

1. Precautions

1-1 Safety Precautions

1) Before returning an instrument to the customer, always make a safety check of the entire instrument, including, but not limited to, the following items:

- (1) Be sure that no built-in protective devices are defective or have been defeated during servicing.
(1) Protective shields are provided to protect both the technician and the customer. Correctly replace all missing protective shields, including any removed for servicing convenience.
(2) When reinstalling the chassis and/or other assembly in the cabinet, be sure to put back in place all protective devices, including, but not limited to, nonmetallic control knobs, insulating fish papers, adjustment and compartment covers/shields, and isolation resistor/capacitor networks. Do not operate this instrument or permit it to be operated without all protective devices correctly installed and functioning.

(2) Be sure that there are no cabinet openings through which adults or children might be able to insert their fingers and contact a hazardous voltage. Such openings include, but are not limited to, excessively wide cabinet ventilation slots, and an improperly fitted and/or incorrectly secured cabinet back cover.

(3) Leakage Current Hot Check-With the instrument completely reassembled, plug the AC line cord directly into a 120V AC outlet. (Do not use an isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards institute (ANSI) C101.1 Leakage Current for Appliances and Underwriters Laboratories (UL) 1270 (40.7). With the instrument's AC switch first in the ON position and then in the OFF position, measure from a known earth ground (metal water pipe, conduit, etc.) to all exposed metal parts of the instrument (antennas, handle brackets, metal cabinets, screwheads, metallic overlays, control shafts, etc.), especially any exposed metal parts that offer an electrical return path to the chassis.

Any current measured must not exceed 0.5mA. Reverse the instrument power cord plug in the outlet and repeat the test. See Fig. 1-1.

Any measurements not within the limits specified herein indicate a potential shock hazard that must be eliminated before returning the instrument to the customer.

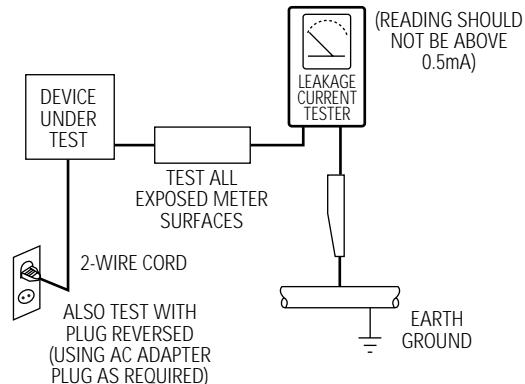


Fig. 1-1 AC Leakage Test

(4) Insulation Resistance Test Cold Check-(1) Unplug the power supply cord and connect a jumper wire between the two prongs of the plug. (2) Turn on the power switch of the instrument. (3) Measure the resistance with an ohmmeter between the jumpered AC plug and all exposed metallic cabinet parts on the instrument, such as screwheads, antenna, control shafts, handle brackets, etc. When an exposed metallic part has a return path to the chassis, the reading should be between 1 and 5.2 megohm. When there is no return path to the chassis, the reading must be infinite. If the reading is not within the limits specified, there is the possibility of a shock hazard, and the instrument must be repaired and rechecked before it is returned to the customer. See Fig. 1-2.

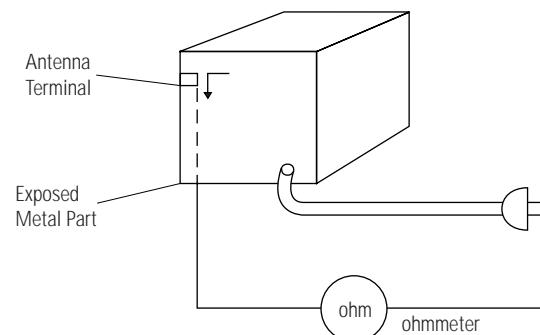


Fig. 1-2 Insulation Resistance Test

Precautions

- 2) Read and comply with all caution and safety related notes on or inside the cabinet, or on the chassis.
- 3) Design Alteration Warning-Do not alter or add to the mechanical or electrical design of this instrument. Design alterations and additions, including but not limited to, circuit modifications and the addition of items such as auxiliary audio output connections, might alter the safety characteristics of this instrument and create a hazard to the user. Any design alterations or additions will make you, the servicer, responsible for personal injury or property damage resulting therefrom.
- 4) Observe original lead dress. Take extra care to assure correct lead dress in the following areas:
(1) near sharp edges, (2) near thermally hot parts (be sure that leads and components do not touch thermally hot parts), (3) the AC supply, (4) high voltage, and (5) antenna wiring. Always inspect in all areas for pinched, out-of-place, or frayed wiring. Do not change spacing between a component and the printed-circuit board. Check the AC power cord for damage.
- 5) Components, parts, and/or wiring that appear to have overheated or that are otherwise damaged should be replaced with components, parts and/or wiring that meet original specifications. Additionally, determine the cause of overheating and/or damage and, if necessary, take corrective action to remove any potential safety hazard.
- 6) Product Safety Notice-Some electrical and mechanical parts have special safety-related characteristics which are often not evident from visual inspection, nor can the protection they give necessarily be obtained by replacing them with components rated for higher voltage, wattage, etc. Parts that have special safety characteristics are identified by shading, an (▲) or a (△) on schematics and parts lists. Use of a substitute replacement that does not have the same safety characteristics as the recommended replacement part might create shock, fire and/or other hazards. Product safety is under review continuously and new instructions are issued whenever appropriate.

1-2 Servicing Precautions

CAUTION : Before servicing units covered by this service manual and its supplements, read and follow the Safety Precautions section of this manual.

Note : If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions, always follow the safety precautions. Remember: Safety First.

1-2-1 General Servicing Precautions

- (1) a. Always unplug the instrument's AC power cord from the AC power source before (1) re-moving or reinstalling any component, circuit board, module or any other instrument assembly, (2) disconnecting any instrument electrical plug or other electrical connection, (3) connecting a test substitute in parallel with an electrolytic capacitor in the instrument.
- b. Do not defeat any plug/socket B+ voltage interlocks with which instruments covered by this service manual might be equipped.
- c. Do not apply AC power to this instrument and /or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
- d. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the test instrument positive lead. Always remove the test instrument ground lead last.

Note : Refer to the Safety Precautions section ground lead last.

- (2) The service precautions are indicated or printed on the cabinet, chassis or components. When servicing, follow the printed or indicated service precautions and service materials.
- (3) The components used in the unit have a specified flame resistance and dielectric strength. When replacing components, use components which have the same ratings. Components identified by shading, by (▲) or by (△) in the circuit diagram are important for safety or for the characteristics of the unit. Always replace them with the exact replacement components.

(4) An insulation tube or tape is sometimes used and some components are raised above the printed wiring board for safety. The internal wiring is sometimes clamped to prevent contact with heating components. Install such elements as they were.

(5) After servicing, always check that the removed screws, components, and wiring have been installed correctly and that the portion around the serviced part has not been damaged and so on. Further, check the insulation between the blades of the attachment plug and accessible conductive parts.

1-2-2 Insulation Checking Procedure

Disconnect the attachment plug from the AC outlet and turn the power ON. Connect the insulation resistance meter (500V) to the blades of the attachment plug. The insulation resistance between each blade of the attachment plug and accessible conductive parts(see note) should be more than 1 Megohm.

Note : Accessible conductive parts include metal panels, input terminals, earphone jacks, etc.

1-3 ESD Precautions

Electrostatically Sensitive Devices (ESD)

Some semiconductor (solid state) devices can be damaged easily by static electricity.

Such components commonly are called Electrostatically Sensitive Devices(ESD). Examples of typical ESD devices are integrated circuits and some field-effect transistors and semiconductor chip components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

- (1) Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
- (2) After removing an electrical assembly equipped with ESD devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
- (3) Use only a grounded-tip soldering iron to solder or unsolder ESD devices.
- (4) Use only an anti-static solder removal devices. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ESD devices.
- (5) Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ESD devices.
- (6) Do not remove a replacement ESD device from its protective package until immediately before you are ready to install it.(Most replacement ESD devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive materials).

(7) Immediately before removing the protective materials from the leads of a replacement ESD device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

CAUTION : Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

(8) Minimize bodily motions when handling unpackaged replacement ESD devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ESD device).

1-4 Handling the optical pick-up

The laser diode in the optical pick up may suffer electrostatic breakdown because of potential static electricity from clothing and your body.

The following method is recommended.

- (1) Place a conductive sheet on the work bench (The black sheet used for wrapping repair parts.)
- (2) Place the set on the conductive sheet so that the chassis is grounded to the sheet.
- (3) Place your hands on the conductive sheet (This gives them the same ground as the sheet.)
- (4) Remove the optical pick up block
- (5) Perform work on top of the conductive sheet. Be careful not to let your clothes or any other static sources to touch the unit.
- ◆ Be sure to put on a wrist strap grounded to the sheet.
- ◆ Be sure to lay a conductive sheet made of copper etc. Which is grounded to the table.

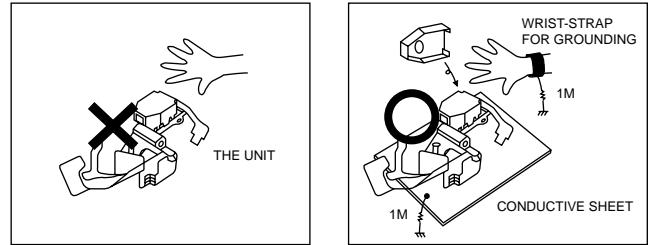


Fig.1-3

- (6) Short the short terminal on the PCB, which is inside the Pick-Up ASS'Y, before replacing the Pick-Up. (The short terminal is shorted when the Pick-Up Ass'y is being lifted or moved.)
- (7) After replacing the Pick-up, open the short terminal on the PCB.

1-5 Pick-up disassembly and reassembly

1-5-1 Disassembly

- 1) Remove the power cord.
- 2) Disassemble the Deck-Assy.
- 3) Make solder land 2 points short on Pick-up.
(See Fig. 1-4)
- 4) Disassemble the Pick-up.

Note : If the assembly and disassembly are not done in correct sequence, the Pick-up may be damaged.

1-5-2 Assembly

- 1) Replace the Pick-up.
- 2) Remove the soldering 2 points on Pick-up.
- 3) Reassemble the Deck-Assy.

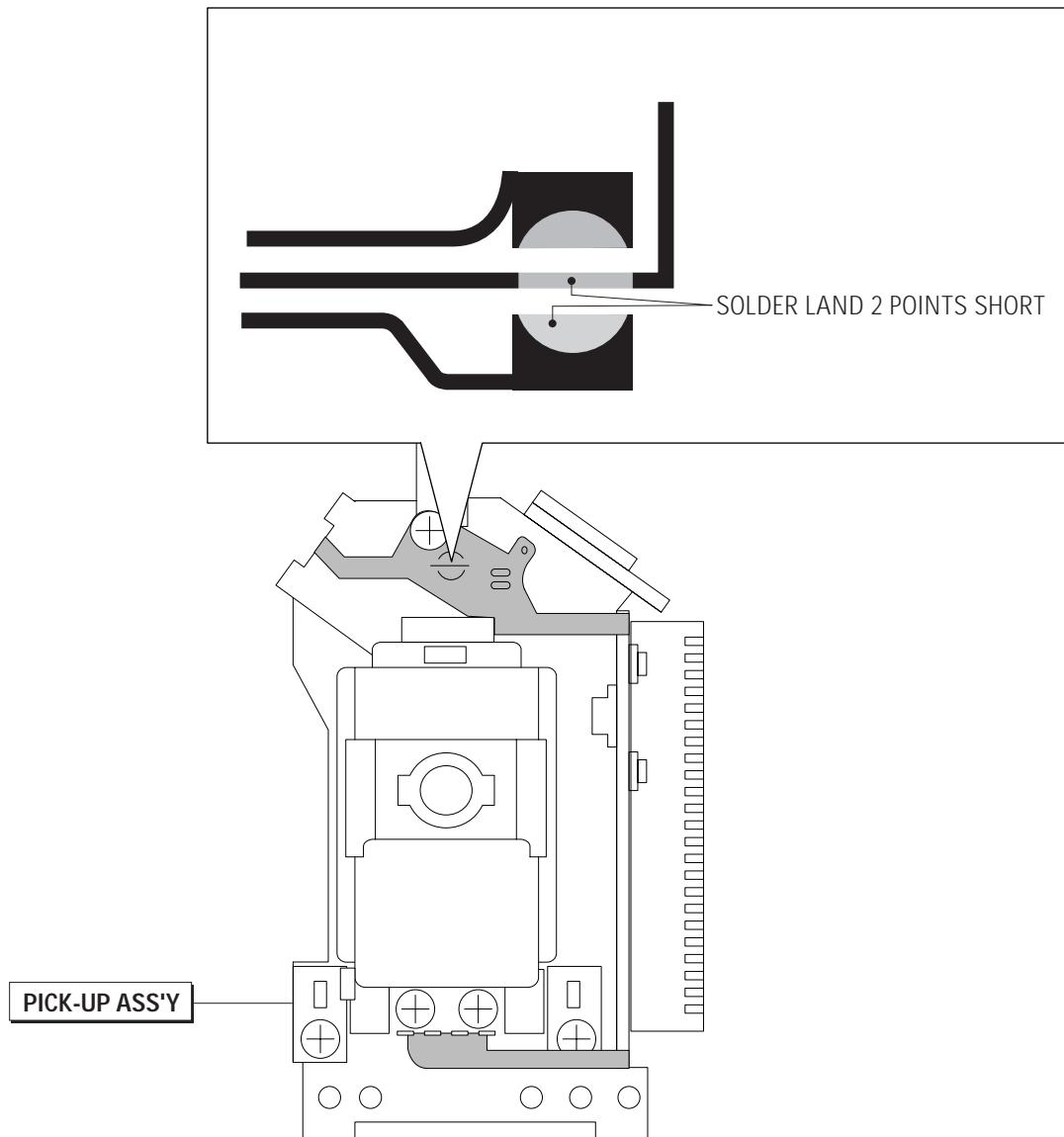


Fig. 1-4



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Printed in Korea
AK82-00419A

TRAINING MANUAL

DVD-P241



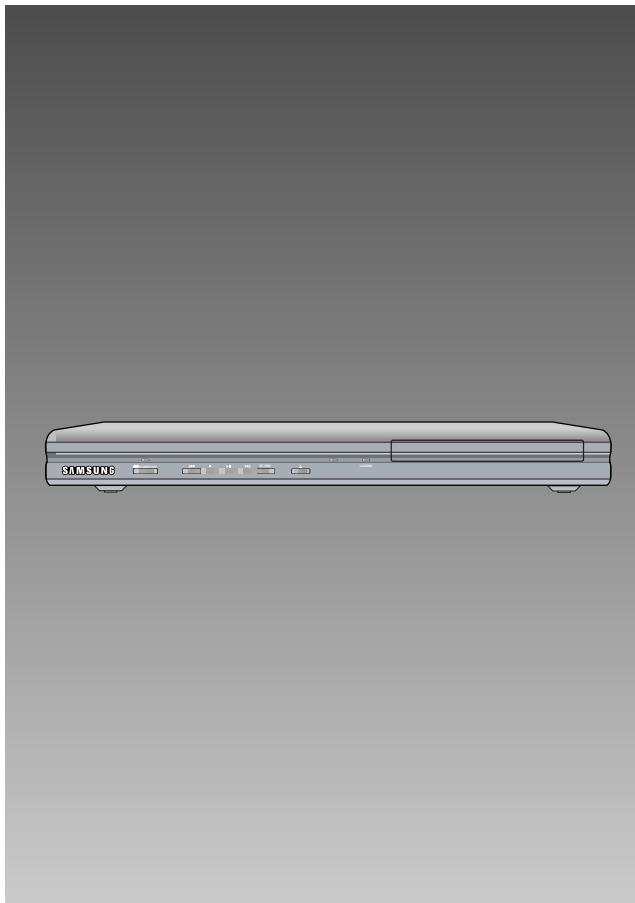
SAMSUNG

DVD PLAYER

Chassis : Trino
DVD-P241

TRAINING Manual

DVD PLAYER



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2. Reference Information

2-1 Introduction to DVD

2-1-1 The Definition of DVD

DVD is the next generation medium and is the acronym of the Digital Versatile Disc or the Digital Video Disc, which maximizes the saving density of the disk surface using the MPEG-2 compression technology to enable the storage of 17G bytes of data on the same size CD.

1) 7 times the storage capacity of the conventional CD

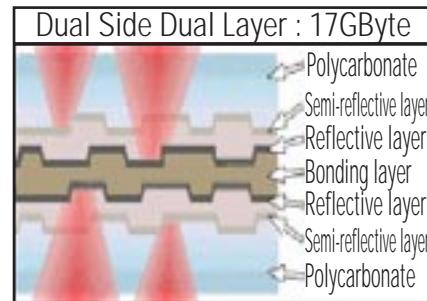
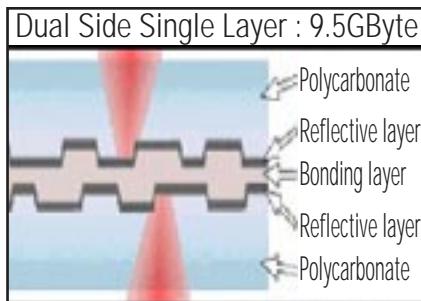
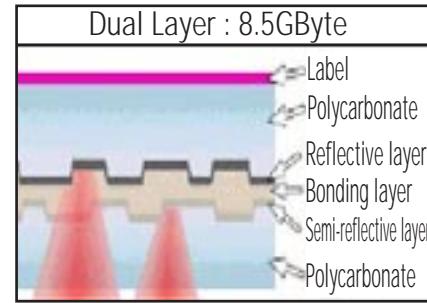
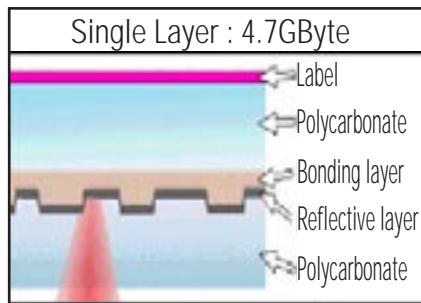
- ◆ Minimized the track pitch and pit size to 1/2 of conventional CD.
- ◆ Uses red laser with short-wavelength of 650nm (635nm).

⌘ DVD Vs. CD-ROM

	DVD		CD-ROM
	Single-Layer	Dual-Layer	
Laser Wavelength	650nm (635nm)		780nm
Track Pitch	0.75um		1.6um
Disc Diameter	120mm		
Disc Thickness	1.2 (0.6 x 2) mm		1.2mm
Linear Velocity	3.49m/s	3.84m/s	1.2 ~ 1.4m/s

2) Disc Formats

DVD consists of two 0.6mm discs attached together, enabling access to the upper and lower side of the disk, and 4 sides could be used at maximum.



2-1-2 DVD Types

FORMAT	TYPE	APPLICATIONS
DVD-Video	Playback Only	High quality image and sound for movies and other video media.
DVD-ROM	Read Only	Multi-functional, multi-midia software that requires large storage capacity.
DVD-Audio	Playback Only	High quality sound that exceeds the CD, multi-channel Audio.
DVD-R	1 Time Recording	Storage media for the computer.
DVD-RAM	Rewritable	Data access/storage media for the computer.

2-2 DVD-Video Format

2-2-1 Main Features

- 1) Able to store up to 160 minutes of Movie by utilizing the MPEG-2 compression technology. (Aver. 133min.)
- 2) Enables more than 500 lines of horizontal resolution. (Class corresponding to the Master Tapes used in broadcasting stations)
- 3) Provides Dolby Digital 5.1ch Surround 3D sound, which enables theater quality sound (NTSC area).
 - ◆ For PAL areas, 1 of either MPEG-2 Audio or Dolby Digital must be selected.
- 4) Multi-Language
 - ◆ Able to store up to 8 languages of dubbing.
 - ◆ Able to store up to 32 subtitle languages.
- 5) Multi-Aspect Ratio
3TV Mode alternatives ; 16:9 Wide Screen (DVD Basic)/4:3 Pan & Scan/Letter Box.
- 6) Multi-Story
Possible to implement Interactive Viewing which enables the user to select the scenario.
- 7) Multi-Angle
Able to view the camera angle you selected among the scenes recorded with multiple camera angles.

Note ; The above media features must have the DVD Title that contains the appropriate contents to function properly.

2-2-2 Audio & Video Specifications

Classification		DVD-Video		Video-CD	LD	
VIDEO	Compression	MPEG-2	MPEG-1	Analog	Analog	
	Pixel	720 x 480	352 x 240			
	Horizontal resolution	Max. 500 Lines	Max. 250 Lines	Max.420 Lines		
	Compression rate	1/40	1/140	Analog		
	Transmission speed	Max. 9.8Mbps (variable)	1.15Mbps (fixed)			
	TV aspect	16:9 / 4:3	4:3	4:3		
AUDIO	Audio	Max. 8 streams		2CH stereo	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 2 Analog CH. 2 Digital CH. (16Bit/44.1KHz) </div> OR	
	Recording type	Dolby Digital	Linear PCM	MPEG-1 Layer 2		
	Transmission rate	448Kbps/stream	6.144Mbps/stream	224Kbps	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 1 Analog CH. 1 Stream of Dolby Digital 2 Digital CH. (16Bit/44.1KHz) </div>	
	Channel	5.1CH/stream	8CH/stream	2CH		
	Sampling frequency	48KHz	16, 20, 24Bit/48, 96KHz	16Bit/44.1KHz		

2-2-3 Detailed Feature

DVD-Video Feature 1

When Developing the DVD Software, various addition and modification is possible.

As the storage capacity increases, the DVD-Video separates the main data and the additional data such as the Multi-Function into different data areas, enabling the control of time-data ratio to provide the format that enables the flexible Software development

- ◆ 1 Movie (3.5Mbps)
 - + Subtitle (1 Language)
 - + Surround Audio (1 Language)
 - = 160min storage (4.673Gbytes)

- ◆ 1 Movie (3.5Mbps)
 - + Subtitle (4 Language)
 - + Surround Audio (4 Language)
 - = 160min storage (4.680Gbytes)

- ◆ 1 Music Video (4Mbps)
 - + 2ch High quality Audio (96kHz/24bit)
 - = 72min storage (4.648Gbytes)

DVD-Video Feature 2

Application of the MPEG-2 compression technology.

DVD-Video uses the variable compression technology, the MPEG-2 to compress the moving image optimally, minimizing the Data loss to Provide a clear, natural screen while increasing the storage time.

DVD-Video	<ul style="list-style-type: none"> ◆ MPEG-2 (Variable compression : Max. 1/40) <ul style="list-style-type: none"> ✓ Field unit compression. ✓ Compression rate change according to the amount of Data. ✓ Differentiates the still image and the moving image compression rate, reducing Data loss and enables efficient compression. 	<p>Amount of data</p> <p>Time</p>
Video-CD	<ul style="list-style-type: none"> ◆ MPEG-1 (Fixed compression : Max. 1/140) <ul style="list-style-type: none"> ✓ Frame unit compression. ✓ Compresses all data using the same ratio. <p>- Fast movements are jagged, and unnatural</p>	<p>Amount of data</p> <p>Loss area</p> <p>Time</p>

DVD-Video Feature 3**High quality surround audio.**

DVD-Video can store the audio using the 5.1ch Dolby Digital compression or the advanced Liner PCM method, providing the better-than-CD quality and theater like audio quality.

- ◆ Dolby Digital (AC-3)
 - ✓ Unlike the traditional Dolby pro-Logic method, the Dolby Digital method separates all 5 main channels (Front L/R, Center, Surround (Rear) L/R) and the Sub woofer to provide live surround audio.
 - ✓ Using the Down Mix method, the conventional Dolby Pro-Logic and Stereo are all compatible.
 - ✓ Each separated channels are played back at CD quality sound. (Frequency band: 20Hz ~ 20KHz)
- ◆ Linear PCM (Pulse Code Modulation)
 - ✓ Provides the high quality Digital sound without the audio data compression.
 - ✓ Various Digital Recordings are possible as shown in the table to the right.

Sampling Frequency	Bit Rate
48KHz	16bit
	20bit
	24bit
96KHz	16bit
	20bit
	24bit

◆ Dolby Digital compatible Audio Mode

Audio Coding Mode	Channel Format					Remark	
	Front			Surround (Rear)			
	L	C	R	L	R		
1/0		0				Mono	
2/0	0		0			Stereo	
3/0	0	0	0			Surround	
2/1	0		0	Mono			
3/1	0	0	0	Mono			
2/2	0		0	0	0		
3/2	0	0	0	0	0		

DVD-Video Feature 4

Multi-Language

- ◆ Audio Dubbing - Max. 8 Languages
- ◆ Subtitle - Max. 32 Languages. Capable of storing, and selectiong.
- ◆ Linear PCM (Pulse Code Modulation)

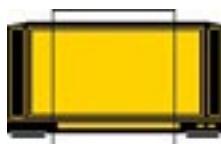
DVD-Video Feature 5

Multi-Aspect

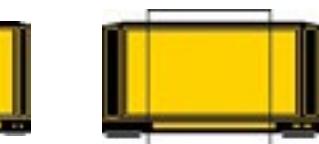
- ◆ Unlike the conventional VCD or LD, DVD-Video has the default of 16:9 Wide, and can be viewed using the conventional 4:3 TV, enabling the expansion of viewer selection capabilities.
 - ✓ 16 : 9 TV : Wide Mode (16:9 Wide Full Screen)
 - ✓ 4 : 3 TV : Letter Box Mode, Pan & Scan Mode



16:9 Wide



4:3 Pan & Scan



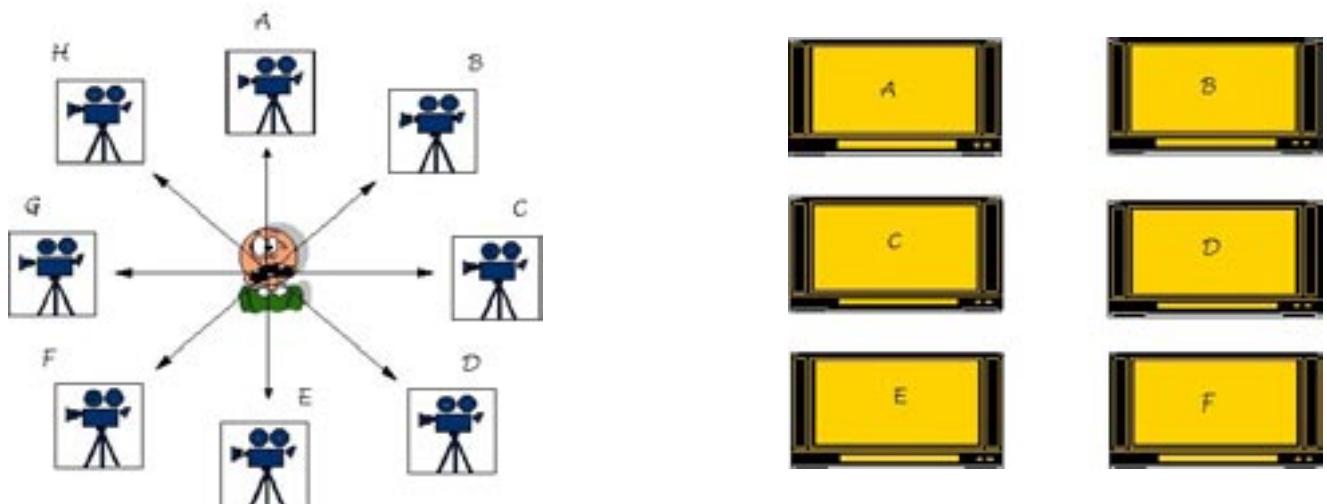
4:3 Letter Box

Note ; Only enable to be worked correctly by an appropriate data supported this function in Disc.

DVD-Video Feature 6

Multi-Angle

- ◆ Up to 9 angles of view may be stored, enabling the viewer to select a specific viewpoint at a given time.
--> Especially, for the Music Video and Sports Title, this provides a more lively image of the scene.



Note ; Only enable to be worked correctly by an appropriate data supported this function in Disc.

DVD-Video Feature 7**Multi-Story**

- ◆ DVD-Video provides the environment suitable for the bi-directional Software development, providing multiple scenarios. This feature enables the Multi-Story function.

OPTION**Parental Lock**

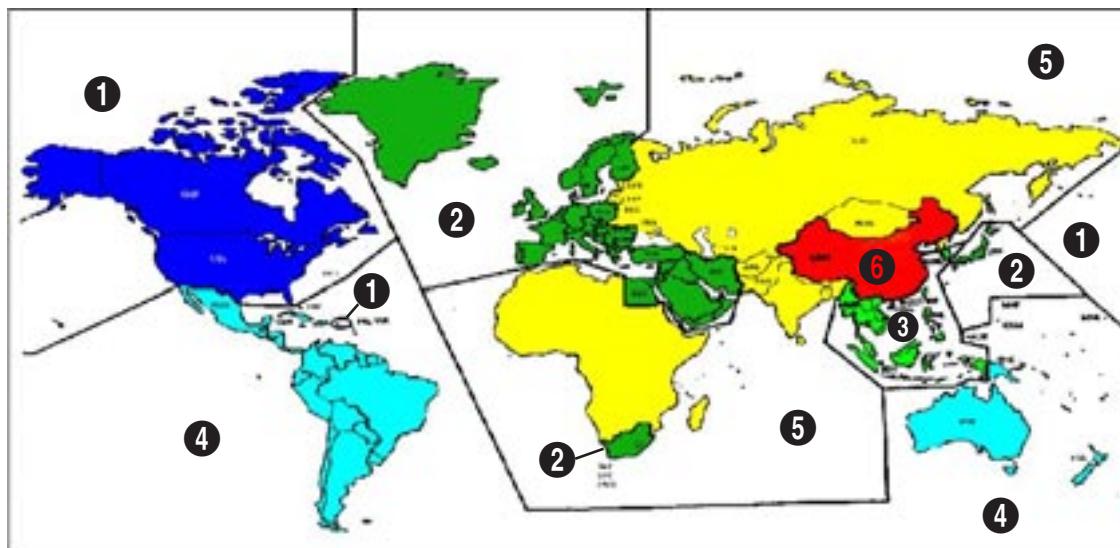
- ◆ For the titles that are not suitable for children viewing, Parental Locks are set, requesting user defined passwords for viewing
- ◆ Parental Locks may be set on specific frames of the Title, enabling the player to skip those frames during playback.

COPYRIGHT**Regional Code & Macrovision**

- ◆ Classify the world into 6 regions, and if the DVD Title and the Player's "Regional Code" do not agree, playback is prohibited.

⌘ Regional Coding is optional for the Software developers (Region 0 All Code), but the Hardware developers must adopt the appropriate regional code for sale.

