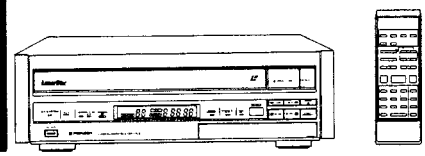
PIONEER®
The future of sound and vision.

Service Manual



ORDER NO.
ARP1420

LASERVISION PLAYER

LD-S1

MODEL LD-S1 COMES IN TWO VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Power requirement	Destination
KU	AC120V only	U.S.A.
CA	AC120V only	Canada

- **This service manual is applicable to the KU and CA types.**

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

1. SPECIFICATIONS

1. General

System .....LaserVision VideoDisc player
Spindle motor speed
Standard play disc .....1,800 RPM
Extended play disc .....1,800 RPM
(inner circumference)
to 600 RPM (outer circumference)
(when using 12-inch disc)
Power requirements .....AC 120 V, 50/60 Hz
Power consumption .....55 W
Dimensions .....457(W) X 468(D) X 136(H) mm
17-15/16(W) X 18-3/8(D) X 5-3/8(H) in
Net weight (without package) .....16.8 kg
Operating temperature .....+5°C to +35°C
(41°F to 95°F)
Operating humidity .....5% to 90%
(There should be no moisture condensation)

2. Disc

LaserVision Videodisc
*Maximum playing time
12-inch standard play disc .....1 hour/both sides
12-inch extended play disc .....2 hour/both sides
8-inch standard play disc .....28 min/both sides
8-inch extended play disc .....40 min/both sides
Actual playback time differs for each disc.

3. Video characteristics

Format .....NTSC specifications
Video output
Level .....1 Vp-p nominal, sync. negative, terminated
Impedance .....75 Ω unbalanced
Output terminals .....2 pin jack terminals

4. Audio characteristics

Digital sound output level .....200 mVrms
(1 kHz, -20 dB)
Analog sound output level .....200 mVrms
(1 kHz, 40%)

Digital sound properties

Frequency properties	4 Hz - 20 kHz (±0.5 dB)
S/N ratio	105 dB
Dynamic range	97 dB
Channel separation	100 dB
Total harmonic distortion	0.0035%

Output terminal .....Pin jacks

5. Functions

Functions controlled by player buttons and dials
- Disc table Open/Close
- Play
- Pause
- Chapter skip forward and reverse
- Scan forward/reverse
- Starting Last Memory playback
- Display ON/OFF switch(FL Display)
- Color Screen (blue/black) switch
- Digital Memory ON/OFF switch
- Picture adjustment

Remote control unit functions

Functions	Standard Play (CAV) Disc	Extended Play (CLV) Disc
PLAY	YES	YES
EJECT	YES	YES
CX SYSTEM SELECTION	YES*(1)	YES*(1)
ANALOG AUDIO CHANNEL SELECTION (Stereo, 1/L, 2/R)	YES	YES
DIGITAL/ANALOG AUDIO SELECTION	YES*(2)	YES*(2)
PAUSE	YES	YES
SCAN (Forward, Reverse)	YES	YES
STILL/STEP (Forward, Reverse)	YES	YES
CHAPTER SKIP (Forward, Reverse)	YES*(3)	YES*(3)
MULTI-SPEED PLAY (Forward/reverse 9 steps)	YES	YES
STILL WITH SOUND PLAYBACK	YES	YES
STROBE MOTION PLAYBACK	YES	YES
A-B REPEAT	YES	YES
MEMORY REPEAT	YES	YES
CHAPTER REPEAT	YES*(3)	YES*(3)
SIDE REPEAT	YES	YES
MULTI-SPEED DISPLAY	YES	YES
FRAME NUMBER DISPLAY	YES	NO
TIME NUMBER DISPLAY	NO	YES
CHAPTER NUMBER DISPLAY	YES*(3)	YES*(3)
FRAME NUMBER SEARCH	YES	NO
TIME NUMBER SEARCH	NO	YES
CHAPTER NUMBER SEARCH	YES*(3)	YES*(3)
CHAPTER PROGRAM PLAY	YES*(3)	YES*(3)

NOTE:
1. *Effective when using LaserVision discs with the CX mark.*
2. *For playback of LaserVision with Digital Sound Disc*
3. *Only for discs recorded with chapter codes.*

2. PANEL FACILITIES

REAR PANEL

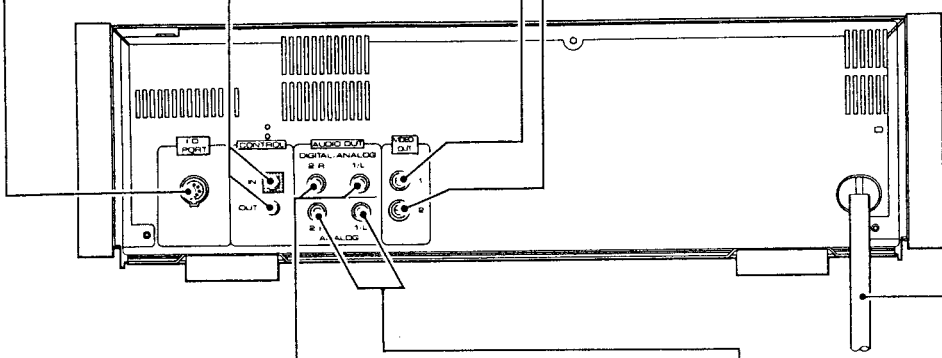
CONTROL IN and OUT terminals (miniature phone jack)
These terminals are for communication of control codes, when the player is used together with other Pioneer products with the Pioneer SR mark.

I/O PORT (U-shaped 8-pin DIN connector)
This is the input/output port used when performing external control of the player.

VIDEO OUT 1 terminal (Pin jack)
Connect this jack to a TV monitor or a TV set which is provided with a video input terminal.

VIDEO OUT 2 terminal (Pin jack)
Connect this jack to a second TV monitor.

Power cord
Connect this to a power outlet.



DIGITAL/ANALOG AUDIO OUTPUT terminals (Pin jacks)
Connect these jacks to the stereo amplifier.
- When playing discs with digital SOUND mark: Digital or analog sound can be output. (The mode is selected by the AUTO DIGITAL/ANALOG key on the remote control unit.)
- When playing discs without digital SOUND mark: Analog sound will be output.

ANALOG AUDIO OUT terminals (Pin jacks)
Connect these jacks to the stereo amplifier. Analog sound will be output.

AUDIO OUTPUT TERMINALS
This player includes two sets of audio output terminals. During normal use, connect the DIGITAL/ANALOG AUDIO OUT terminals with the amplifier.
The ANALOG AUDIO OUT terminals have been included for increasing the possible uses of the player. There is no need to connect them during normal use.

FRONT PANEL

POWER button
Press this button to turn power to the player ON or OFF.

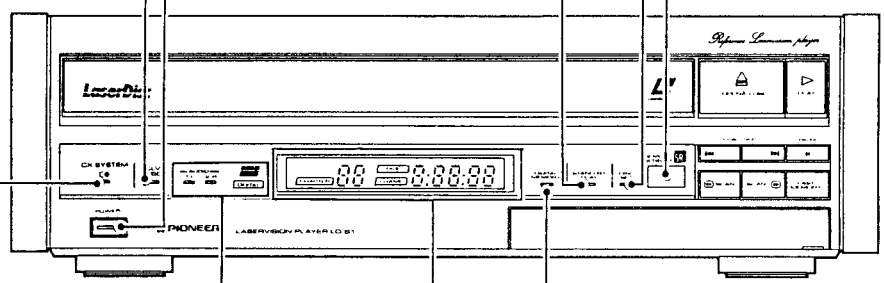
EXTENDED PLAY (CLV) DISC indicator
This lights up when an extended play (CLV) disc is being played.

CX SYSTEM indicator
Lights when the internal CX noise reduction system is operating.

STAND-BY/PLAY indicator
- At the beginning of playback or during a search operation, the indicator flashes until the picture appears (STAND-BY).
- Lights during playback in the play mode (PLAY).

DISC SET indicator
Lights during the disc has been set in the player.

REMOTE SENSOR



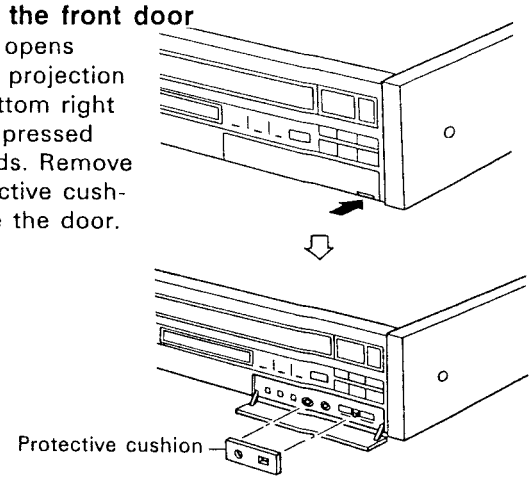
AUDIO Indicator
- 1/L, 2/R — indicates audio channels during output.
- DIGITAL — lights when the digital sound of a digital sound disc is being output.

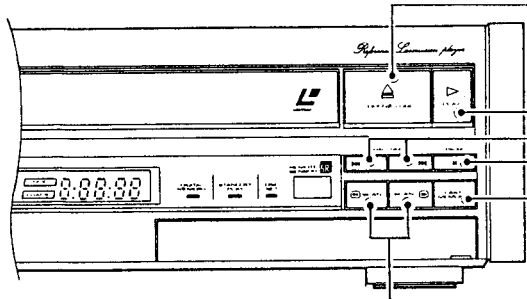
DIGITAL MEMORY Indicator
This indicator lights when pictures that have travelled through the digital memory circuit (switchable with the DIGITAL MEMORY button) are being output.

CHAPTER/FRAME•TIME Display
The display indicates chapter and frame numbers (standard play discs) or time numbers (extended play discs).

NOTE:
When discs without chapter numbers are played back, CHAPTER and chapter numbers are not displayed.

Opening the front door
The door opens when the projection in the bottom right corner is pressed downwards. Remove the protective cushion inside the door.





OPEN/CLOSE button
This opens and closes the disc table.
When this button is pushed after the disc is loaded, the disc table will close and playback will start.
If this button is pushed during playback, playback will stop and the disc table will open.

PLAY button
Press the PLAY button in the following situations.
- To start playback when the disc is not rotating.
- To return to PLAY mode from a mode other than PLAY (pause, still frame, etc.)
- To start chapter program play.

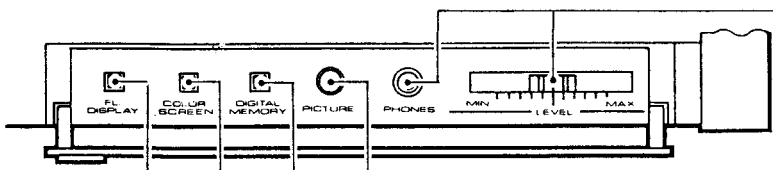
SCAN buttons
If one of these buttons is pressed during playback, the video image will be speeded up only while the button is pressed down.
⏩ — For fast forward scan
⏪ — For fast backward scan
There are two scanning speeds. The scanning speed will be slower in the beginning when the button is pressed. However, when the button is held down long enough, scanning speed will increase.

CHAP. SKIP button
This button is used to skip to the beginning of a chapter.
⏭ : Skip to the beginning of the next chapter
⏮ : Returns to the beginning of the chapter being played back

LAST MEMORY button

PAUSE button
When this is pressed, playback is temporarily interrupted. When pressed again, playback resumes from the point where it stopped.

[IN THE FRONT DOOR]



PHONES jack and LEVEL control
Headphones equipped with a stereo miniature phone plug can be plugged in here, for headphones enjoyment of playback sound. (The sound is the same as from the DIGITAL/ANALOG output terminals).
Please use headphones with an impedance of 8 Ω or more.

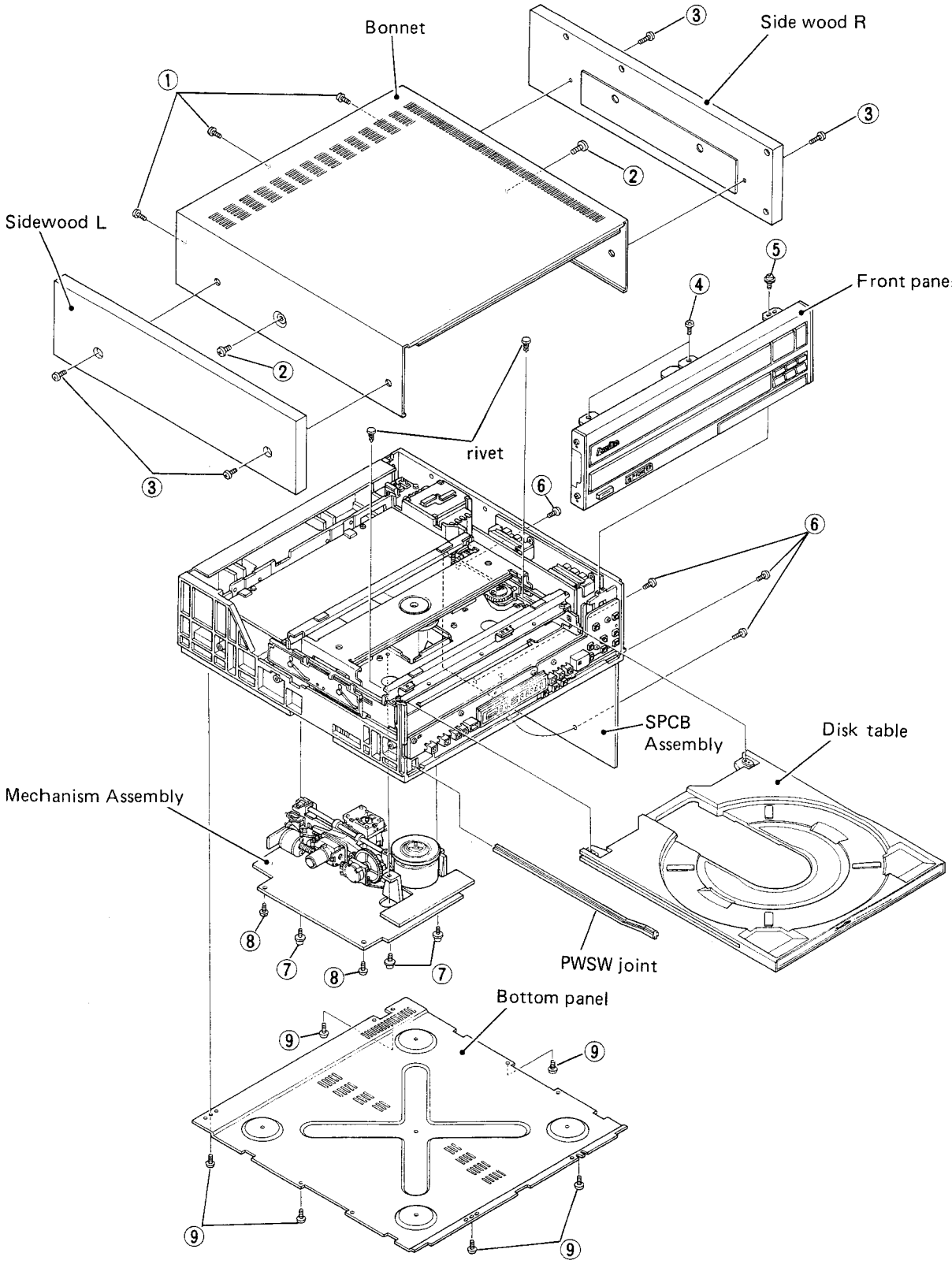
FL DISPLAY button
Press this button to cancel frame and time indications from the chapter, frame/time display to leave chapter indication. (When discs without chapter encoded are played back, no information is displayed). Normal display can be restored by pressing the button again.

PICTURE Dial

COLOR SCREEN button

DIGITAL MEMORY button

3. DISASSEMBLY



Bonnet assembly

- Remove the two screws ③ for each sidewood L and R.
- Remove the three screws ① and the two screws ②.

Bottom panel assembly

Remove the six screws (9).

PWSW joint

- Remove the stopper screw for the PWSB assembly. Move the PWSB assembly slightly and pull out the PWSW joint.

SPCB assembly

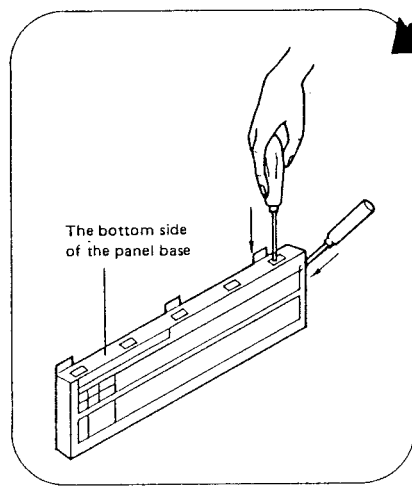
- Remove four screws ⑥ and open SPCB assembly.

Mechanism assembly

- Remove the connector for the SRVB assembly.
- Remove three screws ⑦ on mechanism assembly and two screws ⑧ on SRVB assembly.

Disc table (Carry assembly)

- Set the power switch to ON and press the disc key and remove the disc table.
- Remove the two rivets.



Front panel

- Remove two screws ④ and screw ⑤.

Chapter button assembly, skip button assembly

- Remove two screws at the rear of the front section.

Aluminum panel assembly

Remove the five hooks at the bottom of the panel base. (These hooks can be removed easily by inserting a screw driver between the panel base and the aluminum panel.

- Remove three hooks at the center of the panel base.
- Remove six hooks on the top section of the panel base.

Pocket assembly

- Open the pocket assembly and pull it toward you.

PLAY button assembly, Front button assembly

- Remove the hooks on the PLAY button assembly through the back of the panel base. At the same time, the front door assembly can also be removed.

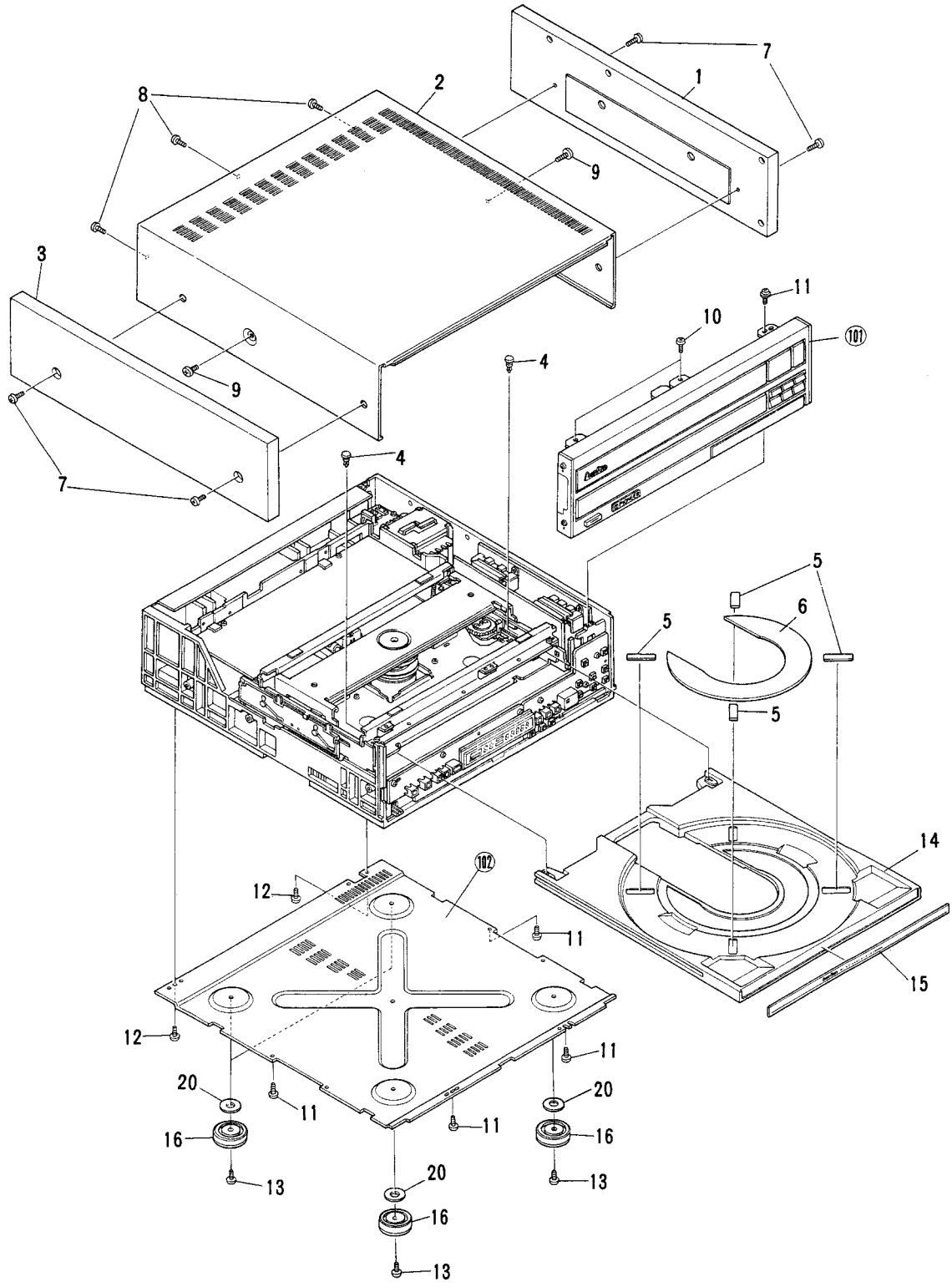
Display acrylic, Display panel, Pocket nameplate

- Remove the dual-side tape by pushing it out from the back of the panel base.

Note: Refer to the disassembly illustration of the front panel.

4. EXPLODED VIEWS AND PARTS LIST

4.1 EXTERNAL TOP VIEWS



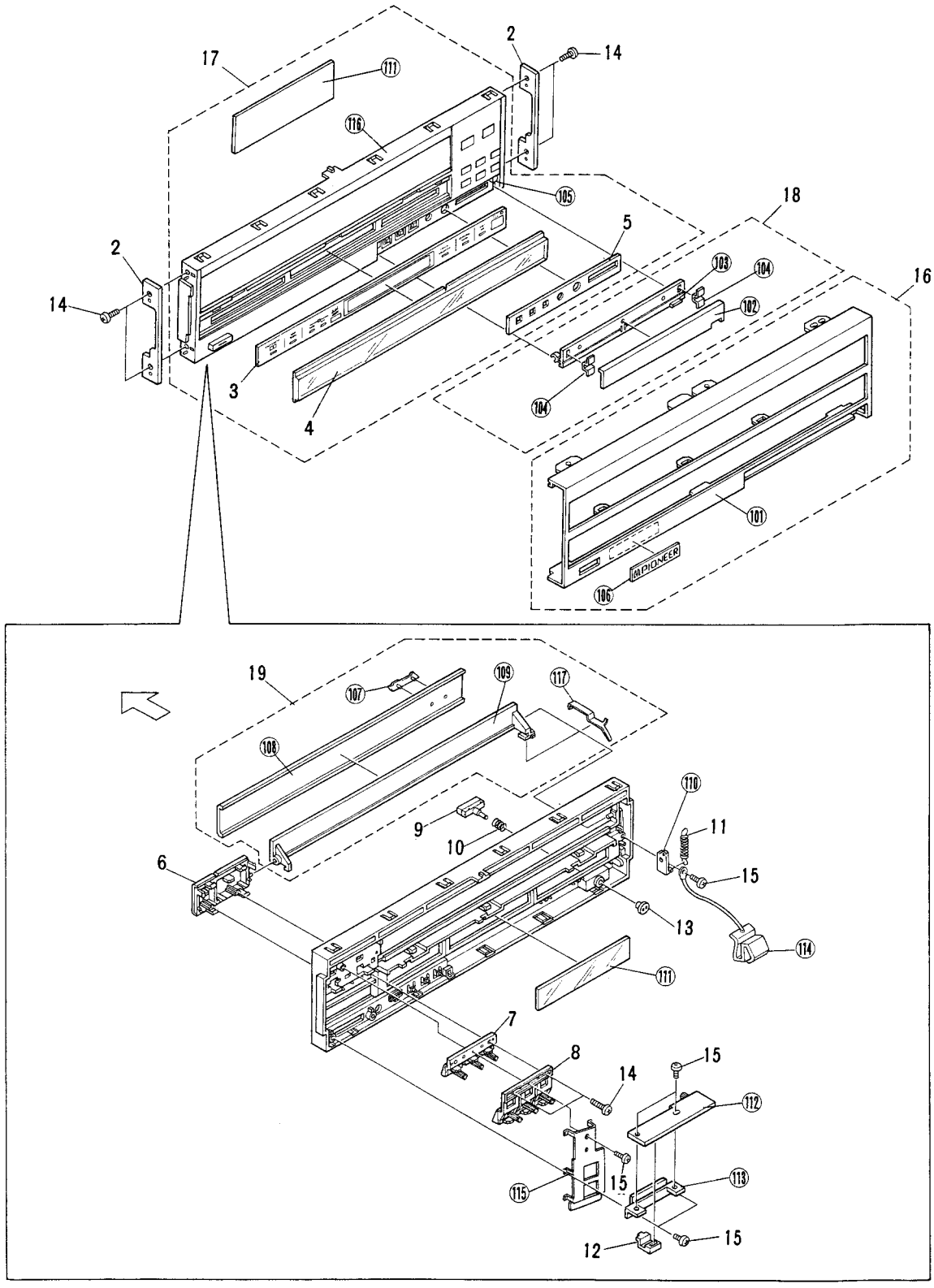
NOTES:

- *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.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

Parts List

Mark	No.	Part No.	Description
	1.	VAP1002	Side wood (R)
	2.	VNA1004	Bonnet
	3.	VAP1001	Side wood (L)
	4.	VEC-261	Plastic rivet
	5.	VEC-273	Disc pad
	6.	VAH1021	Display panel
	7.	VBA1001	Display screw
	8.	BBT30P060FCC	Screw
	9.	BPZ40P100FZK	Screw
	10.	BBZ30P050FCC	Screw
	11.	BPZ30P080FCU	Screw
	12.	BBT30P050FCC	Screw
	13.	BBZ30P120FCC	Screw
	14.	VXA1019	Caddy assembly
	15.	VAH1022	Name plate
	16.	PXB-491	Foot assembly
	17.	.....	.....
	18.	.....	.....
	19.	.....	.....
	20.	VBE1001	Washer
	101.		Front panel
	102.		Bottom board assembly

4.2 FRONT PANEL

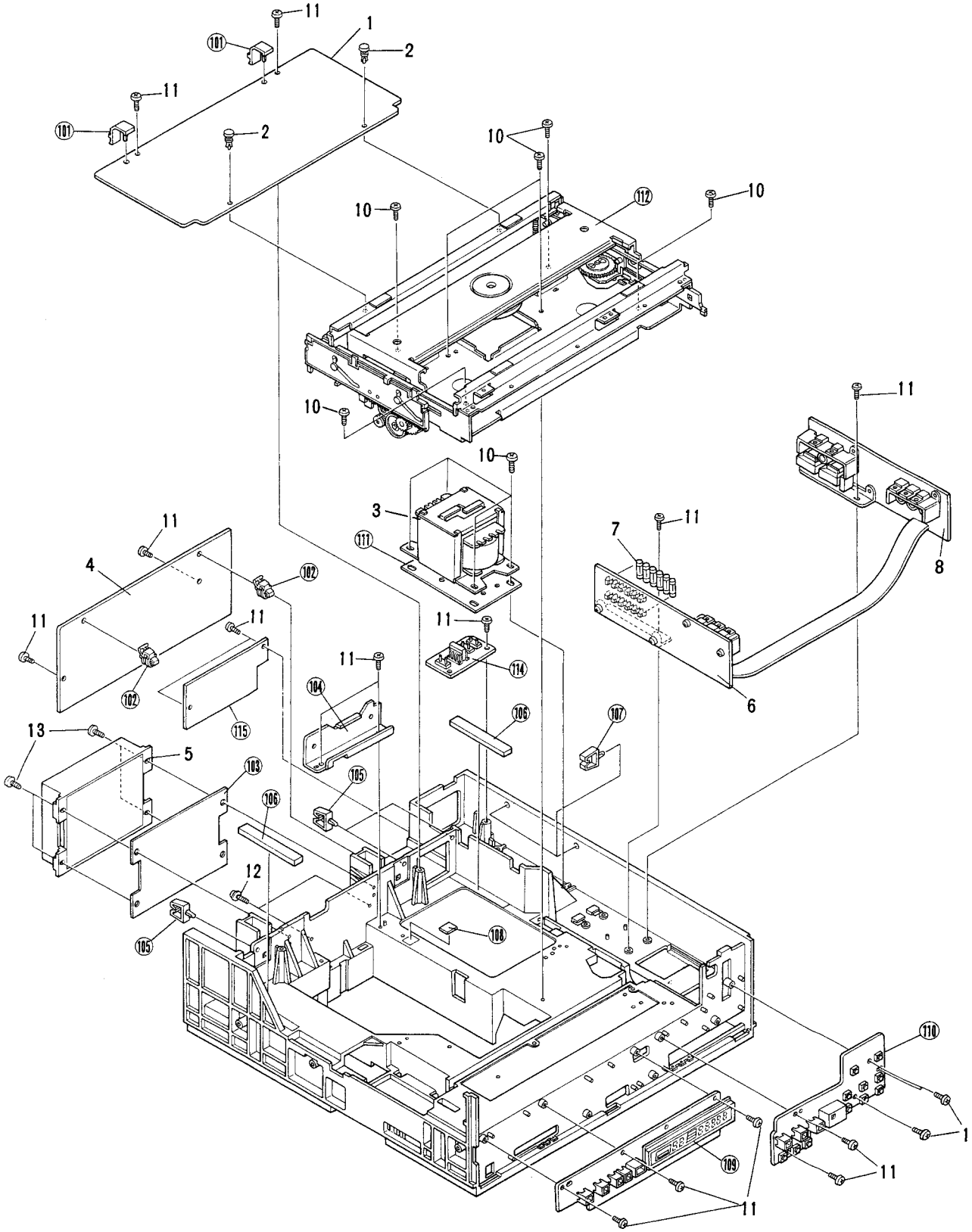


Parts List

Mark	No.	Part No.	Description
	1.		.....
	2.	VAH1024	Gold panel
	3.	VNK1017	Display panel
	4.	VNK1019	Acrylic display
	5.	VNK1088	Pocket plate
	6.	VXA1068	Play button assembly
	7.	VXA1022	Chapter button assembly
	8.	VXA1023	Scan button assembly
	9.	VAC1007	Power knob
	10.	VBH1015	Power spring
	11.	VBH1012	Door spring
	12.	VAC1002	Volume knob
	13.	VNL1044	Stopper A
	14.	BPZ30P080FCU	Screw
	15.	BPZ30P060FCU	Screw
	16.	VXX1054	Aluminum panel assembly
	17.	VXX1048	Panel base assembly
	18.	VXX1023	Pocket assembly
	19.	VXX1033	Front door assembly

Mark	No.	Part No.	Description
	101.		Aluminum panel
	102.		Pocket cover
	103.		Pocket
	104.		Adhere plate
	105.		Magnetic part
	106.		Name plate
	107.		Laser disc badge
	108.		Door panel
	109.		Front door
	110.		Door switch base
	111.		FL filter
	112.		HEPB assembly
	113.		Slide rail
	114.		Earth plate (A)
	115.		Earth plate (B)
	116.		Panel base
	117.		Earth plate (C)

4.3 TOP VIEW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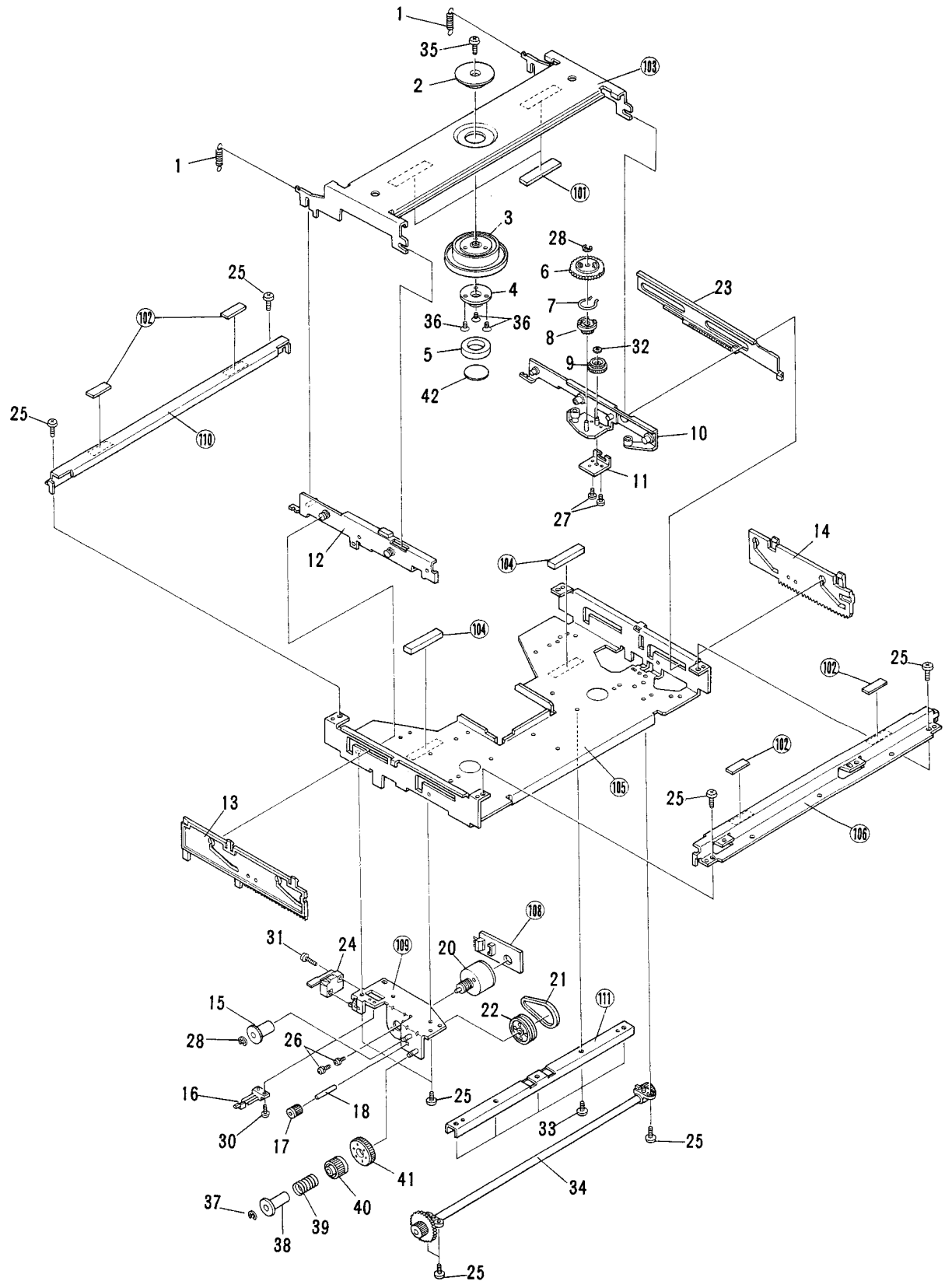
Parts List

Mark	No.	Part No.	Description
	1.	VWV1023	VMRB assembly
	2.	VEC-143	Plastic rivet
⚠	★ 3.	VTT1018	Power transformer (B)
	4.	VWV1002	VDEM assembly
⚠	★ 5.	VTT1017	Power transformer (A)
	6.	VYR1006	DRVA assembly
⚠	★★ 7.	VEK-018	Fuse (3A) (FU1—FU6)
	8.	VYR1007	DRVB assembly
	9.		. . . . .
	10.	APZ30P080FCU	Screw
	11.	BPZ30P080FCU	Screw
	12.	PMA30P060FMC	Screw
	13.	BPZ40P160FCU	Screw

Mark	No.	Part No.	Description
	101.		PCB hinge
	102.		PC support
	103.		Power transformer sheet (B)
	104.		Chassis holder
	105.		Wire clip (B)
	106.		Caddy cushion (A)
	107.		Wire clip (A)
	108.		Caddy cushion (B)
	109.		KEYA assembly
	110.		KEYB assembly
	111.		Power transformer sheet
	112.		Loading assembly
	113.		. . . . .
	114.		LSFB assembly
	115.		REGB assembly

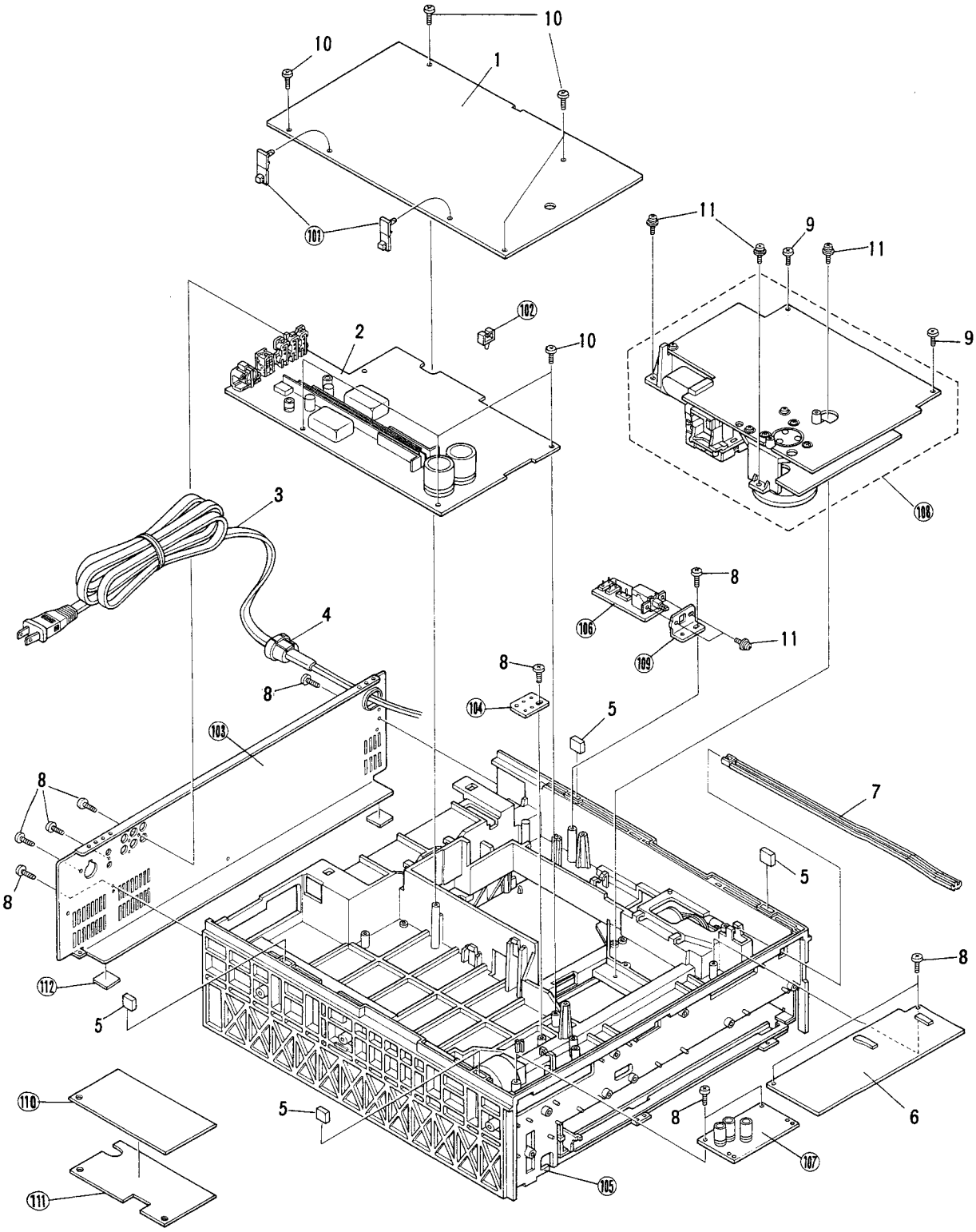
4.4 LOADING ASSEMBLY



Parts List

Mark	No.	Part No.	Description
	1.	VBH1003	Clamper spring
	2.	VNL1001	Clamper head
	3.	VNL1003	Clamper
	4.	VLL1002	Yoke
	5.	VEB1001	Rubber foot
	6.	VNL1013	Gear (E)
	7.	VBH1005	Gear spring (E)
	8.	VNL1023	Pinion (E)
	9.	VNL1012	Gear (D)
	10.	VXA1058	Roller plate (R) assembly
	11.	VNE1040	Rack holder
	12.	VXA1026	Roller plate (L) assembly
	13.	VNL1052	Rack gear (L)
	14.	VNL-490	Rack gear (R)
	15.	VNL1047	Gear (C)
★★	16.	PSN-003	Leaf switch (Table position)
	17.	VNL1020	Gear (A)
	18.	VLL1037	Gear (A) shaft
	19.		.....
★★	20.	VXM1005	Loading motor
	21.	VEB-125	Synchronized belt L
	22.	VNL1051	Motor pulley
	23.	VNL1035	Rack
★★	24.	VSK-010	Slide switch (Disc clamp)
	25.	BBZ30P060FCC	Screw
	26.	PMB26P040FMC	Screw
	27.	BBZ20P040FMC	Screw
	28.	YE30FUC	E ring ϕ3
	29.		.....
	30.	PMZ20P050FMC	Screw
	31.	BMZ20P080FMC	Screw
	32.	WT36D072D025	Washer
	33.	BBZ26P050FMC	Screw
	34.	VXA1047	Synchronized gear assembly
	35.	APZ30P080FCU	Screw
	36.	CMZ26P040FMC	Screw
	37.	YE20FUC	E ring ϕ2
	38.	VLL1033	W gear shaft holder
	39.	VBH1014	W gear spring
	40.	VNL1046	W gear (B)
	41.	VNL1045	W gear (A)
	42.	VEC1030	Magnetic seal
	101.		Cushion
	102.		Cushion
	103.		Clamper holder
	104.		Cushion (B)
	105.		Sub chassis
	106.		Bridge (A)
	107.		.....
	108.		LMCB assembly
	109.		M holder assembly
	110.		Bridge (B)
	111.		Shaft guide

