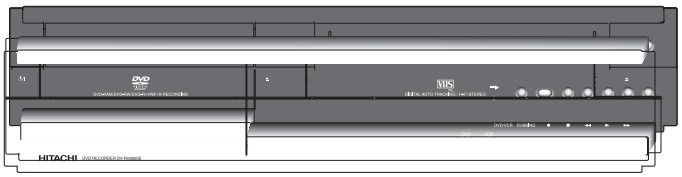
HITACHI

SERVICE MANUAL

SM0512

DV-RV8500E
DV-RV8500E(UK)



PAL

PAL SECAM

DO NOT RESELL OR DIVERT IMPROPERLY.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

DVD VIDEO RECORDER with VIDEO CASSETTE RECORDER

July 2005 Digital Media Division,Yokohama

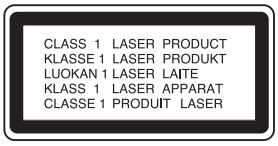
Table of Contents

1 Safety Precaution for Repair

1-1 Cautions

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts have special safety-related characteristics. These are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for a higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual. Electrical components having such features are identified by marking with a ⚠ on the schematics and the parts list in this Service Manual. The use of a substitute replacement component which does not have the same safety characteristics as the HITACHI recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards. Product safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current HITACHI Service Manual. A subscription to, or additional copies for, HITACHI Service Manual may be obtained at a nominal charge from HITACHI SALES CORPORATION.



CAUTION

This product contains a laser diode of higher class than 1. To ensure continued safety, do not remove any covers or attempt to gain access to the inside of the product. Refer all servicing to qualified personnel.

CAUTION

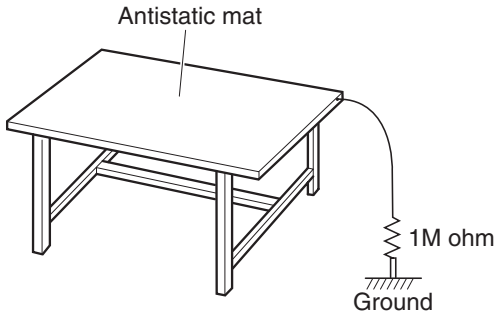
There is a high-voltage section inside the DVD video recorder. When repairing or inspecting it, take great care to prevent electric shock: Use an isolating transformer, wear gloves, etc.

1-2 Electrostatic Protection Measures

Semiconductor components can be damaged by static electricity charged on clothes, human body, etc. Take great care when handling components to avoid electrostatic damage, and perform servicing in an environment where grounding is complete.

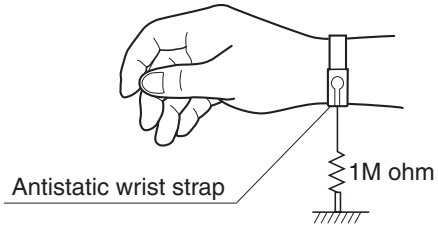
(1) Grounding work bench

Lay out an antistatic mat on work bench, and then use the ground plate to ground the work bench.



(2) Grounding human body

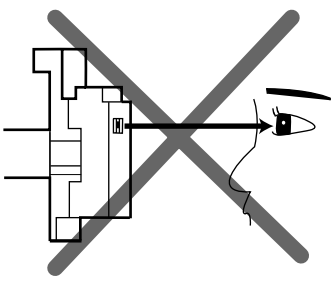
Use an antistatic wrist strap to discharge any static electricity charged on the body. Also, use a tester for wrist strap to make sure that the wrist strap is working normally. Note, however, that static electricity charged on clothes will not be discharged by wrist strap: Therefore do not allow your clothes to touch the semiconductor components.



1-3 Cautions When Handling DVD Drive

The optical pickup in DVD drive has a high precision structure: Be sure to observe the following cautions.

1) Do not subject optical pickups to any severe vibrations or impact during movement, installation or disassembly.
2) When performing repair work, do not perform disassembly any further than that described in this manual.
3) Never turn the semi-variable resistors for adjustment in optical pickup or DVD drive.
4) NEVER look into the objective lens in optical pickup or directly view the laser light: You could lose your eyesight.



Do not directly look at laser light from pickup.

1-4 Lead-Free Solder

The printed circuit board that uses lead-free solder is adopted. To protect the global environment, use the recommended lead-free solder also during servicing.
Read and observe the following before soldering:

Caution
ALWAYS wear protective goggles during soldering so that no solder smoke or scattered solder enters the eye. Lead-free solder may scatter at high temperatures of 600°C.

(1) Characteristics of lead-free solder

The melting point of lead-free solder is 30-40°C higher than that of lead based solder.

(2) Lead-free solder for servicing

Use the following lead-free solder for servicing:
Recommended lead-free solder and composition of alloy (wt%): Sn-3.0Ag-0.5Cu or equivalent

Information:
For composition of alloy, Sn is tin; Ag is silver; Cu is copper; Bi is bismuth; Pb is lead.

(3) Soldering iron for servicing

The temperature of soldering iron tip must be adjusted according to the points to be soldered: Use an antistatic soldering iron with thermal control function.
When removing components, take care not to damage any surrounding component or pattern. When attaching components, observe the heating time in the following table so that the components are not destroyed by heat.

Tip temperatures for different soldering points:

Point to be soldered	Tip temperature
Surface-mounted (chip) parts [other than those shown below]	320 ± 30°C [heating time: less than 5 seconds]
Surface-mounted (chip) parts [for DVD cameras, cellular phones only]	350 ± 10°C [heating time: less than 3 seconds]
Discrete parts	380 ± 30°C
Chassis, metal shield, etc.	420 ± 30°C

(4) Cautions when using lead based solder

It is recommended that you use lead-free solder when servicing, but it is also possible to service using lead based solder. However, if lead based solder is used for servicing, take care with the following:

1) Before using lead based solder, remove the lead-free solder completely from the point to be soldered.
2) For additional soldering for repair, set the soldering iron tip temperature for lead-free solder, mix lead based solder and lead-free solder sufficiently. Do not perform any repair using the bare soldering iron tip without adding solder, since it will cause secondary failure due to lack of strength.

1-5 Notes When Using Service Manual

(1) Value units used in parts list

Certain symbols are indicated as shown below for value units of resistors, capacitors and coils in parts list. When you read them, note the following regular indications:

Parts	Indication in list	Regular indication
Resistor	KOHM	kΩ
Capacitor	UF	μF
	PF	pF
Coil	UH	μH
	MH	mH

(2) Values in schematic diagrams

The values, dielectric strength (power capacitance) and tolerances of the resistors (excluding variable resistors) and capacitors are indicated in the schematic diagrams using abbreviations. Certain symbols are indicated for value units: When you read them note the regular indications in tables below:

[Resistors]

Item	Indication
Value	No indication ..... Ω K ..... kΩ M ..... MΩ
Tolerance	No indication ..... ±5% (All tolerances other than ±5% are indicated in schematic diagrams)
Power capacitance	No indication ..... 1/8W (1/16 W for leadless resistors with no indication) All capacitances other than the above are indicated in schematic diagrams.

[Capacitors]

Item	Indication
Value	No indication ..... μF P ..... pF
Dielectric strength	No indication ..... 50V (All dielectric strengths other than 50 V are indicated in schematic diagrams)

[Coils]

Item	Indication
Value	μ ..... μH m ..... mH

2 General Description

2-1 Overview

The DV-RV8500E is a DVD recorder with VHS VCR that incorporates a DVD super multi-drive: It allows user to record and play back on +RW and +R, as well as on DVD-RAM, DVD-RW, DVD-R and VHS videotape.
It can be used without any concern about the type of media.

2-1-1 Service method

Basically, components are replaced when servicing the DV-RV8500E. However, the service method is different for high-density packaging PCBs and precision components.
Refer to the following table and perform the designated, appropriate servicing. Any changes that occur in the service method will be published using service bulletin, etc.
Do not perform any servicing other than that described in this manual.

Component	Service method
Exterior component	Component replacement
DVD Multi Drive	Unit replacement
VDR P.C.B	Circuit board assembly replacement
VCR P.C.B	Component replacement
TIMER P.C.B	Component replacement
JACK P.C.B	Component replacement
KEY P.C.B	Component replacement
SMPS P.C.B	Component replacement
Deck mechanism	Component replacement

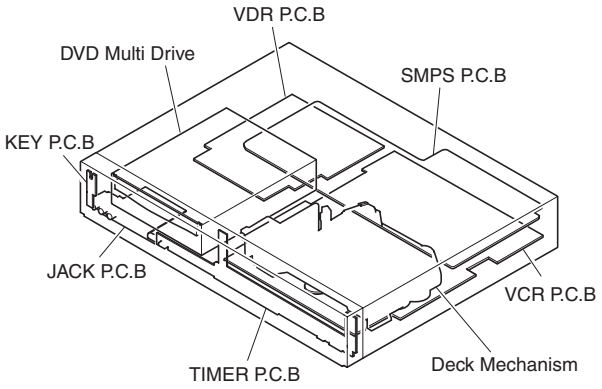


Fig. 2-1-1 Component Location

2-1-2 Disc information

Recordable Discs

DVD-RW (Digital Video Disc - ReWritable):
These Discs can be recorded on repeatedly. Recordings can be erased, then you can record again on the same Disc.
When a brand-new DVD-RW disc is inserted, the screen for formatting the disc will appear: Choose the VR mode or Video mode, and then format the disc before use.

DVD-R (Digital Video Disc - Recordable):
These Discs can be recorded only once. After you finalize a DVD-R, you cannot record on it or edit it any more.

DVD+RW (Digital Video Disc + ReWritable):
These Discs can be recorded on repeatedly. Recordings can be erased, then you can record again on the same Disc.
When a brand-new DVD+RW disc is inserted, the screen for formatting the disc will appear: Format the disc before use.
When a DVD+RW disc recorded on this recorder is removed, it will automatically be finalized, but if you enter a title after finalization, you will need to manually finalize it.

DVD+R (Digital Video Disc + Recordable):
These Discs can be recorded only once. After you finalize a DVD+R, you cannot record on it or edit it any more.

DVD-RAM (DVD - Random Access Memory)
DVD-RAM discs can be formatted for VR mode recording.
These Discs can be recorded on repeatedly. Recordings can be erased, then you can record again on the same Disc.
Playable on DVD-RAM compatible players.
Recordings can be extensively edited.
Only DVD-RAM standard Version 2.0, 2.1 and 2.2 discs can be used in this unit.
You cannot use the cartridge-type DVD-RAM disc in this unit.
When a brand-new DVD-RAM disc is inserted, the screen for formatting the disc will appear: Format the disc before use.
In the case of an 8-cm DVD-RAM on which photos were recorded on a Hitachi DVD video camera/recorder, no editing of Disc Navigation or play list can be performed on this recorder (recording on it and creating a play list are possible).

Notes
– This recorder cannot record CD-R or CD-RW discs.
– DVD-R/RW, DVD+R/RW and CD-R/RW discs recorded using a personal computer or a DVD or CD recorder may not play if the disc is damaged or dirty, or if there is dirt or condensation on the recorder's lens.
– If you record a disc using a personal computer, even if it is recorded in a compatible format, there are cases in which it may not play because of the settings of the application software used to create the disc. (Check with the software publisher for more detailed information.)
– The company does not hold any responsibility to compensate the contents which should have been recorded, and any losses or damages (e.g. losses of business profit, or business intermission) that may arise from malfunction of this recorder (not recording/editing as intended).
Problems arising in the following situations are included.
• When a DVD disc recorded on this recorder is used in a DVD recorder of another manufacturer, or used (insertion, playback, recording or editing) in a personal computer DVD drive.
• When a DVD that has been used as above is used again in this recorder.
• When a DVD disc recorded in a DVD recorder of another manufacturer, or in a personal computer DVD drive is used.

Playable Discs

DVD VIDEO	DVD (8 cm/12 cm disc)
COMPACT disc DIGITAL VIDEO	Video CD (VCD) (8 cm / 12 cm disc)
COMPACT disc DIGITAL AUDIO	Audio CD (8 cm/12 cm disc)

In addition, this unit can play DVD-R/DVD-RW discs; DVD+R/DVD+RW discs; CD-R/CD-RW discs that contain audio titles, MP3 files, WMA files, or JPEG files;. and VCD.

Notes
– Depending on the conditions of the recording equipment or the CD-R/RW (or DVD±R/±RW) disc itself, some CD-R/RW (or DVD±R/±RW) discs cannot be played on the unit.
– Do not attach any seal or label to either side (the labelled side or the recorded side) of a disc.
– Do not use irregularly shaped CDs (e.g., heart-shaped or octagonal). Doing so may result in malfunctions.

About DVD-R and DVD-RW disc

How are DVD-R and DVD-RW discs different?
The essential difference between DVD-R and DVD-RW is that DVD-R is a record-once medium, while DVD-RW is a re-recordable/erasable medium. You can re-record/ erase a DVD-RW disc approximately 1,000 times.

Can I play my recordable discs in a regular DVD player?
Generally, DVD-R discs and DVD-RW discs recorded in Video mode are playable in a regular DVD player, but they must be 'finalized' first. This process fixes the contents of the disc to make them readable to other DVD players as DVD-Video discs.
DVD-RW discs recorded in VR (Video Recording) mode are playable in some players.

RW COMPATIBLE — This indicates a product feature that is capable of playing DVD-RW discs recorded with Video Recording format.

What are 'recording modes'?

There are two recording modes available using this recorder: VR mode and Video mode. When recording to a DVD-R disc, recordings are always in Video mode. DVD-RW discs can be formatted for VR mode recording or Video mode recording.

VR mode recording
- 4 different picture quality/recording time settings available (XP, SP, LP, EP)
- Not playable on regular DVD players
- Recordings can be extensively edited

Video mode recording
- 4 different picture quality/recording time settings available (XP, SP, LP, EP)
- Playable on regular DVD players (after finalizing)
- Limited editing features

Note
DVD-Video Format (Video mode) is a new format for recording on DVD-R/RW and DVD+R/RW discs that was approved by the DVD Forum in 2000. You may therefore experience problems playing recordable DVD discs in some players. Symptoms include video artifacts, audio and/or video dropouts and playback suddenly stopping.
Our company cannot take responsibility for problems playing discs recorded on this recorder in other players.

Is editing a DVD like editing a video tape?

No. When you edit a video tape you need one video deck to play the original tape and another to record the edits. With DVD, you edit by making a 'Playlist' of what to play and when to play it. On playback, the recorder plays the disc according to the Playlist.

About word 'Original' and 'Playlist'

Throughout this manual, you will often see the words Original and Playlist to refer to the actual content and the edited version.
- **Original:** content refers to what's actually recorded on the disc.
- **Playlist:** content refers to the edited version of the disc — how the Original content is to be played.

About DVD+R and DVD+RW disc

How are DVD+R and DVD+RW discs different?
The essential difference between DVD+R and DVD+RW is that DVD+R is a record-once medium, while DVD+RW is a re-recordable/erasable medium. You can re-record/ erase a DVD+RW disc approximately 1,000 times.

DVD+RW mode recording
- 4 different picture quality/recording time settings available (XP, SP, LP, EP)
- Playable on regular DVD players
- The edited contents is playable on regular DVD players only after finalizing
- Recordings can be edited the title/chapter

DVD+R mode recording
- 4 different picture quality/recording time settings available (XP, SP, LP, EP)
- Playable on regular DVD players (after finalizing)
- Any edited contents are not be compatible on regular DVD players. (Hide, chapter combine, added chapter mark, etc.)
- Limited title/chapter editing features

2-2 Features

1. DVD super multi-drive incorporated

1) This drive is newly compatible with recording/playback on +R and +RW, in addition to DVD-RAM, DVD-RW and DVD-R. DVD-RW is compatible with recording/playback in both Video mode and VR (Video Recording) mode: DVD media can be selected to match the application.
2) The drive can play back 8 cm DVD-R recorded on a Hitachi DVD video camera/recorder and not finalized.
3) The drive is widely compatible with reading of original CD-R/RW recorded in MP3, WMA (Windows Media Player) and JPEG formats, as well as music CDs.

2. The Dubbing button easily dubs VHS images to create a DVD.

Simply pressing the button allows user to dub precious material recorded on VHS videotapes onto DVD. And images edited on DVD can be dubbed onto VHS videotape.

3. High-quality image design

1) VBR (Variable Bit Rate control) format ensures both high image quality and long-time recording:
   This DVD recorder uses a VBR recording format that increases the compression ratio with simple images and decreases it with complex images of larger amounts of data, thus variably controlling to the optimum compression ratio: It reduces deterioration in image quality and effectively records on DVD.
2) Progressive playback makes possible the playback of generally available DVD movies, with natural images and reduced flickering:
   This DVD recorder plays back clear images even on a large screen with reduced jagging on diagonal lines or characters, and reduced flickering.

4. Enhanced functions

1) DV input port enables digital dubbing from a digital camcorder to DVD.
2) Zoom-up function allows you to enlarge DVD images.

2-3 Specifications

General

Power requirements	AC 220-240V, 50/60Hz
Power consumption	35W
Dimensions (approx.)	432 X 81.5 X 367 mm (w x h x d)
Mass (approx.)	6.6 kg
Operating temperature	5˚C to 35˚C
Operating humidity	5 % to 90 %
Television system	PAL B/G, SECAM L/L' colour system [For E] PAL I colour system [For E (UK)]
Recording format	VCR : PAL, SECAM [SECAM : E only] DVD : PAL

System

Laser	Semiconductor laser, wavelength 650 nm
Video head system	Double azimuth 4 heads, helical scanning
Signal system	VCR : PAL, SECAM [SECAM : E only] DVD : PAL

Recording

Recording format	DVD VideoRecording, DVD-VIDEO
Recordable discs	DVD-ReWritable, DVD-Recordable, DVD+ReWritable, DVD+Recordable, DVD-Random Access Memory
Recordable time	DVD (4.7GB) : Approx. 1 hour (XP mode), 2 hours (SP mode), 4 hours (LP mode), 6 hours (EP mode)
Video recording format	
Sampling frequency	27MHz
Compression format	MPEG 2
Audio recording format	
Sampling frequency	48kHz
Compression format	Dolby Digital

Playback

Frequency response	DVD (PCM 48 kHz): 8 Hz to 22 kHz, CD: 8 Hz to 20 kHz DVD (PCM 96 kHz): 8 Hz to 44 kHz
Signal-to-noise ratio	More than 100 dB (AUDIO OUT connector)
Harmonic distortion	Less than 0.008% (AUDIO OUT connector)
Dynamic range	More than 95 dB (AUDIO OUT connector)

Inputs

AERIAL IN	Aerial input, 75 ohms
VIDEO IN	1.0 Vp-p 75 ohms, sync negative, RCA jack x 1 / SCART x 2
AUDIO IN	0 dBm more than 47 kohms, RCA jack (L, R) x 1 / SCART x 2
DV IN	4 pin (i.LINK/IEEE 1394 standard)
S-VIDEO IN	(Y) 1.0 V (p-p), 75 Ω, negative sync, Mini DIN 4-pin x 1 (C) 0.3 V (p-p) 75 Ω

Outputs

VIDEO OUT	1.0 Vp-p 75 ohms, sync negative, SCART x 2
S-VIDEO OUT	(Y) 1.0 V (p-p), 75 Ω, negative sync, Mini DIN 4-pin x 1 (C) 0.3 V (p-p) 75 Ω
COMPONENT VIDEO OUT	(Y) 1.0 V (p-p), 75 Ω, negative sync, RCA jack x 1 (C_B/P_B)/(C_R/P_R) 0.7 V (p-p), 75 Ω, RCA jack x 2
Audio output (digital audio)	0.5 V (p-p), 75 Ω, RCA jack x 1
Audio output (optical audio)	3 V (p-p), 75 Ω, Optical connector x 1
Audio output (analogue audio)	2.0 Vrms (1 KHz, 0 dB), 600 Ω, RCA jack (L, R) x 1 / SCART

- Design and specifications are subject to change without notice.
- Manufactured under licence from Dolby Laboratories. “Dolby” and the double-D symbol are trademarks of Dolby Laboratories.
- DTS and DTS Digital Out are registered trademarks of Digital Theater Systems, Inc.

2-4 Major Differences from Previous Model

←— : Same as on left

Item	DV-RV8500E	DV-RX7000E
Appearance		
Dimensions	432(W) x 367(D) x 81.5(H)mm	430(W) x 279(D) x 69(H)mm
Power consumption	Approx. 35 W	Approx.35 W
CPRM	Yes	←—
Recordable media	12 cm (5") 4.7 GB DVD-RAM	←—
	12 cm (5") 9.4 GB DVD-RAM	←—
	8 cm (3") 1.4 GB DVD-RAM	←—
	8 cm (3") 2.8 GB DVD-RAM	←—
	12 cm (5") 4.7 GB DVD-RW	←—
	8 cm (3") 1.4 GB DVD-RW	---
	12 cm (5") 4.7 GB DVD-R	←—
	8 cm (3") 1.4 GB DVD-R	←—
	12 cm (5") 4.7 GB DVD-R (4x-SPEED)	←—
	12 cm (5") 4.7 GB DVD+RW	---
	12 cm (5") 4.7 GB DVD+R	---
	VHS	---
Playable media	DVD-RAM	←—
	DVD-RW	←—
	DVD-R	←—
	DVD+RW	---
	DVD+R	---
	DVD-VIDEO	←—
	Video CD (VCD)	←—
	Audio CD (CD-DA)	←—
	CD-R/CD-RW (CD-DA, MP3,WMA,JPEG,VCD formatted discs)	CD-R/CD-RW (CD-DA, MP3,JPEG formatted discs)
	VHS/S-VHS (SQPB)	---
Remote control	DV-RM8500E	DV-RM7000E
DV input terminal	1 (IEEE 1394/i.LINK)	←—
S-VIDEO input terminal	1 (Mini DIN 4pin)	2 (Mini DIN 4pin: 2)
VIDEO/AUDIO input terminals	3 (RCA: 1, SCART: 2)	4 (RCA: 2, SCART: 2)
COMPONENT VIDEO output terminal	1 (RCA)	---
S-VIDEO output terminal	1 (Mini DIN 4pin)	←—
VIDEO output terminal	2 (SCART: 2)	3 (RCA: 1, SCART: 2)
Analog AUDIO output terminals	3 (RCA: 1, SCART: 2)	4 (RCA: 2, SCART: 2)
Digital AUDIO output terminals	2 (Optical: 1, Coaxial: 1)	←—
Video output switch	Yes (COMPONENT-RGB)	Yes (SETUP screen)

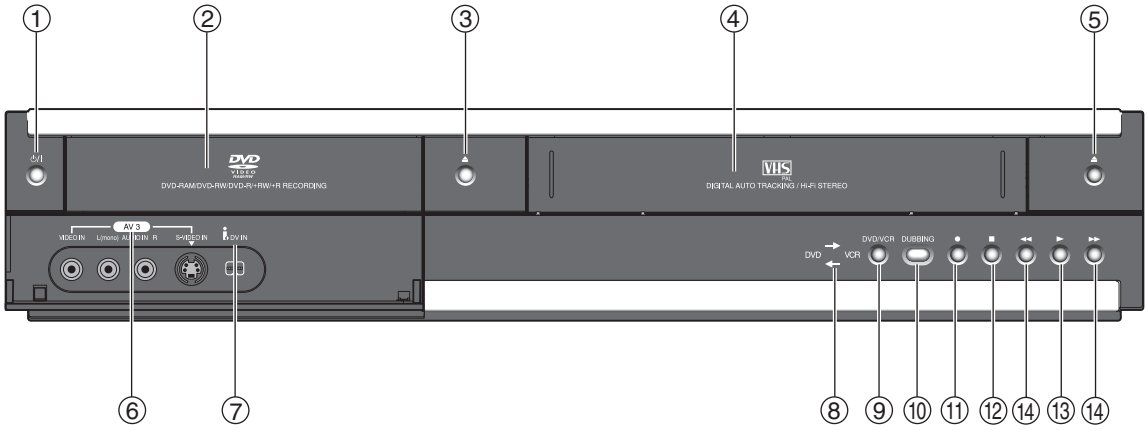
2-5 Function Differences from Previous Model

←— : Same as on left

Item			DV-RV8500E	DV-RX7000E
DVD section	Recording	Digital Recording (DV to DVD)	Yes	No
		Dubbing (VCR to DVD)	Yes	No
		Time Slip (PIP)	Yes	←—
		Instant Timer Recording	Yes	One Touch Recording (OTR)
		Flexible Recording Mode	No	Yes (Timer Recording Only)
		Recording Mode	XP, SP, LP, EP	XP, SP, LP, EP, FR
	Playback	Title List Playback	Yes	←—
		CM Skip	No	Yes (15, 30, 60 sec)
		Manual Skip	Yes	←—
		Marker Search	Yes	←—
		Zoom	Yes	←—
		Photo CD Playback (JPEG)	Yes	←—
		MP3 Playback	Yes	←—
		P in P	No	Yes
		Repeat Play	Yes	←—
		Repeat A-B Play	Yes	←—
		Camera Angle	Yes	←—
		3D Surround	Yes	No
		Slow Motion Play	Yes	←—
		Random Play	Yes (Karaoke, VCD)	Yes
		Time Search	Yes	←—
		DivX Movie Disc Playback	Yes	No
		WMA Playback	Yes	No
		Intro Play	No	Yes
	Other	Disk Menu	Yes	Yes (Disc Manager)
		Title List	Yes	←—
		Chapter List	Yes	←—
		Edit Title List	Yes	←—
		Edit Chapter List	Yes	←—
		Playlist	Yes	←—
		Divide Program	Yes	No
		Hide Program	Yes	No
VCR section	Recording	Digital Recording (DV to VCR)	Yes	---
		Dubbing (DVD to VCR)	Yes	---
		Title List Dubbing (DVD to VCR)	Yes	---
		Instant Timer Recording	Yes	---
	Playback	Picture Search	Yes	---
		Slow Motion	Yes	---
		Counter [0:00:00] Stop	Yes	---

2-6 Names of Parts

Front Panel



① **STANDBY/ON**
Switches the Recorder ON and OFF.
Press to turn the power on and off.(As to the indication of the Operate switch, " I " shows ON and "⏻" shows electrical power stand-by.)

② **Disc Tray (DVD deck)**
Insert a disc here.

③ **⏏ OPEN/CLOSE**
Opens or closes the disc tray.

④ **Cassette Compartment (VCR deck)**
Insert a video cassette here.

⑤ **⏏ EJECT**
Ejects the tape in the VCR deck.

⑥ **AV 3 IN**
- VIDEO /AUDIO (Left/Right)
Connect the audio/video output of an external source
(Audio system, TV/ Monitor, VCR, Camcorder, etc.).
- S-VIDEO IN
Connect the S-Video output of an external source (TV/ Monitor, VCR, Camcorder, etc.).

⑦ **DV IN**
Connect the DV output of a digital camcorder.

⑧ **DVD/VCR indicator**
Indicates the active DVD or VCR deck.

⑨ **DVD/VCR**
Toggles control between the DVD deck and the VCR deck.

⑩ **DUBBING**
Press to copy DVD to VCR (or VCR to DVD).

⑪ **● (REC)**
Starts recording.
Press repeatedly to set the recording time.

⑫ **■ (STOP)**
Stops playback.

⑬ **▶ (PLAY)**
To play back a disc or tape.

⑭ **SEARCH**
Press ◀◀ for fast back.
Press ▶▶ for fast forward.

Note
Holding down the POWER button on the front of this recorder in the stop mode will allow you to reset the recorder. Do not perform this during recording: Doing so will result in flawed recording.

Function Display Window

Disc type indicators
Indicates the type of disc loaded.

Indicates when the recorder is in timer recording or a timer recording is programmed.

REC The recorder is recording.

PRG Programmed playback active.

TTL Indicates current title.

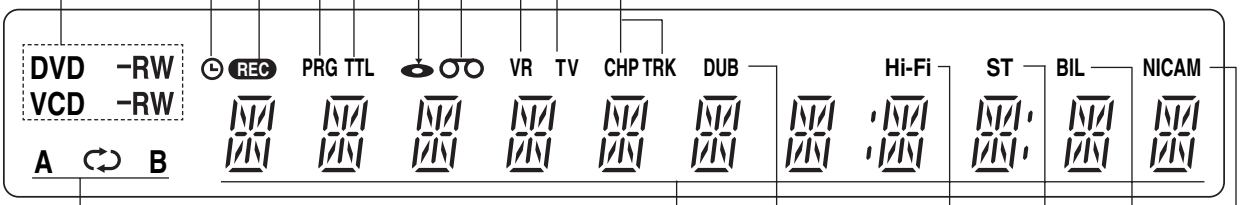
A disc is inserted in the DVD deck.

A VHS tape is inserted in the VCR deck.

VR Indicates a DVD-RW disc (VR mode only) disc is inserted in the DVD deck.

TV Indicates when the recorder is in TV tuner mode.

CHP/TRK Indicates current chapter or track number.



REPEAT Indicates repeat mode.

Character indicators
Indicates clock, total playing time, elapsed time, remaining time, title number, chapter/track number, channel, etc.

DUB Indicates that a DVD to VCR (or VCR to DVD) copy is in progress.

Hi-Fi Indicates when the Recorder is playing a tape in Hi-Fi.

ST Indicates a stereo broadcast is being received.

BIL Indicates when a BILINGUAL broadcast is being received.

NICAM Indicates when a NICAM broadcast is being received.

Remote Control Overview

POWER
Switches the recorder ON or OFF.

DVD
Select the Recorder's function mode to DVD.

VCR
Select the Recorder's function mode to VCR.

INPUT
Changes the input to use for recording (Tuner, AV1-3, or DV IN).

0-9 numerical buttons
Selects numbered options in a menu.

CLEAR
- Removes a track number on the Program List or a mark on the Marker Search menu.
- Reset tape counter to zero.

DISPLAY
Accesses On-Screen Display.

TIME SLIP
To play the title being recorded and also currently being recorded appears as PIP.

TIMER REC
Displays Timer Record menu.

REC (●)
Starts recording. Press repeatedly to set the recording time.

REC MODE
Selects the recording mode: XP, SP, LP, or EP.

MANUAL SKIP
Pressing this button during palyback will skip to a scene 30 seconds forward.

TV/DVD
To view channels selected by the recorder's tuner or by the TV tuner.

CHP ADD
Inserts a chapter marker when playing/ recording a VR mode DVD-RW (and DVD+RW/+R) disc.

VIDEO Plus +
Pressing this button and input VIDEO Plus + number to preset the timer for recording.

DUBBING
Press to copy DVD to VCR (or VCR to DVD).

AUDIO
Selects an audio language (DVD) or an audio channel (CD).

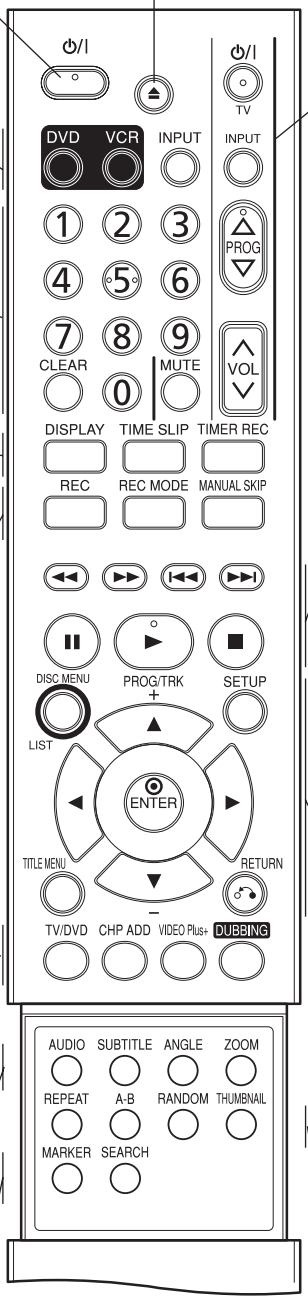
SUBTITLE
Selects a subtitle language.

ANGLE
Selects a DVD camera angle, if available.

ZOOM
Enlarges DVD video image.

MARKER
Marks any point during playback.

SEARCH
Displays Marker Search menu.



EJECT, OPEN/CLOSE
- Opens and closes the disc tray.
- Ejects the tape in the VCR deck.

TV Control Buttons

POWER: Turns the TV on or off.
INPUT: Selects the TV's source.
PROG: Selects TV's channel.
VOL: Adjusts TV's volume.
MUTE: Temporarily turns TV sound OFF, press again to restore.

BACKWARD / FORWARD (◀◀ / ▶▶)
- DVD: Search backward or forward.
- VCR: Rewinds the tape during the STOP mode, for fast reverse picture search and Advances the tape during the STOP mode, fast forward picture search.

SKIP (⏮ / ⏭)
Go to next chapter or track. Returns to beginning of current chapter or track or go to previous chapter or track.

PAUSE/STEP (❚❚)
Pause playback temporarily / press repeatedly for frame-by-frame playback.

PLAY (▶)
Starts playback.

STOP (■)
Stops playback or recording.

DISC MENU / LIST
Accesses menu on a DVD disc, Title List or Playlist menu.

◀ / ▶ / ▲ / ▼ (left/right/up/down)
Selects an option in the menu.

PROG/TRK(+/–)
- Select channel program of the recorder.
- To adjust tracking.
- To control vertical tremble during picture still.

ENTER
- Acknowledges menu selection.
- Displays information while viewing a TV program.

SETUP
Accesses or removes the Setup menu.

TITLE MENU
Displays the disc's Title menu, if available.

RETURN (↶)
- Removes the menu.
- Displays the menu of a video CD with PBC.

REPEAT
Repeat chapter, track, title, all.

A-B
Repeat sequence.

RANDOM
Plays tracks in random order.

THUMBNAIL
Selects a thumbnail picture for the current title and chapter for use in the Original and Playlist menu.

Rear Panel

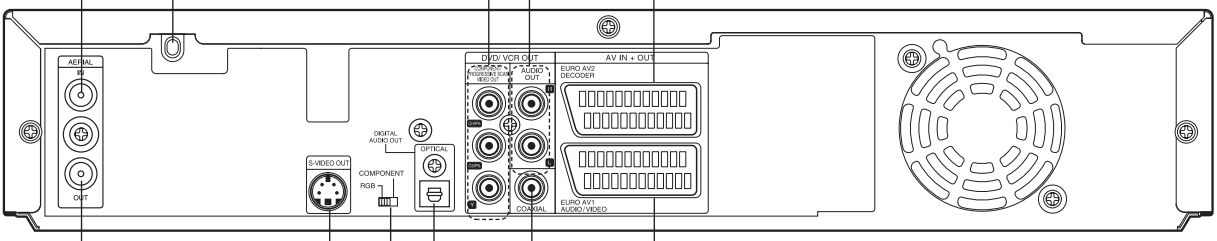
AERIAL
Connect the aerial to this terminal.

COMPONENT/PROGRESSIVE SCAN VIDEO OUT (Y Pb Pr)
Connect to a TV with Y Pb Pr inputs.

AUDIO OUT (Left/Right)
Connect to an amplifier, receiver or stereo system.

Mains Lead
Plug into the power source.

EURO AV 2 DECODER
Connect the audio/video output of an external source (Pay-TV decoder, Set Top Box, VCR, etc.).



EURO AV 1 AUDIO/VIDEO
Connect to a TV with SCART jack.

COAXIAL (Digital audio out jack)
Connect to digital (coaxial) audio equipment.

OPTICAL (Digital audio out jack)
Connect to digital (optical) audio equipment.

VIDEO OUTPUT Switch
Select either COMPONENT/PROGRESSIVE SCAN VIDEO OUT or RGB signal of EURO AV1 AUDIO/ VIDEO terminal depending on how you connect the Recorder to the TV.

S-VIDEO OUT
Connect to a S-Video Input on TV.

AERIAL OUT
Passes the signal from the **AERIAL** to your TV/monitor.