- ✓ Region 1 : The United States and its territories, Canada.
- ✓ Region 2 : Europe, Japan, Greenland, Egypt, South Africa, the Middle East.
- ✓ Region 3 : Taiwan, Hongkong, Korea, South East Asia.
- ✓ Region 4 : Mexico, South America, Australia, New Zealand.
- ✓ Region 5 : Russia, Eastern Europe, India, Africa.
- ✓ Region 6 : China.
- ✓ Region 0 : Worldwide (All Code)

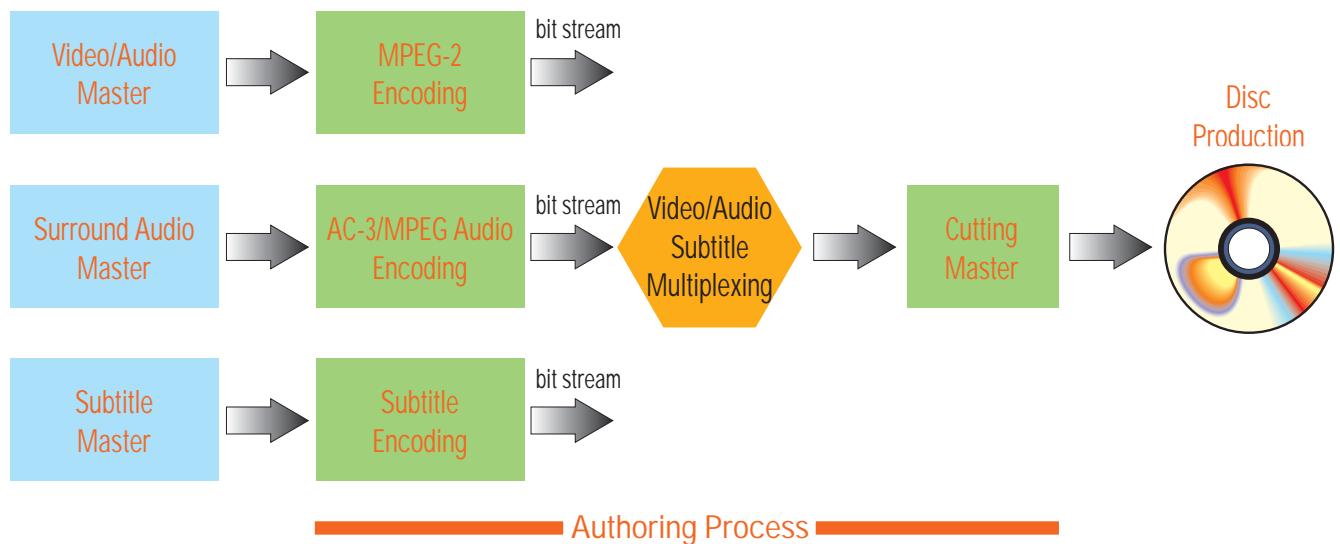


- ◆ Adoption of the Macrovision System disables the copying onto other media.

Remark	DVD-Video Authoring Process
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- ◆ The image quality of the DVD-Video may vary according to the quality of the Master and the Authoring Process
 - ✓ The image quality of the DVD-Video varies according to the Digital Mastering Source such as the conventional LD, VCD, or Original Film.
 - ✓ Different Authoring Process are used according to the Software developers, and this may affect the DVD image quality.

⌘ Authoring Process



3. Product Specification

General	Power Requirements	AC120V, 60Hz
	Power Consumption	10W
	Weight	4.0lbs
	Dimensions	W 16.9 in x D 8.1 in x H 1.7 in
	Operating Temperature Range	+41°F to 95°F
	Operating Humidity Range	10% to 75%
Disc	DVD (Digital Versatile Disc)	Reading Speed : 11.45ft/sec. Approx. Play Time (Single Sided, Single Layer Disc) : 135min.
	CD : 5" (Compact Disc)	Reading Speed : 3.9 to 4.6ft/sec. Maximum Play Time : 74min.
	CD : 3 1/2" (Compact Disc)	Reading Speed : 3.9 to 4.6ft/sec. Maximum Play Time : 20min.
Video Output	Composite Video	1 channel ; 1.0Vp-p (75ohm load)
	Component Video	Y : 1.0Vp-p (75ohm load) Pr : 0.70Vp-p (75ohm load) Pb : 0.70Vp-p (75ohm load)
	S-Video	Luminance Signal : 1.0Vp-p (75ohm load)
		Chrominance Signal : 0.286Vp-p (75ohm load)
Audio Output	2 Channel	L(1/L), R(2/R)
	*Frequency Response	48KHz Sampling : 4Hz to 22KHz 96KHz Sampling : 4Hz to 44KHz
	*S/N Ratio	110dB
	*Dynamic Range	100dB
	*Total Harmonic Distortion	0.004%

* : Nominal specification

MEMO

4. Operating Instructions

General Features

Excellent Sound Dolby Digital, a technology developed by Dolby Laboratories, provides crystal clear sound reproduction.	Digital Photo Viewer (JPEG) You can view Digital Photos on your TV. Repeat You can repeat a song or movie simply by pressing the REPEAT button.	MP3 This unit can play discs created from MP3 files.	Instant Replay This function is used to replay the previous 10 seconds of the movie from the current position.	Instant Skip This function skips playback ahead 10 seconds.	NOTES * Discs which cannot be played with this player. • DVD-ROM • CD-ROM • CDI • HD layer of super Audio CD • CDGs play audio only, not graphics.	Various On-Screen Menu Functions You can select various languages (Audio/Subtitle) and screen angles while enjoying movies.	Progressive Scan Progressive scanning creates an improved picture with double the scan lines of a conventional interlaced picture.	EZ VIEW Easy View can convert Letter Box images to full screen viewing on your conventional TV.	COPY PROTECTION Many DVD discs are encoded with copy protection. Because of this, you should only connect your DVD player directly to your TV, not to a VCR. Connecting to a VCR results in a distorted picture from copy-protected DVD discs.
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This DVD player is capable of playing the following types of discs with the corresponding logos:

Disc Types (Logos)	Recording Types	Disc Size	Max. Playing Time	Characteristics
 V I D E O	Audio + Video	5"	Single-sided 240 min. Double-sided 480 min.	• DVD contains excellent sound and video due to Dolby Digital and MPEG-2 system.
	Audio	3 1/2"	Single-sided 80 min. Double-sided 160 min.	• Various screen and audio functions can be easily selected through the on-screen menu.

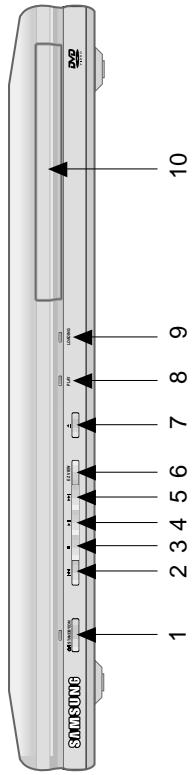
Disc Markings

	74 min.	• CD is recorded as a Digital Signal with better audio quality, less distortion and less deterioration of audio quality over time.
	20 min.	• NTSC broadcast system in U.S.A., Canada, Korea, Japan, etc.
	20 min.	• Dolby Digital disc
	20 min.	• DTS disc

Play Region Number

- This product incorporates copyright protection technology that is protected by methods claims of certain U.S. patents and other intellectual property rights owned by Macrovision Corporation and other rights owners. Use of this copyright protection technology must be authorized by Macrovision Corporation, and is intended for home and other limited viewing uses only unless otherwise authorized by Macrovision Corporation. Reverse engineering or disassembly is prohibited.
- Both the DVD player and the discs are coded by region. These regional codes must match in order for the disc to play. If the codes do not match, the disc will not play.
- The Region Number for this player is described on the rear panel of the player.

Description-Front Panel



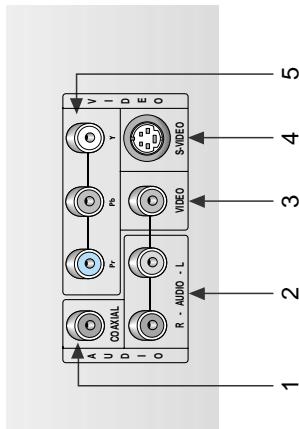
Front Panel Controls

1. STANDBY/ON (O/I)
 - When the player is plugged in, the Power LED lights. If you press the STANDBY/ON button to turn on the player, the LED goes out.
2. SKIP (◀▶)
 - Use to skip a scene or music.
3. STOP (■)
 - Stops disc play.
4. PLAY/PAUSE (►||)
 - Begin or pause disc play.
5. SKIP (►▶)
 - Use to skip a scene or music.
6. EZ VIEW
 - Easy View can convert Letter Box images to full screen viewing on your conventional TV.
7. OPEN/CLOSE (▲)
 - Press to open and close the disc tray.
8. PLAY
 - When playing the disc, the Play LED lights.
9. LOADING
 - When loading the disc, the Loading LED lights.
10. DISC TRAY
 - Place the disc here.

	Power LED (Red)	Play LED (Green)	Loading LED (Yellow)
Power off/Standy	O	X	X
no disc	X	X	O
Stop	X	X	O
Loading	X	X	Blink
Play/Skip	X	O	X
Search/Pause	X	Blink	X
Error	Blink	Blink	Blink

Description-Rear Panel

SETUP



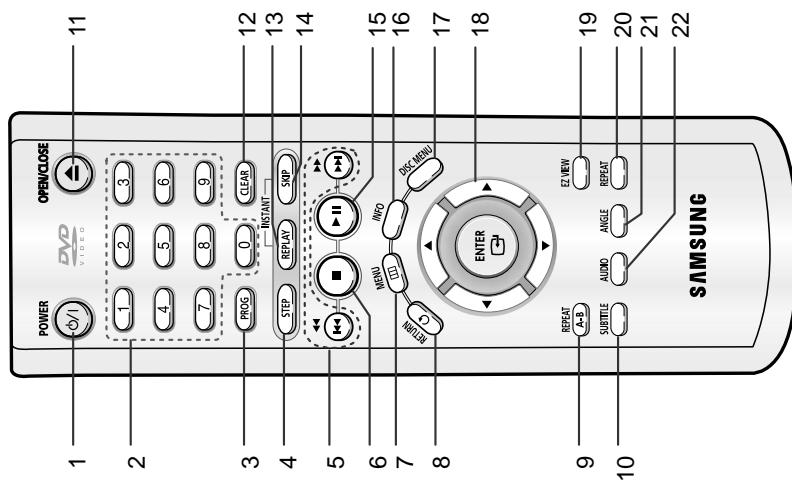
Important Note

- Consult your TV User's Manual to find out if your TV supports Progressive Scan.
- If Progressive Scan is supported, follow the TV User's Manual's instructions regarding Progressive Scan settings in the TV's menu system.
- If 525P Video Output is selected in Setup Menu, Video and S-Video will not work.

Tour of the Remote Control

Tour of the Remote Control

SETUP



DVD Function Buttons

1. DVD POWER Button
• Turns the power on or off.
2. NUMBER Buttons
3. PROG Button
• Allows you to program a specific order.
4. STEP Button
• Advances play one frame at a time.
5. SEARCH/SKIP buttons (◀ / ▶, ▲ / ▼)
• Allows you to search forward/backward through a disc. Use to skip the title, chapter or track.
6. STOP Button (■)
7. MENU Button
• Brings up the DVD player's setup menu.
8. RETURN Button
• Returns to a previous menu.
9. REPEAT A-B Button
• Use to mark a segment to repeat between A and B.
10. SUBTITLE Button
11. OPEN/CLOSE (▲) button
• To open and close the disc tray.
12. CLEAR Button
• Use to remove menus or status displays from the screen.
13. INSTANT REPLAY Button
• This function is used to replay the previous 10 seconds of the movie from the current position.
14. INSTANT SKIP Button
• This function skips playback ahead 10 seconds.
15. PLAY/PAUSE Button (►/■)
• Begin/Pause disc play.
16. INFO Button
• Displays the current disc mode.
17. DISC MENU Button
• Brings up the Disc menu.
18. ENTER/DIRECTION Button (UP/DOWN or LEFT/RIGHT Buttons)
• This button functions as a toggle switch.
19. EZ VIEW Button
• Easy View can convert Letter Box images to full screen viewing on your conventional TV.
20. REPEAT Button
• Allows you to repeat play a title, chapter, track, or disc.
21. ANGLE Button
• Use to access various camera angles on a DVD.
22. AUDIO Button
• Use this button to access various audio functions on a disc.

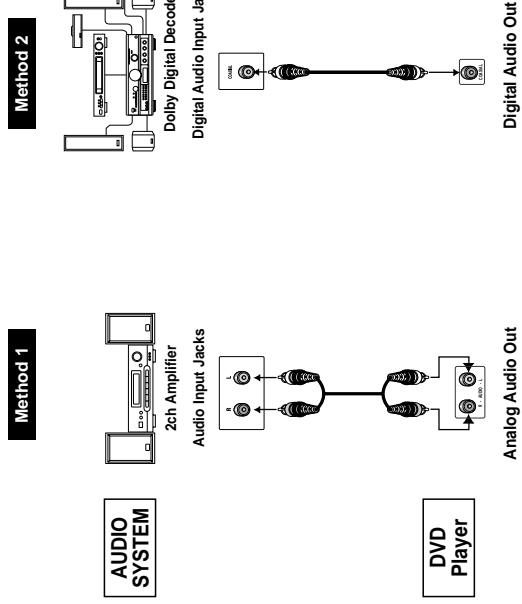
Choosing a Connection

The following shows examples of connections commonly used to connect the DVD player with a TV and other components.

Before Connecting the DVD Player

- Always turn off the DVD player, TV, and other components before you connect or disconnect any cables.
- Refer to the owner's manual of the additional components you are connecting for more information on those particular components.

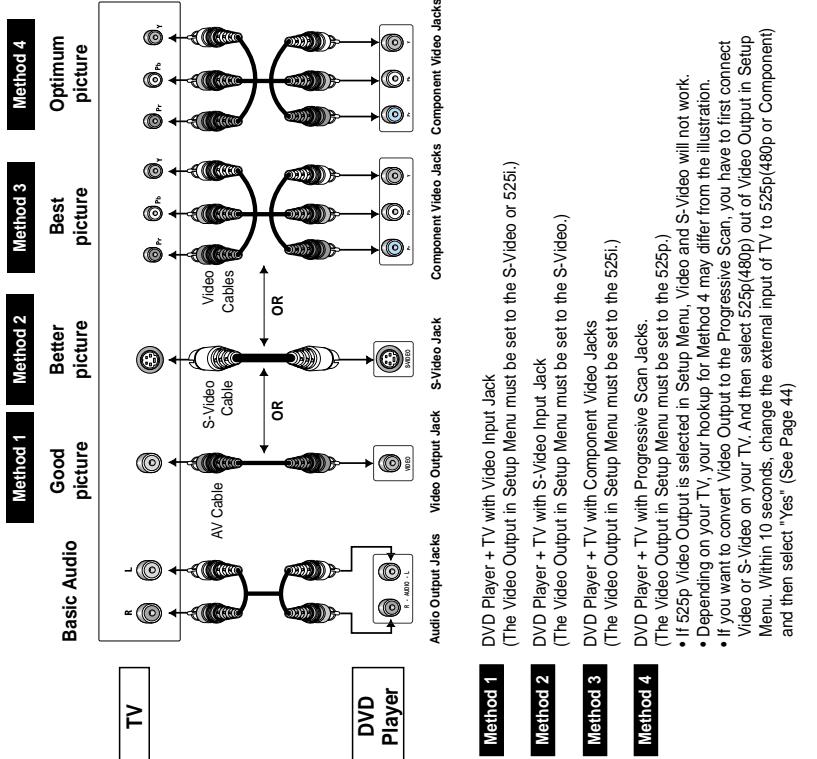
Connection to an Audio System



Connection to a TV (For Video)

TV (Normal, Widescreen, Projection, etc..)

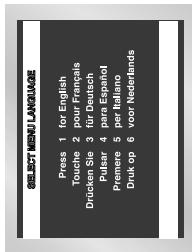
CONNECTIONS



Playing a Disc

Before Play

- Turn on your TV and press the TV/VIDEO button to select the video mode.
 - Turn on your Audio System and select AUX, CD or DVD.
- After plugging in the player, the first time you press the DVD POWER button, this screen comes up :
- If you want to select the language, press a NUMBER button. (This screen will only appear when you plug in the player for the first time.)



Play

- 1** Press the OPEN/CLOSE button.
The STANDBY indicator light goes out and the tray opens.

- 2** Place a disc gently into the tray with the disc's label facing up.

- 3** Press the PLAY/PAUSE (►||) button or OPEN/CLOSE button to close the disc tray.

- 4** Stopping Play
Press the STOP (■) button during play.

- 5** Removing Disc
Press the OPEN/CLOSE button.

- 6** Pausing Play
Press the PLAY/PAUSE (►||) or STEP button on the remote during play.
- Screen stops, no sound.
- To resume, press PLAY/PAUSE (►||) button once again.

Playing a Disc

BASIC FUNCTIONS

7 Step Motion Play (Only DVD)

- Press the STEP button on the remote during play.
- Each time the button is pressed, a new frame will appear.
 - No sound is heard during STEP mode.
 - Press PLAY/PAUSE (►) to resume normal play.
- (You can only perform step motion play in the forward direction.)

8 Slow Motion Play (Only DVD)

- Press and hold the ► button to choose the play speed between 1/8, 1/4 and 1/2 of normal during PAUSE or STEP mode.
- No sound is heard during slow mode.
 - Press PLAY/PAUSE (►) to resume normal play.
 - Reverse slow motion play will not work.

RESUME function

- When you stop disc play, the player remembers where you stopped, so when you press PLAY (►) again, it will pick up where you left off. (unless the disc is removed or the player is unplugged, or if you press the STOP (■) button twice.)

NOTE

- If the player is left for 5 minutes in pause mode, it will stop.
- If the player is left in the stop mode for more than 30 minutes, the power will automatically shut off. (Automatic Power-Off Function)
- If the player is left in the stop mode for more than one minute without any user interaction, a screen saver will be activated. Press the PLAY (►) button to resume normal play.
- This icon indicates an invalid button press.

Using the Search & Skip Functions

During play, you can search quickly through a chapter or track or use the skip function to jump to the next selection.

Searching through a Chapter or Track

Press the SEARCH (◀ or ▶) button on the remote for more than 1 second. If you want to search at a faster speed on the DVD or CD, press and hold the button.

DVD	2X, 8X, 32X, 128X
CD	2X, 4X, 8X

Skipping Tracks

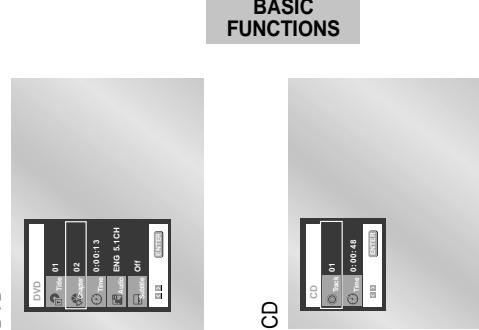
During play, press the ▲ or ▼ button.

- When playing a DVD, if you press the ▼ button, it moves to the next chapter. If you press the ▲ button, it moves to the beginning of the chapter. One more press makes it move to the beginning of the previous chapter.
- When playing a CD, if you press the ▲ button, it moves to next track. If you press the ▼ button, it moves to the beginning of the track. One more press makes it move to the beginning of the previous track.

Using the Display Function

When Playing a DVD/CD

- 1 During play, press the INFO button on the remote.
- 2 Use the UP/DOWN buttons to select the desired item.
- 3 Use the LEFT/RIGHT buttons to make the desired setup.
 - You may use the number buttons of the remote control to directly access a title, chapter or to start the playback from the desired time.
- 4 To make the screen disappear, press the INFO button again.



DVD

BASIC FUNCTIONS

- 1 To access the desired title when there is more than one in the disc. For example, if there is more than one movie on a DVD, each movie will be identified.
- 2 Title
- 3 Most DVD discs are recorded in chapters so that you can quickly find a specific passage (similar to tracks on an audio CD).
- 4 Chapter
- 5 Allows playback of the film from a desired time. You must enter the starting time as a reference.
- 6 Time
- 7 Refers to the language of the film soundtrack.
- 8 Audio
- 9 Subtitle

- You will be able to choose the subtitle languages or, if you prefer, turn them off from the screen.
- A DVD disc can have up to 32 different subtitles.
- Refers to the subtitle languages available in the disc.



CD

Using the Disc and Title Menu

Using the Disc Menu

- 1 During the playback of a DVD disc, press the MENU button on the remote.
- 2 Select **Disc Menu** using the UP/DOWN buttons, then press the RIGHT or ENTER button.



Using the Title Menu

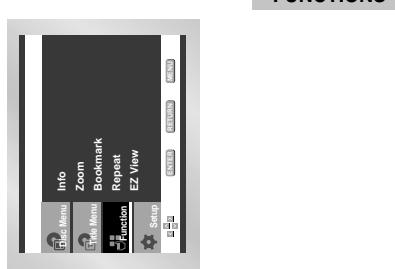
- 1 During the playback of a DVD disc, press the MENU button on the remote.
- 2 Select **Title Menu** using the UP/DOWN buttons, then press the RIGHT or ENTER button.



Using the Function Menu

Using the Function Menu

- 1 Press the MENU button during playback.
- 2 Use the UP/DOWN buttons to highlight **Function**, then press the RIGHT or ENTER button.
- 3 Function selection screen appears: Info, Zoom, Bookmark, Repeat and EZ View.
 - Info (See Page 19)
 - Zoom (See Page 32)
 - Bookmark (See Page 31)
 - Repeat (See Page 22)
 - EZ View (See Page 24-25)
- 4 Use the UP/DOWN button to highlight one of the 5 functions. Then press the RIGHT or ENTER button to access the function.



NOTE

- Depending on the disc, the Title and Disc Menus may not work.
- Title Menu will only be displayed if there are at least two titles in the disc.
- You can also use the Disc Menu, using the DISC MENU button on the remote.

NOTE

- You can also directly select the parts of these functions using their respective buttons on the remote.

Repeat Play

Repeat the current track, chapter, title, a chosen section (A-B), or all of the disc.

When playing a DVD

- 1 Press the REPEAT button on the remote.
Repeat screen appears.
- 2 Select Chapter, Title or A-B using the LEFT/RIGHT buttons.
 - Chapter (◎) : repeats the chapter that is playing.
 - Title (●) : repeats the title that is playing.
 - A-B : repeats a segment of the disc that you select.
- 3 Press ENTER.
- 4 To return to normal play, press REPEAT again, then press the LEFT/RIGHT buttons to select Off and press ENTER.



- * REPEAT A-B button
- Press the REPEAT A-B button to select the point where the function starts. (A)
- Press the REPEAT A-B button to select the point where the function ends. (B)
- To terminate the function, press the 'CLEAR' button or the REPEAT A-B button again.
- A-B REPEAT does not allow you to set point (B) until at least 5 seconds has elapsed after point (A) has been set.

NOTE

- DVD repeats play by chapter or title, CD repeats play by disc or track.
- Depending on the disc, the Repeat function may not work.

Program Play & Random Play

Repeat the current track, chapter, title, a chosen section (A-B), or all of the disc.

Program Play (CD)

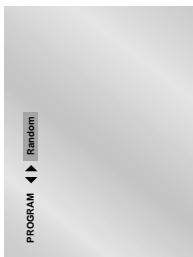
- 1 Press the PROG button.
- 2 Use the LEFT/RIGHT buttons to select PROGRAM. Press the ENTER button.
- 3 Use the LEFT/RIGHT/UP/DOWN buttons to select the first track to add to the program. Press the ENTER button. The selection numbers appear in the Program Order box.
- 4 Press the PLAY/PAUSE (▶/II) button.



PROGRAM 01	
Track	Program order
01	01
02	03
03	04
04	...
05	05
06	07
07	08
08	...
09	09
10	11
11	12
12	...
13	13
14	15
15	16
16	...
...	...

Random Play (CD)

- 1 Press the PROG button.
- 2 Use the LEFT/RIGHT buttons to select Random. Press the ENTER button.
The disc will be played in random order.



NOTE

- Depending on the disc, the Program and Random Play functions may not work.
- PROGRAM/Random playback cannot be used if the disc contains more than two types of file extensions.
- This unit can support a maximum of 20 programmed order.
- While in playback mode, press the CLEAR button on the remote control to cancel Programmed Play or Random Play.

Adjusting the Aspect Ratio (EZ View)

Adjusting the Aspect Ratio (EZ View)

To play back using aspect ratio (DVD)

Press the EZ VIEW button.

- The screen size changes when the button is pressed repeatedly.
- The screen zoom mode operates differently depending on the screen setting in the initial setup menu.
- To ensure correct operation of the EZ VIEW button, you should set the correct aspect ratio in the initial setup (See page 44).

If you are using a 4:3 TV

① For 16:9 aspect ratio discs

- **4:3 Letter Box**
Displays the content of the DVD title in 16:9 aspect ratio.
The black bars will appear at the top and bottom of the screen.
- **4:3 Pan Scan**
The left and right of the screen are cut off and displays the central portion of the 16:9 screen.
- **Screen Fit**
The top and bottom of the screen are cut off and the full screen appears. The picture will look vertically stretched.
- **Zoom Fit**
The top, bottom, left and right of the screen are cut off and the central portion of the screen is enlarged.

② For 4:3 aspect ratio discs

- **Normal Screen**
Displays the content of the DVD title in 4:3 aspect ratio.
- **Screen Fit**
The top and bottom of the screen are cut off. When playing a 2:35: aspect ratio disc, the black bars at the top and bottom of the screen will disappear. The picture will look vertically stretched. (Depending on the type of disc, the black bars may not disappear completely.)
- **Zoom Fit**
The top, bottom, left and right of the screen are cut off and the central portion of the screen is enlarged.

③ For 4:3 aspect ratio discs

- **Normal Wide**
Displays the content of the DVD title in 16:9 aspect ratio.
The picture will look horizontally stretched.
- **Screen Fit**
The top and bottom of the screen are cut off and the full screen appears. The picture will look vertically stretched.
- **Zoom Fit**
The top, bottom, left and right of the screen are cut off and the central portion of the screen is enlarged.
- **Vertical Fit**
When a 4:3 DVD is viewed on a 16:9 TV, black bars will appear at the left and right of the screen in order to prevent the picture from looking horizontally stretched.

NOTE

- This function may behave differently depending on the type of disc.

ADVANCED FUNCTIONS

Slow Repeat play

This feature allows you slowly to repeat scenes containing sports, dancing, musical instruments being played etc. so you can study them more closely.

When playing a DVD

- 1 During play, press the PLAY/PAUSE (▶II) button.
- 2 Press and hold the ▶I button to choose the play speed between 1/8, 1/4, and 1/2 of normal during PAUSE or STEP mode.
- 3 Press the REPEAT A-B button to select the point where the function starts. (A)
- 4 Press the REPEAT A-B button to select the point where the function ends. (B)

NOTE

- The disc will play from A to B repeatedly at the speed you chose.
- To terminate the function, press the CLEAR button or the REPEAT A-B button again.
- A-B REPEAT does not allow you to set point (B) until at least 5 seconds has elapsed after point (A) has been set.

Selecting the Audio Language

You can select a desired language quickly and easily with the AUDIO button.

Using the AUDIO button

- 1 Press the AUDIO button.
 - 2 The Audio changes when the button is pressed repeatedly.
-The audio languages are represented by abbreviations.
 - 3 Press the AUDIO button to select Stereo, Left or Right. (On CD)
- 

DVD



CD

NOTE

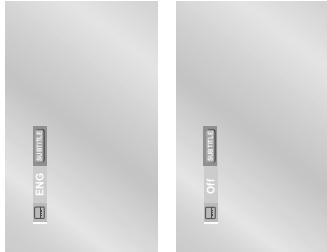
- This function depends on what languages are encoded on the disc and may not work with all DVDs.
- A DVD disc can contain up to 8 audio languages.
- **How to have the same audio language come up whenever you play a DVD;**
Refer to "Setting Up the Language Features" on page 41.

Selecting the Subtitle Language

You can select a desired subtitle quickly and easily with the SUBTITLE button.

Using the SUBTITLE button

- 1 Press the SUBTITLE button.
- 2 The subtitle changes when the button is pressed repeatedly.
- 3 To turn off the display, press the 'CLEAR (RETURN)' button.
 - Initially, the subtitle will not appear on screen.
 - The subtitle languages are represented by abbreviations.



Changing the Camera Angle

When a DVD contains multiple angles of a particular scene, you can select the Angle function.

Using the ANGLE button

- 1 Press the ANGLE button to see if an ANGLE () mark is present at the upper left hand corner of the screen.
- 2 When an ANGLE mark is shown, press the ANGLE button, then an ANGLE select icon will appear at the upper hand corner of the screen.
- 3 Press the ANGLE button to select the desired screen angle.
- 4 To turn off the display, press the ANGLE button again.



ADVANCED FUNCTIONS

NOTE

- This function depends on what languages are encoded on the disc and may not work with all DVDs.
- A DVD disc can contain up to 32 subtitle languages.
- **How to have the same subtitle language come up whenever you play a DVD;**
Refer to "Setting Up the Language Features" on page 41.

NOTE

- If the disc has one angle, this feature won't work. Currently, very few discs have this feature.

Using the Instant Replay/Skip Function

Using the Instant Replay function (DVD)

If you miss a scene, you can see it again using this function.

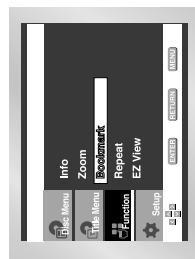
1 If you press the INSTANT REPLAY button, the current scene moves backward about 10 seconds, and plays back.

* Depending on the disc, the Instant Replay function may not work.

Instant Replay

Using the Bookmark Function (DVD)

This feature lets you bookmark sections of a DVD so you can quickly find them at a later time.



Using the Bookmark Function (DVD)

- 1 During play, press the MENU button on the remote.
- 2 Use the UP/DOWN buttons to highlight **Function**, then press the RIGHT or ENTER button.
- 3 Select **Bookmark** using the UP/DOWN buttons, then press the RIGHT or ENTER button.
- 4 Use the LEFT/RIGHT buttons to move to the desired bookmark icon.
- 5 When you reach the scene you want to mark, press the ENTER button. The icon will change to a number (1, 2, or 3).



Recalling a Marked Scene

Instant Skip

Use this function to skip playback 10 seconds ahead of the current scene.

Press the INSTANT SKIP button.

- Playback will skip ahead 10 seconds.
- Depending on the disc, this function may not work.