4.5 BOTTOM VIEW

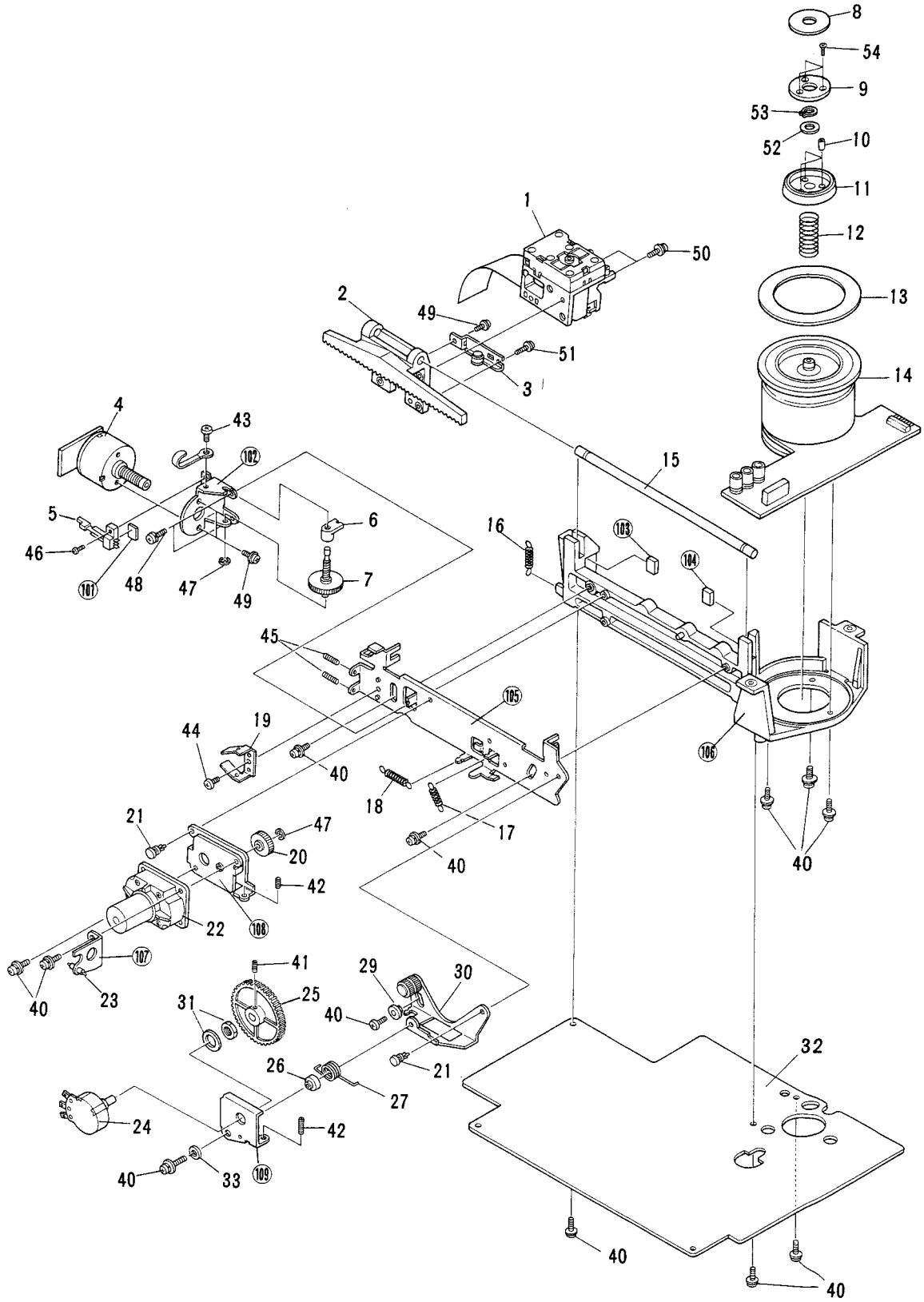


Parts List

Mark	No.	Part No.	Description
	1.	VWS1009	SPCB assembly
	2.	VWV1025	ADEM assembly
⚠	3.	VDG1006	Power cord
	4.	CM-22C	Strain relief
	5.	VEB1001	Rubber foot
	6.	VWV1024	DCRB assembly
	7.	VNK1029	PWSB joint
	8.	BPZ30P080FCC	Screw
	9.	PMB30P080FCC	Screw
	10.	BPZ30P080FCC	Screw
	11.	PMB30P080FCU	Screw

Mark	No.	Part No.	Description
	101.		PCB hinge
	102.		Wire clip (A)
	103.		Rear panel assembly
	104.		Earth plate
	105.		Base
	106.		PWSB assembly
	107.		DRVC assembly
	108.		Mech. assembly
	109.		PWSB base
	110.		ADEM sheet
	111.		Power transformer spacer
	112.		Dump sheet (E)

4.6 MECHANICAL ASSEMBLY

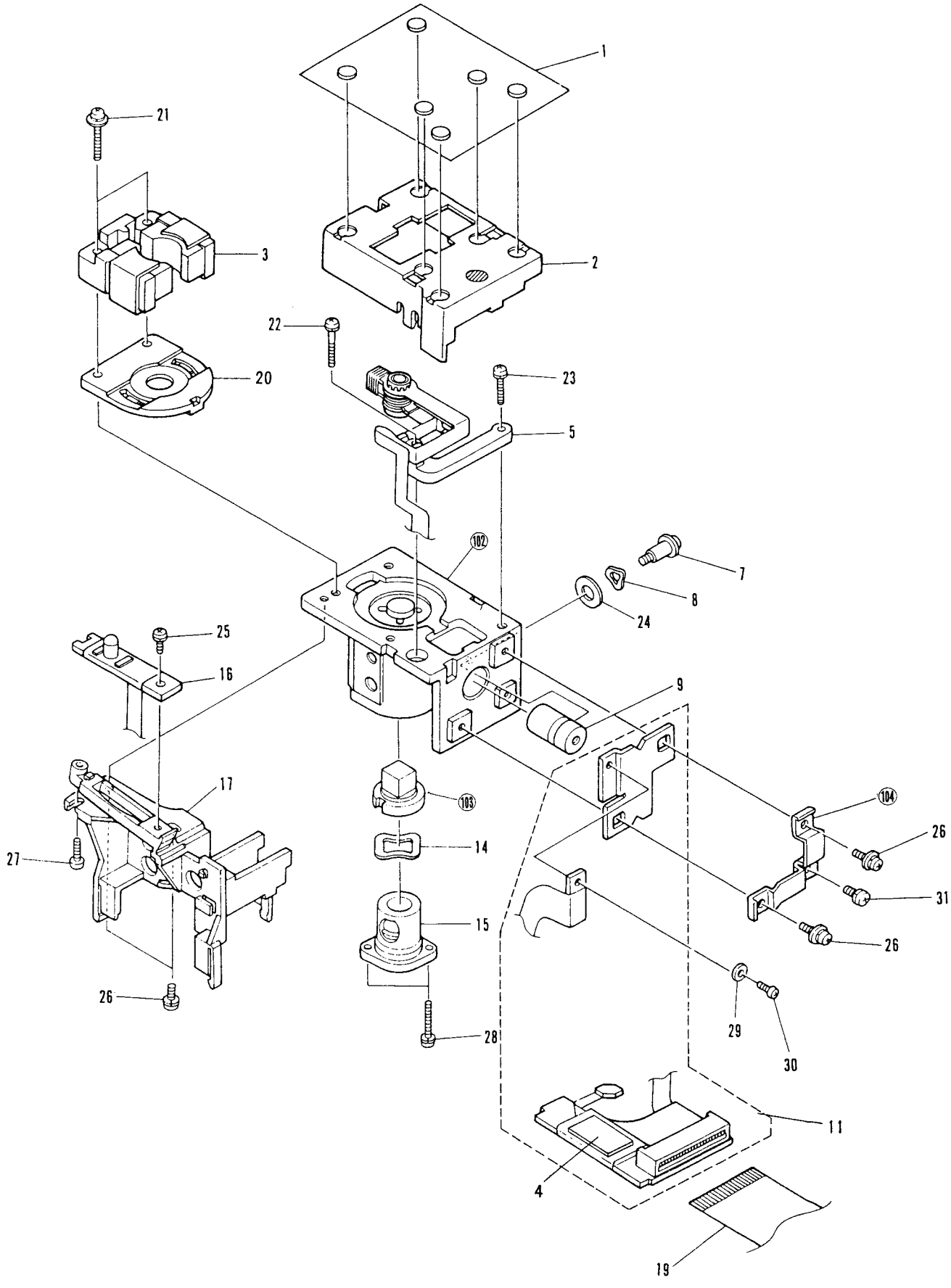


Parts List

Mark	No.	Part No.	Description
	1.	VWY1007	Pick up assembly
	2.	DMA1001	Slider
	3.	VXA-394	Roller arm assembly
★★	4.	VXM-060	Tilt motor
★★	5.	PSN-003 (VSK-015)	Leaf switch (Tilt limit)
	6.	VNV-036	Tilt nut
	7.	VXA-387	Tilt shaft assembly
	8.	VEC1018	Gap sheet
	9.	VLL-045	Plate
	10.	VLL1001	Color
	11.	VNV1003	Centering hub
	12.	VBH-141	Centering spring
	13.	VEB1008	Rubber spacer
★★	14.	VXM1009	Spindle motor
	15.	DLA1001	Shaft
	16.	VBH-142	Tilt spring
	17.	VBH-175	Potentiometer spring
	18.	VBH-138	Slider motor spring
	19.	VNE-701	Switch adj.
	20.	VNL-623	Slider pinion
	21.	VEC-143	Plastic rivet
★★	22.	VXM-074	Slider motor
	23.	VCG-005	Thru type capacitor
	24.	VCS-017	Potentiometer
	25.	VNL-508	Potentio pinion B
	26.	VLL-310	PM washer
	27.	VBH-140	Torsion spring
	28.		.....
	29.	VLL-311	Washer
	30.	VXA-439	PM holder assembly
	31.	VNL-508	Potentio pinion
	32.	VYS1001	SRVB assembly
	33.	VLL-311	Washer
	34.		.....
	35.		.....

Mark	No.	Part No.	Description
	36.		.....
	37.		.....
	38.		.....
	39.		.....
	40.	PMB30P080FCU	Screw
	41.	ZMD30H060FBT	
	42.	ZMD30H080FBT	
	43.	BBZ30P060FCU	Screw
	44.	BBZ30P060FMC	Screw
	45.	ZMD30H120FBT	
	46.	PMZ20P050FMC	Screw
	47.	YE20FUC	E ring ϕ2
	48.	PMA30P080FCU	Screw
	49.	PMA26P040FMC	Screw
	50.	PMB26P050FMC	Screw
	51.	AMZ26P070FMC	Screw
	52.	WA62N120W020	Washer
	53.	YC60FBT	Washer
	54.	CMZ26P140FZK	Screw
	101.		Spacer
	102.		Tilt holder
	103.		Cushion rubber (B)
	104.		Cushion rubber (A)
	105.		Tilt base
	106.		Mech. chassis assembly
	107.		Filter holder
	108.		Motor holder assembly
	109.		PM support

4.7 PICK-UP ASSEMBLY



Parts List

Mark	No.	Part No.	Description
	1.	VED-034	Protection pad
	2.	VNH1001	Actuator cover
	3.	VGX-071	Magnetic circuit assembly
	4.	VEB1012	Insulator sheet
	5.	VGX-069	Objective lens assembly
	6.		.....
	7.	VLL-292	Screw 5
	8.	PBE-020	Washer (A)
	9.	VGX-064	Multi-lens assembly
	10.		.....
	11.	VGX1007	PD-HEAD assembly
	12.		.....
	13.		.....
	14.	PBE-022	Washer (B)
	15.	VGX1004	LD assembly
	16.	VEX1001	Sensor assembly
	17.	VNH-056	Sensor stay
	18.		.....
	19.	VDA1017	FUJI card
	20.	VGX1005	Wavelength plate assembly

Mark	No.	Part No.	Description
	21.	PBM20P120FMC	Screw
	22.	PMA20P140FMC	Screw
	23.	PMA20P080FMC	Screw
	24.	WA40F100M050	Washer
	25.	PPZ20P050FMC	Screw
	26.	PMB20P050FMC	Screw
	27.	PBZ20P080FMC	Screw
	28.	PMA26P080FMC	Screw
	29.	WA20W050R050	Washer
	30.	PMA20P040FMC	Screw
	31.	PMA26P060FMC	Screw
	101.		.....
	102.		Optical body
	103.		Prism assembly
	104.		PD spring N

HEAD Board Mounting Procedure

Since the HEAD board is supported without bending the flexible section, mount the board as described in the following procedure.

1 Bend the board as indicated by the arrow in Fig. 1, and affix using dual-sided adhesive tape or adhesive.

2 Mount the HEAD into the pick-up with the flexible section bent back as shown in Fig. 1.

3 Solder the disc inclination detector board and the flexible board (connected to TRKG and FOCS coils) to the HEAD board as shown in Fig. 2.

Note: Since the copper foil on the flexible board is very susceptible to heat, soldering should be completed in the shortest time possible. And apply the soldering iron to the HEAD board instead of the flexible board.

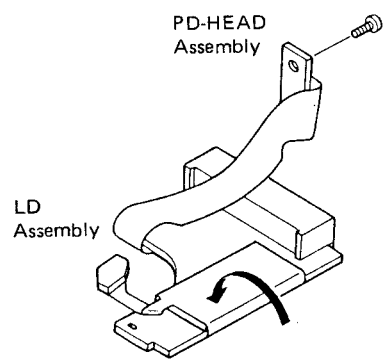


Fig. 1

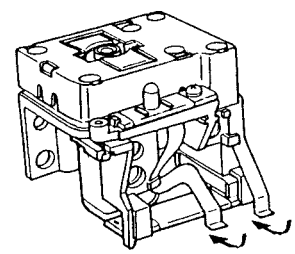
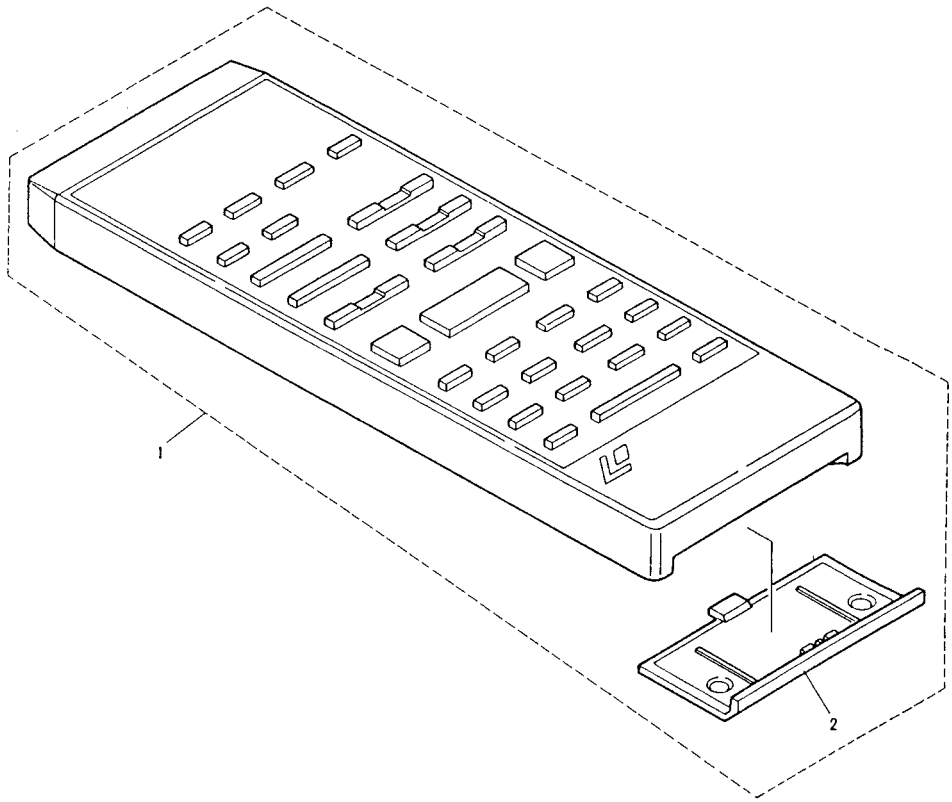


Fig. 2

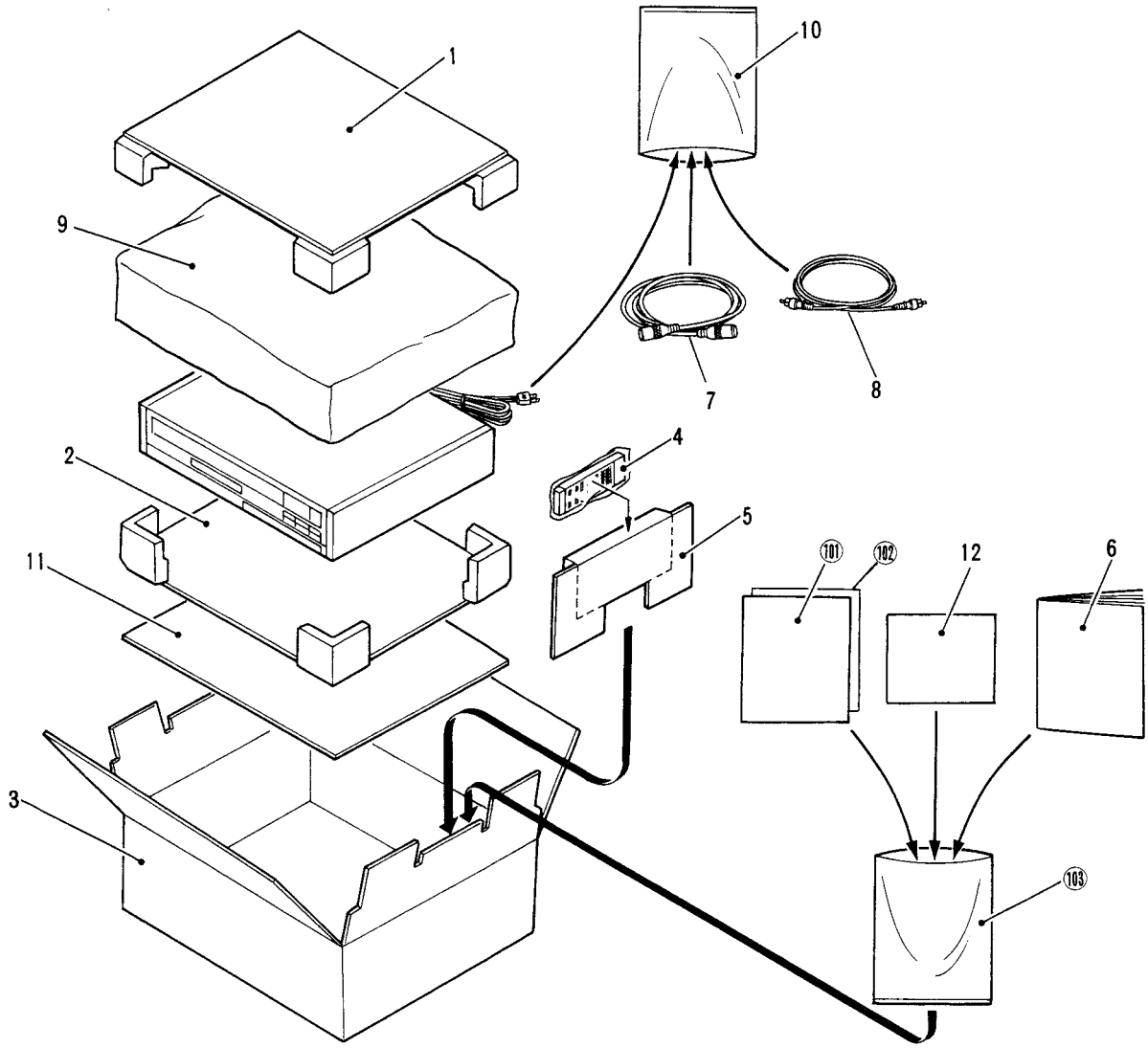
5. REMOTE CONTROL UNIT



Parts List

Mark	No.	Part No.	Description
	1.	VXX1038	CU-LD008
	2.	VNK-548	Cover

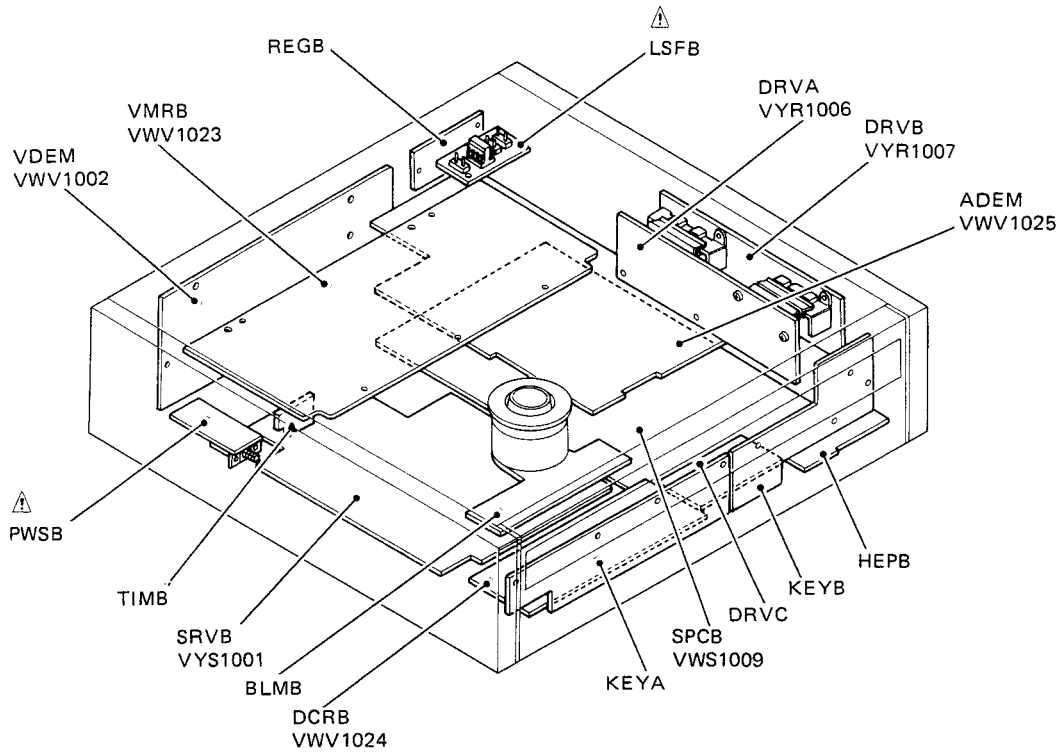
6. PACKING



Parts List

Mark	No.	Part No.	Description
	1.	VXA1056	Pad base assembly (upper)
	2.	VXA1066	Pad base assembly (under)
	3.	VHG1016	Packing case
	4.	VXX1038	Remote control unit (CU-LD008)
	5.	VHX1004	Parts box
	6.	VRB1006	Operating instructions
	7.	VDE1003	Video cable
	8.	PDE1003	Pin plug
	9.	VHL1005	Mirror mat bag (L)
	10.	VHL1004	Mirror mat bag (S)
	11.	VHX1005	Sub base
	12.	VRN-021	Caution card
	101.		Service network
	102.		Warranty card
	103.		Vinyl bag

7. P.C. B. LOCATIONS



SPCB	SPindle servo & Control circuit Board
VMRB	Video MemoRy circuit Board
VDEM	Video DEModulator board
DCRB	EFM signal DeCodeR Board
SYPS	SYstem Power Supply boards
DRVA, B, C	DRiVers board(A, B, C)
⚠ PRMB	PRiMary Boards
⚠ PWSB	PoWer Switch Board
⚠ LSFB	Line Surge Filter Board
ADEM	Audio DEModulator board
HEPB	HEadPhones Board
DIRK	Display, Infrared Receiver & Keys boards
KEYA, B	KEYs board(A, B)
SRTB	SeRvo & Tilt motor Board
SRVB	SeRVo circuit Board
TIMB	TIlt Motor Board
HEAD	HEAD processing board
BLMB	BlushLess Motor Board
REGB	REGulator Board

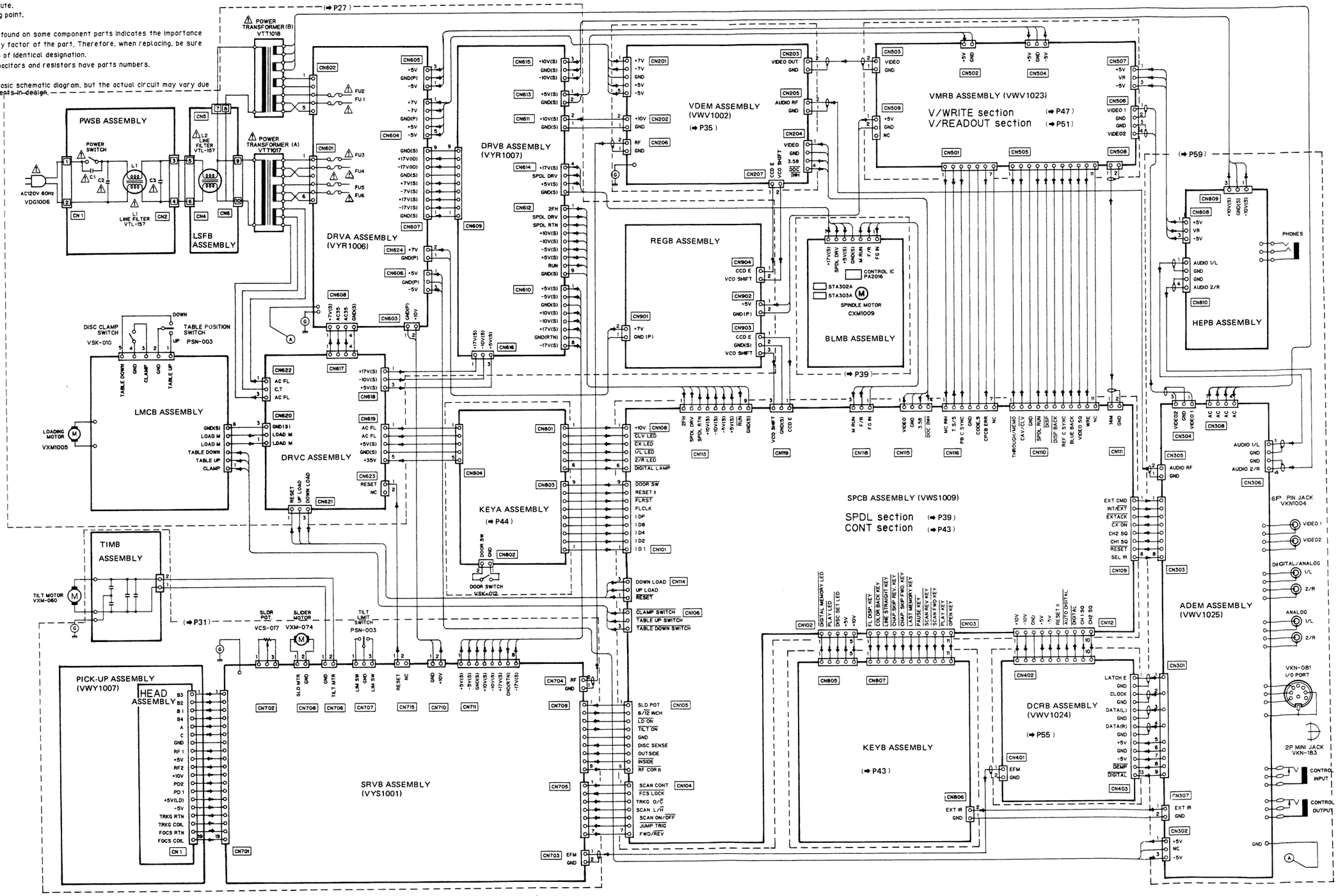
8. SCHEMATIC DIAGRAM AND P.C. BOARD PATTERNS

8.1 OVERALL CONNECTION DIAGRAM

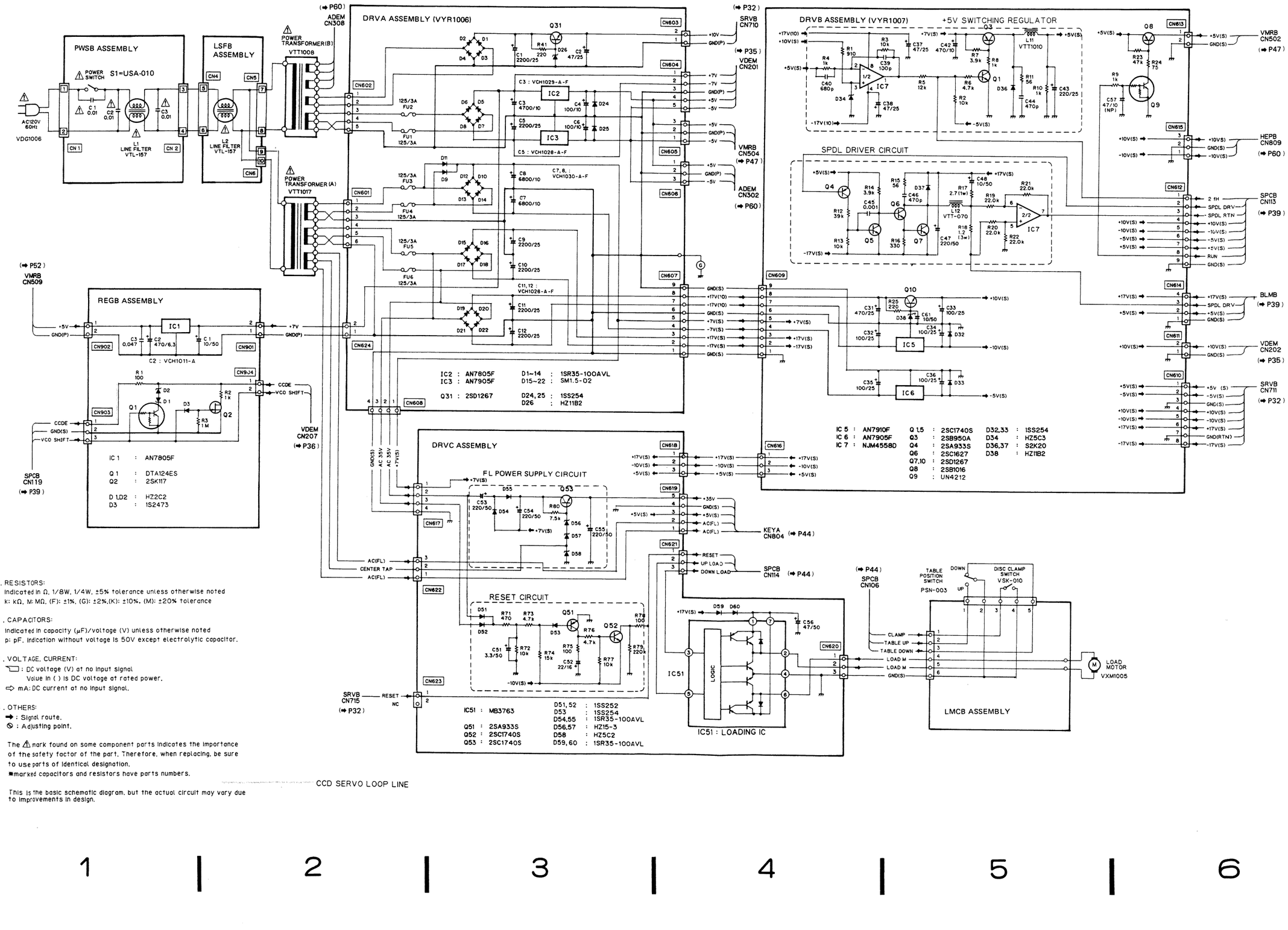
➡ : Signal route.
⊘ : Adjusting point.

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.



8.2 PWSB, LSFB, DRVA, DRVB, DRVC, LMCB AND SRVB ASSEMBLY



1. RESISTORS:
   Indicated in Ω, 1/8W, 1/4W, ±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.

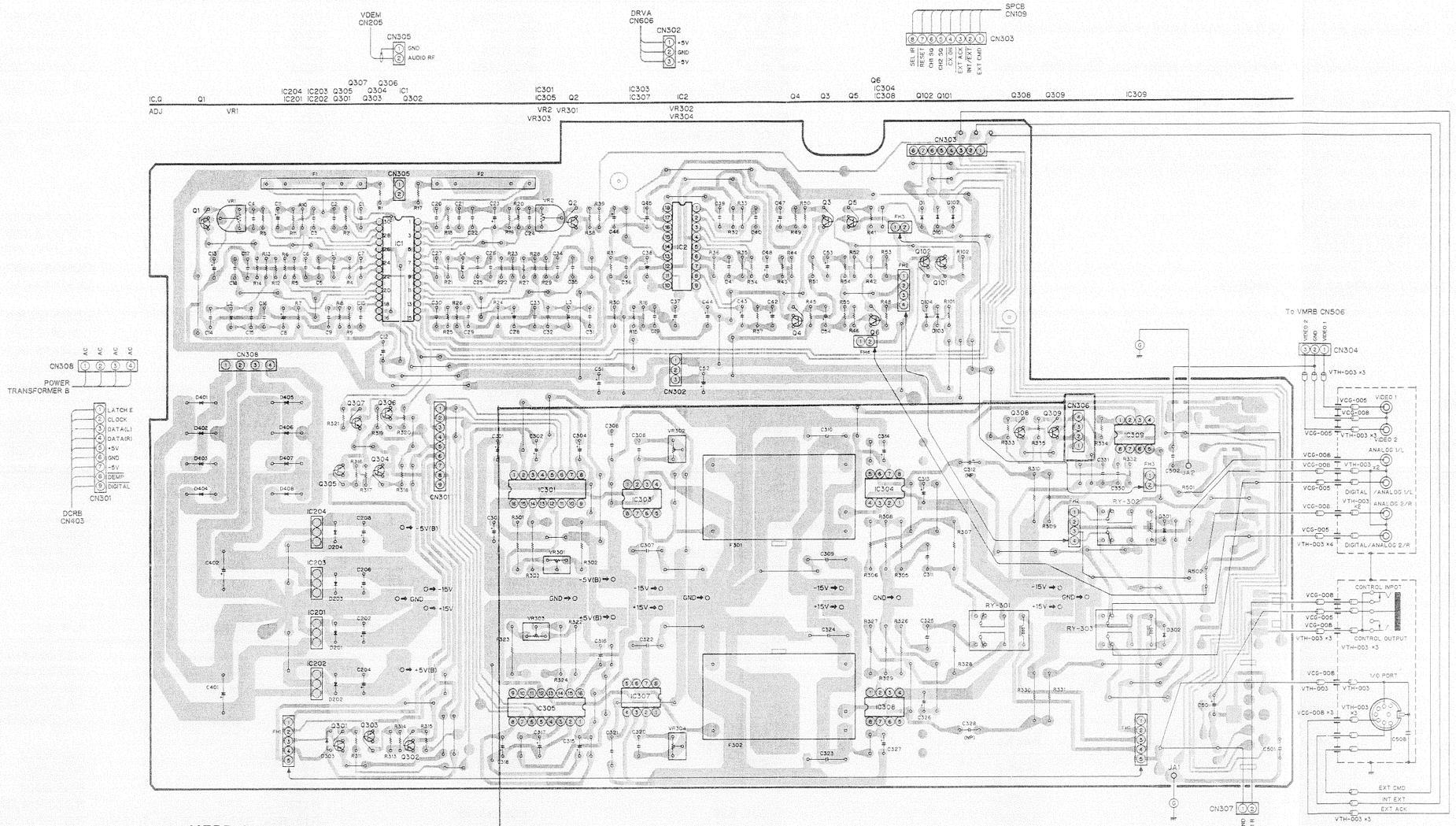
3. VOLTAGE, CURRENT:
   ▭ : DC voltage (V) at no input signal
   Value in ( ) is DC voltage at rated power.
   ⇨ mA: DC current at no input signal.

4. OTHERS:
   ➡ : Signal route.
   ⊘ : Adjusting point.

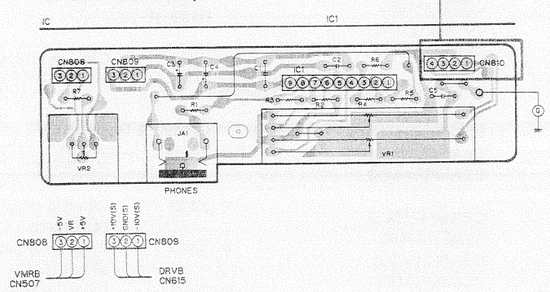
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
*marked capacitors and resistors have parts numbers.

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

ADEM Assembly (VWV1025)



HEPB Assembly



9. 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.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *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 List

P.C. BOARD ASSEMBLIES

Mark	Symbol & Description	Part No.
	SPCB assembly	VWS1009
	VMRB assembly	VWV1023
	VDEM assembly	VWV1002
	DCRB assembly	VWV1024
	ADEM assembly	VWV1025
	BLMB assembly (Included in the spindle motor)	
	HEPB assembly	
	DRVA assembly	VYR1006
	DRVB assembly	VYR1007
	DRVC assembly	
⚠	PWSB assembly	
	LMCB assembly	
⚠	LSFB assembly	
	KEYA assembly	
	KEYB assembly	
	SRVB assembly	VYS1001
	TIMB assembly	
	REGB assembly	

OTHERS

Mark	Symbol & Description	Part No.
⚠	Power cord	VDG1006
	Strain relief	CM-22C
⚠ ★★	FU1–FU6 Fuse (3A)	VEK-018
★★	Slide switch (DOOR)	VSK-012
⚠ ★	Power transformer (A)	VTT1017
⚠ ★	Power transformer (B)	VTT1018
★★	IC107 (EP-ROM)	VYW1026
★★	Leaf switch (TILT LIMIT)	PSN-003 (VSK-015)
	Thru type capacitor	VCG-005
	Pick up assembly	VWY1007
	Potentiometer	VCS-017
★★	Tilt motor	VXM-060
★★	Slider motor	VXM-074
★★	Spindle motor	VXM1009
★★	Control IC (Included in the spindle motor)	PA2016
★★	Transistor array (Included in the spindle motor)	STA302A
★★	Transistor array (Included in the spindle motor)	STA303A
★★	Leaf switch (TABLE POSITION)	PSN-003 (VSK-015)
★★	Slide switch (DISC CLAMP)	VSK-010
★★	Loading motor	VXM1005

SPCB ASSEMBLY (VWS1009)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC4, IC6	IR9393
★★	IC1–IC3, IC7–IC9	NJM4558D
★★	IC12	PA0009
★★	IC10	PA5009
★★	IC106	PD0012A
★★	IC101	PD0027
★★	IC104	PD5029
★★	IC11	PD9001
★★	IC102, IC103	SN74LS541N
★★	IC105	TC4011BP
★★	IC5	TL082CP
★★	Q7, Q15, Q22, Q26, Q27, Q30, Q35–Q37	UN4112
★★	Q13, Q17, Q21, Q102–Q104, Q107	UN4212
★★	Q9, Q20, Q31	2SA933S
★★	Q18	2SC1583
★★	Q4–Q6, Q8, Q10–Q12, Q16, Q19 Q23, Q101	2SC1740S
★★	Q105	2SD1226M
★★	Q25, Q34	2SK117
★★	Q106	2SK192A
★★	Q14	DTC114ES
★	D13, D14	HZ2C2
★	D22	HZ3A2
★	D9, D23, D24. D28	HZ3B2
★	D3, D31	HZ5C2
★	D101	HZ6C2
★	D4, D18, D19, D32	HZ7B2
★	D12	SVC321SP
★	D1, D2, D5–D8, D10, D11, D15–D17, D20, D21, D25–D27, D29, D30, D34–D36, D102–D108	1SS254
★	TH1	D33A

COILS AND FILTERS

Mark	Symbol & Description	Part No.
	L101	LAU221J
	L1 (27μH)	VTL-028
	L2 (120μH)	VTL-036
	L3	LAU120K
	L102	LAU6R8K
	F1, F101, F102 3 terminals filter (0.022 μF/50V)	VTH-005

CAPACITORS

Mark	Symbol & Description	Part No.
	VC101 Ceramic trimmer (50 pF)	VCM-003
	C204	CCCCH100D50
	C20, C21, C23, C43, C68	CCCCH101J50
	C203	CCCCH180J50
	C56	CCCCH221J50
	C209–C211	CCCCH330J50
	C35, C206	CCCCH470J50
	C25, C58, C76	CCCCH680J50
	C221, C222	CCCSL151J50
	C231	CCCSL180J50
	C36, C72	CCCSL241J50
	C38, C39	CCCSL331J50
	C205, C213	CCCSL470J50
	C22, C44, C45	CCCSL681J50
	C74	CCDCH151J50
	C232	CCDCH220J50
	C33, C40	CEANPR47M50
	C4	CEANP010M50
	C5	CEANP101M10
	C7	CEANP2R2M50
	C2, C6	CEANP220M10
	C34	CEANP470M10
	C57, C61, C69, C215, C219	CEAS100M50
	C207, C216	CEAS101M10
	C47	CEAS3R3M50
	C16, C18, C26, C59, C65, C67, C75, C78	CEAS470M25
	C225	CEJAR47M50
	C223	CEJA470M16
	C212	CGCYX473M25
	C230	CGDYX473M25
	C79	CKCYB102K50
	C71	CKCYB472K50
	C27	CKCYB682K50
	C14, C15, C17, C60, C64, C214, C217, C218, C220, C224, C226–C229	CKCYF103Z50
	C66, C208	CKDYF103Z50
	C24	CKPUYB102K50
	C73	CKPUYF223Z25
	C49, C52, C53	CQMA102J50
	C32, C48, C55, C63	CQMA103J50
	C10, C51, C54, C77	CQMA104J50
	C19	CQMA122J50
	C41, C42	CQMA153J50
	C62	CQMA154J50
	C50	CQMA182J50
	C70	CQMA183J50
	C12	CQMA273J50
	C3, C9	CQMA472J50
	C31	CQMA473J50
	C11	CQMA562J50
	C1	CQMA822J50
	C46	CQMA823J50
	C28	CQSA181J50
	C201 (1 μF/5.5)	VCH1013

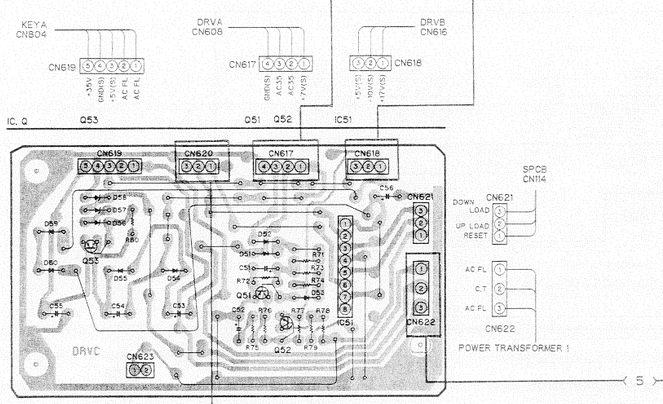
RESISTORS

Mark	Symbol & Description		Part No.
★	VR2	(10 kΩ)	VRTB6VS103
★	VR4	(4.7 kΩ)	VRTB6VS472
★	VR1, VR6	(47 kΩ)	VRTB6VS473
★	VR5	(4.7 kΩ)	VRTG6VS472
★	VR3	(47 kΩ)	VRTG6VS473
	R203, R204		RA4S332J
	R201		RA8S103J
	R202		RA8S332J
	R172		RD1/4VM101J
	R13, R14, R17, R18, R126–R129, R132, R133, R136, R137, R139, R140		RD1/6PQ□□□□F
	Other resistors		RD1/6PM□□□J

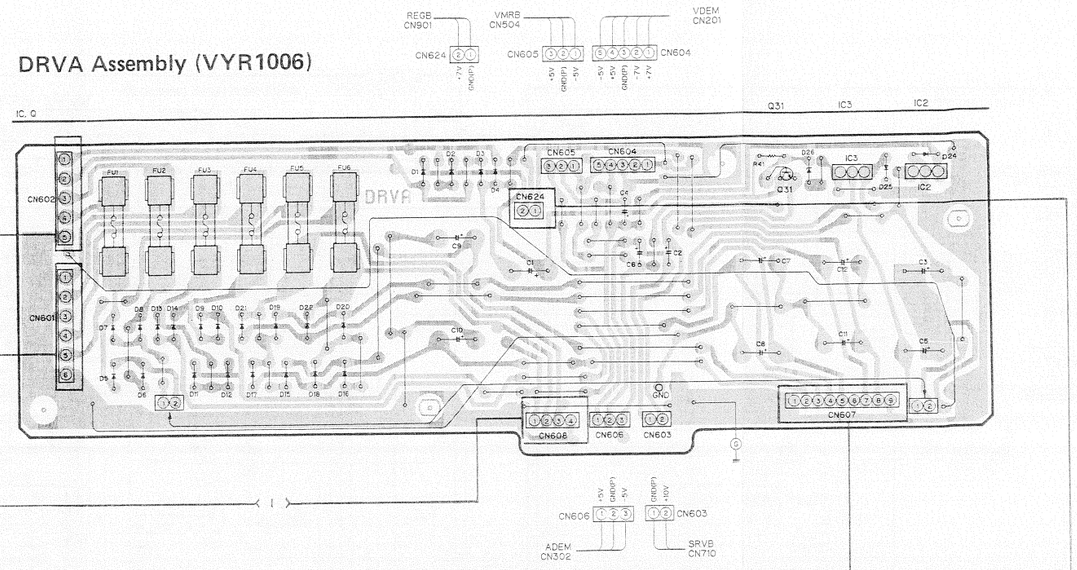
OTHERS

Mark	Symbol & Description		Part No.
	IC socket		VKH-029
★	X103	Ceramic osillator (4.00MHz)	VSS-018
★	X102	Ceramic osillator (400 kHz)	VSS-041
★	X101	Crystal resonator	VSS-043 (VSS1005)
★	X1	Crystal osillator (3.58 MHz)	VSS1007

