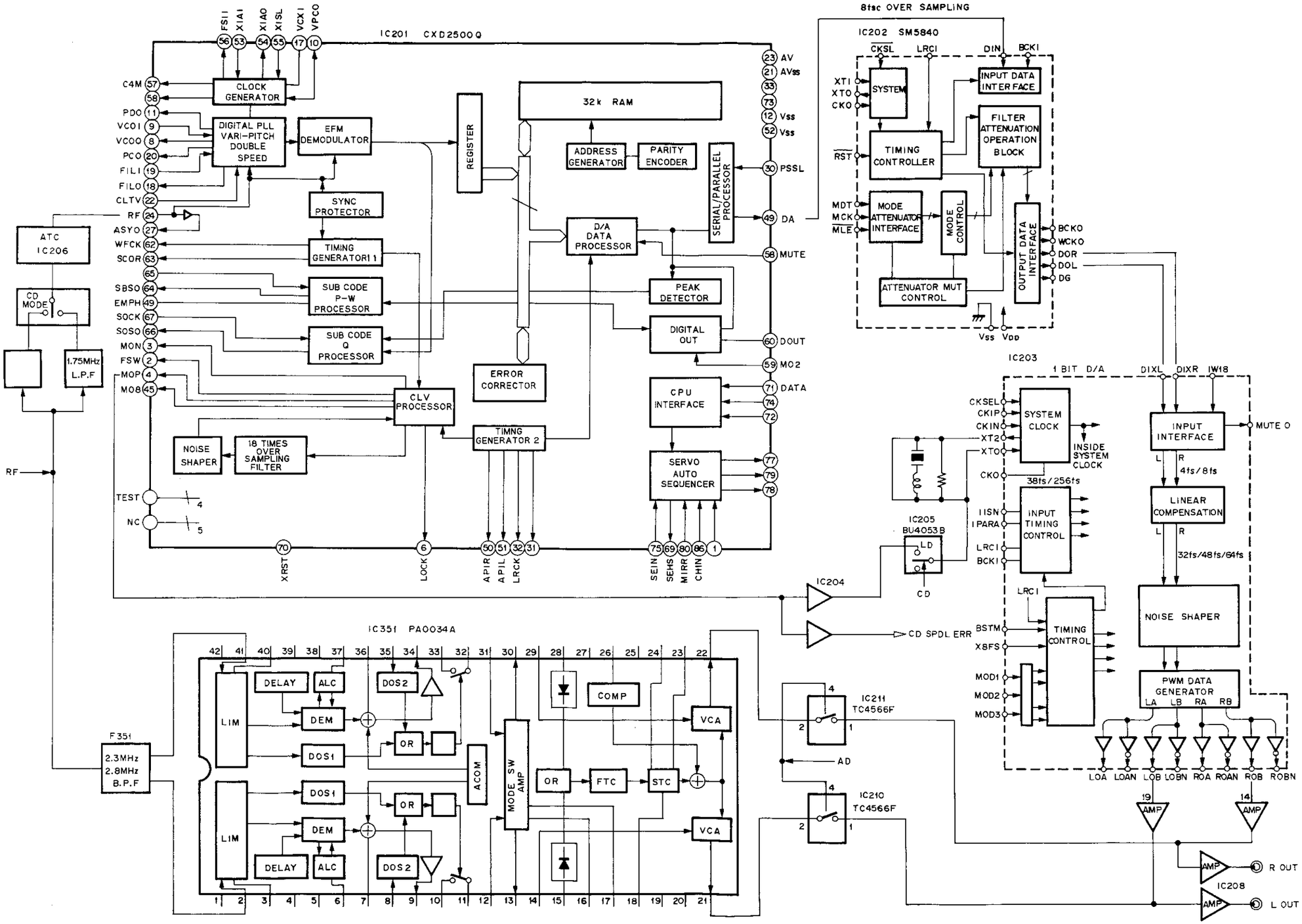
HD49403NT Internal Block Diagram



HD49403NT Pin Description

PIN No.	SYMBOL	I/O	DESCRIPTION
1	SDAT	I	Serial data input from CPU.
2	SCLK		Serial data clock input from CPU. Strobed at the negative edge.
3	LACH		Serial data latch pulse input from CPU.
4	SENS	O	IC internal state sense output. High-impedance when not selected.
5	STOP		Spindle motor ON signal output.
6	MTPL		Spindle motor accelerating signal output(brush motor). Torque generation direction signal output (3-phase).
7	MTMI		Spindle motor decelerating signal output(brush motor). Torque generation signal output(2-phase).
8	RHDO		Reference HD signal output.
9	OSCO		4 fsc reference signal output.
10	OSCI	I	4 fsc reference signal input.
11	TEST		Test pin (0V).
12	RSET		System reset signal input. "L"=reset.
13	DGND	-	GND for digital circuits (0V).
14	AGND		GND for analog circuits (0V).
15	PBVI	I	Burst signal input (AC-coupled).
16	AP1O	O	Op-amp 1 output (burst signal time-axis error output).
17	PFDO		LPF capacitor pin for HD/FG signal time-axis error smoothing.
18	AP2O		Op-amp 2 output (burst signal time-axis error output).
19	AP3I	I	Op-amp 3 invert input.
20	AP3O	O	Op-amp 3 invert output.
21	AP4I	I	Op-amp 4 invert input.
22	AP4O	O	Op-amp 4 output (for CCD circuit phase compensation).
23	SW3O		Analog switch 3 output (HD/FG control select).
24	AP5I	I	Op-amp 5 invert input
25	AVDD	-	Power supply for analog circuits (5V).
26	SW4I	I	Analog switch 4(to discharge capacitor).
27	VREF	-	Reference power supply(Op-amp reference voltage: 2.5V).
28	BUER	O	LPF capacitor pin for burst signal time-axis error smoothing.
29	AP5O		Op-amp 5 output(for phase compensation of spindle motor circuits).
30	LPFC	-	LPF capacitor pin for gain control.
31	CDER	I	CD mode spindle motor control signal input.
32	VRMP		Lamp signal input for PWM.
33	VMOT		Spindle motor pin voltage feedback input
34	OFAD		Op-amp offset adjustment input.
35	DVDD	-	Power supply for digital circuits (5V).
36	SYNC	I	Composite sync signal input (digital signal).
37	RHDI		Reference HD signal input. Normally connected to RHDO(pin 8).
38	FG		FG input(digital signal).
39	CLK	O	Clock signal output for FTS.(447kHz)
40	2FSC		2 fsc clock signal output.
41	FSC		fsc clock signal output.
42	PBHD		Playback HD signal output(after dropout compensation).

AUDIO SIGNAL BLOCK DIAGRAM



5. AUDIO SIGNAL DESCRIPTION

5. 1 Analog Audio System Description (AFM section)

1) PA0034 Description

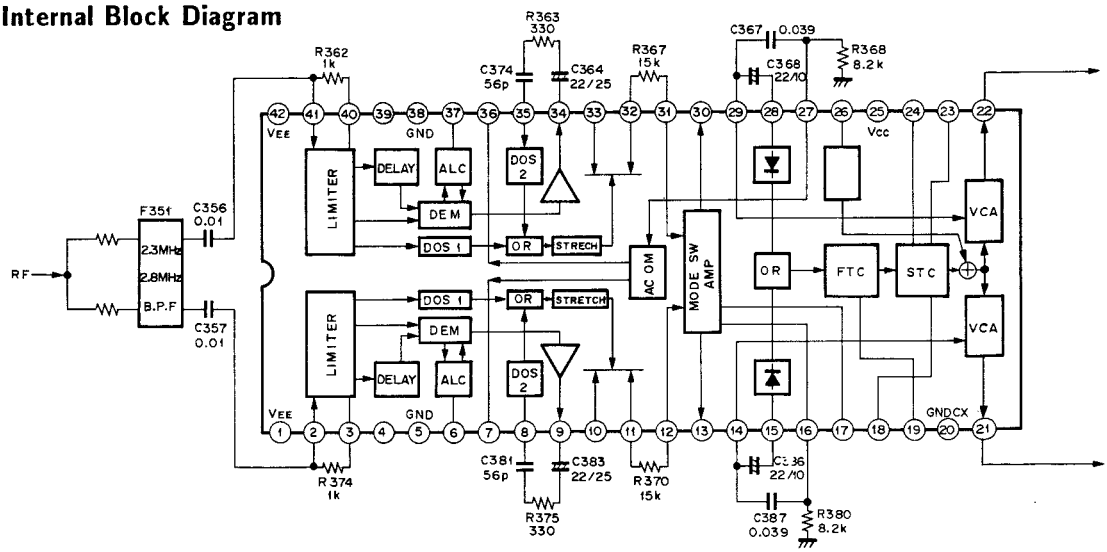
After the audio FM signal which was removed from the 2.3MHz (Lch) and the 2.8MHz (Rch) band-pass filters is demodulated, it will pass through the front hold circuit, the de-emphasis circuit, and the VCA (Voltage Control Amplifier). Then it is output as analog audio. Any dropout will be detected by the dropout detector. During the dropout detection, the front hold circuit will maintain the signal level at the level immediately before the dropout was produced. This is to prevent noise.

Also, the CX noise reduction system expands the audio circuit's dynamic range and improves the S/N ratio.

PA0034 is a single-chip IC dedicated to LD audio. It performs all of the signal processing above.

The analog audio L and R signals output from pins 22 and 21 are sent to the output terminals after digital or analog is selected by the IC210 and IC211 (TC4566F) switching ICs.