2-7 List of Abbreviations and Terms for DVD Recorder

Index	Abbreviation/Term	Explanation
A	AC3	See Dolby AC3.
B	Black Level	Function to correct the gradations on dark portions to make dark scenes easier-to-see.
C	CPRM	Content Protection for Recordable Media: Copyright protection function that is suitable for online distribution of music.
	CD-R	One type of DVD standard disc, to which writing once is possible (recordable type)
	CD-RW	One type of CD standard disc, to which writing up to 1000 times is possible
	Component video output terminals	Used for outputs of HDTV video signal format. Since signals for brightness and colors are independently handled for components signals (Y: luminance signal; PR/PB: chrominance signals), degrading of image will be reduced.
D	Decoder	A device that decodes the data coded and recorded on DVD Video and restores it to video and audio signals. This processing is referred to as decoding.
	Dynamic Range	A difference between maximum and minimum levels of audio recorded on disc: Measured in decibel (dB) units. If the dynamic range is compressed (audio DRC), the minimum signal level will increase and the maximum signal level will decrease: This will reduce the higher audio signal - such as burst sound - so that the low-level audio signal - such as human voice - can be heard more clearly.
	Dolby AC3	Audio coding format developed by Dolby Laboratories in U.S, also simply referred as AC3 format: Supports 5-channel full-range sound and one channel for sub-woofer sound playback.
	DRC	Dynamic Range Control: Adjusting the audio range of maximum and minimum levels (dynamic range) will improve audio signal when, for example, dialog is hard to hear or user is watching movies late at night.
	DTS	Digital Theater System: Sound system as for movie theaters developed by US Digital Theater Systems, Inc. The number of channels provided by DTS is the same for Dolby AC3.
	DVD	Digital Versatile Disc. A huge amount of digital data for video (movie) and audio can be recorded on this disc, whose size is the same as CD.
	DVD-Audio	One type of DVD standard disc, on which high-quality audio can be recorded
	DVD-R	One type of DVD standard disc, to which writing once is possible (recordable type)
	DVD-RAM	One type of DVD standard disc, to which writing up to 100,000 times is possible
	DVD-RW	One type of DVD standard disc, to which writing up to 1000 times is possible
	DVD-Video	One type of DVD standard disc, on which high-quality video and audio can be recorded
	DVD Video Format	Video recording/playback standard that applies to DVD-Video, DVD-R and DVD-RW
	DVD Video Recording Format	Video recording/playback standard that applies to DVD-RAM and DVD-RW: This allows versatile editing functions, differing from the DVD Video Format.
I	I/P/B	DVD recorders normally use data that is common between images, and individually record different data for each image. I-picture: Images recorded independently for the reference of commonly used data. P-picture: Images created from past I-picture or P-picture B-picture: Images created from both I and P pictures, which interact between both types Since I-picture delivers the highest image quality, selecting I-picture is recommended when adjusting image quality.

Index	Abbreviation/Term	Explanation
J	JPEG	Joint Photographic Expert Group: International standard format for compressing still images.
M	MPEG	Moving Picture Experts Group: Standard related to compression of digital video and audio. MPEG2 is a higher standard of MPEG and is applied to video (movie) requiring higher quality.
	MPEG Audio Layer 2	One of three audio compression standards (layers 1-3) defined by MPEG
	MP3	MPEG1 Audio Layer-3: Audio data digital compression technology.
O	Optical digital audio output	Audio is usually converted to an electrical signal and transmitted from DVD to a device such as amp: When audio is converted to a digital signal, this optical digital audio output can be transmitted on optical fiber.
P	Pan & Scan/ Letterbox	Most DVD videos are produced assuming that they will be displayed on wide TV screen (aspect ratio of 16:9): If they are displayed on TV screens with 4:3 aspect ratio, 16:9 images will not quite fit on 4:3 screens. There are two ways of displaying 16:9 images on 4:3 TV: · Pan & Scan: Cuts out the left and right ends of images and displays them on whole screen. · Letterbox: Reproduces 16:9 images on 4:3 screens with black bands across the top and bottom of screen.
	Playback Control (PBC)	One format to play Video CD: User can select desired screens and data while watching the displayed menu screen.
	Progressive playback function	This function converts interlaced images to non-interlaced images and displays them. It can play back 24-frame/second images included in DVD movie software, etc.
S	S-Video Output	The video signal is separated into chrominance (C) and luminance (L) signals and transmitted to TV: This delivers clearer images.
	Sampling Frequency	Sampling slices audio waves (analog signal) at a specified time interval, and digitizes the levels of the sliced waves. The slicing number per second is referred to as the sampling frequency: The higher the number, the closer the sound to the original.
	SDMI	Secure Digital Music Initiative: This conference was established by hardware makers, the Recording Industry Association of America (RIAA) and music industry companies, to protect copyrights of musical compositions.
T	Tracking	To make adjustment for clearer playback image, by reducing noise that appears on screen during videotape playback.
V	Virtual surround	This technology localizes sound at any position using only two front speakers, by subjecting the L and R signals to matrix operation. It uses the four transfer functions from L/R speakers located at specified positions to both ears of listener located in a specified position, taking into account the shape of head and the effect of earlobes, and the two transfer functions from any position to both ears.
W	WMA	Windows Media Audio: Codec that was developed by Microsoft Corporation in USA.

3 Details of Servicing and Troubleshooting

3-1 Details of Servicing

3-1-1 Removing Disc from Faulty Recorder

If disc cannot be removed due to fault, disassemble the recorder and remove the disc by the following procedure:

1) Remove the top cover.
   [See 4-2 (1) for removal procedure.]
2) Remove the front panel.
   [See 4-2 (2) for removal procedure.]
3) Push the white component portion under the disc tray strongly, and the tray will come slightly forward.
   Remove the disc tray in the direction of arrow B. Perform this work carefully, making sure that the disc is not scratched.

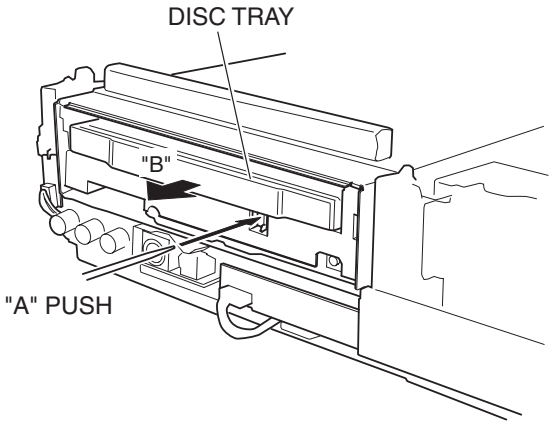


Fig. 3-1-1 Removing Disc

3-1-2 Removing Video Cassette from Faulty Recorder

If video cassette cannot be removed due to fault, disassemble the recorder and remove the video cassette by the following procedure:

1) Remove the top cover. [See 4-2 (1) for removal procedure.]
2) Remove the front panel. [See 4-2 (2) for removal procedure.]
3) Remove the deck mechanism. [See 4-2 (5) for removal procedure.]
4) Turn the worm gear of L/D motor assembly in the direction of arrow A: Unloading will start. When the tape starts to slacken, turn the D37 clutch assembly on the front of deck mechanism in the direction of arrow B to remove the slack tape.
5) When unloading is complete, the deck mechanism will begin EJECT operation: Completely turn the worm gear of L/D motor assembly in the direction of arrow A.

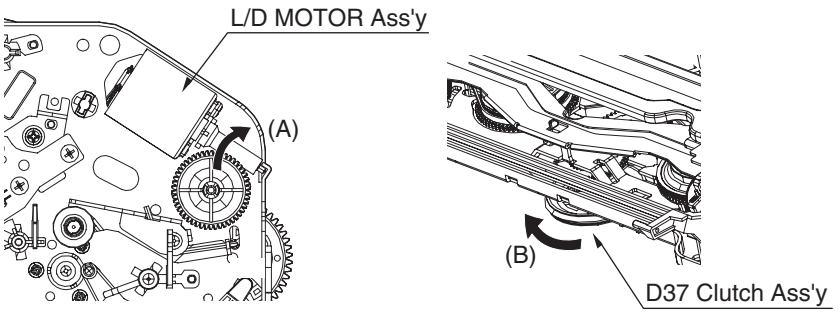


Fig. 3-1-2 Removing Video Cassette

3-1-3 Firmware

The firmware is occasionally updated to improve performance.
Check whether a customer complaint can be solved by updating of firmware: If the complaint can be solved, update the firmware.

Information:

1) If any corrections in firmware are made at the factory, information on how to obtain the firmware data and create a disc containing upgraded firmware will be reported in technical bulletin, etc.
2) The main and drive firmware programs in this DVD recorder can be written to one CD-R and updated at the same time. It is also possible to write one firmware program to a CD-R and update it individually. Note that some parts of on-screen display will be different depending on the contents to be written to CD-R.

(1) Version check procedure

1) With the recorder turned on, make sure that no disc or tape is inserted.
2) Connect a monitor TV to the video output terminals on this DVD recorder.
3) Simultaneously hold down the REC ● and PLAY ▶ buttons on the front of this DVD recorder for approx. 10 seconds.
4) The firmware version screen will appear on the monitor TV.
5) Turn the recorder off to switch off the display.

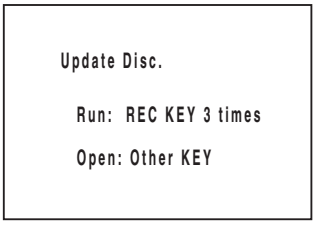


Fig. 3-1-3

(2) Main/drive firmware simultaneous updating procedure

1) Write the main firmware data and drive firmware data to a CD-R.
2) Insert the firmware disc: The screen for verifying update will appear (Fig. 3-1-3).
3) Press the REC ● button on this DVD recorder three times: The Firmware Update screen will appear (Fig. 3-1-4).
4) Use the cursor buttons on remote control to choose “ALL”, and then press the ENTER ◉ button.
5) The current version of drive firmware and the version of firmware on the disc will both appear on the screen. Pressing the REC ● button on this DVD recorder will start writing (Fig. 3-1-5).
   To cancel writing, press the OPEN/CLOSE ⏏ button and remove the disc.
6) The main firmware version will then appear on the screen. Pressing the REC ● button on this DVD recorder will start writing (Fig. 3-1-6).
   To cancel writing, press the OPEN/CLOSE ⏏ button and remove the disc.
7) When updating is complete, the tray will open automatically: Remove the disc.
8) Turn the DVD recorder off and then on: The firmware is now updated.

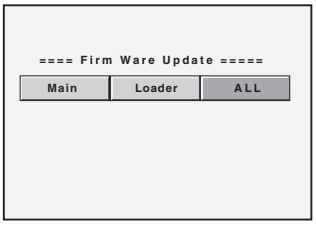


Fig. 3-1-4

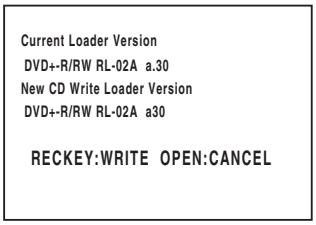


Fig. 3-1-5

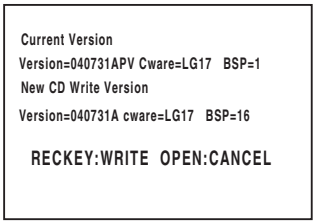


Fig. 3-1-6

(3) Main firmware updating procedure

1) Write the main firmware data to a CD-R.
2) Insert the firmware disc: The screen for verifying update will appear (Fig. 3-1-7).
3) Press the REC ● button on this DVD recorder three times: Both the current version of main firmware and the version of main firmware on the disc will appear on the screen (Fig. 3-1-8).
4) Pressing the REC ● button on this DVD recorder will start writing (Fig. 3-1-8).
   To cancel writing, press the OPEN/CLOSE ⏏ button and remove the disc.
5) When updating is complete, the tray will open automatically: Remove the disc.
6) Turn the DVD recorder off and then on: The firmware is now updated.

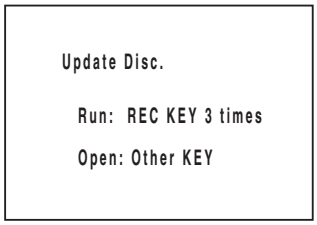


Fig. 3-1-7

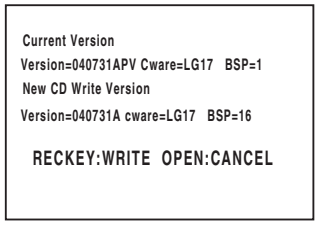


Fig. 3-1-8

(4) Drive firmware updating procedure

1) Write the drive firmware data to a CD-R.
2) Insert the firmware disc: The screen for verifying update will appear (Fig. 3-1-7).
3) Press the REC ● button on this DVD recorder three times: The data on disc will be read, the Firmware Update screen will appear, and the drive firmware version along with the version of drive firmware on the disc, will appear on the screen (Fig. 3-1-9).
   When reading the data on disc is complete, the disc tray will open automatically: Remove the disc.
4) Press the REC ● button on this DVD recorder.
   To cancel writing, press the OPEN/CLOSE ⏏ button.
5) Turn the DVD recorder off and then on: The firmware is now updated.

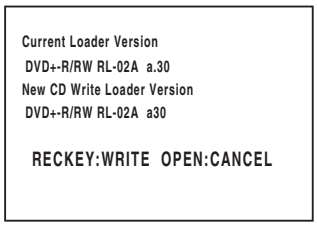


Fig. 3-1-9

3-1-4 Setting to defaults at the factory

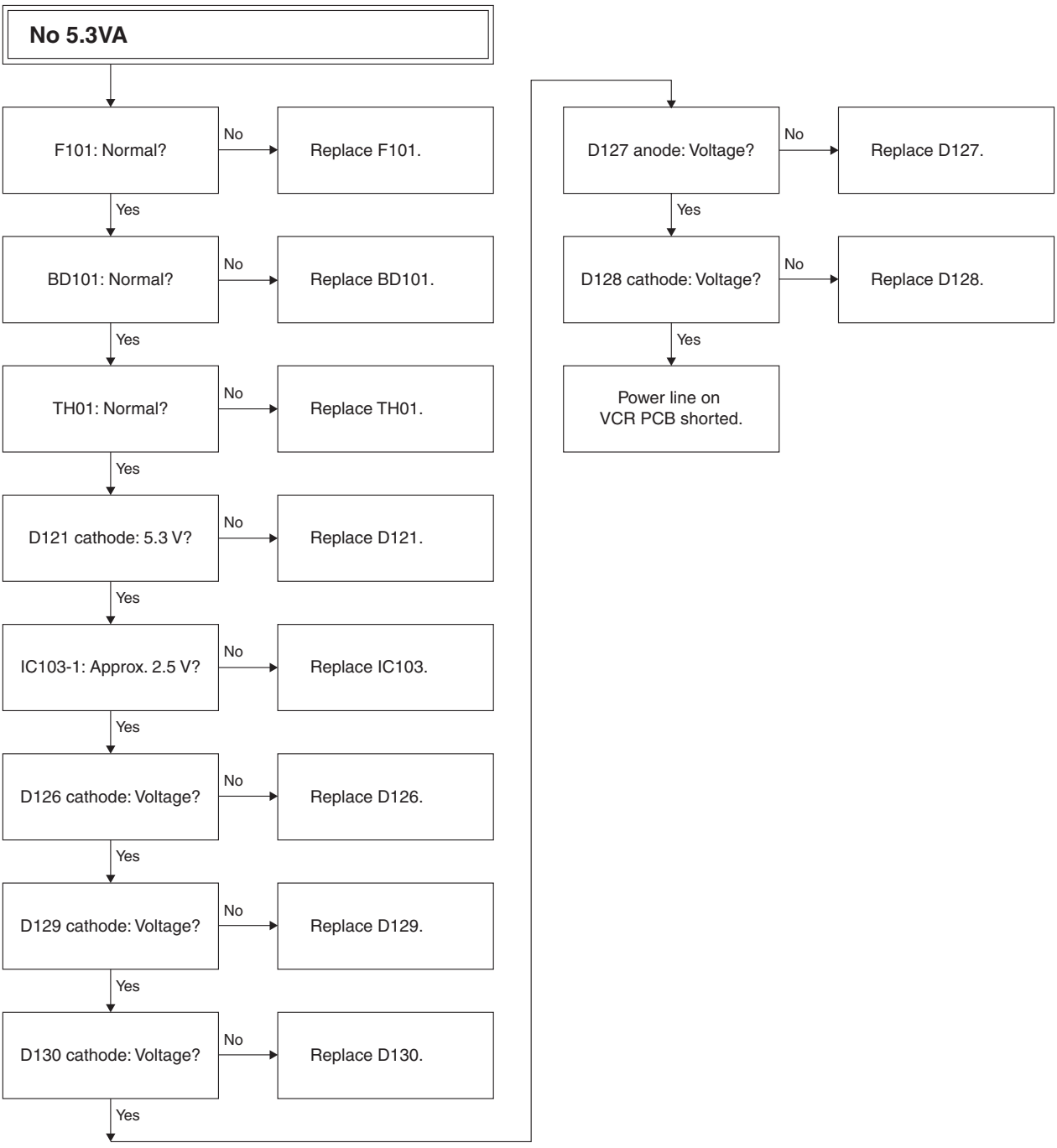
Perform the following procedure to reset this DVD recorder to the initial status when it was shipped from the factory (defaults):

1) Press the SETUP button on remote control and use the cursor ▲▼ buttons to choose the GENERAL menu.
2) Press the cursor ▶ button to move to the second level.
3) Use the cursor ▲▼ buttons to choose “Factory Set”, choose the SET icon, and then press the ENTER ◉ button.

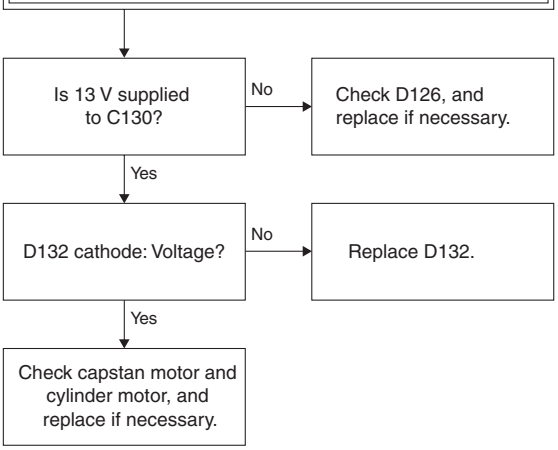
3-2 Troubleshooting

3-2-1 Troubleshooting electronic system

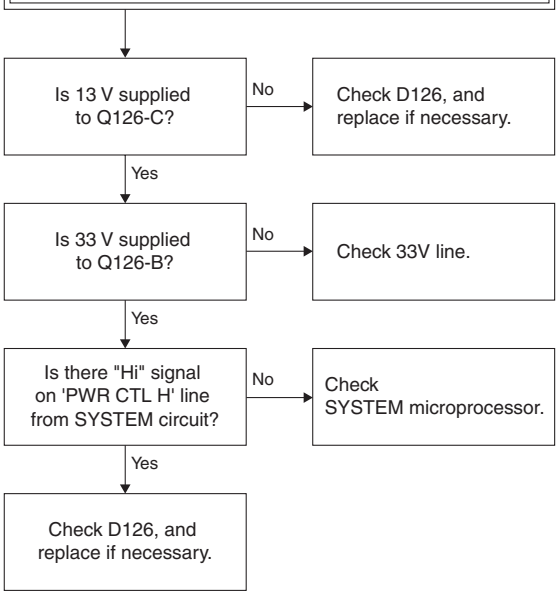
(1) SMPS Circuit



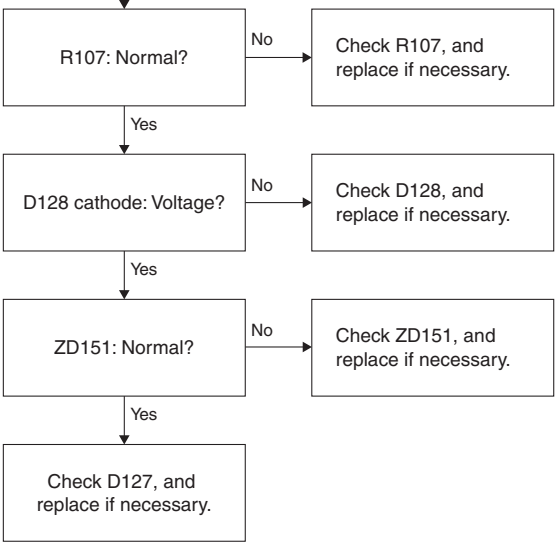
No 12VA (power supply of capstan/cylinder motors)



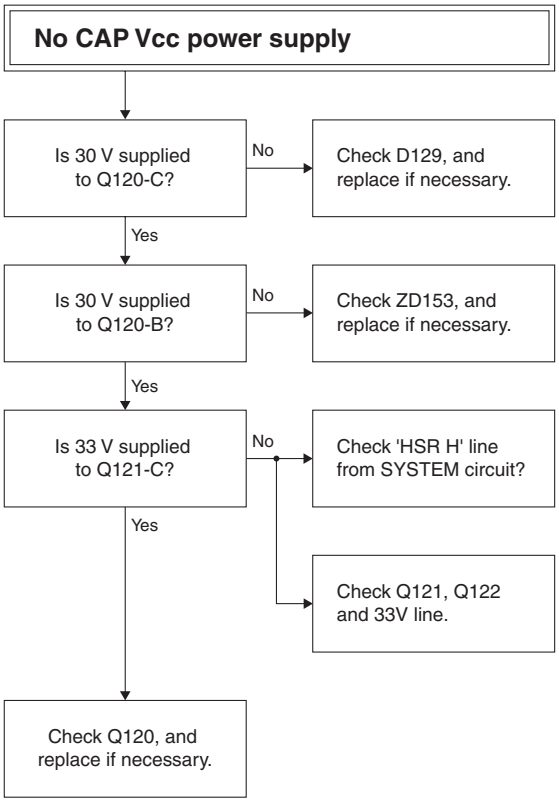
No REG12V



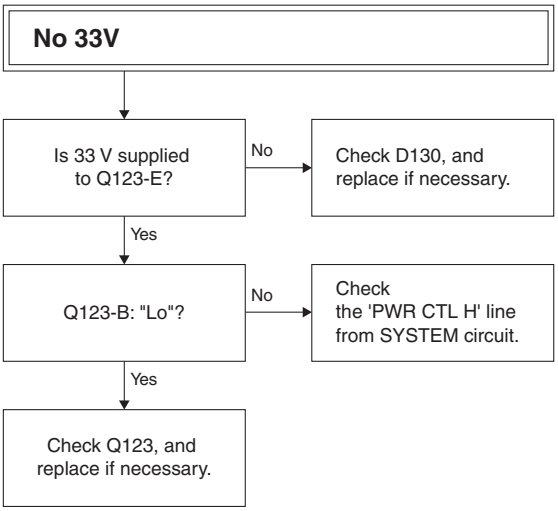
FL display does not light.



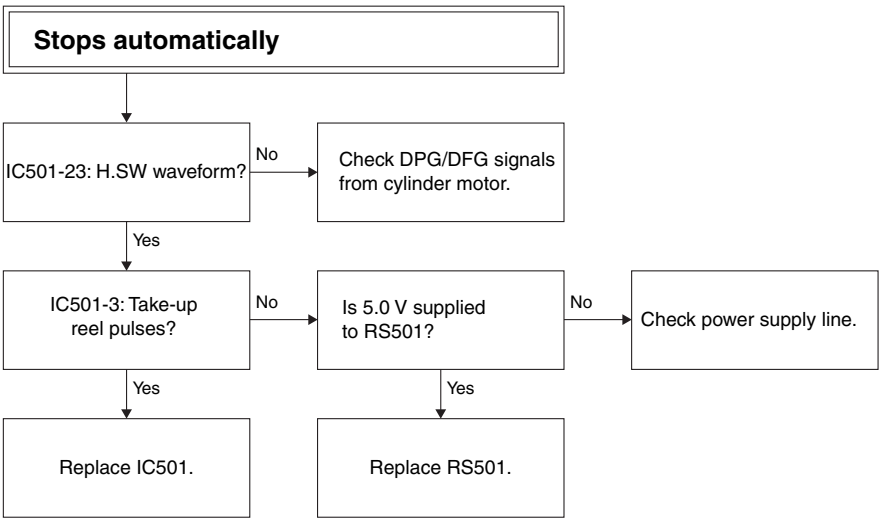
No CAP Vcc power supply



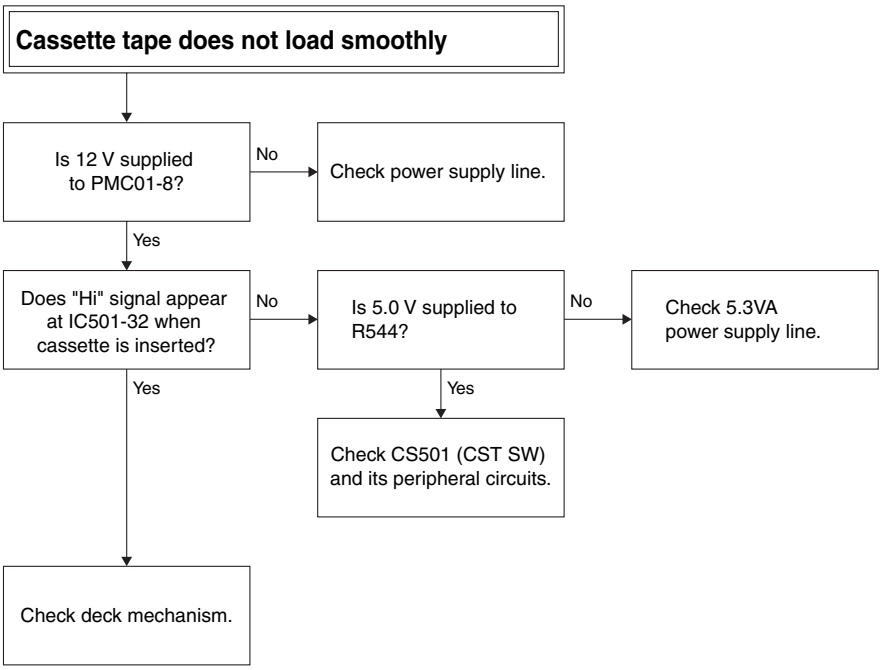
No 33V

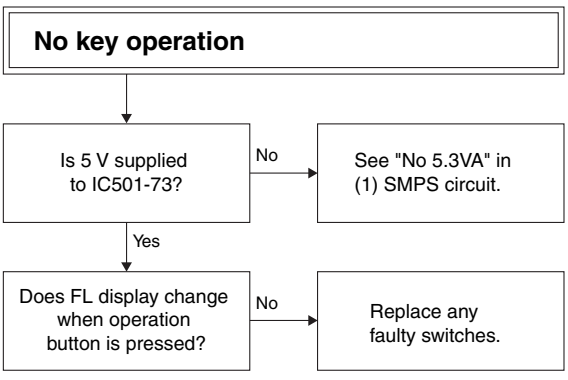


(2) SYSTEM Circuit

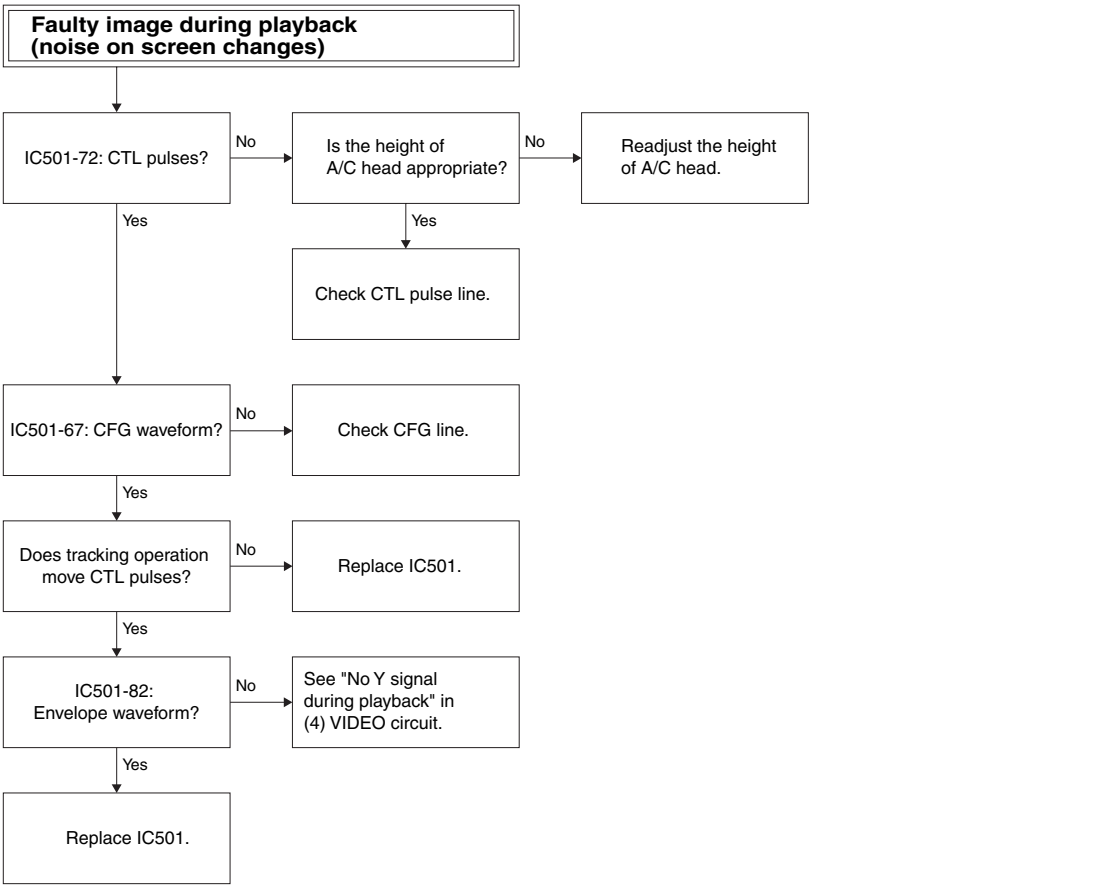


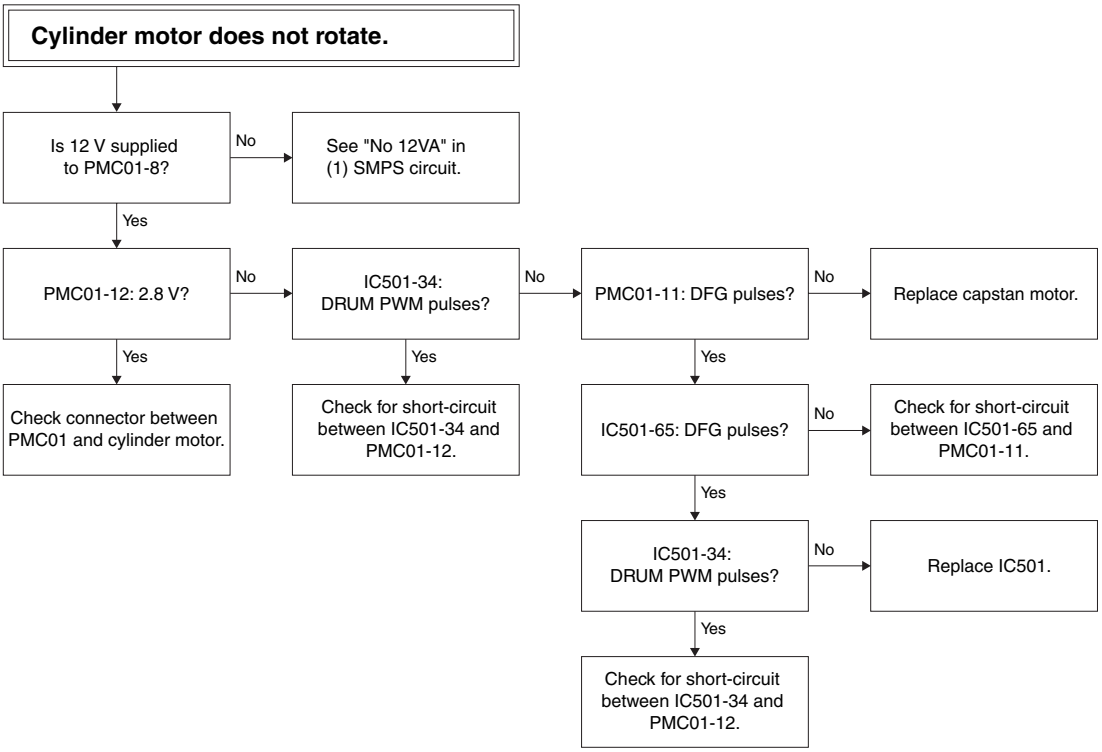
Supplement: Automatic stop may occur when grease or oil in the mechanism block has dried up.

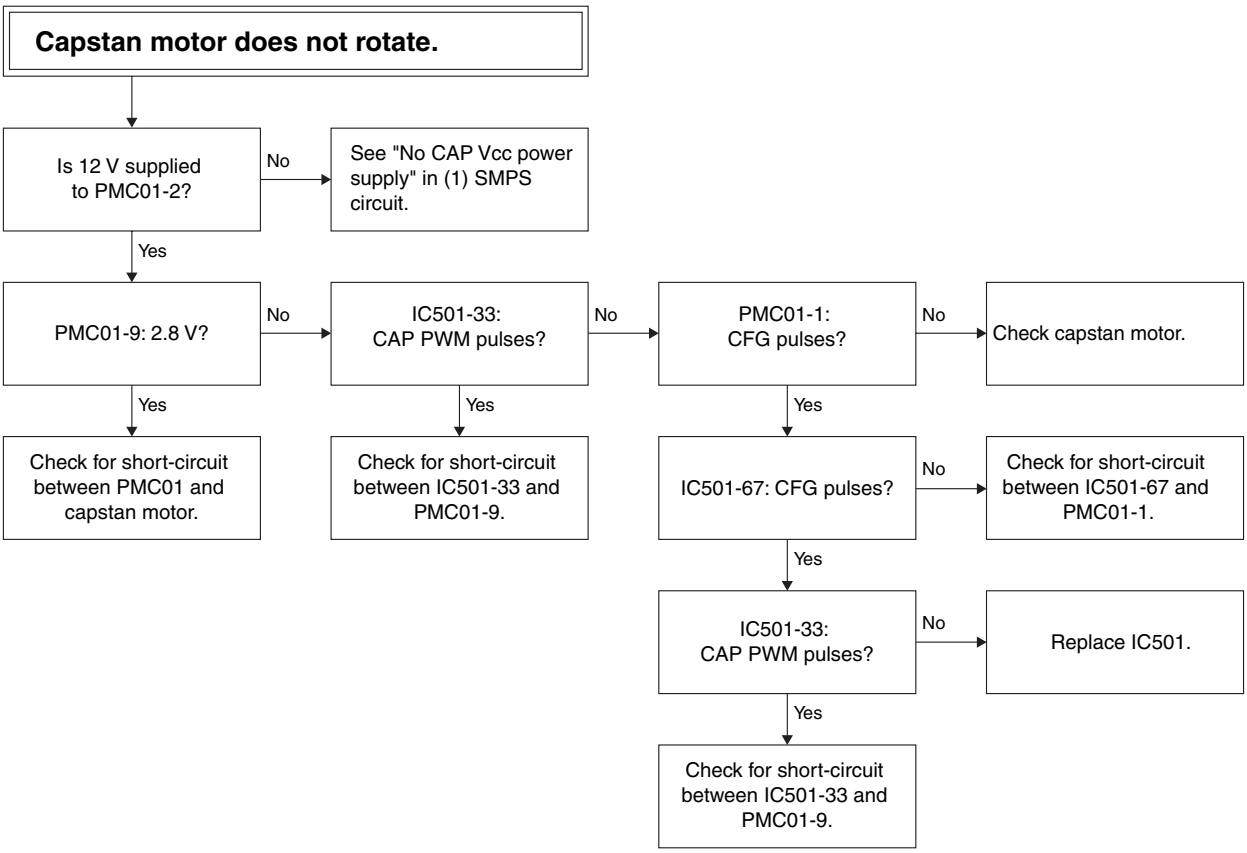




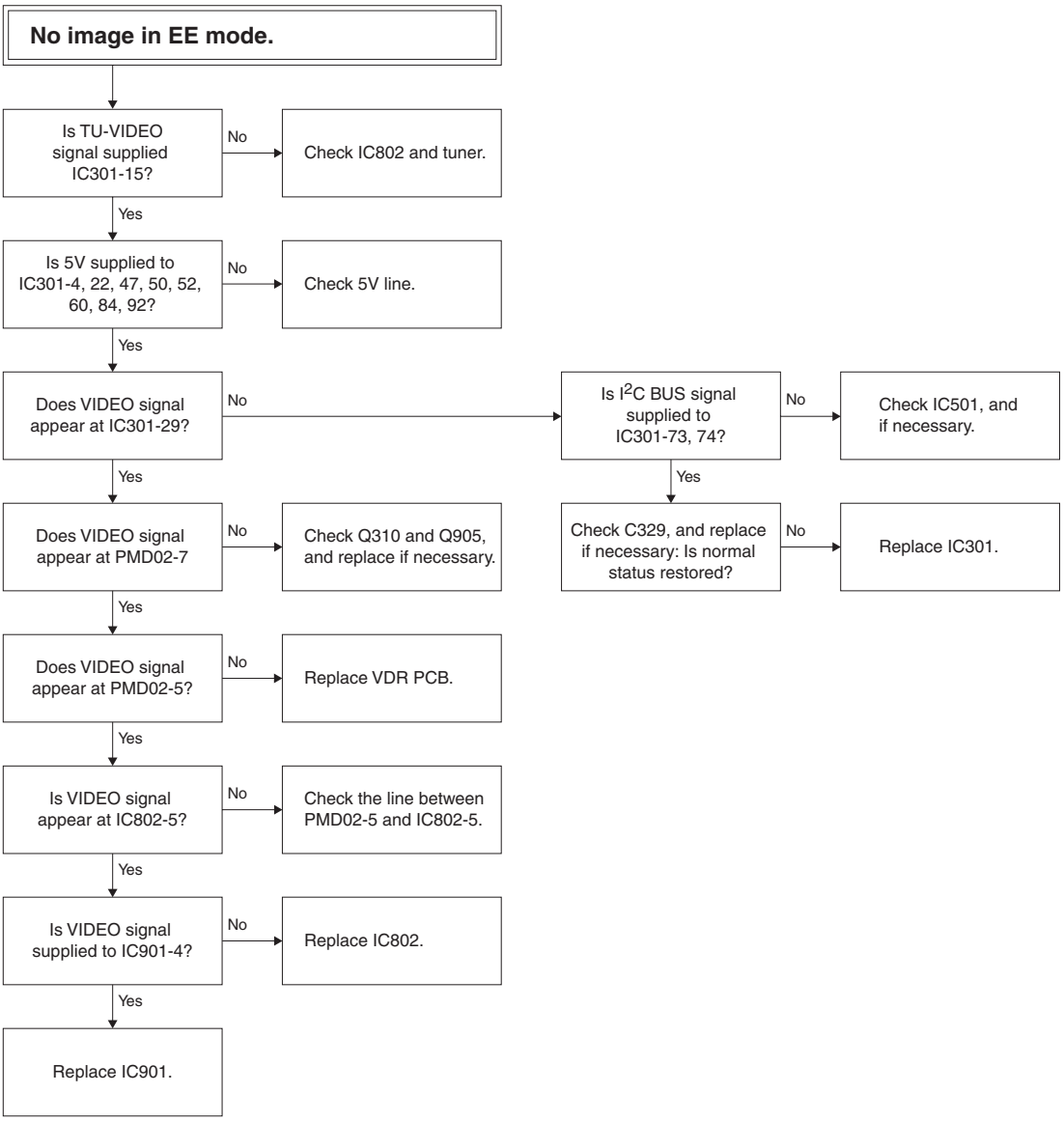
(3) Servo circuit



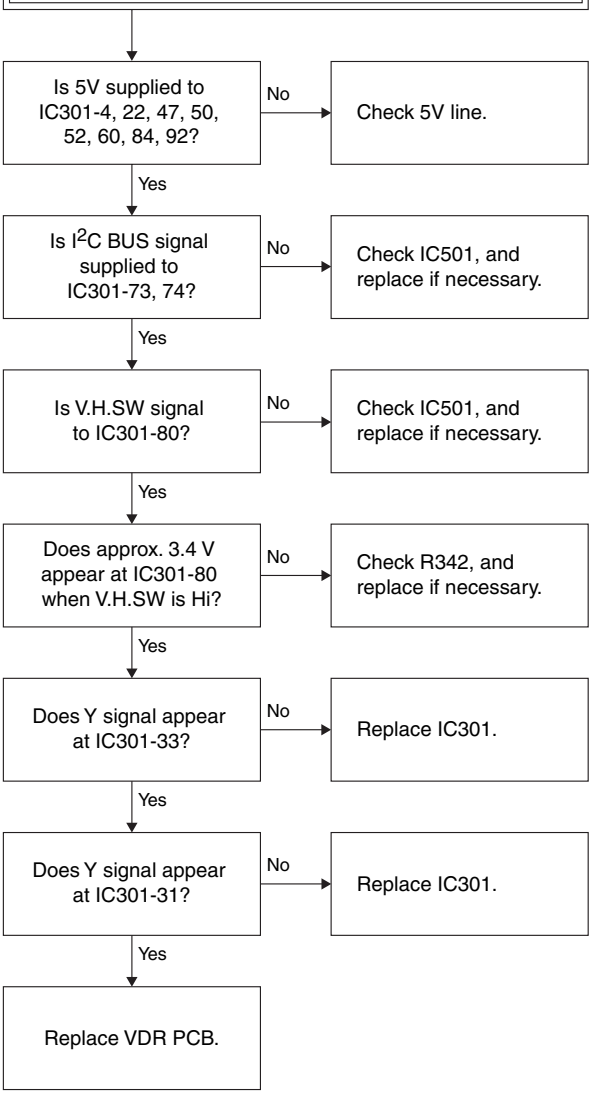



Capstan motor does not rotate.
Is 12 V supplied to PMC01-2?
No
See "No CAP Vcc power supply" in (1) SMPS circuit.
Yes
PMC01-9: 2.8 V?
No
IC501-33: CAP PWM pulses?
No
PMC01-1: CFG pulses?
No
Check capstan motor.
Yes
Yes
Yes
Check for short-circuit between PMC01 and capstan motor.
Check for short-circuit between IC501-33 and PMC01-9.
IC501-67: CFG pulses?
No
Check for short-circuit between IC501-67 and PMC01-1.
Yes
IC501-33: CAP PWM pulses?
No
Replace IC501.
Yes
Check for short-circuit between IC501-33 and PMC01-9.