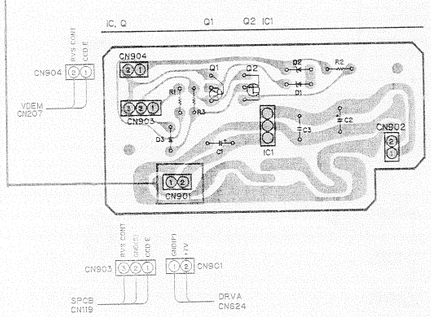
DRVC Assembly



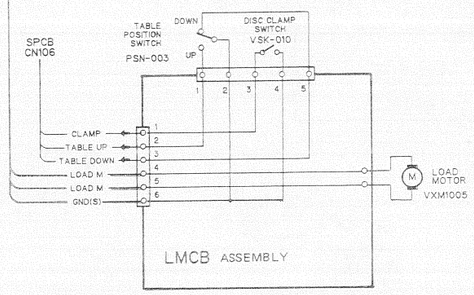
DRVA Assembly (VYR1006)



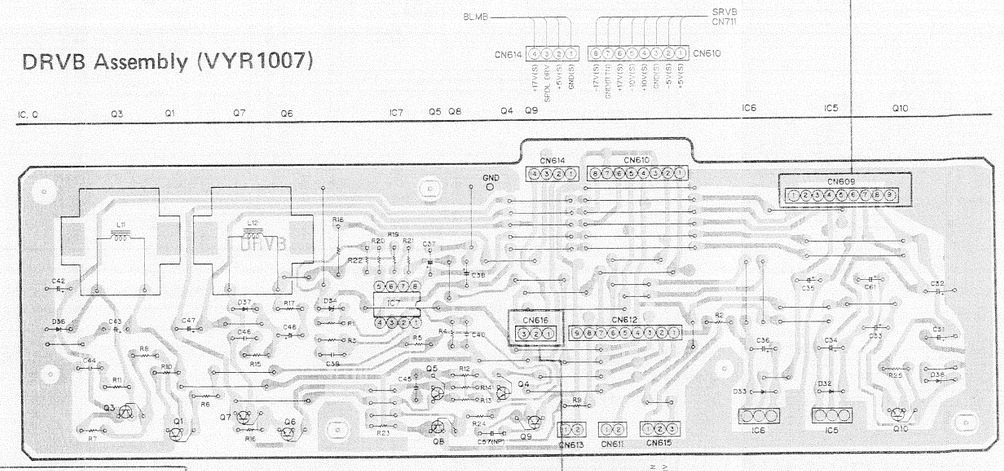
REGB Assembly



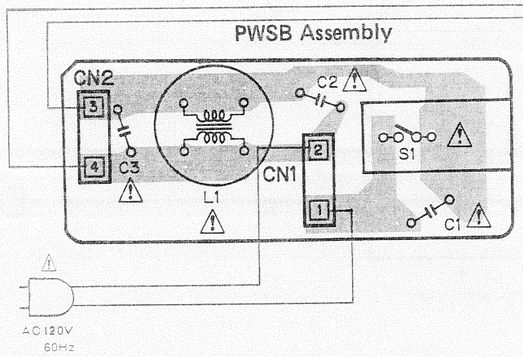
LMCB Assembly



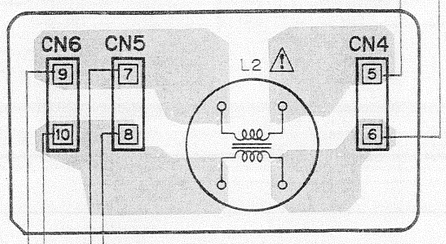
DRVB Assembly (VYR1007)

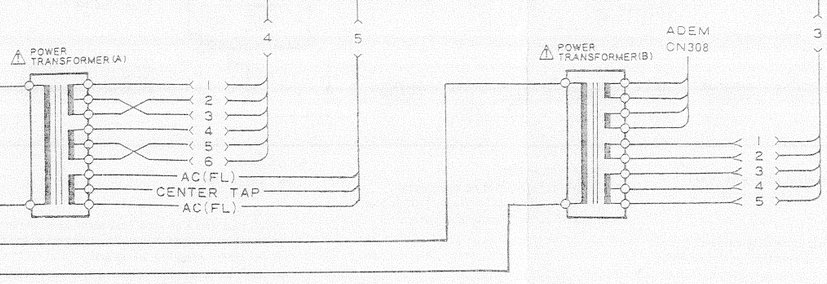


PWSB Assembly

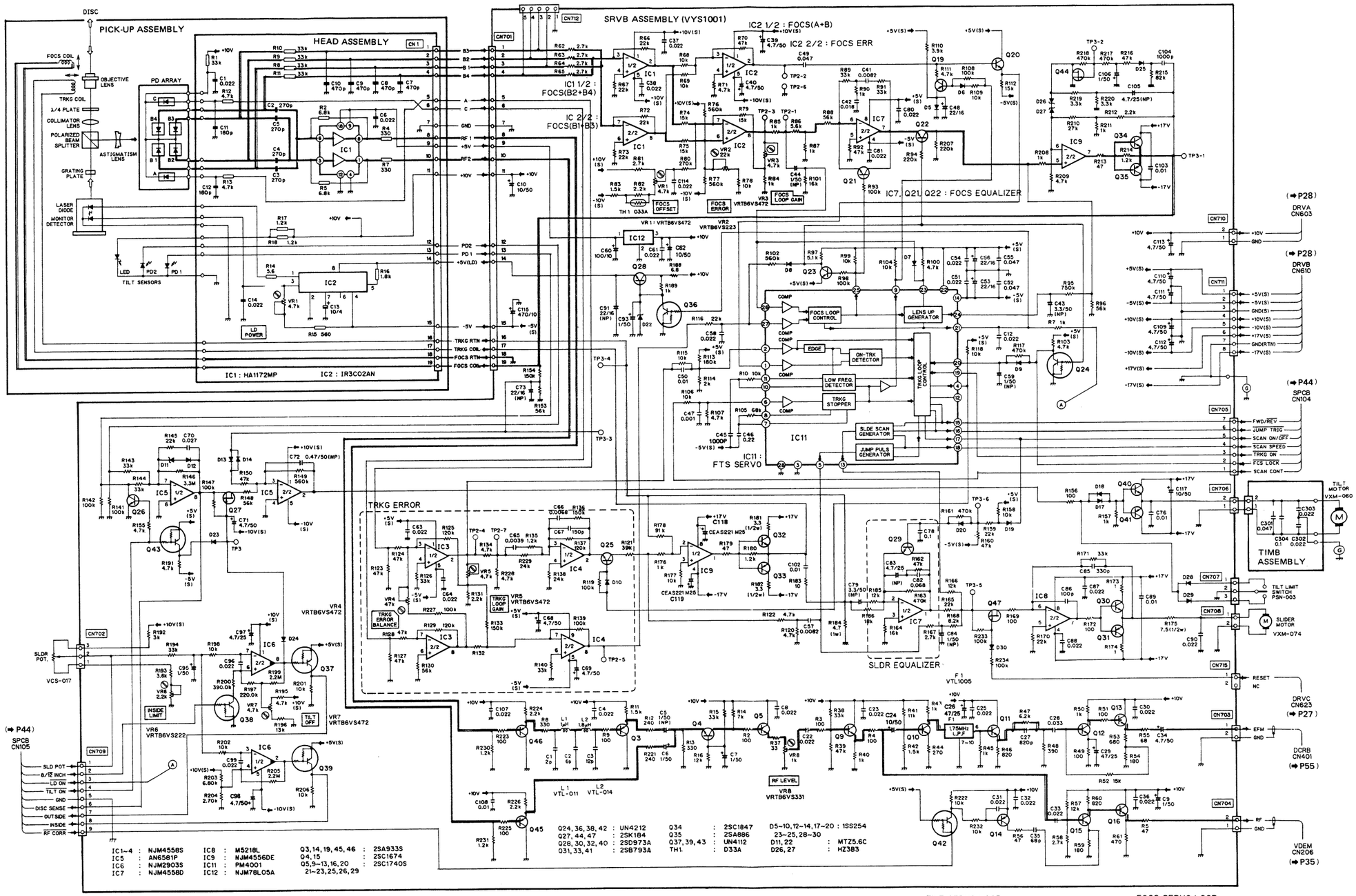


LSFB Assembly





8.3 PICK-UP ASSEMBLY (HEAD) AND SRVB ASSEMBLY



IC1~4 : NJM4558S
IC5 : AN6561P
IC6 : NJM2903S
IC7 : NJM4558D
IC8 : M5218L
IC9 : NJM4556DE
IC11 : PM4001
IC12 : NJM78L05A

Q3,14,19,45,46 : 2SA933S
Q4,15 : 2SC1674
Q5,9~13,16,20 21~23,25,26,29 : 2SC1740S

Q24,36,38,42 : UN4212
Q27,44,47 : 2SK184
Q28,30,32,40 : 2SD973A
Q31,33,41 : 2SB793A
Q34 : 2SC1847
Q35 : 2SA886
Q37,39,43 : UN4112
TH1 : D33A
D5~10,12~14,17~20 : 1SS254
D23~25,28~30
D11,22 : MTZ5.6C
D26,27 : HZ383

1. RESISTORS:
Indicated in Ω, 1/8W, 1/4W, ±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.

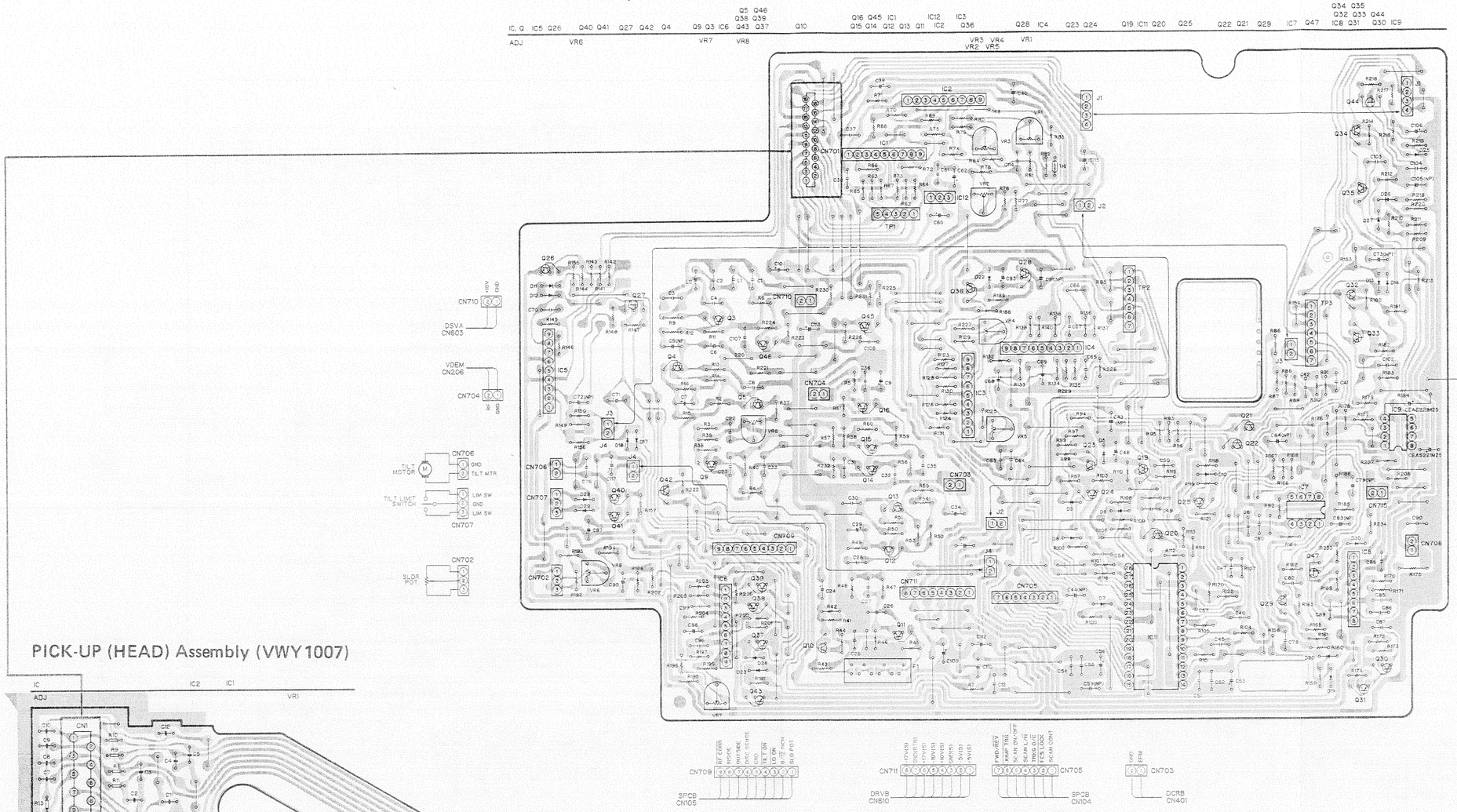
3. VOLTAGE, CURRENT:
: DC voltage (V) at no input signal
Value in ( ) is DC voltage at rated power.
: mA: DC current at no input signal.

4. OTHERS:
: Signal route.
: Adjusting point.

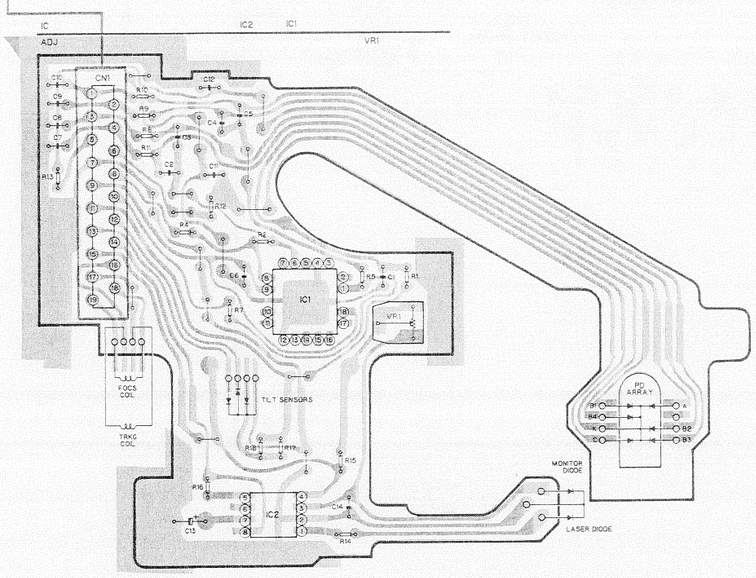
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
*marked capacitors and resistors have parts numbers.

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

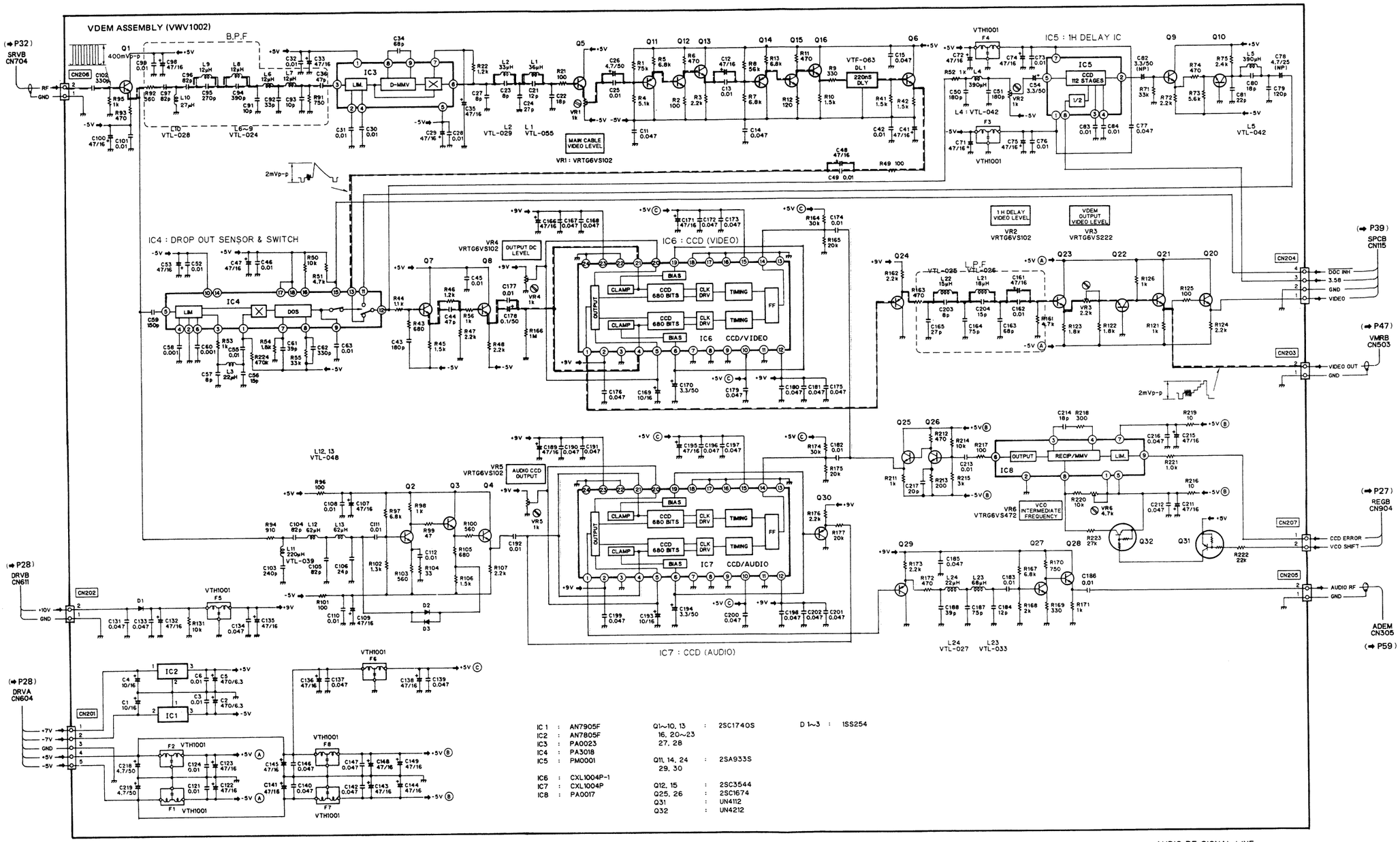
SRVB Assembly (VYS1001)



PICK-UP (HEAD) Assembly (VWY1007)



8.4 VDEM ASSEMBLY



1. RESISTORS:
   Indicated in Ω, 1/8W, 1/4W, ±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.

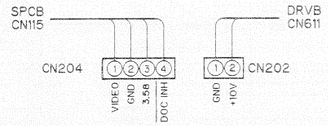
4. OTHERS:
   ➡ : Signal route.
   ⊘ : Adjusting point.

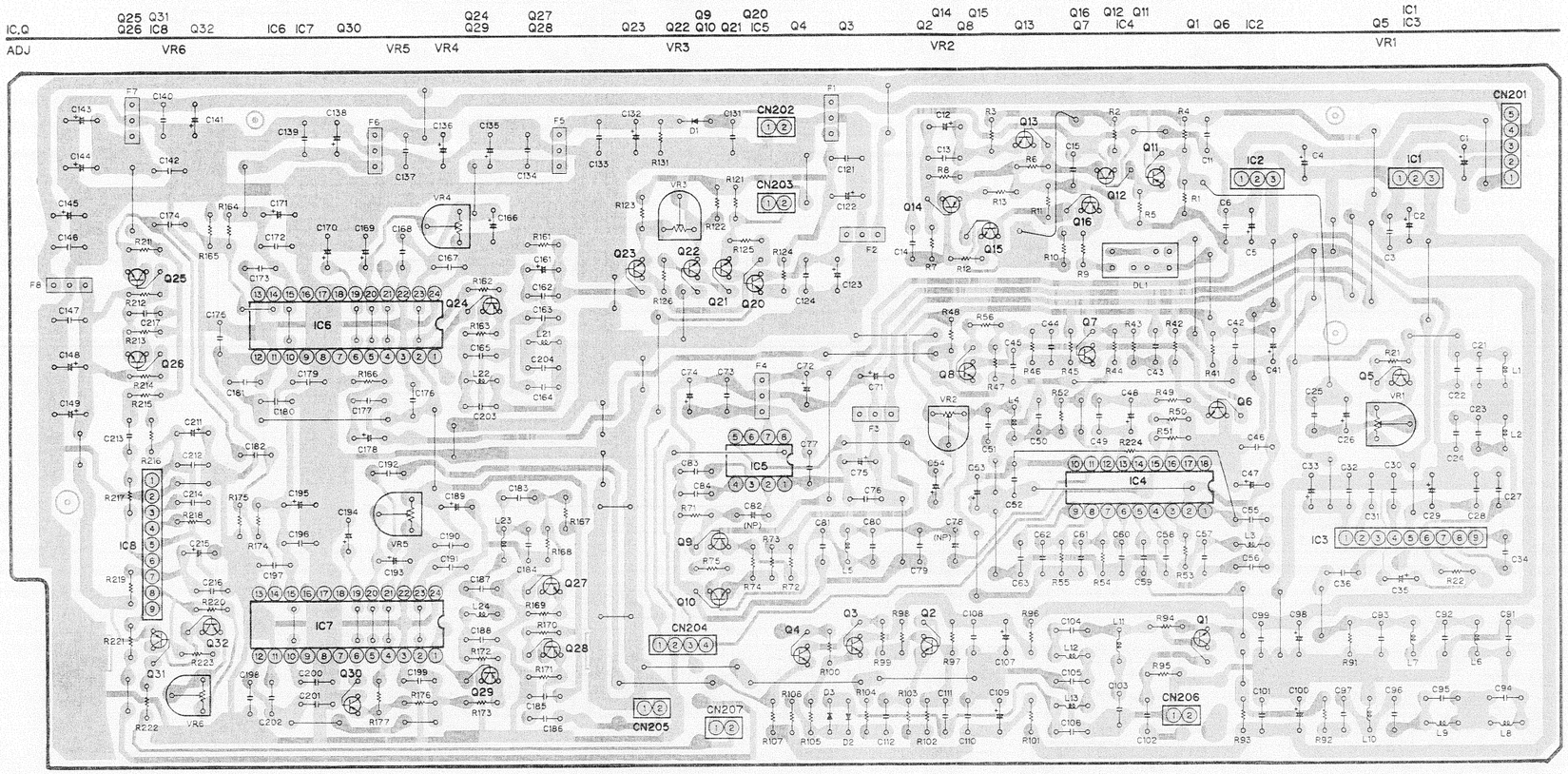
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
*marked capacitors and resistors have parts numbers.

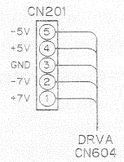
This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

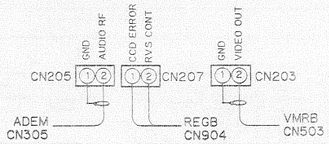
AUDIO RF SIGNAL LINE
VIDEO SIGNAL LINE
CCD SERVO LOOP LINE

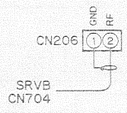
VDEM Assembly (VWV1002)



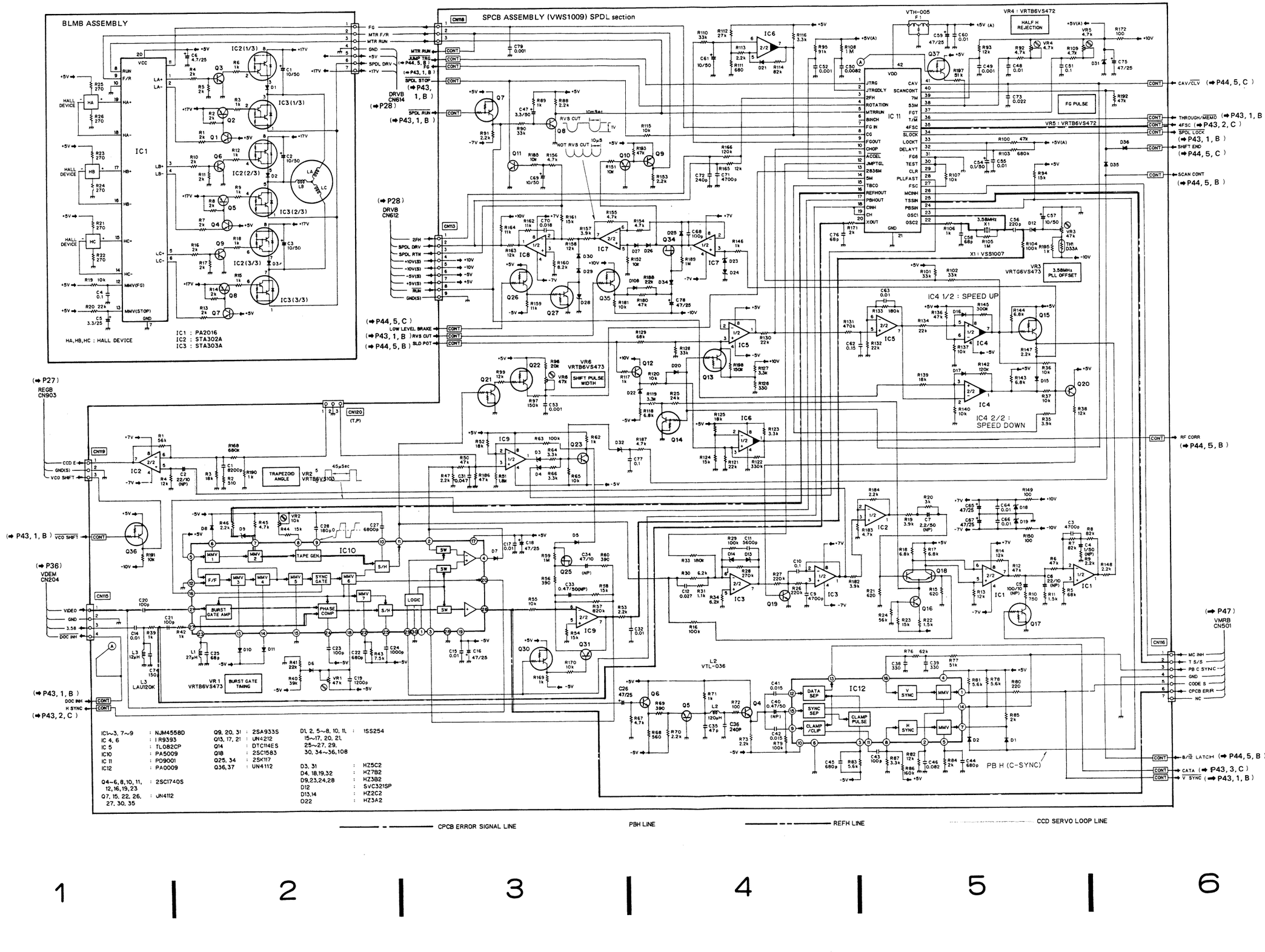




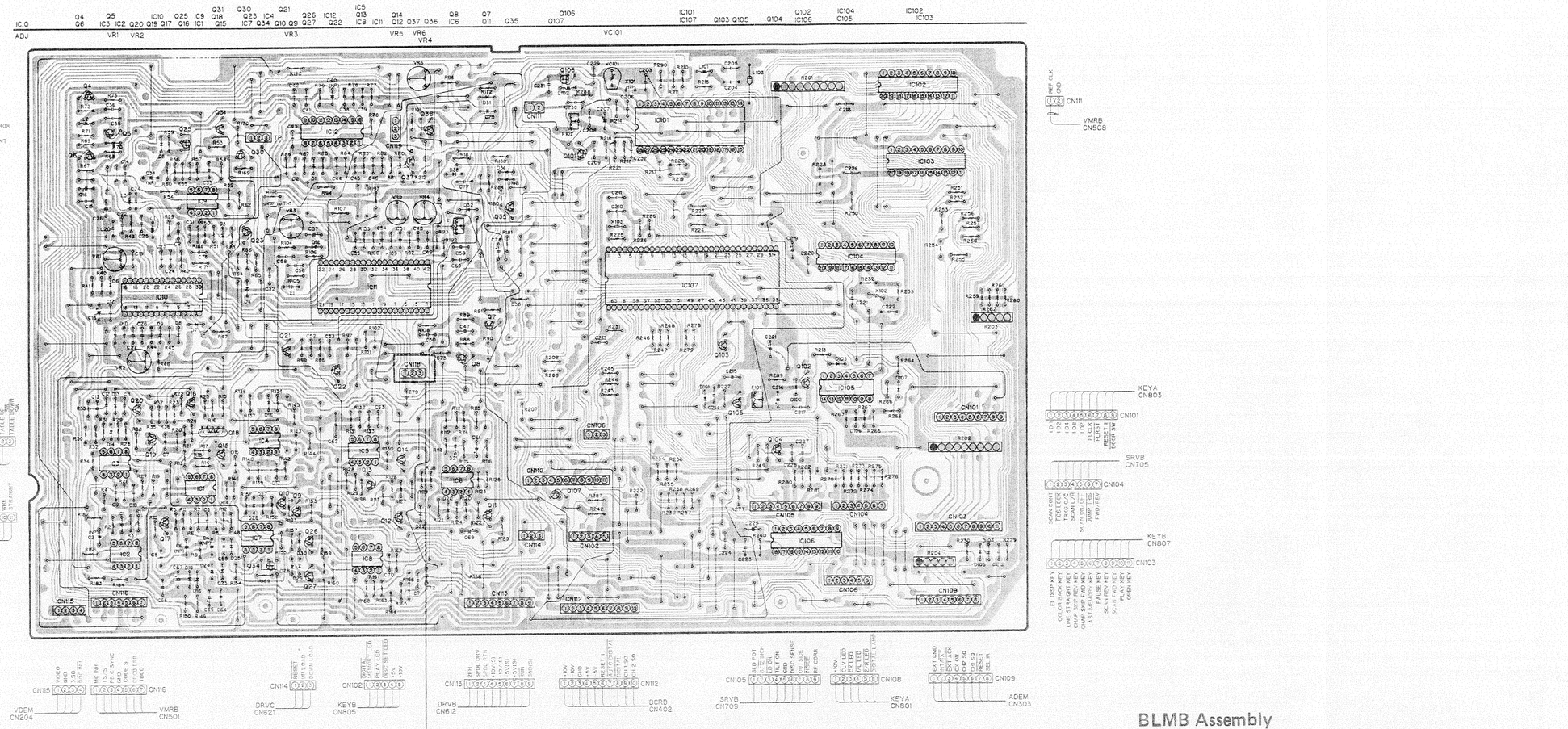




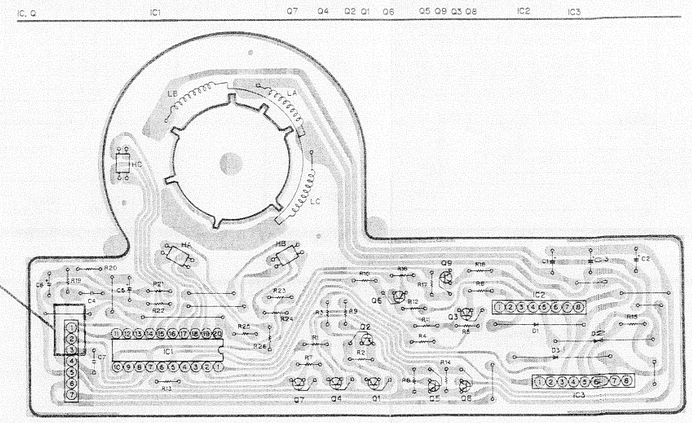
8.5 SPCB ASSEMBLY (SPDL SECTION), BLMB ASSEMBLY



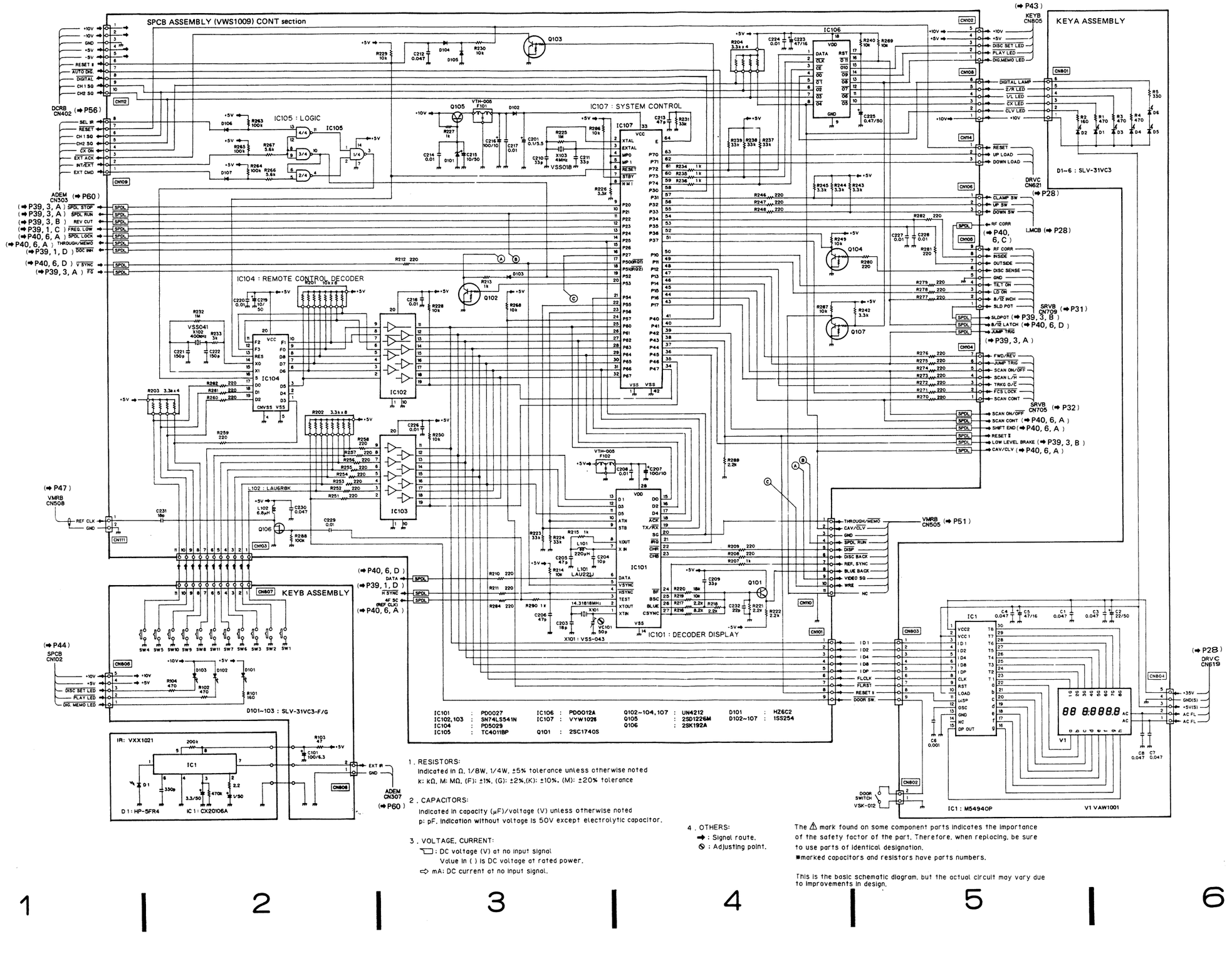
SPCB Assembly (VWS1003)



BLMB Assembly



8.6 SPCB ASSEMBLY (CONT SECTION)



1. RESISTORS:
   Indicated in Ω, 1/8W, 1/4W, ±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.

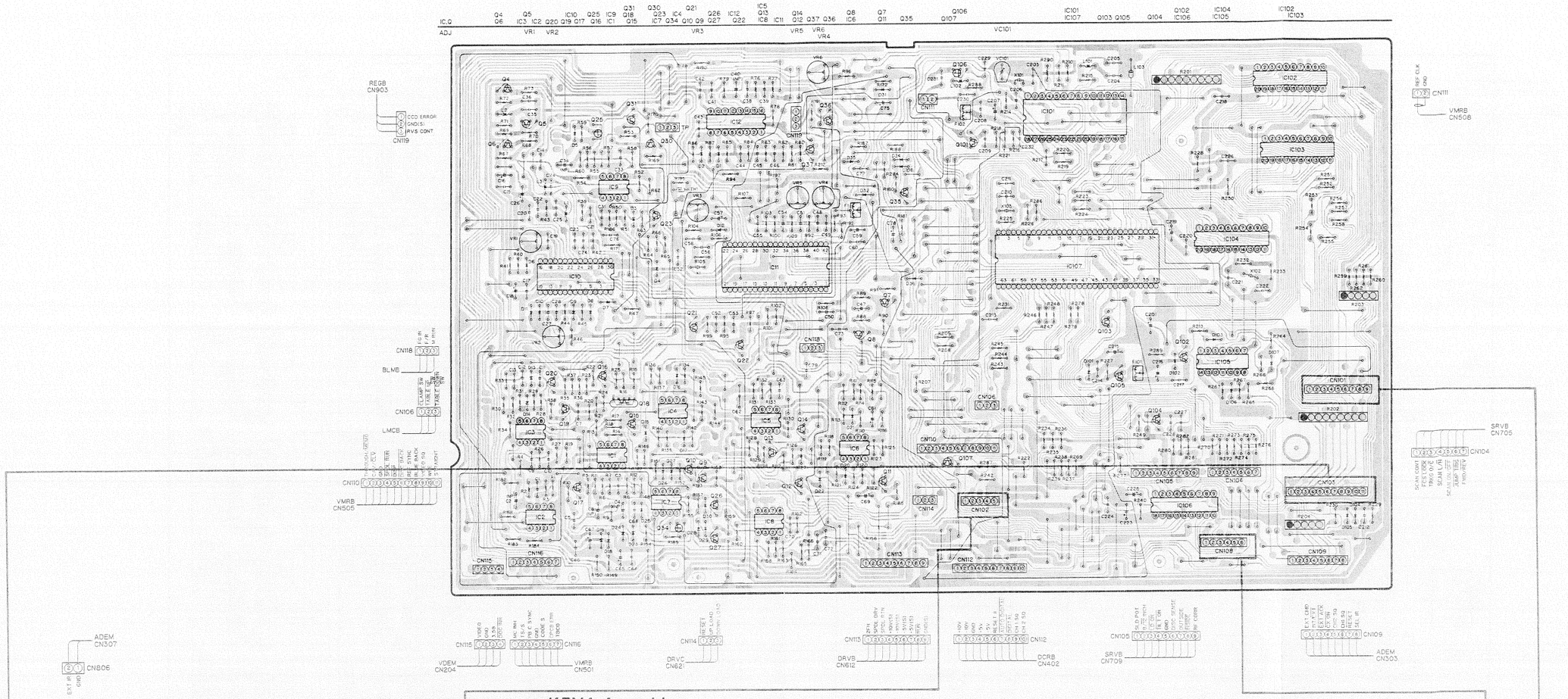
3. VOLTAGE, CURRENT:
   ▭ : DC voltage (V) at no input signal
   Value in ( ) is DC voltage at rated power.
   ⇨ mA: DC current at no input signal.

4. OTHERS:
   ➡ : Signal route.
   ⊘ : Adjusting point.

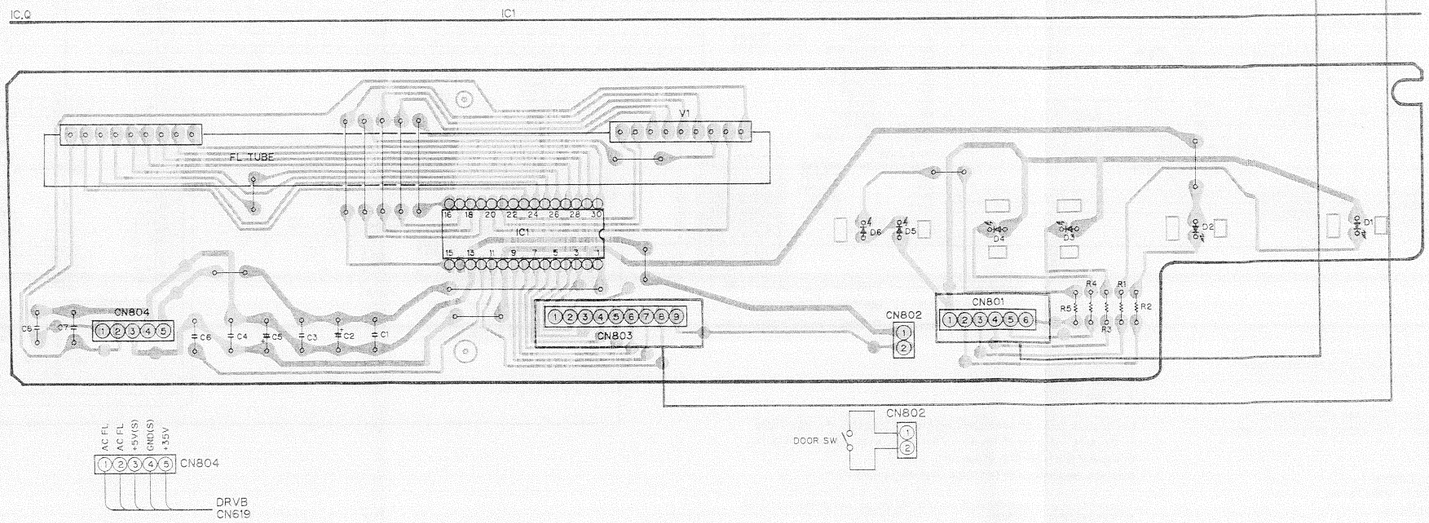
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
*marked capacitors and resistors have parts numbers.