PA0034 Internal Block Diagram



PA0034 Pin Description

PIN No.	SYMBOL	Terminal Function	PIN No.	SYMBOL	Terminal Function
1	VEER	Power supply input	22	LOUT	Lch output
2	VINR	FM signal input	23	STC2	STC terminal 2
3	BIASR	Input bias	24	STC1	STC terminal 1
4	VREFR	Internal reference power supply	25	VCC	Power supply input
5	GNDR	GND	26	COMP	Compensator terminal
6	ALCR	ALC capacitor	27	TBC	TBC error signal input
7	CSR	Carrier deletion	28	CINL	CX control signal input
8	DOS2R	DOS2 input	29	CXINL	CX input
9	DEMOR	Demodulator output	30	SWOL	Mode select amp output
10	SINR	Dropout correction switch input	31	SWINL	Mode select amp input
11	DOCR	Dropout correction switch output	32	DOCL	Dropout correction switch output
12	SWINR	Mode select amp input	33	SINL	Dropout correction switch input
13	SWOR	Mode select amp output	34	DEMOL	Demodulator output
14	CXINR	CX input	35	DOS2L	DOS2 input
15	CINR	CX control signal input	36	CSL	Carrier deletion
16	R	Mode select port R	37	ALCL	ALC capacitor
17	L	Mode select port L	38	GNDL	GND
18	CX	CX control	39	VREFL	Internal reference power supply
19	FTC	Capacitor connection for FTC	40	BIASL	Input bias
20	GNDCX	GND	41	VINL	FM signal input
21	ROUT	Rch output	42	VEEL	Power supply input

5. 2 Digital Audio Circuit Outline (DSP section)

1) Outline

The RF signal from the FTS section passes through the 1.75MHz low-pass filter. The low frequency of the separated EFM signal (which boosts during recording) is flattened by the de-emphasis circuit. Then the pulse is formed by the ATC (Automatic Threshold Control) of IC206(TC74HCU04 AP) and input to pin 24 of IC201 (CXD2500).

The address of the storage RAM is controlled by the frame synchronizing signal that is separated from data and the clock reproduced by the PLL from the EFM signal that was demodulated by. CXD2500. The audio data stored in RAM must be read according to an accurate and stable clock. Otherwise the audio signal played back will have jitter or wow/flutter. Also, if the RAM is written to and read by an unrelated clock, the RAM will become full. The quartz oscillator's output, which is synchronized with the playback EFM signal's average frequency, is therefore used as the reading clock.

CXD2500 output pin 34's digital audio signal passes through the IC202(SM5840AP) 8fs oversampling digital filter. After undergoing digital/analog conversion by IC203 (SM5860BF), the signal is amplified by IC208 and IC209 and output.

2) CXD2500 Features

The CXD2500 has the following features :

1. Better frame sync protection

The sync protection window is produced by the X'tal circuit which has no bit slip. A protection window is also inserted before and after the sync protection window.

2. 4-layer correction

There is 4-layer correction for the error correction. The correction capacity for the burst error has been doubled to 16 frames.

3. Interleave error protection

This prevents noise for non-consecutive frames.

4. Built-in 32K RAM

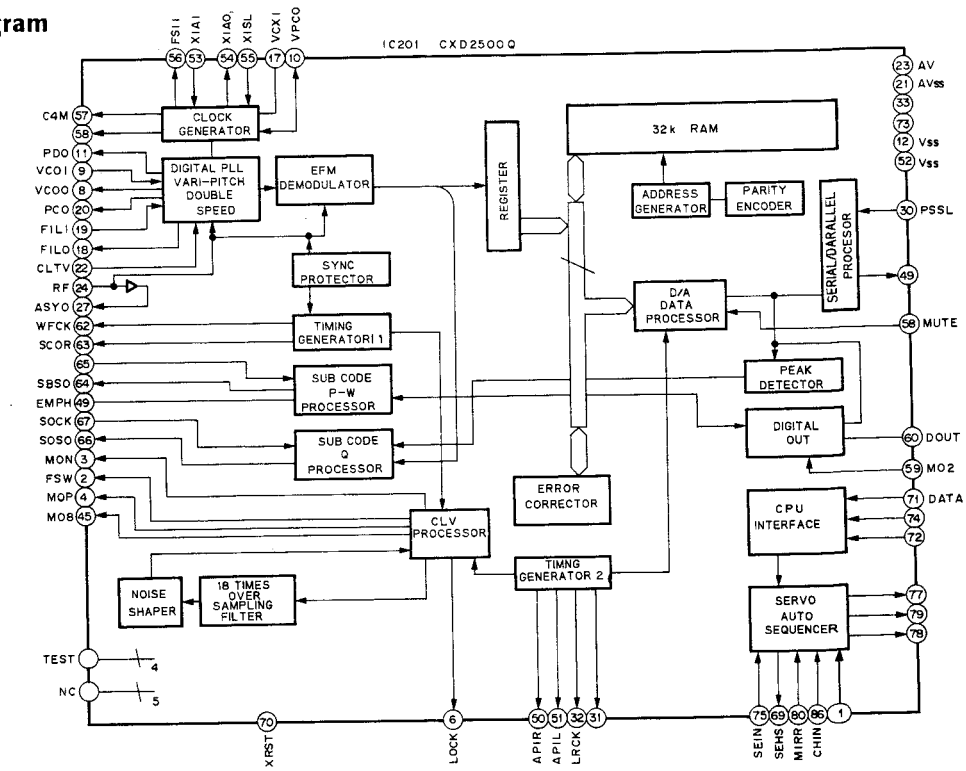
5. Digital peak meter and level meter functions

6. Variable pitch playback

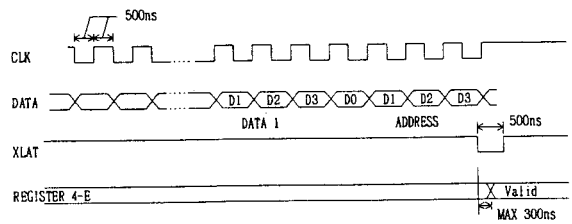
The PLL's output clock on the master side can be varied.

7. Auto zero cross mute

CXD2500Q Internal Block Diagram



Interface Timing Chart



CXD2500Q Pin Description

PIN No.	SYMBOL	I/O		DESCRIPTION
1	FCOK	I		Focus OK input terminal. This is used for the SENS output and the servo auto sequencer.
2	FSW	O	Z 0	Spindle motor's output filter switching output.
3	MON	O	1 0	Spindle motor's ON-OFF control output.
4	MDP	O	1 Z 0	Spindle motor's servo control.
5	MDS	O	1 Z 0	Spindle motor's servo control.
6	LOCK	O	1 0	H output when GFS undergoes sampling LH at 460 Hz. L output when there is L eight consecutive times.
7	NC			
8	VCOO	O	1 0	Oscillation circuit output for the analog EFM PLL.
9	VCOi	I		Oscillation circuit input fLOCK =8.6436 MHz for the analog EFM PLL
10	TEST	I		TEST pin. Normally GND.
11	PDO	O	1 Z 0	Charge pump output for the analog EFM PLL.
12	Vss			GND
13 14 15	NC			
16	VPCO	O	1 Z 0	PLL charge pump output for variable pitch.
17	VCKi	I		Clock input fc center =16.9344MHz from the variable pitch external VCO.
18	Filo	O	A	Filter output (analog) for master PLL (slave = digital PLL).
19	FiLi	I		Filter input for the master PLL.
20	PCO	O	1 Z 0	Charge pump output for the master PLL.
21	AVss			Analog GND.
22	CLTV	I		VCO control voltage input for the master PLL.
23	AVDD			Analog power supply (+5 V).
24	RF	I		EFM input after asymmetry correction.
25	TEST	I		To be GND.
26	TEST	I		To be GND.
27	ASYO	O	1 0	EFM full-swing output.
28	TEST	I		To be GND.
29	NC			
30	PSSL	I		Audio data output mode switching input. "L" serial output. Parallel output with "H" .
31	WDCK	O	1 0	D/A interface for the 48-bit slot. Word clock f = 2Fs.
32	LRCK	O	1 0	D/A interface for the 48-bit slot. LR clock f = Fs.
33	VDD			Power supply (+5V)
34	DA16	O	1 0	DA16 (MSB) output when PSSL = 1. 48 slot serial data (2S'COMP) when PSSL = 0.
35	DA15	O	1 0	DA15 output when PSSL = 1. 48-bit slot bit clock when PSSL = 0.
36	DA14	O	1 0	DA14 output when PSSL = 1. 64-bit slot serial data 2S'COMP LSB first when PSSL = 0.
37	DA13	O	1 0	DA13 output when PSSL = 1. 64-bit slot bit clock when PSSL = 0.
38	DA12	O	1 0	DA12 output when PSSL = 1. 64-bit slot and LR clock when PSSL = 0.
39	DA11	O	1 0	DA11 output when PSSL = 1. GTOP output when PSSL = 0.
40	DA10	O	1 0	DA10 output when PSSL = 1. XUGF output when PSSL = 0.

PIN No.	SYMBOL	I/O		DESCRIPTION
41	DA09	O	1 0	DA10 output when PSSL = 1. XPLCK output when PSSL = 0.
42	DA08	O	1 0	DA08 output when PSSL = 1. GFS output when PSSL = 0.
43	DA07	O	1 0	DA07 output when PSSL = 1. RFCK output when PSSL = 0.
44	DA06	O	1 0	DA06 output when PSSL = 1. C2PO output when PSSL = 0.
45	DA05	O	1 0	DA05 output when PSSL = 1. XRAOF output when PSSL = 0.
46	DA04	O	1 0	DA04 output when PSSL = 1. MNT3 output when PSSL = 0.
47	DA03	O	1 0	DA03 output when PSSL = 1. MNT2 output when PSSL = 0.
48	DA02	O	1 0	DA02 output when PSSL = 1. MNT1 output when PSSL = 0.
49	DA01	O	1 0	DA01 output when PSSL = 1. MNT0 output when PSSL = 0.
50	APTR	O	1 0	Aperture correction control output. "H" for the R ch.
51	APTL	O	1 0	Aperture correction control output. "H" for the L ch.
52	Vss			GND
53	XTAi	I		16.9344 MHz or 33.8688 MHz Xtal oscillation circuit input.
54	XTAO	O	1 0	16.9344 MHz or 33.8688 MHz Xtal oscillation circuit output.
55	XTSL	I		Xtal selection input terminal. "L"when it is 16.9344 MHz. "H" when it is 33.8688 MHz.
56	FSTT	O	1 0	2/3 divided output of the Xtal oscillation. Fixed during variable pitch.
57	C4M	O	1 0	4.2336 MHz output. Changes during variable pitch.
58	C16M	O	1 0	19.9344 MHz output. Changes during variable pitch.
59	MD2	I		Digital OUT ON/OFF control. ON when "H" , and OFF when "L".
60	DOUT	O	1 0	Digital OUT output terminal.
61	EMPH	O	1 0	"H" output when the playback disc has emphasis. "L"output when it has no emphasis.
62	WFCK	O	1 0	Write frame clock output.
63	SCOR	O	1 0	"H" output when the subcode sync SO or SI is detected.
64	SBSO	O	1 0	Sub P - W code and serial output.
65	EXCK	I		For SBSO lead out. External clock input.
66	SQSO	O	1 0	SubQ 80-bit and PCM peak data 16-bit output.
67	SQCK	I		External clock input for SQSO lead out.
68	MUTE	I		Mute with "H" , and cancel with "L".
69	SENS	O	1 0	SENS output. Sent to the CPU.
70	XRST	I		System reset. Reset when "L".
71	DATA	I		Serial data input from the CPU.
72	XLAT	I		Serial data from the CPU is latched with the latch input shutdown.
73	VDD			Power supply input (+5V).
74	CLK	I		From the CPU, serial data transfer clock input.
75	SEIN	I		From the SSP, SENSE input.
76	CNiN	I		Track jump count signal input.
77	DATO	O	1 0	Serial data output to the SSP.
78	XLTO	O	1 0	Serial data latch output to the SSP. Latched during shutdown.
79	CLKO	O	1 0	SP serial data transfer clock output.
80	MiRR	I		Mirror signal input. Used with the auto sequencer for jumps exceeding 128 tracks.