Using the Instant Skip function (DVD)



ADVANCED FUNCTIONS

NOTE

- 1 During play, press the MENU button on the remote and select the **Bookmark**.
 - 2 Use the LEFT/RIGHT buttons to select the bookmark number you want to delete.
 - 3 Press the CLEAR button to delete a bookmark number.
- Up to three scenes may be marked at a time.
 - Depending on the disc, the Bookmark function may not work.

Clearing a Bookmark

Using the Zoom Function

Using the Zoom Function (DVD)

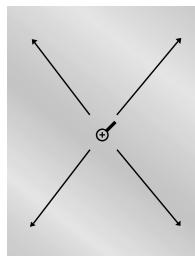
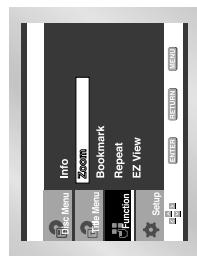
1 During play or pause mode, press the MENU button on the remote.

2 Use the UP/DOWN buttons to highlight **Function**, then press the RIGHT or ENTER button.

3 Select **Zoom** using the UP/DOWN buttons, then press the RIGHT or ENTER button.

4 Use the UP/DOWN or LEFT/RIGHT buttons to select the part of the screen you want to zoom in on.

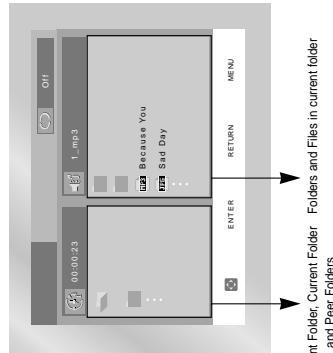
5 Press the ENTER button.
- During DVD play, press ENTER to zoom in 2X/4X/2X/Normal in order.



Clips Menu for MP3/JPEG

ADVANCED FUNCTIONS

- 1** Open the disc tray.
2 Place the disc on the tray.
- Place the disc with the labeled side up.
3 Close the tray.
- The tray closes and you should get a screen that looks like the one below.



Parent Folder Current Folder Folders and Files in current folder
and Peer Folders

- : File name of currently playing.
- : Current Playback Time.
- : Current Playback Mode : There are 4 modes, toggle by the REPEAT button.
 - Off : Normal Playback
 - Track : Repeats the current track
 - Folder : Repeats the current folder.
 - Random : Files in the disc will be played in random order.
- : MP3 file icon.
- : JPEG file icon.
- : Folder icon.
- : Current Folder icon.

Folder Selection

The folder can only be selected in the Stop mode.

To select the Parent Folder

Press the RETURN button to go to parent folder, or use the UP/DOWN buttons to select "..." and press ENTER to go to the parent folder.

To select the Peer Folder

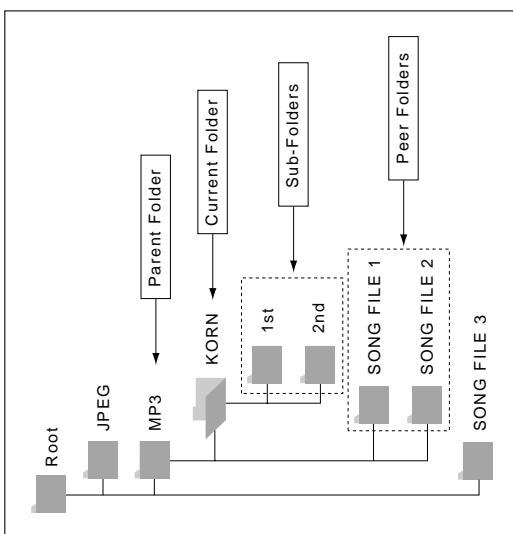
Use the LEFT/RIGHT buttons to highlight left window.

Use the UP/DOWN buttons to select the desired folder, then press ENTER.

To select the Sub Folder

Use the LEFT/RIGHT buttons to highlight right window.

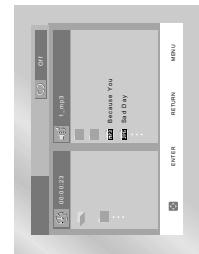
Use the UP/DOWN buttons to select the desired folder, then press ENTER.



MP3 Play

ADVANCED FUNCTIONS

- 1 Open the disc tray.
- 2 Place the disc on the tray.
-Place the disc with the labeled side up.
- 3 Close the tray.
-The tray closes and you should get a screen that looks like the one below.



MP3 Play Function

- 1 Select the desired folder.
(See page 34 to change folder.)
- 2 Use the UP/DOWN or LEFT/RIGHT buttons to select a song file.
- 3 Press ENTER to begin playback of the song file.

Repeat/Random playback

Press the REPEAT button to change playback mode. There are 4 modes, Off, Track, Folder and Random.

- Off : Normal Playback
- Track : Repeats the current song file.
- Folder : Repeats the song files which have the same extension in the current folder.
- Random : Song files which have the same extension in disc will be played in random order.

* To resume normal play, press the CLEAR button.

Picture CD Playback

CD-R MP3 discs

When you record MP3 files on the CD-R, please refer to the following.

- Your MP3 file should be ISO 9660 or JOLIET format.**
ISO 9660 format and Joliet MP3 file are compatible with Microsoft's DOS and Windows, and with Apple's Mac. This format is the most widely used.
- When naming your MP3 file, do not exceed 8 characters, and enter ".mp3" as the file extension.**
General name format of: Title.mp3. When composing your title, make sure that you use 8 characters or less, have no spaces in the name, and avoid the use of special characters including: (.,\,=,+).

- When naming your MP3 file, do not exceed 8 characters, and enter ".mp3" as the file extension.**

General name format of: Title.mp3. When composing your title, make sure that you use 8 characters or less, have no spaces in the name, and avoid the use of special characters including: (.,\,=,+).

- Use a decompression transfer rate of at least 128 Kbps when recording MP3 files.**

Sound quality with MP3 files basically depends on the rate of compression/decompression you choose. Getting the sound quality of audio CD requires an analog/digital sampling rate, that is conversion to MP3 format, of at least 128 Kbps and up to 160 Kbps. However, choosing higher rates, like 192 Kbps or more, only rarely give better sound quality. Conversely, files with decompression rates below 128 Kbps will not be played properly.

- Do not try recording copyright protected MP3 files.**

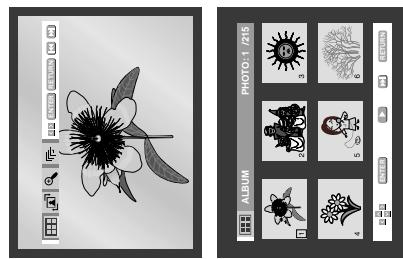
Certain "secured" files are encrypted and code protected to prevent illegal copying. These files are of the following types: Windows Media™ (registered trade mark of Microsoft Inc) and SDMI™ (registered trade mark of The SDMI Foundation). You cannot copy such files.

- Important:** The above recommendations cannot be taken as a guarantee that the DVD player will play MP3 recordings, or as an assurance of sound quality.
You should note that certain technologies and methods for MP3 file recording on CD-Rs prevent optimal playback of these files on your DVD player (degraded sound quality and in some cases, inability of the player to read the files).

• This unit can play a maximum of 3000 files and 300 folders per disc.

1 Select the desired folder. (See page 34 to select the folder)

2 Use the UP/DOWN buttons to select a Picture file in clips menu and then the ENTER button. You should get a screen that looks like the one below.



• Use the INFO button on the remote control to select the menu you want to view and then press the ENTER button.

• : Returns to the Album Screen.

• : To see the next 6 pictures, press the button.

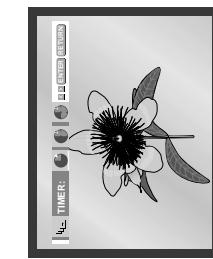
• : To see the previous 6 pictures, press the button.

• : Each time the ENTER button is pressed, the picture rotates 90 degrees clockwise.

• : Each time the ENTER button is pressed, the picture is enlarged up to 4X. (Normal → 2X → 4X → Normal)

• : The unit enters slide show mode.

*Before the Slide Show begin, the picture interval must be set.



• : When this icon is selected and ENTER is pressed, the pictures change automatically with about 6 seconds interval.

• : The pictures change automatically with about 12 seconds interval.

• : The pictures change automatically with about 18 seconds interval.

*Depending on the file size, each interval between images may take longer or shorter than the manual suggests.

NOTE

- If no buttons on the remote control pressed for 10 seconds, the menu will disappear.
- Press the INFO button on the remote control to display the menu again.
- Press the STOP button to return to the clips menu.
- When playing a Kodak Picture CD, the unit displays the Photo directly, not the clips menu.

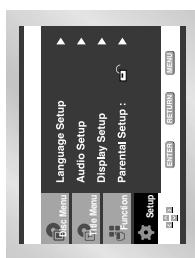
Picture CD Playback

CD-R JPEG Discs

- Only files with the ".jpg" and ".JPG" extensions can be played.
- If the disc is not closed, it will take longer to start playing and not all of the recorded files may be played.
- Only CD-R discs with JPEG files in ISO 9660 or Joliet format can be played.
- The name of the JPEG file may not be longer than 8 characters and should contain no blank spaces or special characters (' / = +).
- Only a consecutively written multisession disc can be played. If there is a blank segment in the multisession disc, the disc can be played only up to the blank segment.
- A maximum of 500 images can be stored on a single CD.
- Only Kodak Picture CDs can be played.
- When playing a Kodak Picture CD, only the JPEG files in the pictures folder can be played.
- Kodak Picture CD : The JPEG files in the pictures folder can be played automatically.
- Konica Picture CD : If you want to see the Picture, select the JPEG files in the clips menu.
- Fuji Picture CD : If you want to see the Picture, select the JPEG files in the clips menu.
- QSS Picture CD : The unit cannot play QSS Picture CD.
- If a number of files in 1 Disc are over 3000, only 3000 JPEG file can be played.
- If a number of folders in 1 Disc are over 300, only JPEG files in 300 folders can be played.

Using the Setup Menu

The Setup menu lets you customize your DVD player by allowing you to select various language preferences, set up a parental level, even adjust the player to the type of television screen you have.



- 1** With the unit in Stop mode, press the MENU button on the remote. Select **Setup** using UP/DOWN buttons, then press the RIGHT or ENTER button.
 - ① **Language Setup** : Setup of the Language.
 - ② **Audio Setup** : Setup of the Audio Options
 - ③ **Display Setup** : Setup of the Display Options
- Use to select which type of screen you want to watch and several display options.
- ④ Parental Setup** : Setup of the Parental Level
 - Allows users to set the level necessary to prevent children from viewing unsuitable movies such as those with violence, adult subject matter, etc.

- 2** Use the UP/DOWN buttons on the remote to access the different features.
- 3** Press the ENTER or RIGHT button to access the sub features.

CHANGING SETUP MENU

To make the setup screen disappear after setting up, press the MENU button again.

NOTE

Depending on the disc, some Setup Menu selections may not work.

Setting Up the Language Features

If you set the player menu, disc menu, audio and subtitle language in advance, they will come up automatically every time you watch a movie.

Using the Player Menu Language

- With the unit in Stop mode, press the MENU button.
- Select **Setup** using UP/DOWN buttons, then RIGHT or ENTER button.
- Select **Language Setup** using UP/DOWN buttons, then RIGHT or ENTER button.
- Select **Player Menu** using UP/DOWN buttons, then press the RIGHT or ENTER button.
- Select **Player Menu** using UP/DOWN buttons, then press the RIGHT or ENTER button.
- Press the ENTER button.
-English is selected and the screen returns to SETUP menu.
-To make the SETUP menu disappear, press the RETURN or LEFT button.

Using the Audio Language

- With the unit in Stop mode, press the MENU button.
- Select **Setup** using UP/DOWN buttons, then RIGHT or ENTER button.
- Select **Language Setup** using UP/DOWN buttons, then press the RIGHT or ENTER button.
- Select **Audio** using UP/DOWN buttons, then press the RIGHT or ENTER button.
- Press the UP/DOWN buttons to select 'English'.
-Select "Original" if you want the default soundtrack language to be the original language the disc is recorded in.
-Select "Others" if the language you want is not listed.
- Press the ENTER button.
-English is selected and the screen returns to SETUP menu.

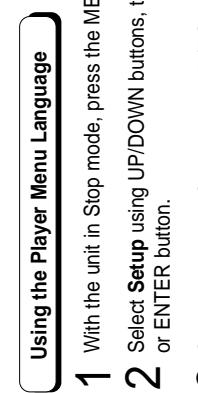
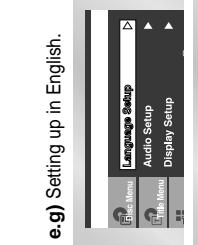
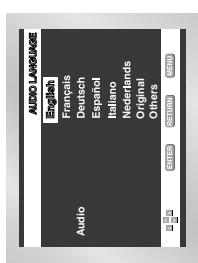
Using the Subtitle Language

- With the unit in Stop mode, press the MENU button.
- Select **Setup** using UP/DOWN buttons, then RIGHT or ENTER button.
- Select **Language Setup** using UP/DOWN buttons, then press the RIGHT or ENTER button.
- Select **Subtitle** using UP/DOWN buttons, then press the RIGHT or ENTER button.
- Use the UP/DOWN buttons to select 'English'.
-Select "Automatic" if you want the subtitle language to be the same as the language selected as the audio preference.
-Select "Others" if the language you want is not listed.
Some discs may not contain the language you select as your initial language; in that case the disc will use its original language setting.
- Press the ENTER button.
-English is selected and the screen returns to SETUP menu.

Using the Disc Menu Language

- This function changes the text language only on the disc menu screens.
- With the unit in Stop mode, press the MENU button.
 - Select **Setup** using UP/DOWN buttons, then RIGHT or ENTER button.
 - Select **Language Setup** using UP/DOWN buttons, then press the RIGHT or ENTER button.
 - Select **Disc Menu** using UP/DOWN buttons, then press the RIGHT or ENTER button.
 - Use the UP/DOWN buttons to select 'English'.
-Select "Automatic" if you want the subtitle language to be the same as the language selected as the audio preference.
-Select "Others" if the language you want is not listed.
Some discs may not contain the language you select as your initial language; in that case the disc will use its original language setting.
 - Press the ENTER button.
-English is selected and the screen returns to SETUP menu.

Setting Up the Language Features



CHANGING SETUP MENU

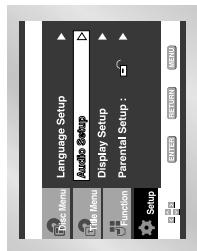
- If the selected language is not recorded on the disc, the original pre-recorded language is selected.
- How to make the **SETUP** menu disappear or return to menu screen during set up: Press RETURN or LEFT button.

NOTE

- If the selected language is not recorded on the disc, the original pre-recorded language is selected.
 - Select "Others" if the language you want is not listed.
Some discs may not contain the language you select as your initial language; in that case the disc will use its original language setting.
- Press the ENTER button.
-English is selected and the screen returns to SETUP menu.

Setting Up the Audio Options

- With the unit in Stop mode, press the MENU button.
- Select **Setup** using UP/DOWN buttons, then RIGHT or ENTER button.
- Select **Audio Setup** using UP/DOWN buttons, then press the RIGHT or ENTER button.
- Use the UP/DOWN buttons to select the desired item. Then press the RIGHT or ENTER button.



- Digital Output**

1. **PCM** : Converts to PCM(2CH) 48kHz audio.
Select PCM when using the Analog Audio Outputs.
2. **Bitstream** : Converts to Dolby Digital Bitstream (5.1CH).
Select Bitstream when using the Digital Audio Output.

NOTE Be sure to select the correct Digital Output or no audio will be heard.

- DTS**

1. Off : Doesn't output digital signal.
2. On : Outputs DTS Bitstream via digital output only.
Select DTS when connecting to a DTS Decoder.

- Dynamic Compression**

1. On : To select dynamic compression.
2. Off : To select the standard range.

- PCM Down Sampling**

1. On : Select this when the amplifier connected to the player is not 96kHz compatible.
In this case, the 96kHz signals will be down converted to 48kHz.
2. Off : Select this when the amplifier connected to the player is 96kHz compatible.
In this case, all signals will be output without any changes.

NOTE

- How to make the **SETUP** menu disappear or return to menu screen during set up:
Press RETURN or LEFT button.
- Manufactured under license from Dolby Laboratories.
"Dolby" and the double-D symbol are trademarks of Dolby Laboratories.
- "DTS" and "DTS Digital Out" are trademarks of Digital Theater Systems, Inc.

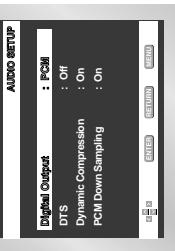
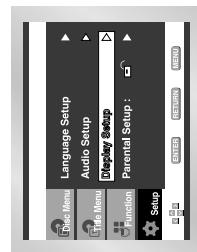
NOTE

- How to make the **SETUP** menu disappear or return to menu screen during set up:
Press the RETURN or LEFT button.

CHANGING SETUP MENU

Setting Up the Display Options

- With the unit in Stop mode, press the MENU button.
- Select **Setup** using UP/DOWN buttons, then RIGHT or ENTER button.
- Select **Display Setup** using UP/DOWN buttons, then press the RIGHT or ENTER button.
- Use the UP/DOWN buttons to select the desired item. Then press the RIGHT or ENTER button.



- TV Aspect**
- Still Mode**
- Screen Messages**
- Black Level**
- Video Output**

Setting Up the Display Options

① TV Aspect

Depending on the type of television you have, you may want to adjust the screen setting (aspect ratio).

1. 4:3 Letter Box : Select when you want to see the total 16:9 ratio screen DVD supplies, even though you have a TV with a 4:3 ratio screen. Black bars will appear at the top and bottom of the screen.

2. 4:3 Pan Scan : Select this for conventional size TVs when you want to see the central portion of the 16:9 screen. (Extreme left and right side of movie picture will be cut off.)

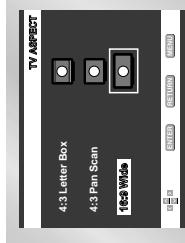
3. 16:9 Wide : You can view the full 16:9 picture on your widescreen TV.



1. 4:3 Letter Box : Select this for conventional size TVs when you want to see the total 16:9 ratio screen DVD supplies, even though you have a TV with a 4:3 ratio screen. Black bars will appear at the top and bottom of the screen.

2. 4:3 Pan Scan : Select this for conventional size TVs when you want to see the central portion of the 16:9 screen. (Extreme left and right side of movie picture will be cut off.)

3. 16:9 Wide : You can view the full 16:9 picture on your widescreen TV.



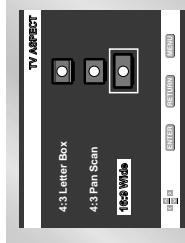
② Still Mode

These options will help prevent picture shake in still mode and display small text clearer.

1. Auto : When selecting Auto, Field/Frame mode will be automatically converted.

2. Field : Select this feature when the screen shakes in the Auto mode.

3. Frame : Select this feature when you want to see small letters more clearly in the Auto mode.

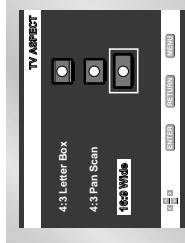


These options will help prevent picture shake in still mode and display small text clearer.

1. Auto : When selecting Auto, Field/Frame mode will be automatically converted.

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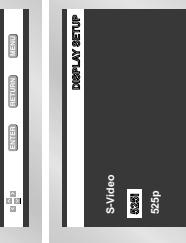


③ Screen Messages

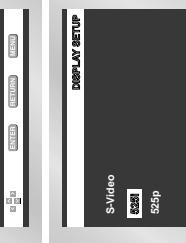
Used to turn on-screen messages On or Off.

④ Black Level

Adjusts the brightness of the screen.(On/Off)



Adjusts the brightness of the screen.(On/Off)



⑤ Video Output

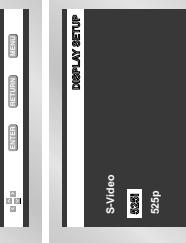
Select Video Output.

1. S-Video : Select when you want to use Video and S-Video Out.

2. 525i : Select when you want to use Video and Component 525i(Interface) Out

3. 525p : Select when you want to use Component 525p(Progressive) Out.

- * If there is no Yes/No selection for 10 seconds at Display Setup sub Menu, Video system is returned to previous menu.



Important Note

- Consult your TV User's Manual to find out if your TV supports Progressive Scan.
- If Progressive Scan is supported, follow the TV User's Manual's instructions regarding Progressive Scan settings in the TV's menu system.
- If the screen is blocked by setting the wrong Video Output, See page 47.

Setting Up the Parental Control

The Parental Control function works in conjunction with DVDs that have been assigned a rating - which helps you control the types of DVDs that your family watches. There are up to 8 rating levels on a disc.

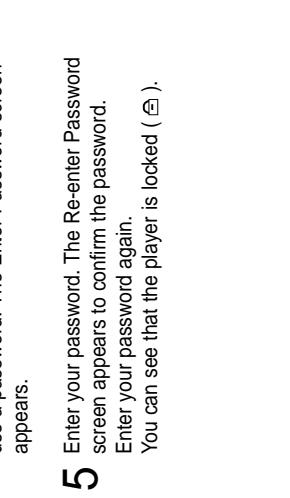
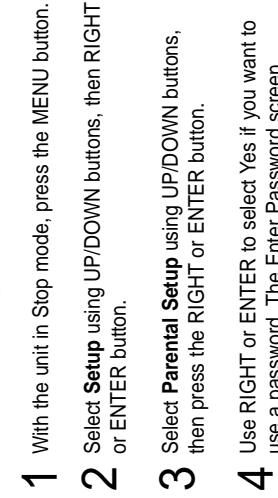
- 1** With the unit in Stop mode, press the MENU button.

- 2** Select **Setup** using UP/DOWN buttons, then RIGHT or ENTER button.

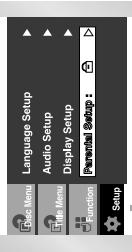
- 3** Select **Parental Setup** using UP/DOWN buttons, then press the RIGHT or ENTER button.

- 4** Use RIGHT or ENTER to select Yes if you want to use a password. The Enter Password screen appears.

- 5** Enter your password. The Re-enter Password screen appears to confirm the password. Enter your password again. You can see that the player is locked ().

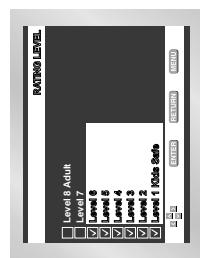
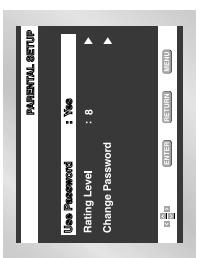


CHANGING SETUP MENU



Setting Up the Parental Control

- 1 With the player in Stop mode, press the MENU button.
- 2 Select **Setup** using UP/DOWN buttons, then RIGHT or ENTER button.
You can see that the player is locked ().
- 3 Select **Parental Setup** using UP/DOWN buttons, then press the RIGHT or ENTER button.
- 4 Enter your password.
The Parental Setup screen appears.
- 5 Select Rating Level using UP/DOWN buttons, and press ENTER or RIGHT button.
- 6 Select Rating Level you want using UP/DOWN buttons. For example, if you select up to Level 6, discs that contain Level 7, 8 will not play.
- To cancel the Rating Level, select No using RIGHT or ENTER in Use Password.



About the Change Password;

- Highlight Change Password using UP/DOWN buttons.
- Press ENTER button.
- The CHANGE PASSWORD screen appears.
- Enter your new password. Enter the new password again.

e.g.) Setting up in LEVEL6.

NOTE

- How to make the **SETUP** menu disappear or return to menu screen during set up;
Press RETURN or LEFT button.
- If you have forgotten your password, see Forgot Password in the Troubleshooting Guide.

5. Disassembly and Reassembly

5-1 Cabinet and PCB

Note : Reassembly in reverse order.

5-1-1 Top Cabinet Removal

- 1) Remove 3 Screws ① on the back Top Cabinet.
- 2) Lift up the Top Cabinet in direction of arrow.

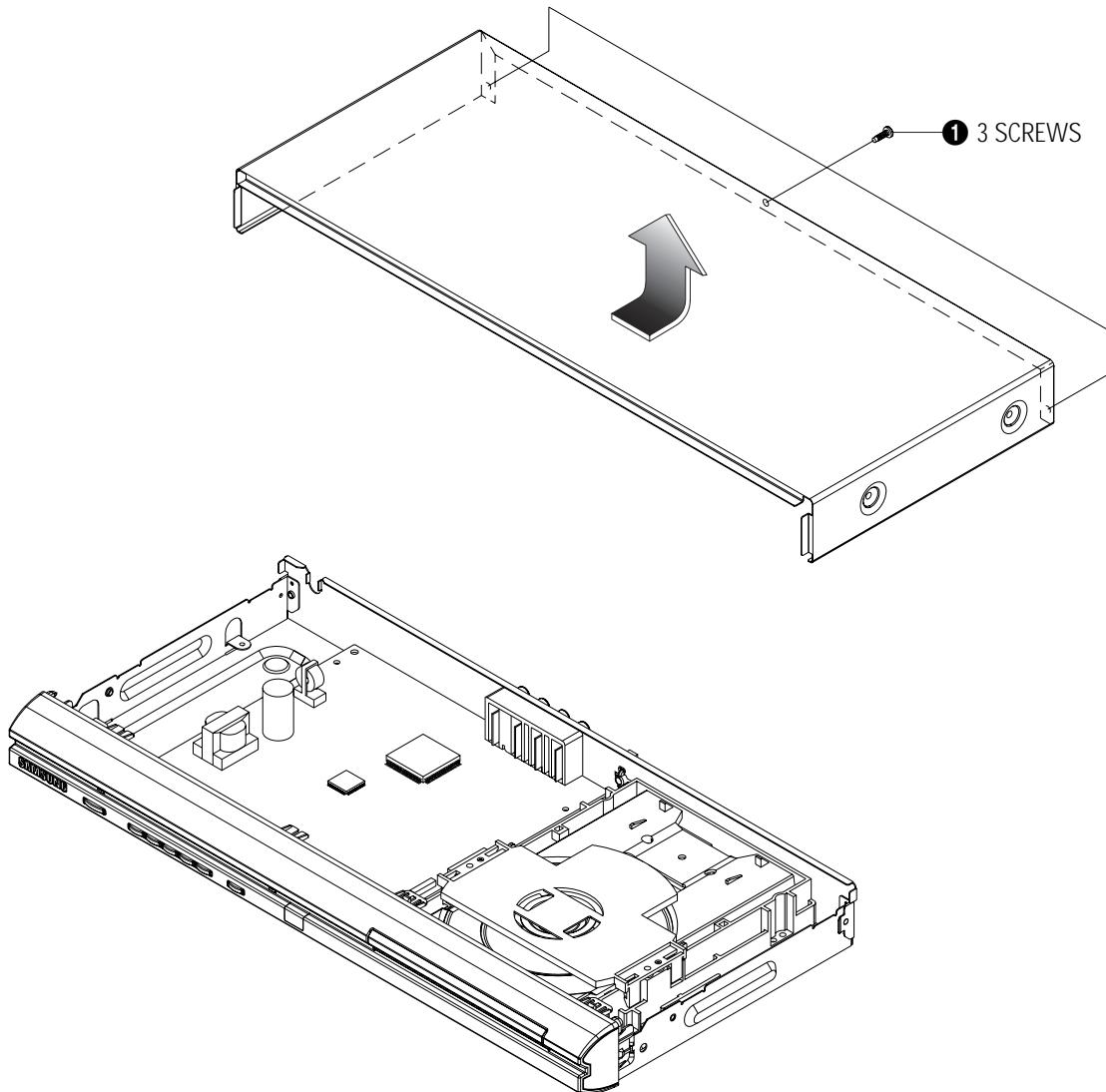


Fig. 5-1 Top Cabinet Removal

5-1-2 Door-Tray Removal

- 1) Supply power and open Tray **1**.
- 2) Disassemble the Door-Tray **2** in direction of arrow "A".
- 3) Close Tray **1** and power off.

Note : If Tray **1** doesn't open, insert a Screw driver **4** into the Emergency hole **3** (as shown in detailed drawing) and then push it in the direction of arrow "B". Open Tray manually.

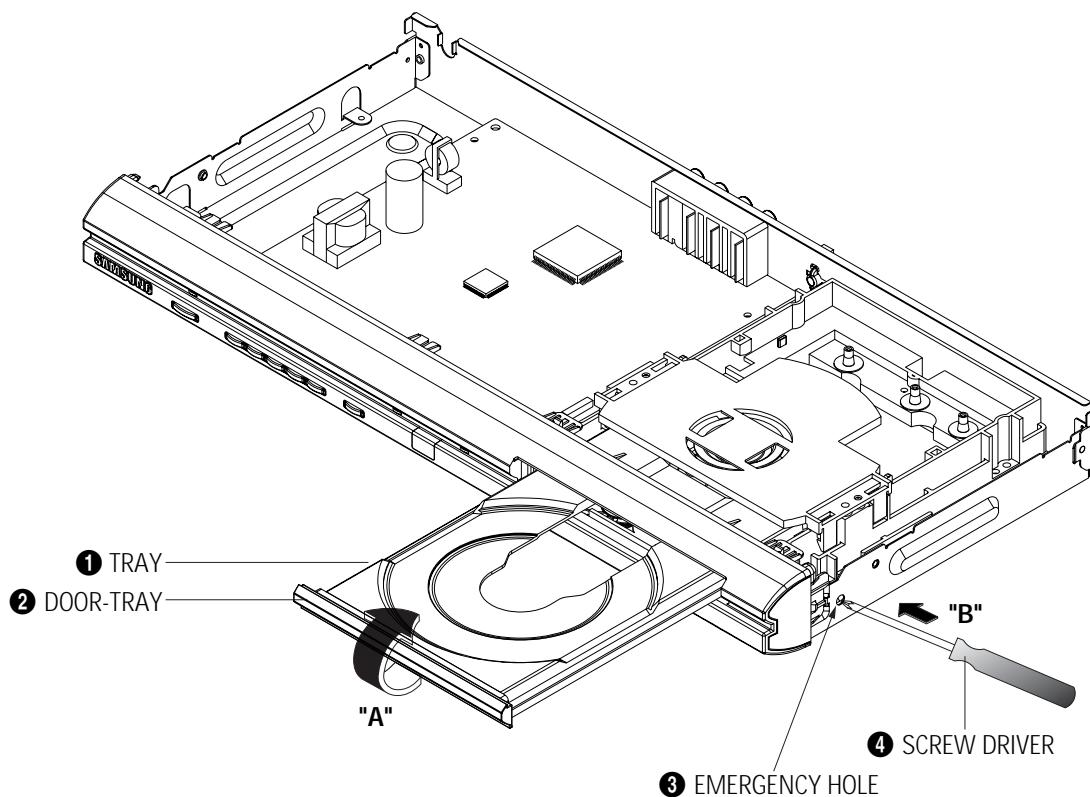


Fig. 5-2 Door-Tray Removal

5-1-3 Ass'y Front-Cabinet Removal

- 1) Release 6 Hooks ①, ②, ③, ④ and Ass'y Front-Cabinet ⑤.