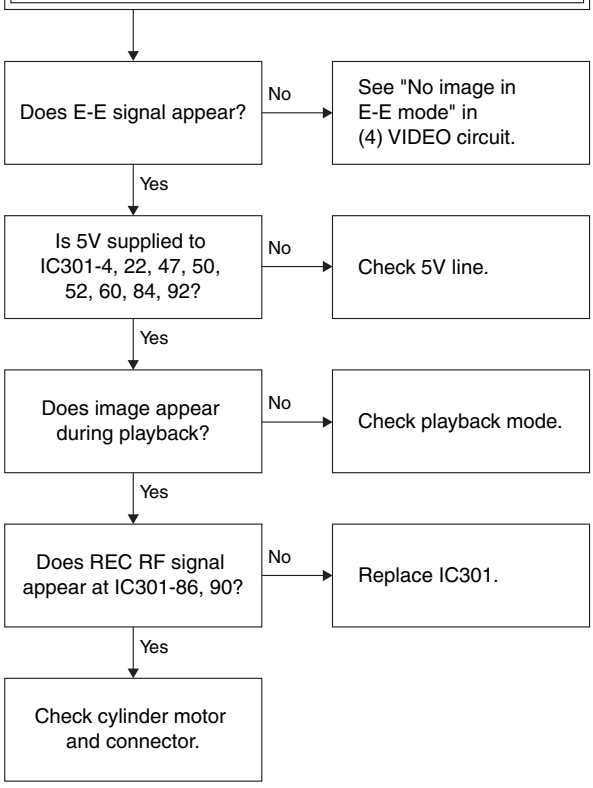
(4) VIDEO circuit



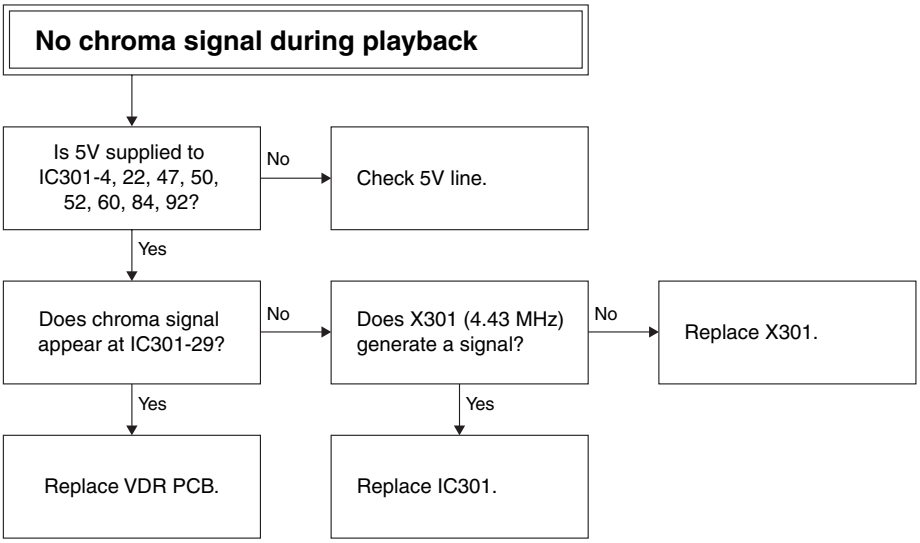
No Y signal during playback



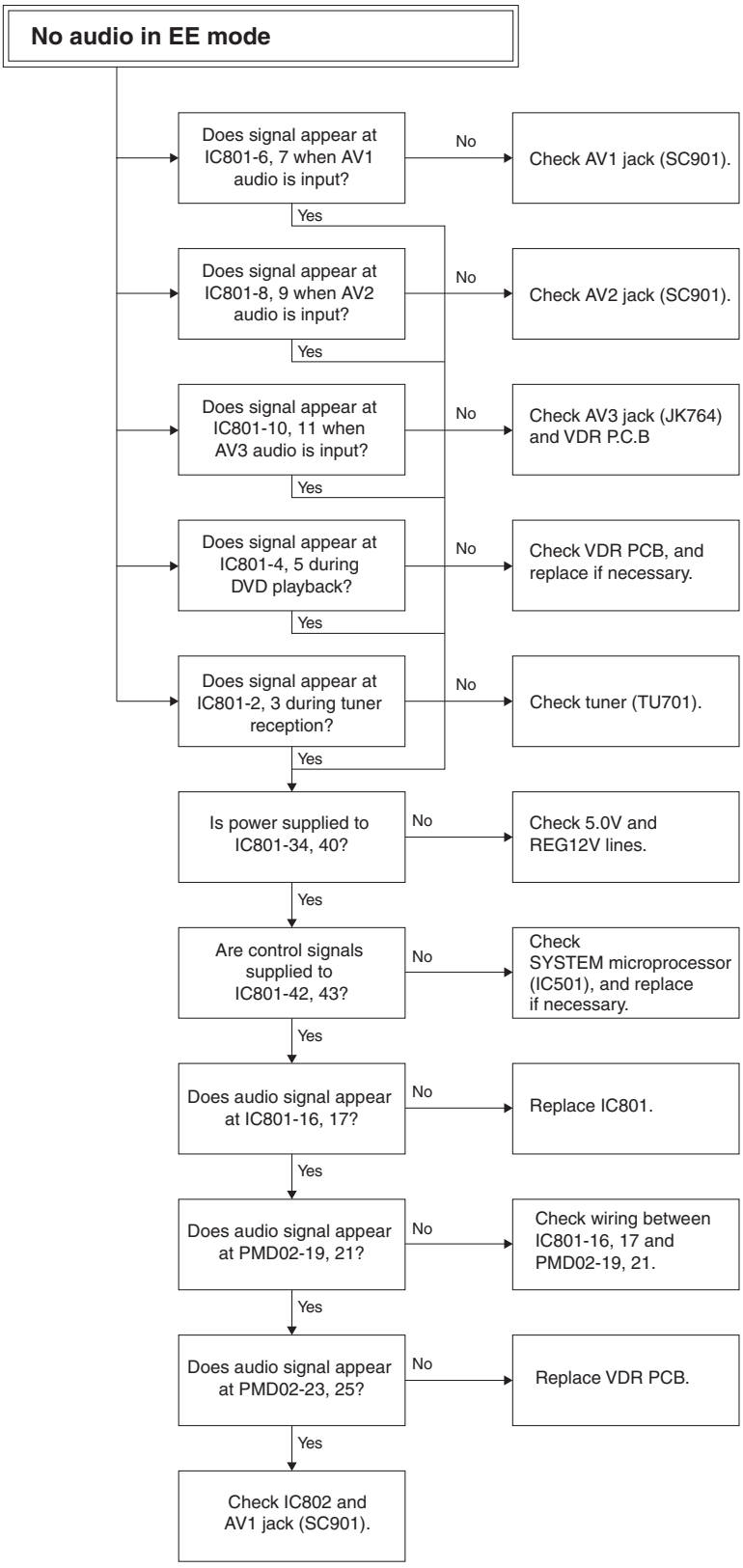
No image during recording

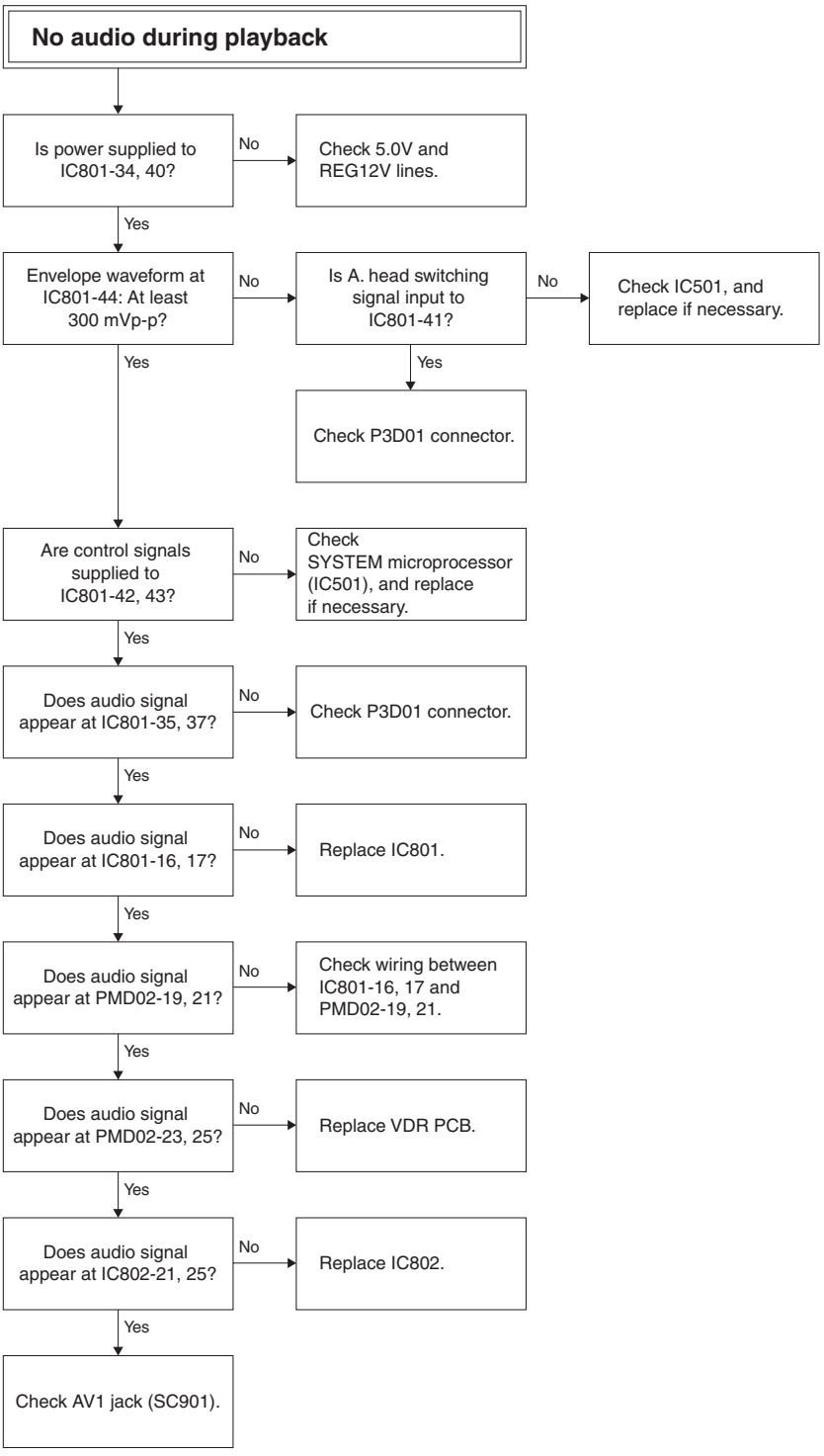


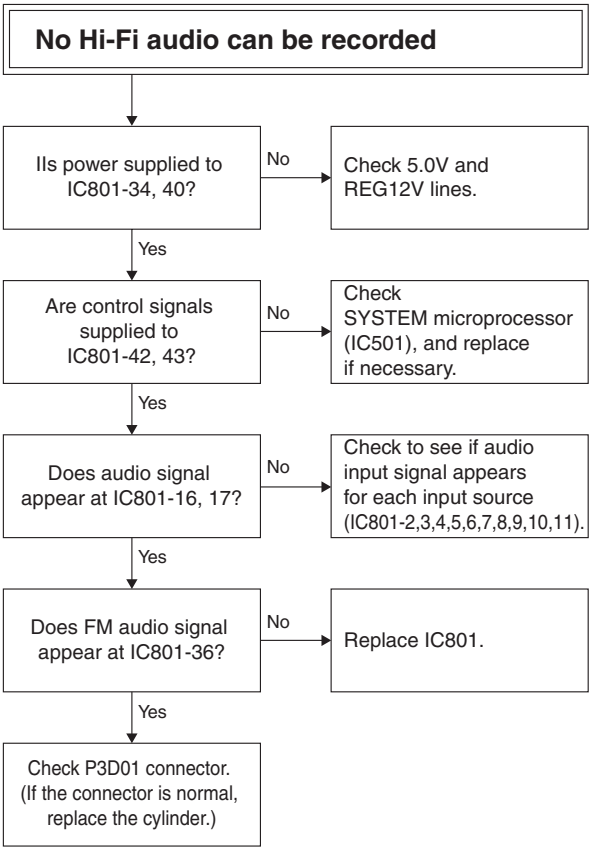
No chroma signal during playback



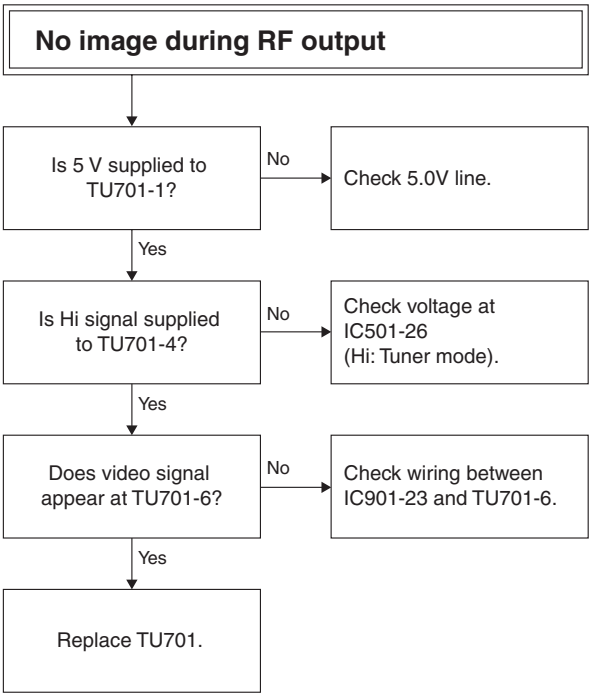
(5) AUDIO circuit




No audio during playback
Is power supplied to IC801-34, 40?
No
Check 5.0V and REG12V lines.
Yes
Envelope waveform at IC801-44: At least 300 mVp-p?
No
Is A. head switching signal input to IC801-41?
No
Check IC501, and replace if necessary.
Yes
Yes
Check P3D01 connector.
Are control signals supplied to IC801-42, 43?
No
Check SYSTEM microprocessor (IC501), and replace if necessary.
Yes
Does audio signal appear at IC801-35, 37?
No
Check P3D01 connector.
Yes
Does audio signal appear at IC801-16, 17?
No
Replace IC801.
Yes
Does audio signal appear at PMD02-19, 21?
No
Check wiring between IC801-16, 17 and PMD02-19, 21.
Yes
Does audio signal appear at PMD02-23, 25?
No
Replace VDR PCB.
Yes
Does audio signal appear at IC802-21, 25?
No
Replace IC802.
Yes
Check AV1 jack (SC901).

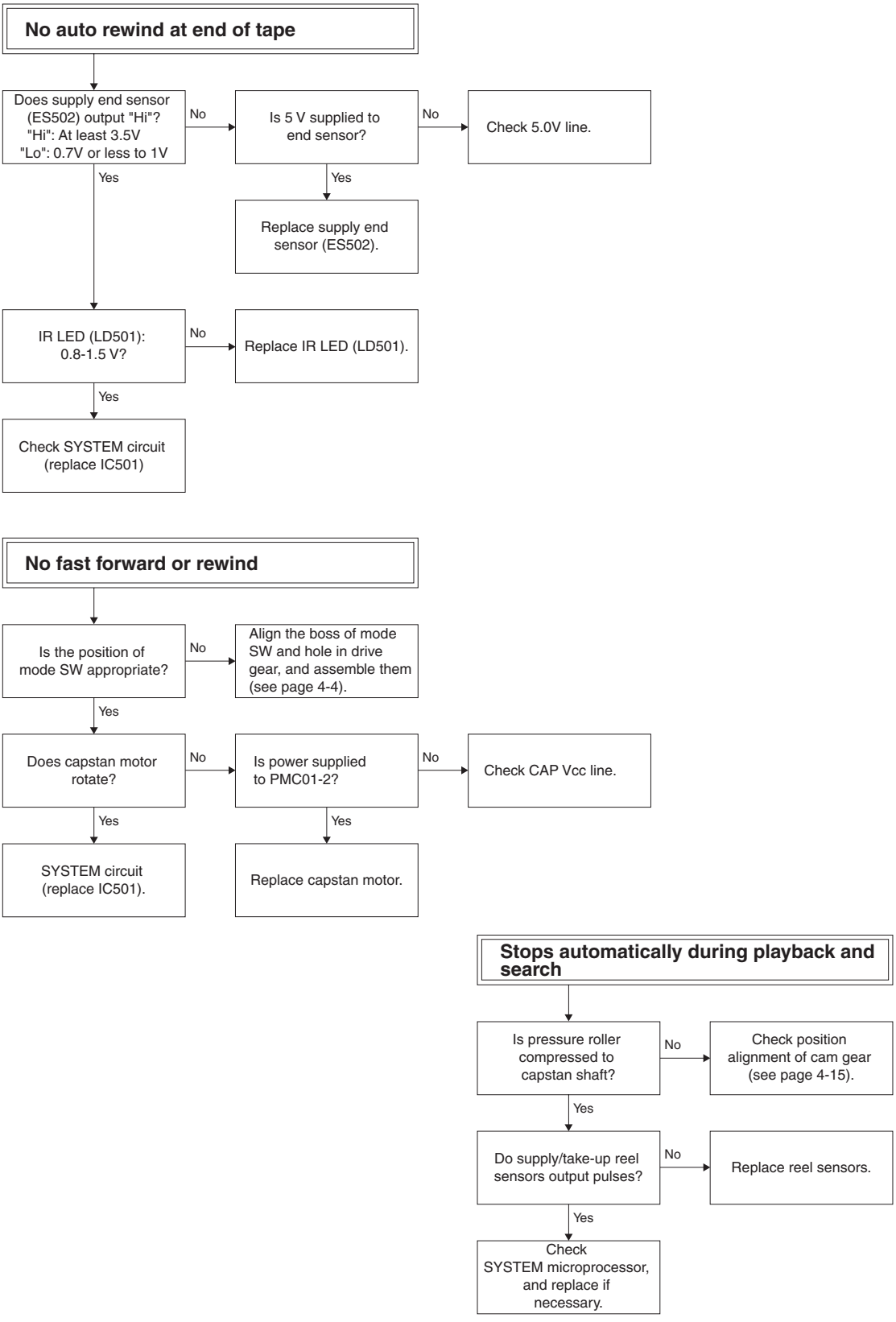


(6) TUNER circuit



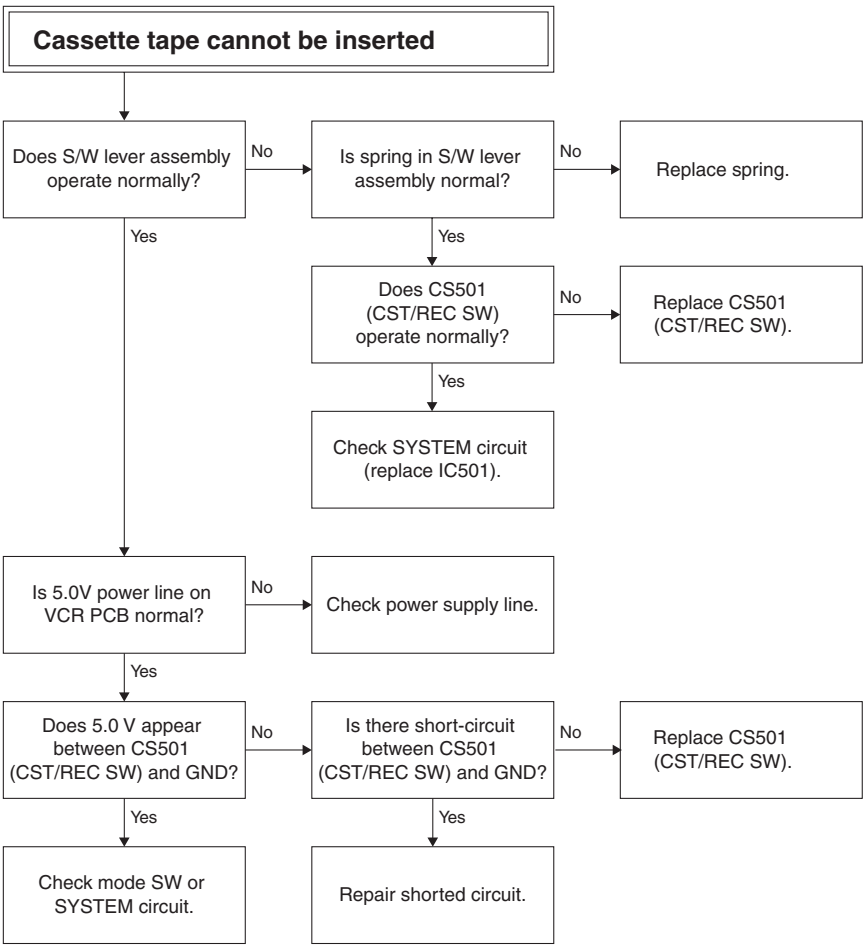
3-2-2 Troubleshooting mechanical block

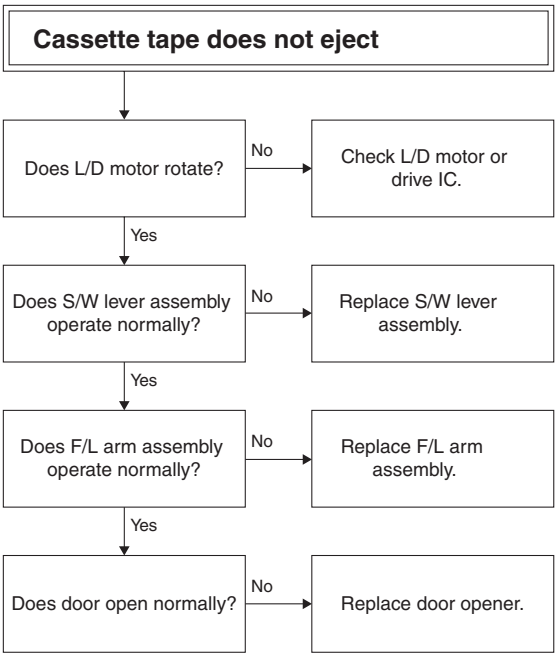
(1) Deck mechanism




Tape transport system faulty during playback
Is pressure roller compressed to capstan shaft?
No
Check position alignment of cam gear (see page 4-15).
Yes
Does take-up reel rotate?
No
Is capstan belt normal?
No
Replace capstan belt.
Yes
Yes
Check D37 clutch assembly.
Does capstan motor rotate?
No
Is power supplied to PMC01-2?
No
Check CAP Vcc line.
Yes
Yes
Replace capstan motor.
Does cylinder motor rotate?
No
Is power supplied to PMC01-8?
No
Check 13.5VA (DRUM) line.
Yes
Yes
PMC01-11: DPG/DFG pulses?
Replace cylinder motor.
Yes
Check SYSTEM circuit.
Cassette tape cannot be inserted
Insert a cassette tape.
Does S/W lever assembly operate normally?
No
Check CST holder assembly.
Yes
Check output level of CS501 (CST/REC SW):
• Tape with record prevention tab ("L"->"H"->"L")
• Tape without record prevention tab ("L"->"H"->"L"->"H")
No
Replace CS501 (CST/REC SW).
Yes
Check SYSTEM circuit (replace IC501).

(2) Front loading mechanism





4 Disassembly and Reassembly

4-1 Order of Disassembly

Refer to the Disassembly Flowchart in Fig. 4-1-1 for the order of removing components. When reassembling components, use the reverse order to removal unless otherwise specified.

Reading Disassembly Flowchart:

After locating the target component in the flowchart, remove all components of the target in sequence, following the arrows (routes) from the top of flowchart. If multiple routes exist to the target component from the top of flowchart, remove all the components on all the routes.

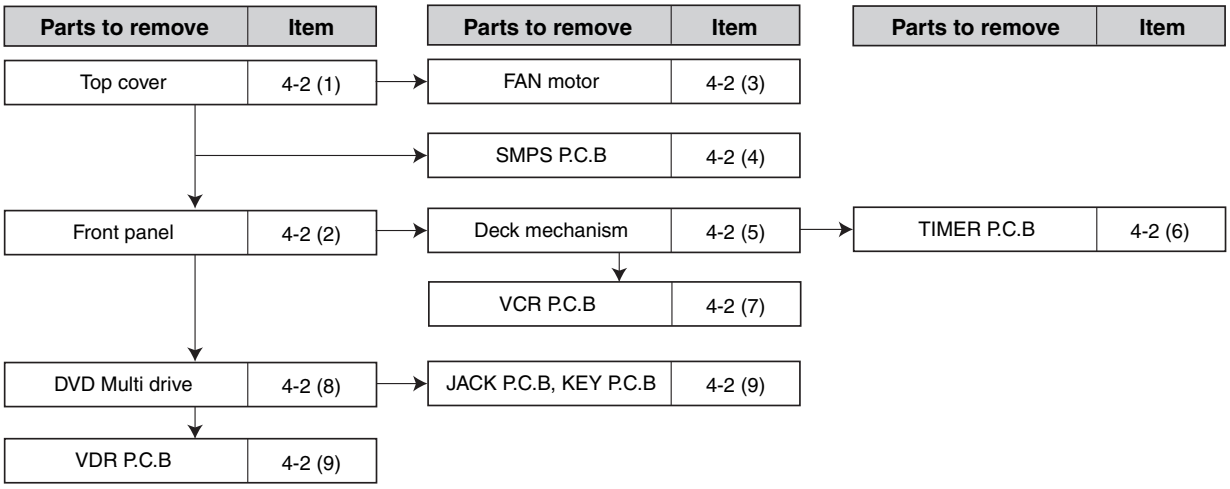


Fig. 4-1-1 Disassembly Flowchart

4-2 Cabinet Disassembly

Information:

Numbers in figures are step numbers in disassembly procedure, and letters in brackets [ ] show the types of screw.

(1) Top Cover

1) Remove the seven screws [A].

2) Slightly open both ends on the front side of top cover and lift the top cover in the direction of the arrow.

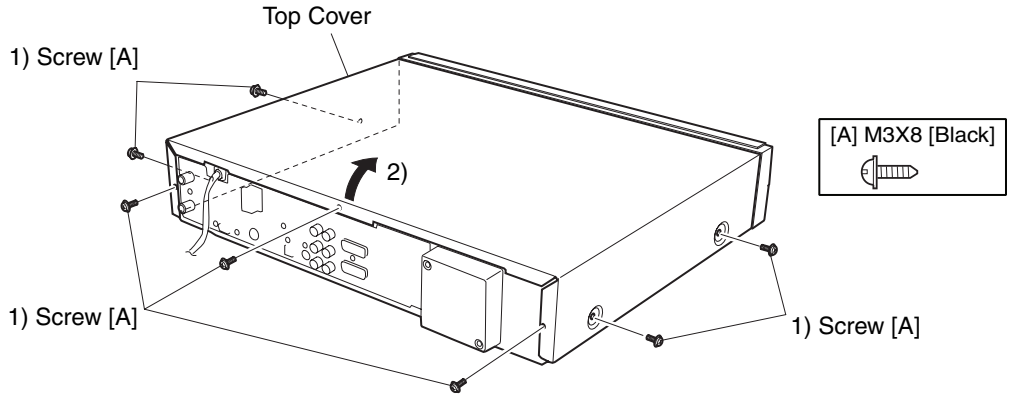


Fig. 4-2-1 Top cover

(2) Front Panel

1) Release three tabs (A), two tabs (B) and two tabs (C) in this order. (The tab (A) and the tab (C) should be released at the same time, respectively.)
2) Slowly move the front panel forward to remove it.

■ Caution when reassembling front panel:

Reattach the front panel while pushing the cassette door so that the cassette door open/close lever is positioned outside the door.

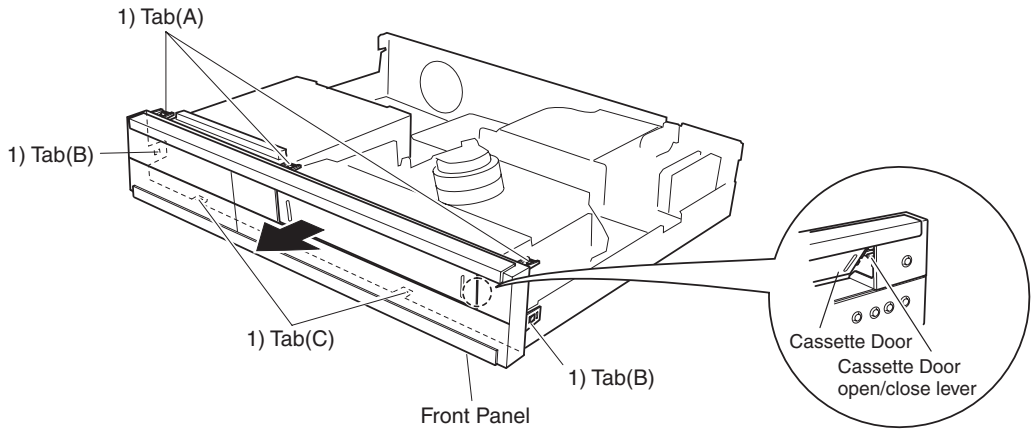


Fig. 4-2-2 Front Panel

(3) FAN Motor

1) Unplug the connector on SMPS P.C.B.
2) Remove two screws [B] from the rear panel.

■ Caution when reinstalling FAN motor:

Wind the cord of FAN motor around the cords on VDR P.C.B, as shown in the figure, to secure them.

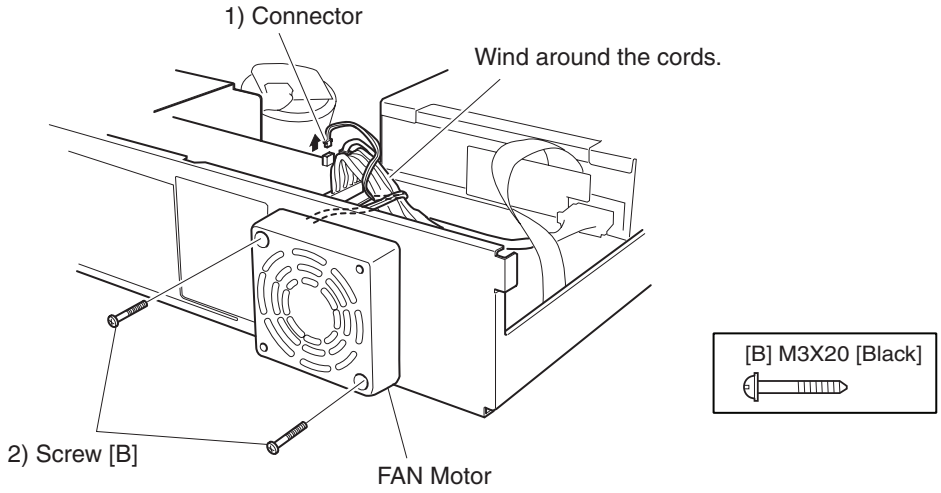


Fig. 4-2-3 FAN Motor

(4) SMPS P.C.B

1) Remove the power cable form rear panel.
2) Unplug the five connectors on SMPS P.C.B.
3) Remove screw [C] on rear panel, three screws [D] and screw [E] on the SMPS P.C.B, and then lift the SMPS P.C.B block.
4) Remove four screws [F] that secure the heat sink, and then separate the SMPS P.C.B.

■ **Caution when reinstalling heat sink:**

Secure the heat sink, identified [Caution] in the figure, on the back of P.C.B, and make sure that a cushion is attached between the heat sink and P.C.B.