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

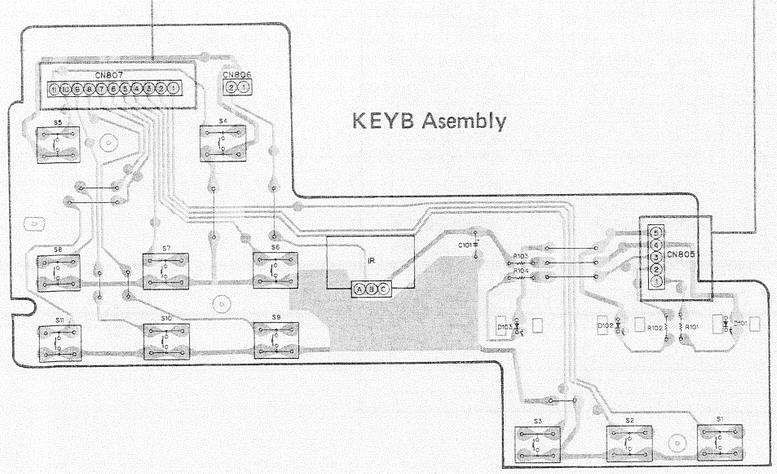
SPCB Assembly (VWS1009)



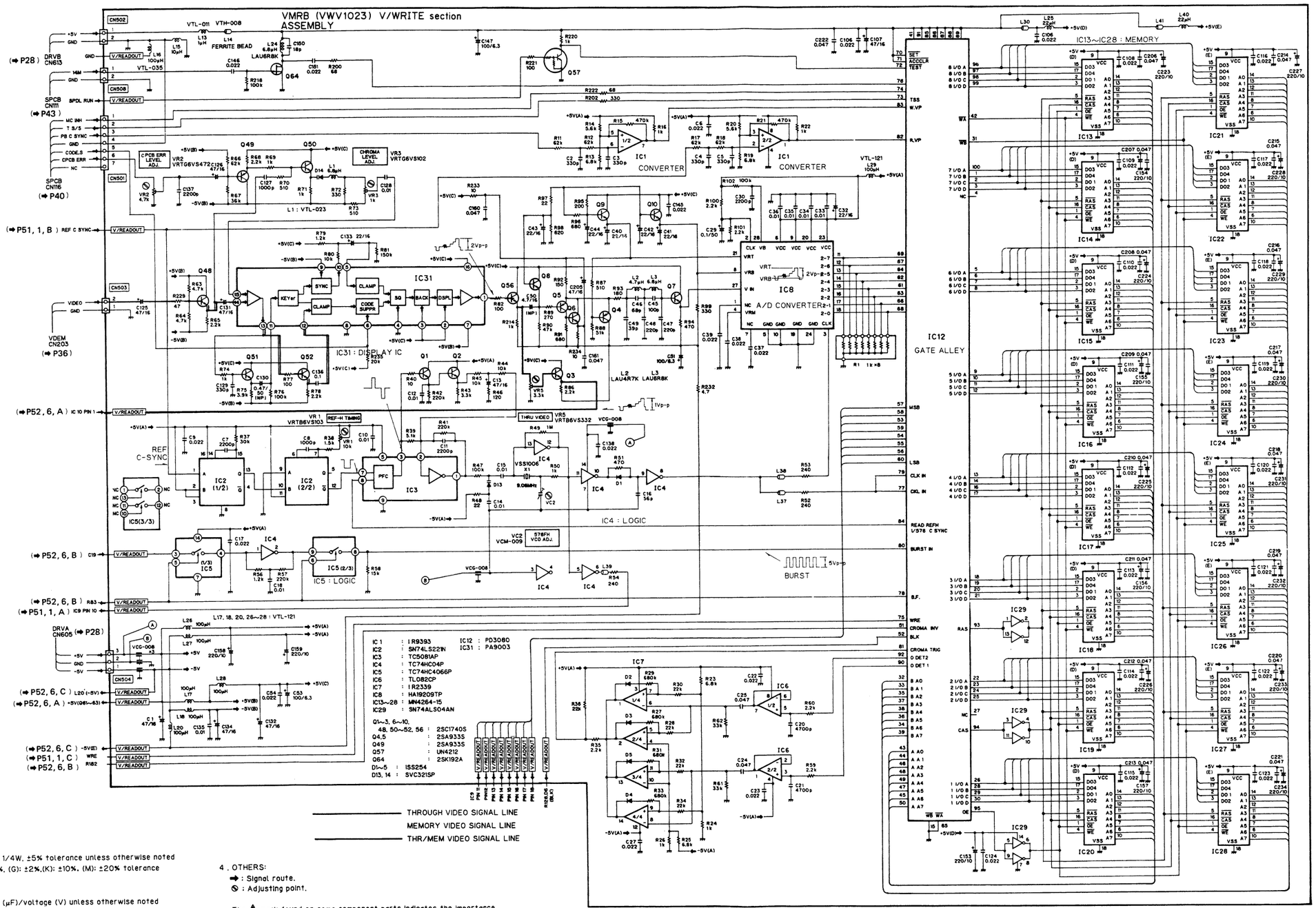
KEYA Assembly



KEYB Asembly



8.7 VMRB (1/2) ASSEMBLY (V-WRITE)



1. RESISTORS:
   Indicated in Ω, 1/8W, 1/4W, ±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.

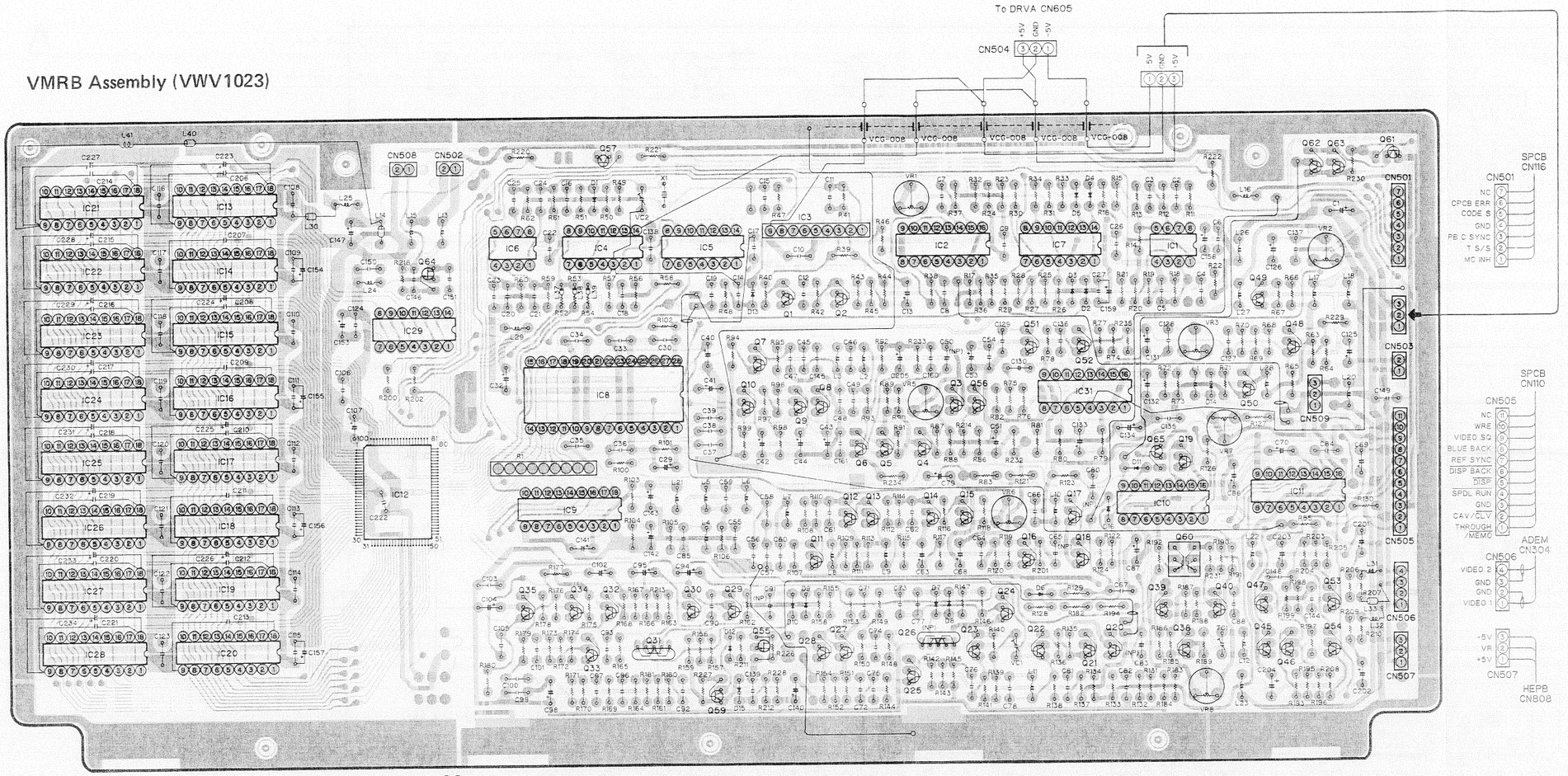
3. VOLTAGE, CURRENT:
   ⊐: DC voltage (V) at no input signal
   Value in ( ) is DC voltage at rated power.
   ⇨ mA: DC current at no input signal.

4. OTHERS:
   ➡ : Signal route.
   ⊘ : Adjusting point.

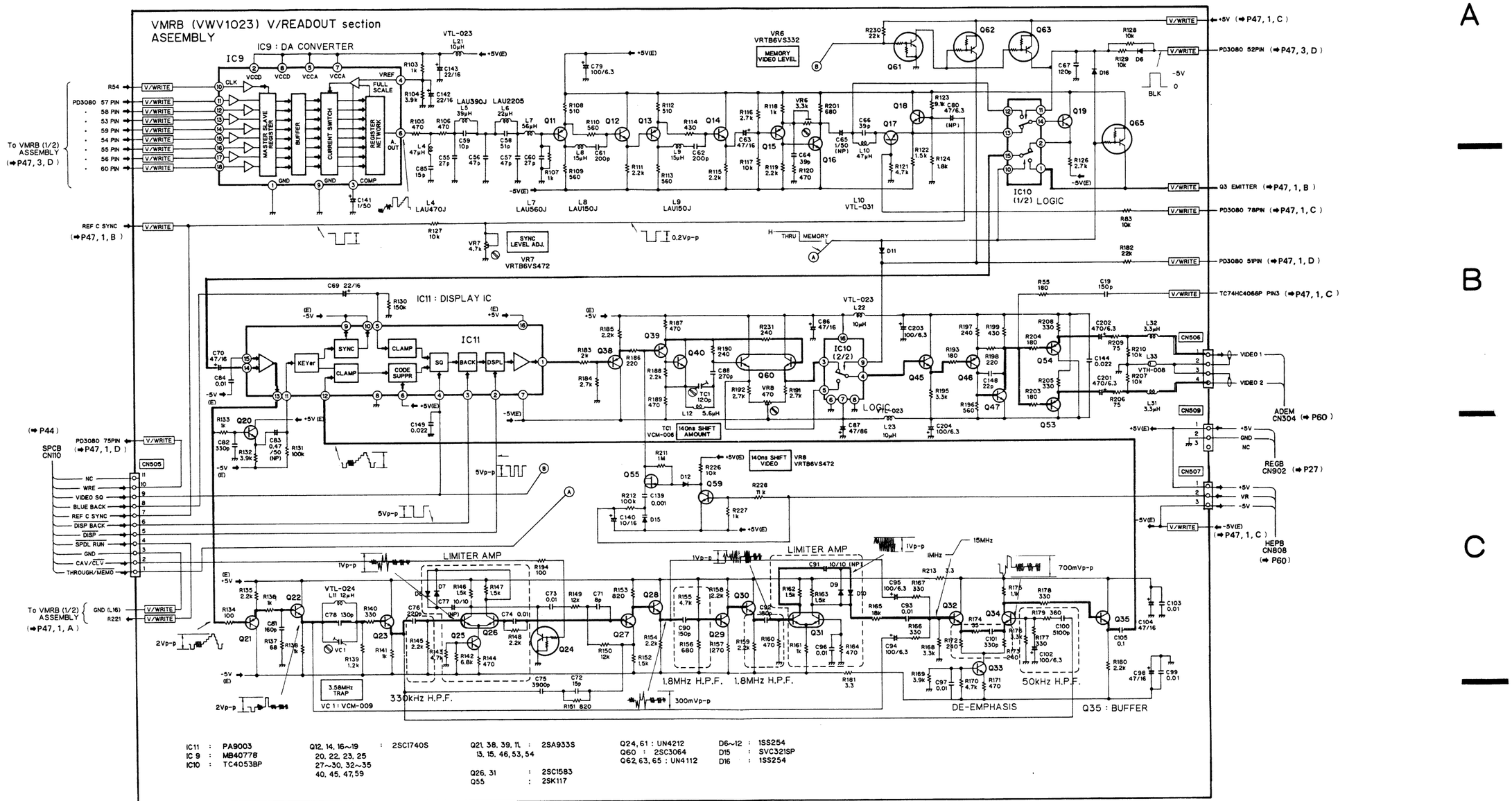
   The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
   ✱marked capacitors and resistors have parts numbers.

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

VMRB Assembly (VWV1023)



8.8 VMRB (2/2) ASSEMBLY (V-READ)



1. RESISTORS:
   Indicated in Ω, 1/8W, 1/4W, ±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.

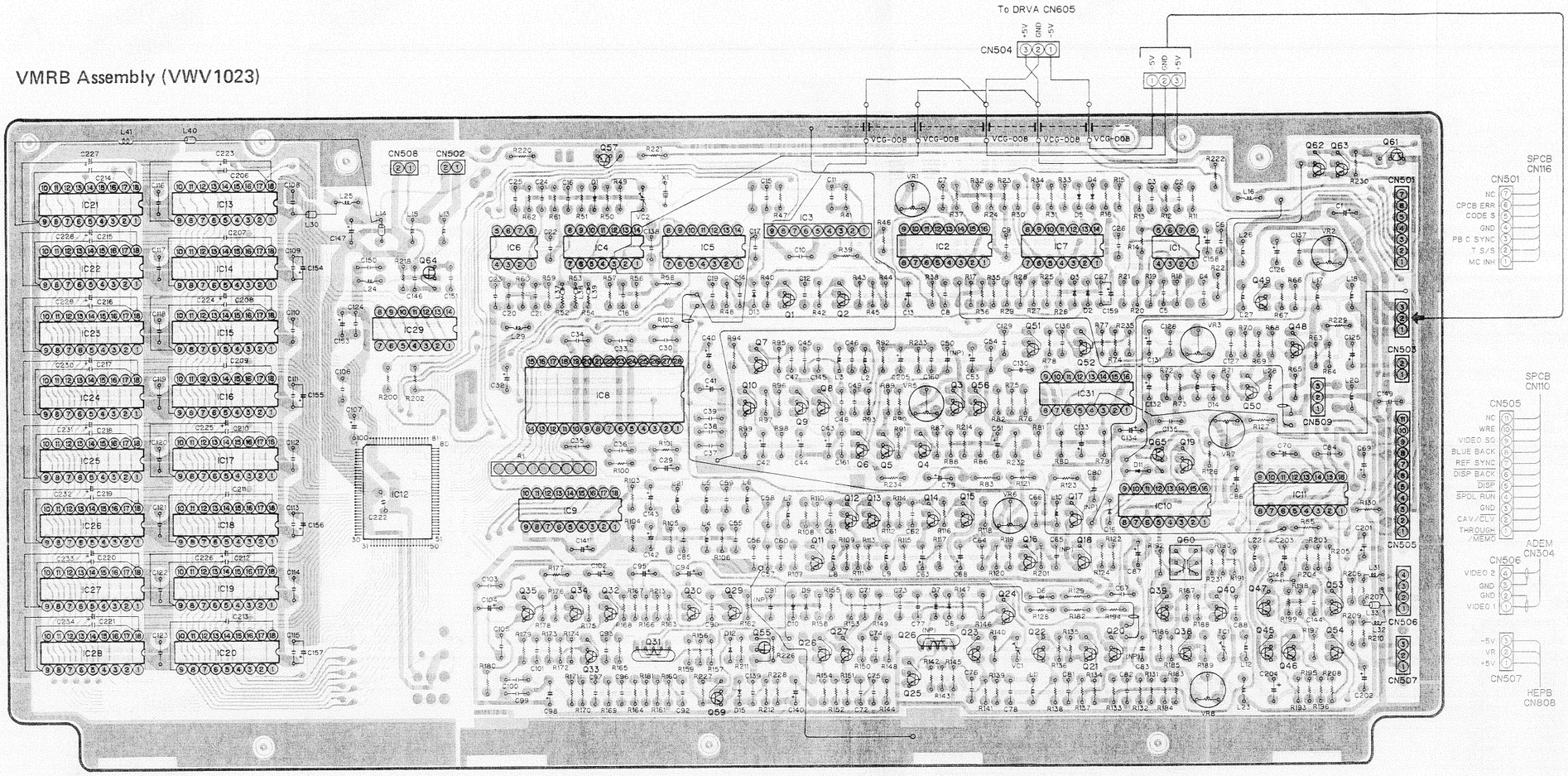
3. VOLTAGE, CURRENT:
   : DC voltage (V) at no input signal
   Value in ( ) is DC voltage at rated power.
   ⇨ mA: DC current at no input signal.

4. OTHERS:
   ➡ : Signal route.
   ⊘ : 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.

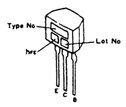
This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

VMRB Assembly (VWV1023)

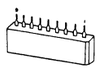


8.9 DCRB ASSEMBLY

2SA933S
2SC1740S



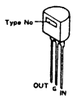
AN6581



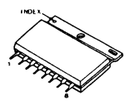
M5218L

NJM4558S
PA0017
PA0023

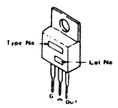
NJM78L05A



MB3763



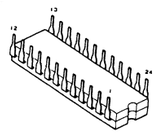
NJM79M05A
NJM79M15A



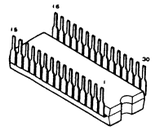
2SD1226M

2SD973A

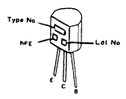
CXL1004P



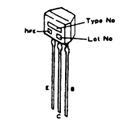
M54940P
CXL1004P-1



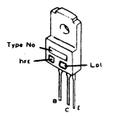
2SC2060



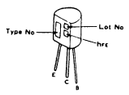
UN4112
UN4212



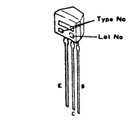
2SB950A
2SB1016
2SD1267



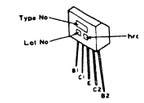
2SC1627



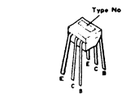
DTC114ES

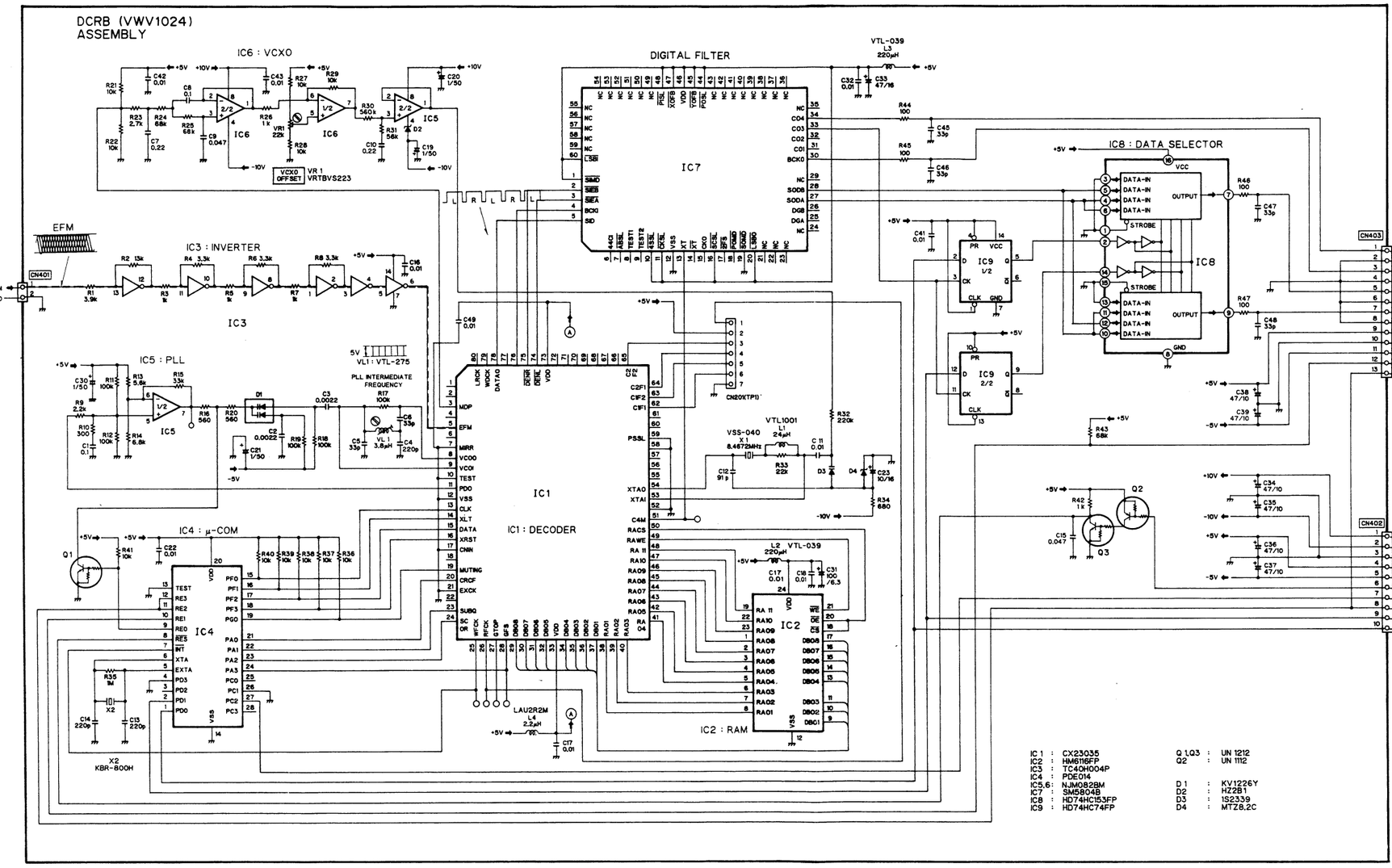


2SC1583

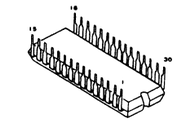


2SC3064

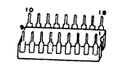




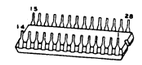
PA3020
PA5009



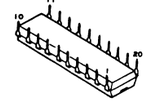
PD0012A
PA3018



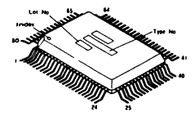
PDE014
PM4001



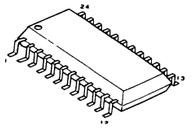
PD5029



CX23035

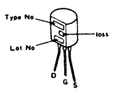


HM6116FP

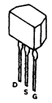


UN1112
UN1212
2SB793A

2SK117

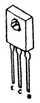


2SK192A



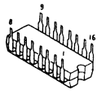
2SC1674
2SC3544

2SC1847
2SA886



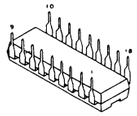
TC4011BP
TC74HC4066P
SN74ALS04AN
TC74HC04P

PA0009
PA9003
PCM56P
TC4053BP
TC40H004P
SN74LS541N

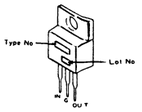


NJM4558D
NJM4556DE
PM0001
NJM353D
NJM5534DD
IR9393
TL082CP

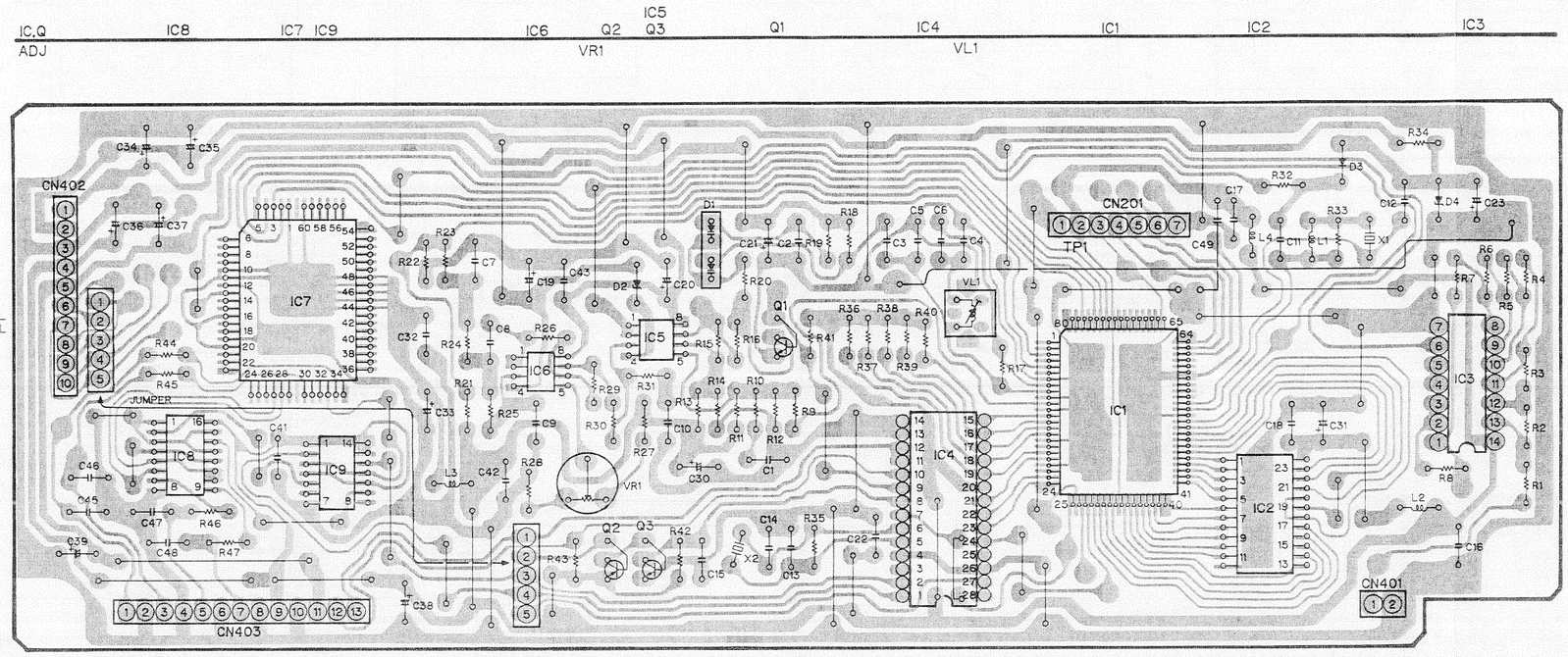
HA12043



NJM78M05A
NJM78M15A



DCRB Assembly (VWV1024)



SPCB CN112 — CN402

1	+10V
2	-10V
3	GND
4	+5V
5	-5V
6	RESET II
7	AUTO DIGITAL
8	DIGITAL
9	CH1 SQ
10	CH2 SQ

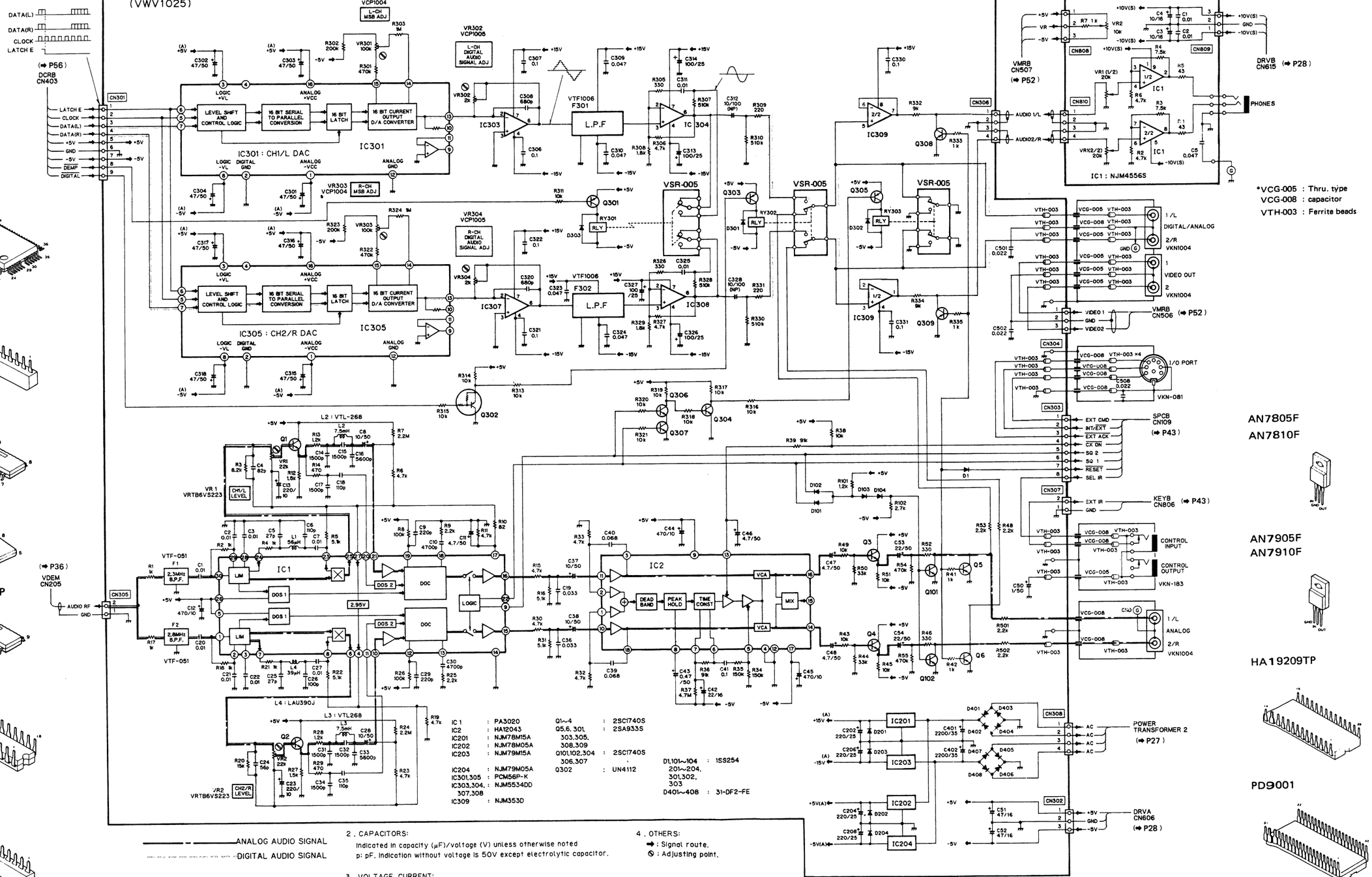
CN403 — ADEM CN301

1	LATCH ERR
2	GND
3	CLOCK
4	GND
5	DATA(L)
6	GND
7	DATA(R)
8	GND
9	+5V
10	GND
11	-5V
12	DEMP
13	DIGITAL

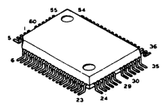
CN401 — SRVB CN703

1	EFM
2	GND

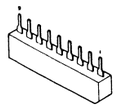
8.10 ADEM AND HEPB ASSEMBLY



SM5804B



TC5081AP

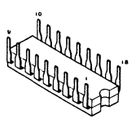


HD74HC74FP

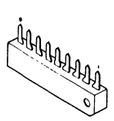
NJM082BM

HD74HC153FP

MN4264



NJM2903S
NJM4556S



AN7805F
AN7810F

AN7905F
AN7910F

HA19209TP

PD9001

1. RESISTORS:
Indicated in Ω, 1/8W, 1/4W, ±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.
⦸ : 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.

VMRB ASSEMBLY (VWV1023)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC8	HA19209TP
★★	IC7	IR2339
★★	IC1	IR9393
★★	IC9	MB40778
★★	IC13–IC28	MN4264-15
★★	IC11, IC31	PA9003
★★	IC12	PD3080
★★	IC29	SN74ALS04AN
★★	IC2	SN74LS221N
★★	IC10	TC4053BP
★★	IC3	TC5081AP
★★	IC4	TC74HC04P
★★	IC5	TC74HC4066P
★★	IC6	TL082CP
★★	Q62, Q63, Q65	UN4112
★★	Q24, Q57, Q61	UN4212
★★	Q4, Q5, Q11, Q13, Q15, Q21, Q38, Q39, Q46, Q49, Q53, Q54	2SA933S
★★	Q26, Q31	2SC1583
★★	Q1–Q3, Q6–Q10, Q12, Q14, Q16–Q20, Q22, Q23, Q25, Q27–Q30, Q32–Q35, Q40, Q45, Q47, Q48, Q50–Q52, Q56, Q59	2SC1740S
★★	Q55	2SK117
★★	Q60	2SC3064
★★	Q64	2SK192A
★	D13–D15	SVC321SP
★	D1–D12, D16	1SS254

COILS

Mark	Symbol & Description	Part No.
	L8, L9 (15μH)	LAU150J
	L6 (22μH)	LAU220J
	L5 (39μH)	LAU390J
	L2 (4.7μH)	LAU4R7K
	L4, L10 (47μH)	LAU470J
	L12 (5.6μH)	LAU5R6K
	L7 (56μH)	LAU560J
	L3, L24 (6.8μH)	LAU6R8K
	L14, L35–L39, L41, L33, L30	VTH-008
	L13 (1μH)	VTL-011
	L25 (2.2μH)	VTL-015
	L1 (6.8μH)	VTL-021
	L15, L21–L23 (10μH)	VTL-023
	L11 (12μH)	VTL-024
	L16 (100μH)	VTL-035
	L17, L18, L20, L26–L29 (100μH)	VTL-121
	L40 (22μH)	VTL-027
	L31, L32, L34	LAU3R3K

CAPACITORS

Mark	Symbol & Description	Part No.
	VC1, VC2 Ceramic trimmer	VCM-009
	TC1 Ceramic trimmer	VCM-006
	C148	CCCCH220J50
	C55, C60	CCCCH270J50
	C49, C64, C66	CCCCH390J50
	C56, C57	CCCCH470J50
	C58	CCCCH510J50
	C16	CCCCH560J50
	C46	CCCCH680J50
	C78	CCCSL131J50
	C19, C90	CCCSL151J50
	C81	CCCSL161J50
	C61, C62	CCCSL201J50
	C47, C48, C76	CCCSL221J50
	C88	CCCSL271J50
	C2–C5, C82, C101, C129	CCCSL331J50
	C71	CCDCH080D50
	C45	CCDCH101J50
	C67	CCDSL121J50
	C92	CCDSL181J50
	C59	CCPUCH100J50
	C72, C85	CCPUCH150J50
	C150	CCPUCH180J50
	C152–C159	CEAS221M10
	C83, C130	CEJANPR47M50
	C65	CEJANP010M50
	C77, C91	CEJANP100M10
	C50	CEJANP4R7M16
	C80	CEJANP470M6R3
	C29	CEJAR10M50
	C141	CEJA010M50
	C140	CEJA100M16
	C51, C53, C68, C79, C94, C95, C102, C147, C203, C204	CEJA101M6R3
	C32, C40–C44, C69, C133, C142, C143	CEJA220M16
	C1, C13, C63, C70, C86, C87, C104, C107, C125, C126, C131, C132, C134, C205	CEJA470M16
	C105, C136	CFTA104J50
	C24, C25, C160	CGCYX473K25
	C161	CGCYX473M25
	C30, C137	CKCYB222K50
	C20, C21	CKCYB472K50
	C10, C12, C14, C15, C18, C33–C36, C73, C74, C84, C93, C96, C97, C99, C103, C128, C135	CKCYF103Z50
	C127, C139	CKPUYB102K50
	C6, C9, C17, C22, C23, C26, C27, C37–C39, C54, C106, C108–C124, C138, C144–C146, C149, C151	CKPUYF223Z25

Mark	Symbol & Description	Part No.
	C8	CQMA102J50
	C7, C11	CQMA222J50
	C75	CQMA392J50
	C100	CQMA512J50
	C201, C202 (470/6.3)	VCH1012

RESISTORS

Mark	Symbol & Description	Part No.
★	VR1 (10kΩ)	VRTB6VS103
★	VR5, VR6 (3.3kΩ)	VRTB6VS332
★	VR8	VRTB6VS471
★	VR7	VRTB6VS472
★	VR3 (1kΩ)	VRTG6VS102
★	VR2 (4.7kΩ)	VRTG6VS472
	R1	RA8S102J
	R95–R98, R187, R189	RN1/6PQ□□□□□F
	Other resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
★	X1 Crystal oscillator (9.06MHz)	VSS1006

VDEM ASSEMBLY (VWV1002)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC2	AN7805F
★★	IC1	AN7905F
★★	IC7	CXL1004P
★★	IC6	CXL1004P-1
★★	IC8	PA0017
★★	IC3	PA0023
★★	IC4	PA3018
★★	IC5	PM0001
★★	Q31	UN4112
★★	Q32	UN4212
★★	Q11, Q14, Q24, Q29, Q30	2SA933S
★★	Q25, Q26	2SC1674
★★	Q1–Q10, Q13, Q16, Q20–Q23, Q27, Q28	2SC1740S
★★	Q12, Q15	2SC3544
★	D1–D3	1SS254

COILS AND FILTERS

Mark	Symbol & Description	Part No.
	L6–L9 (12μH)	VTL-024
	L21 (18μH)	VTL-026
	L3, L24 (22μH)	VTL-027
	L2 (33μH)	VTL-029
	L23 (68μH)	VTL-033
	L10 (27μH)	VTL-028
	L22 (15μH)	VTL-025
	L11 (220μH)	VTL-039
	L4, L5 (390μH)	VTL-042
	L12, L13 (62μH)	VTL-048
	L1 (36μH)	VTL-055
	F1–F8 3 terminals filter	VTH1001

CAPACITORS

Mark	Symbol & Description	Part No.
	C23, C27, C57, C203	CCCCH080D50
	C91, C93	CCCCH100D50
	C21, C184	CCCCH120J50
	C79	CCCCH121J50
	C56, C204	CCCCH150J50
	C22, C80, C214	CCCCH180J50
	C43, C50, C51	CCCCH181J50
	C217	CCCCH200J50
	C81	CCCCH220J50
	C106	CCCCH240J50
	C24, C165	CCCCH270J50
	C92	CCCCH330J50
	C61, C188	CCCCH390J50
	C36, C44	CCCCH470J50
	C34, C163	CCCCH680J50
	C164, C187	CCCCH750J50
	C96, C97, C104, C105	CCCCH820J50
	C59	CCCSL151J50
	C103	CCCSL241J50
	C95	CCCSL271J50
	C102	CCCSL331J50
	C94	CCCSL391J50
	C82	CEJANP3R3M50
	C78	CEJANP4R7M25
	C178	CEJAR10M50
	C1, C4, C169, C193	CEJA100M16
	C54, C170, C194	CEJA3R3M50
	C26, C218, C219	CEJA4R7M50
	C12, C29, C33, C35, C41, C47, C48, C53, C71, C72, C74, C75, C98, C100, C107, C109, C122, C123, C132, C135, C136, C138, C141, C143–C145, C148, C149, C161, C166, C171, C189, C195, C211, C215	CEJA470M16
	C11, C14, C15,C77,C113,C131, C133, C134, C137, C139, C140, C142, C146, C147, C167, C168, C172, C173, C175, C176, C179–C181, C185, C190, C191, C196–C202, C212, C216	CGCYX473M25
	C58, C60	CKCYB102K50
	C62	CKCYB331K50
	C3, C6, C13, C25, C28, C30–C32, C42, C45, C46, C49, C52, C55, C63, C73, C76, C83, C84, C99, C101, C108, C110–C112, C121, C124, C162, C174, C177, C182, C183, C186, C192, C213	CKCYF103Z50
	C2, C5 (470/6.3)	VCH1011

RESISTORS

Mark	Symbol & Description	Part No.
★	VR1, VR2, VR4, VR5 (1kΩ)	VRTG6VS102
★	VR3 (2.2kΩ)	VRTG6VS222
★	VR6 (4.7kΩ)	VRTG6VS472
	Other resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	24 Pin IC socket	VKH1002
★	DL1 220 NSEC Delay line	VTF-063

DCRB Assembly (VWV1024)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC1	CX23035
★★	IC8	HD74HC153FP
★★	IC9	HD74HC74FP
★★	IC2	HM6116FP-2 (HM6116FP-3) (HM6116FP-4)
★★	IC5, IC6	NJM082BM
★★	IC4	PDE014
★★	IC7	SM5804B
★★	IC3	TC40H004P
★★	Q2	UN1112
★★	Q1, Q3	UN1212
★	D2	HZ2B1
★	D1	KV1226Y
★	D4	MTZ8.2C
★	D3	1S2339

COILS

Mark	Symbol & Description	Part No.
	VL1 Variable coil (3.5μH)	VTL-275
	L2, L3 (220μH)	VTL-039
	L1 (24μH)	VTL1001
	L4 (2.2μH)	LAU2R2M

CAPACITORS

Mark	Symbol & Description	Part No.
	C12	CCCCH910J50
	C13, C14	CCCSL221J50
	C4	CCCUJ221J50
	C5, C6, C45–C48	CCCUJ330J50
	C19–C21, C30	CEAL010M50
	C23	CEAL100M16
	C31	CEAL101M6R3
	C33, C35, C37–C39	CEAL470M16
	C11, C16–C18, C22, C32, C41–C43	CKCYF103Z50
	C15	CKCYF473Z50
	C49	CKDYF103Z50
	C34, C36	CEAS470M16
	C1, C8	CQMA104J50
	C2, C3	CQMA222J50
	C7, C10	CQMA224J50
	C9	CQMA473J50

RESISTORS

Mark	Symbol & Description	Part No.
★	VR1 (22kΩ)	VRTB6VS223
	Other resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
★	X2 Ceramic oscillator	KBR-800H
★	X1 Crystal oscillator (8.4672MHz)	VSS-040

ADEM ASSEMBLY (VWV1025)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC2	HA12043
★★	IC309	NJM353D
★★	IC303, IC304, IC307, IC308	NJM5534DD
★★	IC202	NJM78M05A
★★	IC201	NJM78M15A
★★	IC204	NJM79M05A
★★	IC203	NJM79M15A
★★	IC1	PA3020
★★	IC301, IC305	PCM56-K
★★	Q5, Q6, Q301, Q305, Q303, Q308, Q309	2SA933S
★★	Q1–Q4, Q101, Q102, Q306, Q307, Q304	2SC1740S
★★	Q302	UN4112
★	D1, D101–D104, D201–D204, D301–D303	1SS254
★	D401–D408	31DF2

RELAY

Mark	Symbol & Description	Part No.
★	RY301–RY303 Relay	VSR-005

COILS AND FILTERS

Mark	Symbol & Description	Part No.
	L4	LAU390J
	L1	LAU560J
	L2, L3 Coil T (7.5MH)	VTL-268
	F1 B.P.F. (2.3MHz)	VTF-051
	F2 B.P.F. (2.8MHz)	VTF-052
	F301, F302 Low-pass filter (20kHz)	VTF1006

CAPACITORS

Mark	Symbol & Description	Part No.
	C26	CCCCH101J50
	C6, C18, C35	CCCCH111J50
	C9, C29	CCCCH221J50
	C5, C25	CCCCH270J50
	C24	CCCCH560J50
	C4	CCCCH820J50
	C43	CEANLR47K50
	C42	CEANL220K16
	C50	CEAS010M50
	C8, C28, C37, C38	CEAS100M50
	C53, C54	CEAS220M50
	C13, C23	CEAS221M10
	C11, C46–C48	CEAS4R7M50
	C51, C52	CEAS470M16
	C12, C44, C45	CEAS471M10
	C41	CFTA104J50
	C39, C40	CFTA683J50
	C330, C331	CFTXA104J50
	C1–C3, C7, C20–C22, C27	CKCYF103Z50
	C501, C502	CKCYF223Z50
	C14, C15, C17, C31, C32, C34	CQMA152J50
	C19, C36	CQMA333J50
	C10, C30	CQMA472J50
	C16, C33	CQMA562J50
	C306, C307, C321, C322	PCL-057
	C202, C204, C206, C208	PCL-068
	C309, C310, C323, C324 (0.047μF)	VCE1001
	C308, C320 (680 pF)	VCE1005
	C311, C325 (10000pF)	VCE1006
	C313, C314, C326, C327 (100/25)	VCH1007
	C401, C402 (2200/35)	VCH1014
	C301–C304, C315–C318 (47/50)	VCH1023
	C312, C328 (10/100)	VCH1025