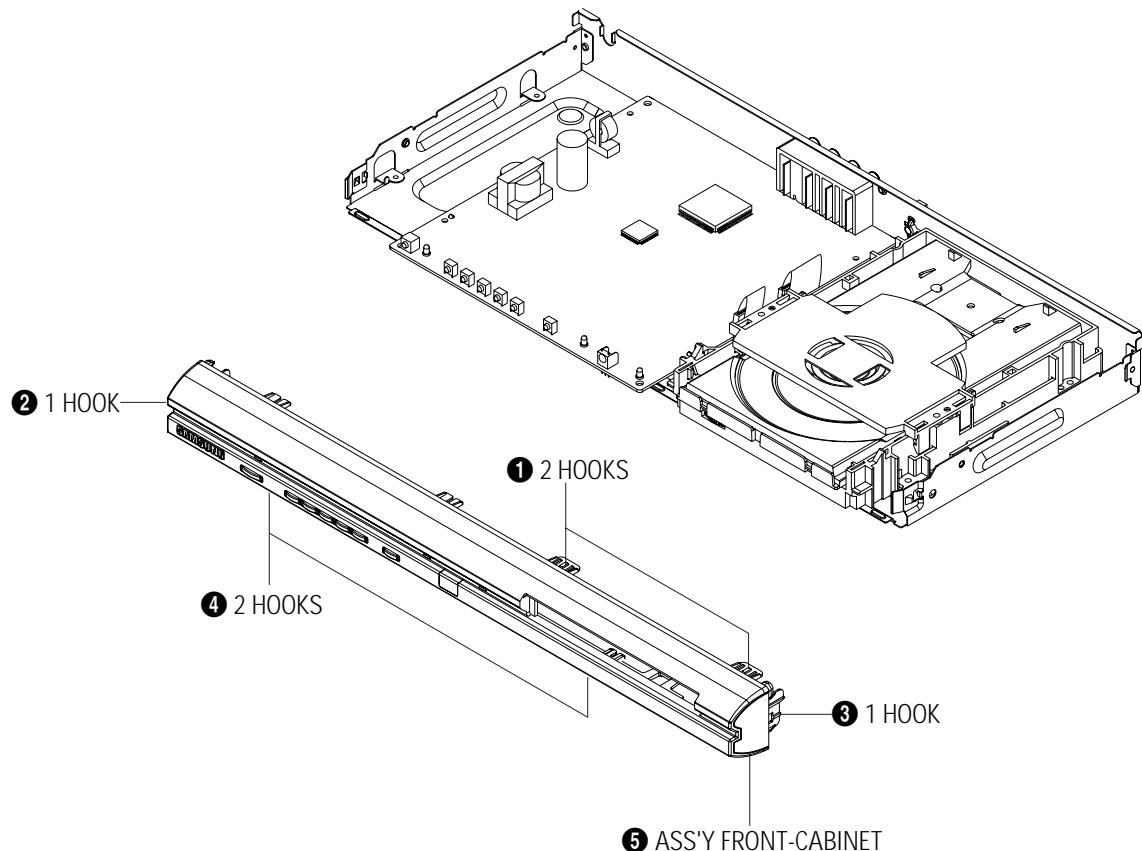


Fig. 5-3 Ass'y Front-Cabinet Removal

5-1-4 Ass'y Deck Removal

- 1) Disconnect Flat-Cable from DCN1, DCN2 on Main PCB.
- 2) Remove 3 Screws ① from the Ass'y Deck and lift it up.

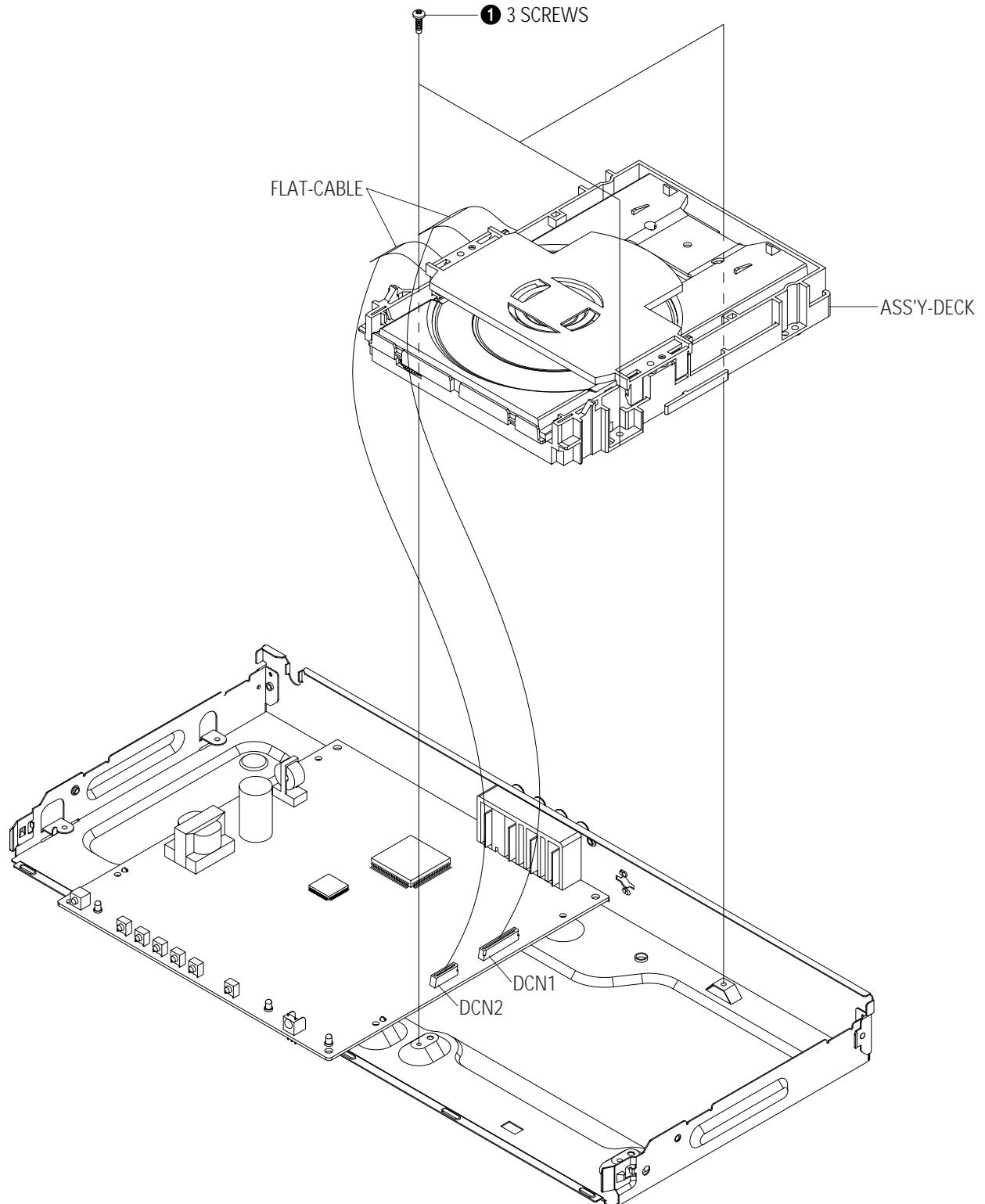


Fig. 5-4 Ass'y Deck Removal

5-1-5 Main PCB Removal

- 1) Remove 4 Screws ①.
- 2) Lift up the Main PCB ②.

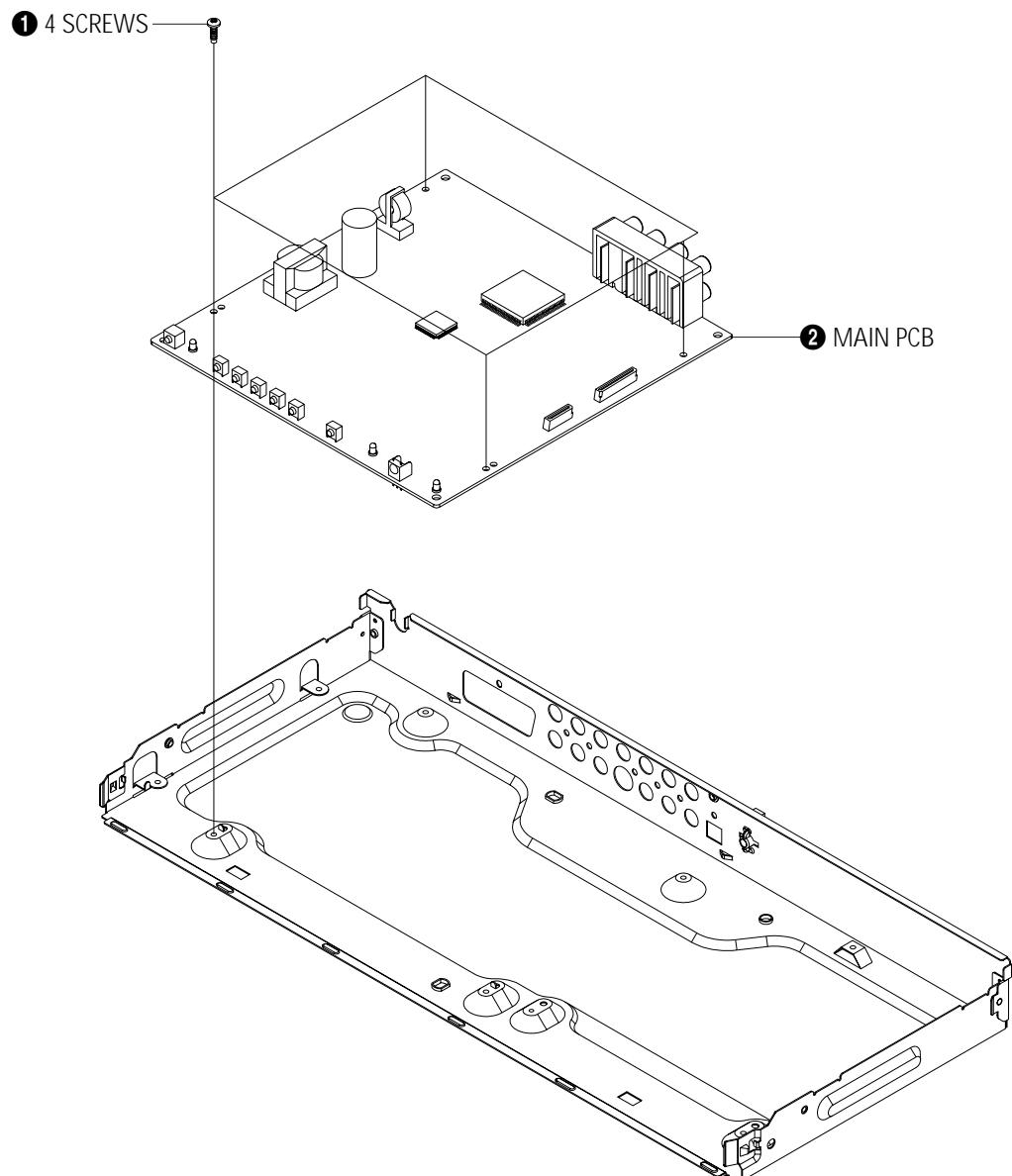


Fig. 5-5 Main PCB Removal

5-2 Deck

5-2-1 Holder Chuck Removal

- 1) Push 4 Hooks ① in the direction of arrow "A" and lift up the Holder Chuck ②.

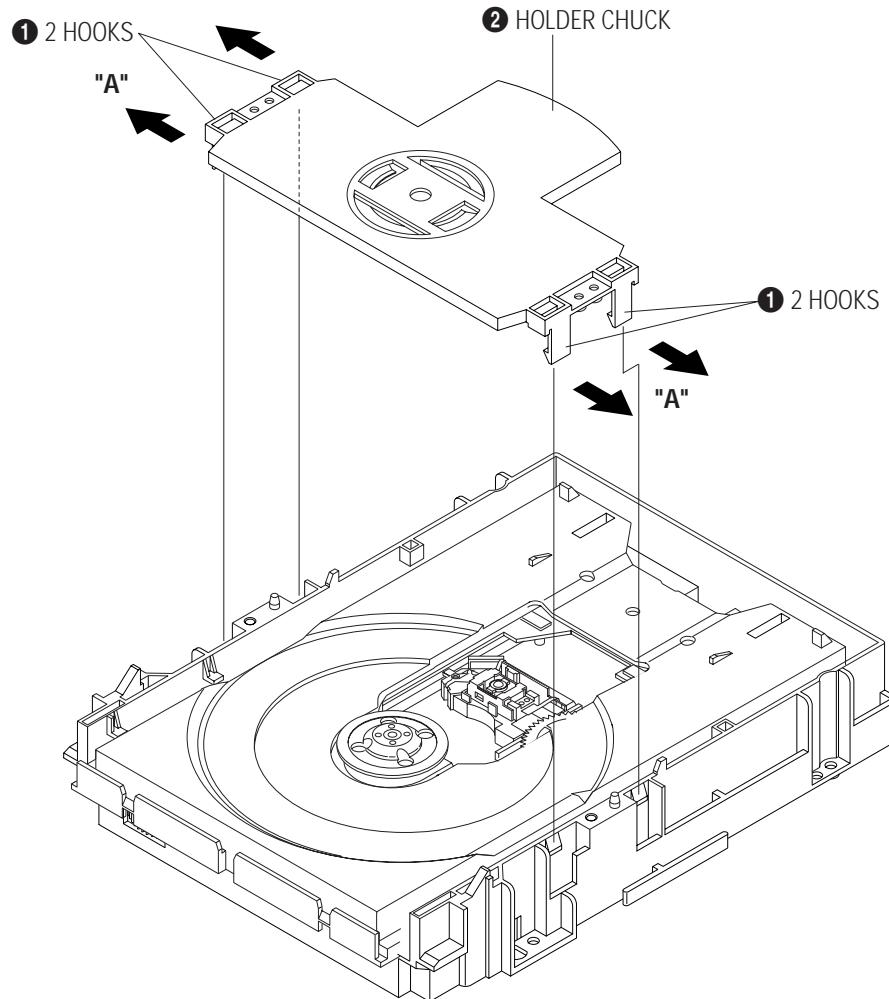


Fig. 5-6 Holder Chuck Removal

5-2-2 Tray Disc Removal

- 1) Insert a Screw Driver **①** into Emergency Hole **②** and push the Slider Housing **③** in the direction arrow "A".
- 2) When the Tray Disc **④** comes out a little, pull it in the direction arrow "B" by hand.

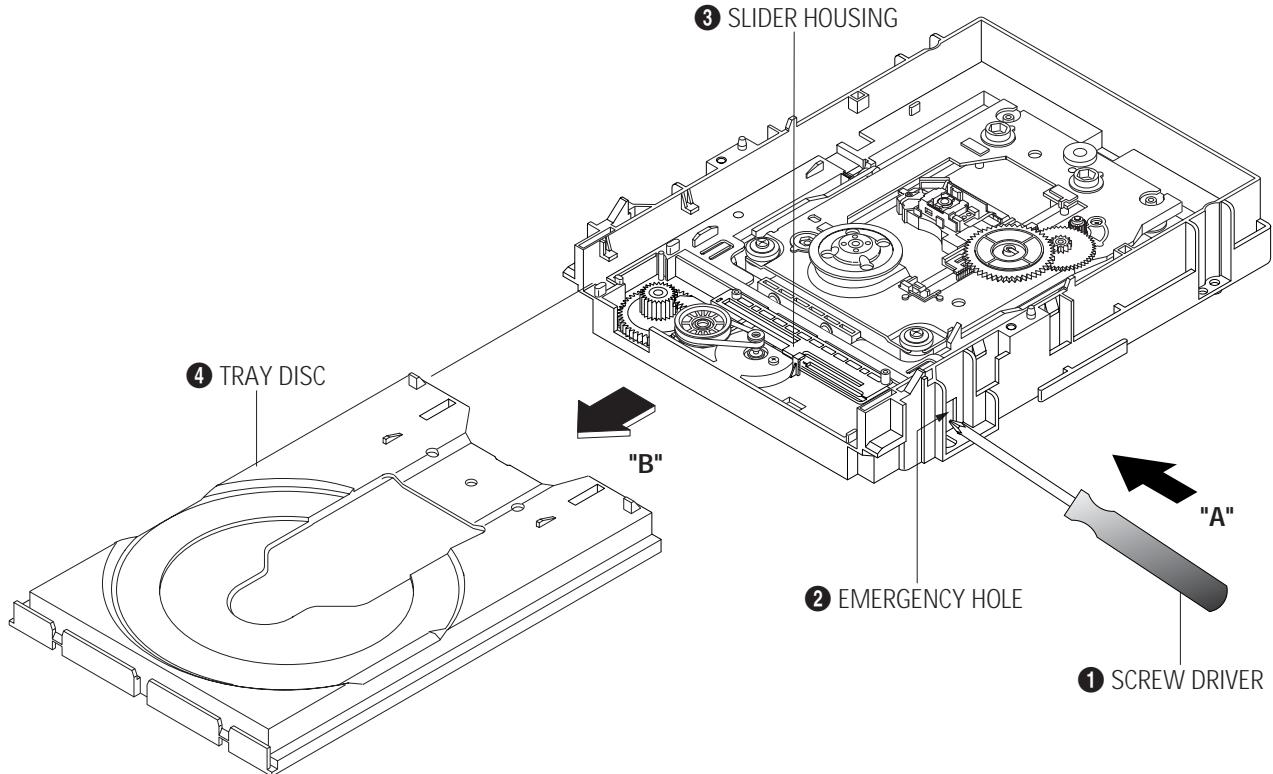


Fig. 5-7 Tray Disc Removal

5-2-3 Assy P/U Deck Removal

- 1) Remove the 4 Soldering ① (SL+, SL-, SP+, SP-).
- 2) Remove the 1 Screw ② and lift up the Ass'y P/U Deck ③ in the direction arrow "A".
- 3) When the Ass'y P/U Deck ③ lift up a little, push Chassis Sub in the direction of arrow "B" and lift up the Ass'y P/U Deck ③.

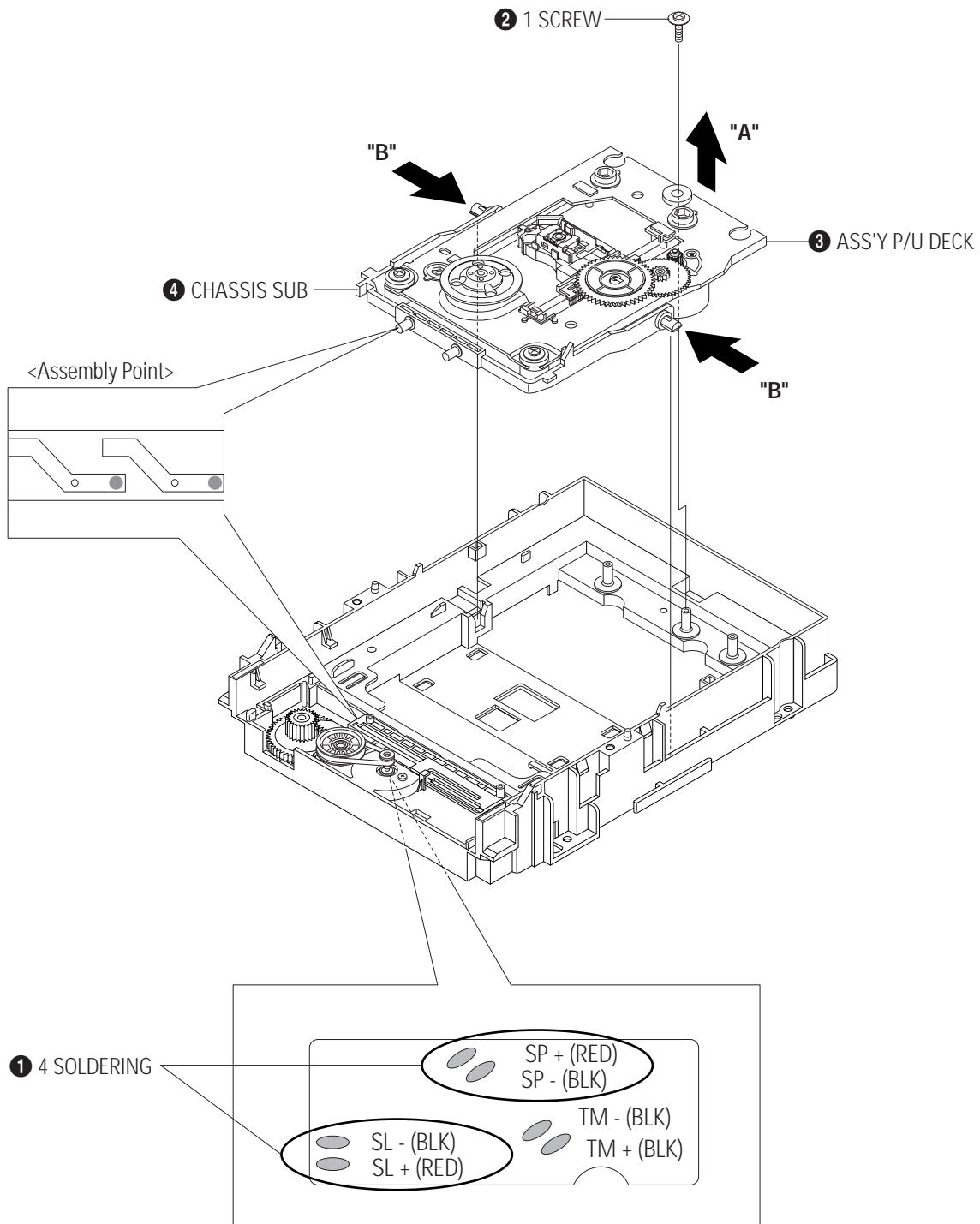


Fig. 5-8 Assy P/U Deck Removal

5-2-4 Ass'y Housing Removal

- 1) Remove the 2 Soldering ①. (TM+, TM-)
- 2) Push the 2 Hooks ② in the direction of arrow "A" and remove Ass'y PCB Deck ③.
- 3) Push the Slider Housing ④ in the direction arrow "B".
- 4) Push the 1 Hook ⑤ in the direction of arrow "C" and lift up the Slider Housing ④.
- 5) Remove the Belt Pulley ⑥ and 2 Screws ⑦, Ass'y Motor Load ⑧.
- 6) Push the 1 Hook ⑨ in the direction of arrow "D" and lift up the Gear Pulley ⑩, Gear Tray ⑪.

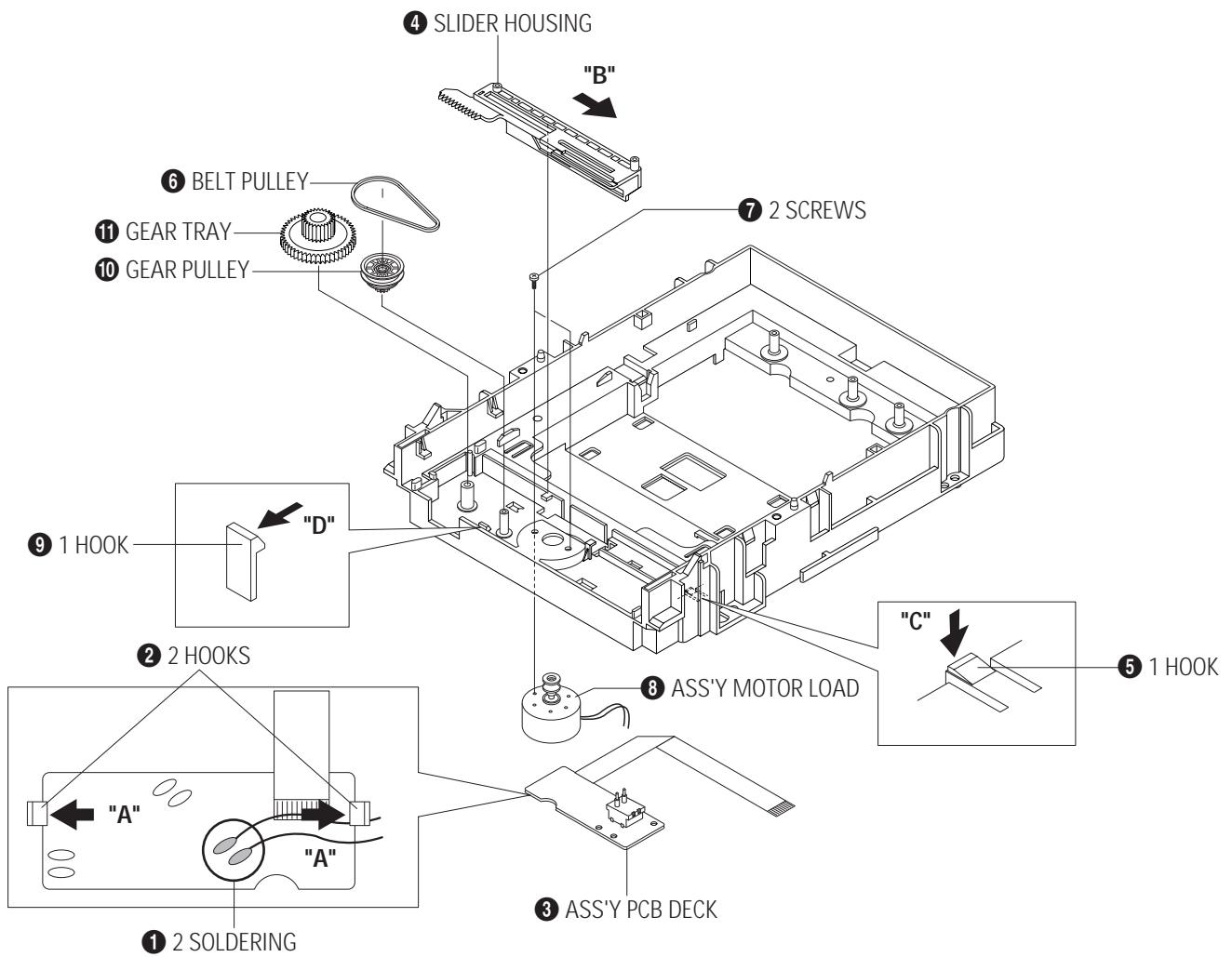


Fig. 5-9 Ass'y Housing Removal

5-2-5 Ass'y Bracket Deck Removal

- 1) Remove the 2 Screws ① and lift down Chassis Sub ②.
- 2) Push the Hook ③ in the direction of arrow "A" and lift up the Gear Feed B ④, Gear Feed A ⑤.
- 3) Remove the 2 Screws ⑥ and lift down Motor Feed Ass'y ⑦.
- 4) Remove the 2 Screws ⑧ and lift down Motor Spindl Ass'y ⑨.
- 5) Remove the 3 Screws ⑩ and remove 3 Holder Cam Skew ⑪, Shaft Pick Up ⑫, Ass'y Pick Up ⑬.