3) CXD2500 Command Code

As shown in the following table, the CXD2500 has 4-bit registers which have addresses from 4 to E. These registers are operated by being input externally with a total of 8 bits (address + data) of data.

CXD2500 Instruction and RESET Initialization

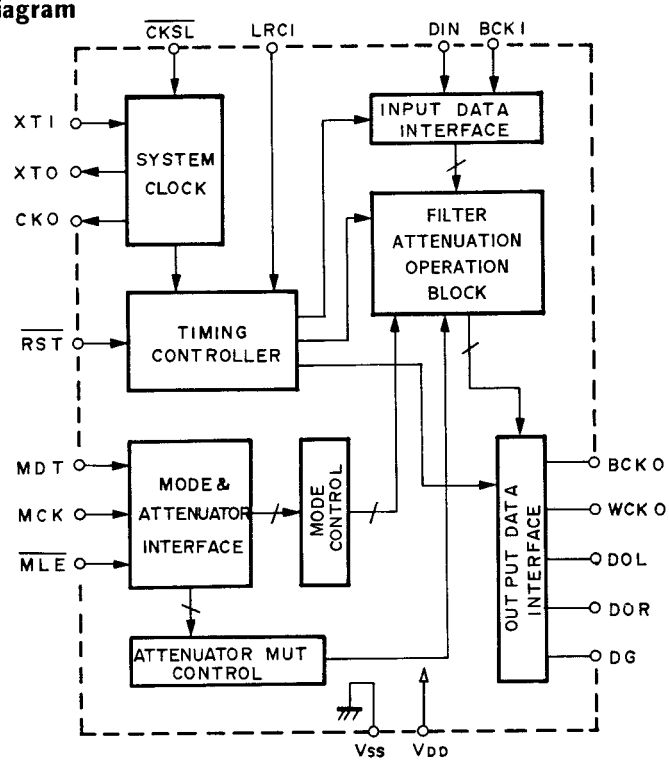
registers Name	Commands	Address				Data1				Data2				Data3				Data4			
		D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
4	Auto Sequence	0	1	0	0	AS3	AS2	AS1	AS0	—	—	—	—	—	—	—	—	—	—	—	—
5	Blind(A,E), Overflow(C) Brake(A)	0	1	0	1	0.18ms 0.36ms	0.09ms 0.18ms	0.045ms 0.09ms	0.022ms 0.045ms	—	—	—	—	—	—	—	—	—	—	—	—
6	KICK(D)	0	1	1	0	11.6ms	5.8ms	2.9ms	1.45ms	—	—	—	—	—	—	—	—	—	—	—	—
7	Auto Sequencer(N) Track Jump	0	1	1	1	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1
8	MODE	1	0	0	0	CDROM	0	D OUT MuTu-F	WSEL	—	—	—	—	—	—	—	—	—	—	—	—
9	Function	1	0	0	1	D CLV ON-OFF	DSPB ON-OFF	A SEQ ON-OFF	D PLL ON-OFF	Bili GL MAIN	Bili GL SUB	—	—	—	—	—	—	—	—	—	—
A	Audio CTRL	1	0	1	0	Vari UP	Vari Down	MUTE	ATT	PCT1	PCT2	—	—	—	—	—	—	—	—	—	—
B	Traverse Monitor Counter	1	0	1	1	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1
C	Servo Factor	1	1	0	0	Gain MDPI	Gain MDPO	Gain MOSI	Gain MOSO	—	—	—	—	—	—	—	—	—	—	—	—
D	CLV CTRL	1	1	0	1	DCLV PWM MD	TB	TP	CLVS Gain	—	—	—	—	—	—	—	—	—	—	—	—
E	CLV MODE	1	1	1	0	CH3	CH2	CH1	CH0	—	—	—	—	—	—	—	—	—	—	—	—

4	Auto Sequence	0	1	0	0	0	0	0	0	—	—	—	—	—	—	—	—	—	—	—	—
5	Blind(A,E), Overflow(C) Brake(A)	0	1	0	1	0	1	0	1	—	—	—	—	—	—	—	—	—	—	—	—
6	KICK(D)	0	1	1	0	0	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—
7	Auto Sequencer($\dot{N}$) Track Jump	0	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
8	MODE	1	0	0	0	0	0	0	0	—	—	—	—	—	—	—	—	—	—	—	—
9	Function	1	0	0	1	1	0	0	1	0	0	$\underline{0}$	—	—	—	—	—	—	—	—	—
A	Audio CTRL	1	0	1	0	0	0	1	1	0	0	—	—	—	—	—	—	—	—	—	—
B	Traverse Monitor Counter	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	Servo Factor	1	1	0	0	0	1	1	0	—	—	—	—	—	—	—	—	—	—	—	—
D	CLV CTRL	1	1	0	1	0	0	0	0	—	—	—	—	—	—	—	—	—	—	—	—
E	CLV MODE	1	1	1	0	0	0	0	0	—	—	—	—	—	—	—	—	—	—	—	—

4) SM5840

DA01 to DA16, which are output from pin 49 of CXD2500, are input to pin 18 of SM5840. SM5840 is a multi-function digital filter for 8fs oversampling. Its functions include digital emphasis, digital attenuation, and soft muting.

SM5840 Internal Block Diagram

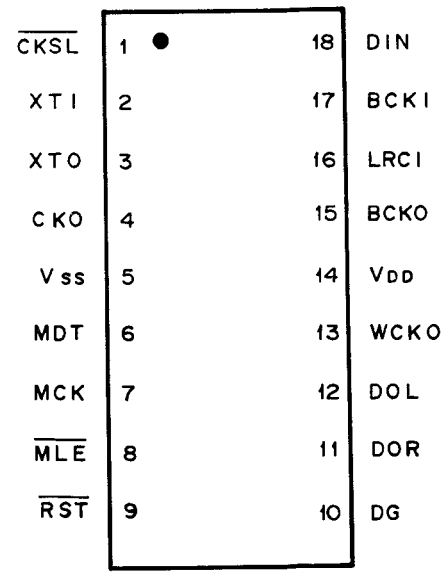


SM5840 Pin Description

"fs" means sampling frequency of input data.

PIN No.	SYMBOL	I/O	Description	
1	CKSL	IP	Select frequency of OSC and input (When CKSL=E, 384fs)	
2	XTI	I	OSC input (Frequency selected by CKSL)	
3	XTO	O	OSC output	
4	CKO	O	Clock of OSC output (Frequency is same as XTI)	
5	Vss		GND	
6	MDT	IP	Mode setting data	Setting the digital attenuator and the mode flag register.
7	MCK	IP	Mode setting clock	
8	MLE	IP	Mode setting latch enable	
9	RST	IP	System reset (Initialize)	
10	DG	O	When 8fsLR parallel output mode; Output De-glitch	
11	DOR	O	When 8fsLR parallel output mode; Output Rch data	
12	DOL	O	When 8fsLR parallel output mode; Output Lch data	
13	WCKO	O	Clock for output words	
14	VDD		Power supply input (5V)	
15	BCKO	O	Clock for output bits	
16	LRCI	IP	Clock for sampling rate (fs) of input data	
17	BCKI	IP	Clock for input bits	
18	DIN	IP	Data input	

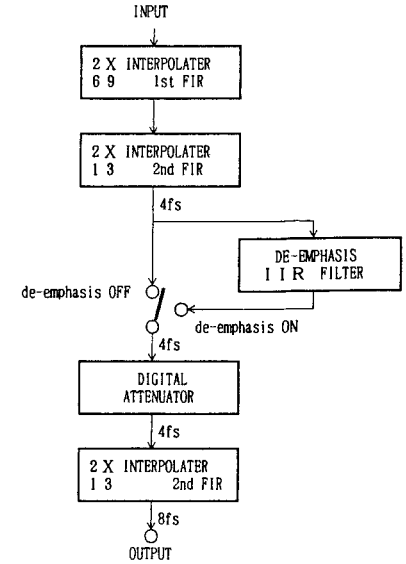
SM5840 External View



SM5840's basic computation block is shown on the right. The interpolation computation block consists of doubled interpolation filters connected in three steps. It outputs 8fs oversampling data for the signal that is input at the fs sample rate.

The output data is an 18 bit MSB first 2's complement. It is output from pins 11 and 12. With the 8fsc L and R parallel output mode, the L and R channel outputs are output simultaneously from two output terminals.

The input data is input from pin 18 in 16 bits, MSB first serial, and two's complement. All the serial data bits are read to the SIPO register (serial/parallel conversion register) with the bit clock BCKI's startup edge and are converted to parallel data. The SIPO's output is transferred to the respective L ch and R ch input registers with the LRCI clock's shutdown/startup edge.