RESISTORS

Mark	Symbol & Description	Part No.
★	VR301, VR303 (100 kΩ)	VCP1004
★	VR302, VR304 (2 kΩ)	VCP1005
★	VR1, VR2 (22 kΩ)	VRTB6VS223
	R309, R331 (220)	PCN-004
	R15, R16, R30, R31, R43–R46, R48–R55, R501, R502	RDR1/4PM□□□J
	R37	RD1/4VM475J
	R4, R10, R11, R21	RN1/6PQ□□□□F
	R305, R326 (330/0.5W)	VCN1006
	R306, R327 (4.7 k/0.5 W)	VCN1008
	R307, R310, R328, R330 (510 k/0.5 W)	VCN1009
	R302, R323 (200 k/0.5 W)	VCN1010
	R301, R322 (470 k/0.5 W)	VCN1011
	R303, R324 (1 M/0.5 W)	VCN1012
	R308, R329 (1.8 k/0.5 W)	VCN1013
	Other resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description		Part No.
	JA	8P DIN socket	VKN-081
	JA	2P terminal	VKN-183
		6P terminal	VKN1004

HEPB Assembly

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
★★	IC1	NJM4556S

CAPACITORS

Mark	Symbol & Description	Part No.
	C3, C4	CEJA100M16
	C5	CGDYX473M25
	C1, C2	CKDYF103Z50

RESISTORS

Mark	Symbol & Description		Part No.
★	VR1	(20kΩ)	VCS-037
★	VR2	(10kΩ)	VCS1004
		Other resistors	RD1/4VM□□□J

OTHERS

Mark	Symbol & Description		Part No.
	JA1	Stereo miniature phone jack	VKN1009

DRVA ASSEMBLY (VYR1006)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC2	AN7805F
★★	IC3	AN7905F
★★	Q31	2SD1267
★	D15–D22	SM1.5-02
★	D26	HZ11B2
★	D1–D14	1SR35-100AVL
★	D24, D25	1SS254

CAPACITORS

Mark	Symbol & Description		Part No.
	C4, C6		CEAS101M10
	C1		CEAS222M25
	C2		CEAS470M25
	C9, C10	(2200/25)	VCH-039
	C5, C11, C12	(2200/25)	VCH1028
	C3	(4700/10)	VCH1029
	C7, C8		VCH1030

RESISTOR

Mark	Symbol & Description	Part No.
	R41	RD1/4VM221J

DRVB Assembly (VYR1007)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC6	AN7905F
★★	IC5	AN7910F
★★	IC7	NJM4558D
★★	Q9	UN4212
★★	Q4	2SA933S
★★	Q8	2SB1016
★★	Q3	2SB950A
★★	Q6	2SC1627
★★	Q1, Q5	2SC1740S
★★	Q7, Q10	2SD1267
★	D34	HZ5C3
★	D36, D37	S2K20
★	D32, D33	1SS254
★	D38	HZ11B2

COILS

Mark	Symbol & Description		Part No.
	L12	Choke coil	VTT1016
	L11	Choke coil	VTT1010

CAPACITORS

Mark	Symbol & Description	Part No.
	C44, C46	CCCSL471J50
	C48, C61	CEAS100M50
	C32–C36	CEAS101M25
	C43	CEAS221M25
	C47	CEAS221M50
	C31	CEAS471M25
	C57	CEANP470M10
	C37, C38	CEAS470M25
	C42	CEAS471M10
	C39	CKCYB101K50
	C45	CKCYB102K50
	C40	CKCYB681K50

RESISTORS

Mark	Symbol & Description		Part No.
	R19–R22		RN1/6PQ2202F
	R17	(1W, 2.7Ω)	VCN-100
	R18	Wire wound resistor (3W, 1.2Ω)	VCN-131
	R25		RN1/4VM221J
		Other resistors	RD1/6PM□□□J

DRVC ASSEMBLY

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC51	MB3763
★★	Q51	2SA933S
★★	Q52, Q53	2SC1740S
★	D56, D57	HZ15-3
★	D58	HZ5C2
★	D54, D55, D59, D60	1SR35-100AVL
★	D51, D52	1SS252
★	D53	1SS254

CAPACITORS

Mark	Symbol & Description	Part No.
	C52	CEAS220M16
	C53–C55	CEAS221M50
	C51	CEAS3R3M50
	C56	CEAS470M50

RESISTORS

Mark	Symbol & Description	Part No.
	R71–R80	RD1/6PM□□□J

PWSB ASSEMBLY

SWITCH

Mark	Symbol & Description		Part No.
⚠ ★★	S1	Power switch	VSA-010

FILTER

Mark	Symbol & Description		Part No.
⚠	L1	Line filter	VTL-157

CAPACITORS

Mark	Symbol & Description		Part No.
⚠	C1–C3	Capacitor for power source	RCG-009

LSFB ASSEMBLY

FILTER

Mark	Symbol & Description		Part No.
⚠	L2	Line filter	VTL-157

KEYA ASSEMBLY

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC1	M54940P
★	D1–D6	SLV-31VC3

CAPACITORS

Mark	Symbol & Description	Part No.
	C2	CEJA220M50
	C5	CEJA470M16
	C4, C7, C8	CGCYX473M25
	C6	CKCYB102K50
	C1, C3	CKDYF473Z50

RESISTORS

Mark	Symbol & Description	Part No.
	R1–R5	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description		Part No.
	V1	Fluorescent indicator tube	VAW1001

KEYB Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★	D101–D103	SLV-31VC3

SWITCH

Mark	Symbol & Description		Part No.
★★	S1–S11	Tact switch	VSC-012

CAPACITOR

Mark	Symbol & Description	Part No.
	C101	CEJA101M6R3

RESISTOR

Mark	Symbol & Description	Part No.
	R101–R104	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description		Part No.
		IR light receiving unit	VXX1021 (VXX-538)

SRVB Assembly (VYS1001)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC5	AN6581P
★★	IC8	M5218L
★★	IC6	NJM2903S
★★	IC9	NJM4556DE
★★	IC7	NJM4558D
★★	IC1–IC4	NJM4558S
★★	IC12	NJM78L05A
★★	IC11	PM4001
★★	Q37, Q39, Q43	UN4112
★★	Q24, Q36, Q38, Q42	UN4212
★★	Q35	2SA886
★★	Q14, Q19, Q45, Q46, Q3	2SA933S
★★	Q31, Q33, Q41	2SB793A
★★	Q4, Q15	2SC1674
★★	Q5, Q9–Q13, Q16, Q20–Q23, Q25, Q26, Q29	2SC1740S
★★	Q34	2SC1847
★★	Q28, Q30, Q32, Q40	2SD973A
★★	Q27, Q44, Q47	2SK184
★	D26, D27	HZ3B3
★	D11, D22	MTZ5.6C
★	D5–D10, D12–D14, D23–D25, D28–D30, D17–D20	1SS254
★	TH1	D33A

CAPACITORS

Mark	Symbol & Description	Part No.
	C1	CCCCH020C50
	C2	CCCCH060D50
	C3	CCCCH120J50
	C86	CCCSL101J50
	C67	CCCSL151J50
	C35	CCCCH680J50
	C85	CCSL331J50
	C26, C98, C109–C112	CEAL4R7M50
	C72	CEANPR47M50
	C44, C59, C84, C5	CEALNP010M50
	C73, C91	CEANP220M16
	C43, C79	CEANP3R3M50
	C83, C105	CEANP4R7M25
	C6, C7, C9, C93, C95, C106	CEAS010M50
	C10, C24, C62, C117	CEAS100M50
	C60	CEAS101M10
	C48, C53, C56	CEAL220M16
	C34, C39, C40, C68, C69, C71, C97, C113	CEAS4R7M50
	C29	CEAS470M25
	C118, 119	CEAS251M25

Mark	Symbol & Description	Part No.
	C115	CEAS471M10
	C47	CKCYB102K50
	C89, C103, C76, C102	CKCYF103Z50
	C49, C52, C55	CKCYX473M25
	C4, C8, C12, C22, C23, C25, C30–C33, C36–C38, C61, C63, C64, C51, C80, C81, C87, C88, C107, C108, C54, C90, C96, C99, C114	CKPUYF223Z25
	C45, C104	CQMA102J50
	C50	CQMA103J50
	C78	CQMA104J50
	C42	CQMA183J50
	C58	CQMA223J50
	C46	CQMA224J50
	C70	CQMA273J50
	C65	CQMA392J50
	C41, C66	CQMA682J50
	C82	CQMA683J50
	C57	CQMA822J50
	C27	CQSA821J50
	C28	CQMA333J50

RESISTORS

Mark	Symbol & Description		Part No.
★	VR6	(2.2kΩ)	VRTB6VS222
★	VR2	(22kΩ)	VRTB6VS223
★	VR8	(330Ω)	VRTB6VS331
★	VR1, VR3, VR5, VR7	(4.7kΩ)	VRTB6VS472
★	VR4	(47kΩ)	VRTB6VS473
	R175, R181, R182		RD1/2PMF□□□J
	R188		RD1/4VM6R8J
	R197, R200, R203, R204		RN1/6PQ□□□□F
	R184		RS1PMF4R7J
		Other resistors	RD1/6PM□□□J

COILS AND FILTER

Mark	Symbol & Description		Part No.
	L1	(1.0μH)	VTL-011
	L2	(1.8μH)	VTL-014
	F1	LPF (1.75MHz)	VTF1005

TIMB Assembly

CAPACITORS

Mark	Symbol & Description	Part No.
	C304	CFTA104J50
	C301	CGCYX473M25
	C302, C303	CKPUYF223Z25

REGB ASSEMBLY

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC1	AN7805F
★★	Q1	DTA124ES
★★	Q2	2SK117
★	D1, D2	HZ2C2
★	D3	1S2473

CAPACITORS

Mark	Symbol & Description		Part No.
	C1		CEAS100M50
	C3		CGDYX473M25
	C2	(470/6.3)	VCH1011

RESISTORS

Mark	Symbol & Description	Part No.
	R1–R3	RD1/4VM□□□J

LMCB Assembly

There are no supply parts in the LMCB assembly.

10. ADJUSTMENT

10.1 REPLACEMENT OF PICK-UP ASSEMBLY

① Remove four connectors of SRVB Assembly and a connector of BLMB Assembly.
SRVB Assembly.....CN710, CN711, CN704, CN712, CN705 and CN 703 earth (ground boards)
BLMB Assembly.....CN8

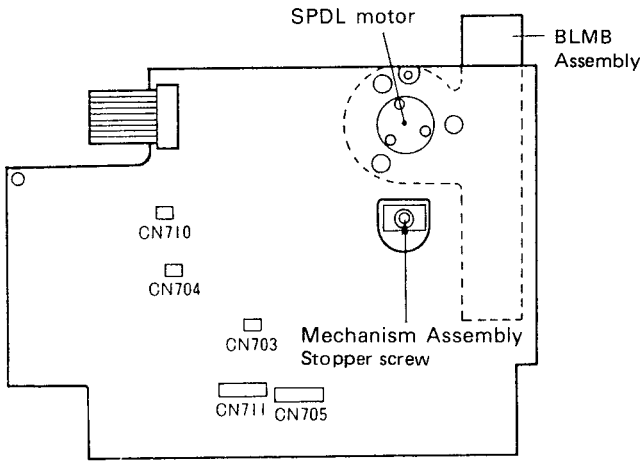


Fig. 10-1-1

② Remove the three stopper screws of the mechanism Assembly. Then, remove the mechanism Assembly from the main unit. Make sure the configuration surrounding the pick-up Assembly is as shown in Fig. 10-1-2.

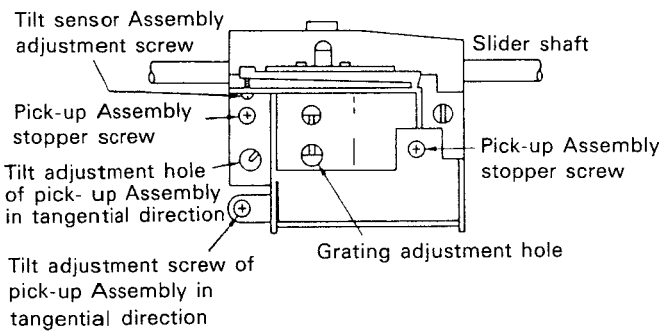


Fig. 10-1-2 Description of the parts of pick-up Assembly

③ Move the pick-up Assembly to the center of the slider shaft and remove the two stopper screws of the pick-up Assembly.

④ Remove the flexible cable connecting SRVB Assembly and the pick-up Assembly from CN701 of SRVB Assembly.

Note:
Pay special attention not to damage the connector section when handling the flexible cable. Also, do not touch the connector section of the flexible cable and soldered section of the pick-up Assembly to prevent damage of the laser diode by static electricity

⑤ Connect the flexible cable of a new pick-up Assembly to CN701 of SRVB Assembly and mount the pick-up Assembly to the slider. Adjust the angle of the pick-up Assembly so that the pick-up Assembly is set parallel to the slider shaft, then fasten stopper screw lightly. Replacement of the pick-up Assembly is completed as above.

Note:
If the stopper screw of the pick-up Assembly is fastened fully, the adjustment of the tilt of the pick-up Assembly will be difficult. Thus, it is desirable that the spring washer is not pressed in all the way.

Note:
After replacing the pick-up Assembly, make sure to adjust the mechanical and electrical sections.

10. 2 ADJUSTMENT OF THE MECHANICAL SECTION

10.2.1 Required Tools and equipment

- Two-channel oscilloscope
- Low frequency oscillator or AE oscillator
- TV monitor and Video cable
- Remote control unit.
- LD test disc
- Angular screw driver (GGV-129: For grating adjustment and tilt adjustment of the pick-up Assembly)

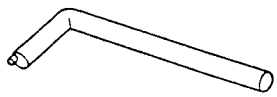


Fig. 10-2-1 Angular screw driver

- Vector scope
- Distortion analyzer

10.2.2 Preparation

① Remove SRVB Assembly along with the entire mechanism Assembly.

② Loosen the two stopper screws of the pick-up Assembly by hand so that the pick-up Assembly can be moved. Then, set the pick-up Assembly parallel to the shaft. Loosen the two screws so as not to damage the spring washers and leave the screws as they are.

③ Adjust the tilt of the Tilt-sensor with the tilt adjustment screw so that the Tilt-sensor is almost set parallel to the mounting stand.

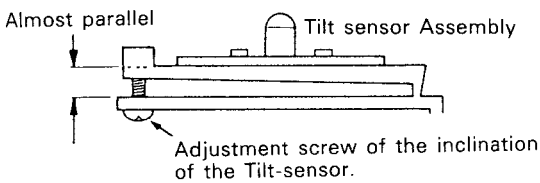


Fig. 10-2-2

④ Remove connector CN706 of SRVB Assembly.

⑤ Rotate the worm gear of the tilt motor by finger so that the lower surface of the tilt base sets parallel to the rib of the mechanism-chassis. (Refer to Fig. 10-2-3)

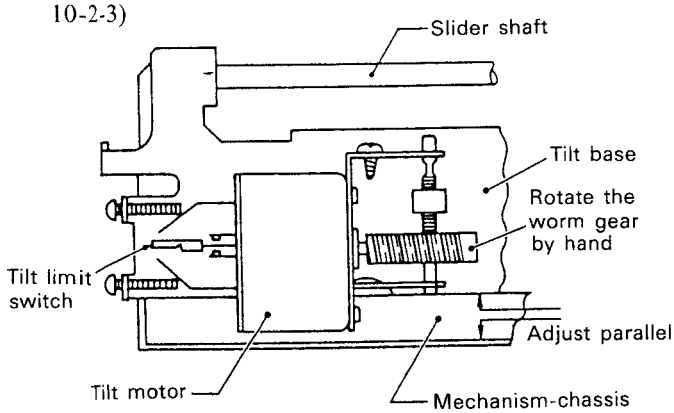


Fig. 10-2-3

Another way to rotate the worm gear is connecting a 1.5V battery to the connector of tilt motor as shown in Fig. 10-2-4.

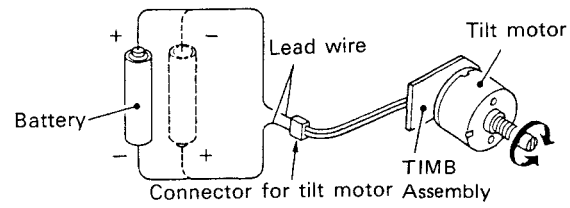


Fig. 10-2-4

⑥ Mount the mechanism Assembly to the player and connect the connectors of SRVB Assembly and BLMB Assembly (except for connector CN706 of the SRVB Assembly which should removed).

Caution: If the connector CN706 is not removed, tilt adjustment of the pick-up Assembly will be difficult.

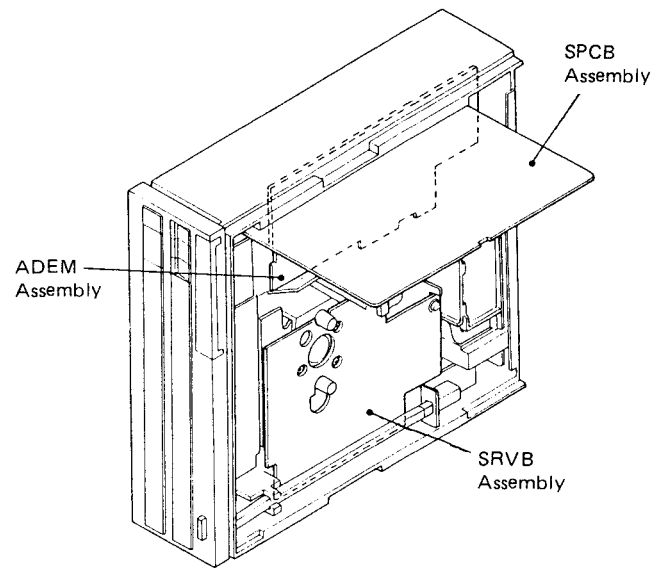


Fig. 10-2-5 The player during adjustment

Notes on adjustment

1) Set and removal of test disc

- When setting or removing the disc, the player must be setting almost horizontally.
  This player is set for the play mode automatically by inserting the disc on the disc table and pushing the table into the player.
  Next, press the removal key of the remote controller to stop the player. Wait unit the rotation of the disc stops completely, then, stand the player upright.
- Do not press the disc removal key on the front panel while the player is standing vertically. To stop the disc, press the removal key on the remote controller once.

2) Setting to open the tracking servo loop.

- Connect pins 20 and 22 of IC11 (PM4001) on the SRVB assembly to open the TRKG servo loop.
- After the slider moves on setting TRKG servo loop to OPEN, connect the base Q29 of SRVB Assembly by 22k ohm to +5V or remove the connector CN708 (slider motor).

- Set the player to perform search operation. When the tracking servo loop is set to OPEN (or can not be set to CLOSE due to some problem), the pick-up obtains near the desired position (searched position) and the search cannot be completed. Also, the image will not appeared immediately on the monitor screen.

  In this case, press the clear key of the remote controller to complete the search operation and output the image to the monitor. Also, to initiate the play mode when the tracking servo loop is set to OPEN, press the clear key when the disc is at stationary revolutions (1800rpm) in order to obtain image output.

3) The VRs (VR1 — VR8) used for '10.2 adjustment of the mechanical section' are featured on the SRVB Assembly.

4) The frame numbers of the test discs indicated in this adjustment are designed for the F Series. The frame numbers on test disc N1 and M1 are different from F Series.

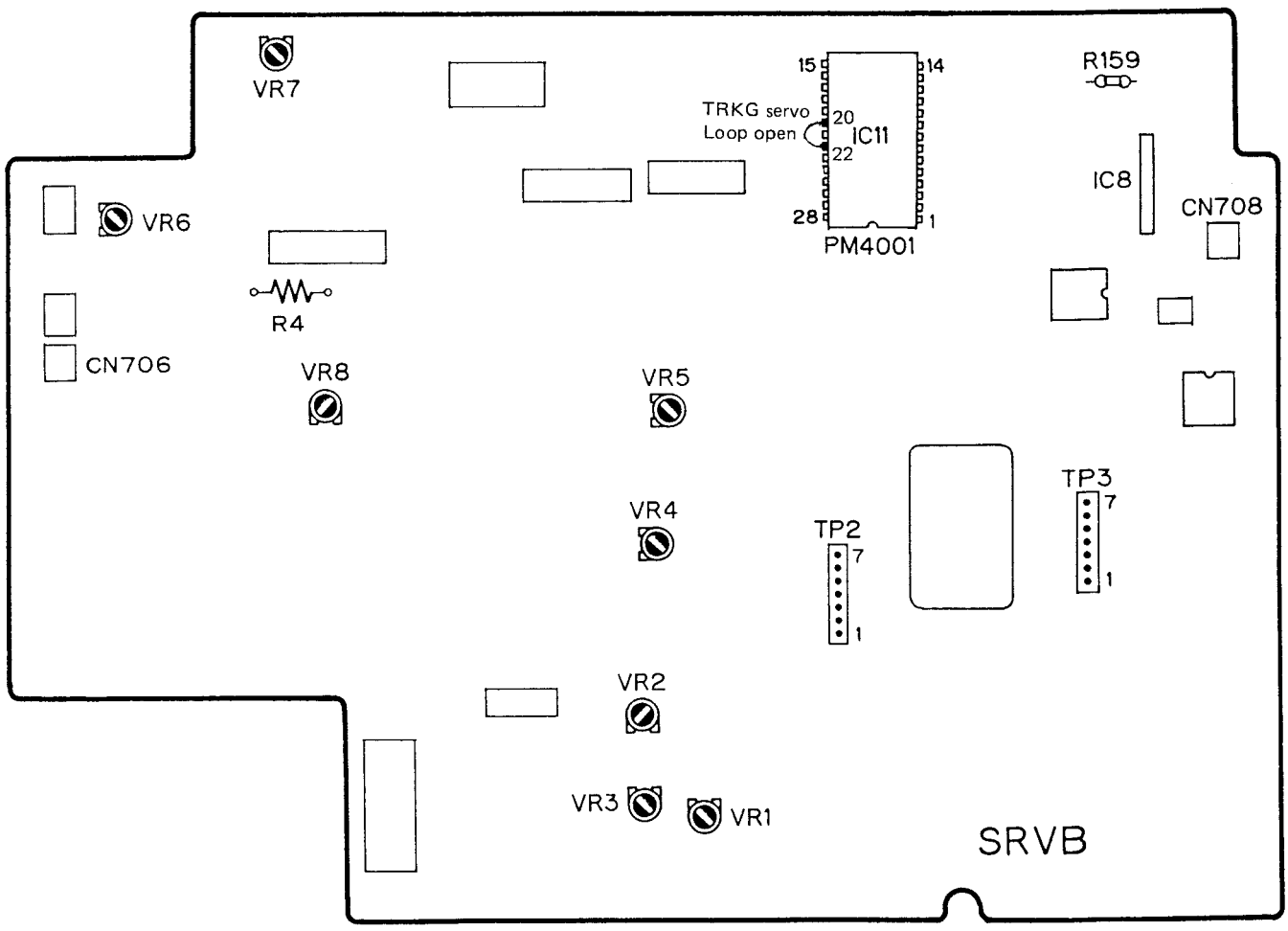


Fig. 10-2-6 Adjustment sections on SRVB Assembly

10.2.3 FOCS offset adjustment (VR1)

① Turn the POWER switch ON and set the player for the standby mode.
② Adjust VR1 so that DC voltage of TP2-3 (FOCS error signal) is set at 0V ± 5mV.

10.2.4 Rough adjustment of grating

① Remove the stopper screws of the SRVB Assembly.
② Set a test disc to PLAY mode. If the grating adjustment is far off, the PLAY lamp on the front panel will flash, but the PLAY operation will not commence. In such instances, perform the grating adjustment as follows:
③ Press the PLAY key.
④ When the spindle accelerates sufficiently, set the TRKG servo loop to OPEN.
⑤ Press the clear key on the remote controller.
⑥ Press the display selector key on the remote control to display the frame number on the TV monitor screen.
⑦ Move the pick-up Assembly to frame NO. #15000 using the Fast Foward key (plus). (When test disc N1 is used, move the pick-up Assembly to frame NO. #16000).
⑧ Set angular screw driver I to the grating as shown in Fig. 10-2-7.

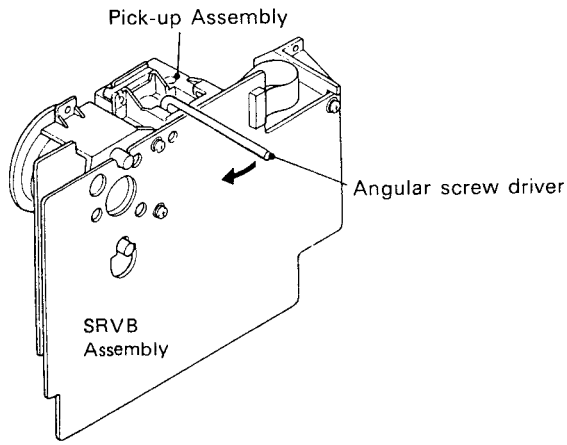


Fig. 10-2-7 Grating adjustment

⑨ Connect the oscilloscope to TP2-4 of the SRVB Assembly and observe tracking error signal. Adjust the grating angle using angular screw driver I so that the amplitude sets at minimum and the envelope of the wave form of the tracking error signal becomes smooth. (Refer to Photo 10-2-1).

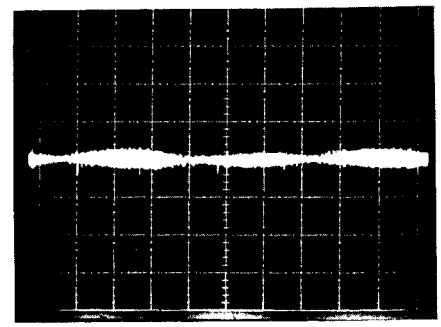


Photo 10-2-1 TRKG error wave form
(when the Loop OPEN is at minimum)

First, adjust the grating by turning the driver to the right from the above position so that the amplitude of the error signal sets at maximum.

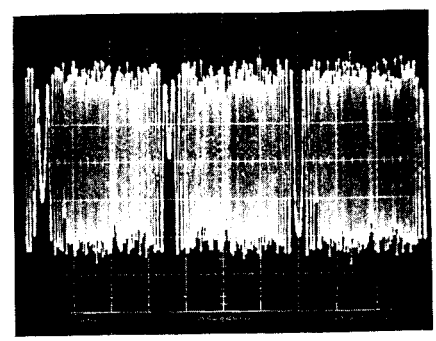


Photo 10-2-2 TRKG error wave form
(when the loop error is at maximum.)

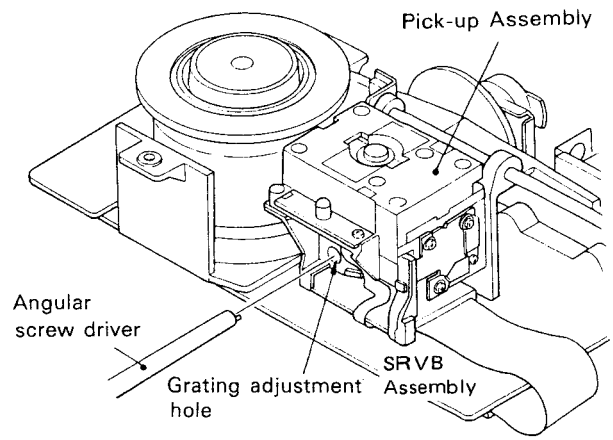


Fig. 10-2-8 Position of the grating adjustment hole

10.2.5 TRKG error balance adjustment (VR4)

*Make sure that the TRKG servo loop is set to OPEN.

① Observe the TKRG error signal of TP2-4 near frame no. #15000 and adjust VR4 so that the center of the amplitude of the wave form becomes DC0V. (Refer to Photo 10-2-3).

② Remove pins 20 and 22 of IC11 (PM4001) on the SRVB assembly to open the TRKG servo loop.

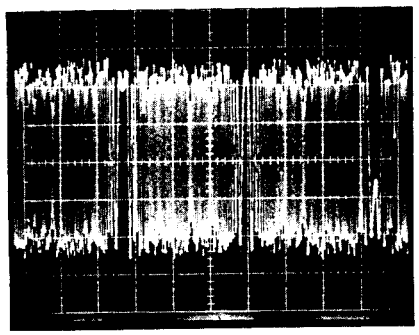


Photo 10-2-3 TRKG error wave form (when loop is open.)

10. 2. 6 Horizontal adjustment of slider shaft

① Connect the oscilloscope to the TP3-1 (FOCS COIL) of the SRVB Assembly through Low-pass filter and observe that voltage flows at the focus coil.

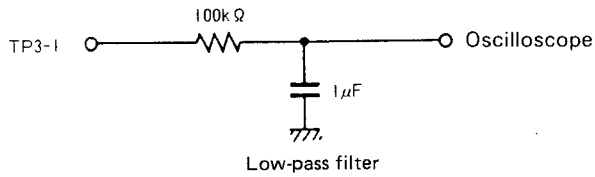


Fig. 10-2-9

② Search out frame #17000 and measure the DC voltage supplied to the focus coil.

③ Search out frame #100 and measure the DC voltage supplied to the focus coil as above. Make sure that the difference between the DC voltages measured in ② above and here in ③ is within ± 90mV.

④ When the specified voltage can not be obtained, connect the lead wire to the tilt motor connector and rotate the worm gear by battery so that DC voltage at frame #100 and #17000 becomes equal. (Refer to Fig. 10-2-4 of "Preparations" on Page 73).

10.2.7 Tilt adjustment of the pick-up Assembly

① Set TRKG servo loop to CLOSE.

② Search out frame #18914.

③ Lift the SRVB Assembly upward slightly and insert angular screw driver I into the tilt adjustment hole of the pick-up Assembly (see Fig. 10-2). Then, adjust the crosstalk to minimum by turning the driver to slowly to the right and left.

④ Search out frames #104 and #18914. Make sure that crosstalk is set at minimum for the both frames.

⑤ Fasten the stopper screw of the pick-up Assembly.

⑥ Make sure that crosstalk does not exist at frame #104. If crosstalk exists here, repeat the procedures given in **10.2.7.**

10.2.8 FOCS error balance adjustment (VR2)

① Search out frame #104.

② Adjust VR2 so that the stripes appearing on the sides of the monitor display caused by crosstalk interference are set at minimum. (Refer to Fig. 10-2-10)

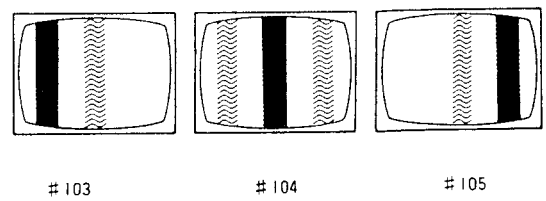


Fig. 10-2-10 Stripes arising due to crosstalk interference.

10.2.9 Tilt-sensor adjustment

① Search out frame #104.

② Insert a Phillipes screwdriver into the tilt adjustment hole of the SRVB Assembly as in Fig. 10-2-11.

③ Adjust the tilt adjustment screw of the Tilt-sensor Assembly to obtain 0 ± 50mV at the foot of R147 of the SRVB Assembly. At the same time, be sure not to allow external light to reach the sensor.

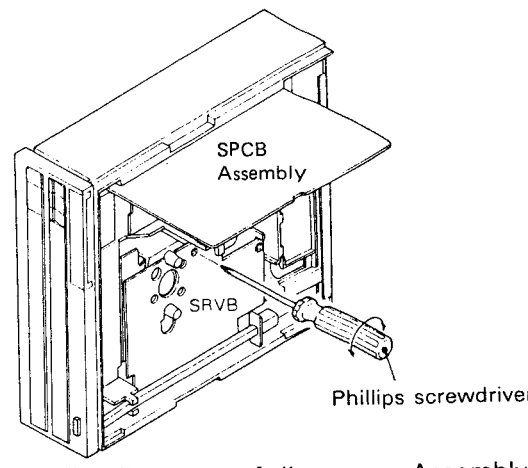


Fig. 10-2-11 Tilt adjustment of tilt sensor Assembly

④ Connect connector CN706 of SRVB assembly.
⑤ Make sure that crosstalk is set at minimum at frames #104 and #18914. If crosstalk exists here, repeat the tilt adjustment.

10.2.10 Fine adjustment of grating

* Connector CN706 of the SRVB Assembly should be connected for this procedure.
① Set the TRKG servo loop to OPEN.
② Set the oscilloscope to the X-Y mode and adjust X and Y to 0V. (Align the beam spot of the oscilloscope to the center of the CRT scale.)
Connect TP2-4 to the X-input (DC mode) and TP2-5 (TRKG(A+C) signal) to the Y-input (AC mode).
③ Press the fast forward key of the remote controller and set the position near frame #15000.
● Adjust the grating so that the Lissajous'wave form becomes horizontal. (Refer to Fig. 10-2-12.)

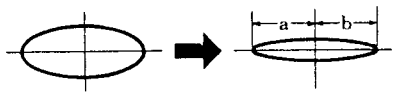


Fig.10-2-12 Fine adjustment of grating

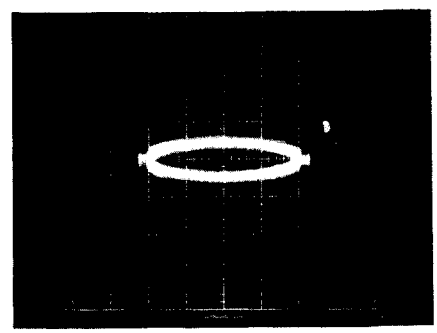
● Adjust VR4 so that the center of horizontal amplitude is positioned at the center of the CRT.

10.2.11 TRKG servo loop gain adjustment (VR5)

* Set TRKG servo loop to CLOSE.
① Connect the oscilloscope and the oscillator to TP2-4 and TP2-7 (OSC, IN) on SRVB assembly as shown in Fig. 10-2-13(a). For this procedure, set the oscilloscope to the X-Y mode.
② Search around frame #15000.
③ For output of the oscillator, refer to Table 1.
④ Adjust VR5 so that Lissajous' wave form becomes horizontal. (Refer to Photo 10-2-4.)

TEST DISC	F1	F2	F3	F4	F5	N1
Frequency (kHz)	3.0	3.7	3.3	3.3	3.3	2.7
Output (Vp-p)	1.5	1.5	1.5	1.5	1.5	1.5

Table 1:
Specified frequency and output of oscillator



X: Disturbance input signal
Y: TRKG error signal (SRVB TP2-4)

Photo 10-2-4 Lissajous' wave form (TRKG servo loop gain adjustment)

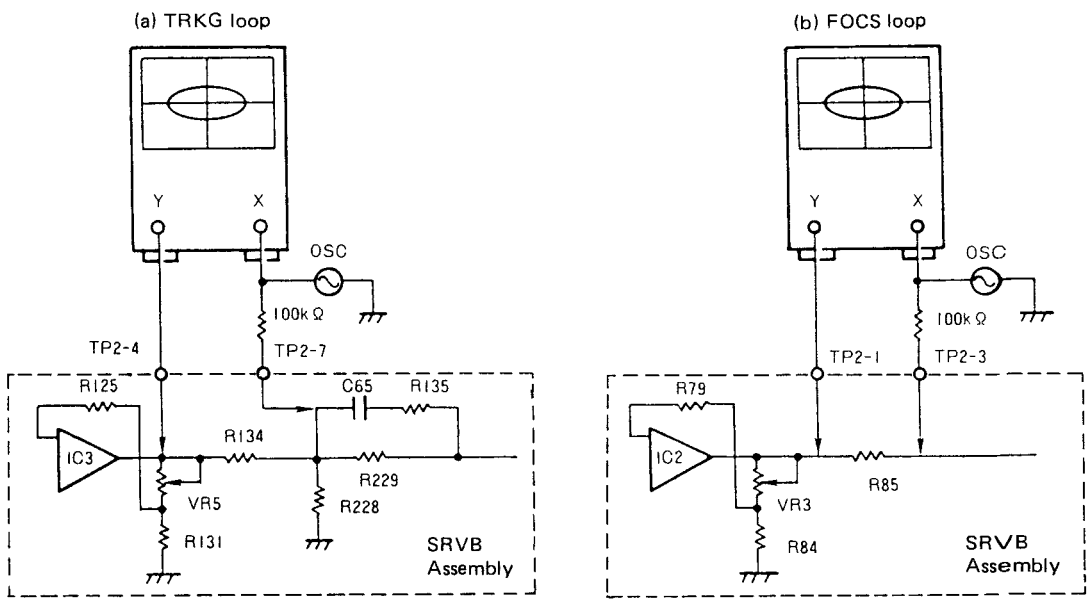


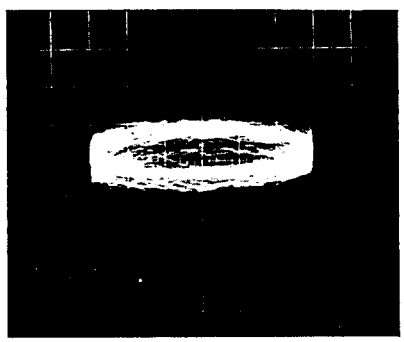
Fig. 10-2-13 Gain adjustment of TRKG servo loop and FOCS servo loop

10.2.12 FOCS servo loop gain adjustment (VR3)

① Connect the oscilloscope and the oscillator to TP2-1 and TP2-3 on SRVB assembly as shown in Fig. 10-2-13 (B).
② Connect CN714-2 of SRVB Assembly to GND.
③ Search around frame #15000.
④ For output of the oscillator, refer to Table 2.
⑤ Adjust VR3 so that the Lissajous's wave form becomes horizontal.

TEST DISC	F1	F2	F3	F4	F5	N1
Frequency (kHz)	2.1	1.7	1.7	2.0	1.7	1.5
Output (Vp-p)	5.0	5.0	5.0	5.0	5.0	5.0

Table 2:
Specified frequency and output of oscillator



X: Disturbance input signal
Y: FOCS error signal (SRVB Assembly TP2-1)

Photo 10-2-5 Lissajous' wave form (FOCS loop gain adjustment)

10.2.13 RF level adjustment (VR8)

① Search around frame #15000.
② Observe emitter Q9 (RF signal) and adjust VR8 so that the amplitude sets at 300Vp-p. (Refer to Photo 10-2- 6.)

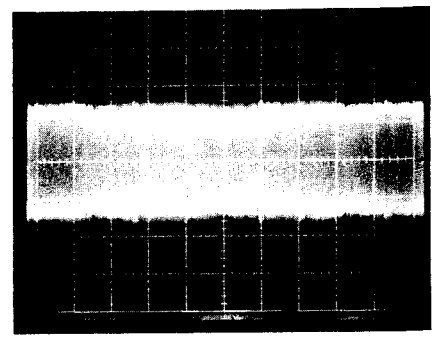


Photo 10-2-6 RF signal wave form

Notes on adjustment

Adjustments 10.2.14 and 10.2.15 should be performed in Test mode.

Setting the test mode:

- The player features a test mode for INSIDE/OUTSIDE Detecting position adjustment.
  Turn the power switch OFF while the disc table is inserted and turn the power switch ON while holding the front panel door opened.
  The test mode can be set as above. (After the power switch is turned ON, the door can be closed.)
  When the player sets at test mode, 'P' or 'L' is indicated on upper right of the monitor display. 'P' is displayed for the disc play position; 'L' is displayed when set up is out of the INSIDE and OUTSIDE positions.

10.2.14 INSIDE Position search adjustment (VR6)

Note:
When the adjustment point for VR6 is changes, be sure to adjust VR7.

① Turn VR6 fully around clockwise.
② Set the player in Test mode and then to the Play mode.
③ Operate the display selector key on the remote controller to display the frame number on the monitor. Make, sure that 'P' is indicated on upper right of the monitor.
④ Set for still at frame #500.
⑤ Turn VR6 gradually counter-clockwise and fix the adjustment when indication 'P' changes to "L".
⑥ While the player is set in the play mode, set it to still immediately after indication 'L' changes to 'P.' Make sure this setting is within frames #500 - 1200.

10.2.15 8-inch and 12-inch outside position search adjustment (VR7)

Note:
Make sure that adjustment of VR6 is completed.

1) 12-inch outside position search adjustment

① While in the Test mode, set frame #44500 for still.
② Fix the adjustment of VR7 to the position where the "P" indication changes to "L".
③ Operate the fast foward key to change indication "L" to "P". Allow the player to play starting from the position where 'P" is indicated to the position where indication "P" changes back to "L" again. Make sure that "L" is indicated within frames #44000 — 45000.

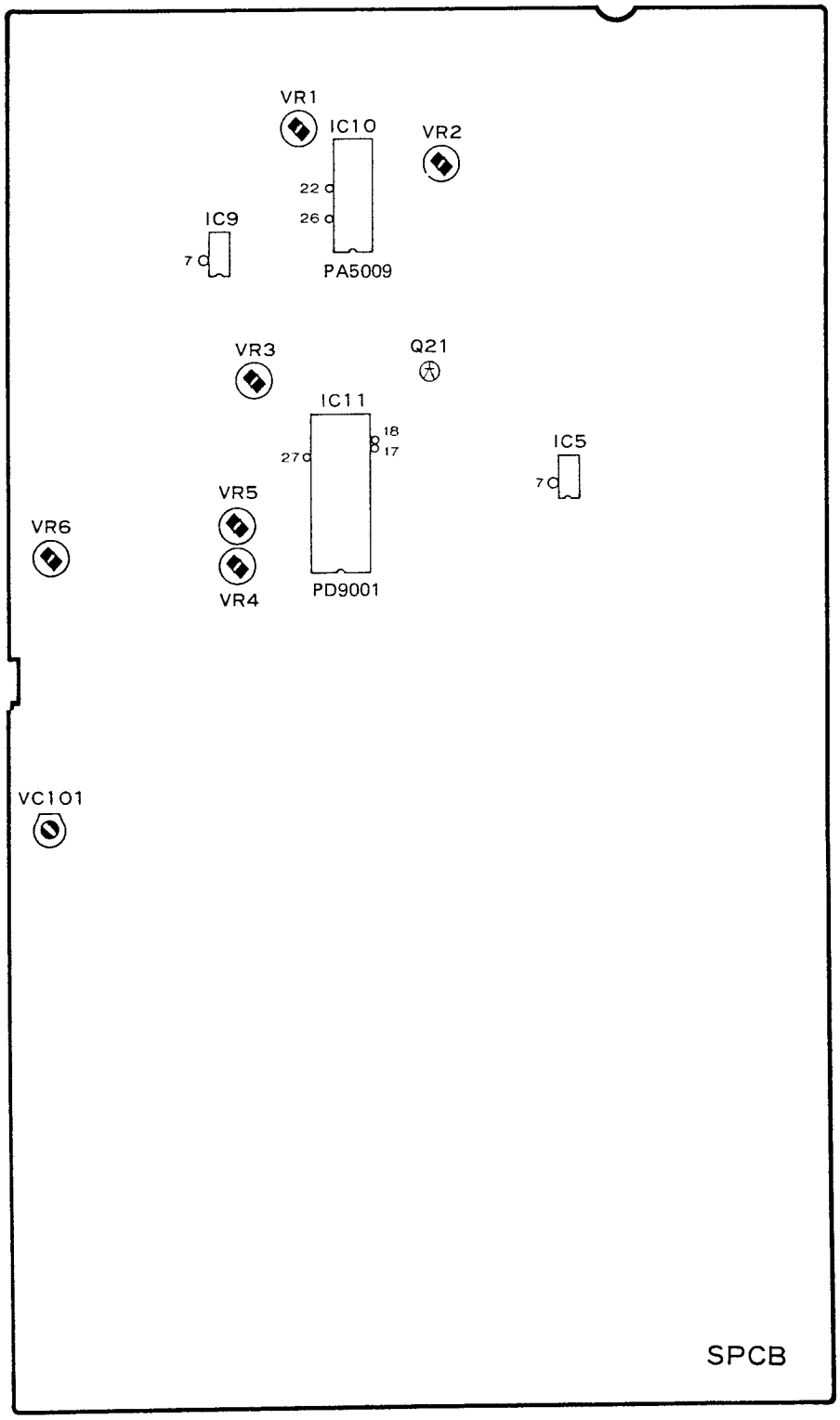
2) 8-inch outside position search adjustment

① Set a 8-inch test disc.
② Set the player in Test mode.
③ Operate in the play mode between frames #16000 — 20000 and make sure indication 'P' changes to indication 'L'.