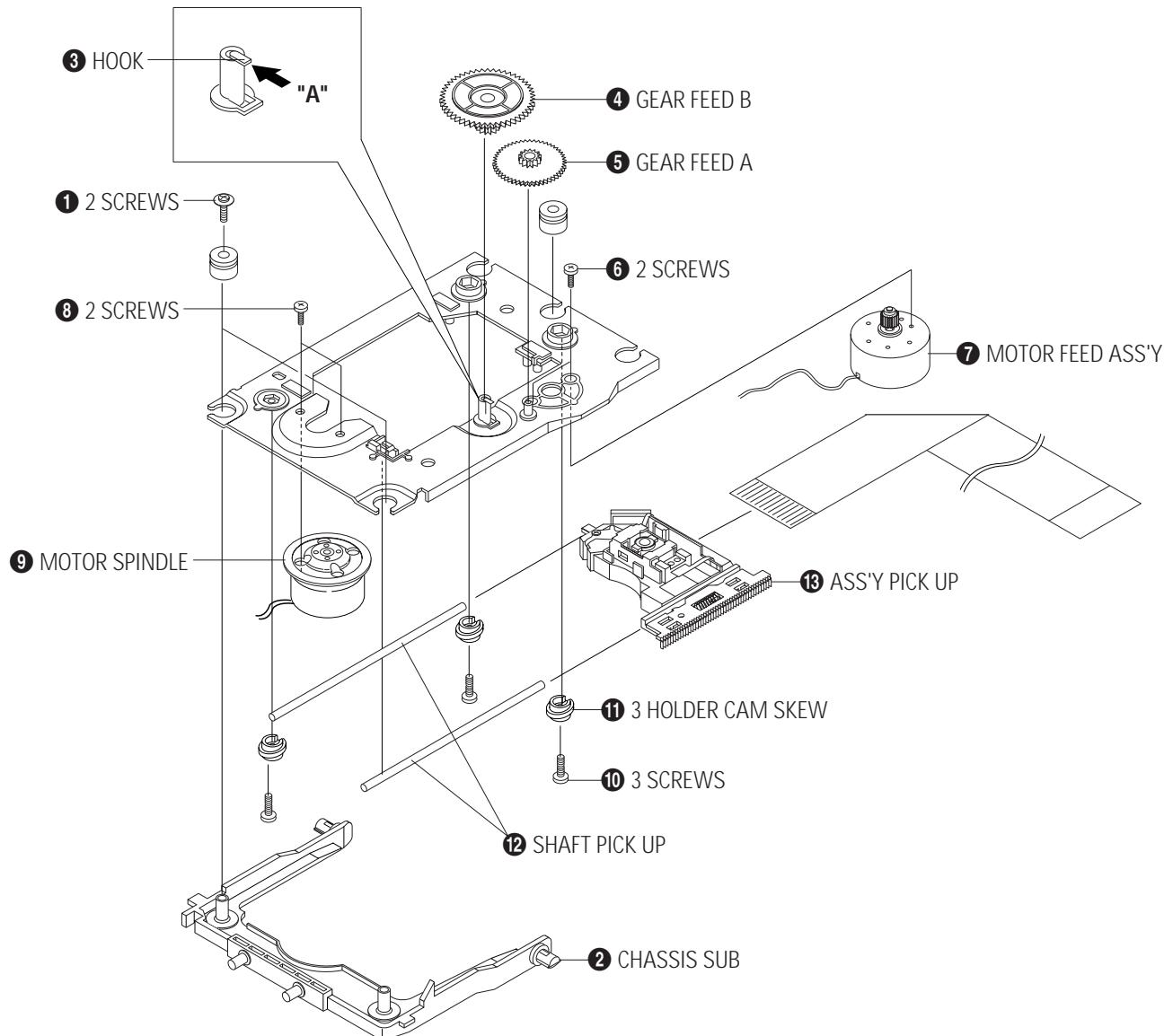


Fig. 5-10 Ass'y Bracket Deck Removal

6. Alignment and Adjustment

6-1 Location of Test Point

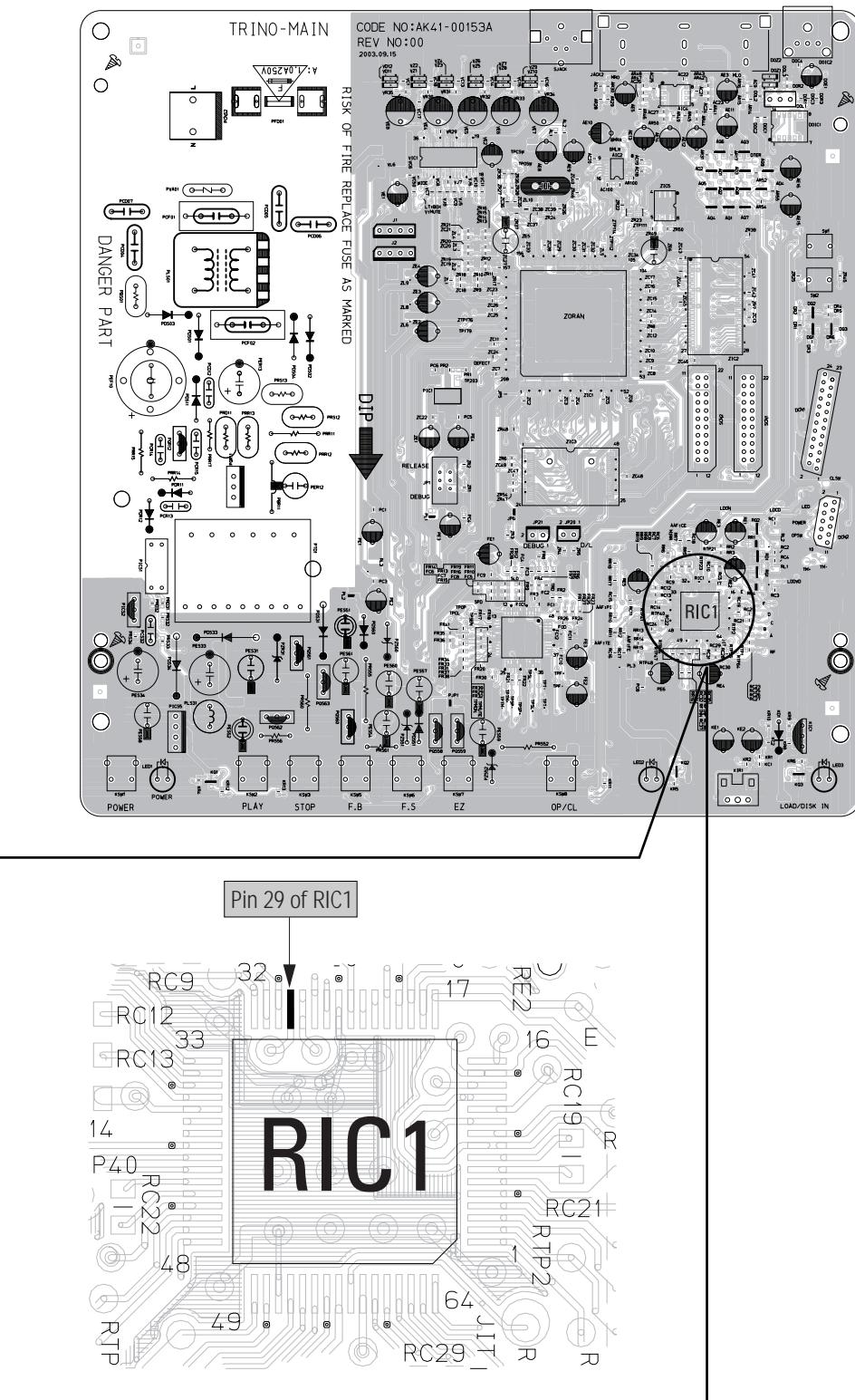


Fig. 6-1 Location of Test Point

6-2 Skew Adjustment

6-2-1 Adjustment Spec. and Test Point

<Table 6-1>

◆ Test Disc ; Service not Available

Test Disc	Adjustment Spec.	Test Point	Adjustment Location
TDV-533 Chapter 14	Flat Waveform	"Pin 29 of RIC1" (Main PCB - Component Side) (See Fig. 6-1)	Screw A / B Ass'y Deck - Top Side (See Fig. 6-2)

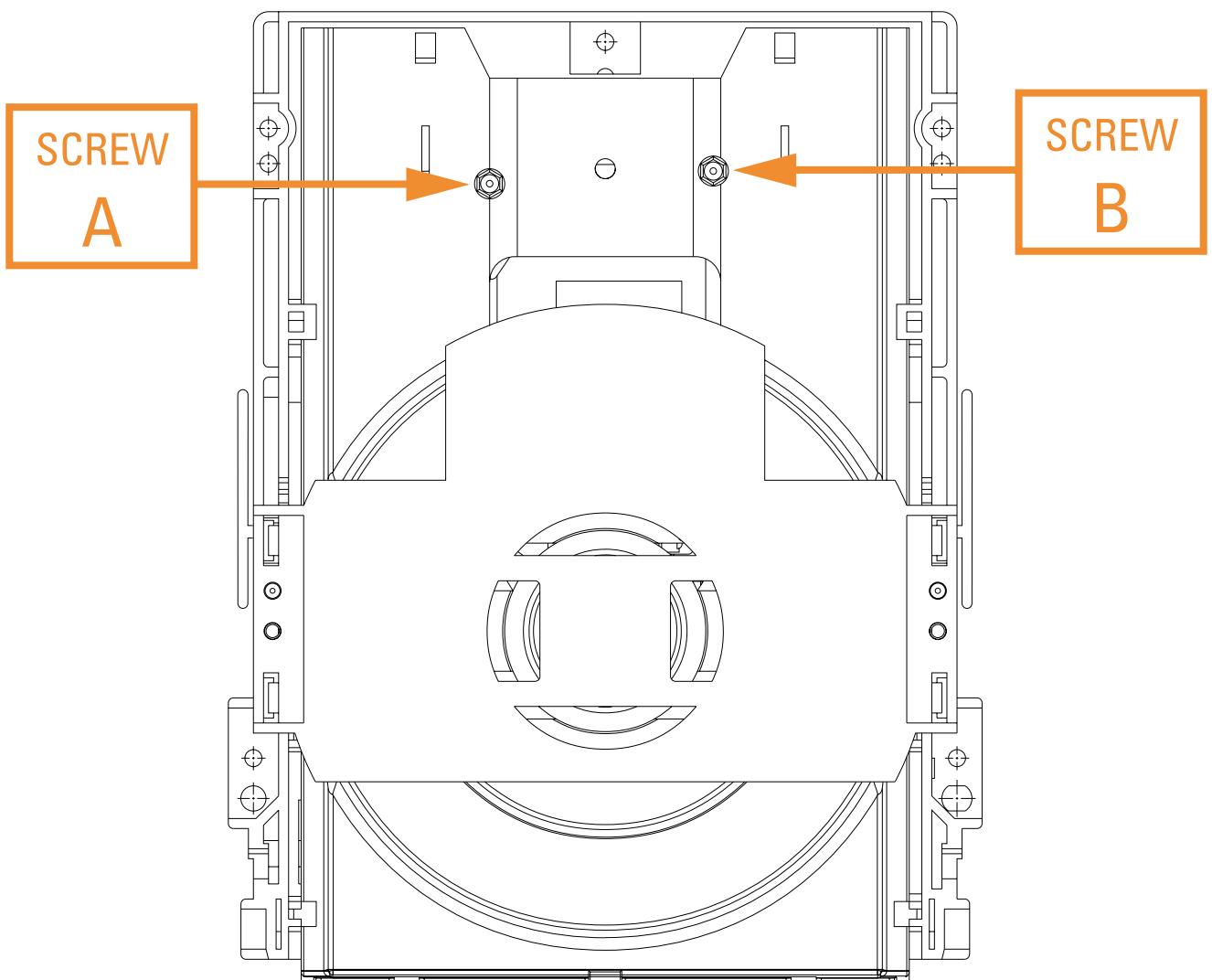


Fig. 6-2 Ass'y Deck (Top Side)

6-2-2 SKEW Adjustment Method

Needed to minimize the variations in Skew of the Pickup unit and to provide optimum match with the recorded signal on the Disc.

- 1) Connect an Oscilloscope to the "Pin 29 of RIC1" Test Point (See Fig. 6-1).
- 2) Connect Power, Open the Tray and Play the TDV-533 Disc, Chapter 14.
 - ◆ Set the Oscilloscope Range as follows :
(Voltage ; 20mV/Div., Frequency ; 10m Sec.)
- 3) Adjust the Screws "A" and "B" (See Fig. 6-2) using a Hex screwdriver until you obtain a Flat Waveform and the picture is stable.
Then, go to Chapter 1 and make sure the Waveform is Flat here as well.
If not, you have to go back to Chapter 14 and adjust again.
If you cannot obtain a Flat waveform, then the unit is defective.

Note : The Deck must be in a horizontal position. Use both "A" and "B" screws to adjust.

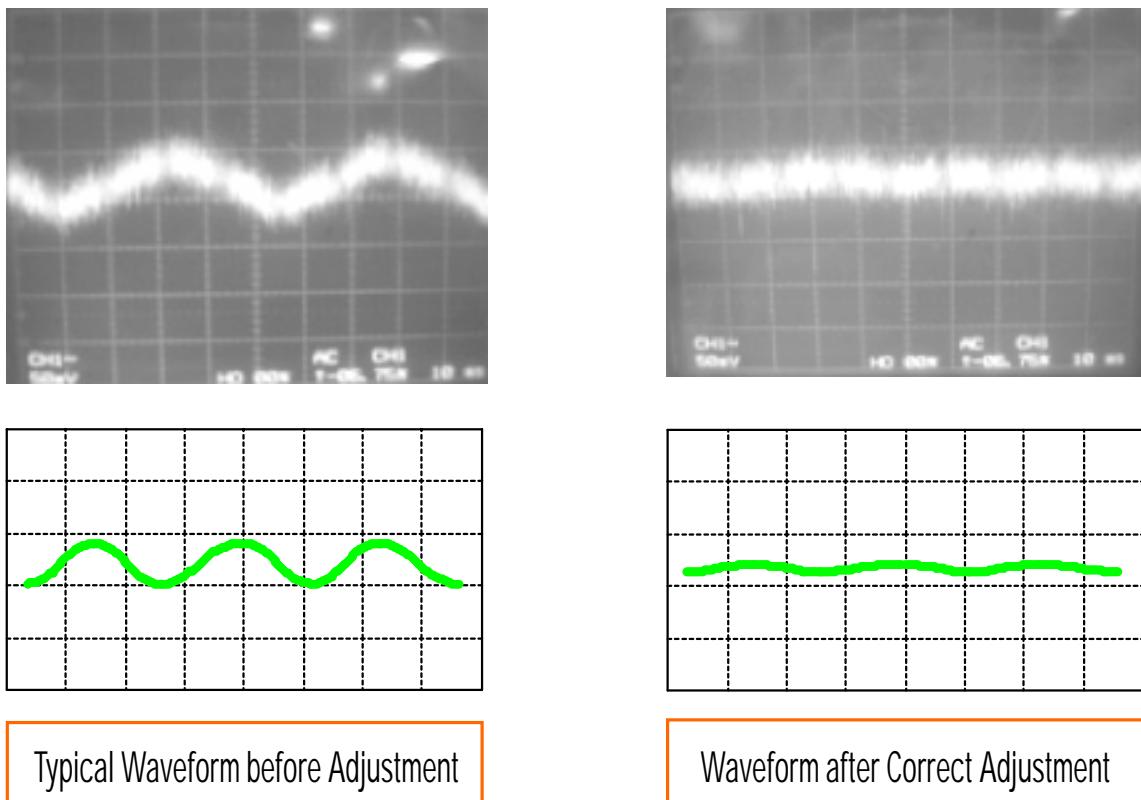


Fig. 6-3 Envelope Waveform

MEMO

7. Circuit Operating Descriptions

7-1 Power

7-1-1 Comparison between Linear Power Supply and S.M.P.S.

7-1-1 (a) Linear

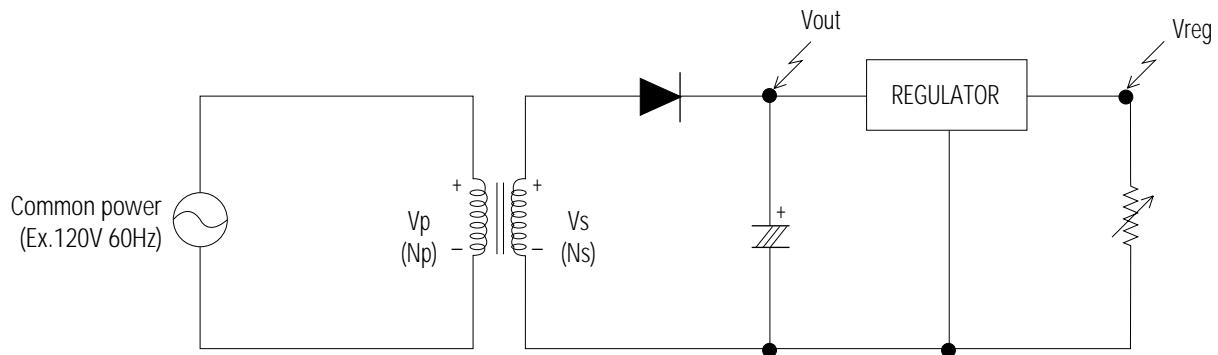


Fig. 7-1 Linear Power Supply

◆ Waveform/Description

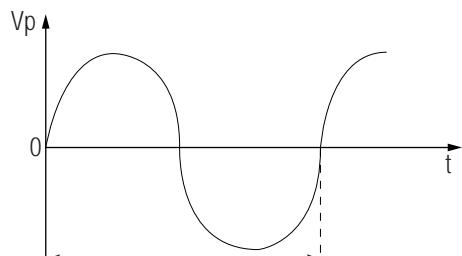


Fig. 7-2

Input : Common power to transformer (V_p).

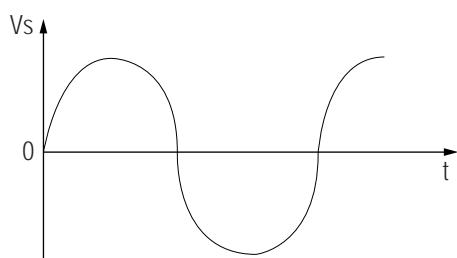


Fig. 7-3

The output V_s of transformer is determined by the ratio of 1st N_p and 2nd N_s .

$$V_s = (N_s/N_p) \times V_p$$

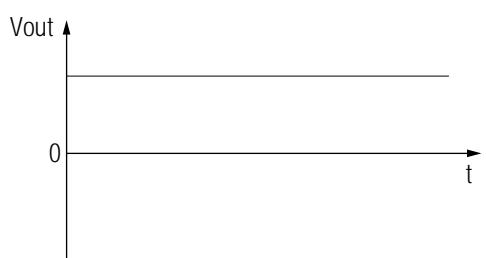


Fig. 7-4

V_{out} is output (DC) by diode and condensor.

- ◆ Advantages and disadvantages of linear power supply

1) Advantages : Little noise because the output waveform of transformer is sine wave.

2) Disadvantages :

- ① Additional margin is required because Vs is changed (depending on power source). (The regulator loss is caused by margin design).
- ② Greater core size and condenser capacity are needed, because the transformer works on a single power frequency.

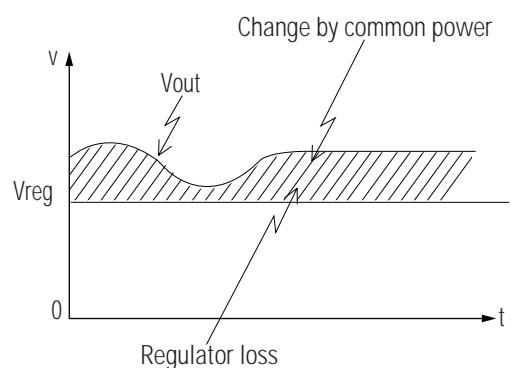


Fig. 7-5

7-1-1 (b) S.M.P.S. (Ringing Choke Converter method)

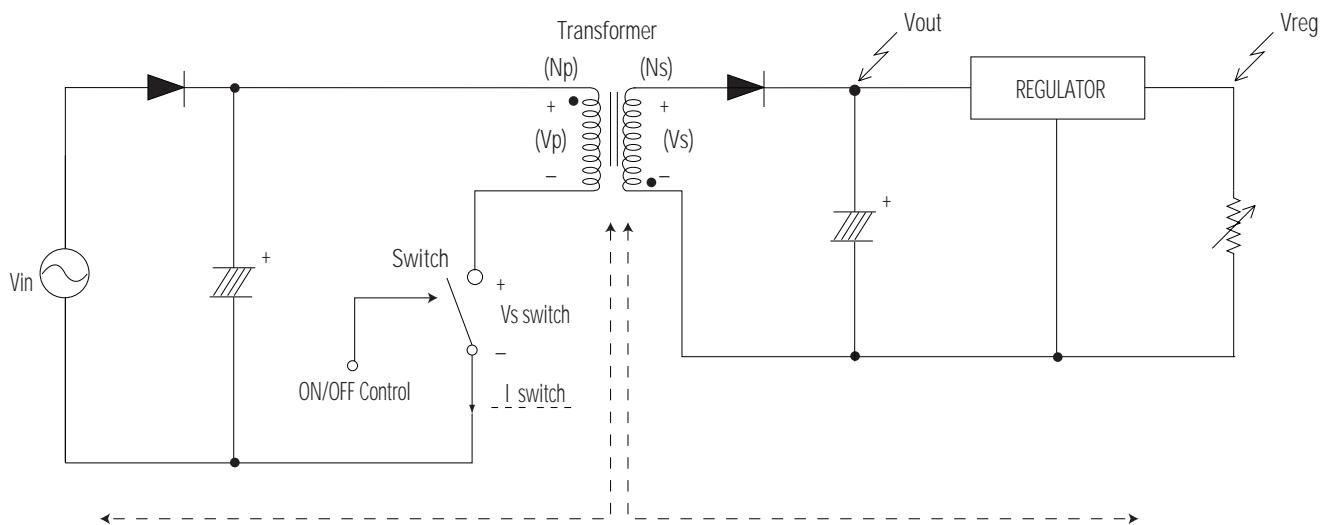


Fig. 7-6

- ◆ Terms

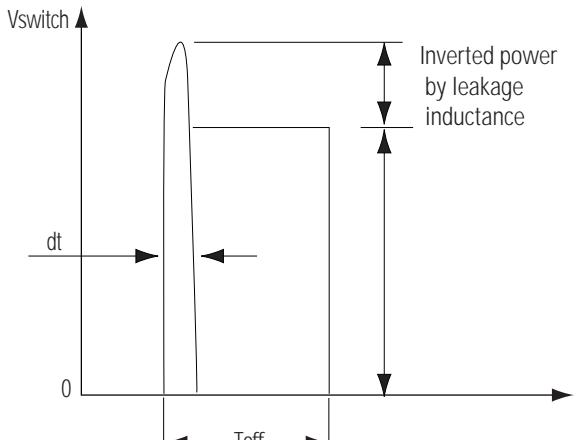
- 1) 1st : Common power input to 1st winding.
- 2) 2nd : Circuit followings output winding of transformer.
- 3) f (Frequency) : Switching frequency (T : Switching cycle)
- 4) Duty : $(T_{on}/T) \times 100$

7-1-2 Circuit description [FLY-Back RCC(Ringing Choke Converter)] Control

7-1-2 (a) AC Power Rectification/Smoothing Terminal

- 1) PDS01, PDS02, PDS03, PDS04 : Convert AC power to DC(Full wave rectification).
- 2) PEF10 : Smooth the voltage converted to DC.
- 3) PLS01, PBS01 : Noise removal at power input/output.
- 4) PVA1 : SMPS protection at power surge input.

7-1-2 (b) SNUBBER Circuit : PDS11, PCD12, PER13, PRS13



- 1) Prevent residual high voltage at the terminals of switch during switch off/Suppress noise.
High inverted power occurs at switch (PQR11) off, because of the 1st winding of transformer :
($V = -L_1 \frac{di}{dt}$. L_1 : Leakage Induction)
A very high residual voltage exist on both terminals of PQR11 because dt is a very short.
- 2) SNUBBER circuit protects PQR11 from damage through leakage voltage suppression by RC, (Charges the leakage voltage to PDS11, PER13, PCD12 and discharges to PRS13).

7-1-2 (c) Driving circuit

When V_{in} supplied, driving current I_g occurs through the PRR11. By this IC ($=H_{fe} \times I_g$) occurs through the PQR11 and the V_b is induced to base winding coil NB of PQR11. By induced V_b , I_b start flow and the PQR11 is saturated (S/W ON). I_b is constant and I_c increases in Proportion to time. After constant time passed I_b become to shortage and PQR11 is cut OFF (S/W OFF).

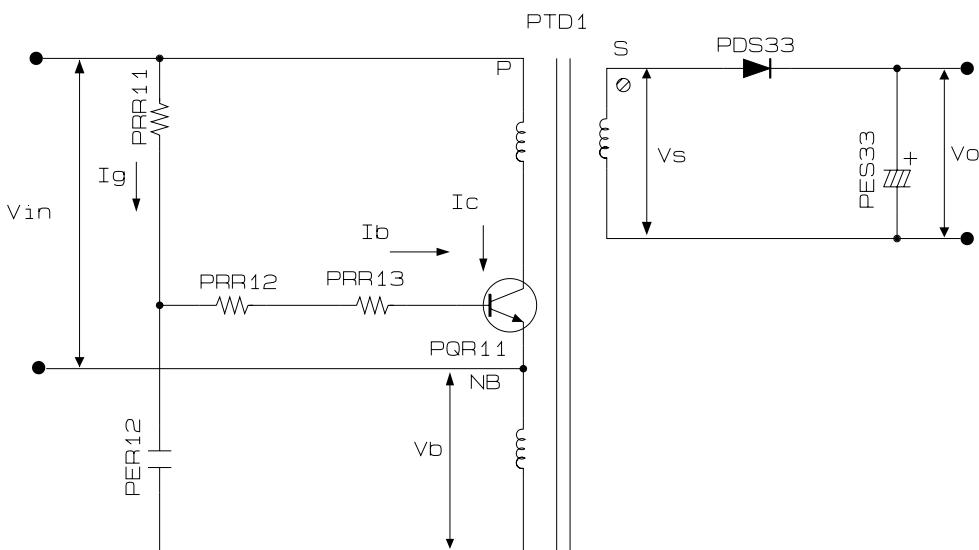


Fig. 7-8 Driving Circuit

7-1-2 (d) Feedback Control Circuit

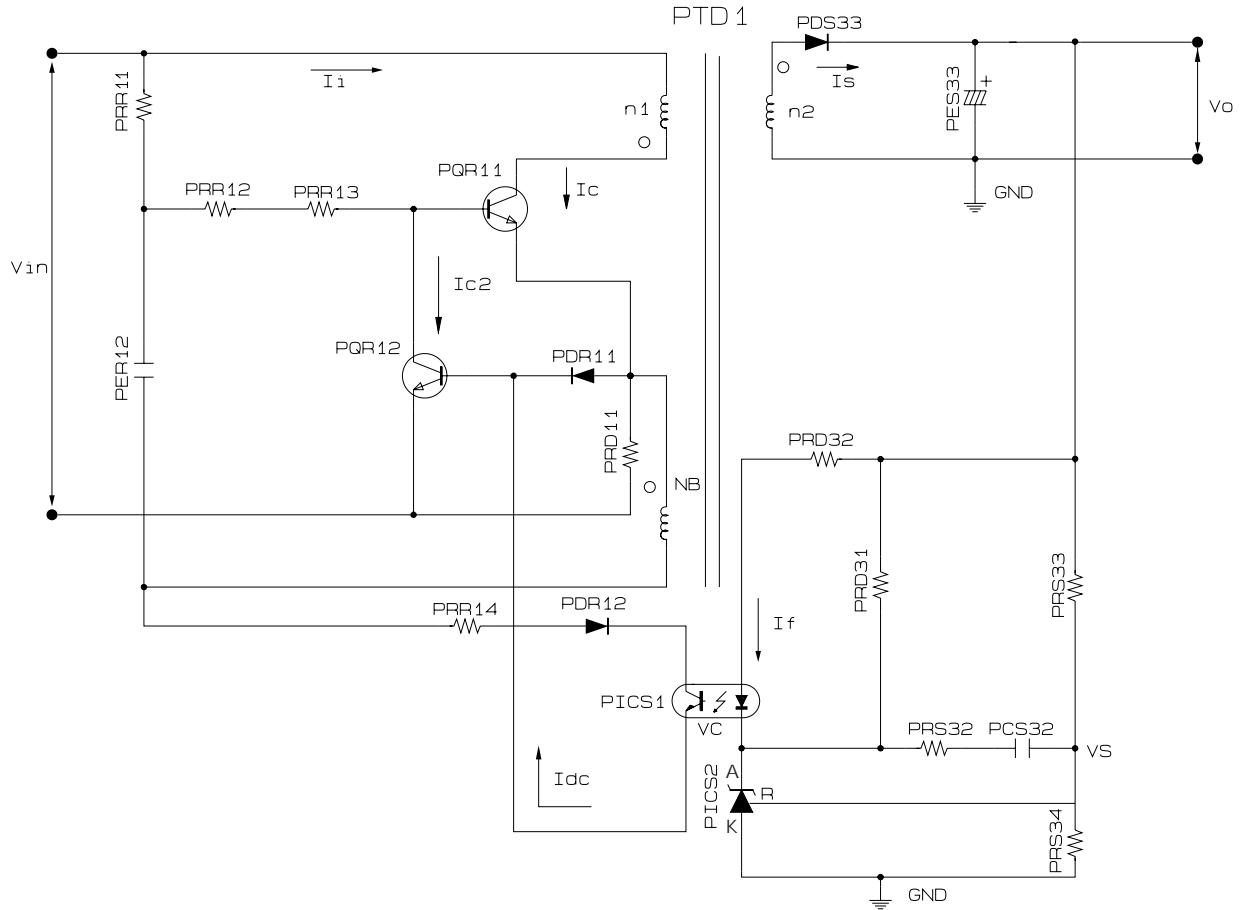


Fig. 7-9

◆ Operation descriptions

- 1) Internal OP-Amp '+' base potential of $PICS2$ is 2.5V and external '-' input potential is connected with $PRS33$ and $PRS34$ to maintain V_{out} of 5.8V.
- 2) If load of 5.8V terminal increase (or AC inout voltage decrease) and V_{out} decrease over 5.8V,
Then : $PICS2$ "R" potential decrease over 2.5V --> $PICS2$ A-K BASE Current decrease --> $PICS2$ A-K Current decrease --> $PICS1$ DIODE Current decrease --> $PICS1$ C-E Current decrease --> $PICS1$ C-E Voltage increase --> $PICS1$ F-B Voltage increase --> OUT DUTY increase TRANS Primary Cuttent Increase --> TRANS Primary Power increase --> V_{out} increase --> V_{out} maintain 5.8V
 - $PRD31$, $PRD32$: Reduce 5.8V overshoot.
 - $PRS32$, $PCS32$: Prevent $PICS2$ oscillation (for phase correction).

7-1-3 Internal Block Diagram

◆ Internal Block Diagram

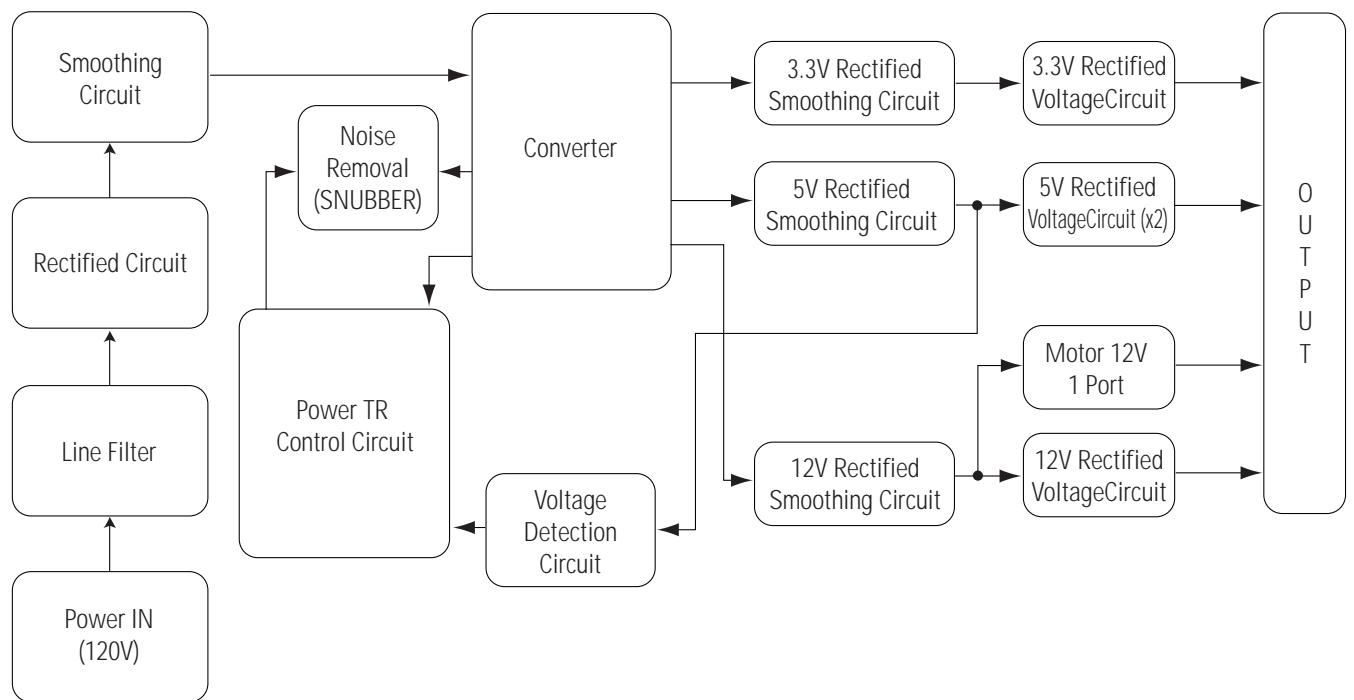


Fig. 7-10

7-2 RF

7-2-1 RIC1 (SP3723)

SP3723 is combined with Zoran Vaddis 6 as bipolar IC developed for DVD SERVO system.