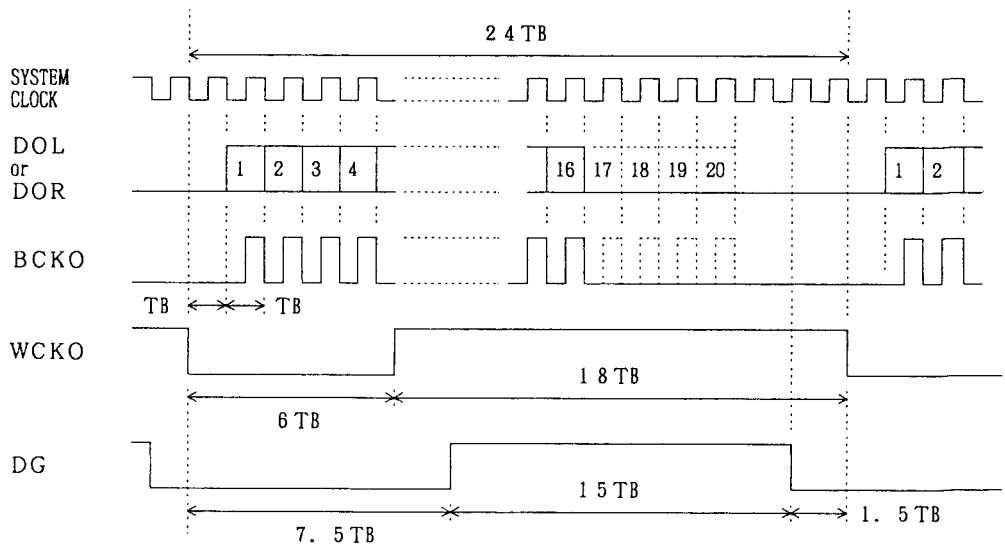


Fig. Data Output Timing Chart

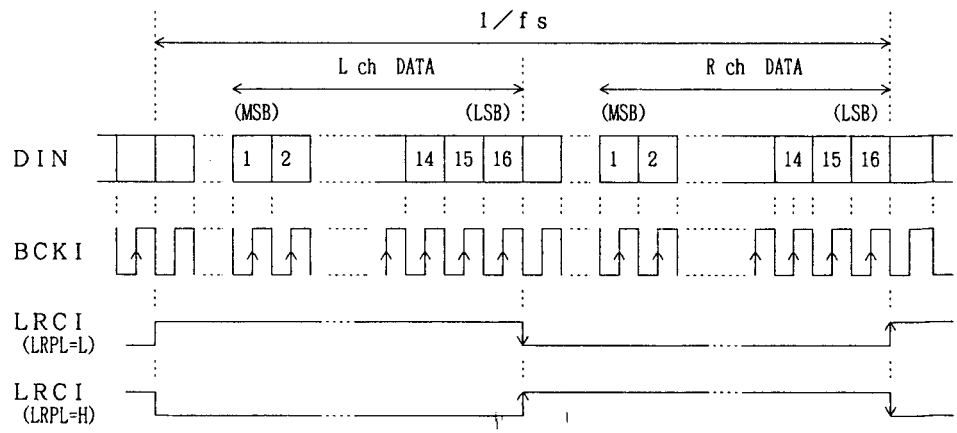
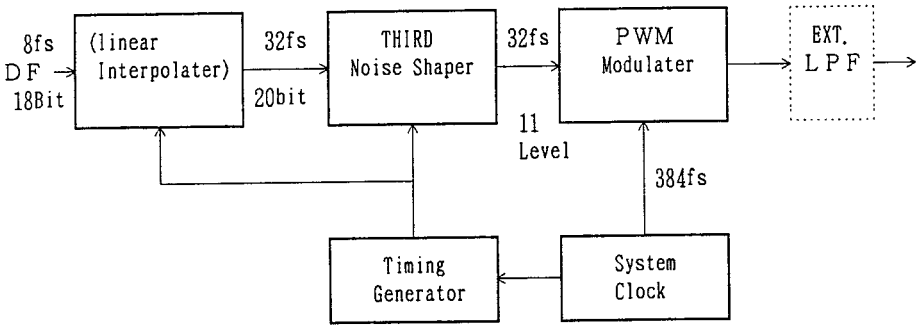


Fig. Data Input Timing Chart

5) SM5860

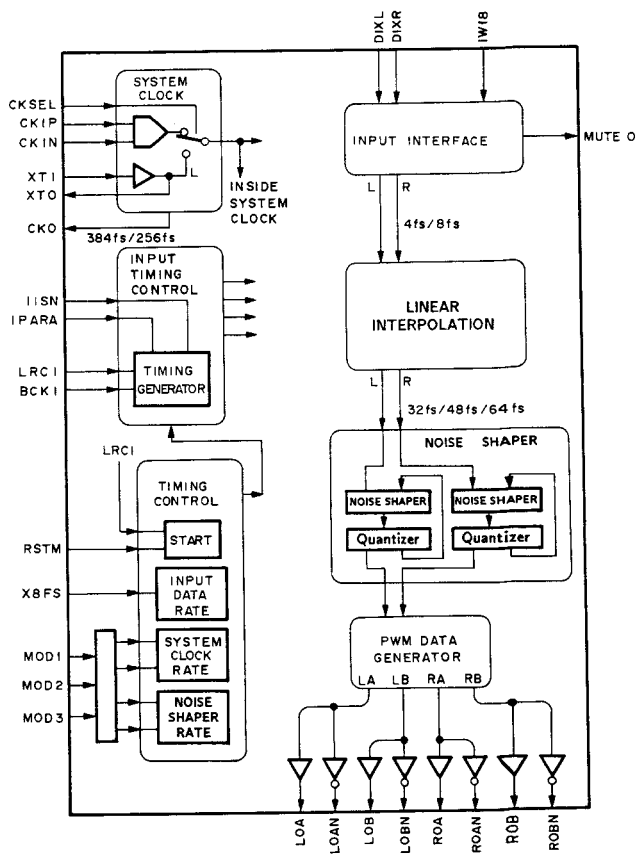
The data that is output from pins 11 and 12 of SM5840 is input to pins 40 and 41 of SM5860. SM5860 is a D/A converter for the 18-bit input. It has the following features :

- Built-in D/A converter for the LR2 channel.
- Built-in overflow limiter.
- Built-in quartz oscillation circuit.
- I/O TTL compatible.

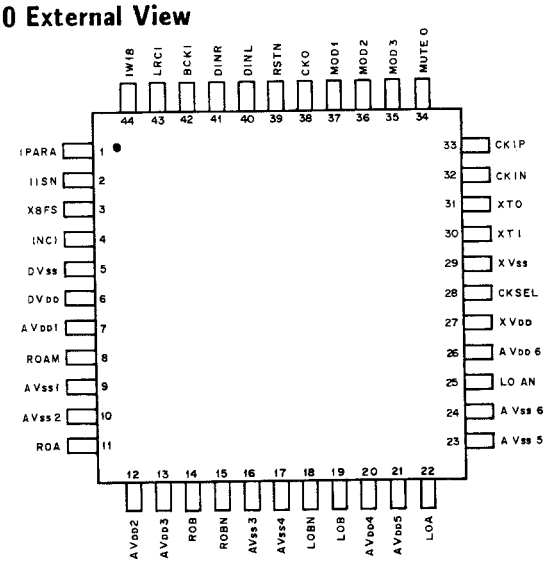


The SM5860's internal block is shown in the figure.
The linear interpolator receives the data from SM5840.
There is a 20-bit output resolution with the section of data which underwent higher order (32 fs) oversampling by the linear interpolation. With the linear interpolator, the next step's noise shaper shows the signal's (oversampled by the linear interpolator) 2^{20} line resolution signal with the level 11's signal. This method thereby pushes out the re-quantized noise from the audio band.
To output the data that was dropped from the 20 bit to level 11 by the noise shaper, the PWM modulator is used.
For the level number increase, the PWM modulation allows an increase of 1 system clock time toward only one side of the sample period center. A 1-bit D/A converter which uses low crystal oscillation is thereby realized.