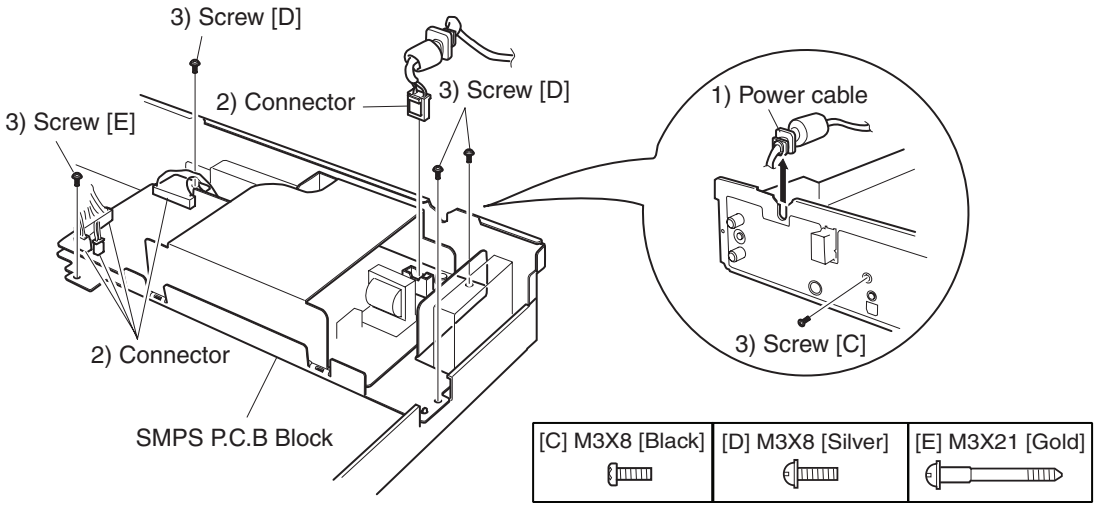


Fig. 4-2-4 SMPS P.C.B (1)

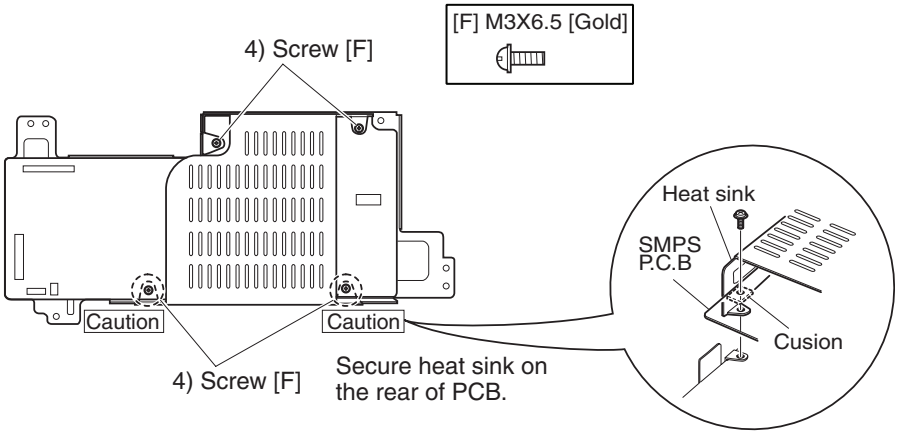


Fig. 4-2-5 SMPS P.C.B (2)

(5) Deck mechanism

1) Unplug the connector from A/C head.
2) Remove four screws [D] and two screws [E].
3) While unplugging the three direct connectors that connect the deck mechanism and VCR P.C.B, lift the entire deck mechanism straight up.

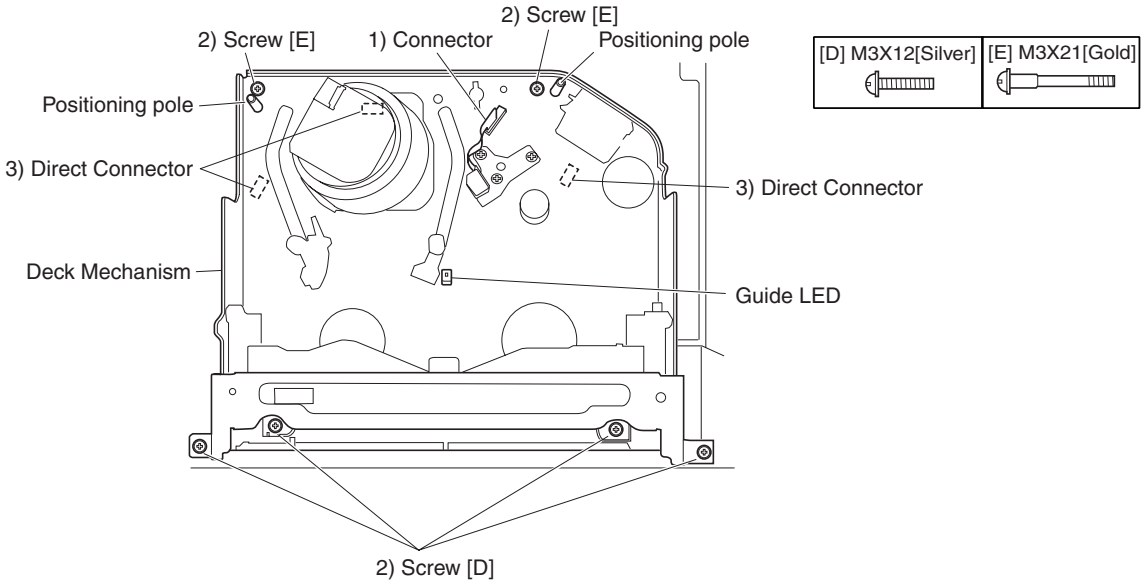


Fig. 4-2-6 Deck Mechanism

■ Caution when reinstalling deck mechanism:

Make sure of the following when reinstalling the deck mechanism:

- The mode switch (MS501) on VCR P.C.B is positioned as in the figure shown below.
- The drive gear on the back of deck mechanism is positioned as in the figure shown below.

While keeping the two positioning poles and guide LEDs aligned, assemble the deck mechanism at right angles: The boss of mode switch will fit into the hole in drive gear.

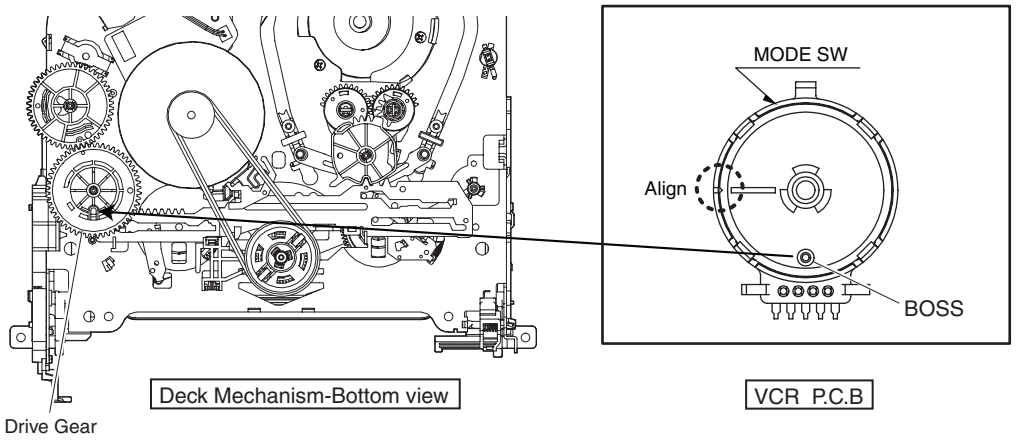


Fig. 4-2-7 Reassembling Deck Mechanism

(6) TIMER P.C.B

1) Remove the front holder.
2) Unplug the direct connectors from the VCR P.C.B.
3) Unplug the connector.

Information

Release the four stoppers of front holder: The TIMER P.C.B can be detached without removing the deck mechanism.

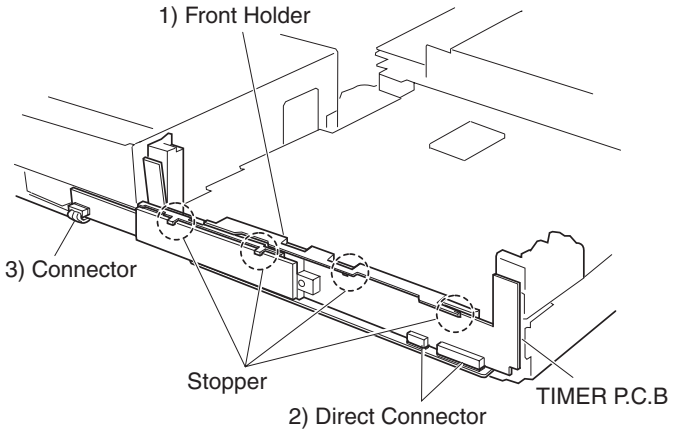


Fig. 4-2-8 TIMER P.C.B

(7) VCR P.C.B

1) Disconnect the two FFCs.
2) Remove four screws [C] from the rear panel.
3) Remove four screws [F] on the P.C.B.
4) Release the stopper.
5) Lift the entire VCR P.C.B, and then remove it in the direction of the arrow.

■ **Caution when reinstalling VCR P.C.B:**

Position the VCR P.C.B according to the positioning boss.

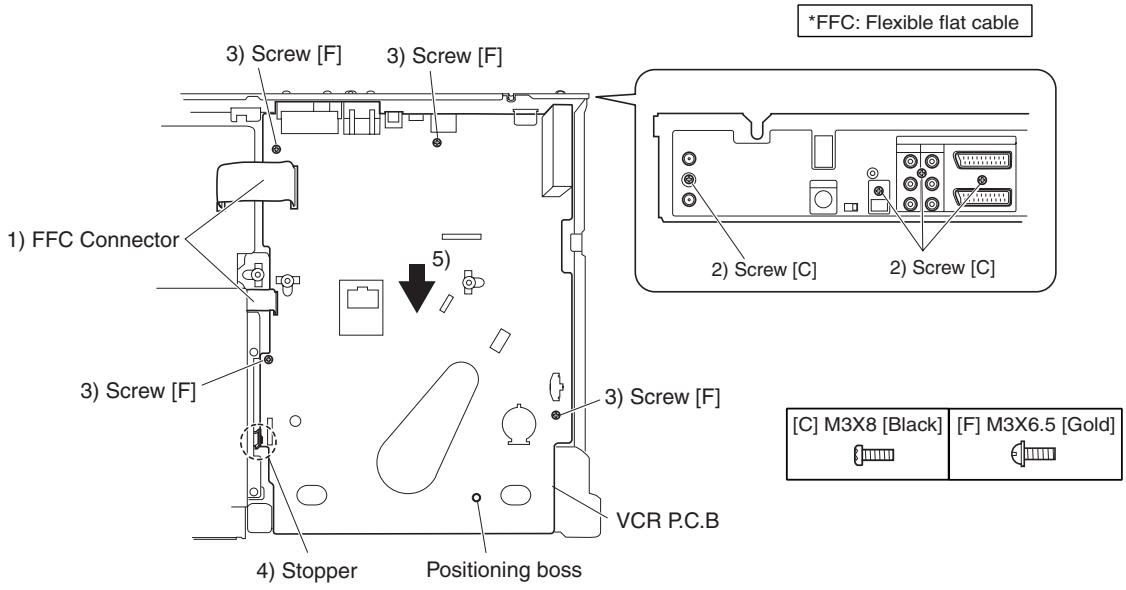


Fig. 4-2-9 VCR P.C.B

(8) DVD multi-drive

1) Unplug the connector on SMPS P.C.B.
2) Disconnect the FFC on the VDR P.C.B: Lift both sides of the connector up (a), tilt it in the direction of arrow (b) to release the stoppers, and then disconnect the FFC.
3) Remove four screws [G], and then slowly lift the DVD multi-drive.
4) Release the screws on both sides of the drive holder, and then remove the DVD multi-drive.

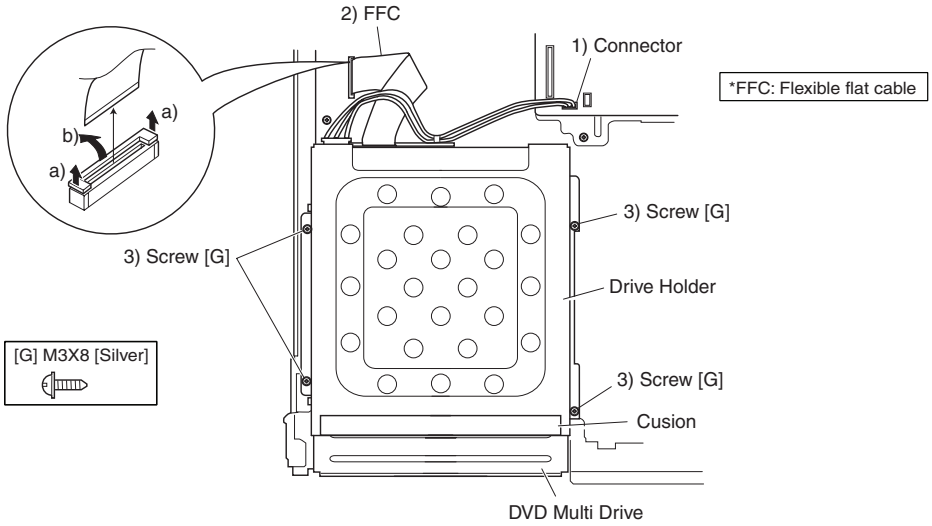


Fig. 4-2-10 DVD Multi Drive

(9) VDR, JACK and KEY P.C.Bs

■ **VDR P.C.B**

1) Unplug the connector and disconnect the two FFCs on the VDR P.C.B.
2) Remove five screws [F], and then remove the VDR P.C.B.

■ **JACK P.C.B**

3) Unplug the connector on JACK P.C.B.
4) Remove two screws [F], and then remove the JACK P.C.B.

■ **KEY P.C.B**

5) Remove screw [D], and then remove the KEY P.C.B.

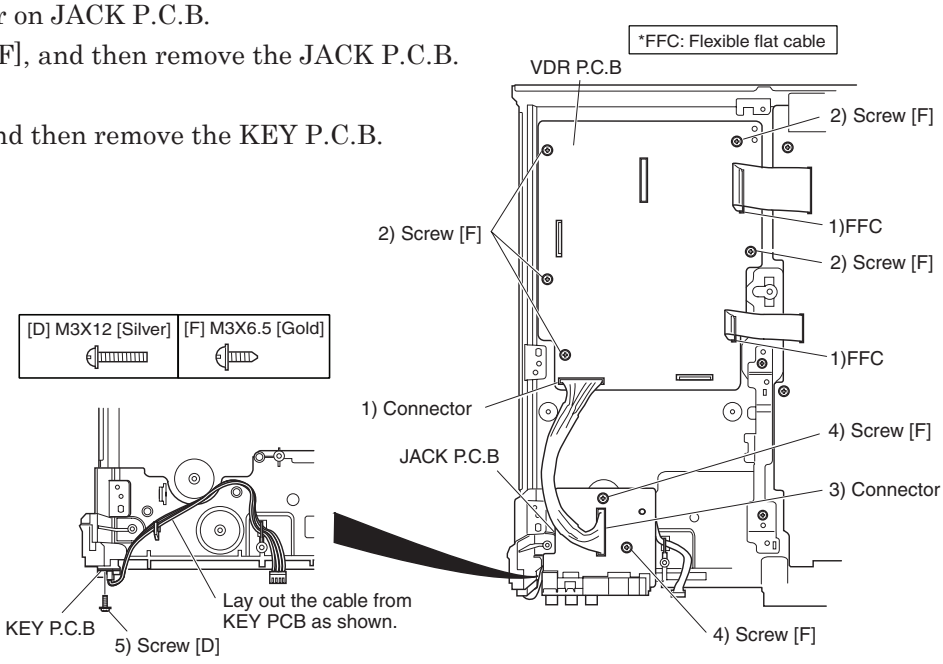


Fig. 4-2-11 VDR P.C.B, JACK P.C.B, KEY P.C.B

4-3 Deck Mechanism Parts Locations

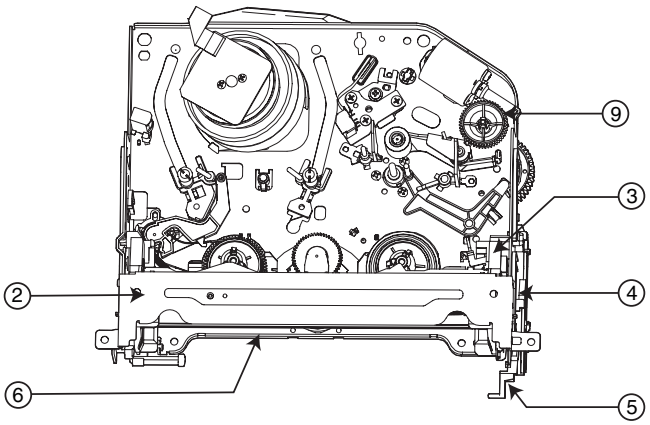


Fig. 4-3-1 Top View of Mechanism-1

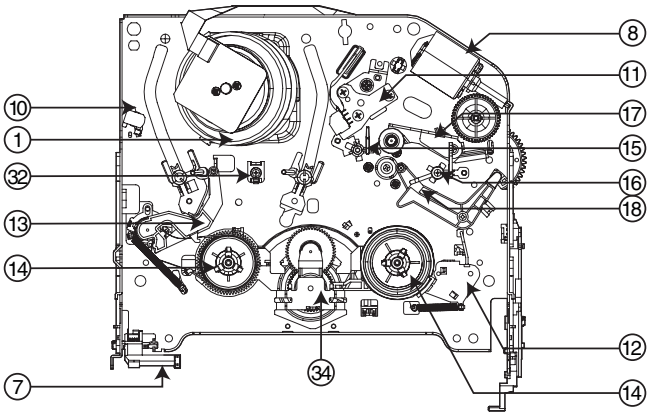


Fig. 4-3-2 Top View of Mechanism-2

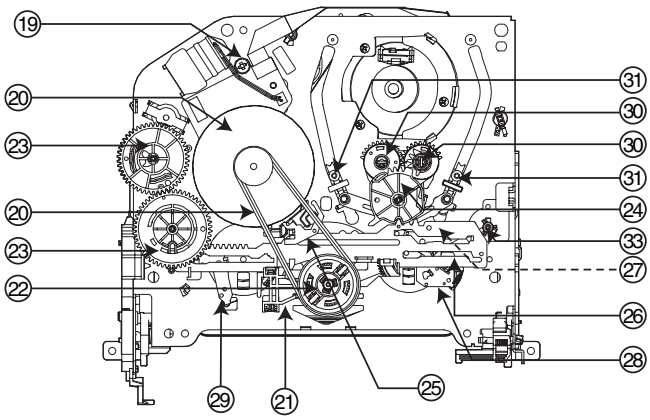


Fig. 4-3-3 Bottom View of Mechanism

Disassembly start no.	Item no.	Part name	Disassembly reference diagram
	1	Drum assembly	A-1
	2	Top plate	A-2
2	3	CST holder assembly	A-2
2,3	4	F/L rack gear assembly	A-2
2,3,4	5	Door opener	A-2
2,3,4,5	6	F/L arm assembly	A-2
	7	S/W lever assembly	A-2
	8	L/D motor assembly	A-3
	9	Wheel gear	A-3
	10	F/E head	A-3
	11	A/C head assembly	A-3
2,3	12	T brake assembly	A-4
2,3	13	Tension arm assembly	A-4
2,3,12,13	14	S reel/T reel	A-4
	15	P4 base assembly	A-5
	16	Lid opener	A-5
16	17	Pressure arm assembly	A-5
16	18	Take-up arm	A-5
	19	Capstan supporter	A-6
16,17	20	Capstan belt, Capstan motor	A-6
	21	F/R lever	A-6
20,21	22	D37 clutch assembly	A-6
	23	Drive gear/cam gear	A-7
	24	Sector gear	A-7
20	25	Capstan brake assembly	A-7
20,21,22, 23,24,25	26	Slider plate	A-7
20,21,22, 23,24,25,26	27	Tension lever	A-7
20,21,22, 23,24,25,26	28	Spring lever	A-7
20,21,22, 23,24,25,26	29	Brake lever	A-7
24	30	P2 gear assembly/ P3 gear assembly	A-8
2,3,13, 24,30	31	P2 base assembly/ P3 base assembly	A-8
24,30	32	Loading base	A-8
2,3,13	33	Tension base	A-9
	34	Jog idler arm assembly	A-9

Information

Use the reverse procedure to removal when reinstalling components.

4-4 Deck Mechanism Disassembly

(1) Drum assembly (Fig. A-1)

1) Disconnect the flat cable between the drum assembly and capstan motor.
2) Remove three screws (S1), and then remove the drum assembly upward.
3) Release hooks (H1, H2) only if necessary, and then separate the FPC holder and FPC cap.

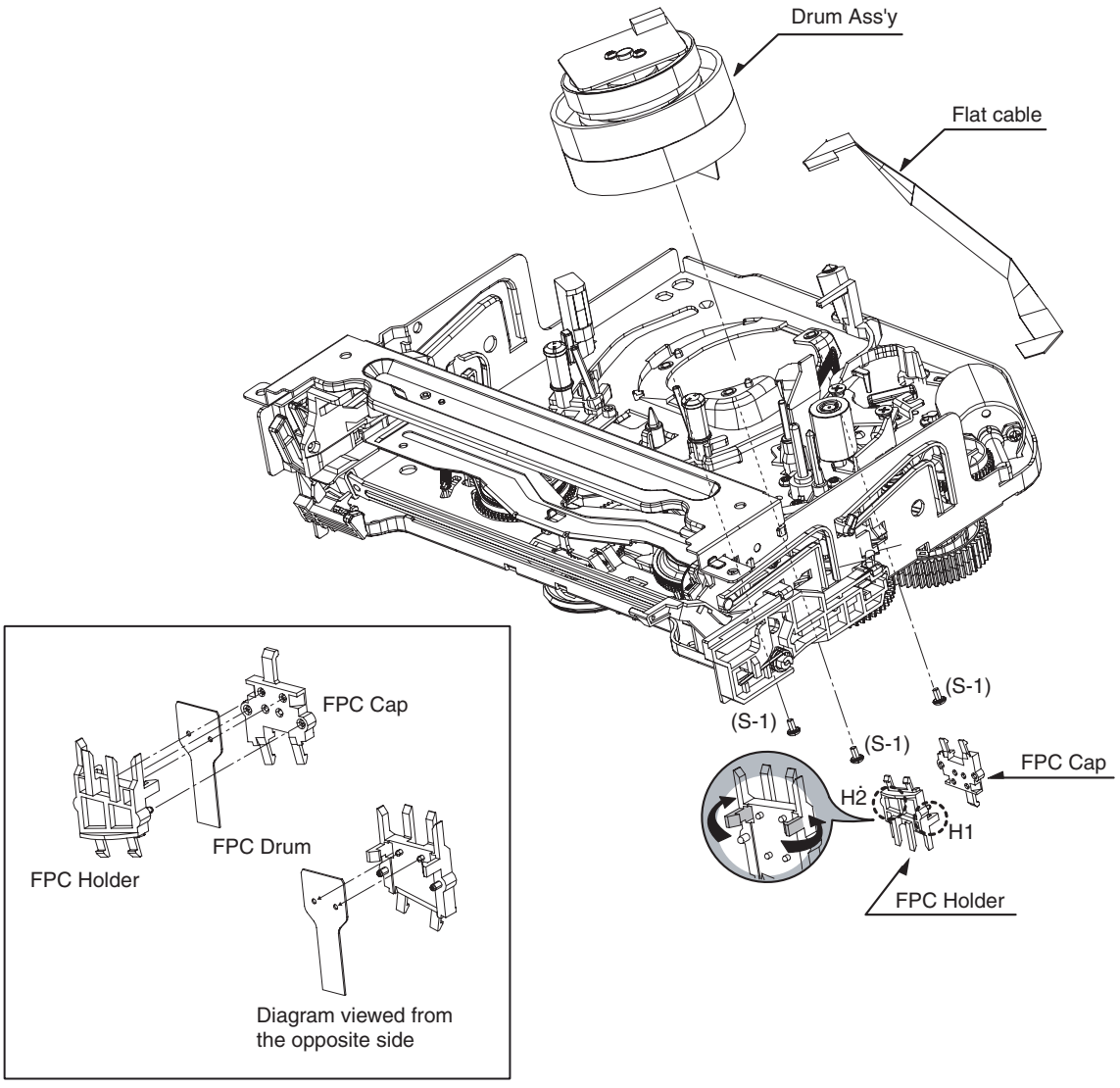


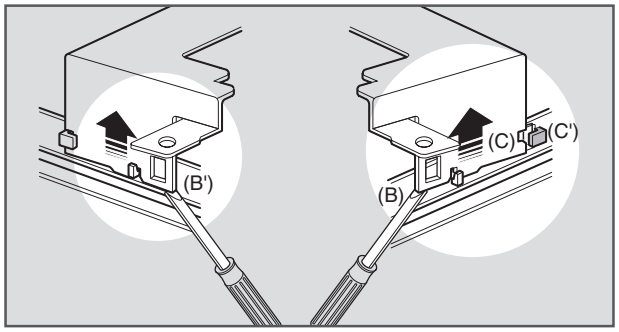
Fig. A-1 Drum Ass'y

(2) Top plate (Fig. A-2-1)

1) Use a flat-bladed screwdriver, etc. to release portion (B) at the right of top plate in the direction of the arrow.
2) Use the same procedure to release portion (B') at the left of top plate in the direction of the arrow.

Note:

When reinstalling the top plate, align portions (C) and (C').

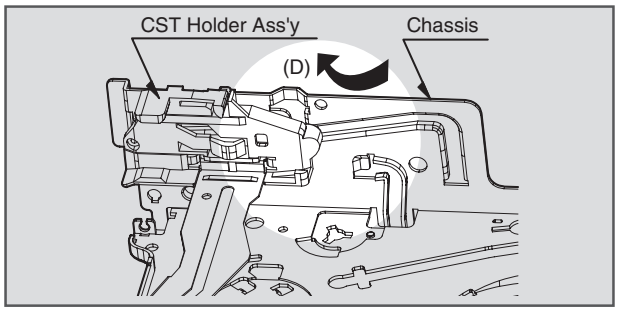


(3) CST holder assembly (Fig. A-2-2)

1) Move the CST holder assembly in the direction of arrow (D) to release the CST holder assembly from the slit in chassis.
2) Also release the CST holder assembly from the right slit in chassis.

Note:

When reinstalling, first insert portion (E) of the CST holder assembly into the slit in chassis, and then fit the remaining bosses into the slits in chassis in sequence.

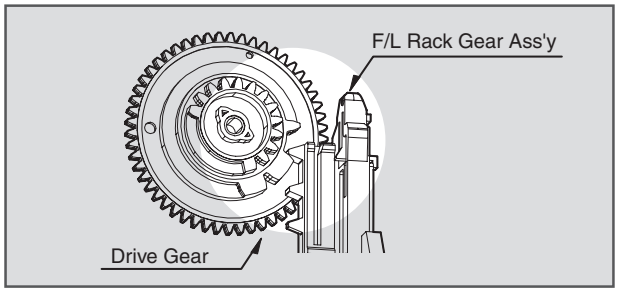


(4) F/L rack gear assembly (Fig. A-2-3)

1) Release hook (H3), and then slide the F/L rack gear assembly in the direction of arrow (A) to remove it.

Note:

When reinstalling the F/L rack gear assembly, assemble the drive gear and F/L rack gear as shown in the figure.



(5) Door opener (Fig. A-2-4)

1) Turn the door opener clockwise to release it from the guide hole in chassis.

(6) F/L arm assembly (Fig. A-2-5)

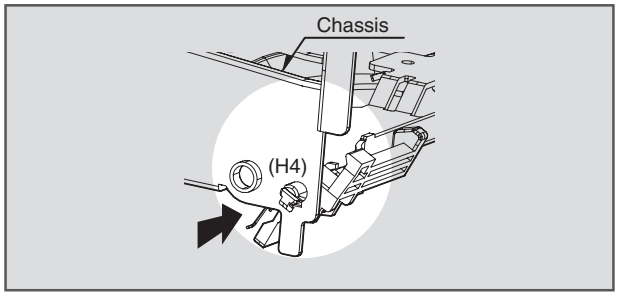
1) Turn the left side of F/L arm assembly in the direction of the arrow to release it from the slit in chassis.

(7) S/W lever assembly (Fig. A-2-6)

1) Release hook (H4) and push it in the direction of the arrow to remove the S/W lever.

Note:

Take care not to lose the spring attached to the S/W lever assembly.



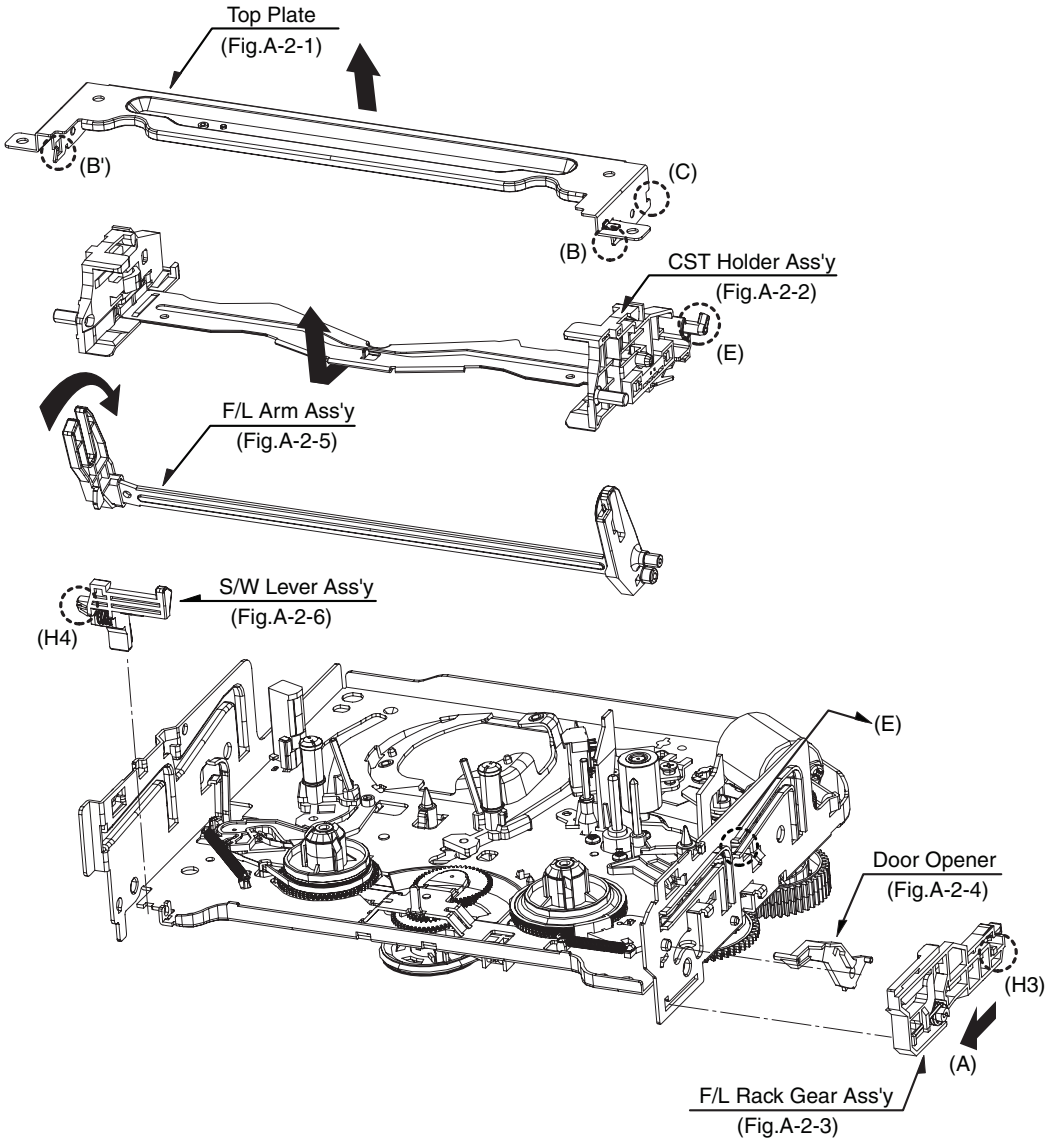


Fig. A-2 Top Plate, CST Holder Ass'y, F/L Rack Gear Ass'y,
Door Opener, F/L Arm Ass'y, S/W Lever Ass'y

(8) L/D motor assembly (Fig. A-3-1)

1) Unplug connector (C1).
2) Remove screw (S4), and then remove the L/D motor assembly.

(9) Wheel gear (Fig. A-3-2)

1) Release hook (H5) of wheel gear shaft, and then lift the wheel gear.

(10) F/E head (Fig. A-3-3)

1) Turn the entire E/F head in the direction of arrow (A) to release its engagement with chassis.

(11) A/C head assembly (Fig. A-3-4)

1) Remove screw (S5), and then lift the A/C head assembly.

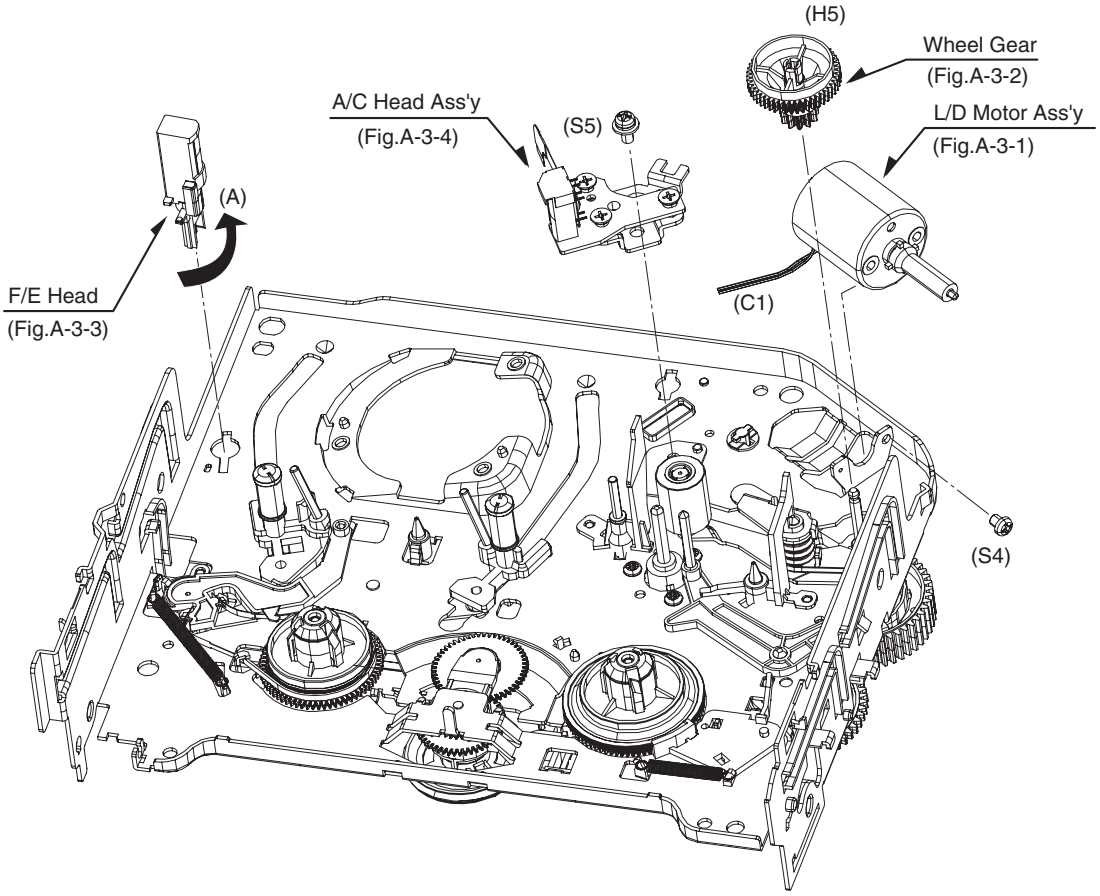


Fig. A-3 L/D Motor Ass'y, Wheel Gear, F/E Head, A/C Head Ass'y

(12) T brake assembly (Fig. A-4-1)

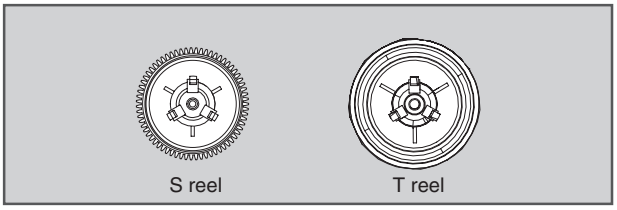
1) Release the tension spring from hook (H6) of chassis.
2) Turn the T brake arm counterclockwise to release its engagement with chassis, and then lift it.

(13) Tension arm assembly (Fig. A-4-2)

1) Release the tension spring from hook (H7) of spring lever.
2) Release hook (H8) of tension base, and then lift the tension arm assembly.

(14) S reel and T reel (Fig. A-4-3)

1) Lift the S reel and T reel.
   Take care during reassembly that the S reel and T reel are not reversed.