Main features include DVD waveform equalizing, CD waveform equalizing, focus error signal generation, 3-beam tracking error signal generation, DPD 1-beam tracking error, defect, MIRR output, Laser Power Control, etc.

7-2-1 (a) Basic Potentiometer

SP3723 Uses 4.5V to 5.5V and reference voltage is 1.65V.

7-2-1(b) RF signal

Fig. 7-11 shows the flow of signal generated by the pick-up.

RF signal detected from pick-up is converted in to RF signal via RF interface and attenuators.

A, B, C, D signals detected from pick-up are converted in to FE, TE, PI, CE, DEFECT signals.

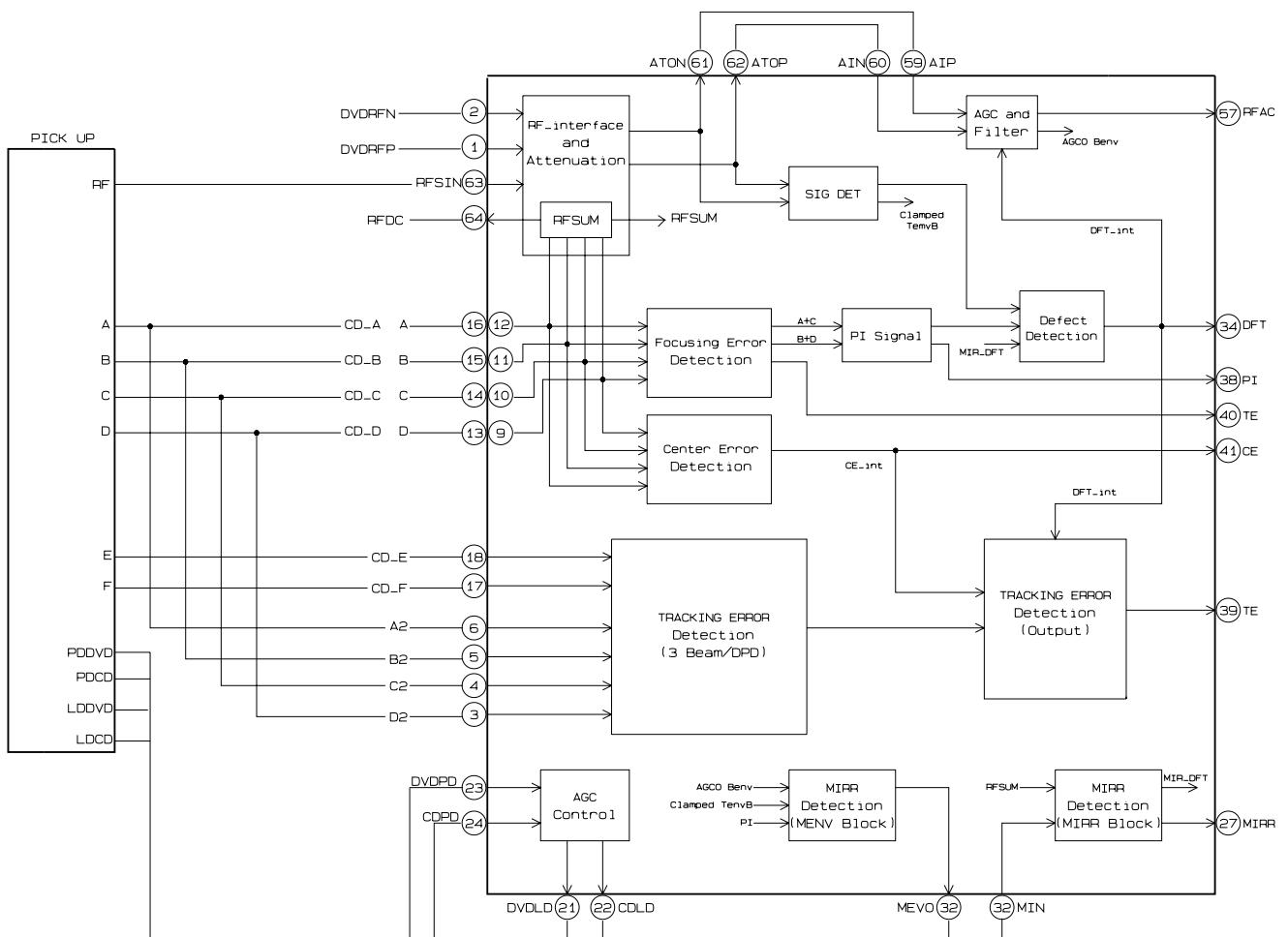


Fig. 7-11

Fig. 7-12 shows the waveform-equalizing block diagram for the RF signal.
RF signal from the pick-up is the input of RF equalizer module of RIC1 (SP3723).

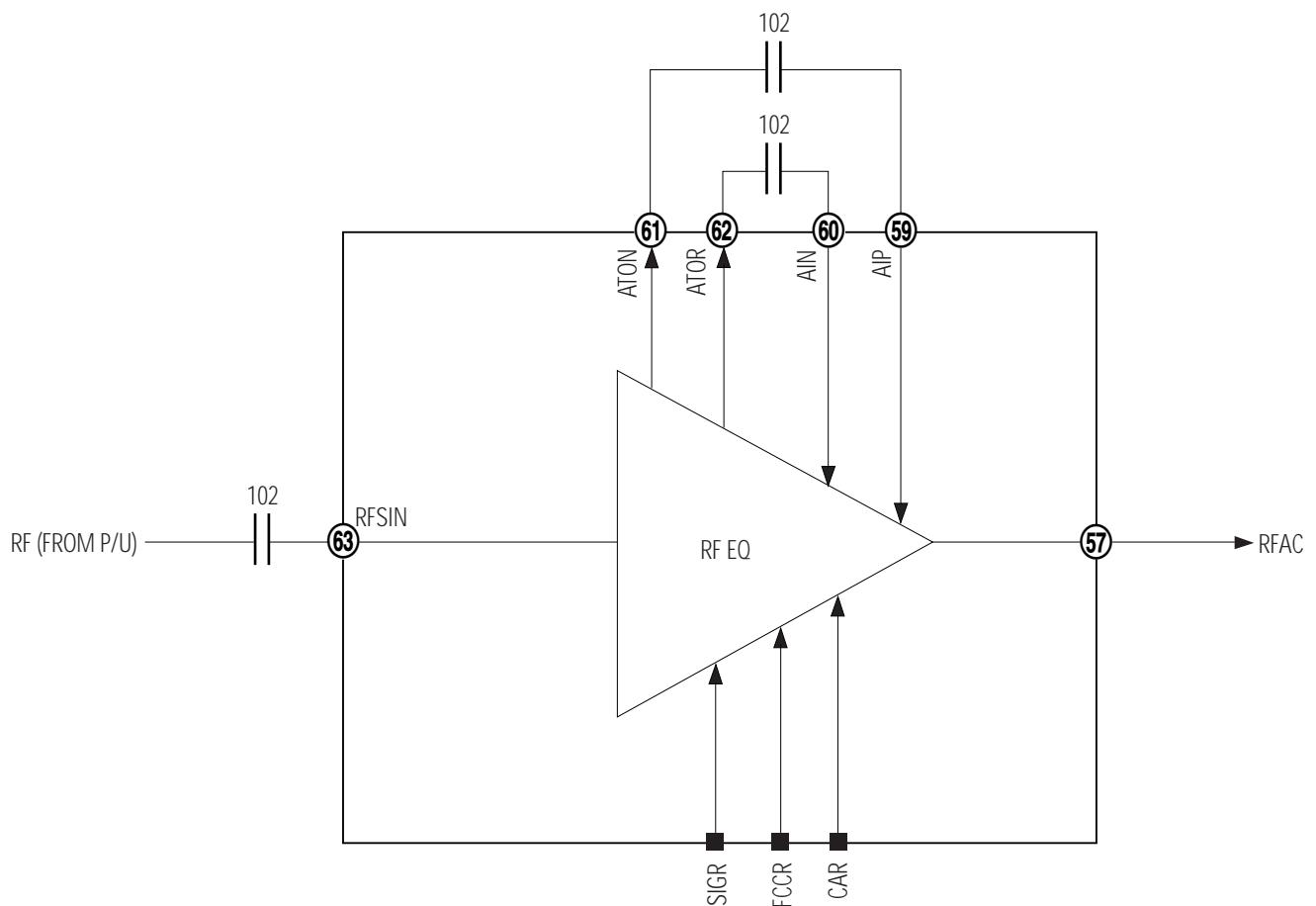


Fig. 7-12

7-3 System Control

7-3-1 Outline

The main micom peripheral circuit is composed of 8M Flash Memory (ZIC3) for Microcode and data save, 2Kbit EEPROM (ZIC5) for permanent storage of data needed at power off, 64Mbit SDRAM (ZIC2) for temporary data read and write.

The Micom (ZIC1 ; Vaddis 6E) mounted in main board analizes the key commands of front panel or instructions of remote control and controls the devices on board to execute the corresponding commands after initializing the devices connected with micom on board at power on.

7-3-2 Block Diagram

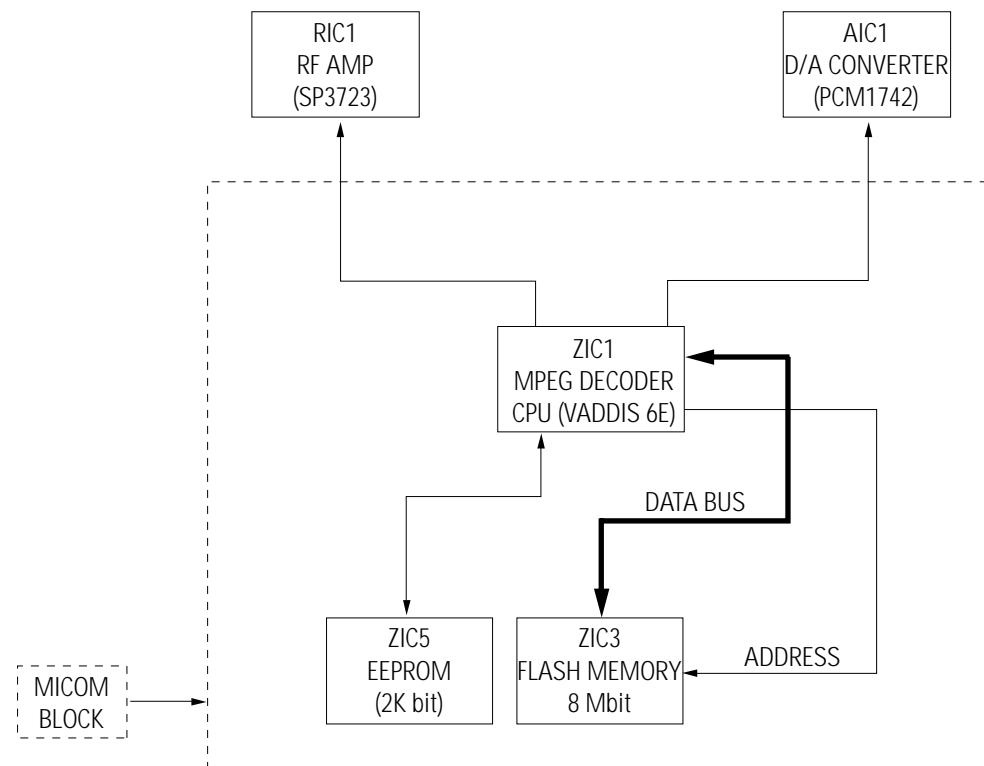


Fig. 7-13

7-4 Servo

7-4-1 Outline

SERVO system of DVD is Composed of Focusing SERVO, Tracking SERVO, SLED Linked SERVO and CLV SERVO (DISC Motor Control SERVO).

- 1) Focusing SERVO : Focuses the optical spot output from object lens onto the disc surface. Maintains a uniform distance between object lens of Pick-up and disc (for surface vibration of disc).
- 2) Tracking SERVO : Make the object lens follow the disc track in use of tracking error signal (created from Pick-up).
- 3) SLED Linked SERVO : When the tracking actuator inclines outwardly as the object lens follows the track during play, the SLED motor moves slightly (and counteracts the incline).
- 4) CLV SERVO (DISC Motor Control SERVO) : Controls the disc motor to maintain a constant linear velocity (necessary for RF signal).

7-4-2 Block Diagram

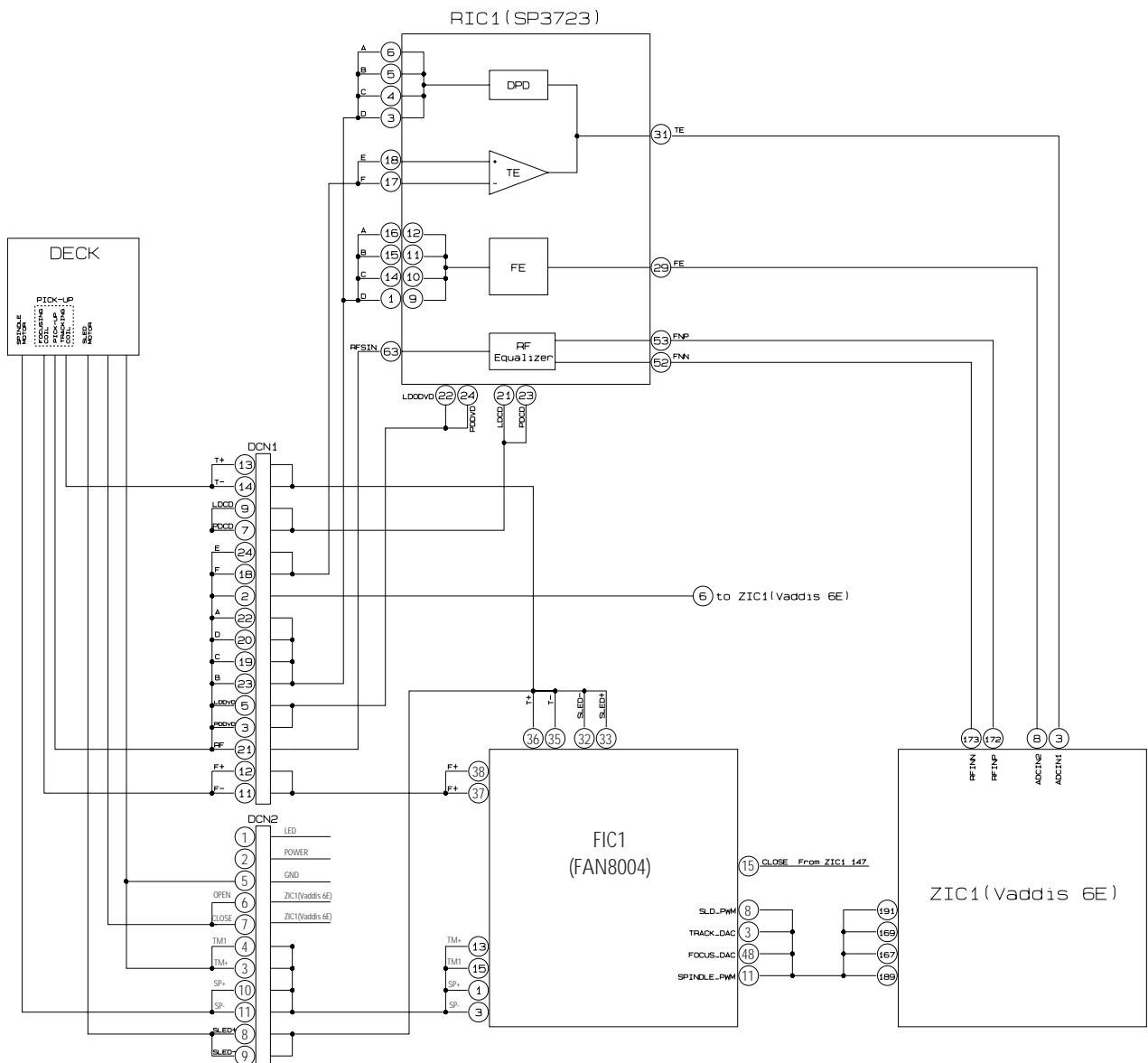


Fig. 7-14

7-4-3 Operation

1) FOCUSING SERVO

(1) FOCUS INPUT

The focus loop is changed from open loop to closed loop, and the triangular waveform moves the object lens up and down (at pin 167 of ZIC1 during Focus SERVO ON.) At that time, S curve is input to pin 181 of ZIC1.

PZ (pin 183 of ZIC1) signal, summing signal of PD A, B, C, D, is generated, and zero cross(1.65V) point occurs when S curve is focused and ABCD signal exceeds a preset,constant value. The focus loop is changed to closed loop, and the object lens follows the disc movement, maintaining a constant distance from the disc. (these operations are same in CD and DVD).

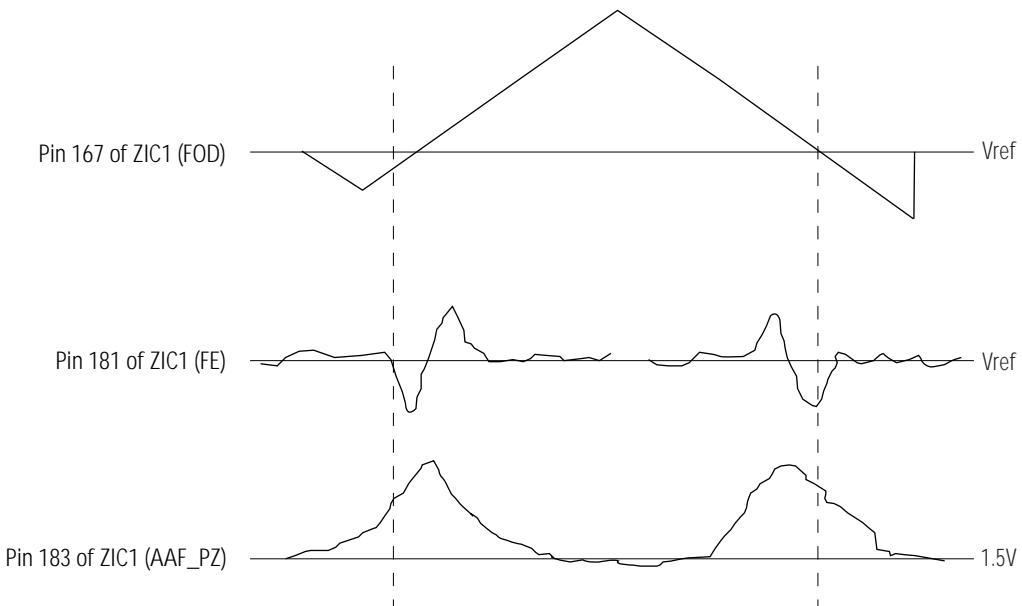


Fig. 7-15

(2) PLAY

When focus loop closes the loop during focus servo on, both pin 65 and pin 75 of SIC1 are controlled by VREF voltage (approx. 1.65V).

2) TRACKING SERVO

(1) NORMAL PLAY MODE

① For DVD

Composite : The signal output from PD A, B, C, D of Pick-up, the tracking error signal (pin39 of RIC1) uses the phase difference of A+C and B+D in RIC1, and inputs to ZIC1. Then, it is output to ZIC1 pin 169 via digital equalizer, and applied to the tracking actuator through FIC3.

Pin 69 of ZIC1 is controlled by VREF(approx. 1.65V) during normal play.

Meanwhile, DVD repeats the track jump from 1 to 4 in inner direction at normal play (because data- read speed from disc is faster than data output speed on screen).

② For CD, VCD

Receive the signal output through E, F of Pick-up, from RIC1. The tracking error signal is similar to DVD.

(2) SEARCH Mode :

Search mode : Fine seek,(Moving the tracking actuator slightly little below 255 track) and coarse search, moving much in use of sled motor. The coarse search will be described in sled linked servo and now, the fine seek is explained shortly.

If the object lens is located near target, cut off the tracking loop and give the control signal as many as desired count to move the tracking actuator via ZIC1 pin 169 terminal(TRD).

3) SLED LINKED SERVO

• Normal play mode

Move SLED motor slightly by means of PWM signal in ZIC1 pin 191, as the tracking actuator moves along with track during play. Control to move the entire Pick-up as the tracking actuator moves.

• Coarse serach mode

In case of long-distance search (such as chapter serach), ZIC1 uses MIRR and Global sense signal.

Then, read ID and compute the existing track count after input of next track.

If the existing track count is within fine seek range, tracking begins using fine seek.

4) CLV SERVO(DISC MOTOR CONTROL SERVO)

Input RF signal (from Pick-up) to ZIC1 pin 172, 173.

Detect SYNC signal from RF in ZIC1, and output PWM signal to ZIC1 pin 189 for constant linear velocity.

7-5 DVD Data Processor

7-5-1 Outline

The Vaddis 6E(highly-integrated device) includes the full front-end disc controller, back-end decoder functions as well as the host control CPU.

The principal off-chip components include the disc drive with its optical pickup, tray, sled and spindle drivers and motors, 16Mbits of flash EPROM, 64Mbits of SDRAM, and the audio Digital-to-Analog converters some applications.

In case of general disc refresh, the memory is almost filled up periodically. It is because Write rate to memory after disc playback and signal process is faster than Read of A/V decoder. When the memory is filled, this status is reported by interrupt to main micom, which controls the servo to kick back the pick-up to the previous track after memorizing the last data read from disc until now. It takes some times to jump to the previous track and return to the original(jump location) again. The memory will have an empty space because A/V decoder reads out data of memory.

When the memory has an empty space, where data can be processed and written and the pick-up correctly gets to the original location(before kick back location) again, it reads data again avoids the interrupt of data read previously. The basic operation repeats to perform as described above.

7-5-2 Block Diagram

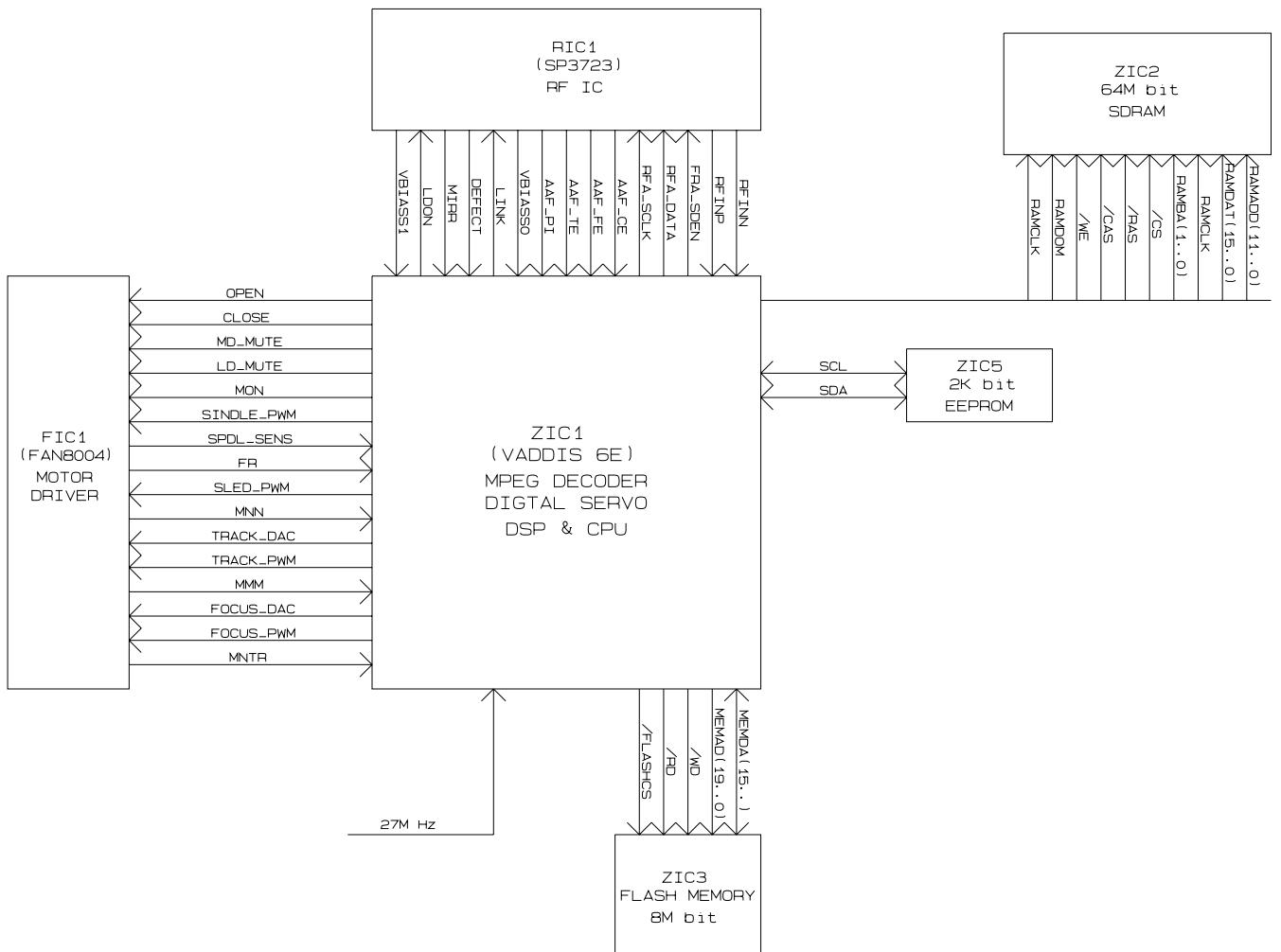


Fig. 7-16

7-6 Video

7-6-1 Outline

ZIC1(A/V decoder with video encoder) diverges from the 27MHz crystal, then generates VSYNC and HSYNC.
 ZIC1(A/V decoder with video encoder) does RGB encoding, copy guard processing and D/A conversion of 8bit video data internally inputted from video decoder block by ZIC1.
 Video signal converted into analog signal is outputted via amplifier of analog part.

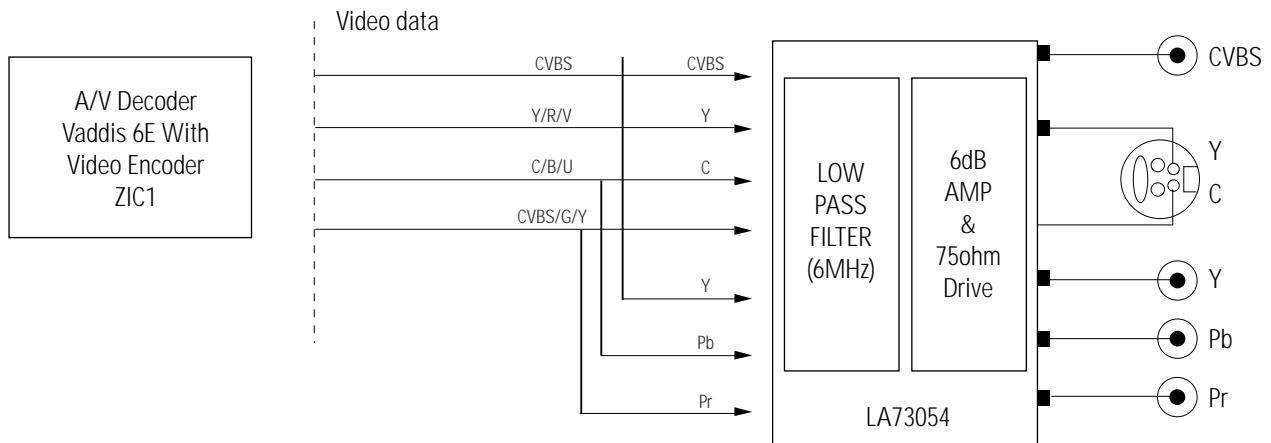


Fig. 7-17 Video Output Block Diagram

7-6-2 NTSC/PAL Digital Encoder (VADDIS 6E ; Built in video encode)

ZIC1 inputted from pin 161 with 27MHz generates HSYNC and VSYNC which are based on video signal.
 ZIC1 is synchronous signals with decoded video signal and control the output timing of 8bit video signal of ITU-R601 format.

The separate signal is encoded to NTSC/PAL by control of MIC1.

The above signals, which are CVBS (Composite Video Burst Synchronized)/G (GREEN)/Y [PIN158], Y (S_VIDEO)/R (RED)/Pr[PIN161] and C (S_VIDEO)/B (BLUE)/Pb [PIN162], are selectively outputted CVBS +S_VIDEO, RGB/Component by the rear switch. In Course of encoding, 8bit data can extend to 10bit or more. To convert the extended data to quantization noise as possible, ZIC1 adopts 10bit D/A converter.

ZIC1 perform video en-coding as well as copy protection.

7-6-3 Amplifier (VIC1: LA73054)

VIC1 is 6dB amplifier.

Based on CVBS signal, the final output level must be 2Vpp without 75ohm terminal resistance.

Because the level of video encoder output is only 1.1Vpp, the level is adjusted with the special amplifier.

When mute of pin 5 is high active, if the pin is floating and connecte to power, the output signal is never ouputted.

CVBS, Y, C, R, Pb(B), Pr(R) outputted from video encoder are inputted to VIC1 (Pin 2, 8, 6, 16, 14).

The signal to which gain is adjusted by amplifier is outputted from jack via 75ohm Resistance (VR11~VR16).

7-7 Audio

7-7-1 Outline

A/V decoder (ZIC1 ; Vaddis 6E) is supply to DATA 0 for 2-channel mixed audio output.

The audio data transmitted from A/V decoder (ZIC1 ; Vaddis 6E) are converted into analog signal via audio D/A converter and outputted via post filter and amplifier.

CD and VCD are outputted with only 2 channels audio data and transmit them to Data 0.

If DVD of multichannel Source disc, if is downmixed and transmit them to Data0.

If you want to listen to the multichannel output, you have to connect digital output with AC-3 amp or MPEG/DTS amp.