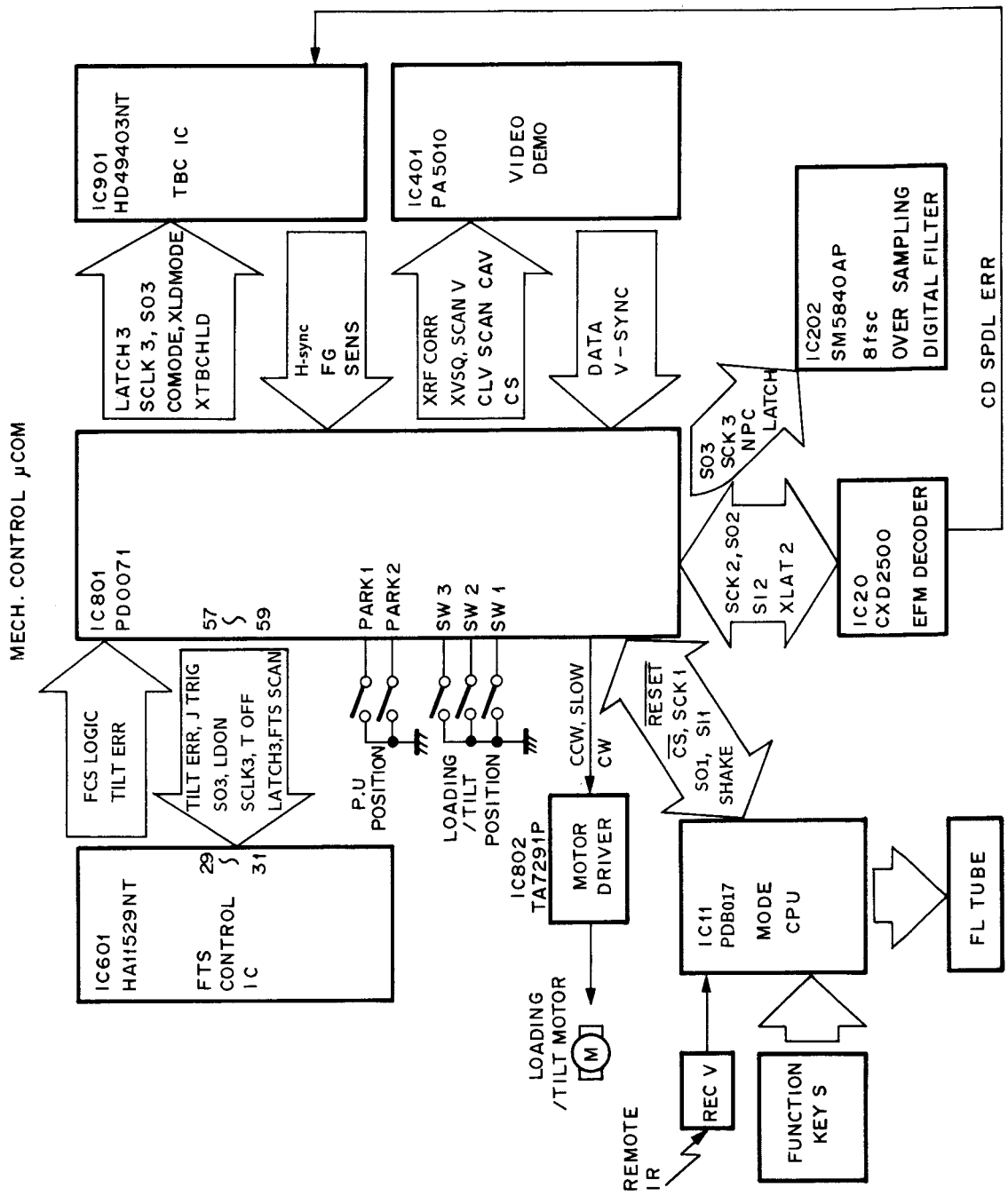
SM5860 Internal Block Diagram



SM5860 External View



CONTROL SYSTEM BLOCK DIAGRAM

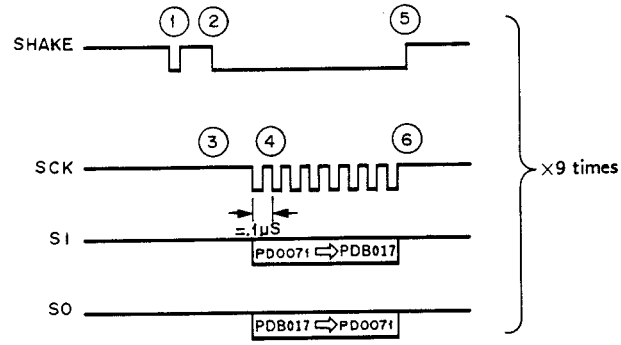


6 Control System

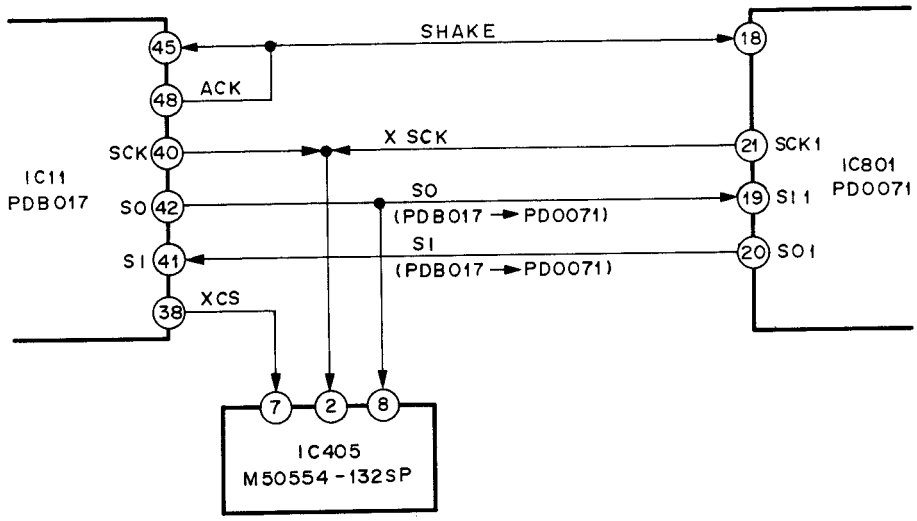
6. 1 Microcomputer interfaces

The player's microcomputer consists of two chips : an 8-bit microcomputer (IC801 : PD0071) which controls the mechanisms and a 4-bit microcomputer (IC11 : PDB017) which controls the operation and display. These two microcomputers are connected via a serial interface. This transmission line is also used for controlling the character generator IC (IC405 : M50554-132SP).

● Timing Chart of Microcomputers' Communication



● Serial Data Transfer Connection



● Microcomputer communication sequence

1. PD0071 sets the SHAKE terminal (pin 18) to"L"for several μS to request the start of a communication with PDB017.
2. When PDB017 receives the communication start request, it sets the ACK terminal (pin 48) to"L"and informs PD 0071 that communication has been enabled.
3. PD0071 then sets SCK1 (pin 21), which had been used as an input port, to the output mode. PDB017 sets SCK (pin 40) to the input mode and connects the communication line between the microcomputers.
4. PD0071 sends the transfer clock(1MHz) in 8 bits. The data is then sent and received in synchronization with this clock.
5. When PDB017 receives 8-bit data, it sets the ACK terminal (pin 48) to"H"and reports that a single communication is completed.
6. PD0071 set SCK1 (pin 21) to the input mode, and PDB017 sets SCK (pin 40) to the output mode. The communication line is thereby disconnected, and a single communication is completed.

★ The communication is takes place at a cycle between 10mS and 30mS. Nine bytes of data are transmitted at one time.

★ The handshake is done on a single line. Both PD0071 and PDB017 use a single port for both input and output. The output mode will be set only when the output is"L". Otherwise, it will be set to the input mode (high impedance). Also, before"L"is output, whether the SHAKE terminal is"H"is mutually checked. This is to prevent signal confusion between output signals.

★ The communication data is appended with a check code to prevent transfer errors. If sixteen consecutive transfer errors are detected, PDB017 will output the reset signal to PD0071 to reset it to the initial condition. This will also happen if the communication is not 300mS or longer.

6. 2 Mode Control Outline

Mode microcomputer (IC11 : PDB017)

The mode microcomputer performs the following :

1. Key data/remote control signal processing
   The key switch and remote control signals are received and processed for the specified keys.
2. FL display operation
   The FL tube display (VAW1010) is operated.
3. Screen display control
   The character generator IC(IC405 : M50554-132SP) is controlled and characters are superimposed on the screen. The blue back is also controlled.
4. Mechanism control micro computer control
   When operational instructions are given to the mechanism control microcomputer(IC801 : PD0071), the time data is read at the same time.
5. System reset management
   If there is any communication problems with the mechanism control microcomputer, the system reset will be activated to return the unit to the initial condition.

PIN No.	SYMBOL	I/O	DESCRIPTION
1	VDD	I	Power supply input (5V)
2			No connection
3			
4			
5			
6			
7	G1	O	FL lighting timing output "H": ON, "L": OFF
8	G2		
9	G3		
10	G4		
11	G5		
12	G6		
13	G7		
14	G8		
15	G9		
16	G10		
17	G11		
18	VDISP	I	FL display power supply input (−30V)
19	l	O	FL lighting segment output "H": ON, "L": OFF
20	k		
21	j		
22	i		
23	h		
24	g		
25	f		
26	e		
27	d		
28	c		
29	b		
30	a		
31	LAST MEMORY	O	LED lighting output. "H": ON, "L": OFF
32	CD DIRECT		

PIN No.	SYMBOL	I/O	DESCRIPTION
33	DOOR SW	I	Door switch input. "H": ON, "L": OFF
34	SYNC IN		Synchronized REC control input
35	SYNC OUT	O	Synchronized REC control output
36	POWER ON		Power ON/OFF "H": ON, "L": OFF
37	X RESET		PD0071 reset
38	X CS		M50554 select
39			No connection
40	X SCK	I/O	Serial data transfer clock
41	SI	I	Serial data input
42	SO	O	Serial data output
43	RESET	I	Reset input
44	SEL IR		Remote control unit input
45	SHAKE		Serial communication start request input
46			No connection
47			
48	ACK	O	Serial communication acceptance output
49	KS0	O	Key scan output "H": ON, "L": OFF
50	KS1		
51	KS2		
52	KS3		
53	KS4		
54	KS5		
55	KS6		
56	KIN0	I	Key data input "H": ON, "L": OFF
57	KIN1		
58	KIN2		
59	KIN3		
60	X2		No connection
61	X1		GND (Not used.)
62	Vss	-	GND
63	OSC2	I	Oscillator (6.0MHz)
64	OSC1	O	

6. 3 Mechanism Control Outline

1 Processing during power ON

After the power is turned ON, the mechanism control microcomputer (IC801 : PD0071) will execute the initialization in the following sequence upon reset cancellation (pin 28 : H→L).

1. The internal RAM and port are initialized.
2. HA11529NT is initialized.
3. CXD2500 is initialized.
4. The tray position is detected.
5. HD49403 is initialized.
6. Communications with PDB017 is checked.
7. The pickup position is initialized.
8. The disc rotation stops.
9. The loading mode is initialized.

After all of the above initializations are completed, normal operation will begin.

2 Loading motor control

The loading motor drive is controlled by the signals output (via the motor driver IC[IC802]) from pins 49 to 51 of the CONT section's mechanism control IC (IC801). The voltage applied to the loading motor is switched by the control signal as follows.

SLOW	CW	CCW	LOAD M+	LOAD M−	Motor Operation
L	L	L	.....	.....	.....
L	L	H	0V	5V	Low-speed CCW rotation
L	H	L	5V	0V	Low-speed CW rotation
L	H	H	0V	0V	Short brake mode
H	L	L	Open	Open	Motor both-ends open mode
H	L	H	0V	11V	High-speed CCW rotation
H	H	L	11V	0V	High-speed CW rotation
H	H	H	.....	.....	.....

CW: Clockwise direction CCW: Counterclockwise direction

• Loading/Clamp operation

For the disc tray opening and closing, disc clamp operation, and stop operation, the motor is operated while the cam gear position is detected by the loading/tilt position detection switch which is connected to pins 62 to 64 of IC801. The motor will operate in the high-speed mode. Even after the operation is completed, the loading/tilt position detection switch constantly monitors the cam gear position while the latter is in the standby position and in the tilt neutral position. If the cam gear position shifts, the motor will be operated in the low-speed mode.