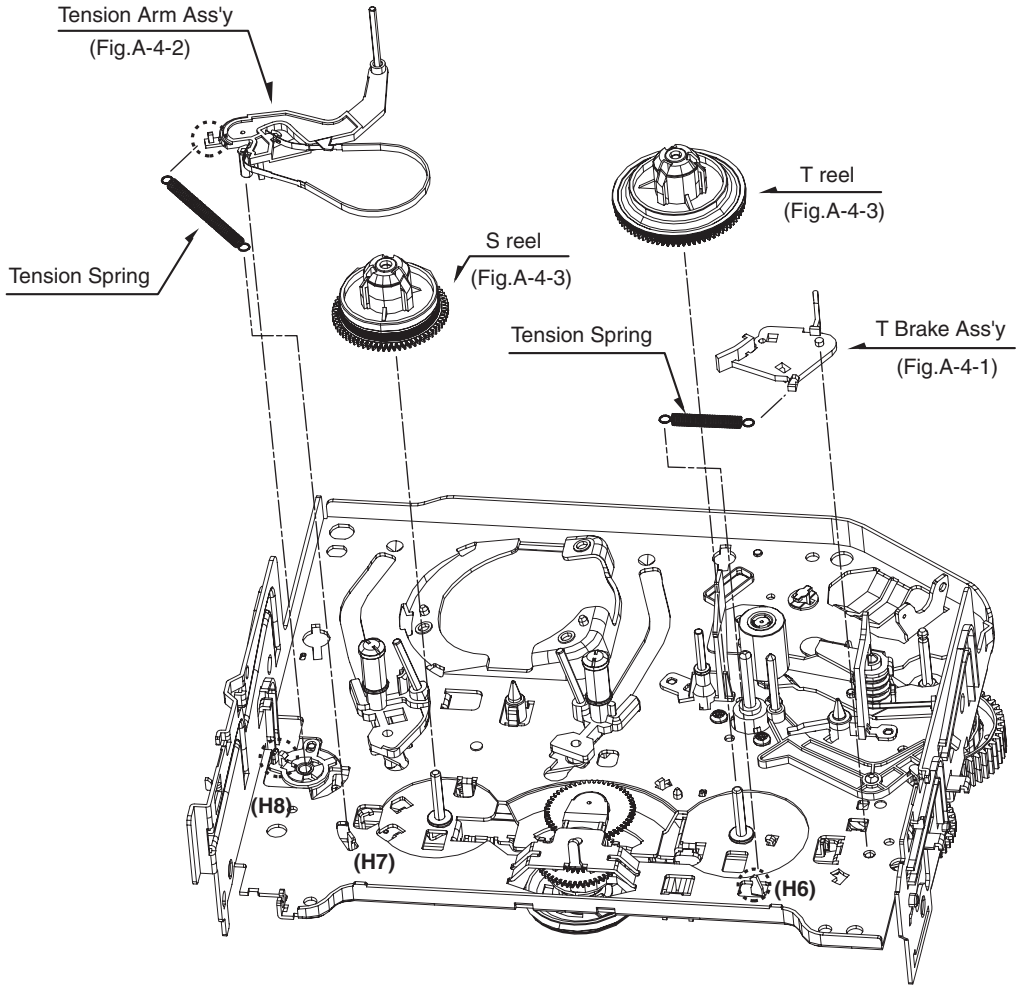


Fig. A-4 T Brake Ass'y, Tension Arm Ass'y, S reel, T reel

(15) P4 base assembly (Fig. A-5-1)

1) Release portion (A) of the P4 base assembly from the boss of chassis.
2) Turn the P4 base assembly in the direction of the arrow to release its engagement with chassis.

(16) Lid opener (Fig. A-5-2)

1) Release portion (B) of the lid opener from the boss of chassis.
2) Turn the lid opener in the direction of the arrow to release its engagement with chassis.

(17) Pressure arm assembly (Fig. A-5-3)

1) Lift the pressure arm assembly.

Note:

A spring is attached between the pressure arm assembly and chassis: Take care not to lose it. When reinstalling the pressure arm assembly, make sure that you insert the boss at portion (C) of pressure arm assembly into the slit in cam gear at the back of chassis.

(18) Take-up arm (Fig. A-5-4)

1) Lift the take-up arm to release it from hook (H9) of chassis.

Note:

When reinstalling the take-up arm, make sure that you insert the boss at portion (D) of take-up arm into the slit in cam gear at the back of chassis.

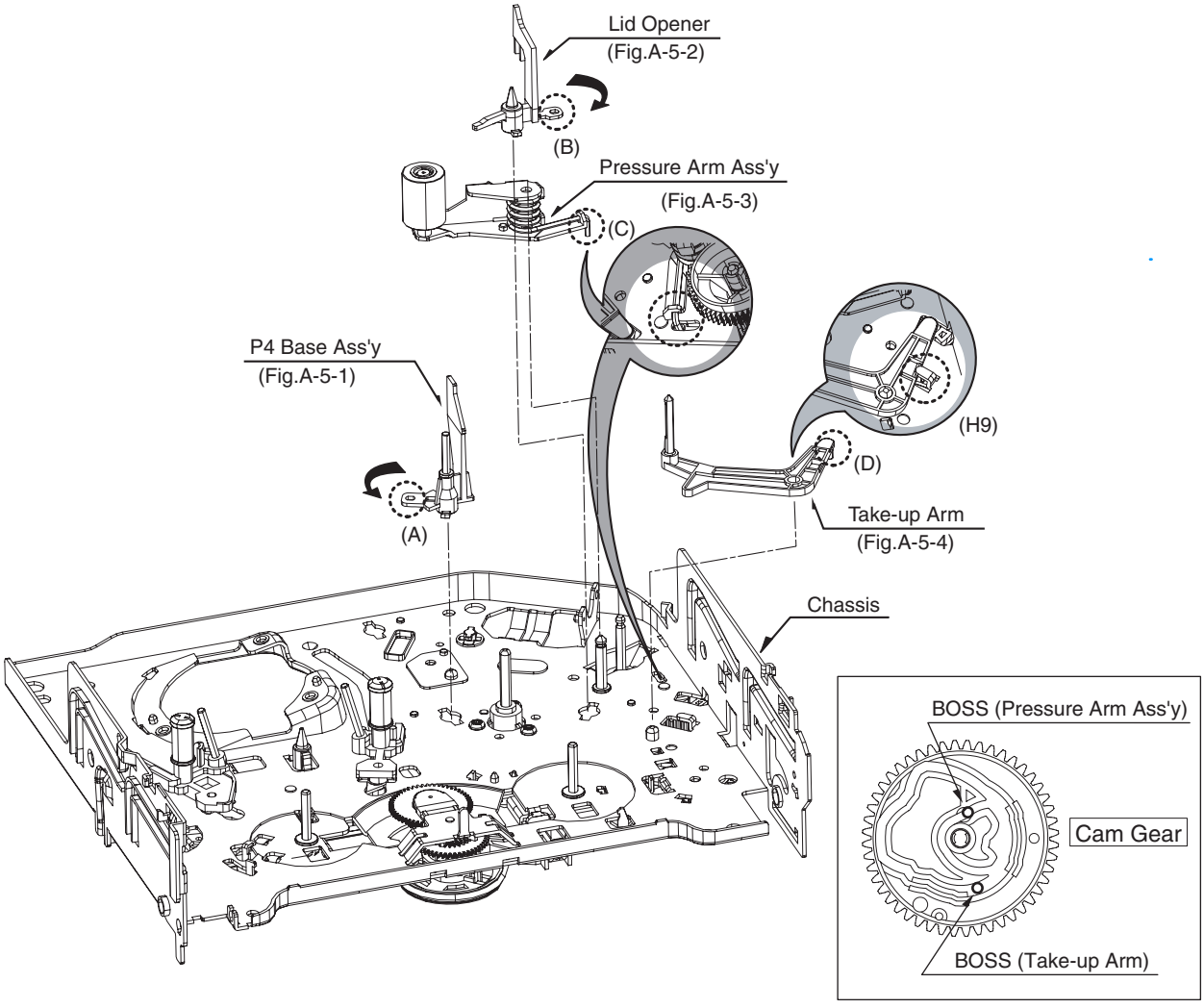


Fig. A-5 P4 Base Ass'y, Lid Opener, Pressure Arm Ass'y, Take-up Arm

(19) Capstan supporter (Fig. A-6-1)

1) Use a Philips (+) screwdriver to turn the capstan supporter 90° clockwise and release it from the chassis.

(20) Capstan belt (Fig. A-6-2) and capstan motor (Fig. A-6-3)

1) Remove the capstan belt.
2) Remove three screws (S6), and then lift the capstan motor.

(21) F/R lever (Fig. A-6-4)

1) Release lock tab (L1) in the direction of the arrow, and then lift the F/R lever.

(22) D37 clutch assembly (Fig. A-6-5)

1) Remove washer (W1), and the lift the D37 clutch assembly.

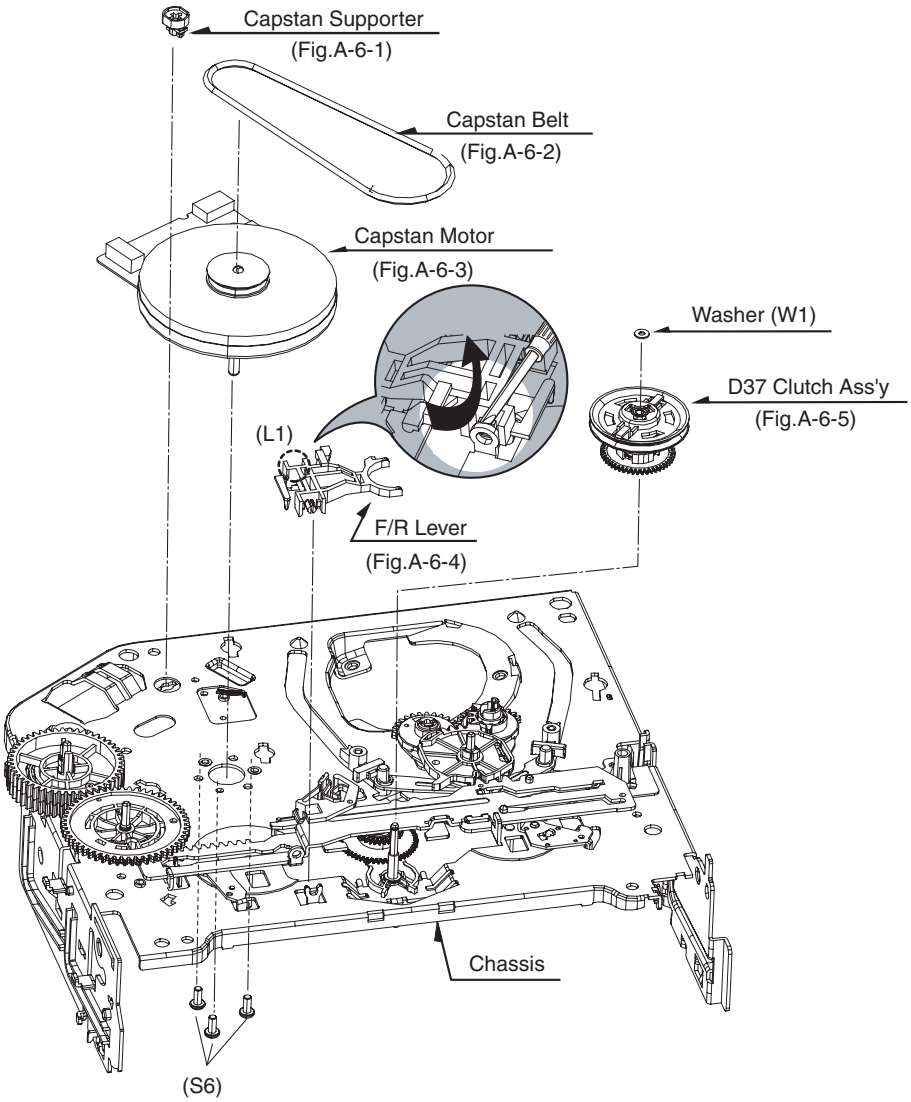


Fig. A-6 Capstan Supporter, Capstan Belt, Capstan Motor, F/R Lever, D37 Clutch Ass'y

(23) Driver gear (Fig. A-7-1) and cam gear (Fig. A-7-2)

1) Remove washer (W2), and then lift the drive gear.
2) Release hook (H10) of the cam gear shaft, and then lift the cam gear.

Note:

Align these positions of gears during reassembly:

1) Align hole (A) in drive gear and hole (B) in cam gear.
2) Align hole (C) in cam gear and the hole in chassis.

(24) Sector gear (Fig. A-7-3)

1) Release hook (H11) of sector gear, and then lift the sector gear.

(25) Capstan brake assembly (Fig. A-7-4)

1) Release lock tab (L2) from the surface of chassis, and then lift the capstan brake.

(26) Slider plate (Fig. A-7-5)

1) Release the engagement with chassis, and then lift the slider plate.

(27) Tension lever (Fig. A-7-6)

1) Turn the tension lever counterclockwise to release it from guide (A) of chassis.

(28) Spring lever (Fig. A-7-7)

1) Turn the spring lever in the direction of the arrow to release portion (B) from the guide of chassis.

(29) Brake lever (Fig. A-7-8)

1) Lift the brake lever.

Note:

When reinstalling the sector gear and slider plate, perform the position alignment shown in the figure on next page.

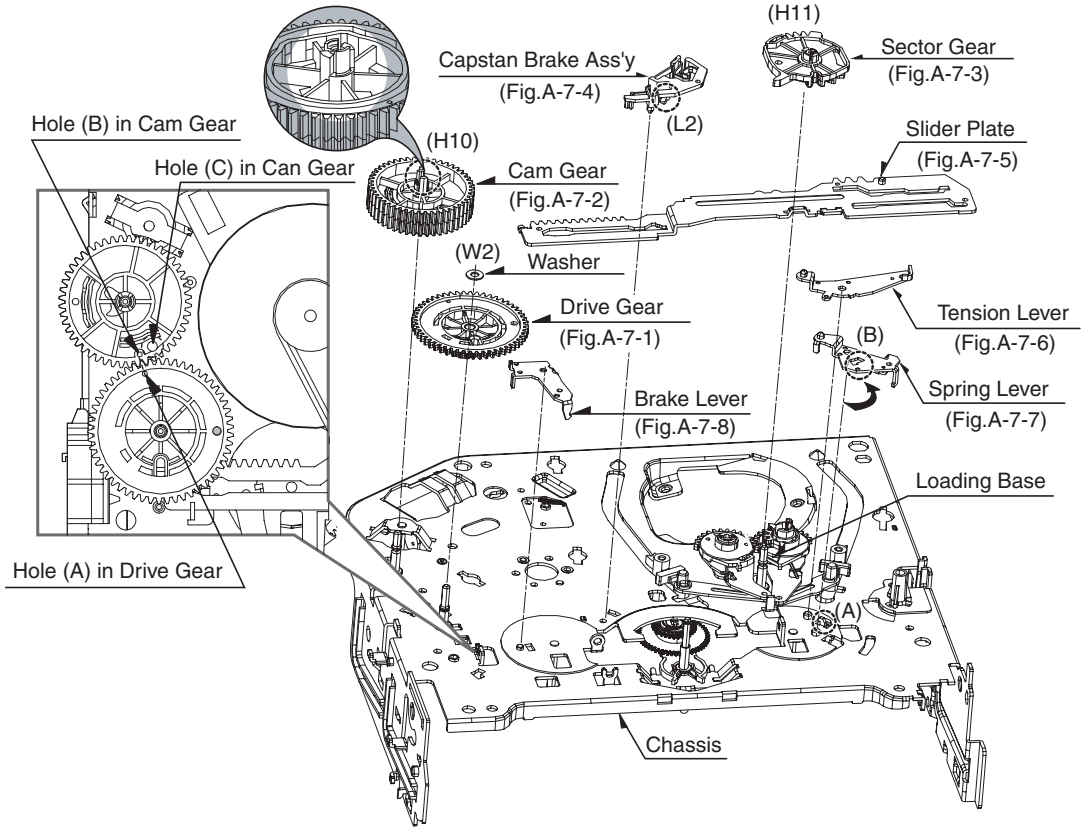


Fig. A-7 Drive Gear, Cam Gear, Sector Gear, Capstan Brake Ass'y, Slider Plate, Tension Lever, Spring Lever, Brake Lever

(30) P2 gear assembly (Fig. A-8-1) and P3 gear assembly (Fig. A-8-2)

1) Lift the P3 gear assembly.
2) Lift the P2 gear assembly.

Note:

When reinstalling the P2 and P3 gear assemblies, be sure to align the holes in them.

(31) P2 base assembly (Fig. A-8-3) and P3 base assembly (Fig. A-8-4)

1) Slide the P2 base assembly in the direction of arrow (A) to release it from the guide hole in chassis.
2) Slide the P3 base assembly in the direction of arrow (B) to release it from the guide hole in chassis.

(32) Loading base (Fig. A-8-5)

1) Release three hooks (H12, H13, H14), and then lift the loading base.

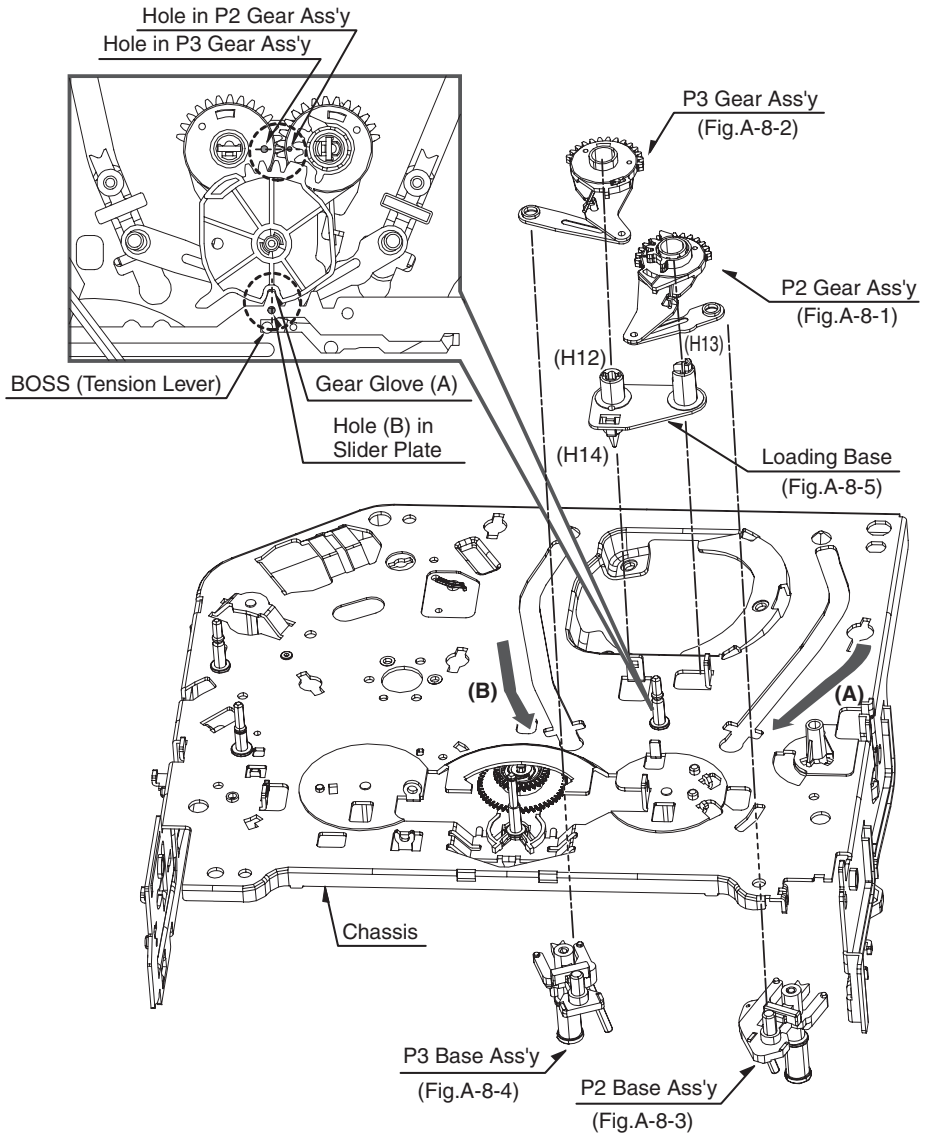


Fig. A-8 P2 Gear Ass'y, P3 Gear Ass'y, P2 Base Ass'y, P3 Base Ass'y, Loading Base

(33) Tension base (Fig. A-9-1)

1) Release portion (A) of tension base from the boss of chassis.
2) Turn the tension base in the direction of the arrow to release its engagement with chassis.

(34) Jog idler arm assembly (Fig. A-9-2)

1) Hold portions (B) and (C) of jog idler arm assembly on both sides, and then remove the arm assembly.

Note:

Take care that portion (D) does not strike the chassis during disassembly.

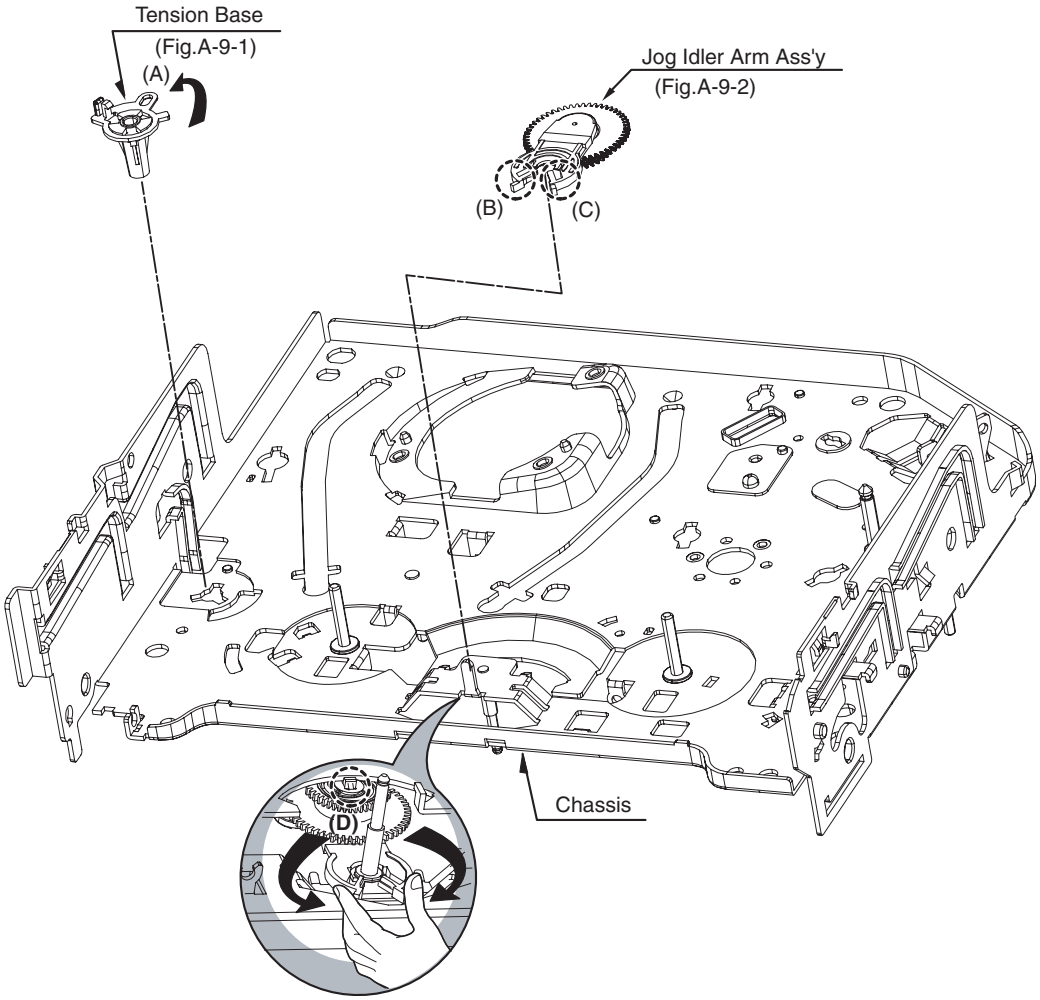


Fig. A-9 Tension Base, Jog Idler Arm Ass'y

4-5 Checking Mode after Reassembling Deck Mechanism

After disassembling the deck mechanism, check the positions of the following gears when reassembling it: If the positions of gears drift, the deck mechanism will not operate normally. Turn the cam gear with the L/D motor assembly removed, and make sure that loading and unloading are performed normally.

1) Make sure that hole (A') in chassis on the surface of deck mechanism is aligned with hole (A) in cam gear: If they are not aligned, remove the L/D motor assembly, and then turn the cam gear until the holes are aligned.
2) Make sure that the small hole in cam gear on the back of deck mechanism is aligned with hole (B) in drive gear: If they are not aligned, remove the drive gear, align their positions, and then reassemble the gears.

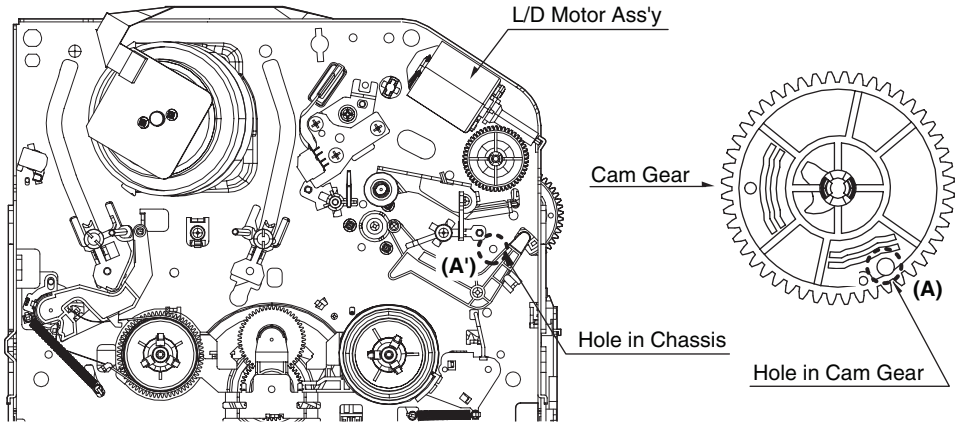


Fig. 4-5-1 Cam Gear Position Alignment

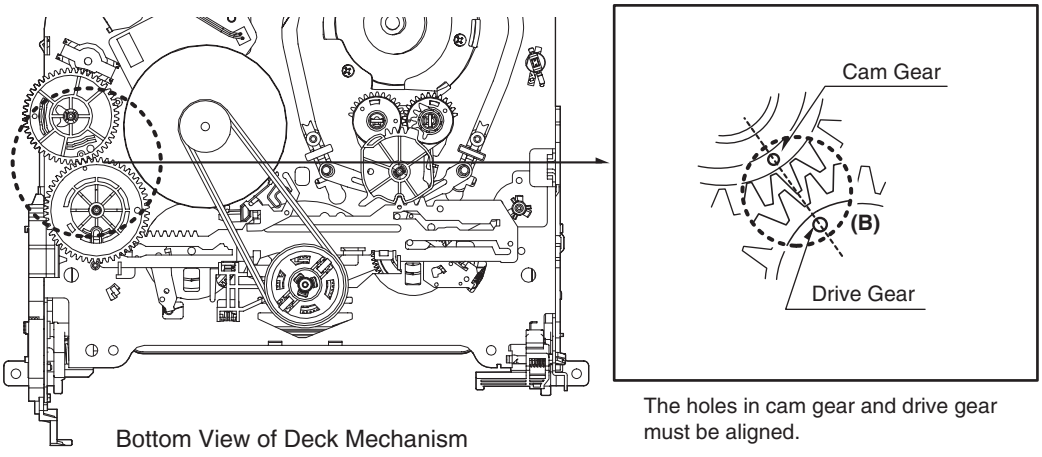


Fig. 4-5-2 Drive Gear Position Alignment

5 Adjustment / Maintenance

5-1 Set-up for Adjustment

(1) Test equipment necessary for adjustment

1) Dual-trace oscilloscope
2) Color bar generator
3) Monitor TV
4) Blank tape (VHS)

(2) Connections of test equipment

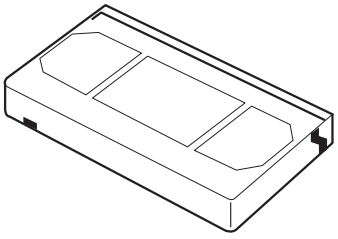
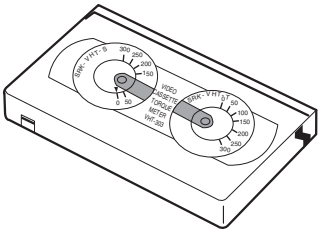
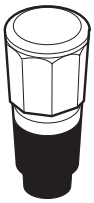
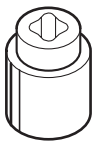
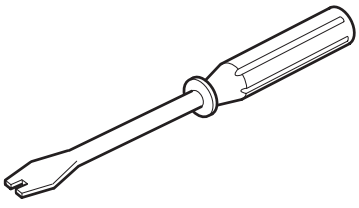
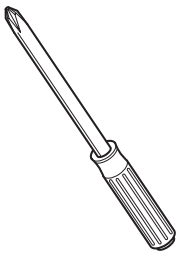
Connect the equipment as follows when otherwise not specified.

1) Connect a color bar generator to the video input jack.
2) Connect a monitor TV to the EURO AV1 AUDIO/VIDEO jack.

(3) Cautions on adjustment

1) The following conditions apply when otherwise not specified.
   Probe of oscilloscope: 10:1
   Synchronization of oscilloscope: Internal sync
2) When performing more than one adjustment, follow the specified oder.

(4) List of Adjustment jigs

Alignment tape 	Cassett Torque Meter (SRK-VHT-303) 	Torque Gauge (600 g/cm) 
Torque Gauge Adaptor 	Guide roller screwdriver Parts No. 7069064 	Philips (+) screwdriver 

5-2 VCR Electrical Adjustment

5-2-1 Head switching adjustment

(1) Supplement

- If the SYSTEM microprocessor (IC501) or EEPROM (IC503) on VCR P.C.B is replaced, be sure to perform the head switching adjustment.
- If the drum assembly is replaced, be sure to perform the X-value adjustment and head switching adjustment.

(2) Adjustment method

1) Connect oscilloscope CH-1 to the H/SW terminal on VCR P.C.B, and CH-2 to the VCR VIDEO terminal on VDR P.C.B.
2) Use CH-1 (H/SW) to trigger the oscilloscope.
3) Play back the alignment tape.
4) Play back the tape for approx. 3 seconds, while simultaneously holding down the REC ● and PLAY ▶ buttons on recorder for several seconds (FL display: – –).
5) Simultaneously hold down the REC ● and PLAY ▶ buttons on recorder for several seconds again: The adjustment will automatically start.
   When the adjustment is complete, “PG” will appear in the FL display.
6) Observe the waveforms on oscilloscope, and make sure that the phase from the vertical sync signal to the leading edge (trigger position) of H/SW pulse is 6.5H ± 0.5H.

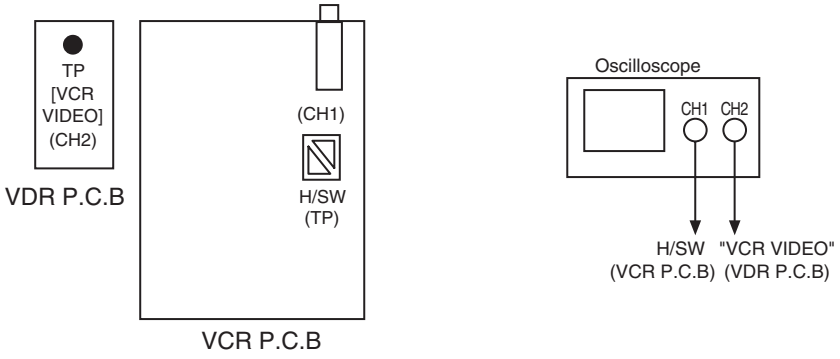


Fig. 5-2-1 Connection Diagram

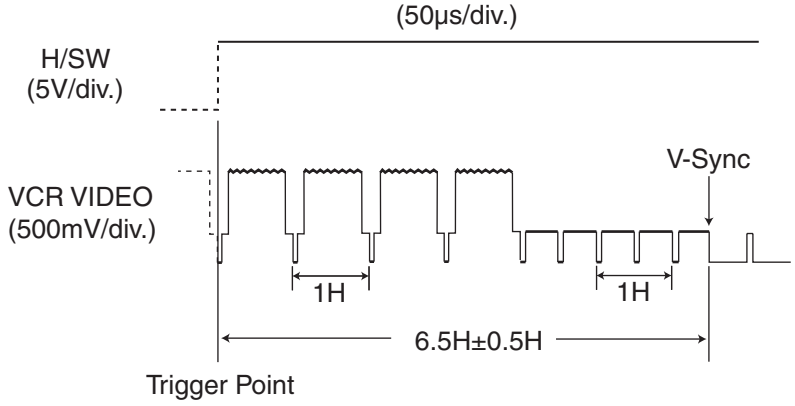


Fig. 5-2-2 Waveform Diagram

5-3 Deck Mechanism Tape Transport System Adjustment

The tape transport components were precisely adjusted before the recorder was shipped from the factory. They do not need to be adjusted except for the following cases:

1) Noise appears on the screen during playback.
2) Tape is damaged.
3) Any of the tape transport components is replaced

If any of the above occurs, or if any of the tape transport components is replaced, first run a E-240 tape and make sure that excessive tape winkling does not occur at the P2/P3 guide rollers, tape run guideline on lower drum, A/C head or P4 guide post.

- ◆ If tape winkling occurs at the P2/P3 guide rollers or tape run guideline on lower drum assembly, turn the height adjustment screws of P2/P3 guide rollers until winkling is eliminated
  See “5-3-1 Guide roller height adjustment”.
- ◆ If tape winkling occurs at the post of P4 base assembly, perform the A/C head height and tilt adjustments.
  See “5-3-2 A/C head adjustment”.

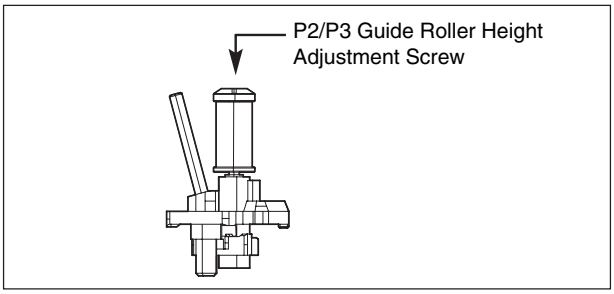


Fig. 5-3-1 P2/P3 Guide Roller Height Adjustment Screws

5-3-1 Guide roller height adjustment

(1) Rough adjustment

1) Run a E-240 blank tape, and check the tape run guideline on lower drum.
2) If the tape rides under the tape run guideline, turn the guide roller height adjustment screw to the left to adjust.
3) If the tape is above the tape run guideline, turn the guide roller height adjustment screw to the right to adjust.

(2) Fine adjustment

1) Connect oscilloscope CH-1 to the H/SW terminal on VCR P.C.B, and CH-2 to the RF terminal.
2) Use CH-1 (H/SW) to trigger the oscilloscope.
3) Play back the alignment tape.
   (If the drum assembly is replaced, adjust the tracking so that the FM output is maximal.)
4) Finely adjust the guide roller height adjustment screw so that the supply and take-up portions of RF envelope are flat.
5) Move the tracking in both directions, and make sure that the FM envelope waveform drops evenly.

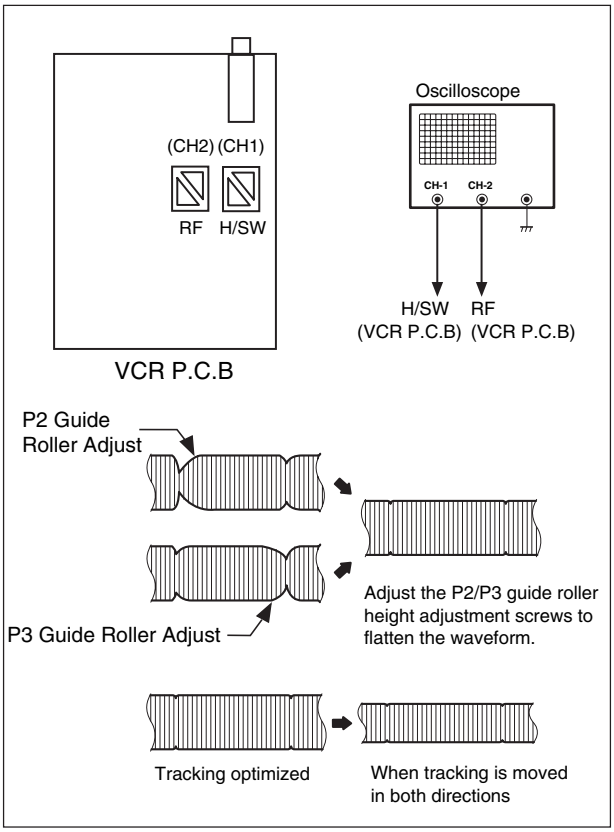


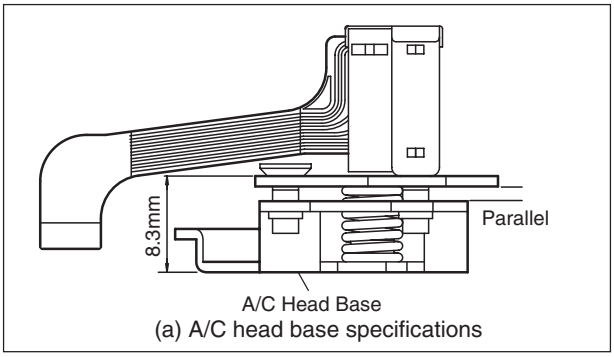
Fig. 5-3-2 Guide Roller Fine Adjustment

5-3-2 A/C head adjustment

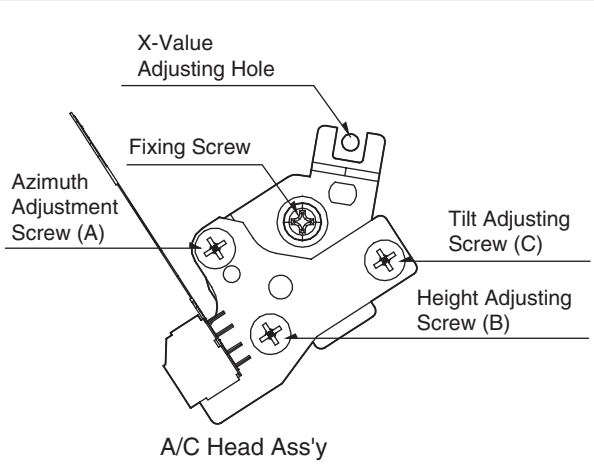
(1) Rough adjustment (height adjustment and tilt adjustment)

(Play back the alignment tape: Perform this adjustment only if no audio signal is output.)