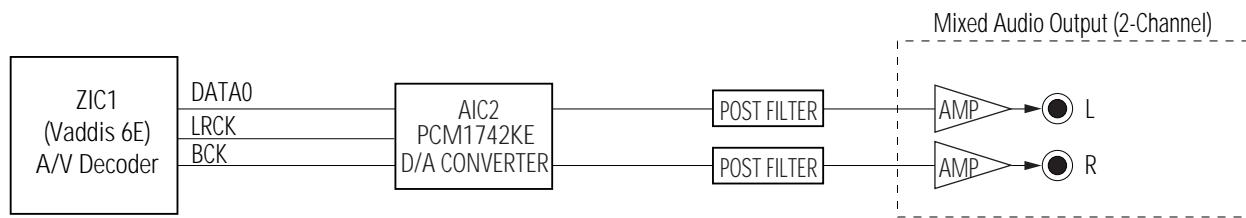


Fig. 7-18 Audio Output Block Diagram

7-7-2 DVD Audio Output

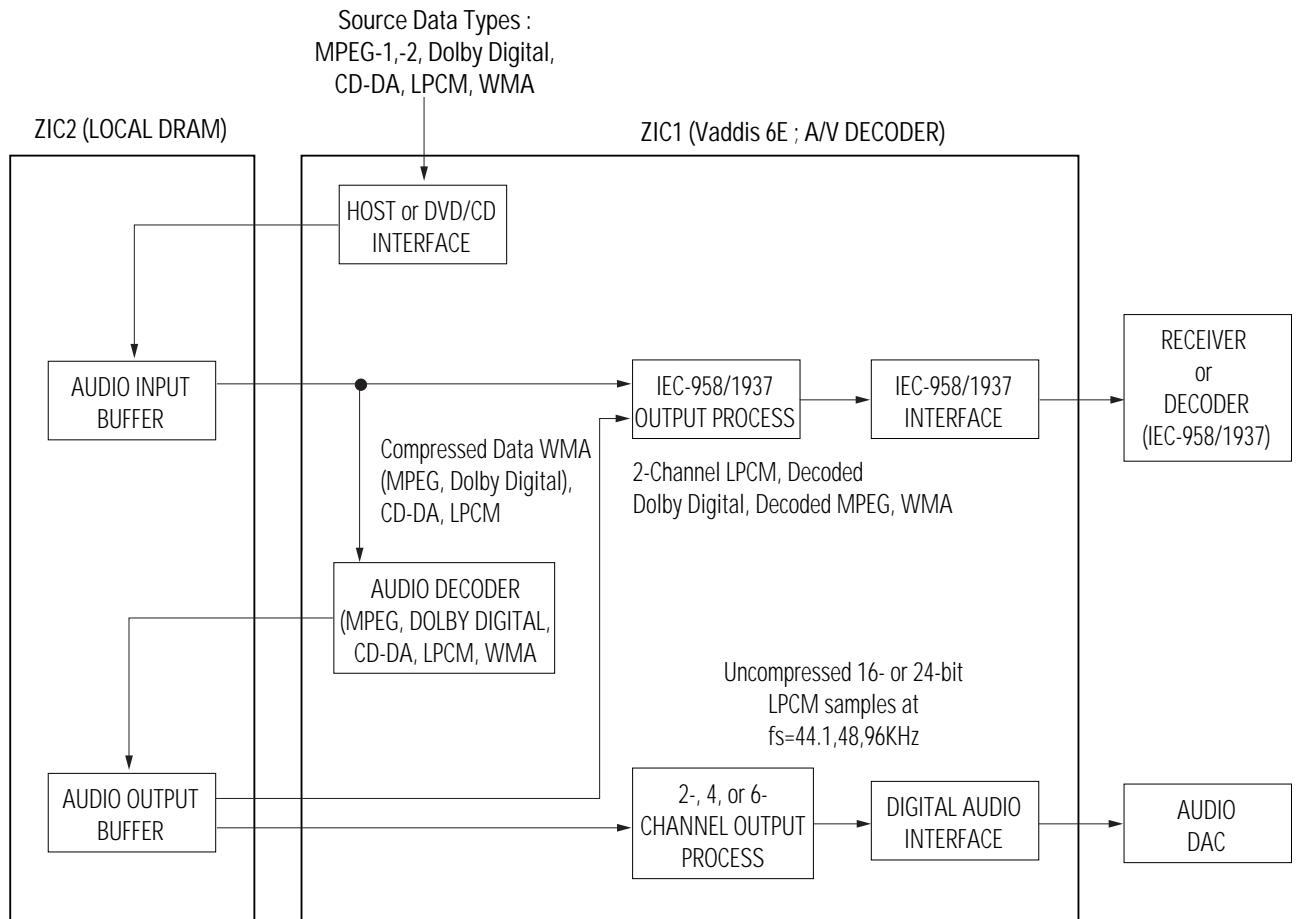


Fig. 7-19 Audio Decoder and Output Interface Datapath

1) Compressed Data

The audio data inputted to ZIC1 (Vaddis 6E) A/V decoder is divided into compressed data and uncompressed data.

It is compressed data that is compressed with multi-channel audio data such as Dolby digital, MPEG, DTS, WMA,etc. The compressed data inputted to ZIC1 (Vaddis 6E) is converted into the uncompressed data of 2, 4, and 6 channels through ZIC1 built-in audio decoder and is outputted to Data 0 through digital audio interface. The compressed data is transmitted to external AC-3 amplifier or MPEG/DTS amplifier as IEC-958/1937 transmission data format compressed by ZIC1 built-in IEC-958 output process.

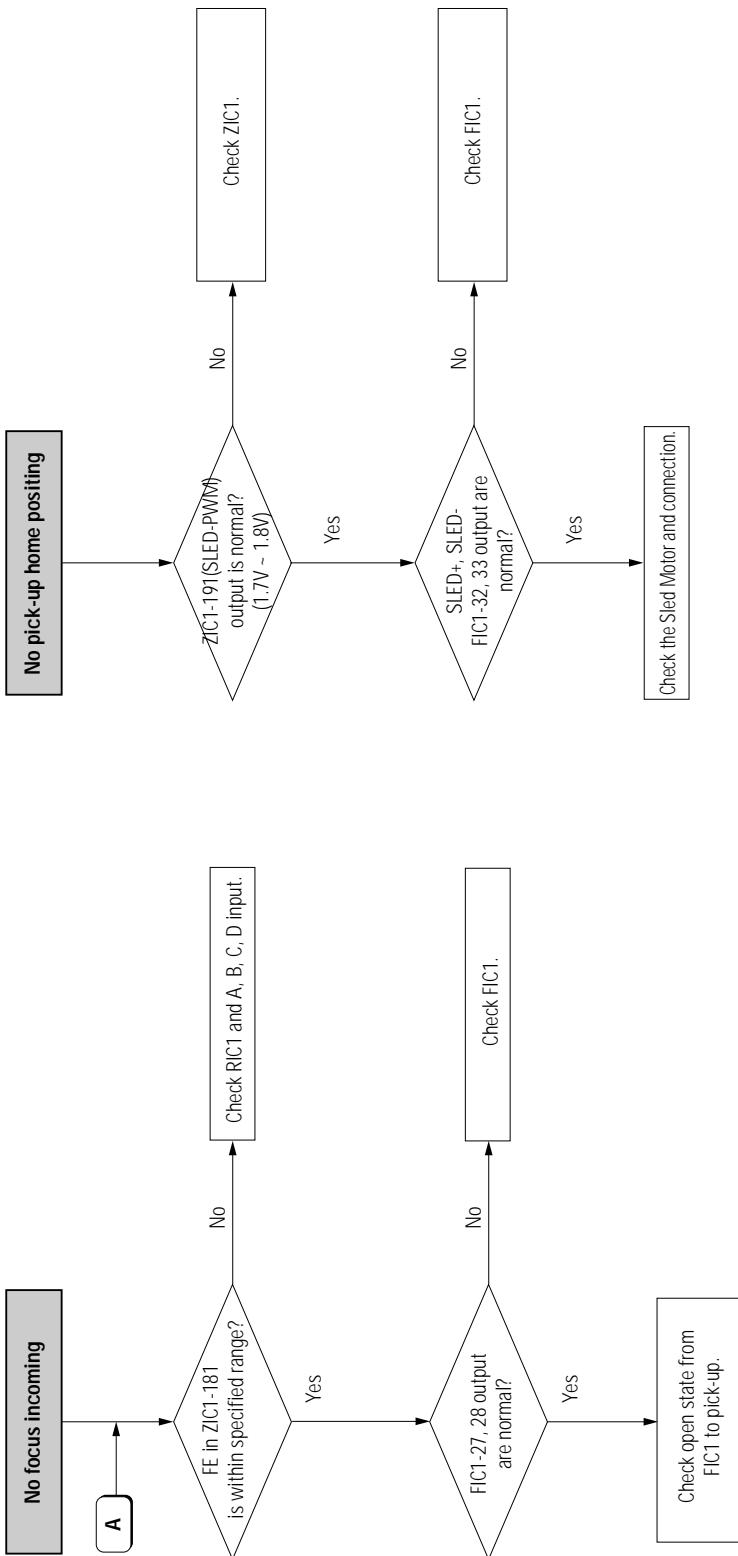
2) Uncompressed Data

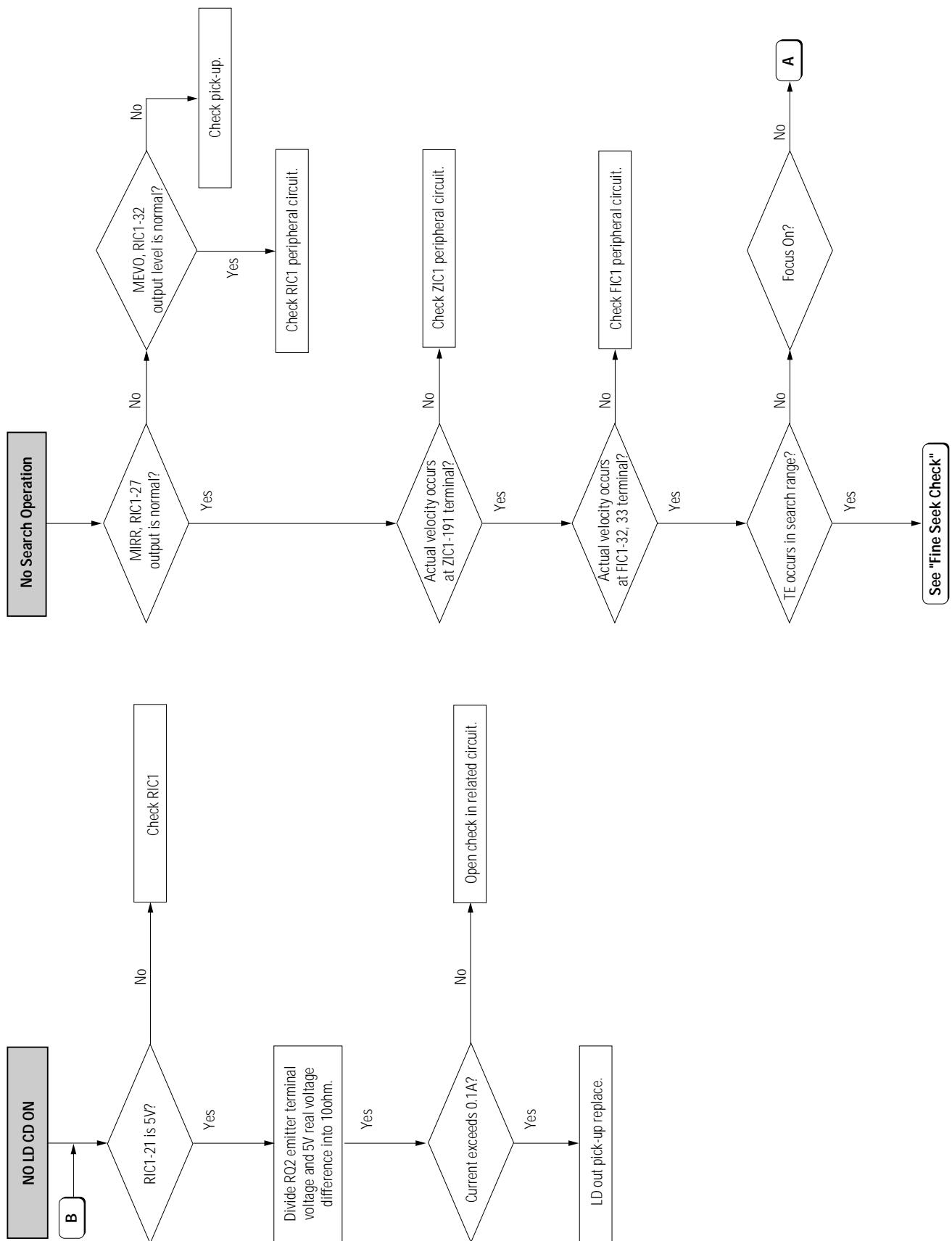
The uncompressed data is that data isn't compressed, so it is called CD-DA, LPCM data.

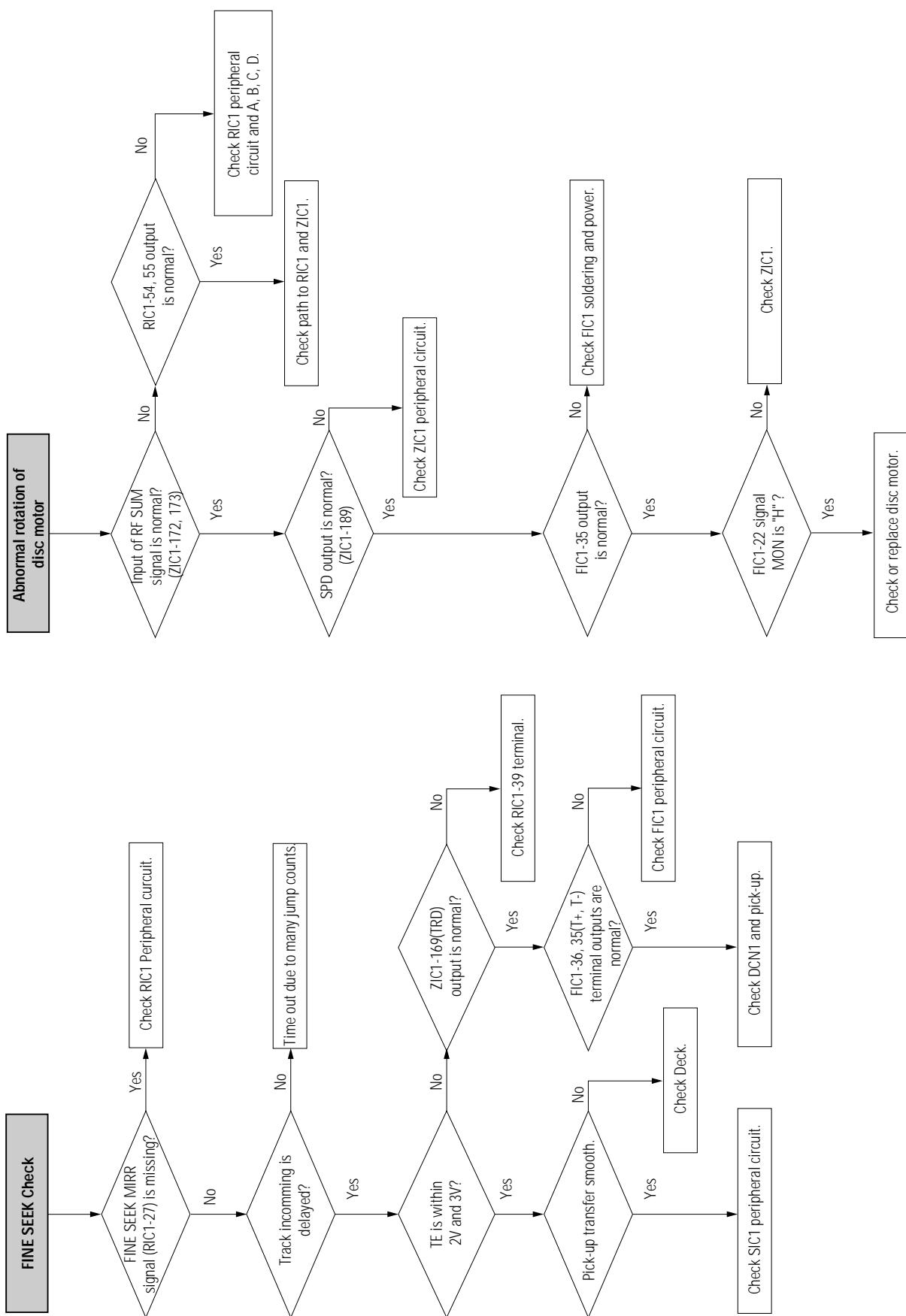
The 2 channels data is converted through audio decoder 2-channel data and Data 0 and are outputted in digital audio interface.Via IEC-958 output process, they are transmitted to digital amplifier or AC-3/MPEG/DTS amplifier built in the external digital input source with IEC-958/1937 transmission format.

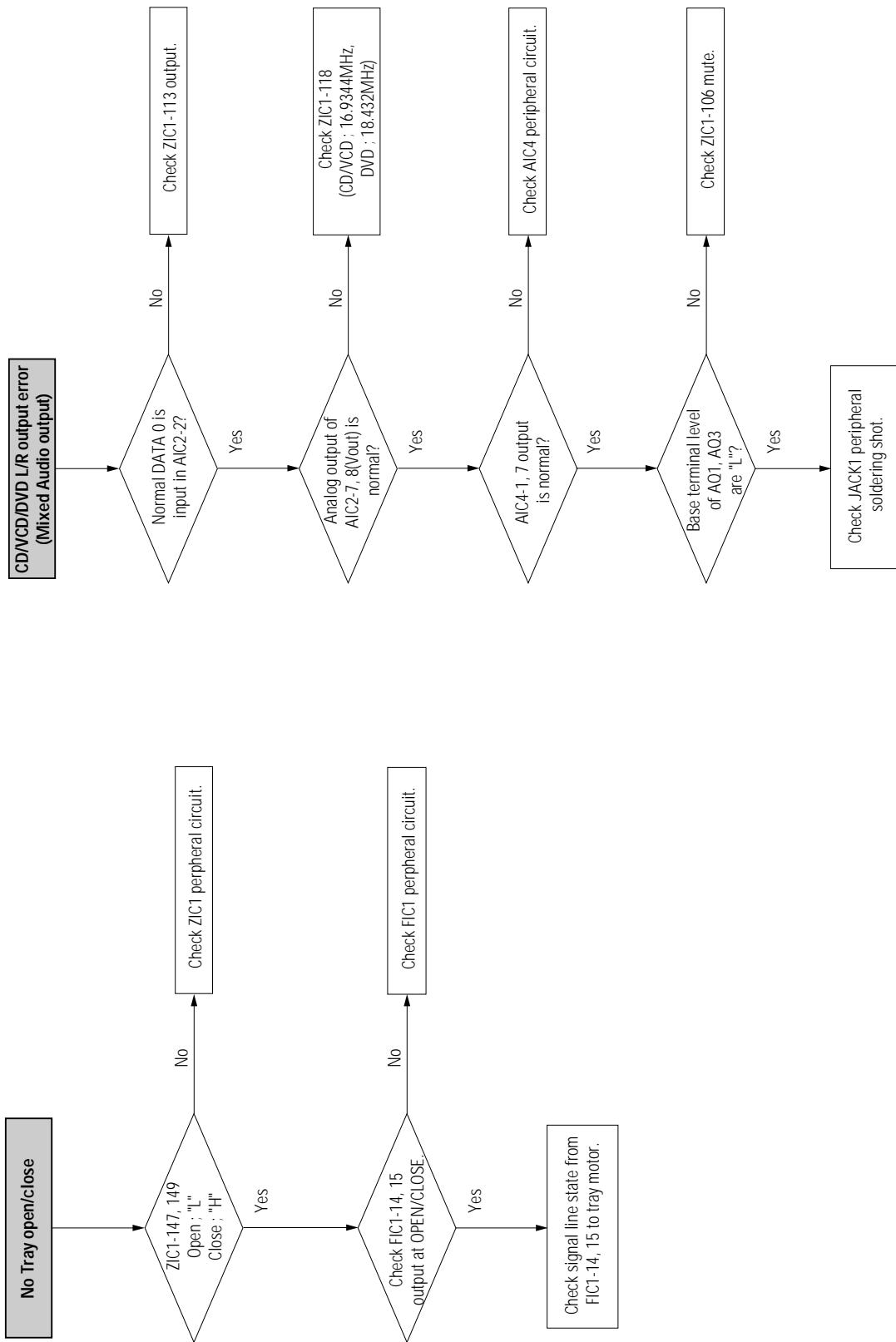
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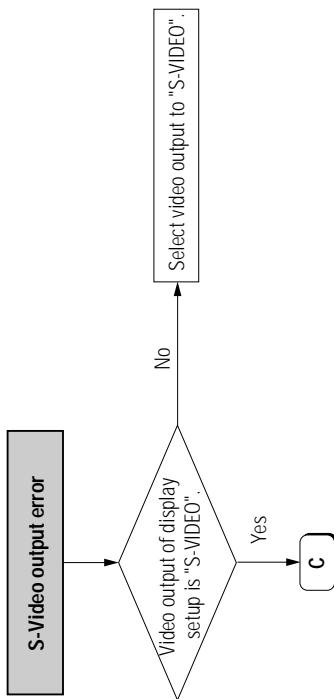
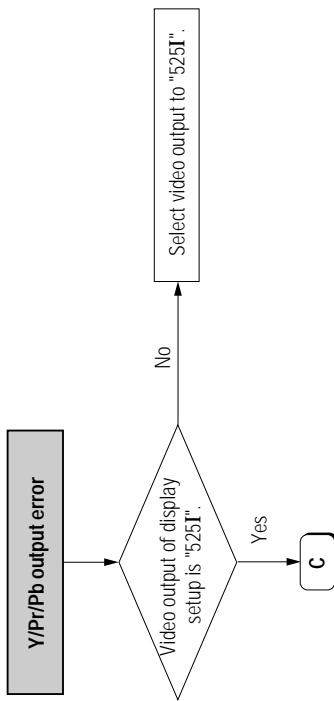
8. Troubleshooting

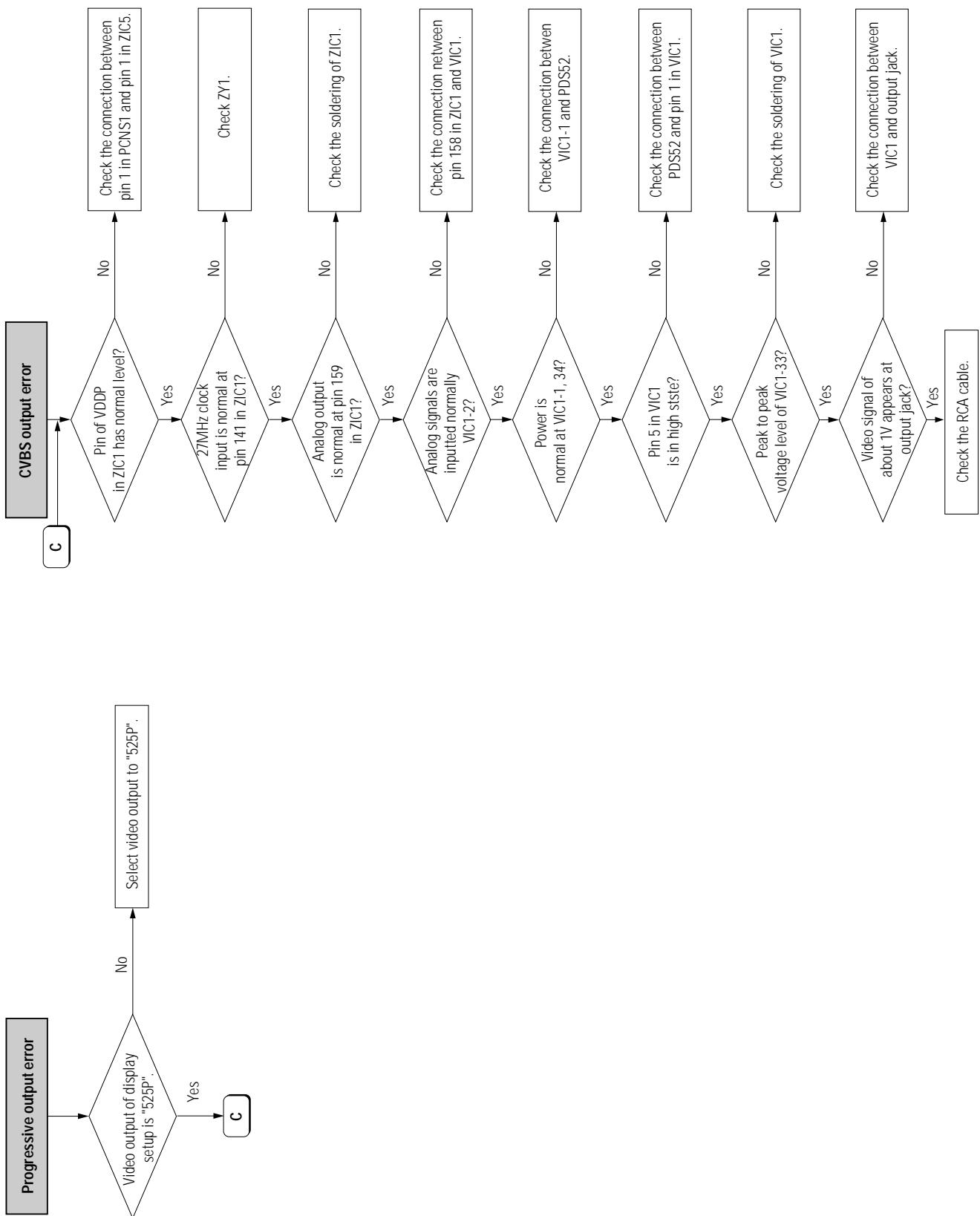


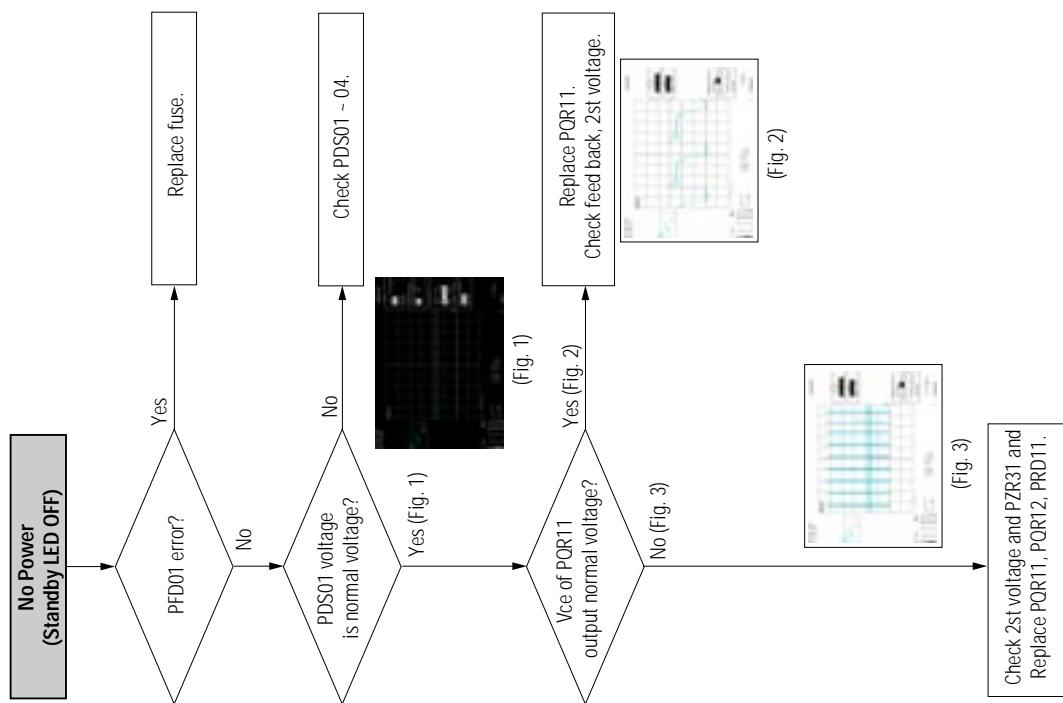






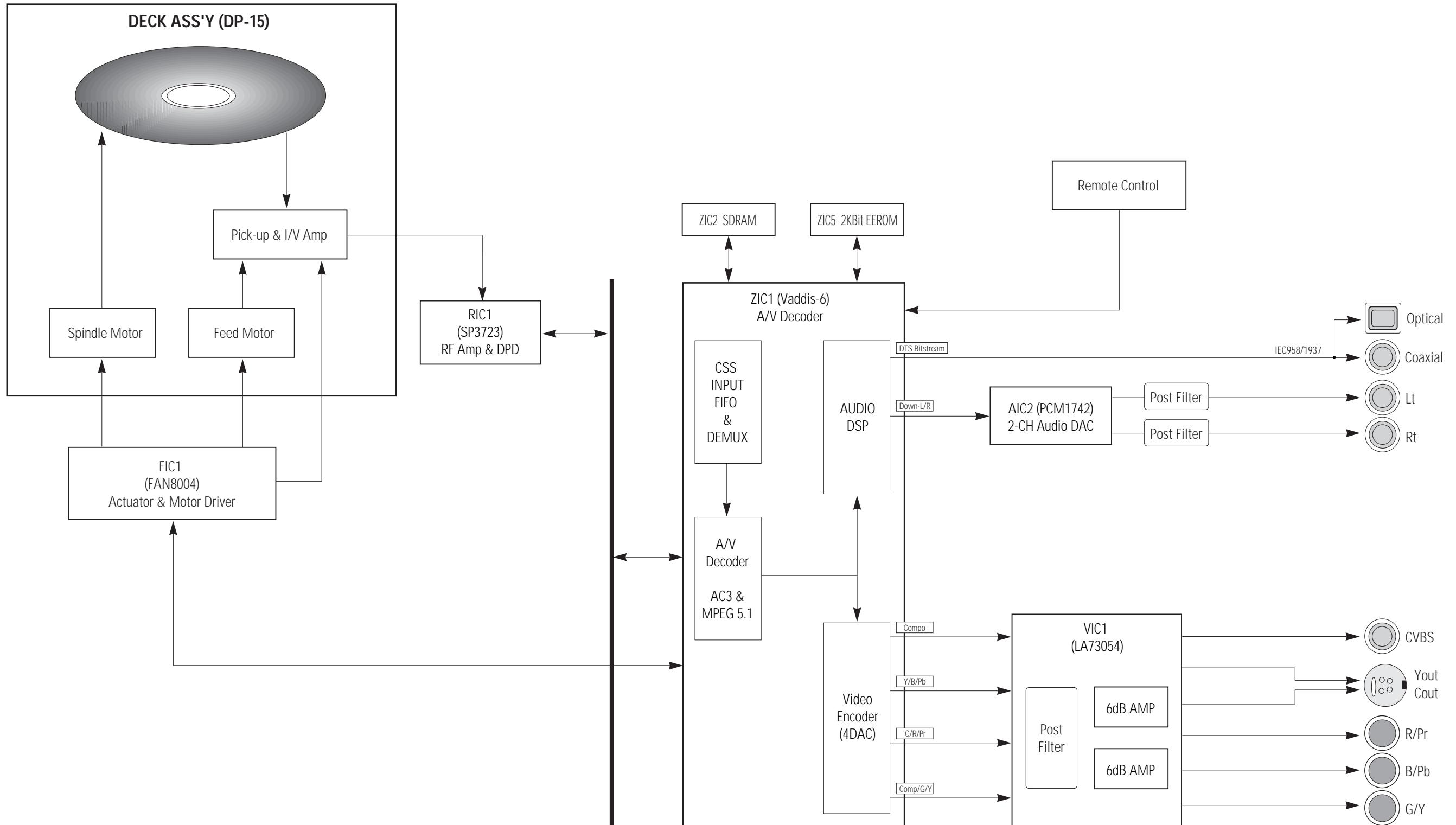






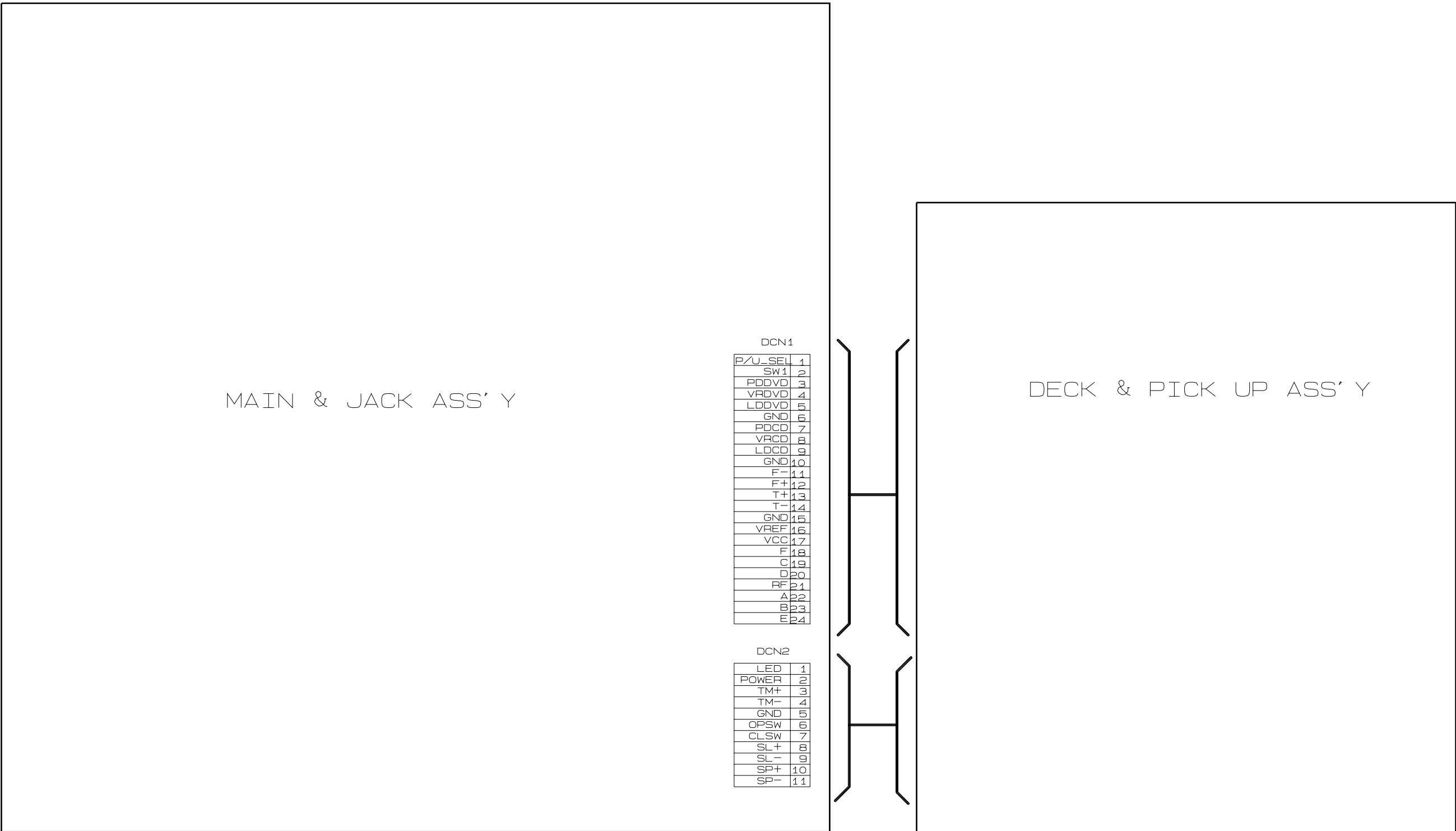
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9. Block Diagram