Note:
With both 12-inch and 8-inch discs, repeat the above procedures until the specified conditions are obtained.

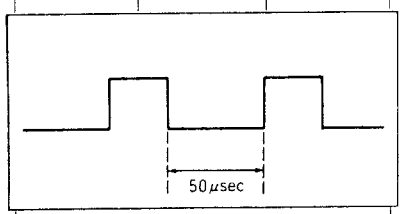
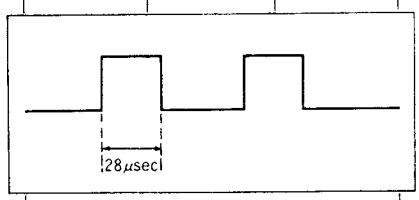
10.3 Adjustment of electrical section

10.3.1 SPCB Assembly

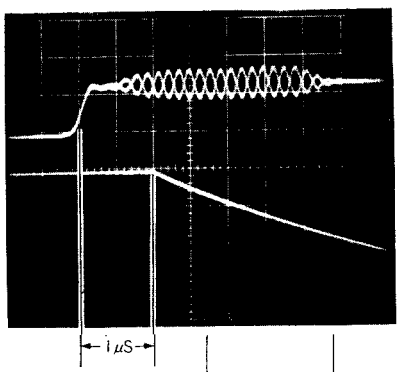


VC101: Main oscillator output frequency adjustment
VR1: Burst gate timing adjustment
VR2: Trapezoid tilt adjustment
VR3: 3.58PLL offset adjustment
VR4: Half-H rejection adjustment
VR5: FG pulse adjustment
VR6: Shift pulse width adjustment

Fig. 10-3-1 SPCB Assembly adjustment section

STEP NO.	OSCILLOSCOPE RANGE V	OSCILLOSCOPE RANGE H	TEST POINTS	ADJUST-MENT POSI-TIONS	CHECK ITEMS/ ADJUST-MENT SPECIFI-CATIONS	ADJUSTMENT PROCEDURE
						10.3.1 SPCB Assembly
	–	–	IC11 ㉗ pin	VC101	3.579545 MHz ±5Hz	**1) Main oscillator output frequency adjustment** ● Connect the frequency counter to pin ㉗ of IC11 (PD9001) and adjust VC101 to output 3.579545MHz±5Hz.
	0.5V/div	–	IC5 ⑦ pin	VR5	1.4V	**2) FG pulse adjustment** ● Play the CAV disc and adjust VR5 so that pin ⑦ of IC5 (TLR082) sets at 1.4V.
	2V/div	10μsec/ div	IC11 ⑰ pin	VR4	Pulse width 50μsec	**3) Half-H Rejection adjustment** ● Observe the wave form of pin ⑰ of IC11 (PD9001) in the play mode. ● Adjust VR4 so that the pulse width (LOW time) sets at 50μs. (Refer to Fig. 10-3-2.)
						 Fig. 10-3-2
	2V/div	10μsec/ div	IC11 ⑱ pin	VR6	Pulse width 28μsec	**4) Shift pulse width adjustment** ● Short-circuit between E and C of Q21 on the SPCB Assembly. ● Set the disc and adjust the pulse width of pin ⑱ of IC11 (PD9001) to obtain 28μsec before the SPDL LOCK state (play mode) is set. (Refer to Fig. 10-3-3.)
						 Fig. 10-3-3

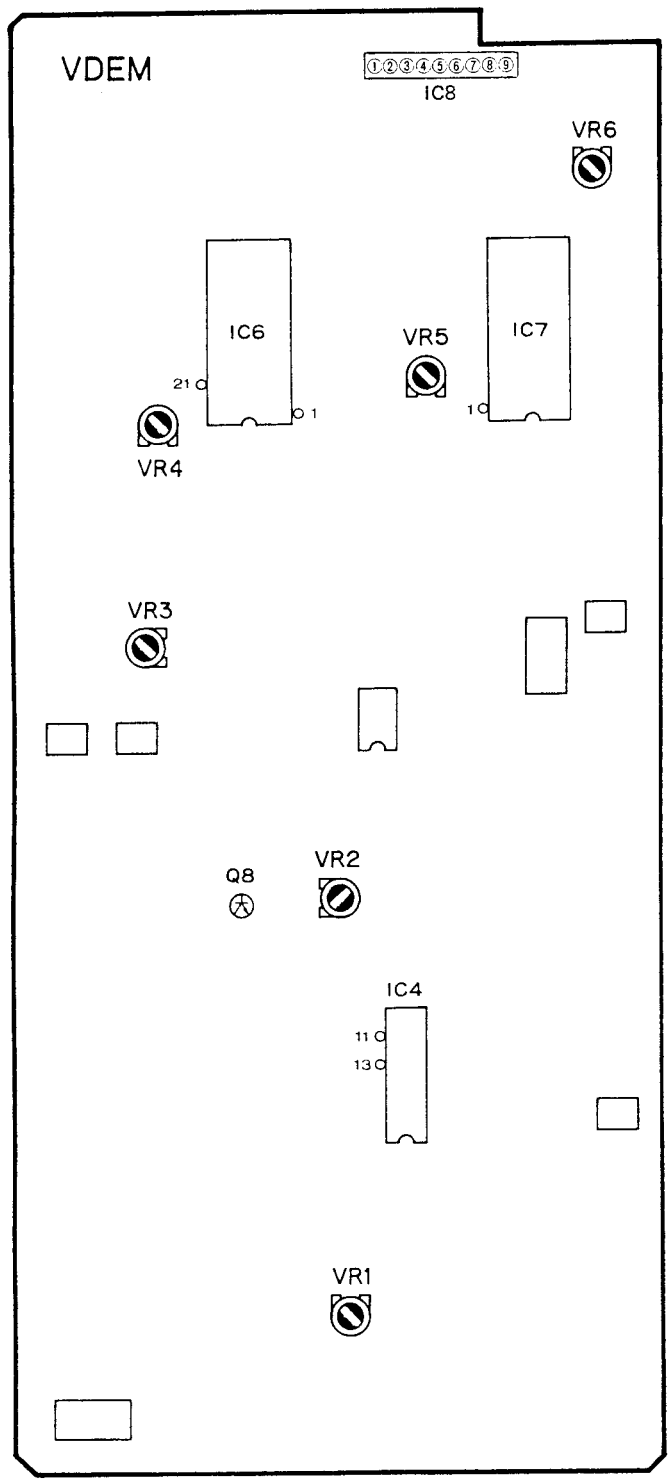
STEP NO.	OSCILLOSCOPE RANGE V	OSCILLOSCOPE RANGE H	TEST POINTS	ADJUST-MENT POSI-TIONS	CHECK ITEMS/ ADJUST-MENT SPECIFI-CATIONS	ADJUSTMENT PROCEDURE
		0.5μS	IC10 (22) pin	VR1	Wave form timing	**5) Burst gate timing adjustment** ● Adjust VR1 so that the video signal of CN115-2 and the wave form of pin (22) of IC10 (PA5009) are set at the timing shown in Photo 10-3-1.
	1V/div	–	IC9 (7) pin	VR3	0V	**6) 3.58MHz PLL offset adjustment** ● Adjust VR3 so that pin (7) of IC9 (NJM4558D) sets at 0V in the play mode.
	2V/div	–	IC10 (26) pin	VR2	Disturb-ance of wave form is mini-mum.	**7) Tilt adjustment of trapezoid wave form** ● Play the CAV disc in the still mode and observe the output signal (CPCB error) from pin (6) IC10. ● Adjust VR2 so that wave form disturbance is at minimum. Note: When wave form cannot be observed clearly, connect L.P.F.



Upper:
CN115-2
500mV/div
Lower:
IC10 (2) pin
IV/div
0.5μS/div

Photo 10-3-1

10.3.2 VDEM Assembly



VR1: Main video signal level adjustment
VR2: IH delay video signal level adjustment
VR3: Output video signal level adjustment
VR4: Output DC level adjustment
VR5: Audio CCD output DC level adjustment
VR6: VCO circuit center frequency adjustment

Fig. 10-3-4 VDEM Assembly adjustment section

STEP NO.	OSCILLOSCOPE RANGE V	OSCILLOSCOPE RANGE H	TEST POINTS	ADJUSTMENT POSITIONS	CHECK ITEMS/ ADJUSTMENT SPECIFICATIONS	ADJUSTMENT PROCEDURE
			Base Q8	VR1	0.8Vp-p	**10.3.2 VDEM Assembly** **1) Main video signal level adjustment** ● Play the test disc around #1000 of the composite test signal area. ● Observe video signal at base Q8 and adjust VR1 so that the level between the sync tip to the white peak sets at 0.8Vp-p.
			Pin ⑪ and ⑬ of IC4 (PA3018)	VR2	Video signal level	**2) IH delay video level adjustment** ● Play the test disc around #1000 of the composite test signal area. ● Observe video signal at pin ⑪ and ⑬ of IC4 (PA3018) and adjust VR2 so that video signals at pin ⑪ and at pin ⑬ set at the same level.
			Pin ㉑ and ① of IC6 (CXL-1004P-1)	VR6	Input signal, Output signal	**3) VCO circuit center frequency adjustment** ● Connect pin ⑨ of IC8 (PA0017) to GND. ➡ Time axis error is set to 0 forcefully. ● Adjust VR6 so that the output signal from pin ① of IC6 is delayed by 71.6μsec (1H+8.1μsec) from the input signal at pin ㉑ of IC6 (CXL1004P-1).

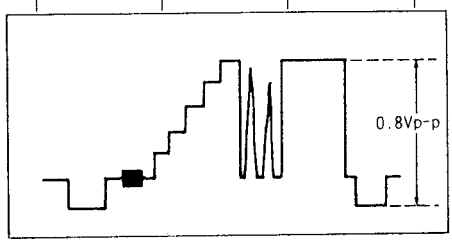
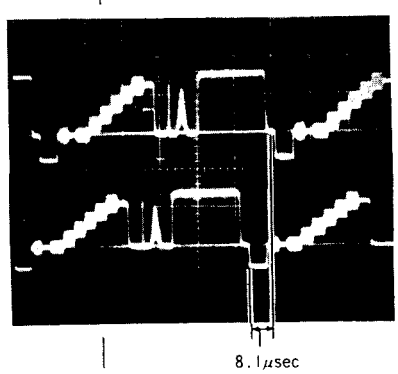


Fig. 10-3-5 Main video signal level adjustment



Upper: Pin ① of IC6,
Lower: Pin ㉑ of IC6

Photo 10-3-2 VOC intermediate frequency adjustment

STEP NO.	OSCILLOSCOPE RANGE V	OSCILLOSCOPE RANGE H	TEST POINTS	ADJUSTMENT POSITIONS	CHECK ITEMS/ ADJUSTMENT SPECIFICATIONS	ADJUSTMENT PROCEDURE
			Pin ① of IC6	VR4	Sync tip is at 2.7V	**4) Output DC level adjustment** NOTE: Make sure that adjustment of VR6 was completed. ● Play the test disc around #1000 of the composite test signal area. ● Observe the video signal at pin ① of IC6 (CXL1004P-1) and adjust VR4 so that the sync tip level sets at 2.7V.
			Pin ① of IC7	VR5	Center valve of Audio output signal: 2.7V	**5) Audio CCD output DC level adjustment** ● Adjust VR5 so that the center of the audio signal output from pin ① of IC7 sets at 2.7V.
			Pin ② of CN203	VR3		**6) Output video signal level** NOTE: Make sure that adjustments of VR4 and VR6 were completed before entering this procedure. ● Play the test disc around #1000 of the composite test signal area. ● Adjust VR3 so that the level between the sync tip and white peak of video signal output from pin ② of CN203 sets at 0.8Vp-p. (Refer to Fig. 10-3-8.)

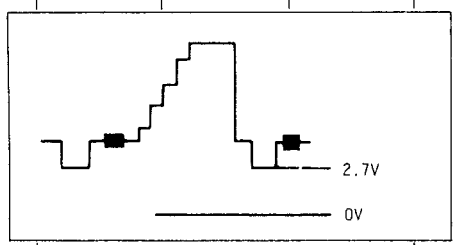


Fig. 10-3-6

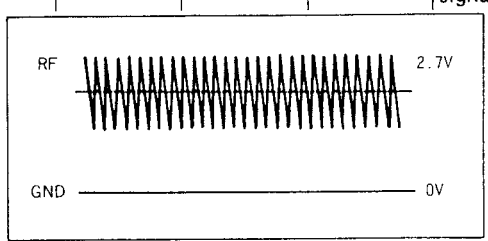


Fig. 10-3-7

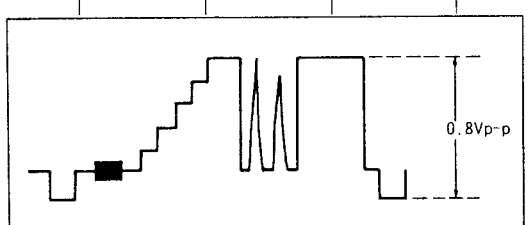
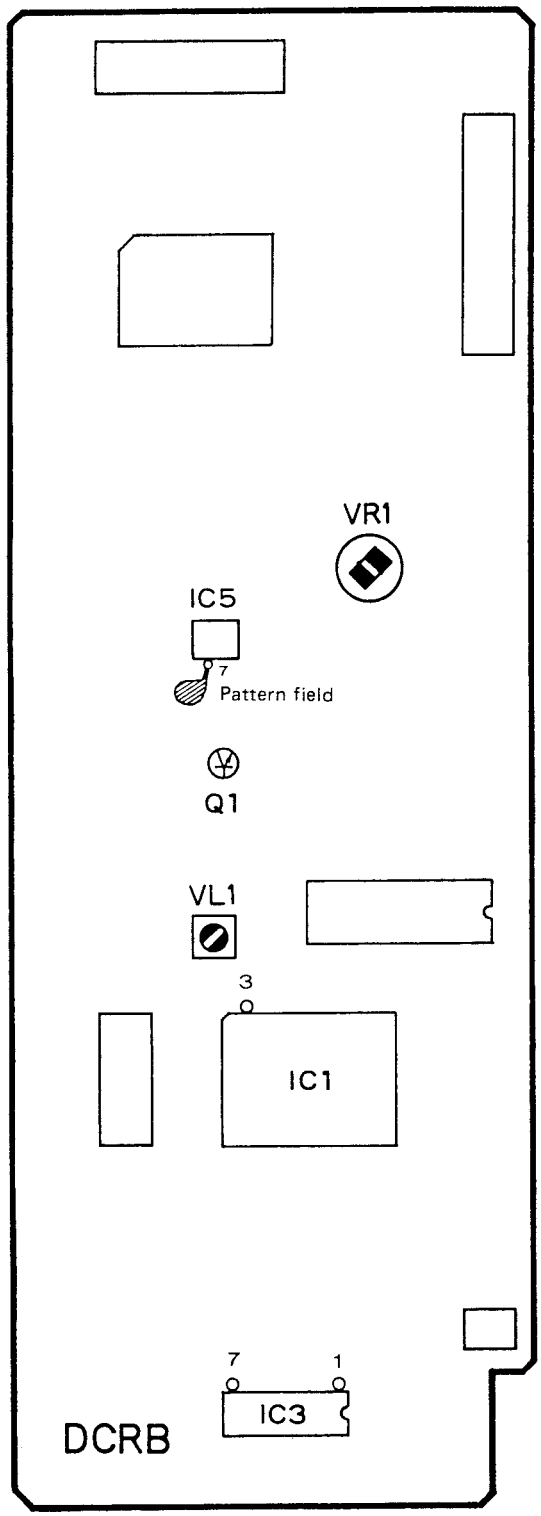


Fig. 10-3-8

10.3.3 DCRB Assembly



VL1: PLL circuit adjustment
VR1: VCXO offset adjustment

Fig. 10-3-9 DCRB Assembly adjustment section

STEP NO.	OSCILLOSCOPE RANGE V	OSCILLOSCOPE RANGE H	TEST POINTS	ADJUSTMENT POSITIONS	CHECK ITEMS/ ADJUSTMENT SPECIFICATIONS	ADJUSTMENT PROCEDURE
	0.5V/div	0.2mS/div	IC5, pin ⑦	VL1	DC level V_0 + 0.5 ~ 0.7V	**10.3.3 DCRB Assembly adjustment**

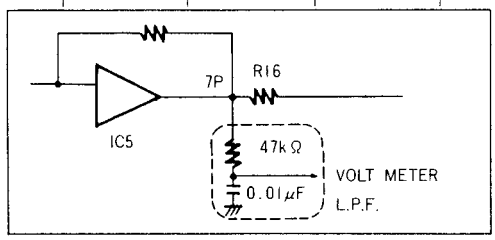


Fig. 10-3-10 Connection of oscilloscope and probe

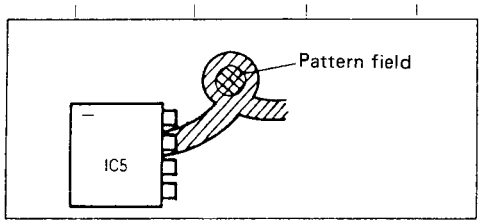


Fig. 10-3-11 Pin (7) (Pattern field) of IC5

1) PLL intermediate frequency adjustment

- Connect L.P.F. to pin ⑦ (pattern field) of IC5 (NJM082D) as shown in Fig. 10-3-10.
- Connect pin ① of IC3 (TC40H004P) to GND and connect the collector of Q1 (UN1212) to GND.
- Turn power switch ON and read voltage (V_0) at pin ⑦ of IC5 through L.P.F.
- Remove pin ① of IC3 and the collector of Q1 from GND.
- Set the LDD disc and play.
- Adjust VL1 to obtain voltage which is 0.5 ~ 0.7V (V_0 + 0.5 ~ 0.7V) higher than the voltage measured above.
- Remove L.P.F.

2V/div	0.2mS/div	IC1, pin ③	VR1	Plus and minus pulse are at equivalent level.	

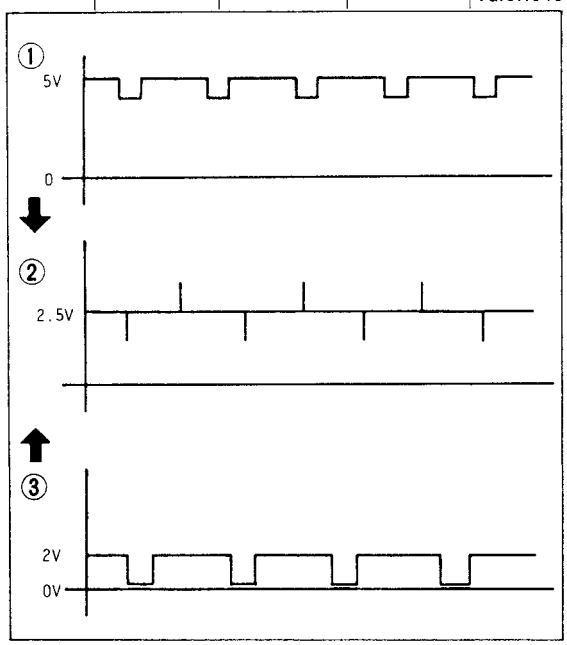
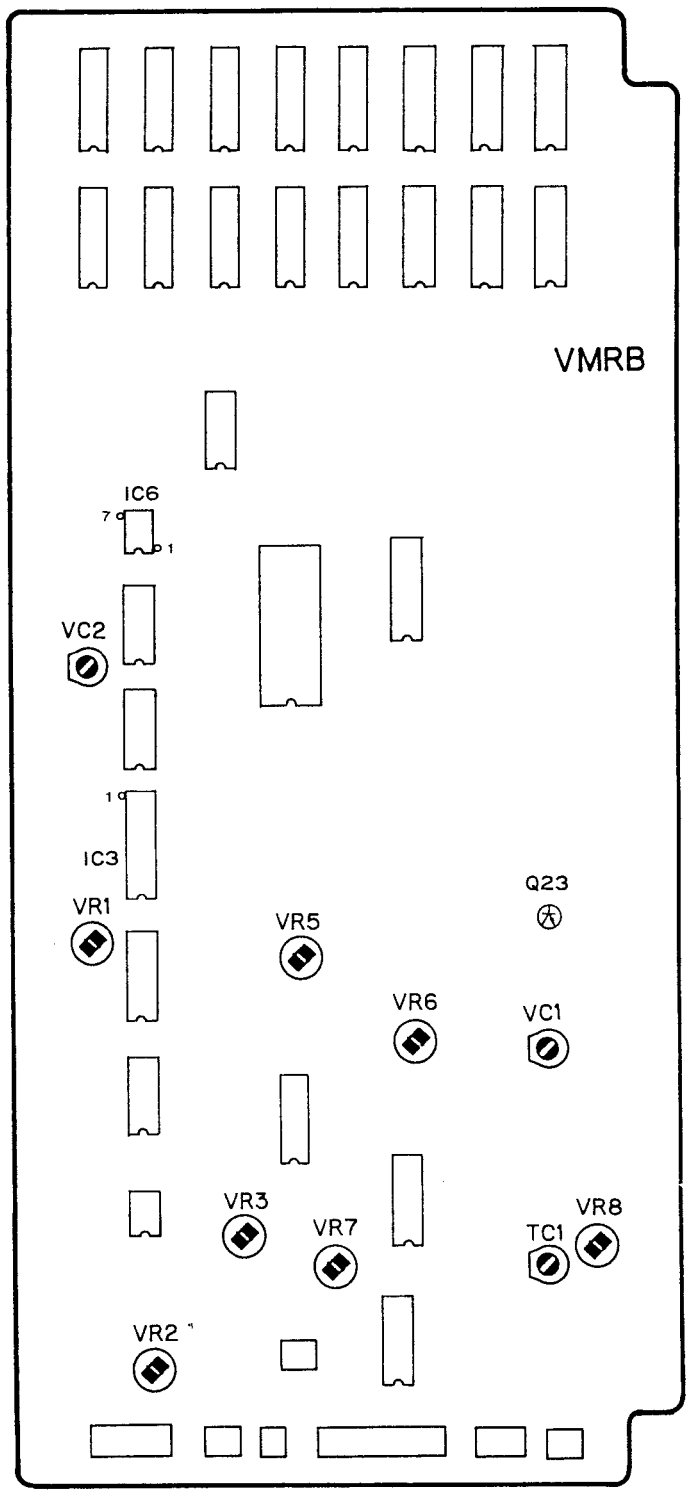


Fig. 10-3-12 VCXO offset adjustment

2) VCXO offset adjustment

- Play the LDD disc.
- Observe the wave form of pin ③ of IC1 (CX23035) by the oscilloscope.
- When wave forms like those in ① or ③ of Fig. 10-3-11 are observed, adjust VR1 so that plus and minus pulses set to equivalent levels centering on 2.5VDC as in ② of Fig. 10-3-11.

10.3.4 VMRB Assembly



VR1: REF-H timing adjustment
VR2: CPCB error level adjustment
VR3: Chroma level adjustment
VR5: Through video level adjustment
VR6: Memory video level adjustment
VR7: Sync level adjustment
VR8: 140nS shift video DC level minimum
VC1: 3.58MHz trap
VC2: 576H VCO adjustment
TC1: 140nS. Shift amount adjustment

Fig. 10-3-13 VMRB Assembly adjustment section

STEP NO.	OSCILLOSCOPE RANGE V	OSCILLOSCOPE RANGE H	TEST POINTS	ADJUSTMENT POSITIONS	CHECK ITEMS/ ADJUSTMENT SPECIFICATIONS	ADJUSTMENT PROCEDURE
			IC3, pin ①	VC2	Lock voltage: 2.5V	**10.3.4 VMRB Assembly** **1) 576fH VCXO adjustment** ● Adjust the lock voltage of pin ① of IC3 (TC5081AP) to obtain 2.5V in the play mode.
			Monitor display	VR1	Eliminate misalignment of color bar(s).	**2) REF-H timing adjustment** ● Set the player in the repeat mode around #1000 of the composite test signal of the test disc. ● A composite test pattern as in Fig. 10-3-14 is observed on the monitor. ● Adjust VR1 so that the composite pattern of the MEMORY VIDEO during search operation is aligned with that of the THROUGH VIDEO in the play mode.
			Final output video terminal	VR5	Video level	**3) Through video level adjustment** ● Play the test disc around #1000 of the composite test signal. ● Observe the video signal from the video output terminal (75Ω terminate). ● Adjust VR5 so that the level between the sync tip and white peak sets at 1Vp-p. (Refer to Fig. 10-3-15.)

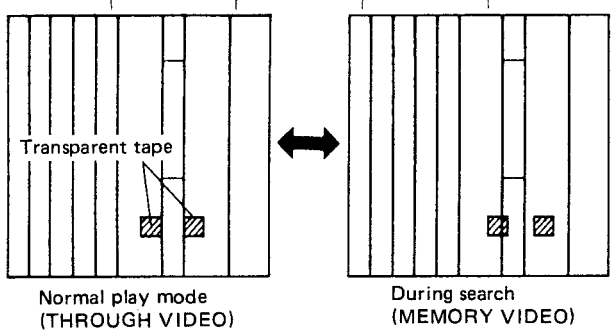


Fig. 10-3-14 Composite display

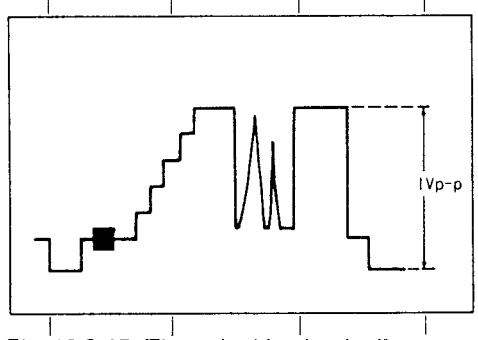


Fig. 10-3-15 Through video level adjustment

STEP NO.	OSCILLOSCOPE RANGE V	OSCILLOSCOPE RANGE H	TEST POINTS	ADJUSTMENT POSITIONS	CHECK ITEMS/ ADJUSTMENT SPECIFICATIONS	ADJUSTMENT PROCEDURE
			Final output video terminal	VR3	Stable wave form	**4) Chromatic level adjustment** • Turn VR2 fully around clockwise. • Set for still with the Chapter 8 magnenta screen. • Observe video signal output by V rate and adjust VR3 so that the envelope of chromatic signal becomes flat.
			Monitor display	VR2	Color unevenness sets at minimum	**5) CPCB error level adjustment** Note: Be sure to perform this adjustment along with adjustment of VR3. • Set for still with the Chapter 8 magenta screen and adjust VR2 to reduce color unevenness to a minimum.
			Final output video terminal	VR7	Sync level a = a'	**6) Sync level adjustment** • Set the player in the repeat mode around #1000 of the composite signal of the test disc. • When the video signal output is observed on the oscilloscope, wave forms as in ① and ② of Fig. 10-3-16 will appear alternately. Wave form ① indicates the video signal (THROUGH VIDEO) for the normal play mode and ② indicates play operation for the MEMORY VIDEO in the during search operation. • When there is difference between sync level x and x' of video signal ① and ② in Fig. 10-3-15, adjust VR7 to obtain x = x'.

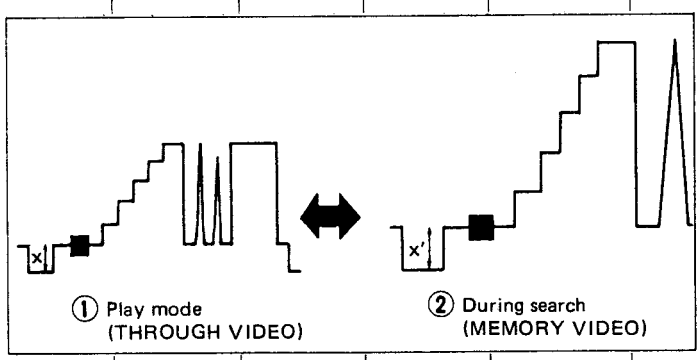


Fig. 10-3-16

Note: CAV PLAY = THROUGH VIDEO
CLV SEARCH / SCAN = MEMORY VIDEO

STEP NO.	OSCILLOSCOPE RANGE V	OSCILLOSCOPE RANGE H	TEST POINTS	ADJUSTMENT POSITIONS	CHECK ITEMS/ ADJUSTMENT SPECIFICATIONS	ADJUSTMENT PROCEDURE
			Final output video terminal	VR6	Video level	**7) Memory video level adjustment** • Set the player in the repeat mode around #1000 of the composite test signal of the test disc. • Video signal ① of the normal play state (THROUGH VIDEO) and ② of the search operation (MEMORY VIDEO) can be observed from the video output terminal. • Adjust VR6 so that the white peak level y in Fig. ① and y' in Fig. ② become the same level.
			Final output video terminal	TC1	Memory jitter is set at minimum.	**8) 140nSec. Shift amount adjustment** • Set the player in the STILL & SOUND mode at chapter 8 of the magenta display of the test disc. • Observe the video signal output with a vector scope. Note: Only MEMORY VIDEO can be observed when the STILL & SOUND mode is set. • Adjust TC1 so that memory jitter sets at minimum. (Refer to Fig. 10-3-18.) Note: **Adjustment without using a vector scope is as follows:** • Set the oscilloscope to the X–Y mode and set the X and Y levels to 0V. • When pin ① of IC6 (TL082CP) is connected to X and pin ⑦ to Y, the following wave forms can be observed. Wave forms a and b appeared in the range indicated by squares centering on (X, Y) = (1.25V, 1.25V) as in the following figure. • Adjust TC1 to equalize a and b.

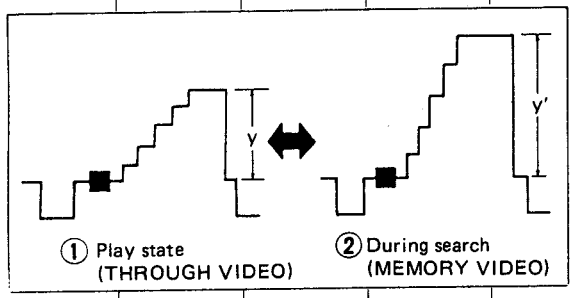


Fig. 10-3-17

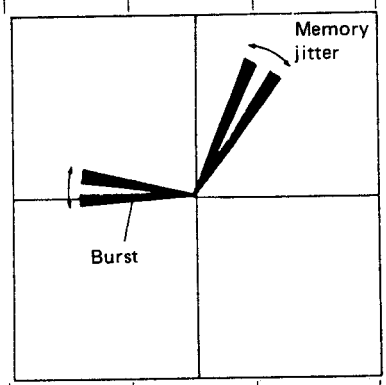
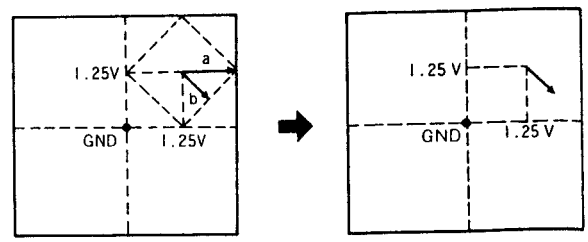


Fig. 10-3-18 Magnenta display observed by vector scope



STEP NO.	OSCILLOSCOPE RANGE V	OSCILLOSCOPE RANGE H	TEST POINTS	ADJUSTMENT POSITIONS	CHECK ITEMS/ ADJUSTMENT SPECIFICATIONS	ADJUSTMENT PROCEDURE
			Final output video terminal	VR8	Misalignment of sync is set at minimum.	**9) Setting 140nS shift video DC level fluctuation to minimum.** ● Set the player in the STILL & SOUND mode at chapter 4 of the black display of the test disc. ● Observe the video signal output in V rate of the oscilloscope. ● Adjust VR8 so that vertical fluctuation of video signal sets at minimum. (Refer to Fig. 10-30-19.)
			Q23 Emitter	VC1	Chromatic constituent is at minimum.	**10) 3.5MHz trap** ● Play chapter 2. ● Adjust VC1 to set 3.58MHz chromatic constituent at emitter of Q23 to minimum. (Refer to Fig. 10-3-10.)

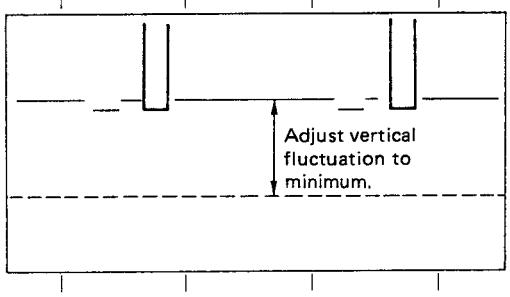


Fig. 10-3-19 Vertical fluctuation of video sync

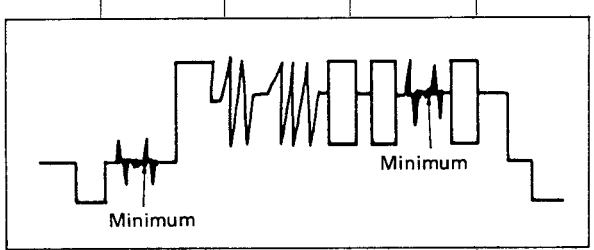
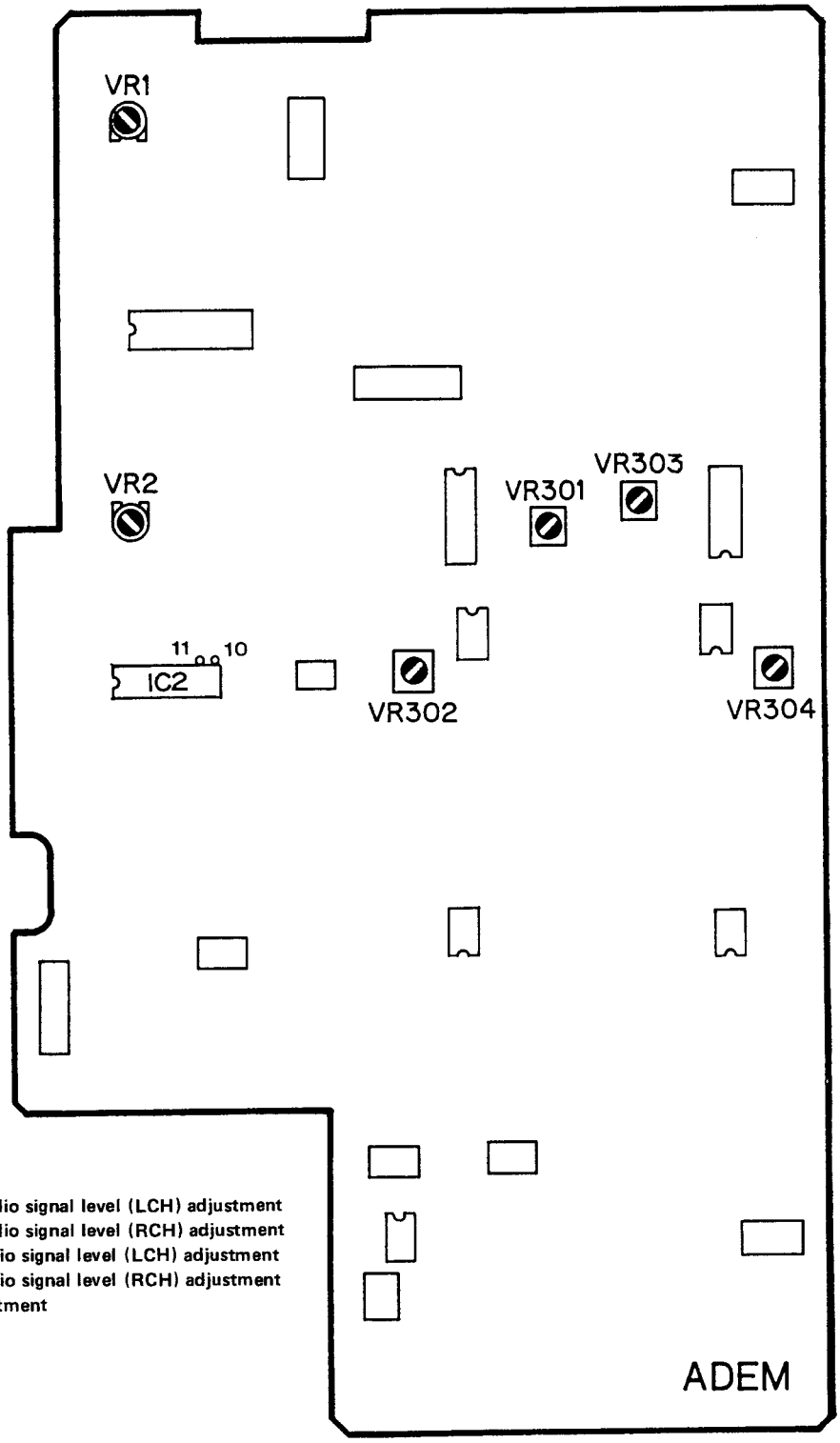


Fig. 10-3-20

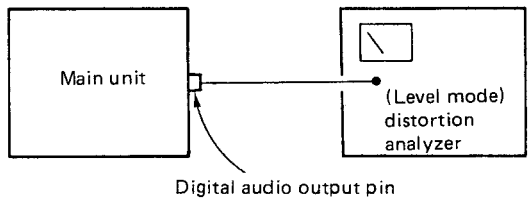
10.3.5 ADEM Assembly



VR1: Analog audio signal level (LCH) adjustment
VR2: Analog audio signal level (RCH) adjustment
VR302: Digital audio signal level (LCH) adjustment
VR304: Digital audio signal level (RCH) adjustment
VR301: MSB adjustment

Fig. 10-3-21 ADEM adjustment section

STEP NO.	OSCILLOSCOPE RANGE V	OSCILLOSCOPE RANGE H	TEST POINTS	ADJUSTMENT POSITIONS	CHECK ITEMS/ ADJUSTMENT SPECIFICATIONS	ADJUSTMENT PROCEDURE
						10.3.5 ADEM Assembly
			IC2 (HA12043) Pin ⑪	VR1 (Lch)	72mVrms	**1) Analog audio signal level adjustment** • Search out frame #7201 (1/L channel 1kHz, 40% modulation) and set operation to the play mode.
			IC2 (HA12043) Pin ⑩	VR2 (Rch)	72mVrms	• Adjust VR1 so that the level at pin ⑪ of IC2 (HA12043) sets at 72mVrms. • Search out frame #8101 (2/R channel 1kHz, 40% modulation) and set operation to the play mode. • Adjust VR2 so that the level at pin ⑩ of IC2 (HA12043) sets at 72mVrms.
			Digital audio output terminal	VR302 (Lch) VR304 (Rch)	2Vrms	**2) Digital audio signal level adjustment** • Connect the distortion analyzer to the digital audio output pin and set operation to the level mode. • Play Chapter 2 (1kHz, 0dB) of MI disc and adjust both VR302 (Lch) and VR304 (Rch) to obtain 2Vrms output level.
			Digital audio output terminal	VR301 (Lch) VR303 (Rch)	Minimum distortion rate	**3) MSB adjustment** • Connect a 60dB gain amplifier between the digital audio output terminal and distortion analyzer. • Play Chapter 20 (1kHz, –60dB) of the MI test disc and set to distortion mode. (20 kHz, L.P.F. ON) • Adjust both VR301 (Lch) and VR303 (Rch) to obtain minimum distortion ratios.



Digital audio output pin, Fig. 10-3-20

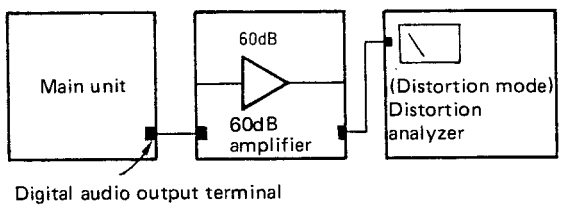


Fig. 10-3-21

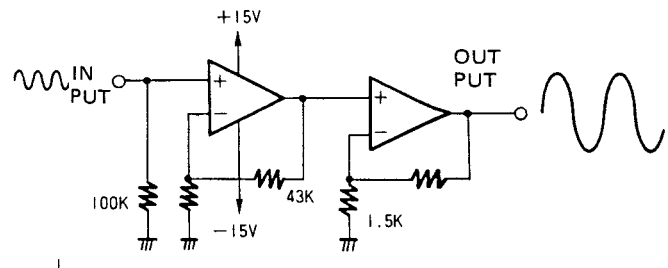


Fig. 10-3-22 60 dB amplifier

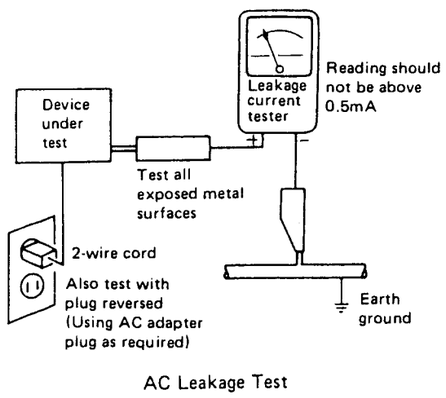
11. SAFETY INFORMATION

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.

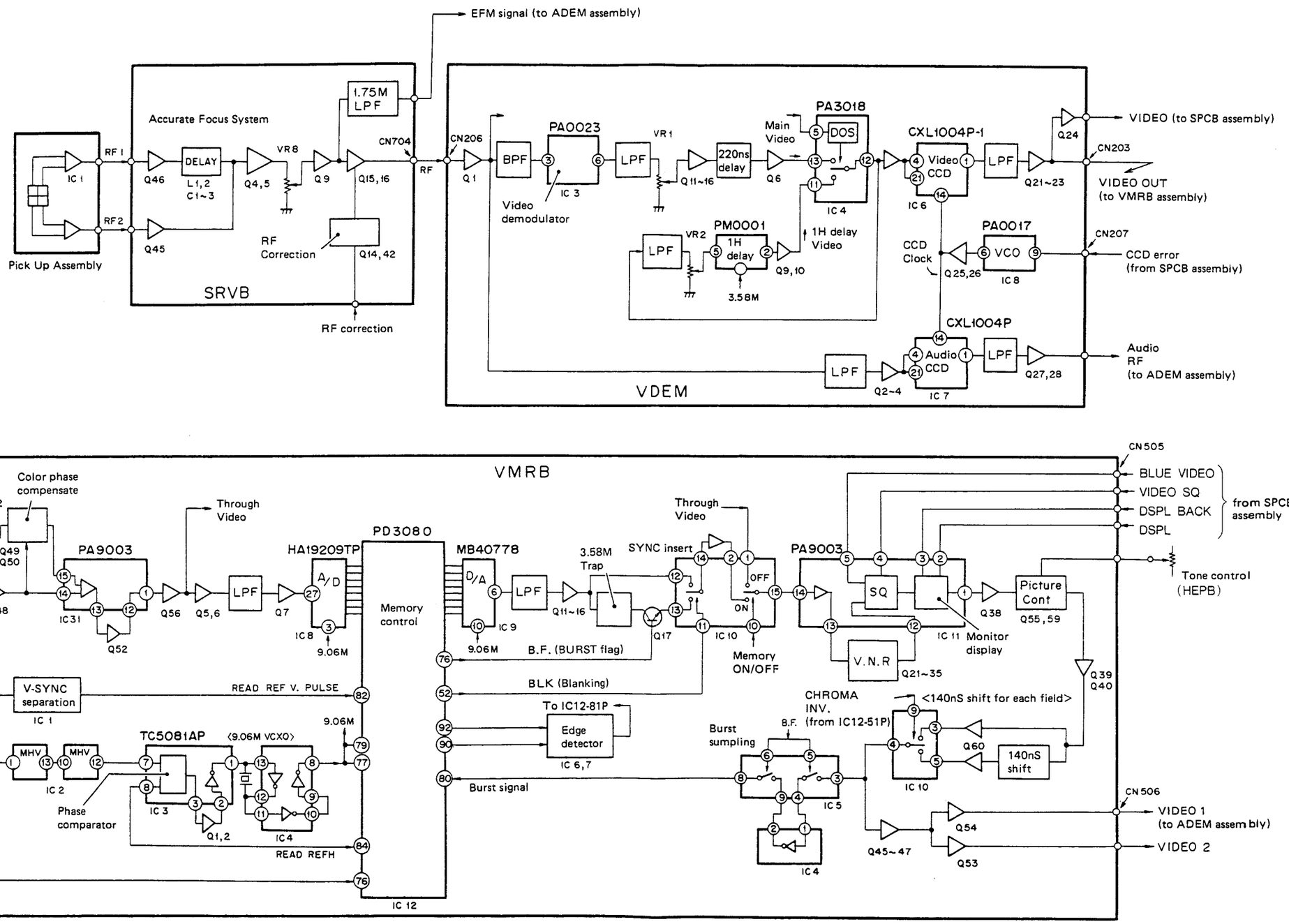
Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which does 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.