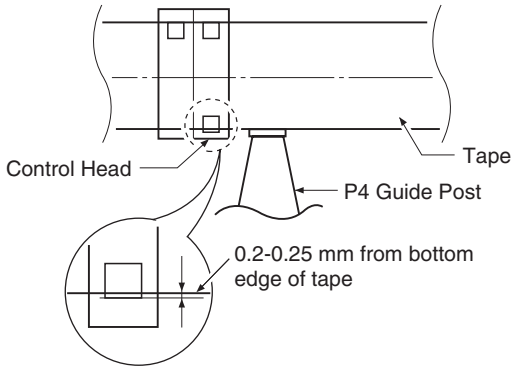
1) Make sure that the A/C head base assembly satisfies the specifications in Fig. 5-3-3(a).
2) Run a E-240 blank tape and make sure that no curling or winkling of tape occurs at the lower flange of P4 guide post [see Fig. 5-3-3(c)].
3) If curling or winkling occurs, slowly turn tilt adjustment screw (C) to precisely adjust [see Fig. 5-3-3(b)].
4) Finely adjust height adjustment screw (B) and tilt adjustment screw (C) so that the lower edge of tape is positioned at the bottom of control head as shown in Fig. 5-3-3(c).



(a) A/C head base specifications



(b) A/C head adjustment screws



(c) A/C head height adjustment

Fig. 5-3-3 A/C Head Rough Adjustment

(2) Tape transport check between P4 guide post and pressure roller

1) Play back a tape recorded in SP mode.
2) Set to the reverse playback mode, and make sure that no curling or wrinkling of tape occurs between the P4 guide post and pressure roller.
   If curling or wrinkling occurs, slowly turn tilt adjustment screw (C) to precisely adjust [see Fig. 5-3-3(b)].

(3) Fine adjustment (azimuth adjustment)

1) Play back the alignment tape.
2) Observe the audio output waveform on oscilloscope.
3) Finely adjust azimuth adjustment screw (A) so that the audio output level is maximal at the 1 kHz and 7 kHz audio signals of alignment tape.

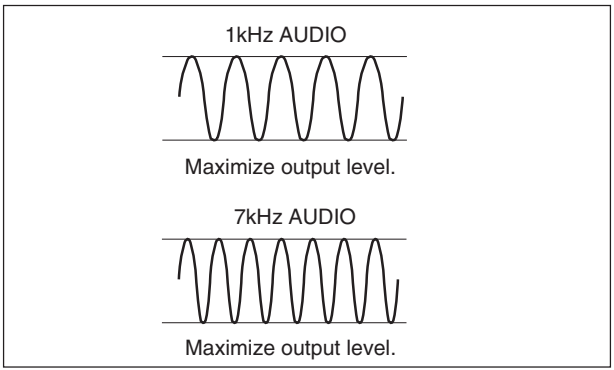
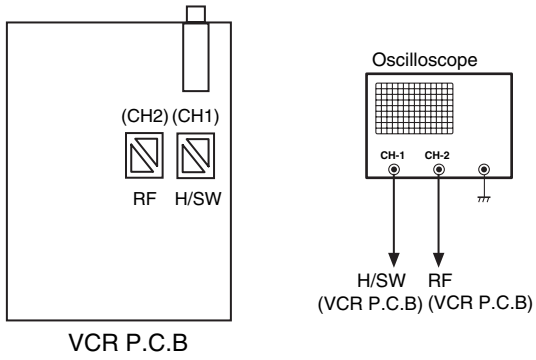


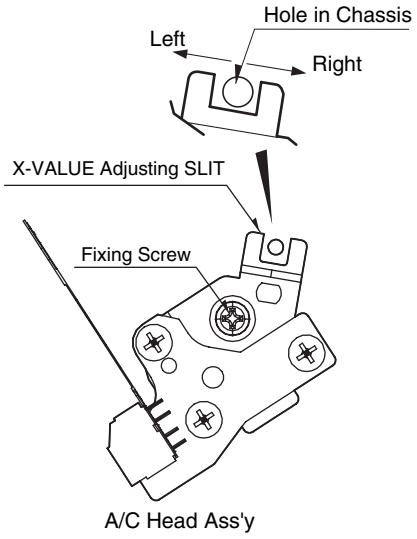
Fig. 5-3-4 A/C Head Fine Adjustment

5-3-3 X-value adjustment

1) Connect oscilloscope CH-1 to the H/SW terminal on VCR P.C.B, and CH-2 to the RF terminal.
2) Use CH-1 (H/SW) to trigger the oscilloscope.
3) Play back the color-bar portion of alignment tape, and activate auto tracking.
4) Slightly loosen the screw that secures the A/C head (do not loosen excessively).
5) Insert a ϕ 3-4 Philips (+) screwdriver into the hole in chassis of X-value adjustment mechanical block, tilt the screwdriver to the left and right until the CH-2 FM ENV output is maximal.
6) Tighten the securing screw.



(a) Connection Diagram



(b) Adjustment screw diagram

Fig. 5-3-5 X-Value Adjustment

5-3-4 Adjustments after replacing drum assembly

After replacing the drum assembly, check and adjust the following:

1) Guide roller height adjustment
2) X-value adjustment
3) Head switching adjustment

5-3-5 Check after adjustment

(1) FM output check when switching from VCR search to playback

Press the playback button during VCR search, and make sure that the appropriate amplitudes of FM envelope and audio outputs can be obtained within the specified time.

1) Connect oscilloscope CH-1 to the FM ENV terminal on VCR P.C.B, and CH-2 to the audio output terminal.
2) Play back the alignment tape.
3) Observe the waveforms on oscilloscope: Measure the times until the appropriate amplitudes are obtained when the playback button is pressed during reverse search.
   Specifications: FM envelope within 5 seconds; audio output within 10 seconds
4) Press the playback button during forward search, and measure the times in the same way.
5) If the specifications are not satisfied, perform the following adjustments again:
   - A/C head adjustment
   - X-value adjustment

(2) Tape curling/wrinkling check

1) Run an E-240 tape, and make sure that no curling or wrinkling occurs at the start, middle or end of tape.
2) If curling or wrinkling occurs, perform the following adjustments again:
   - Guide roller height adjustment
   - A/C head adjustment

5-3-6 Method of setting the mechanism to loading status without inserting tape

1) Unplug the power cord from AC outlet.
2) Remove the top cover and front panel.
3) Use black masking tape, etc. to shield light from the end sensors on both sides.
4) Plug the power cord into AC outlet to power the recorder.
5) While pressing the stop lever of CST holder assembly, load the CST holder assembly (it will automatically load midway).
6) When the CST holder assembly descends to chassis, the cylinder will rotate, and the P2/P3 base assemblies will operate in the loading status to go to stand by.

This status will allow you to input each mode. However, when rewind is performed, the power will turn off in a few seconds, since the take-up reel is in the stop status and no reel pulse can be detected.

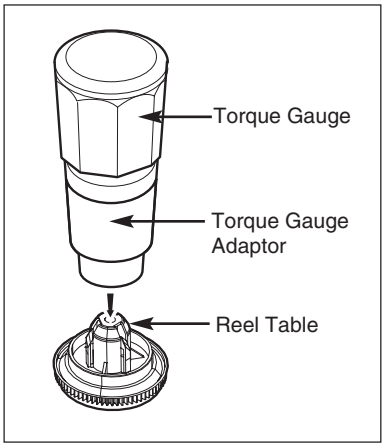
Therefore, for rewind operation, manually rotate the take-up reel.

5-3-7 Reel torques

(1) Preparations when using a torque gauge

1) Set the recorder to the loading status, referring to "5-3-6 Method of setting the mechanism to loading status without inserting tape".

2) Assemble the torque gauge adapter and torque gauge, and place them on reel.



3) Check the torque values in the following operation modes:

Item	Operation mode	Gauge	Measured reel	Torque value
Fast forward torque	Fast forward	Torque gauge	Take-up	At least 400 g/cm
Rewind torque	Rewind	Torque gauge	Supply	At least 400 g/cm
Playback torque	Playback	Torque meter	Take-up	40-100 g/cm
Reverse search torque	Reverse search	Torque meter	Supply	120-210 g/cm

5-4 Maintenance

5-4-1 Maintenance and inspection

The deck mechanism uses very precise components to ensure the compatibility between VCR models: If any of the mechanical components are dirty or the performance is degraded, the symptoms will be similar to those when the mechanism is faulty.
For clear images, it is necessary to periodically clean and lubricate the mechanism and replace any faulty components.

(1) Reference for maintenance and inspection

The time for maintenance and inspection depends on the environment and the way the VCR is used: For ordinary home use, maintenance and inspection every 1,000 hours will ensure clear images.

Time used per day	Period for reaching 1,000 hours
Approx. 1 hour	Approx. 3 years
Approx. 2 hours	Approx. 1.5 years
Approx. 3 hours	Approx. 1 year

(2) Items necessary for maintenance and inspection

1) Head cleaning kit
2) Oil and grease for maintenance
3) Alcohol
4) Cleaning cloth

(3) Cleaning video heads

It is recommended that you use a generally available cleaning tape to clean the heads.
If noise cannot be removed completely with a cleaning tape, use a cleaning cloth to clean the heads and transport system.

[Cleaning method using cleaning tape]

Play back the cleaning tape in the same way as an ordinary tape for approx. 30 seconds.

[Cleaning method using cleaning cloth]

1) Lightly fit the cleaning cloth to the head, and turn the rotating cylinder gently to the left and right. Turn the rotating cylinder one turn to also clean its outer circumference. (Cleaning with cleaning cloth moistened with alcohol is more effective.)
2) Do not use a cleaning cloth to which oil adheres or a dirty one.

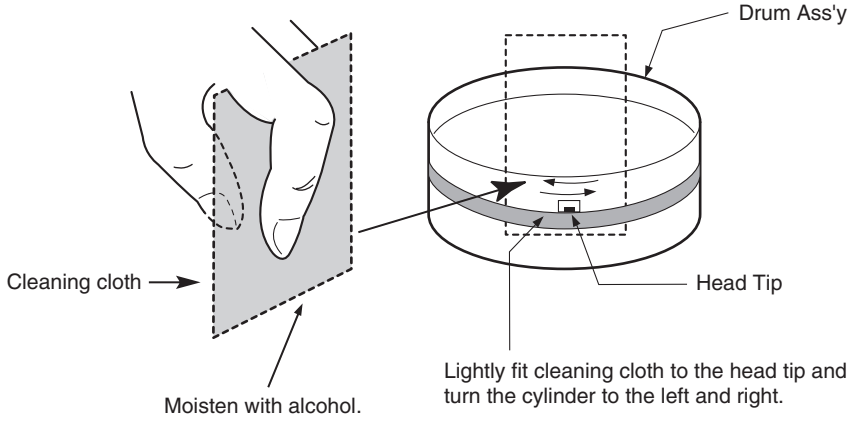


Fig. 5-4-1 Cleaning Method using Cleaning Cloth

(4) Problem guide

If the time of using the VCR exceeds approx. 1,000 hours, the phenomena shown in Table 5-4-1 may appear on playback images. These phenomena may disappear when the mechanical components are cleaned or lubricated. Check the use time, etc., and if judged that it is time for maintenance and inspection, inspect the portions to be checked according to Table 5-4-1.

Note:

If normal operation is not restored after cleaning, the components marked ○ in component replacement column probably need to be replaced, since their performance may be degraded.

Table 5-4-1 List of phenomena

Phenomenon	Cause	Portions to be checked	Component replacement	Component
Color beats	Dirt on F/E head	Clean part of F/E head where tape is in contact	○	(a)
Poor S/N, no color	Dirt on video heads	Clean video heads	○	(b)
Vertical jitter, horizontal jitter	Dirt on video heads (drum), tape transport system	Clean video heads (drum) and tape transport system.	○	(b)
Low volume, sound distortion	Dirt on A/C head	Clean part of A/C head where tape is in contact	○	(c)
Tape twisted	Dirt on pressure roller, capstan belt	Clean pressure roller and capstan shaft. Check capstan belt.	○	(d) (e)
No tape run, slack tape	Insufficient torque of D37 clutch assembly	Check torque of D37 clutch assembly	○	(f)
	Dirt on video heads (drum), tape transport system	Clean and check tape transport system.	○	

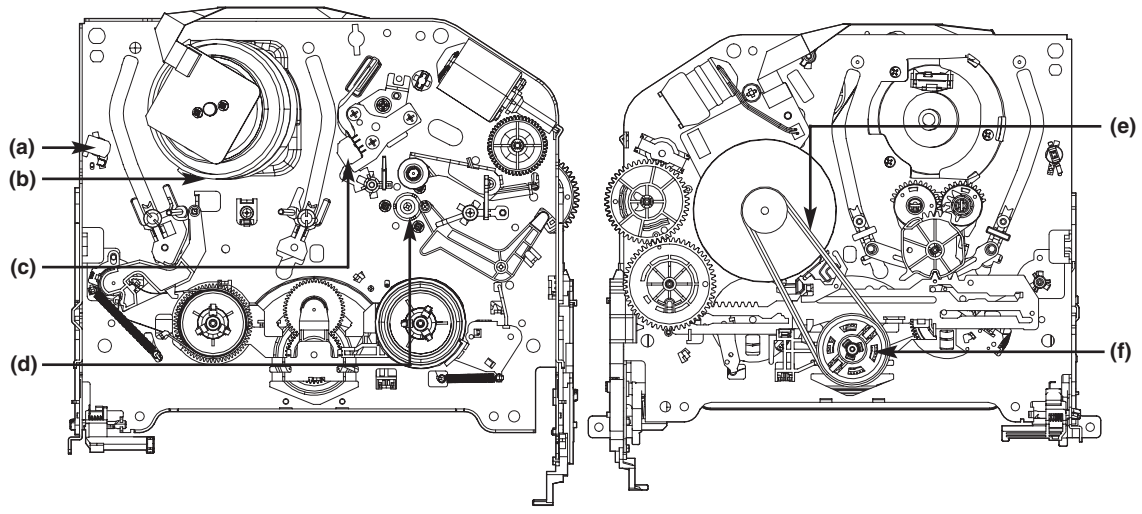


Fig. 5-4-2 Locations of Components to Be Checked

5-4-2 Lubricating oil and greasing

(1) Greasing procedure

Coat components with an appropriate amount of grease applied to a rod or brush. Take care that excessive grease does not adhere to tape transport system or drive system. If there is too much grease on them, use gauze moistened with alcohol to wipe it off. Periodically grease components with a reference of 500-hour use.

(2) Greases to be used

- KG-684G (green)
- PL-433 (yellow)

(3) Lubricating/coating locations

P2/P3 guide tape run portions

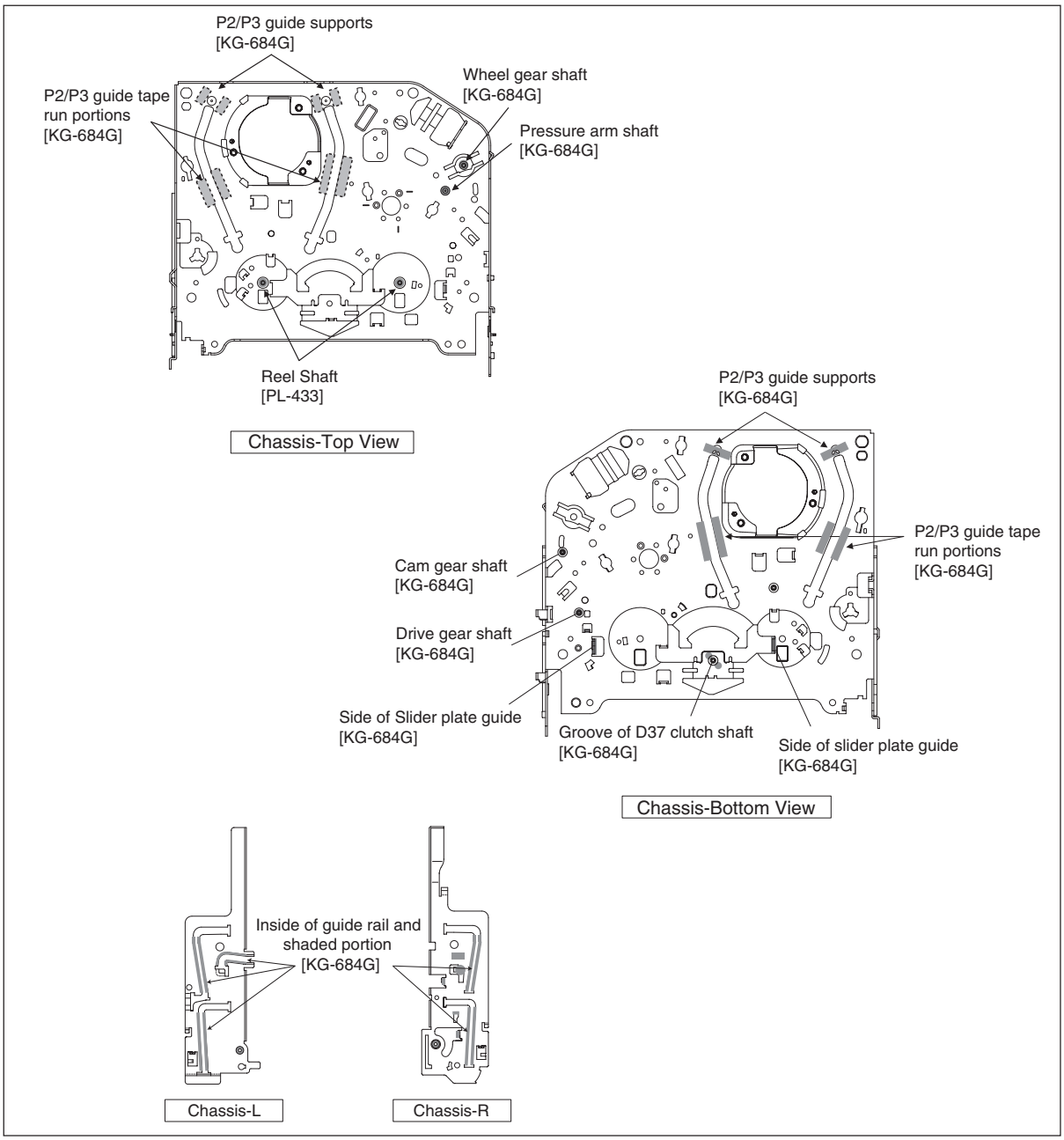


Fig. 5-4-3 Chassis

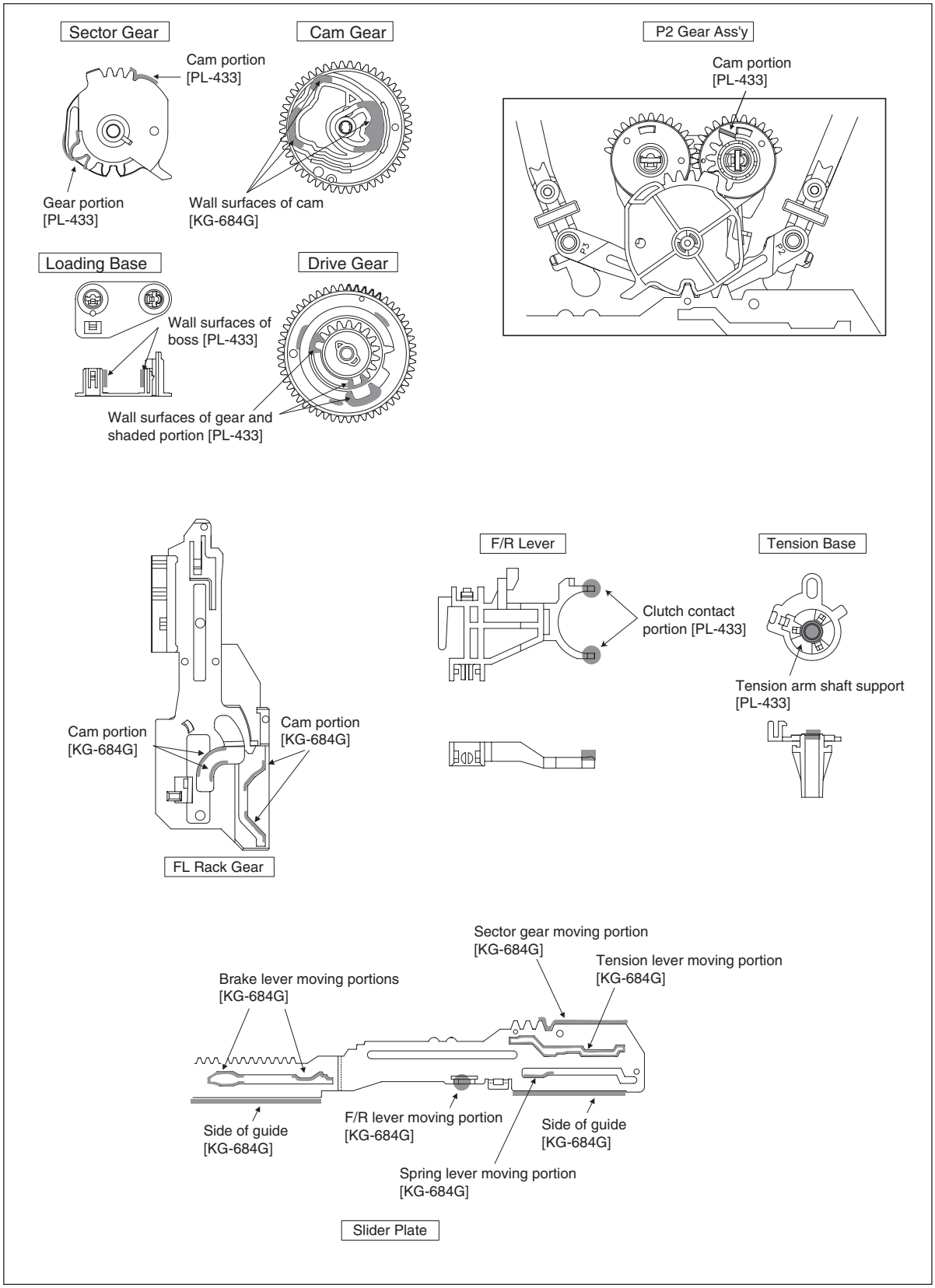


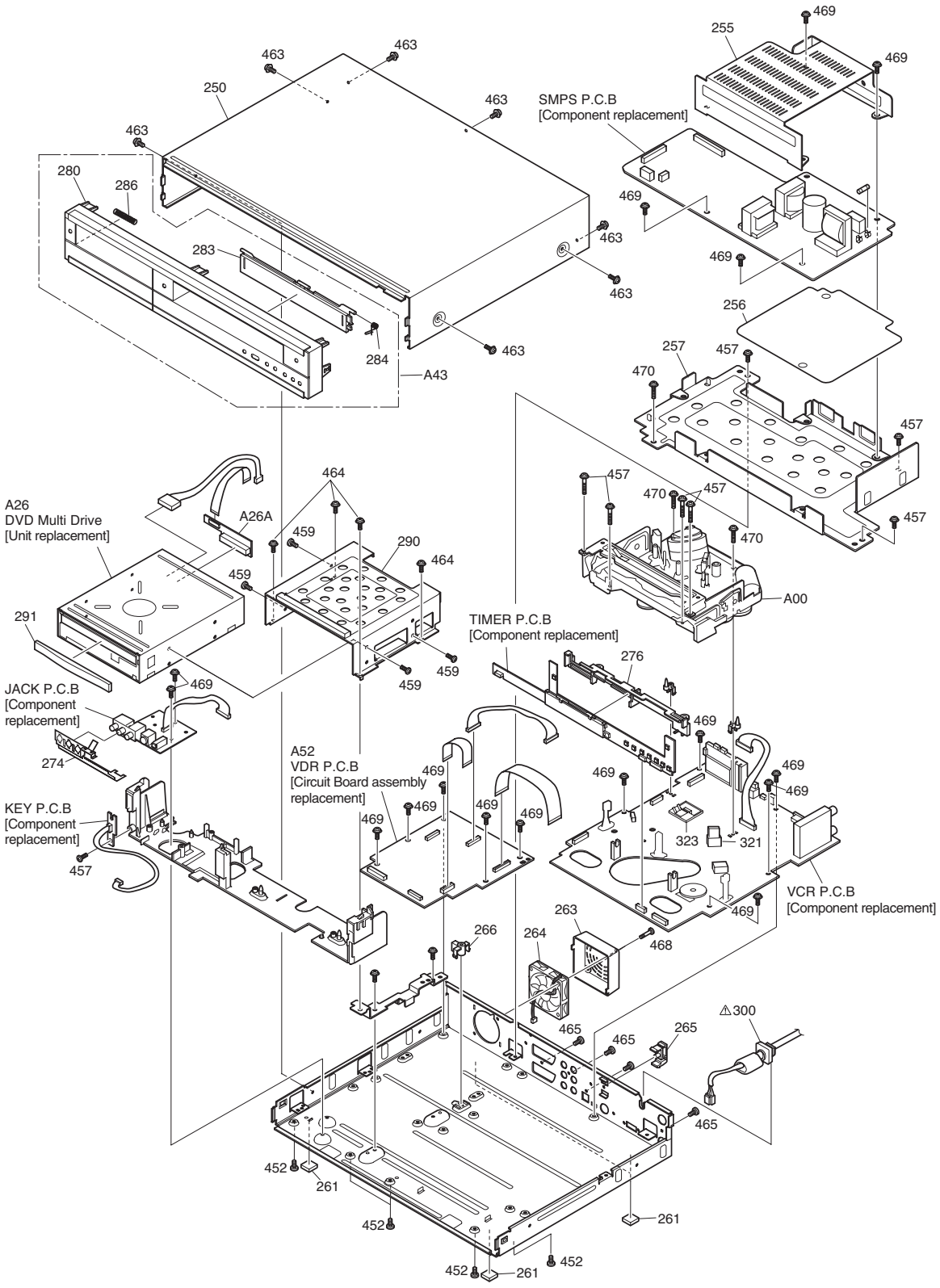
Fig. 5-4-4 Mechanical Components

6 Exploded View and Parts List

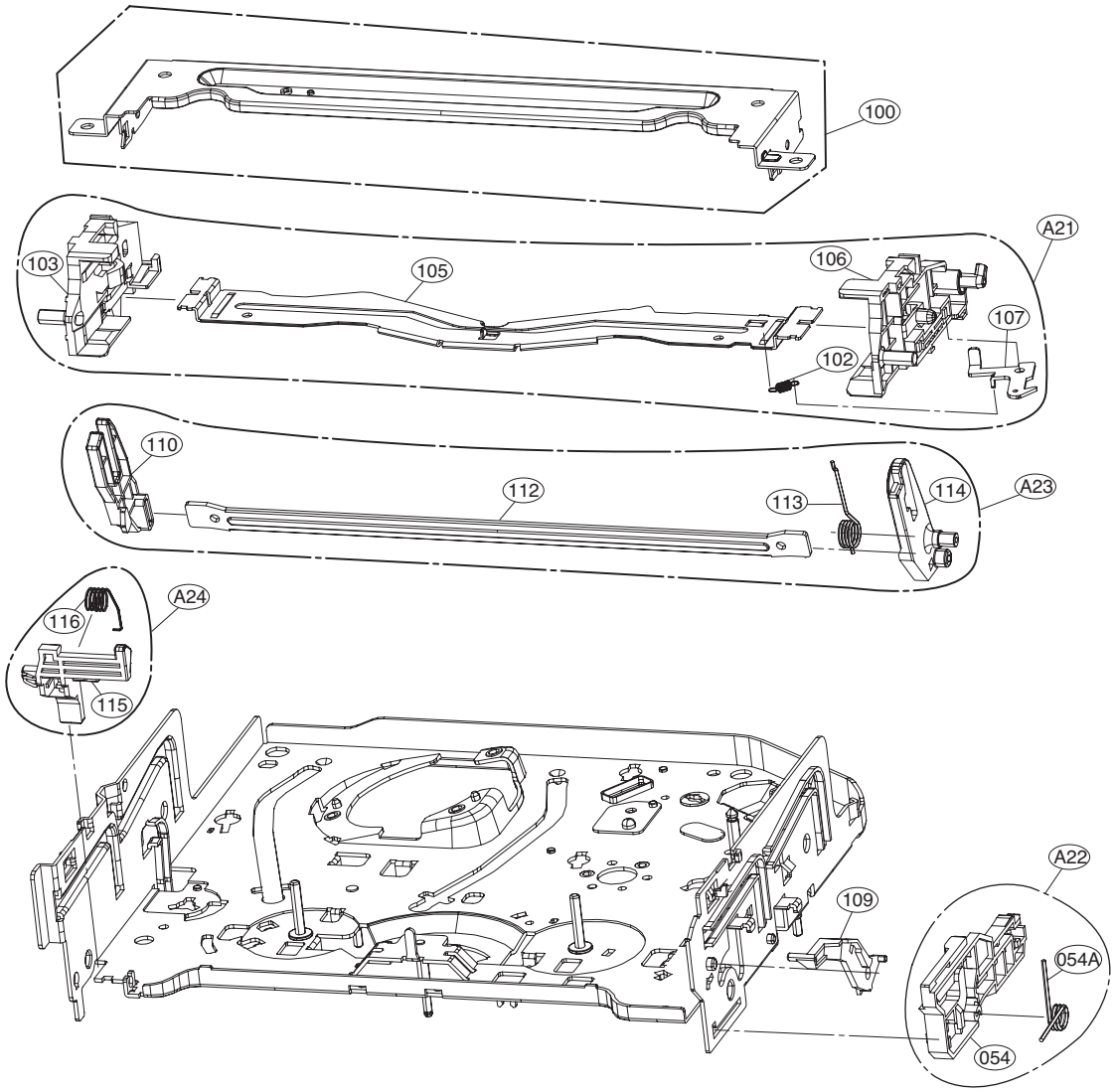
6-1 Exploded Views

Note: Components without any numbers in exploded views were not assigned as service parts as of the date of issue of this manual.

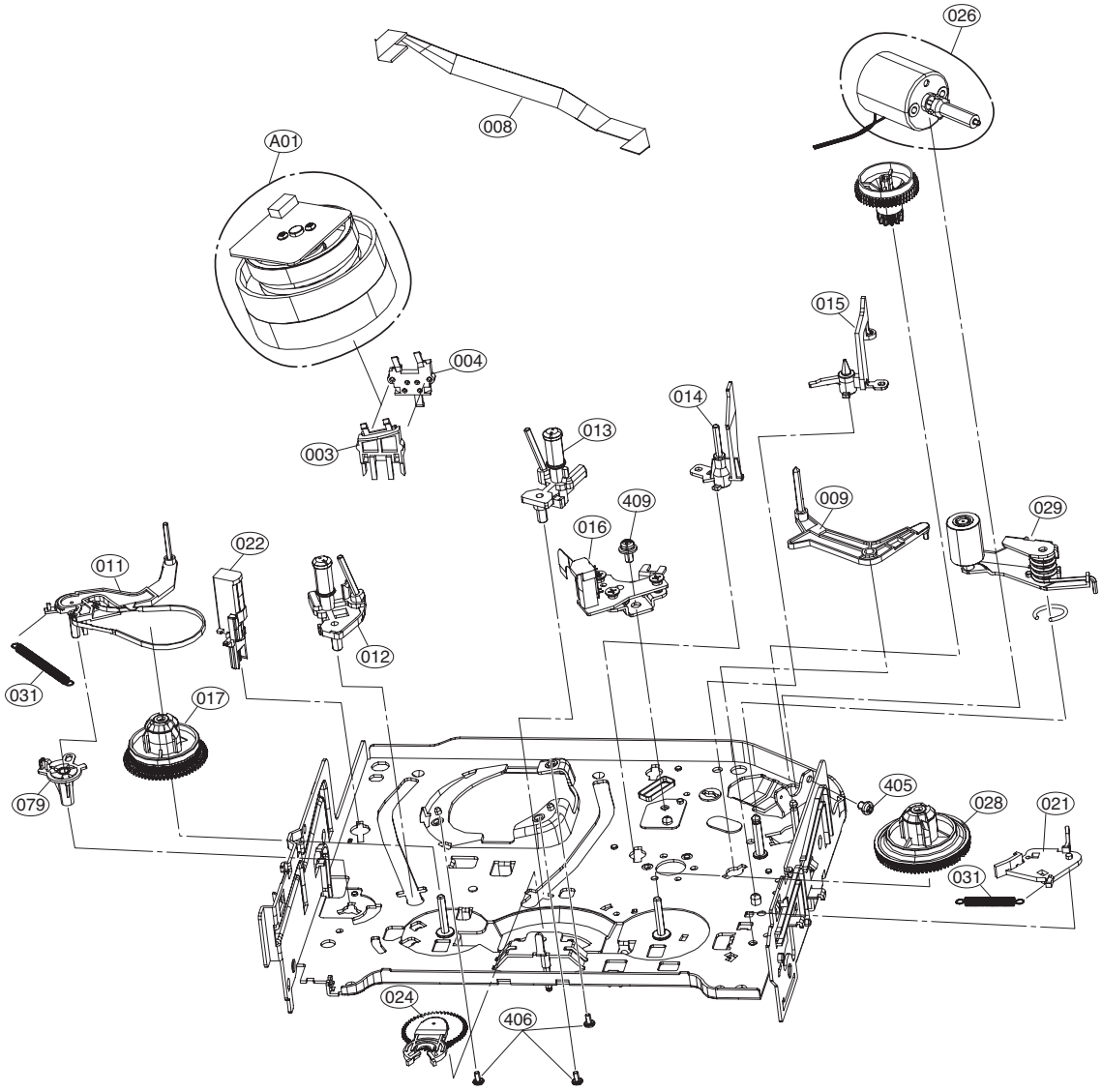
6-1-1 Cabinet Section



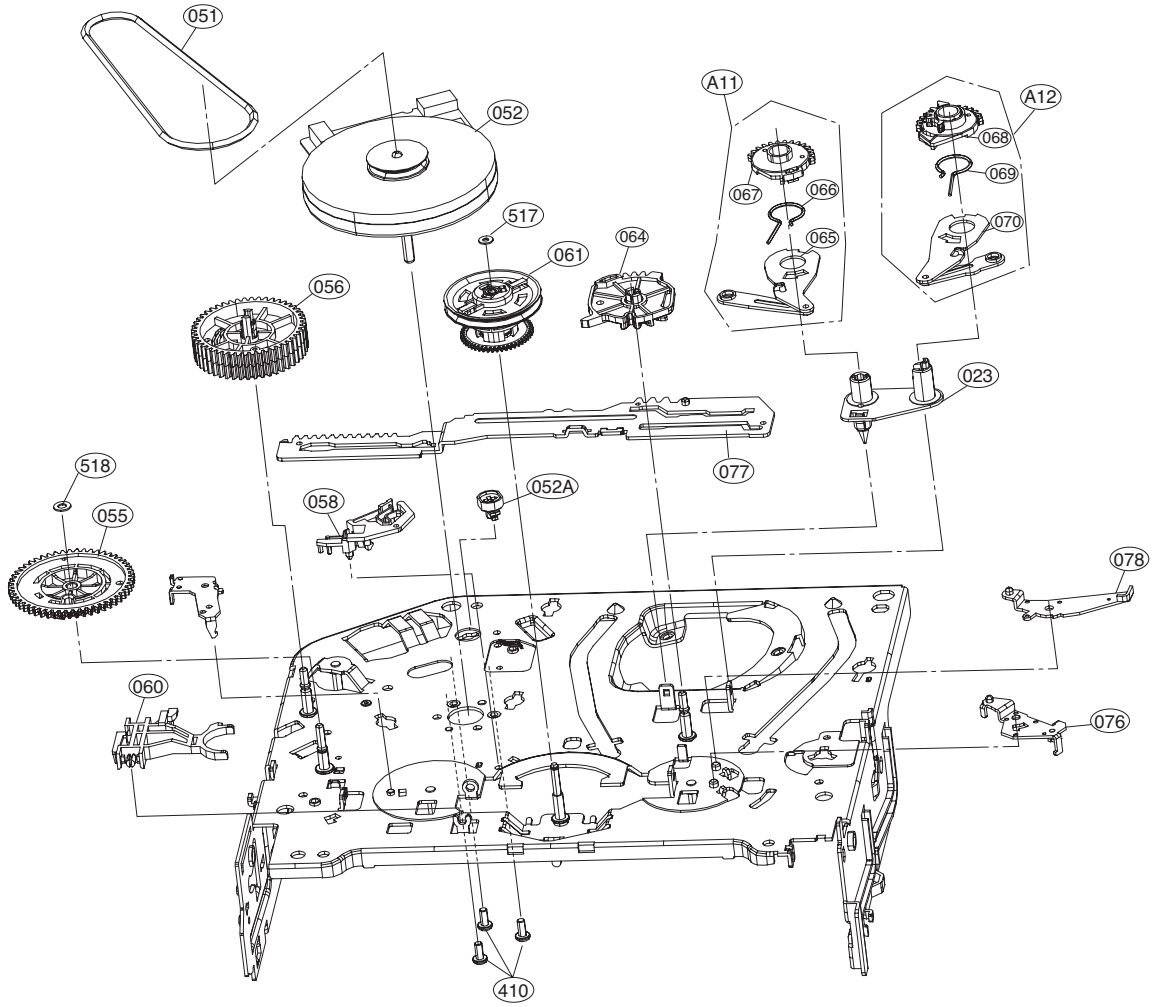
6-1-2 F / L Mechanism Section



6-1-3 Deck Mechanism Section - Top view



6-1-4 Deck Mechanism Section - Bottom view



THE UPDATED PARTS LIST

FOR THIS MODEL IS

AVAILABLE ON ESTA

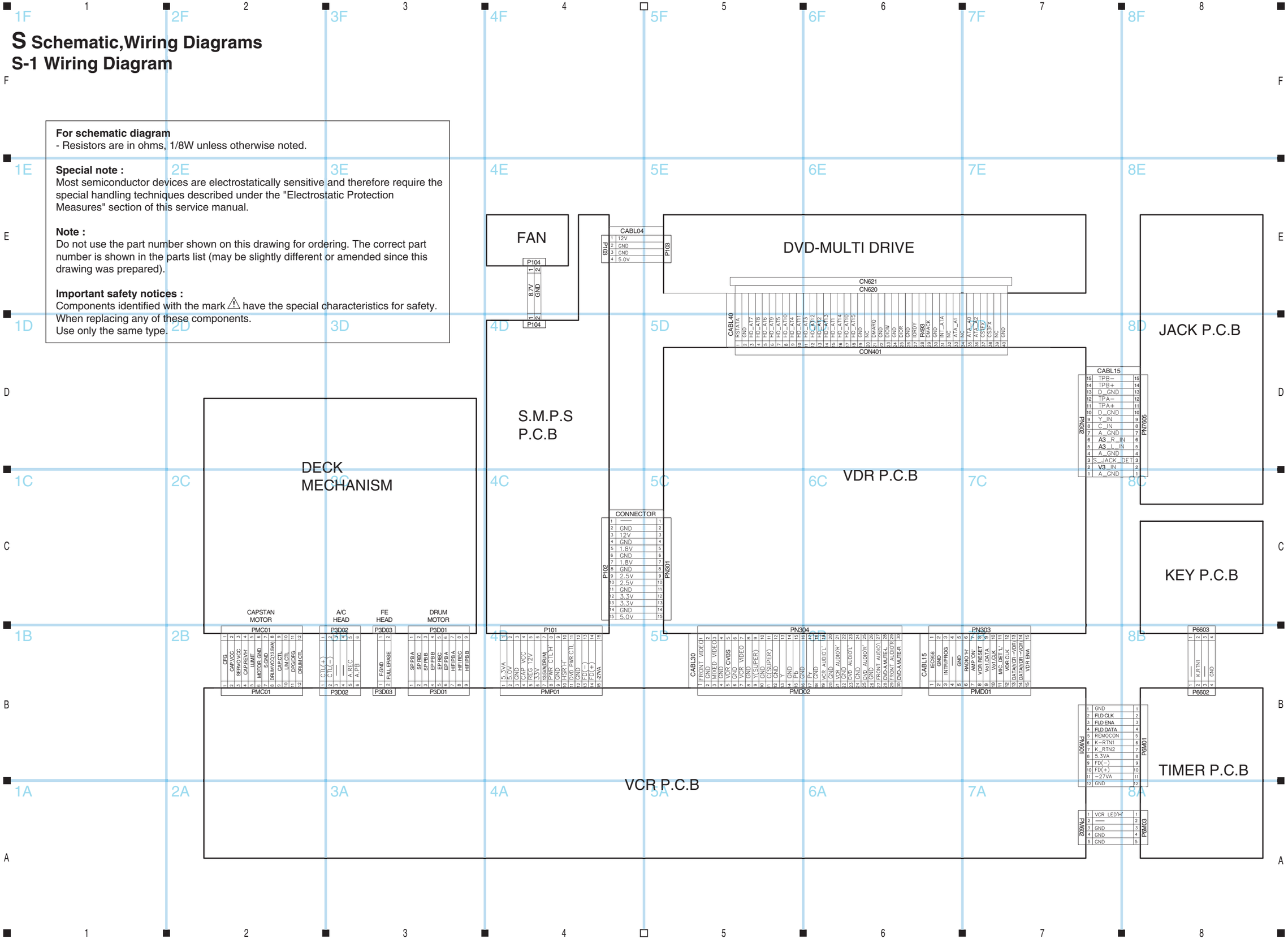
S Schematic,Wiring Diagrams
S-1 Wiring Diagram

For schematic diagram
- Resistors are in ohms, 1/8W unless otherwise noted.