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10. Wiring Diagram

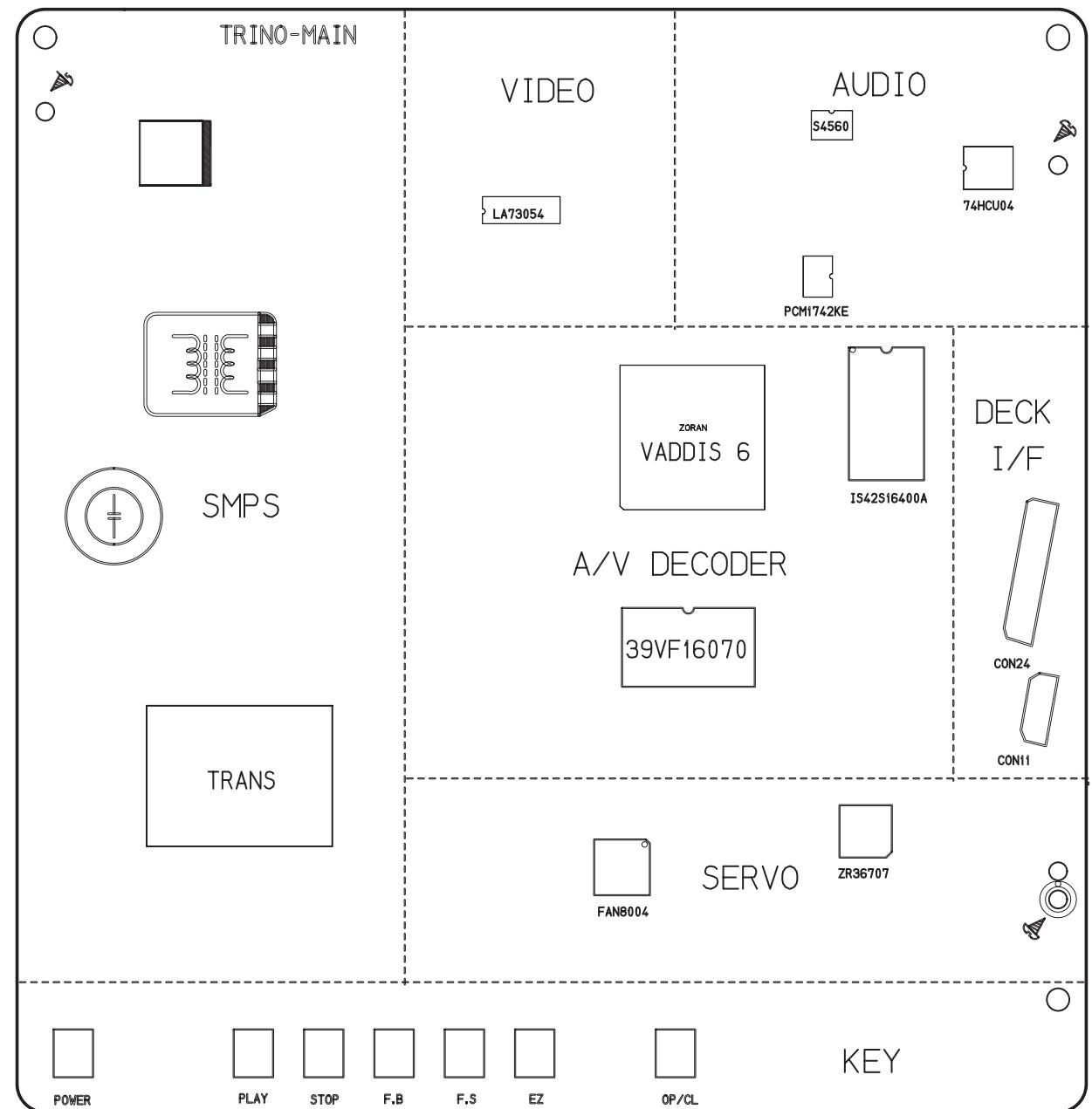


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11. Schematic Diagrams

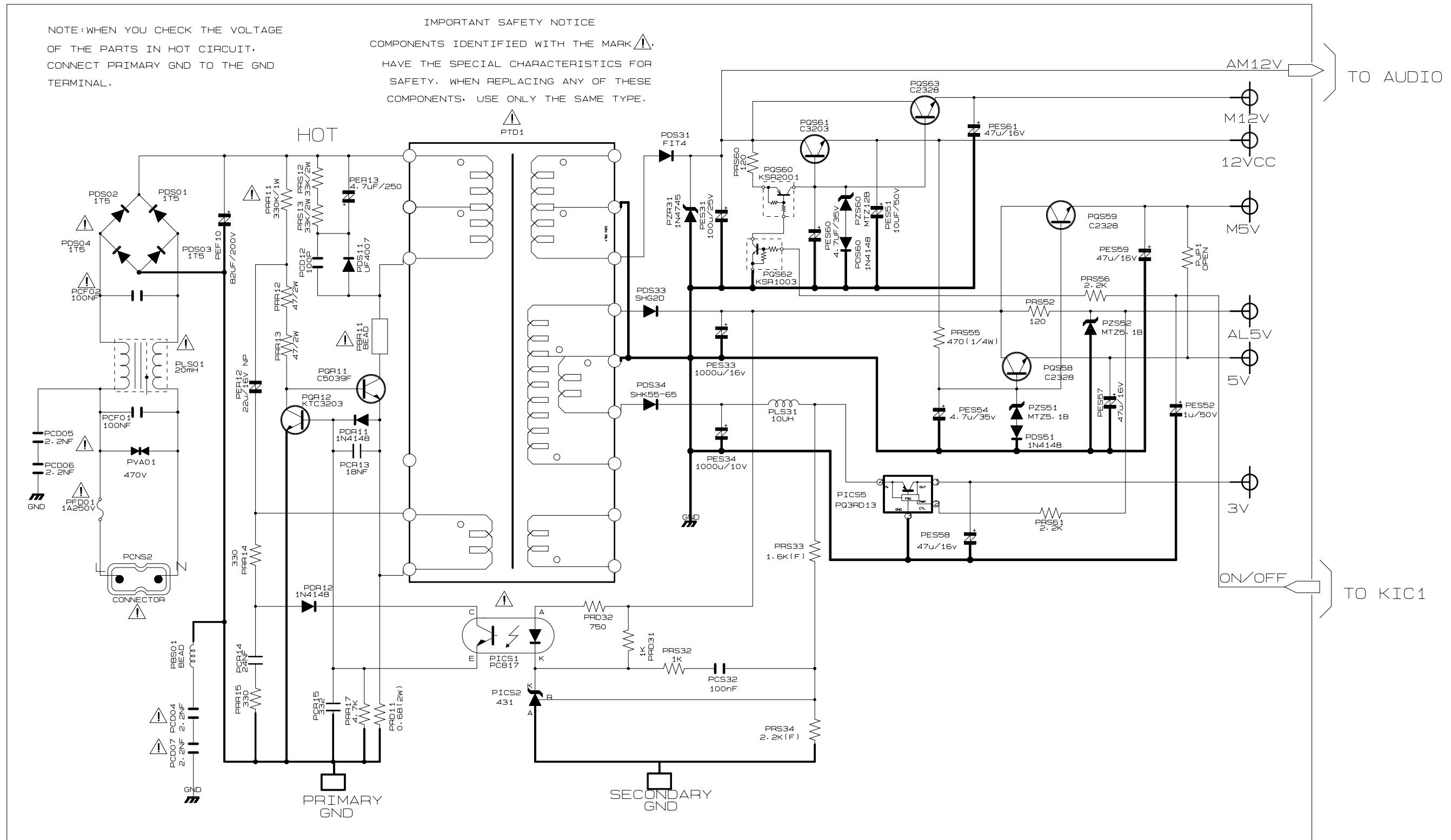
- 11-1 Power ----- 11-2
- 11-2 AV-Decoder/Main-Micom ----- 11-3
- 11-3 Servo ----- 11-4
- 11-4 Video ----- 11-5
- 11-5 Audio ----- 11-6
- 11-6 Key ----- 11-7

Block Identification of PCB

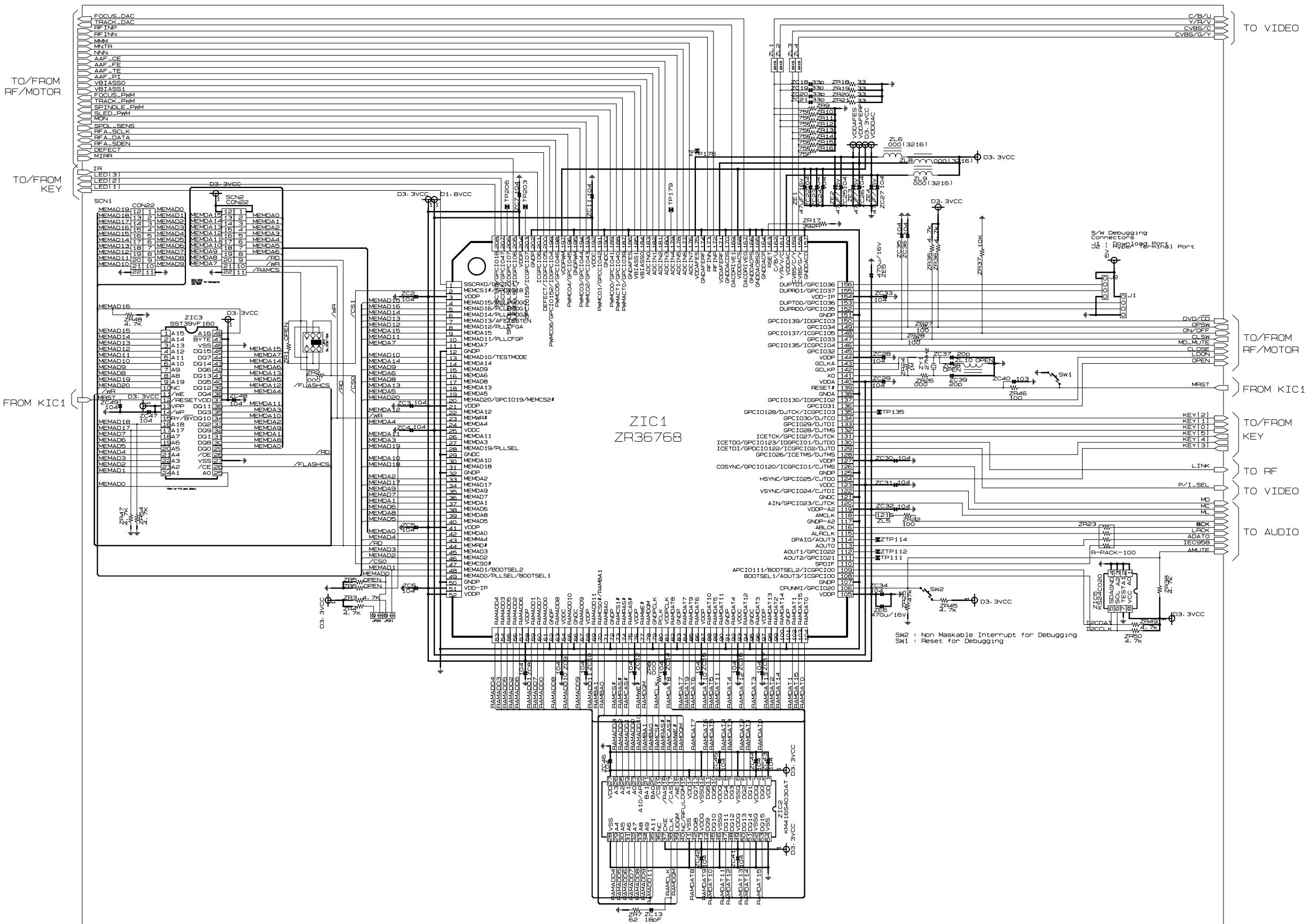


Main PCB (Component Side)

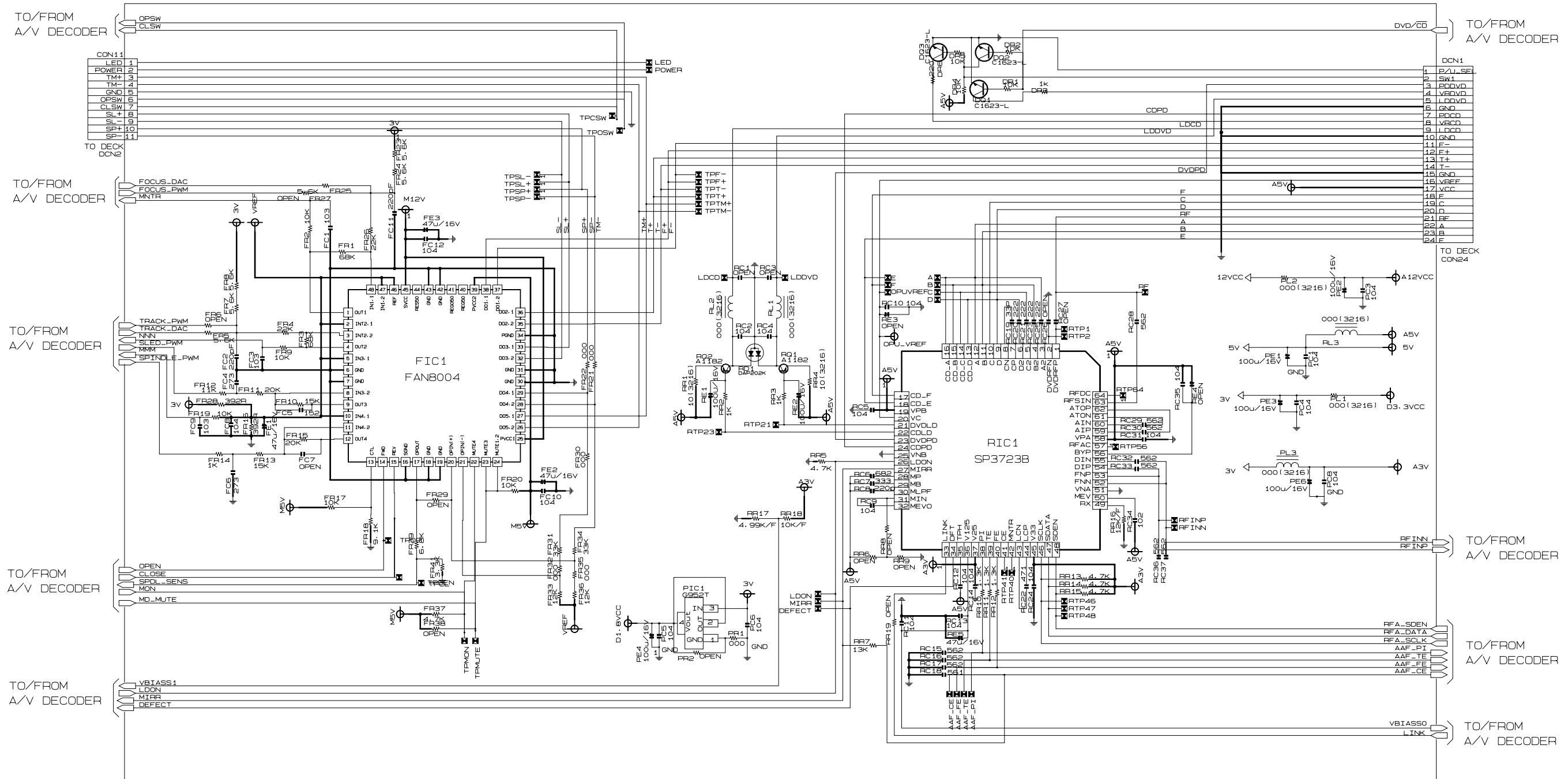
11-1 Power



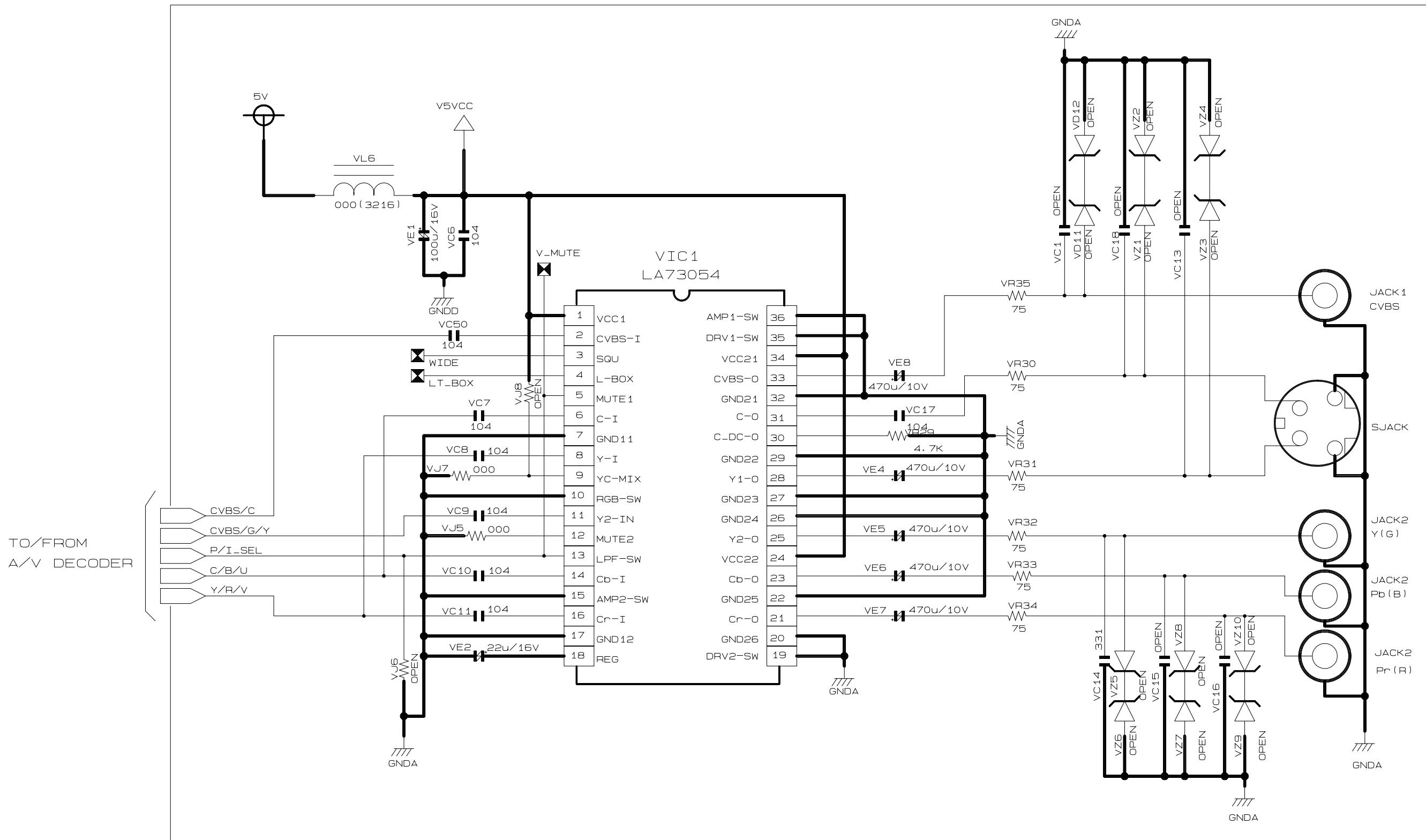
11-2 AV-Decoder/Main-Micom



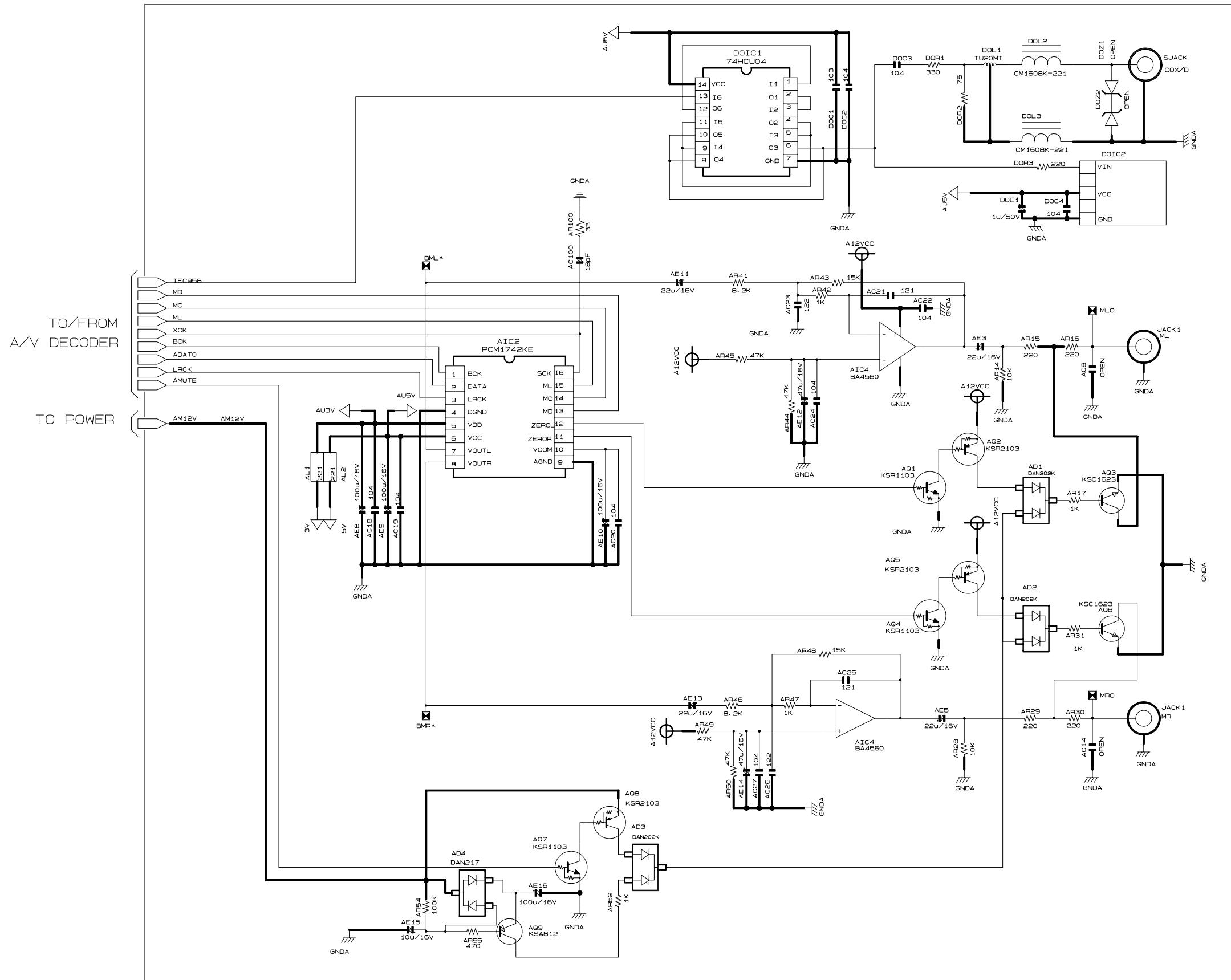
11-3 Servo



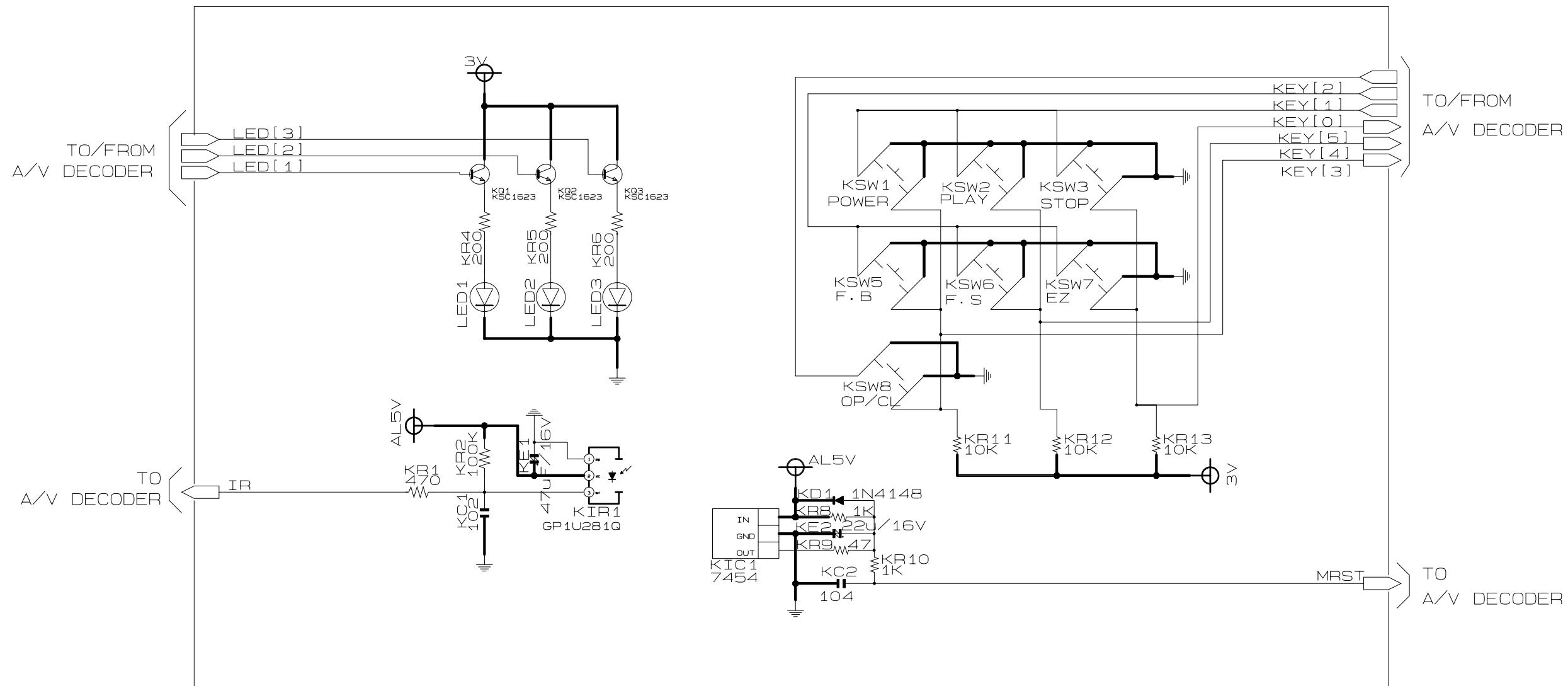
11-4 Video



11-5 Audio



11-6 Key



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