• Tilt servo operation

When an LD disc or a CDV disc (video part) is played back, the loading motor will be used for the tilt servo. In this mode, the motor will be operated in the low-speed mode. The loading motor drive for the tilt servo will be PWM. There is two-stage duty (high-speed duty 50%, low-speed duty 8%). The tilt servo operates the loading motor so that the voltage of input pin 12 (TILT ERR) of IC801 becomes 2.5V. During normal playback, the tilt servo's operating range will be as follows :

CAV disc (12-inch) : Frames 0 - 40999
(8-inch) : Frames 0 - 16999
CLV disc (12-inch) : 0 min. - 44 min. 59 sec.
(8-inch) : 0 min. - 13 min. 59 sec.
CDV disc(video part) : 0 min. 0 sec. - 0 min. 59 sec.
(Recording time > 3 min.)

If there is a problem with the disc or the tilt sensor circuit and the pickup inclination is ± 2% or more and the TILT terminal's input voltage is still not within the set range, the status of the mechanical switch will be detected and the loading motor will be stopped.

• Slider motor control

The slider motor drive is controlled by the signal that is output from pin 18 of the FTS servo IC (IC601) via IC606. The voltage applied to the slider motor is switched by the control signal from the mechanism control IC (IC801).
When the pickup position is moved compulsorily during disc recognition and startup, the motor is operated while the pickup position is detected by the park switch connected to pins 33 and 34 of IC801.

PD0071 Pin Description

Pin No.	SYMBOL	I/O	Description
1	Vcc	-	Power supply connection (+5V)
2	SQ2	O	Analog audio switching signal output terminal. Digital audio is controlled by IC201(CXD2500Q). (*1)
3	SQ1		
4	N.C.		Unused
5	N.C.		
6	X DIGITAL	O	Digital/analog audio switching signal output terminal. This signal switches the signal which is output to LINE OUT and HEADPHONE. When "H", analog audio. When "L", digital audio. (*1)
7	XLDP		RF modulator switching signal output terminal.
8	XCX		Analog audio CX noise reduction switching signal output terminal.
9	LDON		Laser diode ON/OFF control signal output terminal. When "H" Laser diode ON. When "L" Laser diode OFF.
10	MUTE		Audio system mute control signal output terminal. When "L", MUTE OFF. When "H", MUTE ON.
11	NPC LATCH		Digital filter IC (IC202: SM5840AP) control latch signal output terminal.
12	TILT ERR	I	Tilt sensor output signal input terminal. (Analog signal) The signal which amplified the tilt sensor output by 40dB to 50dB is input (0V - 5V). This signal undergoes A-D conversion and becomes the control input for the tilt servo. The loading motor is controlled so that the TILT input signal becomes 2.5V.
13	GFS		CD (EFM signal) frame lock signal input terminal. (IC201: Connected to pin 12 of CXD2500Q) When "H", OK. When "L", NG.
14	XLAT2	O	IC201 CXD2500Q control latch signal output terminal.
15	SI2	I	IC201 CXD2500Q subcode data input terminal
16	SO2	O	IC201 CXD2500Q control data output terminal.
17	SCK2		IC201 CXD2500Q control/subcode reading clock signal output terminal.
18	SHAKE	I/O	Mode Control IC (IC11: PDB017) data transmission handshake signal terminal. This terminal is a bidirectional data line. It transmits the timing for the data transfer after the respective microcomputer switches between the output or input mode. (*2)
19	SI1	I	Mode Control IC data transmission data I/O terminal. SCK1(pin 21) will be set to the input mode when there is no communications with the Mode Control IC.
20	SO1	O	
21	SCK1	I/O	
22	T.CROSS	O	Tracking error zero cross signal input terminal. This signal monitors the tracking error signal. During track count search, this signal is counted and the slider motor is controlled.
23	SCOR	I	Subcode sync signal input terminal. When this signal is "H", the subcode signal is input from I201(CXD2500Q). The disc's playback status is also monitored through the existence or non-existence of the signal.
24	SENS		IC901(HD49403) SPDL servo status monitor signal input terminal.
25	XTBCHLD	O	During TBC servo jump, it is the correction signal output terminal. During a special playback of CAV disc, the signal becomes "L" when there is track jumping. After V sync and a fixed time period, it becomes "H".
26	V-Sync	I	Playback vertical synchronization signal input terminal for LD/CDV. The IC basically operates while in synchronization with this signal. (Trailing edge input) During a special playback mode for a CAV, the signal is the standard for producing the jump timing. It is "L" during vertical synchronization.
27	CNVss	-	GND.
28	XRESET	I	Reset signal input terminal. When "L", RESET. When "H", Normal operation.
29	XIN		9MHz clock oscillation input terminal.
30	XOUT	O	9MHz clock oscillation output terminal.
31	N.C.		Unused
32	Vss	-	GND.

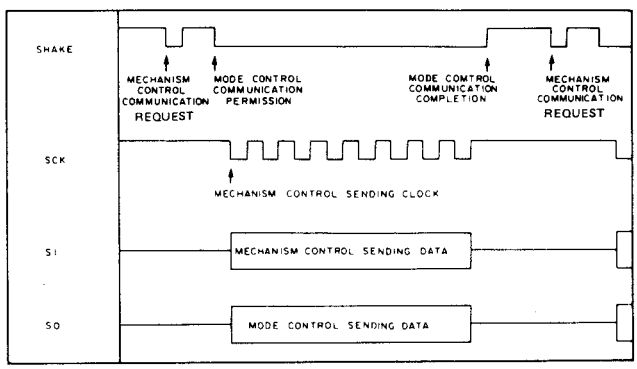
Pin No.	SYMBOL	I/O	Description
33	PARK2	I	The pickup position detection switch input terminals. Being a switch input for mechanism position detection, it detects the pickup's position. (*3)
34	PARK1		
35	FOCUS LOCK		Focus servo lock signal input terminal. It is used for focus servo lock detection. When "L", OK. When "H", NG.
36	1080/2080		Mechanism controller mode switching input terminal. When "H", CLD-1080.
37	FG		Spindle motor FG signal switching input terminal.
38	DATA		PHILIPS code decoder input terminal built-in in the mechanism controller.
39	Hsync		
40	Vsync		
41	CAV	O	CAV/CLV switching signal output terminal. (IC201: Connected to pin 17 of PA5010, it is used as the video NR switching signal.)
42	CLVSCAN		CLV V sync scan mode signal output terminal. When CLVSCAN is "L", SCANV(pin 44) is inserted to the video signal.
43	N.C.		Unused.
44	SCANV	O	Pseudo V sync signal output terminal for the CLV V sync scan.
45	XVSQ		Blue back switching signal output terminal for the video output. When "H", playback video. When "L", blue back.
46	XRFCORR		RF correction switching signal output terminal. (Connected to IC201 PA5010 pin 52.) "H" at the outer periphery of the CAV.
47	N.C.		Unused.
48	N.C.		
49	CCW	O	Loading/tilt motor rotational direction control signal output terminal. The motor's rotational direction and brake mode are selected by pins 49 and 50. Pin 49: counterclockwise. Pin 50: clockwise. (*4)
50	CW		
51	SLOW		Loading/tilt motor operation speed switching signal output terminal. When it is switched to the loading mode, high-speed operation will take effect. During tilt operation, low-speed operation will take effect. When, "L", low-speed. When "H", high-speed.
52	J. TRIG		Track jump signal output terminal.
53	FTSSCAN	I/O	Signal output terminal for tracking servo stabilization. Normally, it will be HI-Z in the input mode.
54	TOFF	O	Tracking servo operation control signal output terminal. This signal backs up the ON/OFF of the tracking servo operation. When "L", ON. When "H", OFF.
55	CD MODE		Servo equalizer switching signal output terminal. This is switched according to the disc to be played. (*5)
56	XLD MODE		
57	S03		Serial signal output terminal for the FTS servo IC(IC601: HA11529), the SPDL/TBC servo IC(IC901:HD49403), and the digital filter IC(IC202: SM5840AP). The serial signals of these three ICs are the same. They are distinguished by pin 11 (NPCLAT) and pin 59 (LATCH3).
58	SCLK3		
59	LATCH3		Latch signal output terminal for the FTS servo and the SPDL servo.
60	N.C.		Unused.
61	N.C.		
62	SW1	I	Loading/tilt position detection switch input terminals.
63	SW2		
64	SW3		

*1

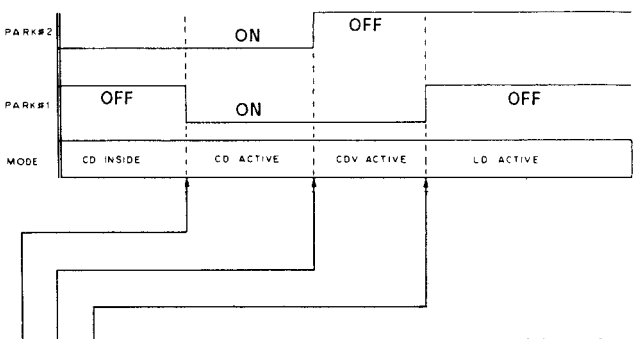
DIGITAL Pin 6	SQ1 Pin 3	SQ2 Pin 2	L-Ch Line Out	R-Ch Line Out
H	L	L	Analog L Channel	Analog R Channel
H	H	L	Analog L Channel	Analog L Channel
H	L	H	Analog R Channel	Analog R Channel
H	H	H	Mute	Mute
L	L	L	Digital L Channel	Digital R Channel
			Digital L Channel	Digital L Channel
			Digital R Channel	Digital R Channel
			Digital –12dB-L	Digital –12dB-R

CXD2500 switching the digital audio channel by commands from microcomputer.

*2



*3



LD-inside position: Indicating the start of the active program area of an LD disc (R55 – R56.4)

CDV-inside position: Indicating the start of the video part of a CDV disc. (R37 – R38.4)

CD-inside position: Indicating the start of the active program of a CD disc. (R25 – R26.4)

R: The distance from center of the spindle motor.