— MEMO —

12. BLOCK DIAGRAM OF VIDED SIGNAL



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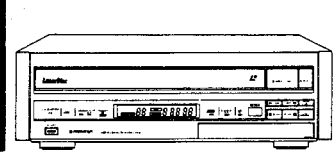

SERVICE GUIDE
ORDER NO.
ARP1446

LASERVISION PLAYER

LD-S1

● **Please refer to the LD-S1 Service Manual (ARP1420) for repair details.**

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

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INTRODUCTION

Electrical circuits of the following units are basically the same as previous models.

VDEM unit

In regard to the CCD IC, TL8614P was changed to the CXL1004P.

SRVB unit

Uses the PM 4001 the same as before.

DCRB unit

In regard to the digital audio decoder IC is CX23035.
Decoder output goes to the 4-times over sampling digital filter IC (NPC SM5804B).
The IC8 data selector switches the digital audio signal L, R sound.

ADEM unit

The analog audio section uses the PA3020 and HA 12043 the same as before.
In regard to the digital audio section, IC301 and IC305 are D/A convertors.
In regard to the LPF, a 3rd order filter is used.
RY301 is used for emphasis ON/OFF.

Please refer to the circuit diagrams for an understanding of this manual if necessary.

1. LD-S1 FEATURES

1.1 CLV DISC TRIC PLAY

In the laser vision system, when extended play disc (CLV disc) playback is performed, tric play could not be performed.

The LD-S1 enables CLV disc tric play by using a digital video memory and new SPDL and TBC servo system.

CLV disc functions

- Still picture, multi speed playback are enabled the same as for a CAV disc.
- Still and Sound function
  Still picture playback is performed while playing a disc.
- Strobe motion function
  Video can be obtained for motion when a strobe is continuously flashed.
- Noiseless scan function
  When a CLV disc was played back and scanned, color synchronization could not be obtained. However, a clear picture can be obtained during scan with the LD-S1.
  With 8-bit signal processing and a 1 Mbit (64 Kbit X 16) memory capacity, memory is provided for one field.

1.2 DIGITAL FILTER SOUND QUALITY IMPROVEMENT

A quad over sampling digital filter is used for digital audio laser vision disc (LDD) playback.

As a result, it has less distortion and excellent low to high phase characteristics since 3rd order LPF is used after D/A conversion.

Also, in the D/A conversion section, a dedicated D/A converter is used for each L ch and R ch (twin D/A converter) to reduce the L-R ch phase difference and crosstalk.

1.3 RF SIGNAL PROCESSING IMPROVEMENT

As a system to reduce pickup RF signal distortion (accurate focus system), 4 division diode output preceeding 2 diode output is delayed and finally added to improve frequency responce, distortion and S/N. (See Fig. 1-3-1.)

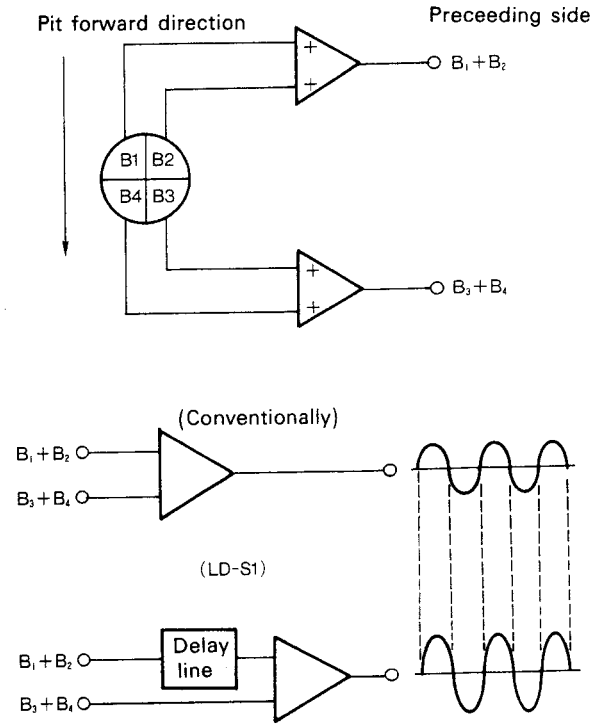


Figure 1-3-1

2. CLV DISC TRIC PLAY

2.1 OUTLINE

The following items are required for CLV disc tric play.

1. The large amplitude time axis error that occurs when the beam spot jumps to another track is obserbed by using a quick responding time base collector (TBC). To accomplish this, the conventional CCD servo system was improved.
2. The development of a digital video memory and independent memory control circuit that allows independent and simultaneous write-in and read-out. Fig. 2-1-1 provides a block diagram of the TBC section centered on the CCD and memory section.

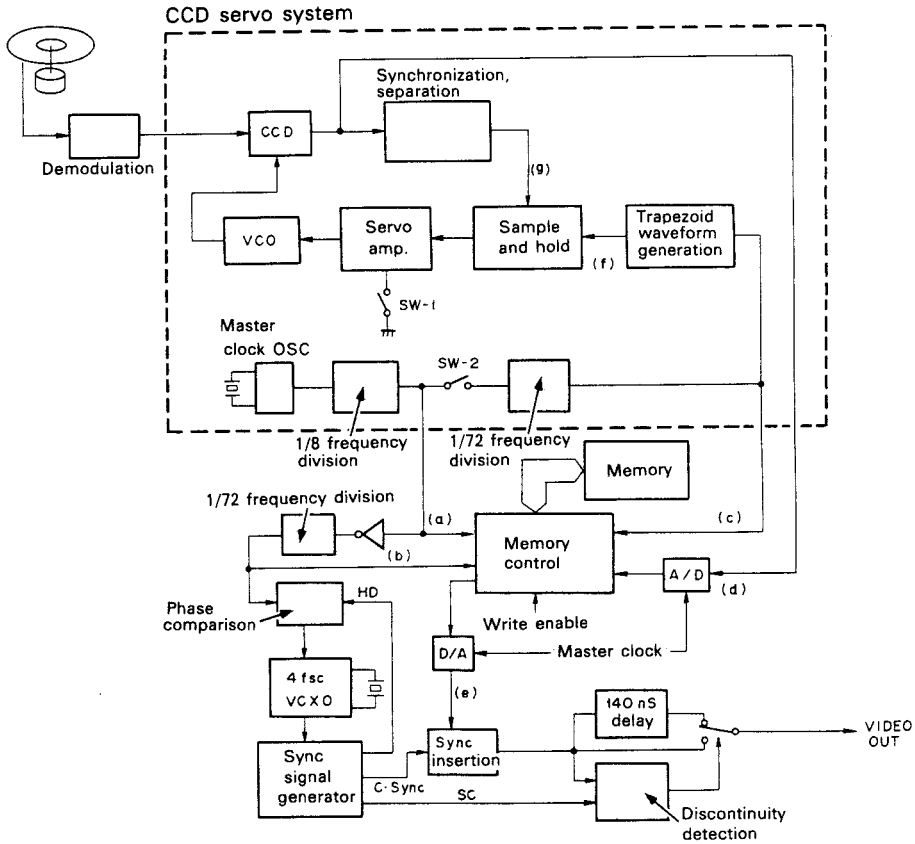


Fig. 2-1-1

In the above figure, SW-2 opens during a certain time period when track jump occurs which stops count down of the frequency division counter.
When a truck is jumped, the interval of PBH becomes irregular.
To compensate it, the trapezoidal waveform (reference H) is delayed as shown in Fig. 2-1-2.

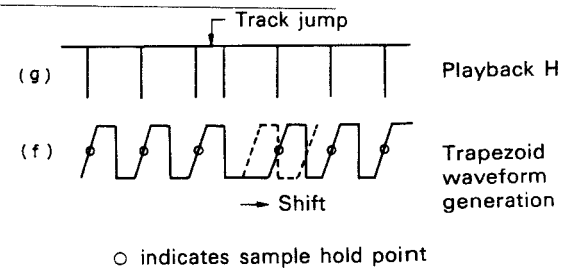
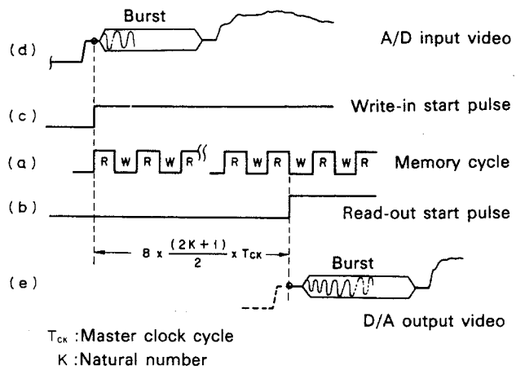


Fig. 2-1-2

In regard to the line speed difference before and after a jump, it is absorbed by the CCD servo system just after a jump, then by the spindle servo system. However, if truck jump is repeated, the CCD operating point sometimes deviates from the center of the compensation range. As a result, SW-1 operates with prescribed timing along with a jump to remove the regular error that accumulates in the CCD servo system for operation stabilization.
In regard to the memory section, the master clock frequency is divided to fh by 1/72 and 1/8 frequency division counters in Fig. 2-1-1. The read-out phase of the sync signal generator is synchronized and at the same time, it functions as a memory write-in start pulse. Fig. 2-1-3 shows this timing.



T_{CK} :Master clock cycle
K :Natural number

Fig. 2-1-3

The phase difference between write-in and read-out is maintained with 1/2 odd number times of the 8 clock without a track jump relationship.
Also, the memory read/write cycle is alternately performed with the 8 clock cycle without a relationship to the player playback mode. Only the write enable signal that controls write execution is output by system control CPU.
During tric play, the memory output odd and even field read-out continuation and color signal continuation cannot be maintained. Field continuation compensation is provided by shifting the start position of the read-out address counter by 1H while observing the field flag during write-in. Color signal continuation is provided by a circuit that detects the color burst continuation after D/A output by switching a 140 ns delay line.

2.2 TRIC PLAY OPERATION CONCEPT

A description concerning the basic concept of CLV disc tric play operation is provided as follows.

2.2.1 Still operation

After Still key input occurs, and when the disc rotates twice, the still operation is completed.
In regard to the signal that indicates one disc rotation, the rotation signal (ROT signal) is generated by SPDL gate array IC PD 9001 based on the spindle motor FG signal. Since this signal is used as input to the interrupt terminal of the system control CPU, interrupt processing always occurs. (See Fig. 2-2-1.) When ROT signal is input, the CPU becomes V-sync input wait mode. The above relationship is shown in Fig. 2-2-2.

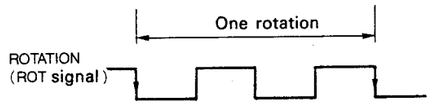


Fig. 2-2-1

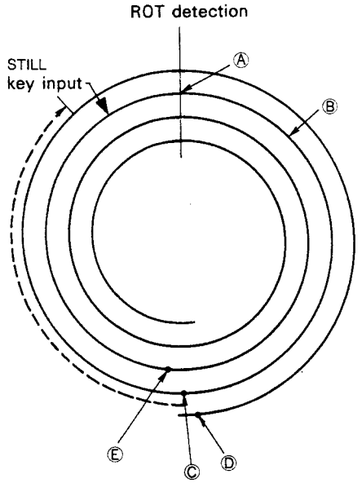


Fig. 2-2-2

In Fig. 2-2-2, the following occurs:
1. Still key input occurs.
2. When ROT signal detection occurs at point Ⓐ, the CPU becomes V-sync input wait.
3. Although V-sync detection occurs at point Ⓑ, the CPU waits for the next V-sync input.
4. When V-sync input occurs at point Ⓒ, the CPU immediately outputs a WRITE ENABLE signal to the video memory, then from point Ⓒ, one field video signal is written in the memory (Part of --- line from part Ⓒ).
5. One time rotation occurs, V-sync detection occurs at point Ⓓ and Phillips code is read, then 2-track reverse jump occurs (1 msec interval) to reach point Ⓔ.
6. Returns to 2 to repeat the operations mentioned above.
The disc rotates two times as mentioned above to complete the STILL operation.

2.2.2 STEP operation

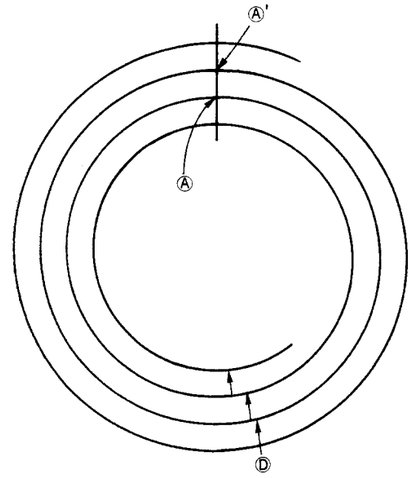


Fig. 2-2-3

In Fig. 2-2-3, 2-track reverse jump occurs at point Ⓓ in the previously mentioned STILL mode to repeat the operation to return to point Ⓐ. When 1-track reverse jump occurs at point Ⓓ, the ROT signal detection point is shifted to point Ⓐ' which is toward the external circumference by 1-track when compared to point Ⓐ.
When ordinary STILL operation is performed starting at point Ⓐ', the field shifted toward the external circumference by 1-track is written to memory for playback which enables STEP FWD operation.
Also, when 3-track reverse jump occurs at point Ⓓ, a field toward the inner circumference by 1-track is written to memory for playback. As a result, STEP REV operation occurs.

2.2.3 SCAN operation

In a previous model, tracking servo loop open/close during SCAN is controlled by the PM4001. However in the LD-S1, tracking servo loop open/close is controlled by a system control CPU since playback video is output through the video memory during scan. Therefore, SCAN CONT signal is input to pin 6 of PM4001 as shown in Fig. 2-2-4.

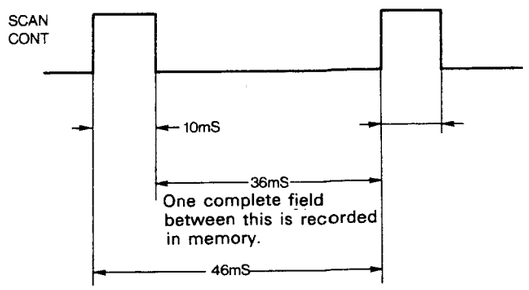


Fig. 2-2-4

After the tracking servo loop is closed, one complete field (16.7 ms) is written to memory during a 36 ms interval as shown in Fig. 2-2-4 for output. As a result, during SCAN, color lock picture is always output.

3. VIDEO MEMORY

3.1 SIGNAL PROCESSING OUTLINE

A video signal is sampled at 576 fh clock (= 9.06 MHz) for 8-bit linear quantization.
In 1H period, there 576 samples.

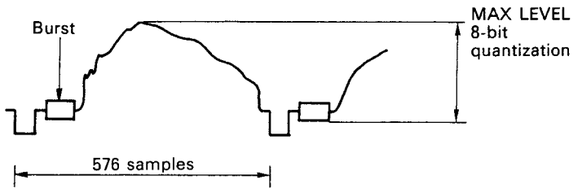


Fig. 3-1-1

However, 64 samples shown in Fig. 3-1-2 are not memoried, because V and H sync signals from a reference sync generator is inserted after D/A conversion.
512 samples in 1H period, which include luminance and chroma with burst signals are input to the video memory.

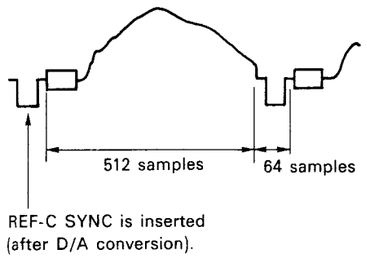


Fig. 3-1-2

3.2 MEMORY CAPACITY

In regard to the memory capacity, 256 ($=2^8$) lines are recorded in the V direction as shown in Fig. 3-2-1. (V-SYNC is not recorded in memory.) Therefore, the total memory capacity is:

$$512 \times 256 \times 8 = 1048576 \text{ bits}$$

Since the LD-S1 is provided with 16 64Kbit D-RAMs, the total memory capacity is:

$$16384 \times 4 \times 16 = 1048576 \text{ bits}$$

in which no memory is wasted.

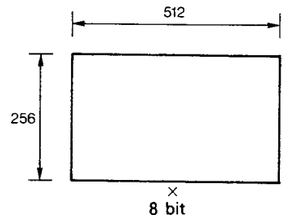


Fig. 3-2-1

3.3 DATA WRITE-IN

Fig. 3-3-1 shows a block diagram of the video memory. In this diagram, the PD3080 memory control IC provides the IC logic to control the D-RAM video memory configuration.
Since D-RAM read/write is performed with parallel data, the video signal path is as shown in fig. 3-3-2. Also to provide continuous digital data read/write, the memory is divided into two blocks, A and B, which are alternately read and written to with time division.

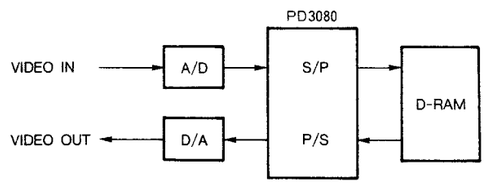


Fig. 3-3-2

3.3.1 RAM data write

Fig. 3-3-3 shows the data write operation. Since A/D conversion output is 8-bit parallel, the serial data of each bit is converted from serial (S) to parallel (P) in the PD3080.
Since the RAM data bus is 4-bit, 4-bit serial data is written in memory each time. The 16 RAMs are divided into blocks A and B with 8 RAMs each and 4-bit data is alternately written to A and B.
The same address is specified to A and B at that time and when 8-bit data is written to A and B, the address counter counts up.
Since the RAM write sequence is the same as that for TV screen scanning (left to right, and top to bottom), the address counter counts up with the same sequence.
Also, since 8-bit data is written to the same address in the H direction, the address counter is $512/8=64=2^6$, which requires a 6-bit address counter. In the V direction, it is $256=2^8$ which requires an 8-bit address counter. As a result, the address number and TV screen position are fixed.
The PD3080 address counter output can drive the D-RAM directly.
Data is written alternately to A and B blocks as previously mentioned. While data is written to only one block, it is read from the other block. A read out address counter is provided separately from the write-in address counter. A read out address counter is synchronized with the reference sync signals which are inserted after D/A conversion.

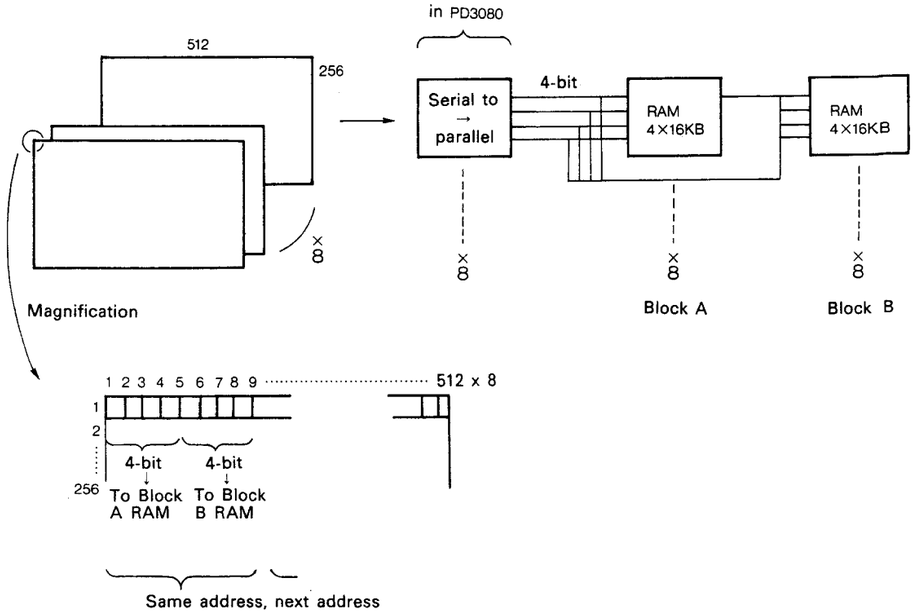


Fig. 3-3-3 RAM data write

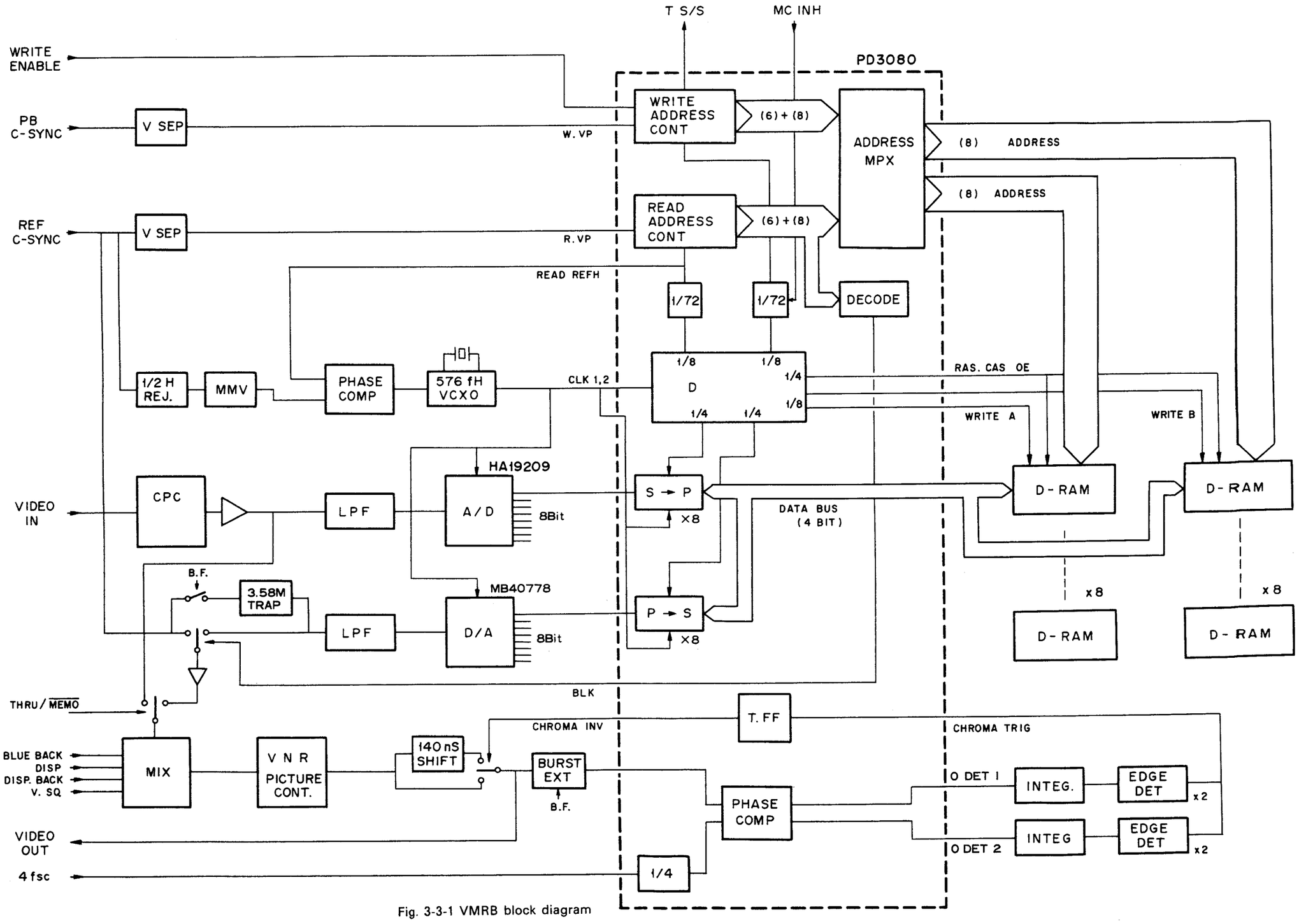


Fig. 3-3-1 VMRB block diagram

3.4 VMRB SIGNAL FLOW

Note:
Refer to the Fig.3-3-1 block diagram together with the actual circuit for this section.

The video signal from the VDEM circuit board enters CPC (hue compensation) first. This part is the same as previous that for a LD player. Output from IC31 pin 1 passes through a LPF (L2, L3, etc.), through a buffer for A/D conversion. (See 3. Video Memory.)
The A/D, D/A conversion sampling clock (576fh=9.06M) is input from a clock generator that consists of IC2, 3 and 4. This clock also goes to memory control IC12 pin 77, 79 for use as the IC main clock. This clock has a 65% duty cycle.
Video signal input goes to IC8 (A/D converter) pin 27 after passing through an LPF. Pins 8 and 21 set the upper and lower level limits during quantization signal. The A/D converted 8-bit data is input to serial/parallel converter of PD3080 (IC12) with 4-bits each written to D-RAM. The 16 D-RAMs are divided into groups A and B with group A consisting of IC13 to IC20 and group B consisting of IC21 to IC28.
A signal read from memory is input to a parallel/serial convertor from D-RAM to become serial data which is input to the IC9 D/A converter. Converted D/A signal from IC9 pin 6 is input to a buffer from an LPF consisting of L5, 6, 7, etc. Since this signal is not included with a sync signal, the REF-C SYNC signal generated at CONT PD0027 is inserted. Since data read out timing from RAM is performed by synchronizing with the REF-C SYNC, REF-C SYNC insertion timing is also determined in the PD3080. The SYNC insertion SW is selected by the BLK signal from pin 52. REF-C SYNC input from Q18 goes to IC10 pin 13 and IC10 pin 11 becomes High during the SYNC insertion period, then SYNC from pin 13 is output from pin 14.

Also, during the period when a burst signal exists, the BF (Burst Flag) signal from IC12 pin 78 becomes High which turns Q17 on. Since D/A signal conversion starts with the burst signal period, the level after SYNC insertion is clamped when Q17 is on. L10 and C66 form a burst signal trap which prevent clamp level change by the burst signal during clamping.
As a result, an ordinary video signal with SYNC is output from IC10 pin 14.
In the next SW, 2 video signals are selected. One is input before A/D, and another is input after D/A.
This SW is controled by THRU/$\overline{\text{MEMO}}$ signal. When pin 10 of IC10 becomes H, video signal which is input from Q3 to IC10 pin 1 is output from pin 15.
This video signal bypasses the video memory. This THRU/$\overline{\text{MEMO}}$ signal turns to low automatically in the following operation modes.

* Memory ON modes regardless of the front panel SW position.

SCAN and SEARCH during CAV play
STILL, SCAN and SEARCH during CLV play

Also during PLAY and STILL modes with CAV the video signal which bypasses the video memory is always selected.
The video signal from IC10 pin 15 is input to IC11 pin 14.
IC11 performs blue back video switching during video squelch, DSPL, DSPL BACK insertion, the same as a previous player, and video signal is input from pin 13 to the VNR (Video Noise Reduction) section. The VNR section is the same as that used for CLD-909.
Video signal output from the VNR section is output from IC11 pin 1. Since a 1-field video signal is only recorded in memory with the LD-S1, if the memory output signal is used as it is during STILL, not lock because the burst phase of each field is not inverted. Phase inversion is performed by passing the video signal through a 140 ns shift circuit. The 140 ns shift is performed by Q40E, C89 and L12. The 140 ns shift video is input to IC10 pin 5 and normal video is input to pin 3. Burst (chroma) phase inversion is performed by switching the video with the chroma INV signal from IC12 pin 51 in each field.
In the PD3080, inversion timing is determined by comparing the phase of the video signal burst from Q47C with that of the 4fsc signal input to IC12 pin 76 which had its frequency divided by 4.
The result of the phase comparison is output from pin 90 and 92 and is input to the IC7 edge detector. The edge detection result is input to pin 81 as a CHROMA TRIG, which toggles T.FF and is output from pin 5 as CHROMA INV.
This CHROMA INV is input to IC10 pin 9.

4. SPINDLE SERVO

The spindle servo circuit (SPCB unit) uses a new spindle gate array, PD9001.
REF H is selected according to video memory OFF/ON.

1. During video memory off:
   910 frequency division of 4fsc signal from PD0027 by PD9001.
2. During video memory on:
   576 frequency division of 576fh, an A/D, D/A conversion clock, by PD3080.

Two REF H is selected by the THROUGH/$\overline{\text{MEMO}}$ signal input to PD9001 pin 36 and outputs from pin 16. The REF H input to PA5009 pin 7 triggers the trapezoidal waveform generator. This trapezoid is sample-held by PB-H input from PA5009 pin 16 to detect an error. In a CLD-909, this part was used for CCD loop phase error detection while in the LD-S1, frequency error detection is performed in addition to phase error detection.
Also, the shape of the trapezoid waveform differs from that of the CLD-909 system as shown in Fig. 4-1.

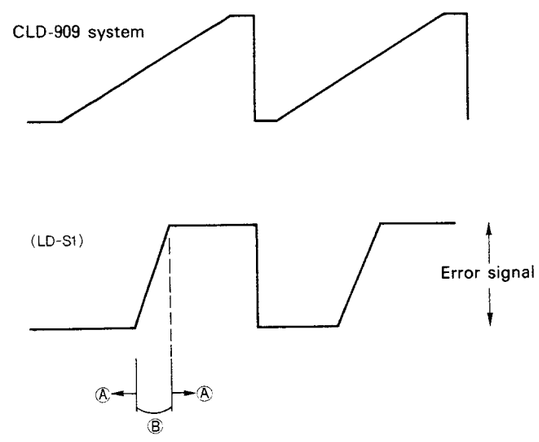
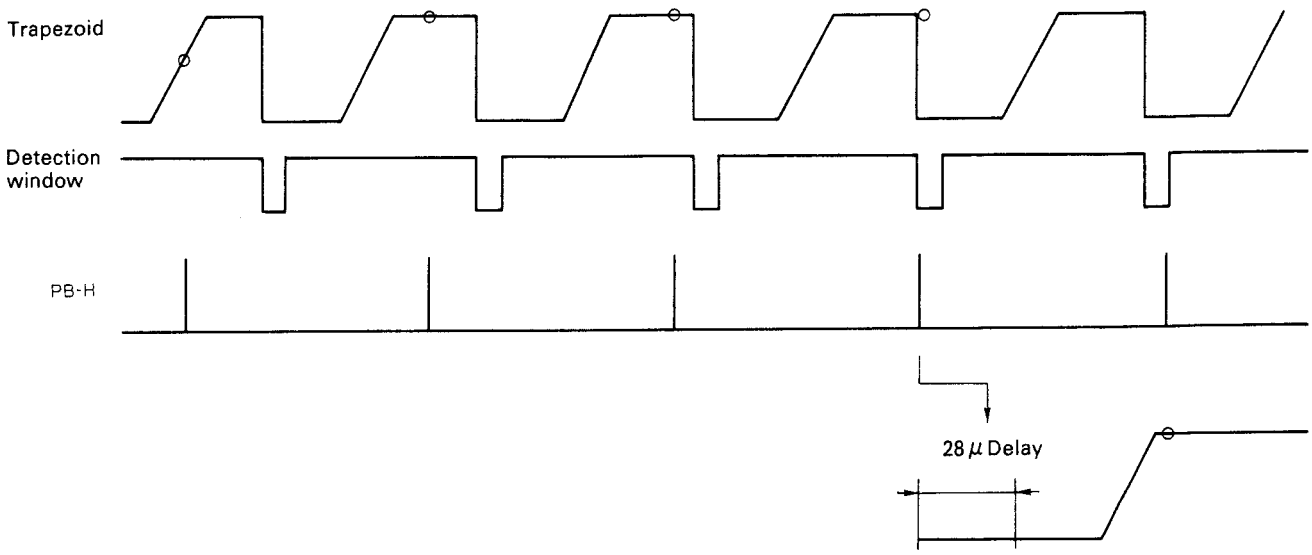


Fig. 4-1

In the LD-S1, the A interval is used for frequency error detection and the B interval is used for phase error detection.
Since interval B has a steep slope, the loop gain is high while the lock range is narrow. Therefore, the SPDL servo cannot be locked if the CCD loop is not operating.
In CLD-909, the CCD servo is turned on after SPDL is locked.
However in LD-S1 the CCD servo is turned on, when SPDL is not locked.
The error detection status is shown in Fig. 4-2.
When SPDL rotation is slower than normal speed, the PB-H cycle is longer than that of REF-H and the sampling point on the trapezoid moves from left to right.
At this stage, the error signal sampling point does not include the frequency error component. (Error signal polarity becomes random centered on the middle of the trapezoid slope.) To detect a frequency error, MMV is triggered by the falling edge of the trapezoid to provide a 5μs detection window.
First, if SPDL rotation is slow when the sampling point enters the detection window, or in other words, when the sampling point is over the upper horizontal part of the trapezoid, the trapezoid is delayed by 28 μsec. Then the sampling point reaches the horizontal part at the top of the trapezoid as shown in the figure. Since the sampled point (error signal) always come to the upper horizontal part of the trapezoid, plus voltage occurs on the average which enables frequency error detection (a + electric potential accelerates the SPDL motor).
If SPDL rotation is fast when the sampling point enters the detection window, the trapezoid is delayed by 36 μsec. Then the sampling point comes to the horizontal part at the bottom of the trapezoid. Since the sampling point (error signal) always comes to the bottom of the trapezoid, a - electric potential occurs on the average with a slow SPDL rotation and a reverse electric potential error signal can be obtained.
To delay the trapezoid by 28 μsec/36 μsec, REF H is delayed by the same amount.
Trapezoid generation and S/H are performed by the PA5009. However, PB-H position to the detection window is detected by PD9001.

When the speed is slow compared to the standard.

→ Sampling point movement direction



When the speed is fast compared to the standard.

← Sampling point movement direction

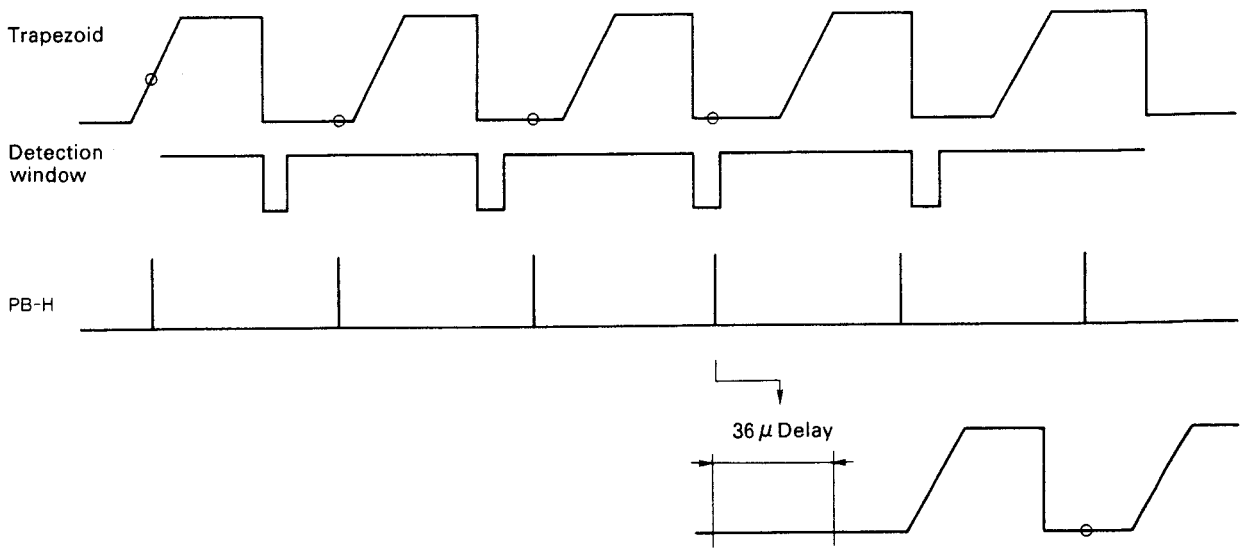


Fig. 4-2

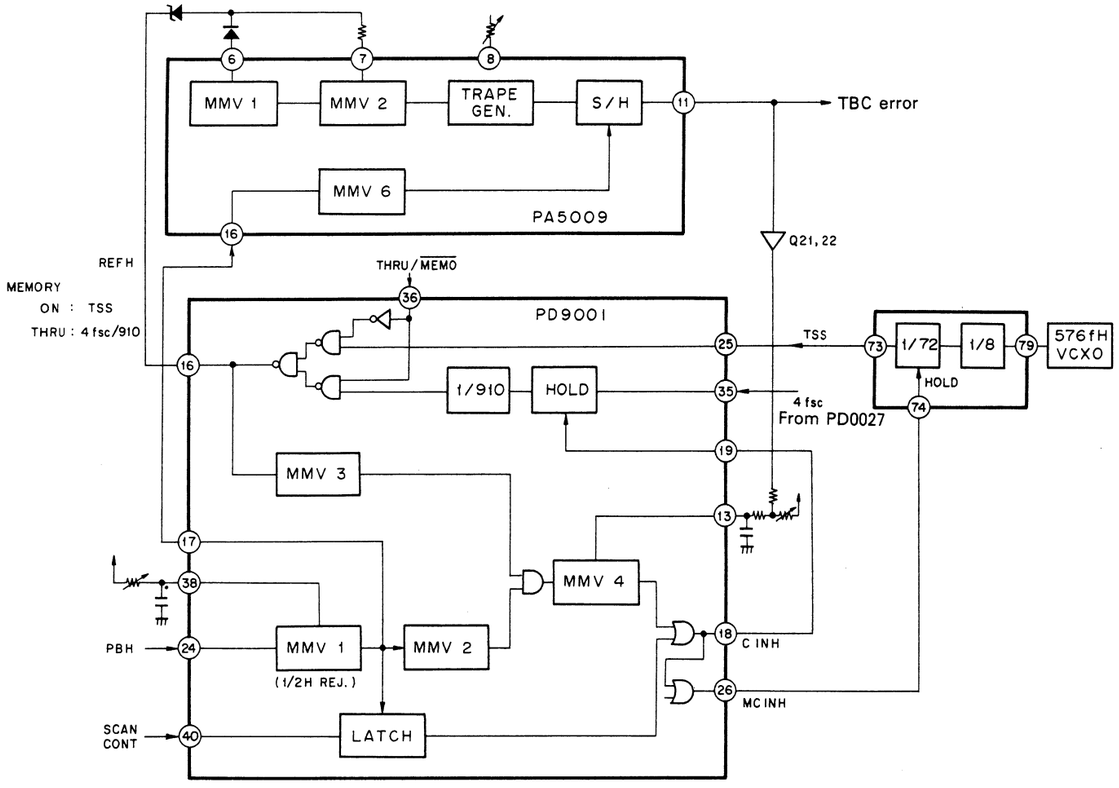
First, PB-H is input to PD9001 pin 24 after sync separation by PA0009. (See Fig. 4-3.)
MMV1 is used to eliminate an equivalent pulse (output from pin 17 as PB-H) and is input to PA5009 pin 16 to perform sampling. Also, MMV2 is triggered by MMV1 output. The output timing of MMV2 is the same as that for the error detection sampling pulse in PA5009. REFH triggers MMV3 in PD9001 to provide the previously mentioned detection window output.
Whether or not the sampling point enters the detection window can be checked by AND of the MMV2 and MMV3 output. The AND output triggers MMV4 which is output from PD9001 pin 18 as CINH and from pin 26 as MCINH.
The CINH signal from pin 18 is input to pin 19 as it is. The MCINH signal from pin 26 is input to the VMRB circuit board PD3080 pin 74. Each of them stops frequency divider operation for REFH generation to delay REFH.
MMV4 timing must be switched to 36 or 28 μs depending on whether SPDL is fast or slow compared to the standard.
MMV4 timing is determined by a time constant connected to pin 13, which is switched by Q21, 22.
When the SPDL speed is slower than normal speed, the sampling point is shifted from left to right on the trapezoid in Fig. 4-2. When the sampling point enters the window, Q21, 22 are on. As a result, the time constant of pin 13 is small. The MMV4 timing becomes 28 μsec by the time constant at that time and MMV4 is triggered at the same time.
When the speed is fast, the sampling point on the trapezoid shifts from right to left. However, since an error by PA5009 pin 11 becomes a - voltage, Q21, 22 are not turned on and the time constant is not switched.
The error signal from PA5009 pin 11 goes to the IC3 error amp EQ. Since Q16, 18 are variable gain amps, when the Q12 -E voltage rises, the gain drops. This VCA is controlled by the slider potentiometer voltage that is input to Q12 -B only during CLV playback. Q14 is on during CAV playback when the gain is fixed.
In the LD-S1, spindle speed is detected by using the SPDL motor FG signal separately from the previously mentioned SPDL servo loop.
First, FG signal input goes to PD9001 pin 7 which triggers the internal MMV. MMV timing can be changed by VR5. Since MMV output turns pin 10 ON/OFF (open drain output), the DC voltage from IC5 pin 1 is switched at IC5 pin 5 by FG.
The IC5 pin 1 voltage is constant during CAV playback because Q13 is ON. However, it depends on slider potentiometer voltage during CLV playback.
If SPDL operation is normal, it functions so that the IC5 pin 7 voltage becomes constant even if SPDL rotation becomes slow at the CLV external circumference. Therefore, SPDL speed can be checked by detecting an IC5 pin 7 voltage variation.
IC4 is a wind comparator for checking SPDL speed.
IC4 pin 7 becomes Low when the IC5 pin 7 voltage is low compared to the standard, or in other words, when SPDL rotation is slow and SPDL acceleration is required. On the other hand, IC4 pin 1 becomes Low when the IC5 pin 7 voltage is high compared to the standard.
When IC4 pin 7 becomes Low, Q20, 19 are turned on which drops the TBC error to GND and also turns Q15 on which causes acceleration signal input to the IC7 absolute value amp.
When IC4 pin 1 becomes Low, - voltage deceleration signal is output through D15.