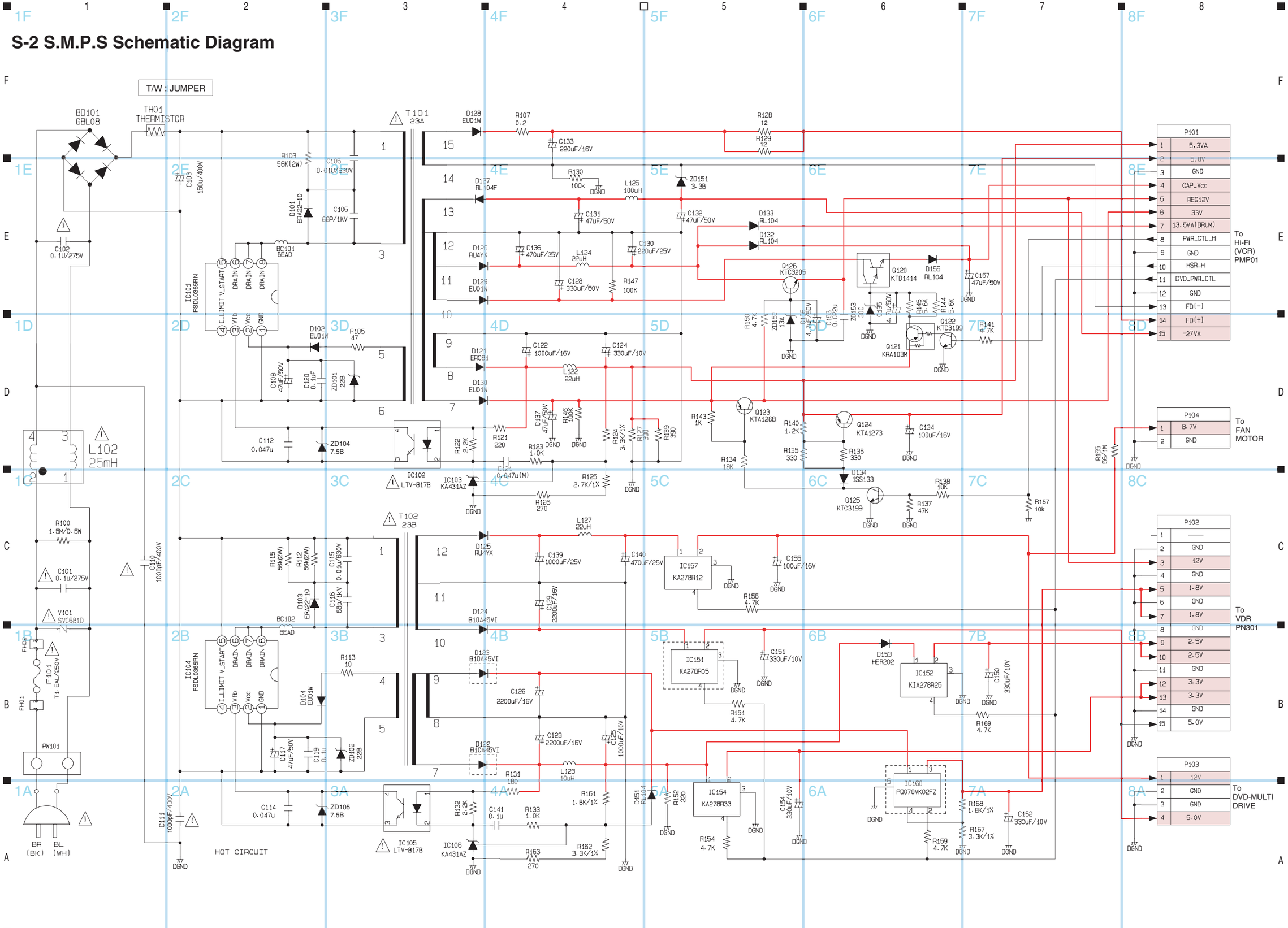
Special note :
Most semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described under the "Electrostatic Protection Measures" section of this service manual.

Note :
Do not use the part number shown on this drawing for ordering. The correct part number is shown in the parts list (may be slightly different or amended since this drawing was prepared).

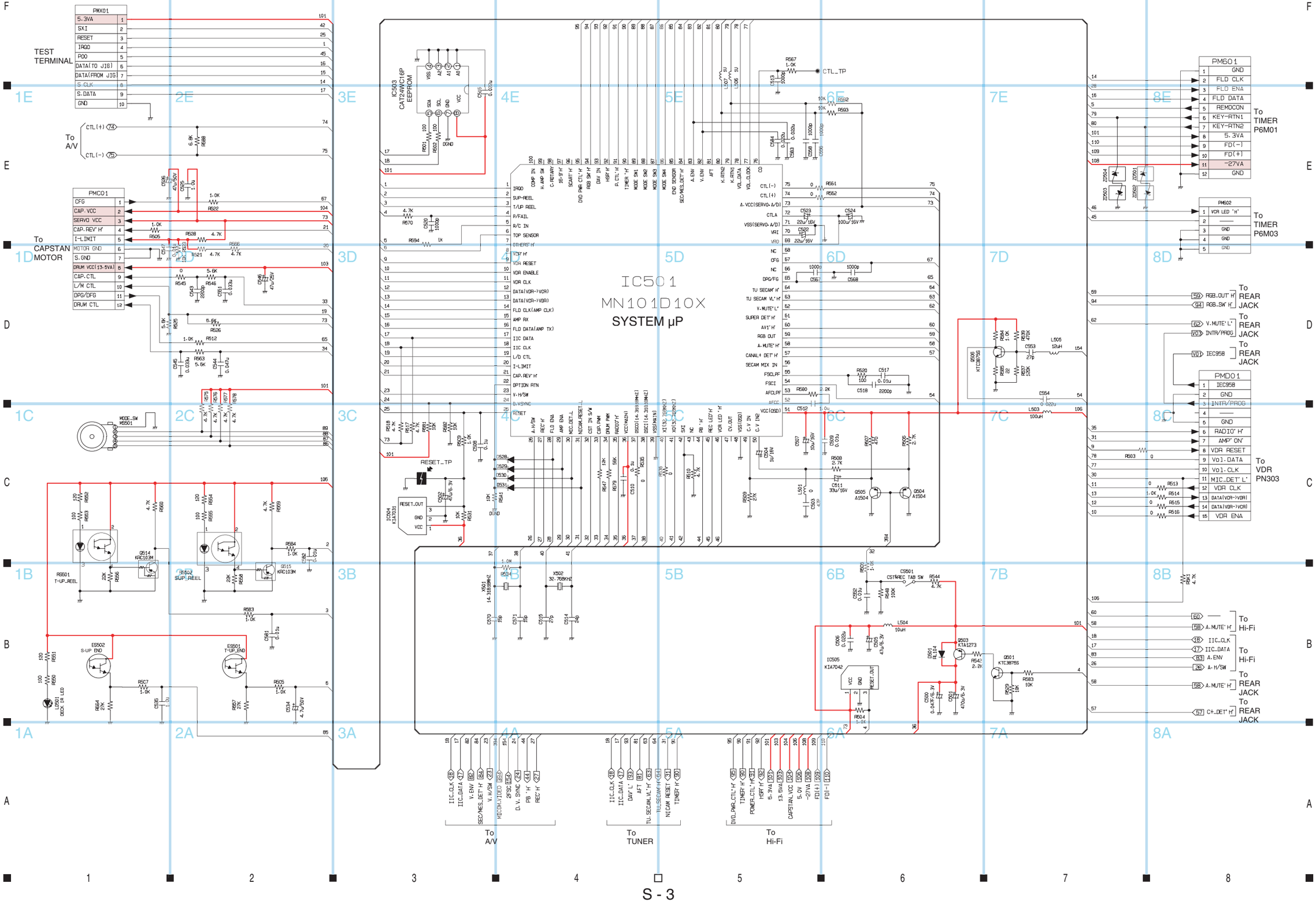
Important safety notices :
Components identified with the mark ⚠ have the special characteristics for safety.
When replacing any of these components.
Use only the same type.



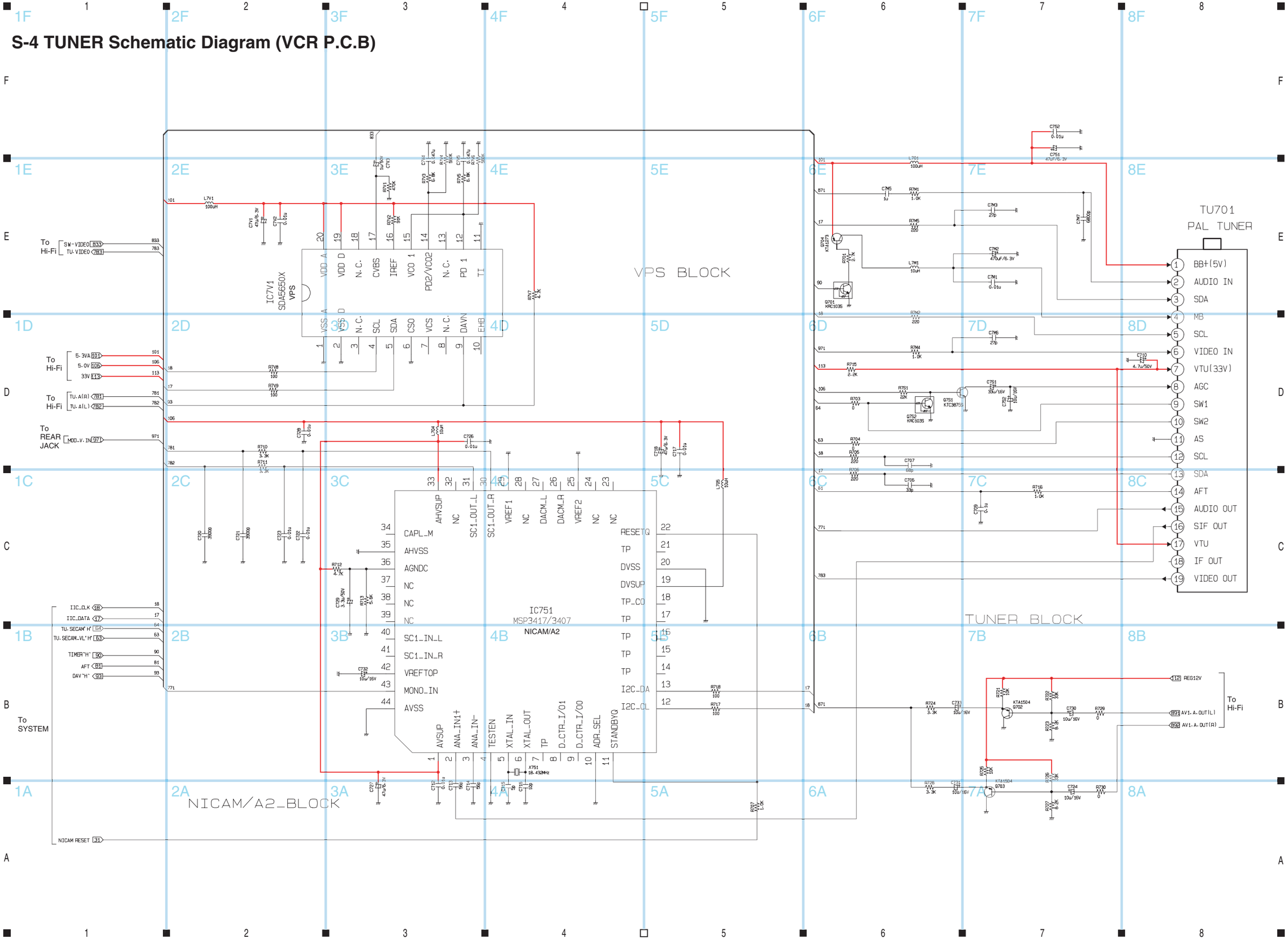
S-2 S.M.P.S Schematic Diagram



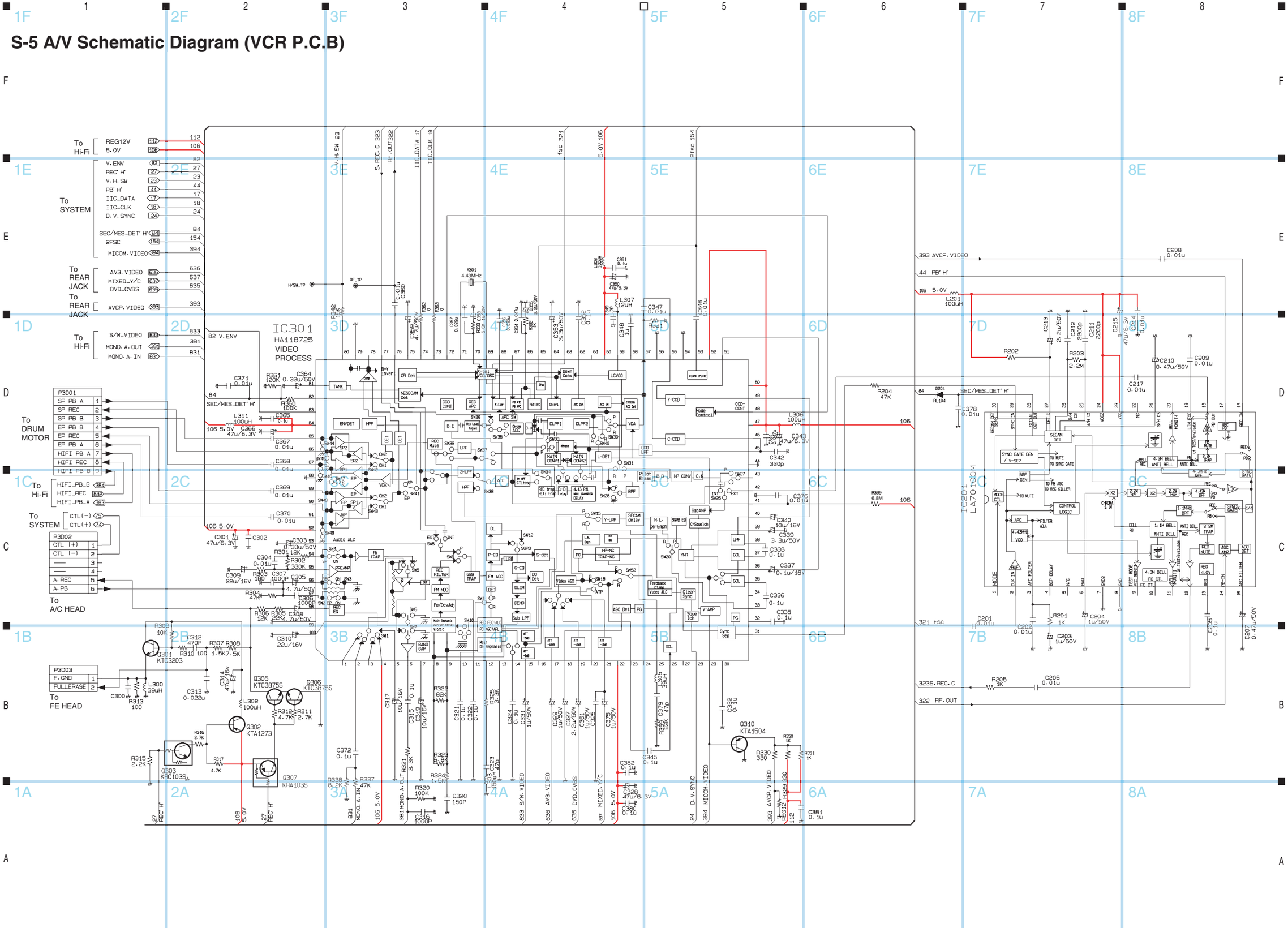
S-3 SYSTEM Schematic Diagram (VCR P.C.B)



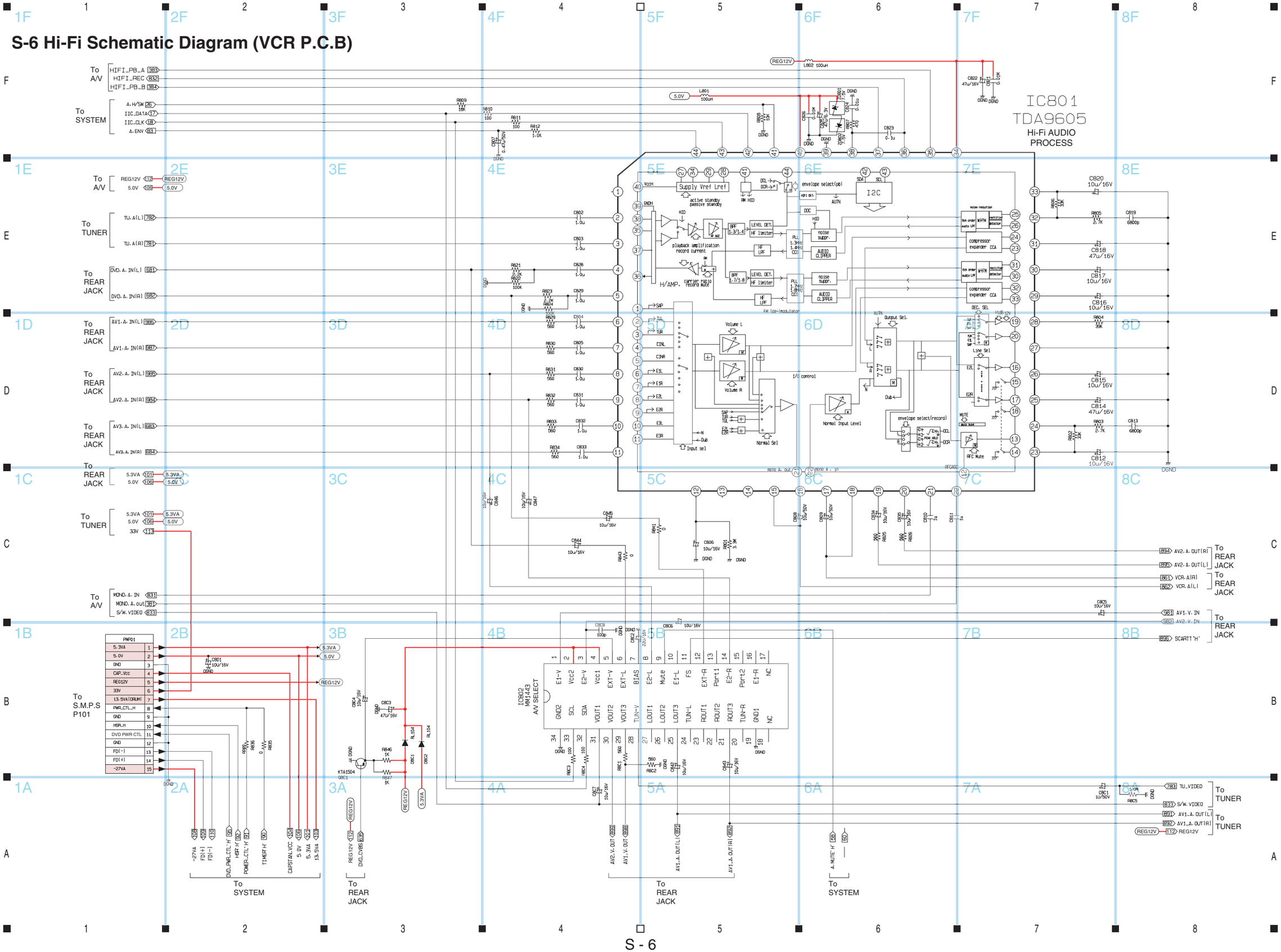
S-4 TUNER Schematic Diagram (VCR P.C.B)



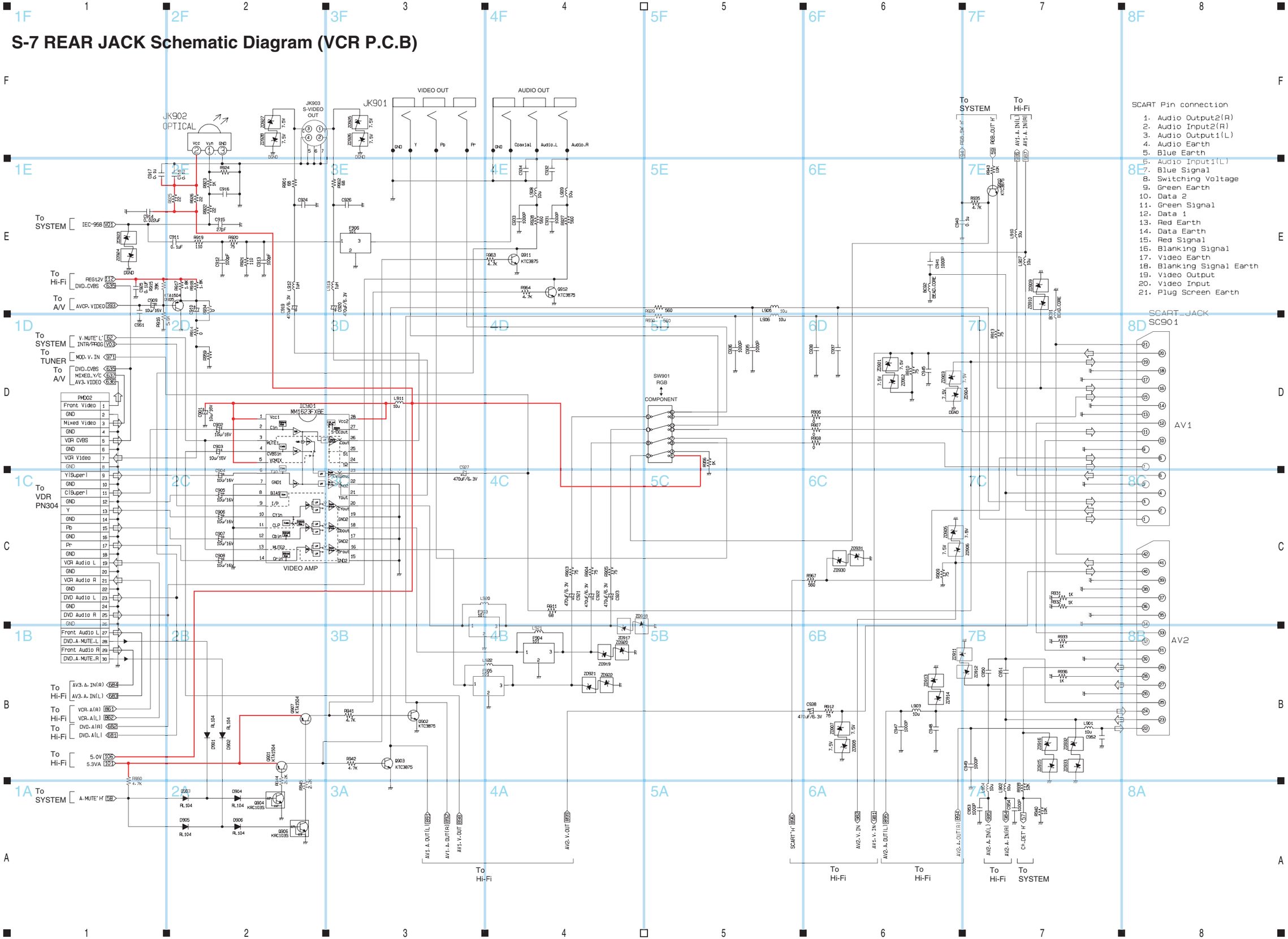
S-5 A/V Schematic Diagram (VCR P.C.B)



S-6 Hi-Fi Schematic Diagram (VCR P.C.B)



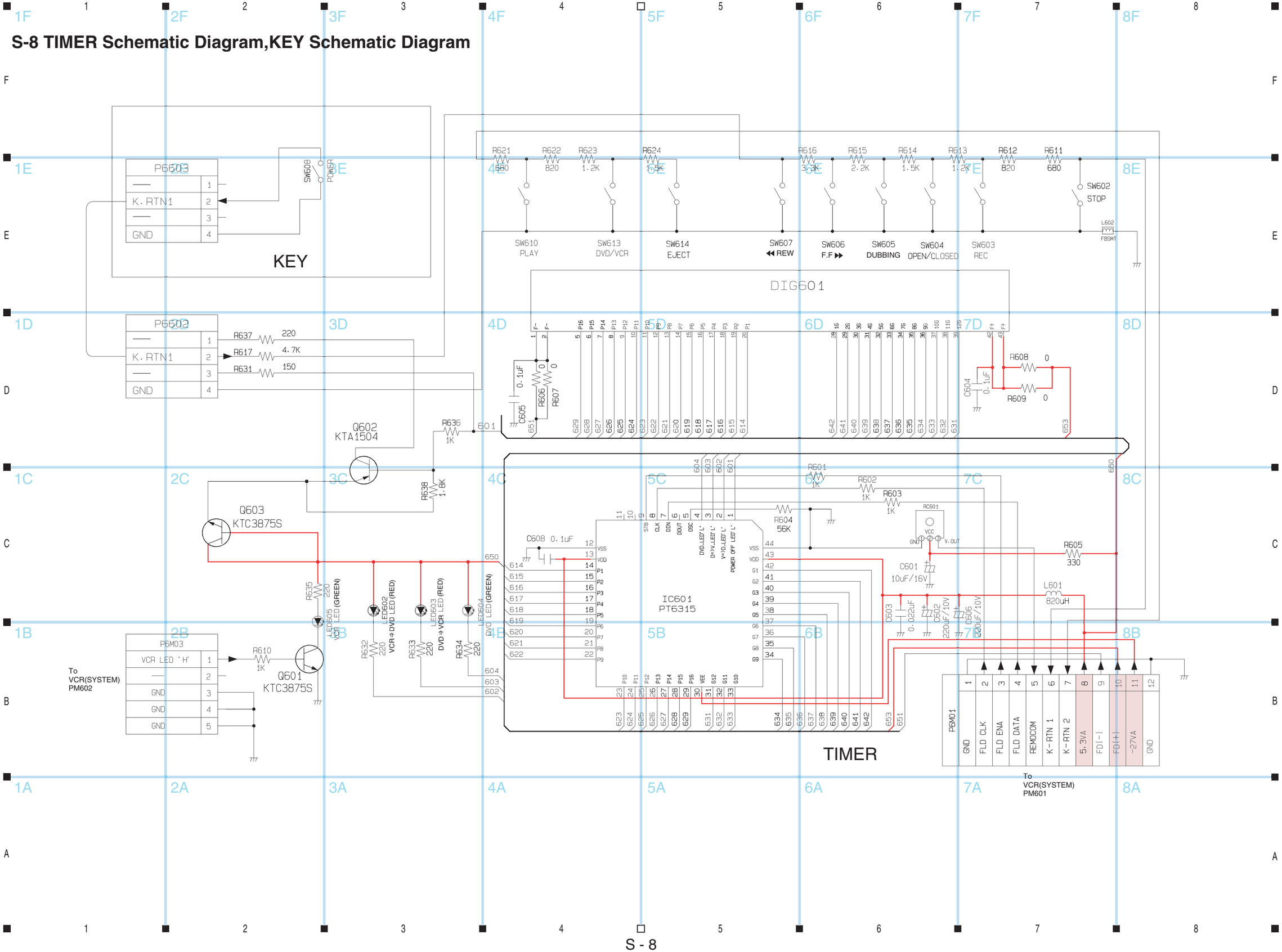
S-7 REAR JACK Schematic Diagram (VCR P.C.B)



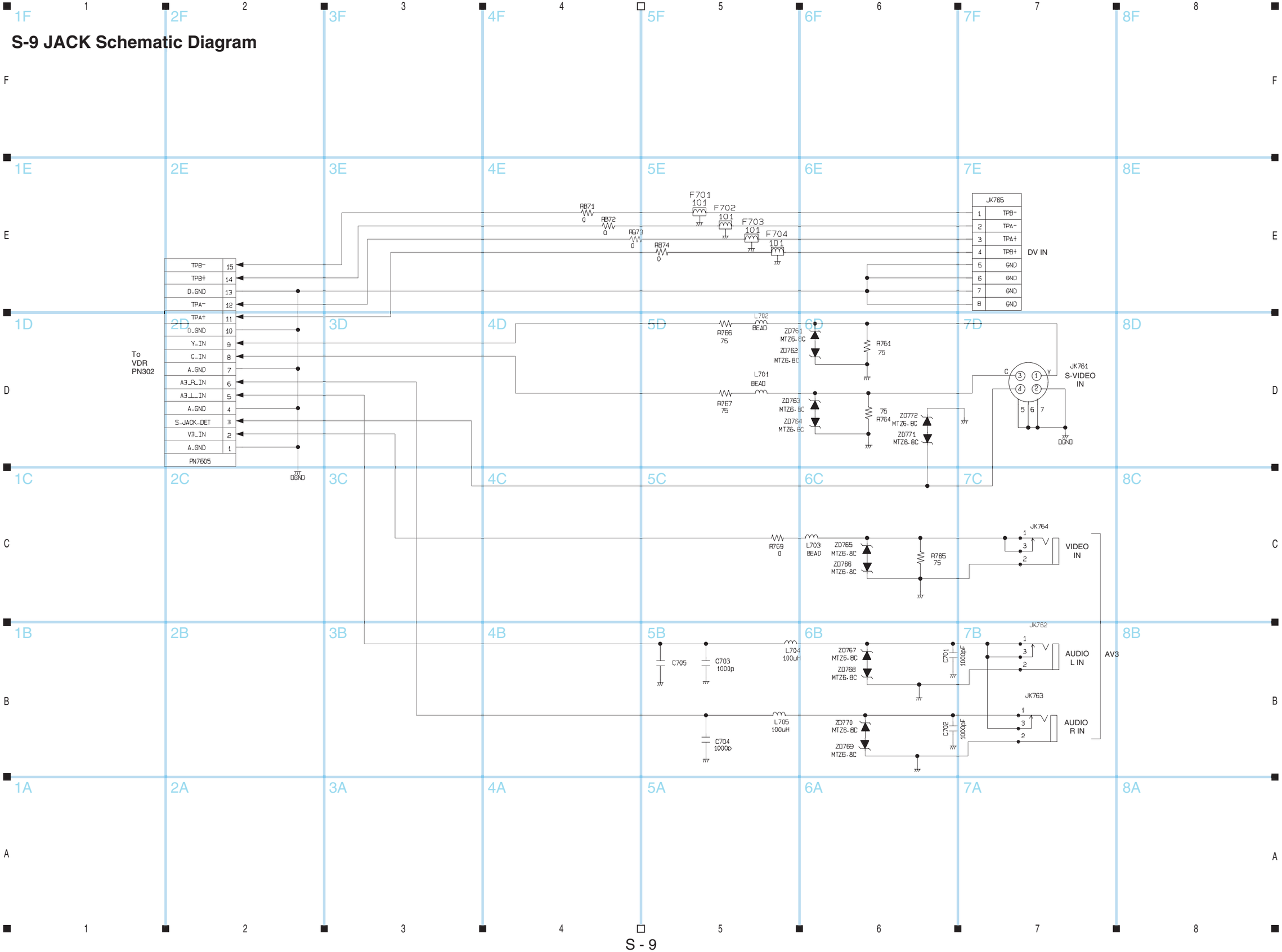
SCART Pin connection

1. Audio Output2(R)
2. Audio Input2(R)
3. Audio Output1(L)
4. Audio Earth
5. Blue Earth
6. Audio Input1(L)
7. Blue Signal
8. Switching Voltage
9. Green Earth
10. Data 2
11. Green Signal
12. Data 1
13. Red Earth
14. Data Earth
15. Red Signal
16. Blanking Signal
17. Video Earth
18. Blanking Signal Earth
19. Video Output
20. Video Input
21. Plug Screen Earth