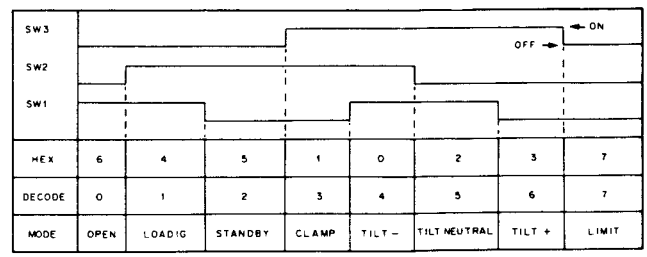
*4

CW	CCW	Loading/Tilt Motor Operation
L	L	Motor both-ends release (open mode)
L	H	Loading-out direction rotation
H	L	Loading-in direction rotation
H	H	Motor both-ends short-circuit (short-circuit mode)

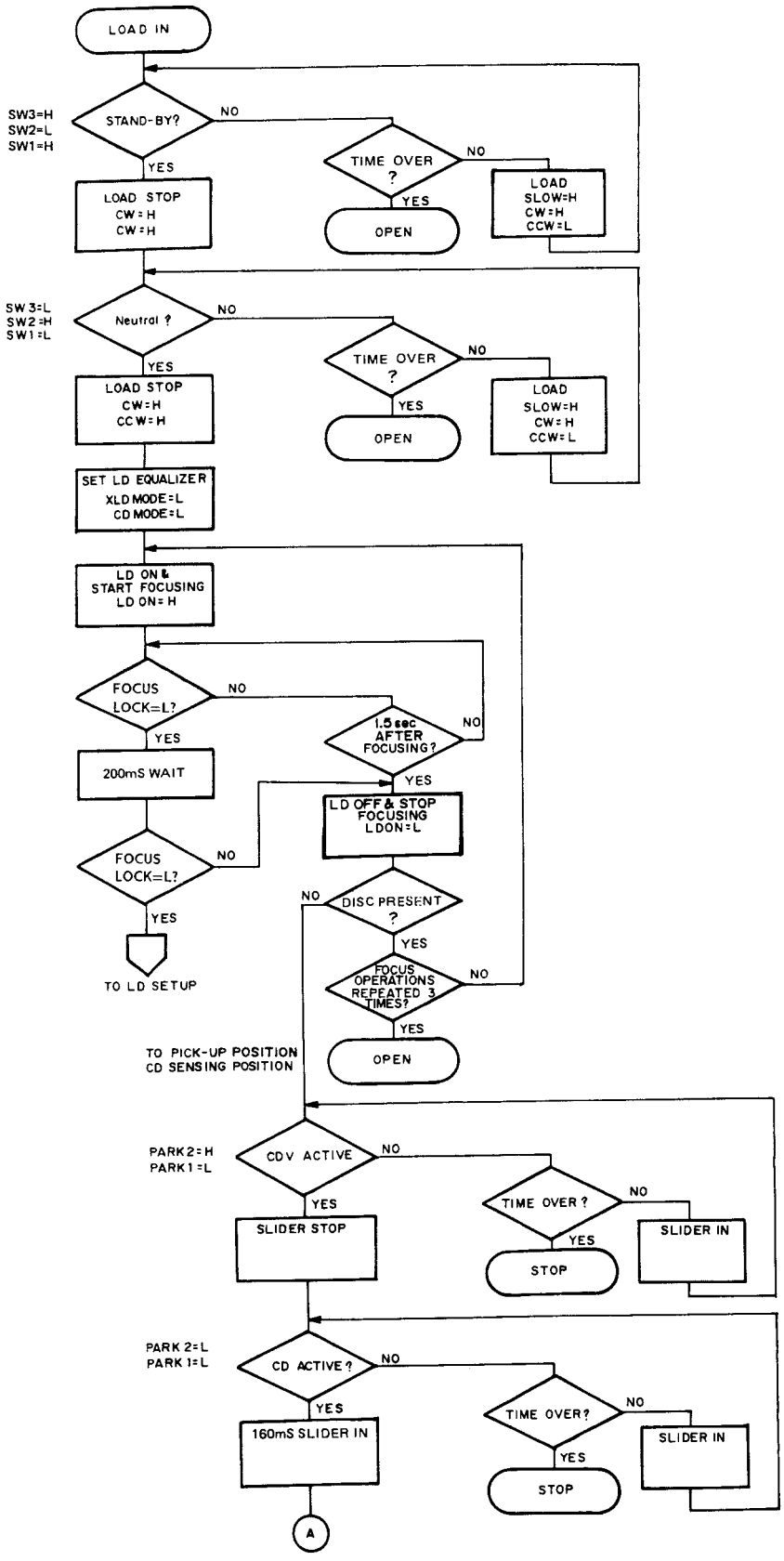
*5

CDMODE	XLDMODE	Disc Mode
L	L	LD
L	H	CDV Video part
H	L	Not defined
H	H	CD/CDV Audio part

*6



• Flowchart from tray open status to tray in operation



- From open status till tray-in operation is completed

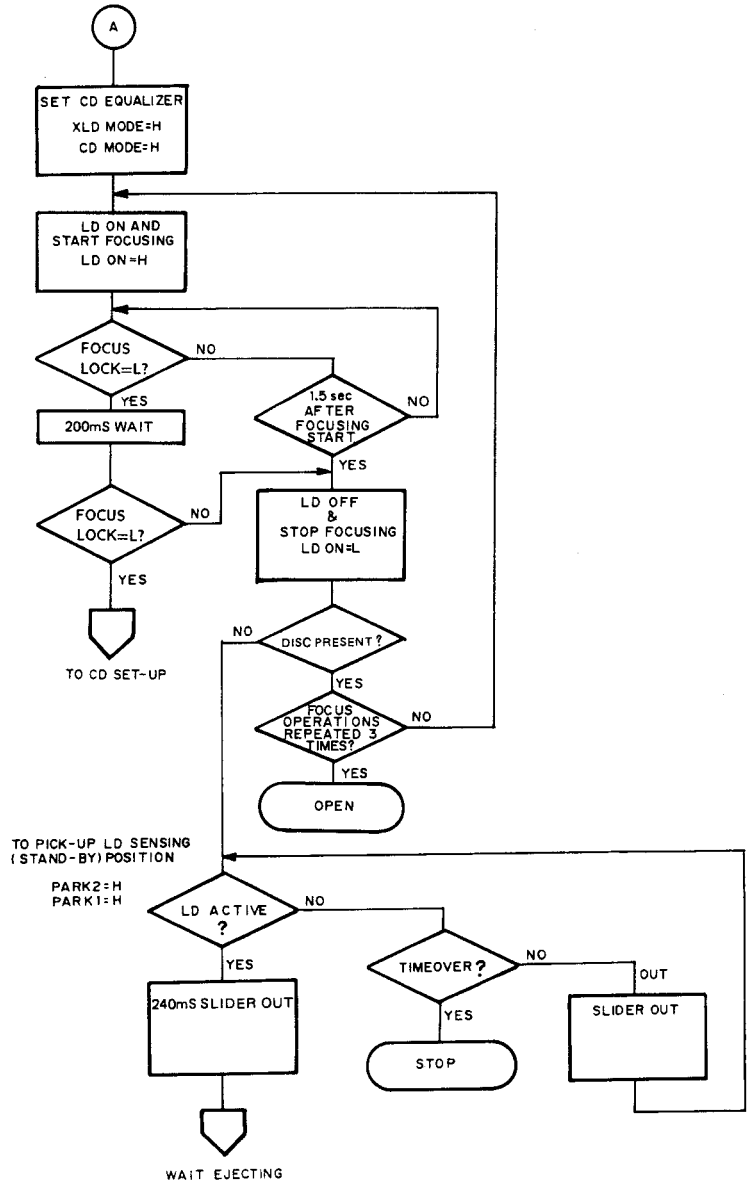
- If the loading operation is not finished within 10 seconds, it is regarded as abnormal and the tray is opened again

- Clamping

- Pick-up position during LD focus operation: around R65
  R: The distance from center of the spindle motor.

- **During focus sweep operation, when FOCUS LOCK goes "L", it is regarded that a disc is present.**
- With a disc present, if the focus lock is not obtained after sweeping the focus three times, it is regarded as abnormal and opens the tray.
- Slider operation limit timer: about 10 seconds

- If the slider operation is not finished within a fixed time, the player enters the stop mode and no key inputs other than OPEN key are accepted.