Starting up operation

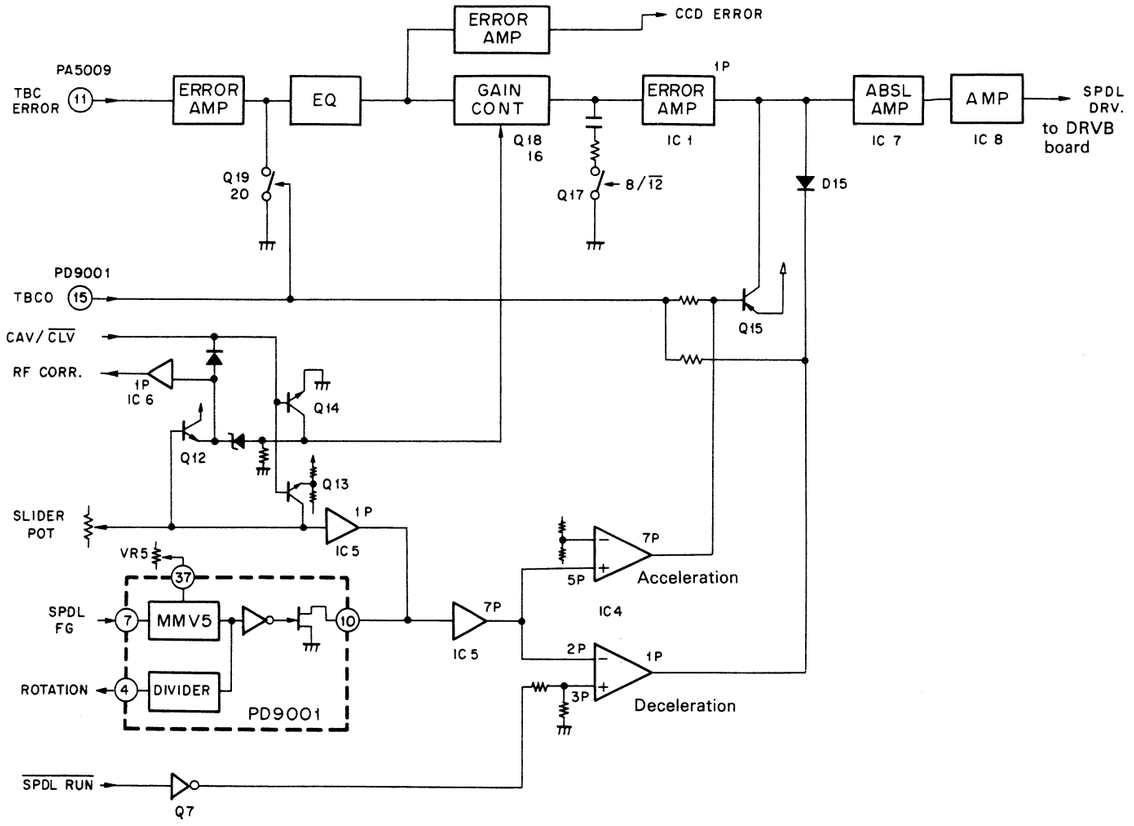
Since the SPDL RUN signal is High when the power is turned on, Q7 is off and minus voltage is applied to IC4 pin 3. Also, since IC5 pin 7 is 0, IC4 pin 7 and pin 1 are Low. When SPDL RUN becomes Low, IC4 pin 3 becomes High, then pin 1 becomes High. However, since pin 7 is still Low, Q15 is turned on which accelerates the SPDL motor. The IC5 pin 7 voltage rises with SPDL acceleration. When it exceeds about 1.3V, IC4 pin 7 becomes High, Q15 is turned off, then Q19, 20 are turned off which starts SPDL servo operation.

SPDL servo operation during track jump

In a previous unit, during CLV scan, it takes time after track jump until the SPDL servo is locked. So that is no color during SCAN.
In LD-S1, the SPDL error after jump is electrically absorbed as follows.
First, when tracking opens, REFH is held, then REFH starts by synchronizing with PB H after tracking is closed. In other words, after track jump the phase difference between PB H and REFH is set at 0, then SPDL and CCD servos are turned on.



(a) TBC error detection block diagram



(b) SPDL servo block diagram

Fig. 4-3 Spindle servo block diagram (a), (b)

Since the frequency error component is not zero at this stage, the error increases rapidly. However, the CCD loop absorbs the error electrically.
Then, since the SPDL servo, which has a slower response than the CCD loop, functions to absorb the frequency error, the CCD loop error decreases to return to a normal state.
Actually, SCAN CONT signal is input to PD 9001 pin 40 (Fig. 4-4).

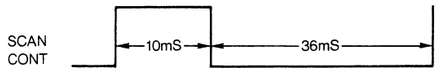


Fig. 4-4 SCAN CONT signal

4.1 CPC ERROR DETECTION CIRCUIT

The PB VIDEO signal from the VDEM board is input to IC10, PA5009 pin 21, then burst signal is output. The phase of the burst signal is compared to that of the 3.58 MHz VCXO input to pin 27, then the error is sampled and held. Then the error outputs from pin 26. The error signal is also input to IC9 pin 6. This error amp has a gain switch, the gain increases when Q25 is turned on.
The output of IC9 pin 7 controls the 3.58MHz VCXO at PD9001 pin 22, 23.
Since the 3.58MHz VCXO output is locked to the playback burst signal, the error signal output from PA5009 pin 26 becomes a phase error component of the play back burst signal which is input to the VMRB board as a CPC error.
This CPC error detection circuit is basically the same as that of LD-700/CLD-909.
Whether or not the error detection loop is properly locked or not is judged when the error signal has DC component. When DC is detected, IC9 pin 1 becomes High, Q23 turns on, then the Q25 FET SW turns on. Then the error amp gain increases and the loop enters the FAST mode to bring the loop back to a normal lock point.

The rising edge is latched with PB H, CINH and MCINH become High, the REFH generation frequency divider stops and REFH is held.
Next, the falling edge is also latched by PB H which causes CINH and MCINH to become Low.
In other words, to start REFH with the signal latched by PB H, REFH started with the same phase as that of PB H.
Also, while CINH and MCINH are High or, in other words, while REFH is being held, TBCO at pin 15 is also Low. While tracking open occurs, Q20, 19 are on so that the CCD loop operation point does not swing unnecesarily. Fig. 4-5 provides an internal block diagram of spindle gate array PD9001.

Also, during scan, IC11 pin 28 becomes High, Q23 turns on and the loop enters the FAST mode.
Since it changes to a SLOW mode during PLAY and the loop only follows the low pass component, a high pass component error remains to become a CPC error.
In addition, the SCAN CONT signal that controls tracking servo open/close during SCAN also controls the Q23 B (Base) through D32.
The phase of the 3.58MHz VCXO output from PD9001 pin 20 inverts with every jump when the memory is on to provide color phase compensation.
When the video memory is off, the jump toggle signal is output from PD9001 pin 12 to compensate the color phase.

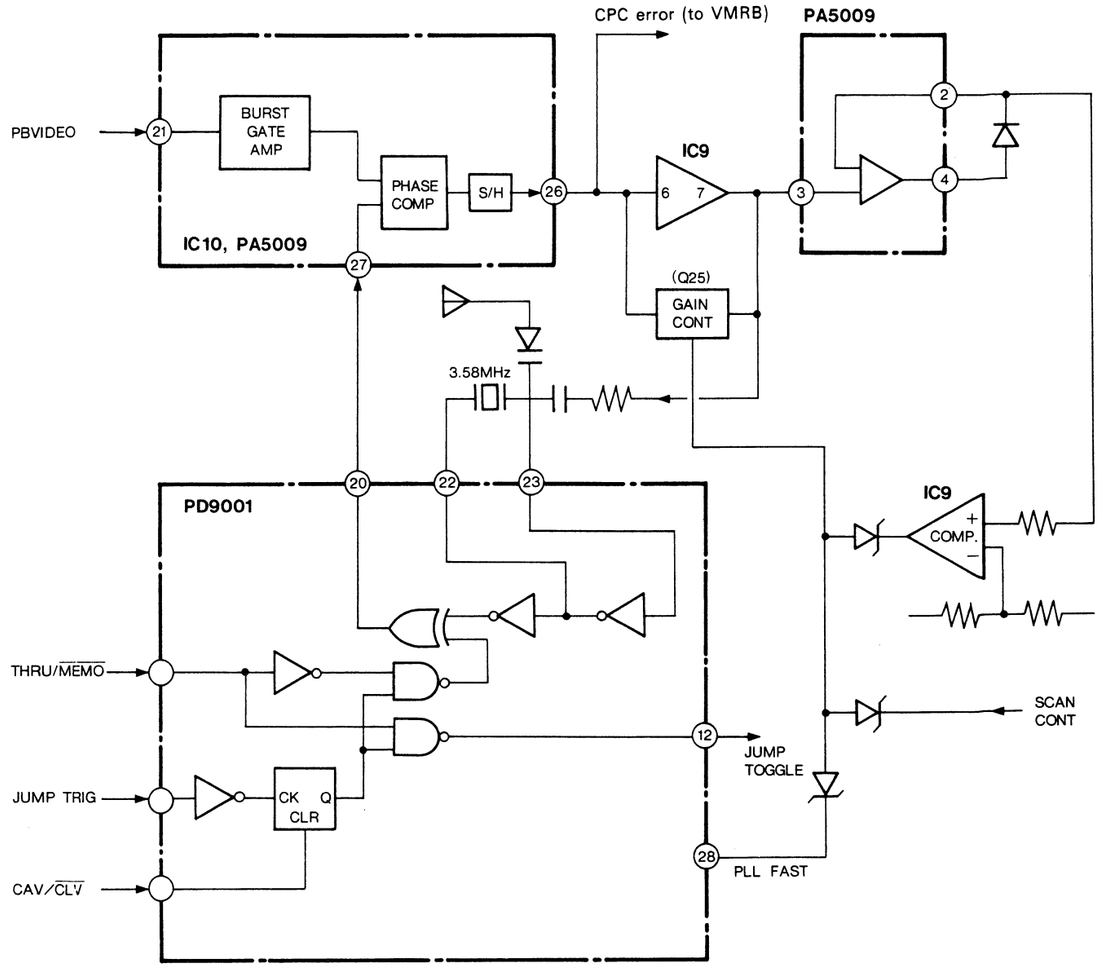
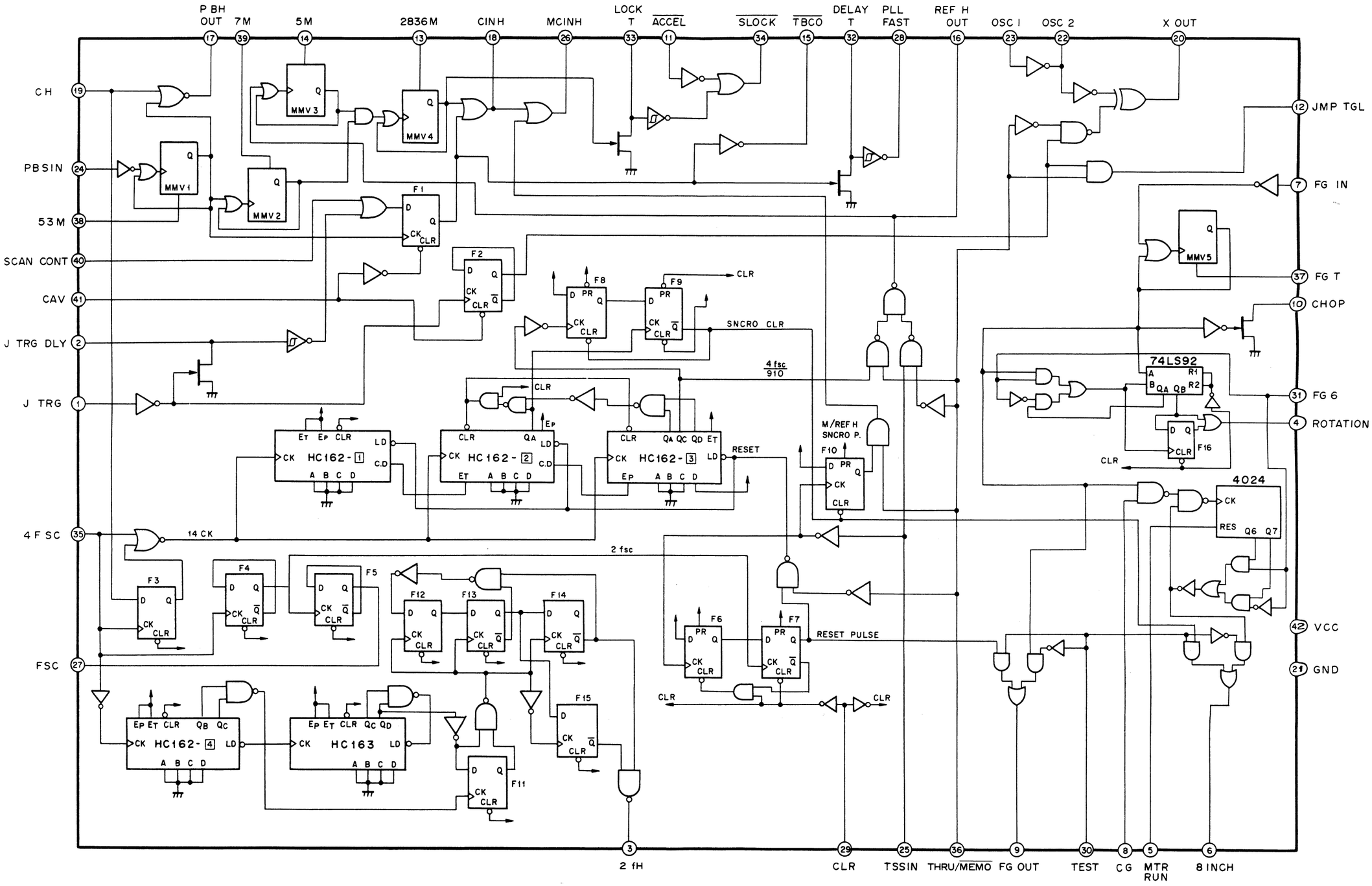
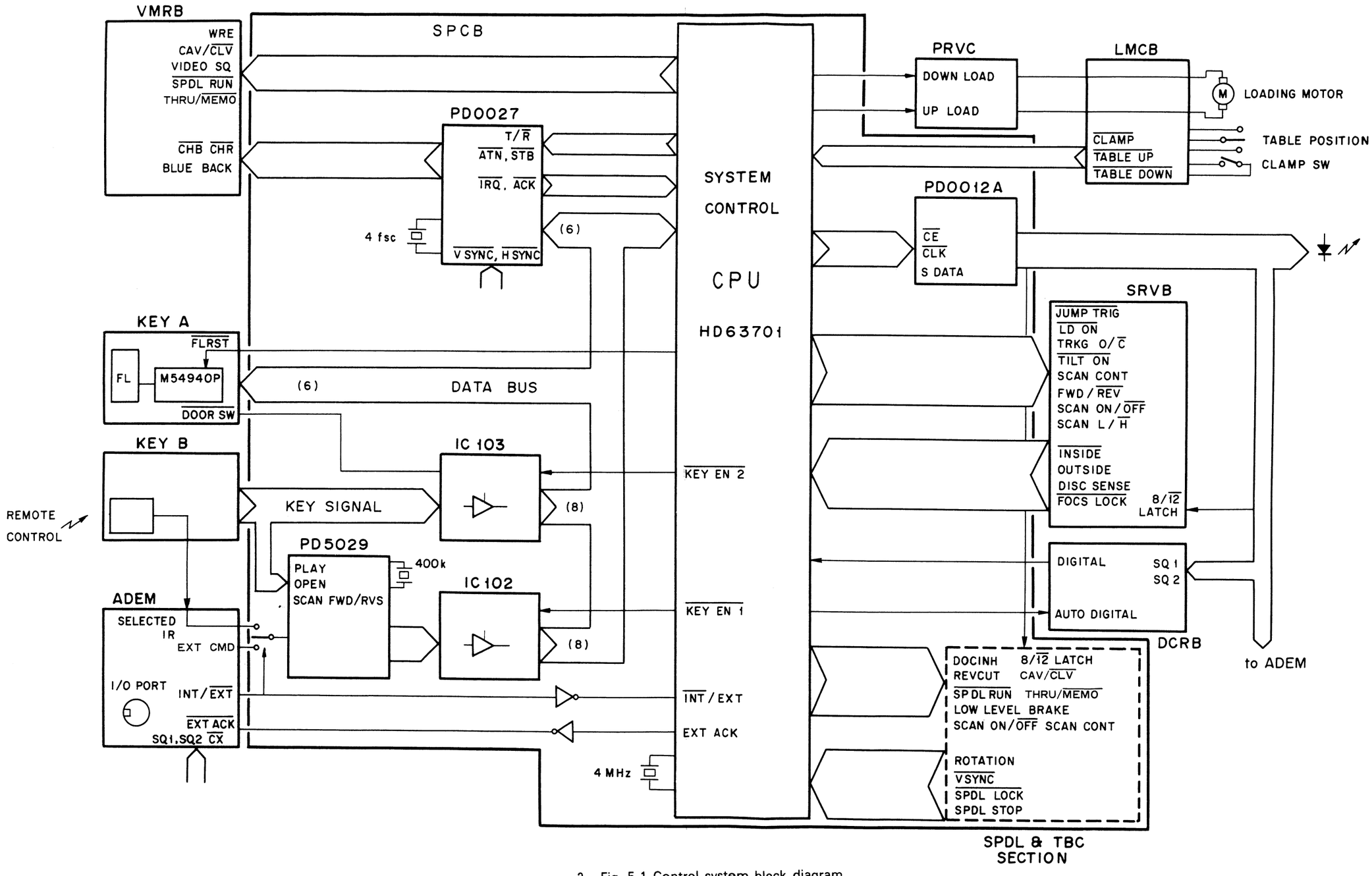


Fig. 4-1-1



1. Fig. 4-5 PD9001 internal block diagram



2. Fig. 5-1 Control system block diagram

5. CONTROL SYSTEM

Fig. 5-1 provides a control system block diagram. The control system mainly functions to monitor the status of the player sections, main frame key input, remote control signal operation and response. Most of these are performed by the main CPU, HD 63701 and peripheral ICs.

PD0027
NTSC sync generator, 24 bit code decoding, on screen display function.

PD5029
Remote control signal decoding, main frame key input processing.

PD0012A
This output expander is provided with a 12-bit output port which turns the LED on and off by 12-bit serial data from the main CPU and controls the CX decoder and RF modulator.

PDE014
Controls the EFM decoder IC, CX23035. A detailed explanation is provided in section 6.

M54940
A fluorescent display tube decoder driver that stores 5-bit × 8 digit data and displays (7 segments + decimal point) × 8 digits by a dynamic lighting system. One digit data consists of BCD 4-bit and decimal 1-bit. The data memory is a latching shift register which allows previous data to be displayed during data transfer.

5.1 OPERATIONS AND FLOWCHARTS

The following operations and their flowcharts are provided below. The operation flowcharts are basically the same as those for the LD-V2000 and LD-838D.

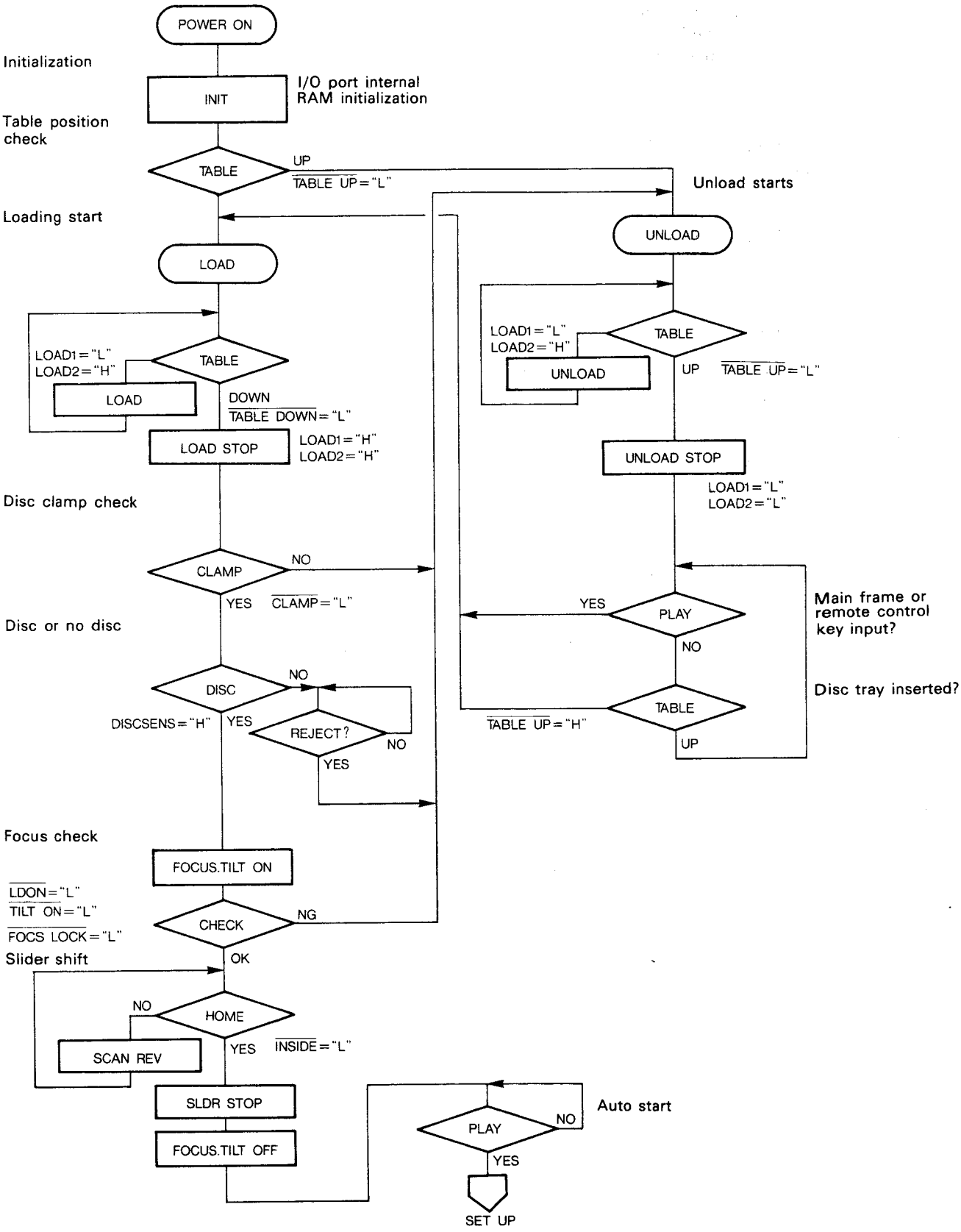


Fig. 5-1-1 Power on and load operation flowchart

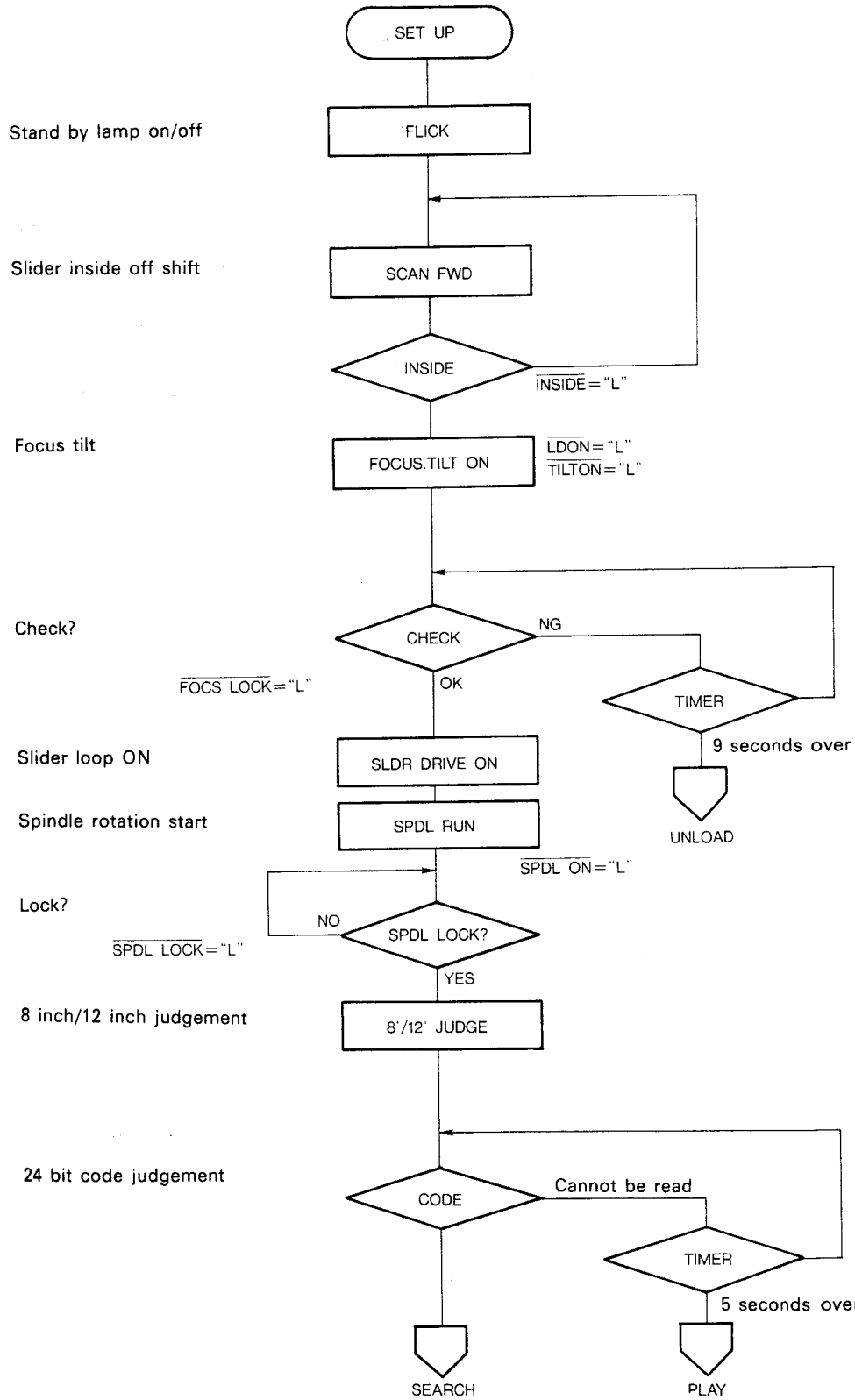


Fig. 5-1-2 Set up operation flowchart

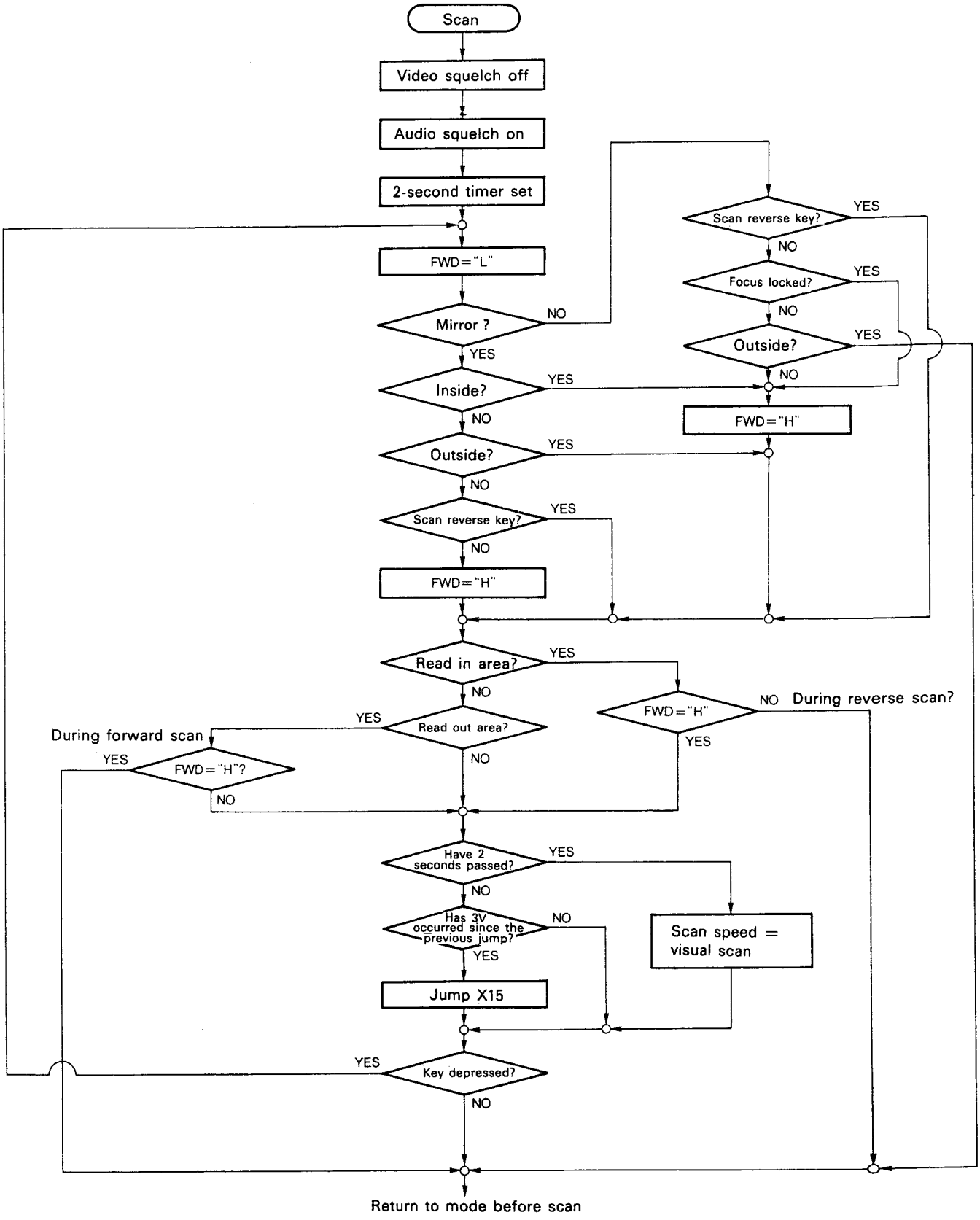


Fig. 5-1-3 Scan operation flowchart

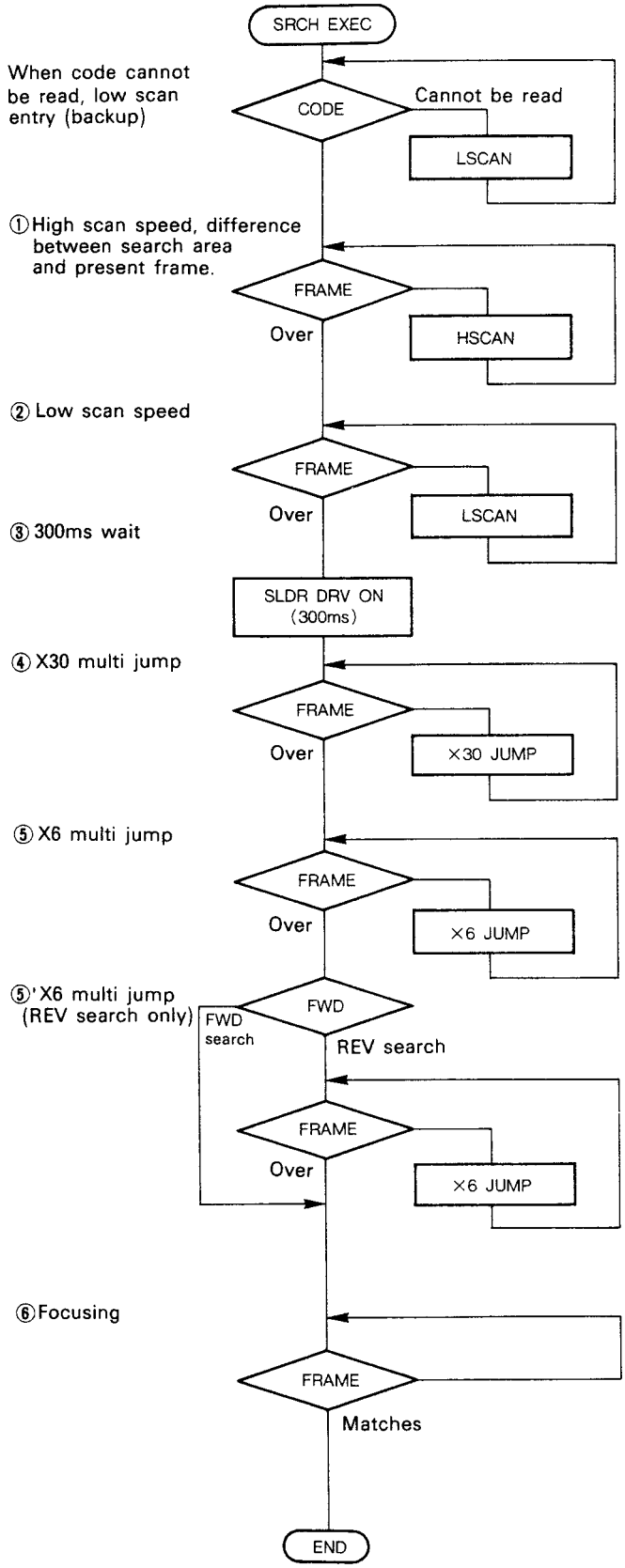


Fig. 5-1-4 Frame search operation flowchart

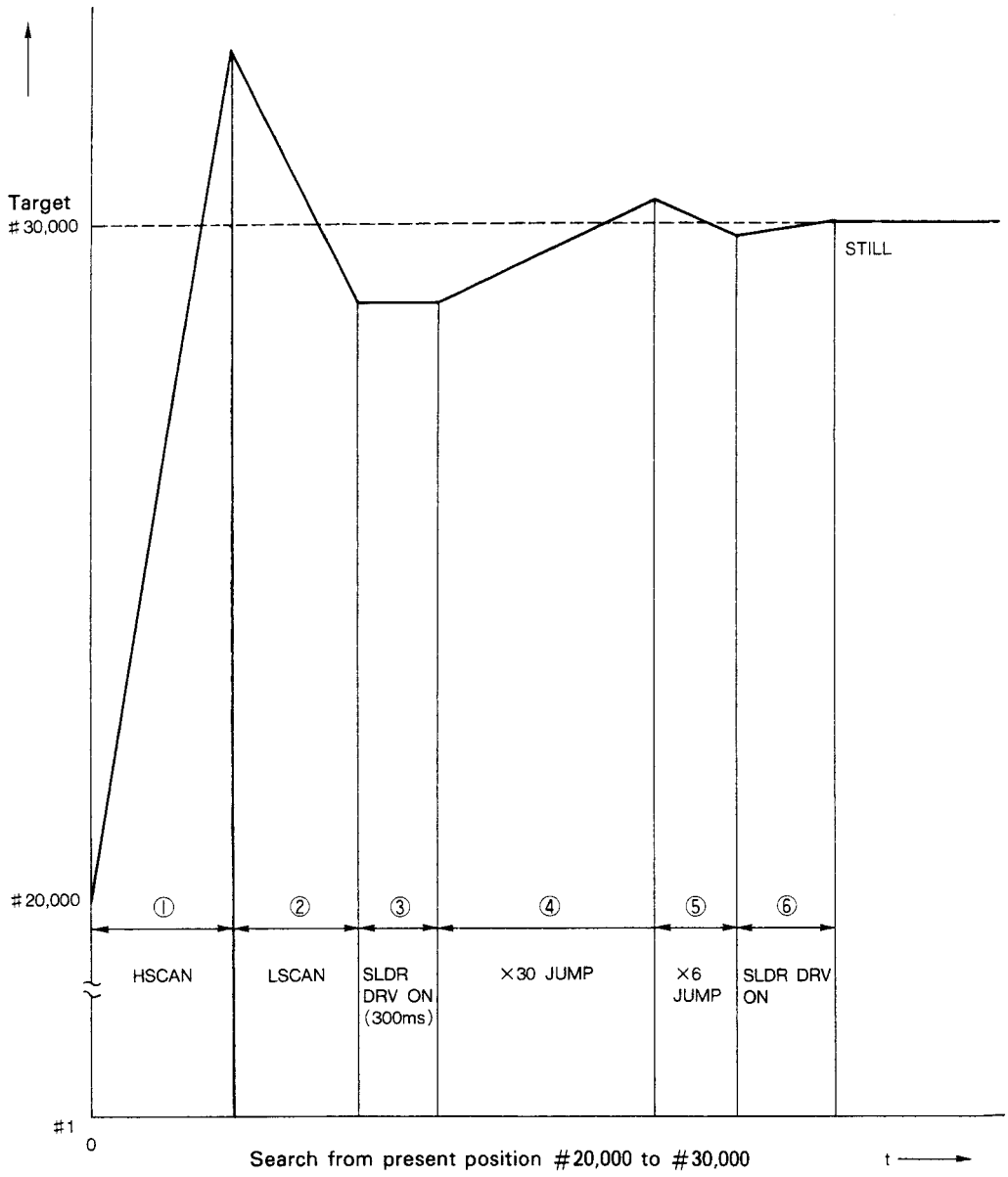


Fig. 5-1-5 Frame search operation

6. OTHERS

6.1 DIGITAL FILTER

The digital filter (SM5804B) in the DCRB unit is a 2-step cascade connected linear phase FIR filter. The basic configuration is shown in Fig. 6-1-1.

The 44.1kHz sampled input signal is converted to an 88.2kHz sampled signal by the 80th 1st DF (Digital Filter) that performs 2-time over sampling. The 15th 2nd DF also performs 2-time over sampling of the 88.2kHz sampled input signal with output performed at a 176.4kHz rate that was over sampled 4-times against the input.

SM5804B is provided with a filter. In regard to filter ring responce, more than 90 dB attenuation is performed with 24.1kHz at the 1st DF by X2 over sampling as shown in Ⓐ. However, sampling noise remains in a +/-24.1kHz range centered at 88.2kHz as shown in Fig. 6-1-2.

At the 2nd DF, sampling noise remains centered at 176.4kHz. However, an attenuation band can be realized between 64.1kHz and 112.3kHz by generating a blocking band at more than 64.1kHz as shown in Ⓑ. As a result, the overall responce become as shown in Ⓒ by a 1st DF and 2nd DF cascade connection that enables a simple low pass filter configuration. LD-S1 uses a 3rd Chebyshev filter.

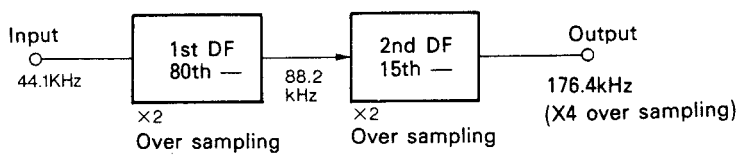


Fig. 6-1-1

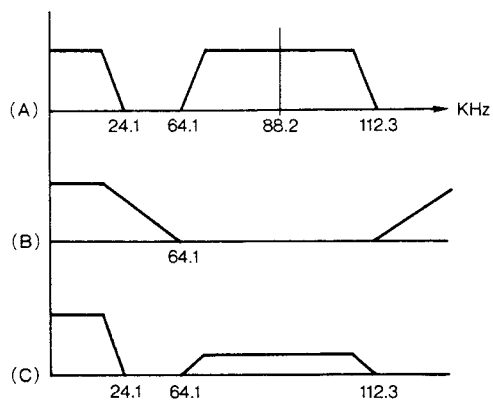


Fig. 6-1-2

6.2 DIGITAL AUDIO SELECTION

In the LD-S1, an auto digital mode and analog mode can be switched by remote control. The main CPU inverts $\overline{DEG}$/ANA output when a remote control signal is received.

PDE014 starts EFM decoding when $\overline{DEG}$/ANA is Low and AUD SQ is also Low. If a disc has an EFM signal, LDD becomes Low.

A front panel digital sound LED displays auto digital mode or analog mode when AUD SQ is High, or in other words, when no sound is generated. When AUD SQ is Low, or in other words, when sound is generated, it monitors the $\overline{LDD}$ signal to display digital audio or analog audio. The flowchart is shown in fig. 6-2-1.

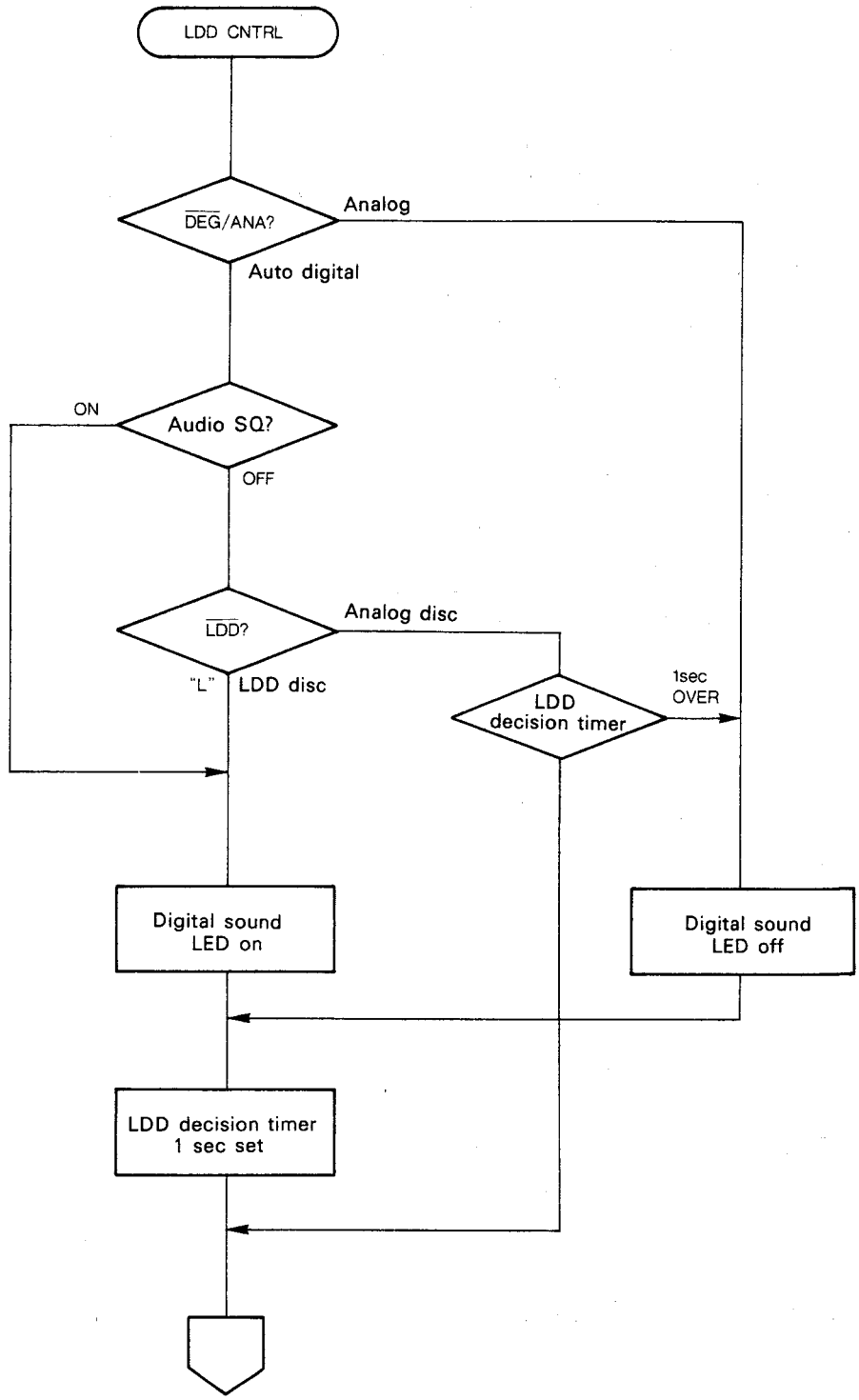


Fig. 6-2-1 Digital sound switching flowchart