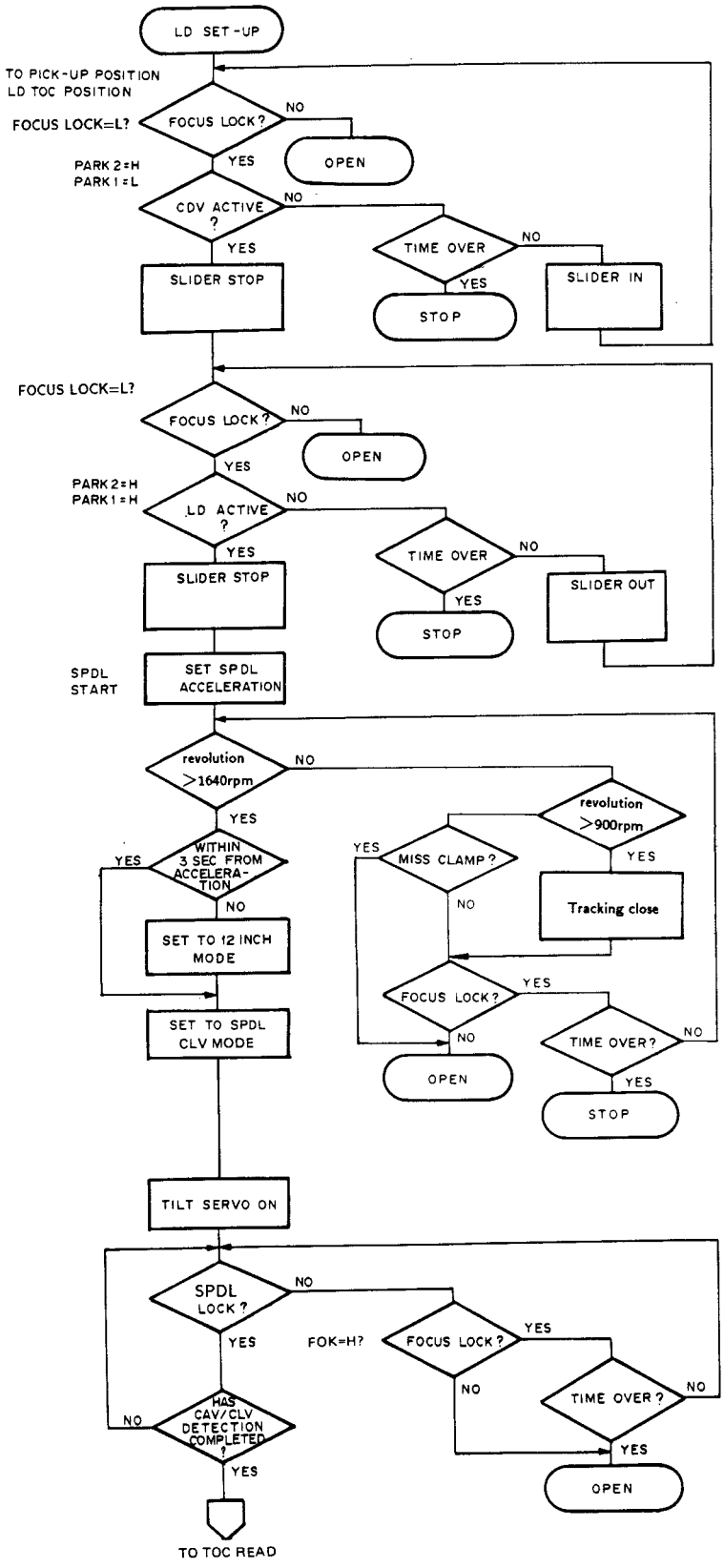


- Pick-up position during CD focus operation: around R30
- CD focus operation is performed in the same way as that for LDs.
  R: The distance from center of the spindle motor.

- LD sense position: around R65
  R: The distance from center of the spindle motor.

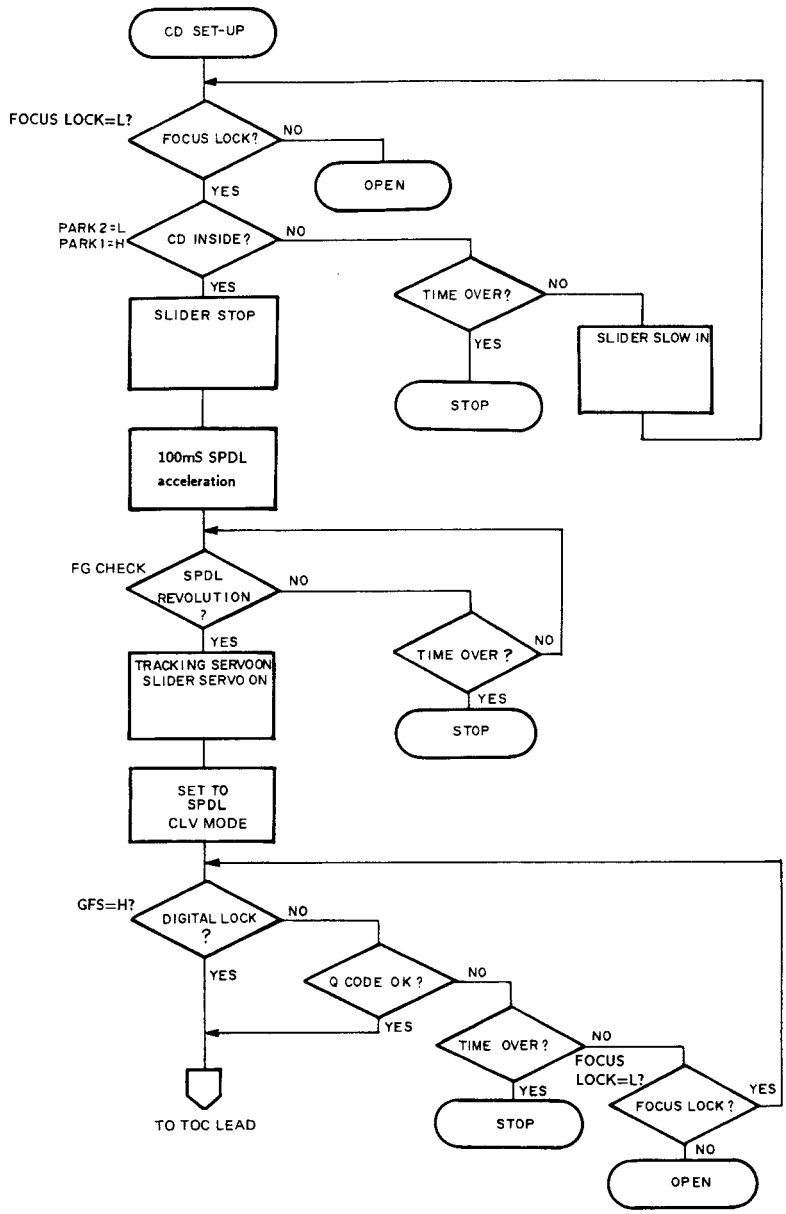
- Timer: about 10 seconds.
  Timer → The TIME OVER time mentioned on the left.

• Flowchart of LD Setup



- When the focus is unlocked while the pick-up is moving to the spindle motor start position, it is judged that LD and CD discs have been loadded simultaneously and the tray is opened.
- Timer : about 10 seconds
  Timer → The TIME OVER time mentioned on the left.
- Timer : about 10 seconds
- **Until the disc rotation speed exceeds 900 rpm, the tracking servo is set to the open mode and spindle motor is forced acceleration.**
- **When the pick-up moves across more than 1600 rpm tracks in one revolution of the disc, it is judged as mis-clamping and the tray is opened.**
- If the focus is unlocked during setup operation, it is judged that there is a scratch on the disc or that the unrecorded surface of the single-side disc is being played, and the tray is opened.
- **When the disc rotation speed does not exceed 1640 rpm within 60 seconds after the spindle motor starts accelerating, the player enters the stop mode.**

• Flowchart of CD Setup

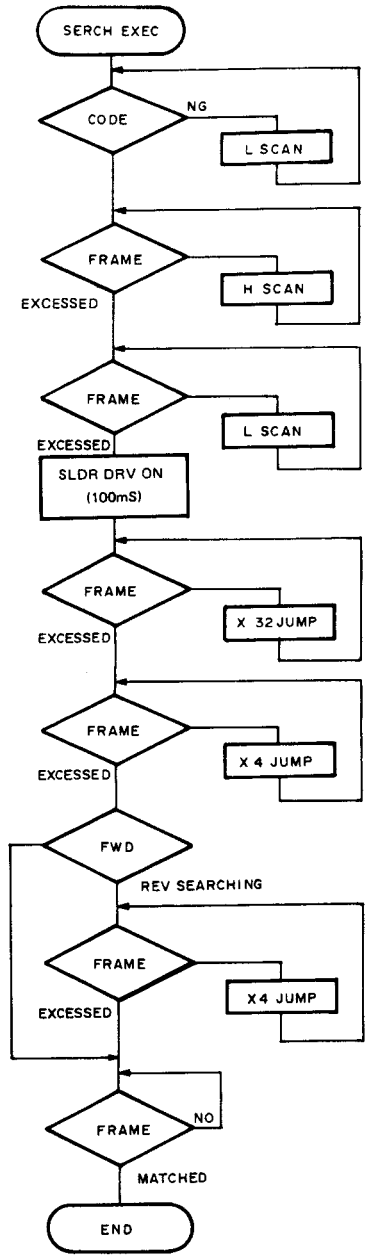


- When the pick-up is fed to the inside of the disc (CD), the disc speed is lowered by driving the slider motor in PWM drive.
- **When a CD is loaded, the spindle motor is accelerated for 100 mS forcibly.**

- When the FG input signal is not inverted 6 times within 2 seconds, the player enters the stop mode.

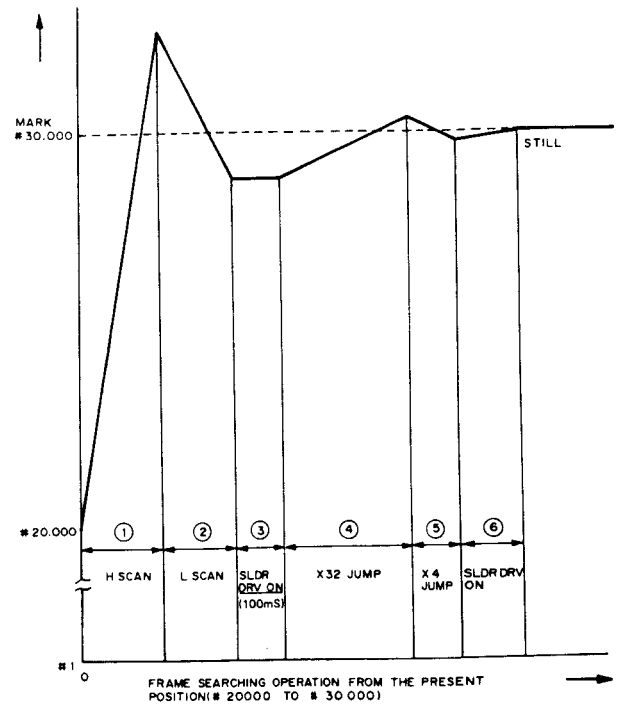
- When the digital lock or Q-code OK signal is not detected within 2 seconds after the tracking/slider servo is closed, the player enters the stop mode.
- If the focus is unlocked during disc rotation, it is judged that the unrecorded surface of the disc has been placed on the tray, and the tray is opened.

• Flowchart of Frame Search Operation



SET TO THE LOW SPEED SCANNING MODE WHEN CODE READING IS NOT POSSIBLE (BACK UP)

- Slider motor drive duty : 1/8
- Slider motor drive duty : 100%
- Slider motor drive duty : 1/8
- Waiting for 100 mS (tracking/ slider servo ON)
- 32-track jump
- 4-track jump
- 4-track jump (Reverse search only)



FRAME SEARCH OPERATION