S-8 TIMER Schematic Diagram,KEY Schematic Diagram

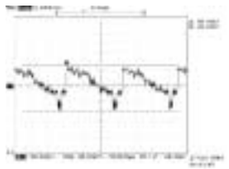


S-9 JACK Schematic Diagram

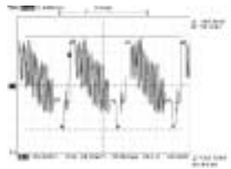


S-10 A/V,SYSTEM Circuit Waveforms

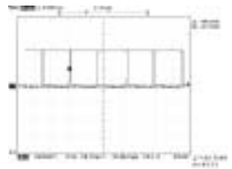
IC301 (A/V)

① 

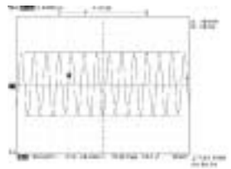
IC301 Pins 8, 9
PB mode
500mvp-p

② 

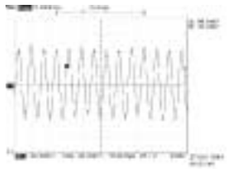
IC301 Pins 15, 17,
19,21
Video in 1Vp-p

③ 

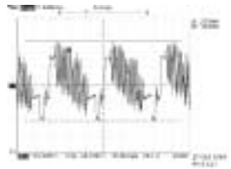
IC301 Pin 31
PB/REC mode
4.0Vp-p

④ 

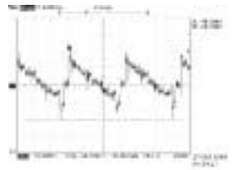
IC301 Pin 98
REC mode
1.1Vp-p

⑤ 

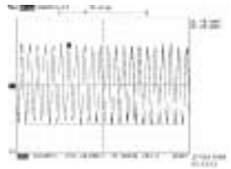
IC301 Pin 94
REC mode
2.0Vp-p

⑥ 

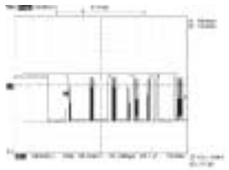
IC301 Pin 29
PB mode
2.02Vp-p

⑦ 

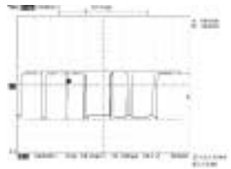
IC301 Pin 57
PB mode
400mVp-p

⑧ 

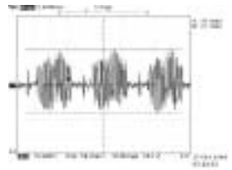
IC301 Pin 63
PB mode
400mVp-p

⑨ 

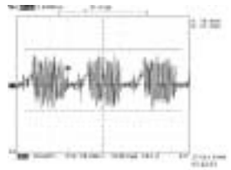
IC301 Pin 73
PB/REC mode
5Vp-p

⑩ 

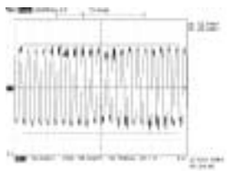
IC301 Pin 74
PB/REC mode
5Vp-p

⑪ 

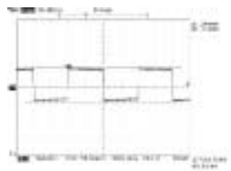
IC301 Pin 77
REC mode
340mVp-p

⑫ 

IC301 Pin 42
PB mode
300mVp-p

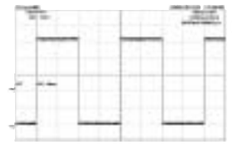
⑬ 

IC301 Pin 53
PB mode
400mVp-p

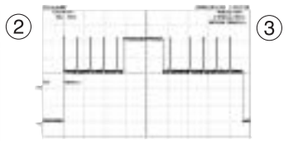
⑭ 

IC301 Pin 80
PB mode
3.6Vp-p

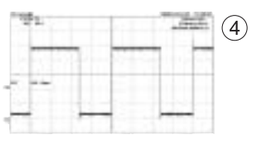
IC501 (SYSTEM)

① 

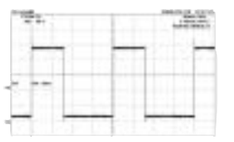
V.HSW
(IC501 Pin 23)
1V/10mS
REC/PB MODE

② 

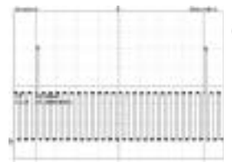
DV.SYNC
(IC501 PIN 24)
1V/100uS
QUE/REV MODE

③ 

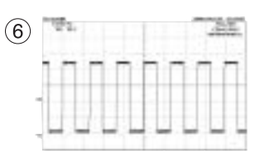
CTL(+)
(IC501 Pin 74)
1V/10mS

④ 

CTL(-)
(IC501 Pin 75)
1V/10mS

⑤ 

DFG/DFG
(IC501 PIN 65)
1V/10mS
REC/PB MODE

⑥ 

CFG
(IC501 Pin 67)
1V/10mS

S-11 CIRCUIT VOLTAGE CHART

MODE / PIN NO.	EE	PLAY
IC301		
1	20m	100m
2	20m	100m
3	20m	100m
4	1.95	4.88
5	1.94	1.88
6	2.64	3.12
7	2.8	2.74
8	2.5	1.7
9	2.04	1.3
10	1.80	1.88
11	2.0	1.8
12	1.6	0.72
13	0	0
14	1.26	1.3
15	3.40	3.36
16	0	4.78
17	2.38	2.32
18	1.88	2.84
19	3.02	2.94
20	0	0
21	2.38	2.34
22	4.88	4.82
23	2.64	2.24
24	0	0
25	2.08	2.14
26	3.08	2.66
27	0	0
28	150m	140m
29	3.88	3.18
30	2.08	2.74
31	4.74	4.72
32	2.08	2.12
33	2.42	2.26
34	1.58	1.54
35	3.30	3.36
36	2.50	2.32
37	3.10	3.18
38	2.60	2.28
39	1.40	1.42
40	2.30	2.16
41	1.08	1.58
42	1.82	1.84
43	2.04	2.28
44	0	0
45	2.88	3.04
46	2.0	2.98
47	4.82	4.78
48	120m	2.40
49	3.48	1.94
50	4.78	4.74
51	2.08	1.98
52	4.8	4.70
53	2.60	2.8
54	0	0

MODE / PIN NO.	EE	PLAY
55	1.3	1.48
56	0	0
57	2.08	2.18
58	1.78	2.14
59	4.6	4.62
60	4.62	4.62
61	3.82	0
62	2.2	2.08
63	2.32	2.32
64	1.62	1.64
65	1.62	2.28
66	2.30	1.68
67	0	0
68	1.12	1.14
69	2.3	2.38
70	0.82	0.82
71	2.2	2.18
72	100m	2.42
73	4.96	4.98
74	4.96	4.98
75	2.56	2.54
76	2.34	2.18
77	2.68	2.64
78	0	4.72
79	0	0
80	2.16	2.68
81	4.06	20m
82	0	0
83	120m	2.72
84	2.76	4.74
85	2.114	2.42
86	2.04	2.08
87	2.04	2.08
88	0	0
89	2.14	2.08
90	2.14	2.08
91	2.14	2.08
92	4.88	4.89
93	300m	260m
94	2.48	2.40
95	2.48	1.86
96	2.06	1.86
97	0	0
98	2.30	2.46
99	0	20m
100	2.48	2.42
IC501		
1	0	0
2	4.52	4.82
3	4.84	4.84
4	4.64	4.58
5	4.56	4.56
6	80m	60m
7	0	0
8	4.98	4.98

MODE / PIN NO.	EE	PLAY
9	4.98	5.30
10	4.80	4.80
11	4.82	4.82
12	4.72	4.82
13	4.92	4.92
14	5.02	5.02
15	0	0
16	4.98	4.98
17	5.04	5.04
18	4.98	9.98
19	2.46	2.46
20	3.36	3.36
21	0	0
22	0	0
23	4.96	4.96
24	120m	140m
25	4.94	4.94
26	4.92	4.92
27	20m	20m
28	5.02	5.02
29	4.98	4.98
30	4.84	4.84
31	5.00	5.00
32	0	0
33	4.98	4.94
34	0	5.00
35	5.02	100m
36	3.16	3.12
37	5.70	-
38	0	5.70
39	520m	0
40	4.84	520m
41	4.83	-
42	4.86	4.86
43	0	0
44	5.02	5.0
45	0	0
46	3.94	3.94
47	2.88	2.88
48	0	0
49	0.98	2.94
50	1.84	1.94
51	0.98	4.78
52	3.28	3.28
53	2.38	2.38
54	2.52	2.54
55	1.88	1.88
56	0	0
57	0	0
58	120m	120m
59	4.92	4.92
60	4.92	4.92
61	0	0
62	4.82	4.82
63	3.98	3.98

MODE / PIN NO.	EE	PLAY
64	0	0
65	2.36	2.36
66	0	0
67	4.68	9.68
68	0	0
69	2.48	2.48
70	2.48	2.48
71	0	0
72	2.48	4.98
73	4.92	4.92
74	0	0
75	2.52	2.42
76	2.42	2.48
77	80m	80m
78	0	0
79	4.02	4.96
80	4.96	4.96
81	2.8	280m
82	1.0	2.62
83	120m	3.24
84	0	1.96
85	0	0
86	4.98	4.9
87	4.98	4.98
88	5.0	5.0
89	0	0
90	4.88	4.88
91	0	0
92	0	0
93	5.04	5.04
94	4.88	0
95	4.98	4.98
96	0	0
97	0	0
98	4.98	4.98
99	20m	4.98
100	0	0
IC751		
1	4.88	4.88
2	1.46	1.48
3	1.38	1.38
4	0	0
5	2.26	2.24
6	2.38	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	5.0
12	5.0	5.0
13	5.0	0
14	0	0
15	0	0
16	0	0
17	0	0

MODE / PIN NO.	EE	PLAY
18	0	0
19	4.88	4.88
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	2.96	3.98
31	2.96	3.98
32	0	0
33	4.88	4.88
34	3.64	3.58
35	0	0
36	2.62	2.58
37	0	0
38	0	0
39	0	0
40	2.54	2.54
41	2.54	2.56
42	2.48	2.48
43	2.30	2.34
44	0	0
IC7V1		
1	0	0
2	0	0
3	0	142m
4	DA/CL(5.34)	DA/CL(5.34)
5	DA/CL(5.34)	DA/CL(5.34)
6	0	0
7	DA/CL(5.34)	DA/CL(5.34)
8	0	0
9	DA/CL(5.34)	DA/CL(5.34)
10	DA/CL(5.34)	DA/CL(5.34)
11	0	0
12	DA/CL(2.82)	DA/CL(2.82)
13	0	0
14	DA/CL(2.82)	DA/CL(62m)
15	2.89	1.41
16	1.53	950M
17	DA/CL(1.14)	DA/CL(810m)
18	0	0
19	5.26	5.24
20	5.26	5.24
IC801		
1	3.28	3.24
2	3.28	3.28
3	3.28	3.26
4	3.28	3.92
5	3.28	3.92
6	3.28	3.26

MODE / PIN NO.	EE	PLAY
7	3.28	3.74
8	3.28	3.24
9	3.28	3.24
10	3.28	3.24
11	3.28	3.26
12	0	0
13	3.78	4.52
14	0	0
15	0	640m
16	5.82	6.64
17	5.28	6.68
18	0	620m
19	6.28	6.66
20	6.28	6.72
21	4.46	4.42
22	3.28	4.02
23	3.62	3.68
24	3.74	4.12
25	3.74	3.76
26	0.1	640m
27	0	0
28	3.7	3.68
29	3.66	3.64
30	0.7	680m
31	3.72	3.72
32	3.74	4.08
33	3.62	3.68
34	13.4	13.32
35	580m	520m
36	0	520m
37	580m	520m
38	0	0
39	0	20m
40	4.7	4.76
41	0	1.68
42	5.0	5.04m
43	5.0	4.96
44	20m	3.38
IC901		
1	4.76	4.68
2	2.02	2.24
3	4.88	4.88
4	1.64	1.78
5	4.72	4.78
6	1.88	1.88
7	0	0
8	2.26	2.18
9	0	0
10	1.64	1.72
11	0	0
12	1.92	2.08
13	4.86	4.82
14	1.92	2.08
15	0	2.31
16	2.26	2.64

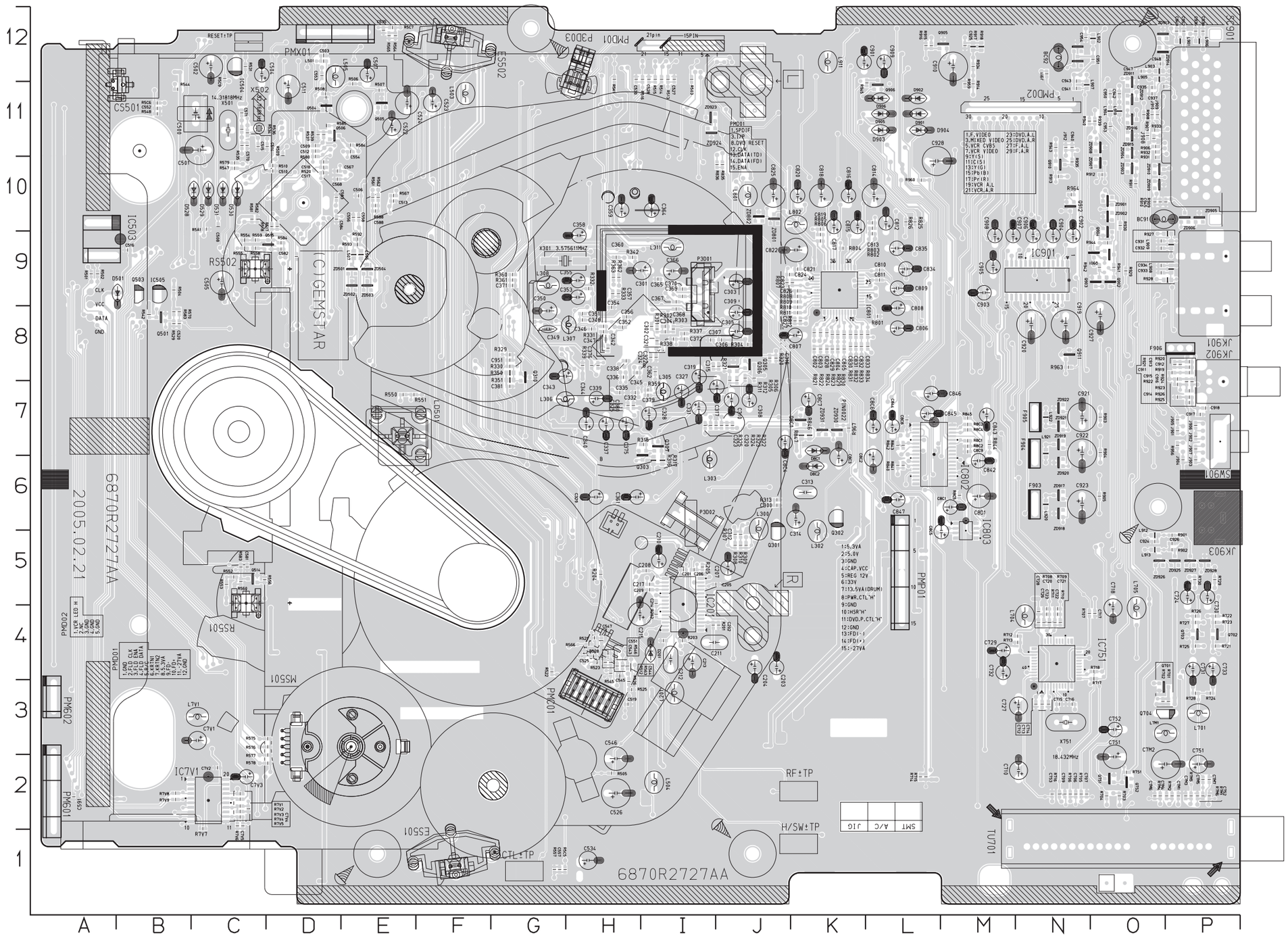
MODE / PIN NO.	EE	PLAY
17	0	0
18	2.28	2.74
19	0	0
20	2.56	2.58
21	2.64	2.68
22	0	0
23	2.56	2.92
24	0	0
25	0	0
26	2.52	2.98
27	20m	0
28	4.72	4.68
IC201		
1	2.51	2.51
2	2.39	2.39
3	3.54	3.53
4	2.57	2.56
5	1.52	1.34
6	0.43	3.68
7	0	0
8	0	0
9	3.04	3.03
10	2.52	2.52
11	2	2.05
12	3.22	1.97
13	3.99	3.99
14	2.5	2.49
15	3.11	1.93
16	3.2	3.18
17	27.4m	4.11
18	112.1m	3.35
19	2.27	2.26
20	1.99	2.12
21	2.31	2.37
22	0.78	0.81
23	5.02	5.01
24	5.02	5.0
25	2.44	2.27
26	2.44	2.26
27	2.82	2.85
28	181.5m	187.4m
29	371.6m	212.2m
30	2.08	2.08

E-MODE NO.	E	C	B
Q501	0	0	0.7
Q503	5.19	5.19	4.57
Q504	Y/C_VIDEO	0	Y/C_VIDEO
Q505	Y/C_VIDEO	0	Y/C_VIDEO
Q506	0	2Fsc	2Fsc
Q514	0	0	4.87
Q515	0	0	4.87
Q301	0	5.04	0
Q302	5.04	0	5.04
Q303	0	0	0
Q305	4.93	4.81	4.79
Q307	5.04	5.04	0
Q310	Y/C_VIDEO	0	Y/C_VIDEO
Q7S1	0	1.47	0
Q7S2	0	0	5.13
Q901	5.1	0	4.5
Q902	0	0	0
Q903	0	0	0
Q904	0	4.5	0
Q905	2.69	0	2

C Circuit Board Diagrams

C-1 VCR Circuit Board Diagram

COMPONENT SIDE



LOCATION GUIDE

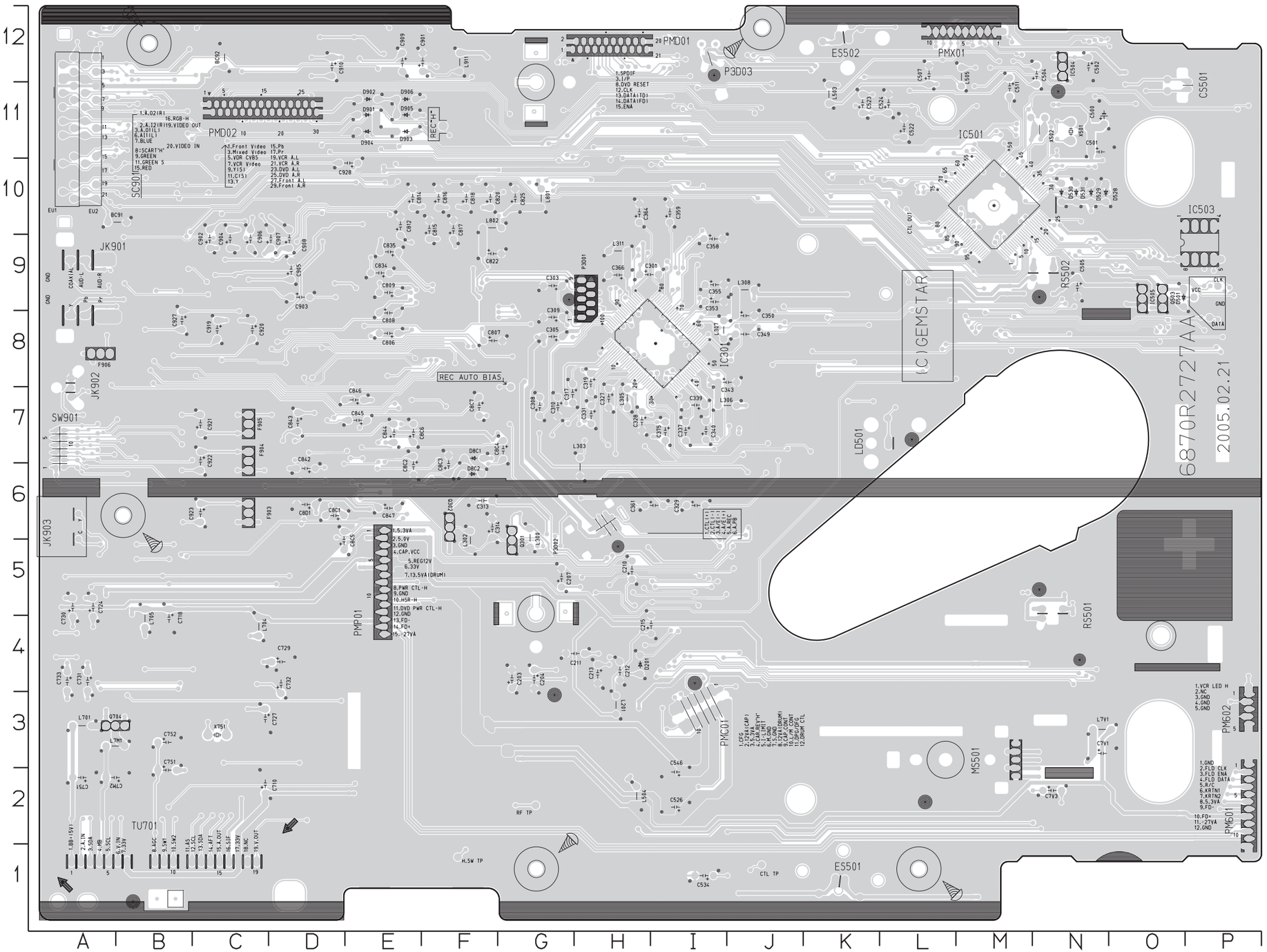
BC91	O10	C367	I9	C721	N4	C8C9	M7	IC504	C12
BC92	N12	C368	I8	C722	N4	C8D1	M6	IC505	B9
C201	I5	C369	I9	C723	N4	C901	K12	IC751	N4
C202	J4	C370	I9	C724	P5	C902	N9	IC7V1	K2
C203	J4	C371	I9	C726	N4	C903	M9	IC801	K9
C204	J4	C372	I8	C727	N3	C904	N9	IC802	L7
C205	J5	C375	H7	C728	N4	C905	M9	IC803	M5
C206	I5	C376	H8	C729	M4	C906	N9	IC901	N9
C207	J5	C378	I4	C730	P5	C907	M9	J901	P7
C208	I5	C379	I7	C731	P4	C908	M9	J902	P7
C209	I5	C380	H7	C732	M4	C909	L12	J903	P6
C210	I5	C381	G7	C733	P4	C910	M12	J904	P6
C211	I4	C500	C11	C751	P2	C911	P8	J905	P7
C212	I4	C501	C11	C752	P2	C912	P8	J906	P7
C213	I4	C502	C12	C7M1	P2	C913	P8	J907	P7
C214	I5	C503	D12	C7M2	P2	C914	P7	J908	O11
C215	H4	C504	C12	C7M3	P2	C915	P8	J909	O11
C217	I5	C505	C9	C7M4	P2	C916	P7	J910	O11
C300	J6	C506	E10	C7M5	P2	C917	P7	J911	N12
C301	I9	C507	E12	C7M6	O2	C918	P7	J912	N11
C302	I8	C508	C10	C7M7	P2	C919	N8	JK901	P8
C303	J9	C509	D11	C751	O2	C920	N8	JK902	P7
C304	I8	C510	D10	C752	O3	C921	N7	JK903	P6
C305	J8	C511	D11	C7S3	N2	C922	N7	L201	I3
C306	J8	C512	D11	C7V1	C3	C923	N8	L300	J6
C307	I8	C513	E10	C7V2	C2	C924	O5	L302	K5
C308	J7	C514	D11	C7V3	C2	C925	M12	L303	I6
C309	J8	C515	C11	C7V4	C2	C926	P5	L305	I7
C310	J7	C516	B9	C7V5	C2	C927	P5	L306	G7
C312	J5	C517	D10	C802	K8	C928	L10	L307	H8
C313	K6	C518	D10	C803	K8	C931	O9	L308	G9
C314	K6	C519	H3	C804	K8	C932	O9	L311	I9
C315	I8	C520	B8	C805	K8	C933	O9	L501	D12
C316	J8	C522	E11	C806	L8	C934	O9	L503	F11
C317	J7	C523	E11	C807	K8	C935	K8	L504	J2
C319	I8	C524	E11	C808	L8	C936	P12	L505	D12
C320	J7	C525	H4	C809	L9	C937	O11	L506	E9
C321	I8	C526	H2	C810	L9	C938	P12	L507	E9
C322	I8	C527	I12	C811	L9	C939	O11	L508	P3
C323	I7	C528	I12	C812	L10	C941	N11	L704	N4
C324	I8	C530	H12	C813	L10	C942	O11	L705	O4
C325	H7	C534	H1	C814	L10	C943	N11	L7M1	P3
C327	I7	C535	E12	C815	K10	C945	O10	L7V1	C3
C328	I7	C543	H4	C816	K10	C947	O12	L801	J10
C329	H6	C544	H4	C817	K10	C948	O12	L802	K10
C331	I7	C545	H4	C818	K10	C949	O12	L901	P12
C332	H7	C546	H2	C819	K10	C950	O11	L902	O12
C335	H7	C547	H4	C820	K10	C951	O12	L903	O12
C336	H8	C551	H4	C821	K9	C952	O11	L904	O11
C337	H7	C552	B11	C822	K9	C953	O11	L905	O12
C338	H8	C553	D12	C823	K9	C954	N12	L906	P12
C339	H7	C554	E11	C824	J9	C955	G8	L907	N11
C340	H7	C556	E10	C825	J10	CS501	B11	L908	P9
C342	H8	C557	G1	C826	K9	CTL±TP	G1	L909	P9
C343	G8	C558	E10	C827	K8	D201	I4	L910	O11
C344	H8	C567	D10	C828	K8	D501	O10	L911	K12
C345	H8	C568	D10	C829	K8	D528	C10	L912	O5
C346	H8	C570	C11	C830	K8	D529	C10	L913	O5
C347	H8	C571	C11	C831	K8	D530	C10	L920	N5
C348	H8	C581	C5	C832	K8	D531	C10	L921	N7
C349	G8	C582	D9	C833	L8	D8C1	K7	L922	N7
C350	G8	C583	D10	C834	L9	D8C2	K6	LD501	E7
C351	H8	C584	D10	C835	L9	D901	L11	M5501	D3
C352	H8	C588	E10	C842	M6	D902	L11	P3D01	I8
C353	H9	C591	A2	C843	M7	D903	L11	P3D02	I6
C354	H9	C706	N2	C844	L7	D904	L11	P3D03	H12
C355	H9	C707	N2	C845	L7	D905	L11		
C356	H8	C709	N2	C846	L7	D906	L11		
C357	H9	C710	N2	C847	L6	E5501	G1		
C358	H9	C712	N3	C8C1	M6	ES502	E12		
C359	H10	C713	N3	C8C2	L6	F903	N6		
C360	H9	C714	N3	C8C3	K6	F904	N7		
C361	H6	C715	N3	C8C4	L7	F905	N8		
C362	I8	C716	N3	C8C5	M5	F906	P8		
C364	I10	C717	O4	C8C6	L7	H/SW±TP	K1		
C365	I9	C718	O4	C8C7	K7	IC201	I5		
C366	I9	C720	N4	C8C8	L7	IC503	A10		

PMD01	A3	Q907	O9	R539	D11	R7M1	P2	R924	P7
PMD02	A3	Q910	N10	R542	B8	R7M2	P2	R925	P7
PMC01	H3	Q911	N8	R544	B11	R7M4	O2	R926	P7
PMD01	I12	Q912	N10	R545	H4	R7M5	P2	R927	P9
PMD02	M11	R201	I4	R546	H4	R7M6	P2	R928	P9
PMP01	L6	R202	I4	R547	C10	R7S1	O2	R929	O9
PMX01	D12	R203	I4	R548	B11	R7V1	C2	R930	O10
Q301	J5	R204	H5	R550	E7	R7V2	C2	R931	O10
Q302	K6	R205	I5	R551	E7	R7V3	C2	R932	O11
Q303	I6	R301	I8	R552	C5	R7V4	C2	R933	O11
Q305	J8	R302	I8	R553	C5	R7V5	C2	R934	M12
Q306	J8	R303	I8	R554	C9	R7V6	C2	R935	N10
Q307	I7	R304	J8	R555	C9	R7V7	C2	R936	O11
Q310	G8	R305	J8	R556	C5	R7V8	B2	R939	O11
Q501	B8	R306	J8	R557	G1	R7V9	B2	R940	N11
Q503	B9	R307	J5	R558	C9	R801	L8	R941	O9
Q504	D11	R308	J5	R559	C9	R802	L8	R942	O9
Q505	E11	R309	J5	R560	C5	R803	L10	R943	N11
Q506	D11	R310	J5	R561	E10	R804	K9	R944	O9
Q514	C5	R311	J7	R562	E10	R805	K9	R945	L11
Q515	D9	R312	J7	R563	H4	R806	K9	R956	P7
Q701	O3	R313	J6	R564	E12	R807	J9	R959	M11
Q702	P4	R315	I7	R565	E12	R808	K9	R960	L10
Q703	P4	R316	I6	R566	H4	R809	K9	R963	N8
Q704	P3	R317	I6	R567	E10	R810	K8	R964	N10
Q751	O2	R320	J8	R570	B8	R811	K8	R967	K7
Q752	O2	R321	J8	R575	D3	R812	K8	RESET±TP	M12
QBC1	K7	R322	J7	R576	D3	R821	K8	RF±TP	K2
Q901	O9	R323	J7	R577	D2	R822	K8	RS501	C5
Q902	O9	R324	J7	R578	D2	R823	K8	RS502	C9
Q903	O9	R325	I7	R579	C10	R824	K8	SC901	P10
Q904	O9	R329	G8	R580	D10	R825	L10	SW901	P7
Q905	M12	R330	G8	R581	C10	R826	L10	TU701	P1
Q906	L11	R331	H8	R582	C10	R829	K8	X301	O9
		R332	H9	R583	B8	R830	K8	X501	C11
		R333	H9	R584	E11	R831	K8	X502	C11
		R337	I8	R585	D11	R832	K8	X751	N3
		R338	I8	R588	E10	R833	K8	ZD501	E9
		R339	H8	R592	E9	R834	L8	ZD502	E9
		R342	H9	R593	E9	R835	J10	ZD503	E9
		R350	G8	R594	D9	R836	J10	ZD504	E9
		R351	G8	R5A1	C10	R840	L6	ZD801	J10
		R359	I7	R5B3	C5	R841	L6	ZD802	J10
		R360	G9	R5B4	D9	R842	L7	ZD901	O10
		R361	O9	R5C5	G1	R843	L7	ZD902	O10
		R362	H9	R5C6	B11	R844	M7	ZD903	O10
		R363	H9	R5C7	E12	R845	M7	ZD904	O11
		R501	A9	R5C9	C12	R846	K7	ZD905	P10
		R502	A9	R5K1	H12	R847	K7	ZD906	P10
		R503	I12	R701	P3	R8C1	M7	ZD907	O10
		R504	B9	R702	O3	R8C2	M7	ZD908	O11
		R505	H2	R703	O2	R8C3	M7	ZD909	O10
		R506	E11	R704	O2	R8C4	M7	ZD910	O10
		R507	E11	R705	N2	R8C5	M6	ZD911	O11
		R508	D11	R706	N2	R901	P5	ZD912	O11
		R509	D11	R707	N4	R902	P5	ZD913	O12
		R510	D10	R708	N4	R903	O7	ZD914	O12
		R512	H4	R709	N4	R904	O7	ZD915	O11
		R513	I12	R710	N4	R905	O6	ZD916	O11
		R514	I12	R711	N4	R906	O11	ZD917	N6
		R515	I12	R712	N4	R907	O11	ZD918	N6
		R516	I12	R713	N4	R908	O11	ZD919	N7
		R517	D10	R714	L2	R909	P10	ZD920	N6
		R518	D10	R715	L2	R910	O10	ZD921	N7
		R520	D10	R716	N2	R911	O10	ZD922	N7
		R521	H4	R717	O4	R912	O10	ZD923	I11
		R522	G4	R718	O4	R913	N10	ZD924	I11
		R523	H4	R721	P4	R914	M11	ZD925	P5
		R525	H3	R722	P4	R915	L12	ZD926	O5
		R526	H3	R723	P4	R916	L12	ZD927	P5
		R528	H4	R724	P3	R917	M12	ZD928	P5
		R529	B8	R725	P4	R918	M12	ZD930	K7
		R531	C12	R726	P4	R919	P8	ZD931	K7
		R534	C11	R727	P4	R920	P8	ZD932	N12
		R535	C11	R728	P3	R921	P8	ZD933	N12
		R536	C11	R729	P5	R922	P7		
		R537	D11	R730	P5	R923	P7		

CONDUCTOR SIDE

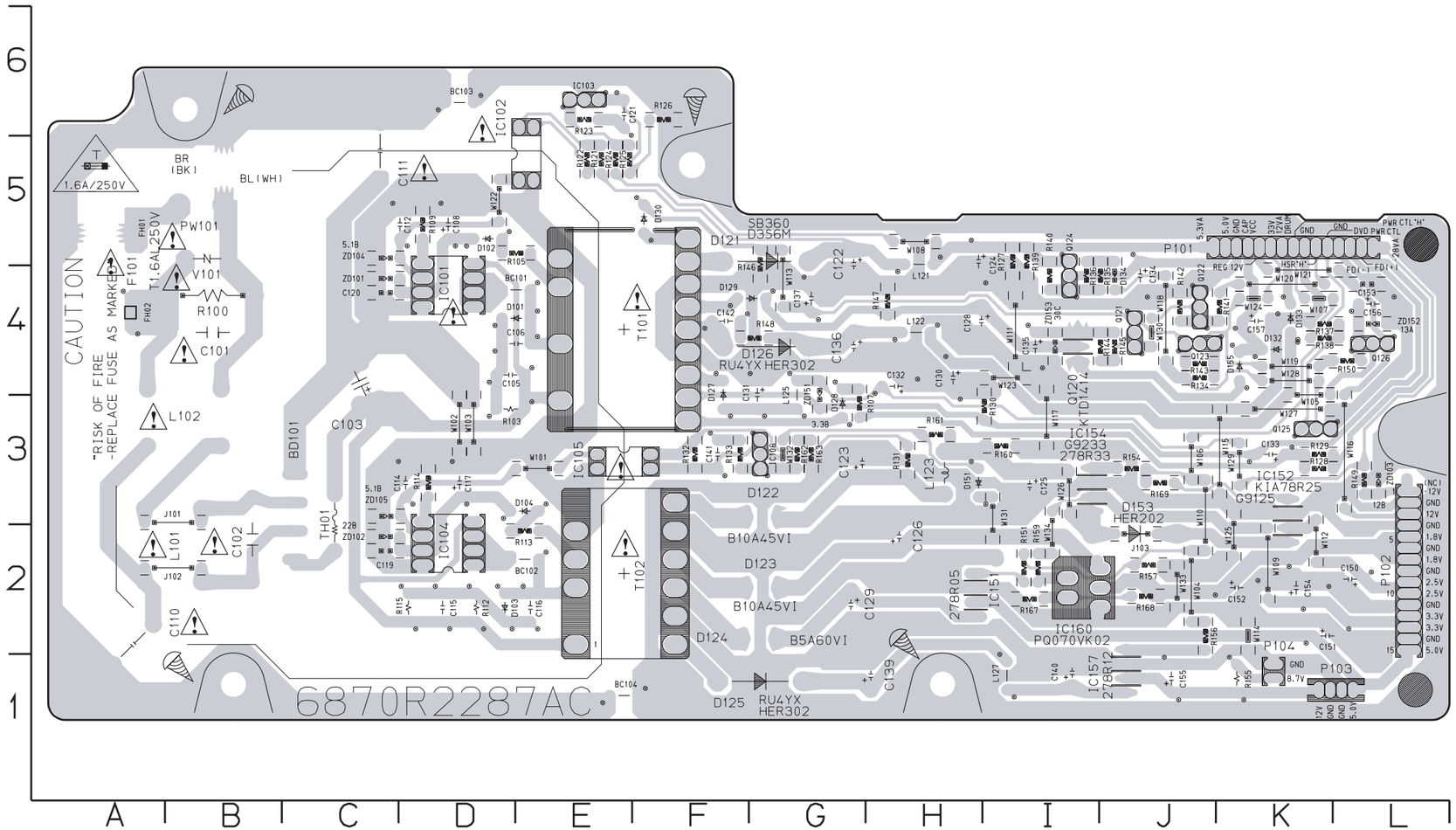
LOCATION GUIDE

IC301	I8
IC501	M10



C-2 S.M.P.S Circuit Board Diagram

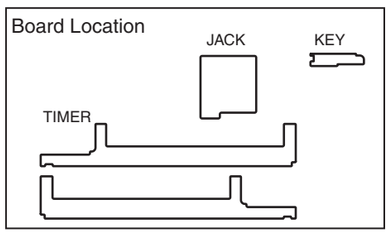
CONDUCTOR SIDE



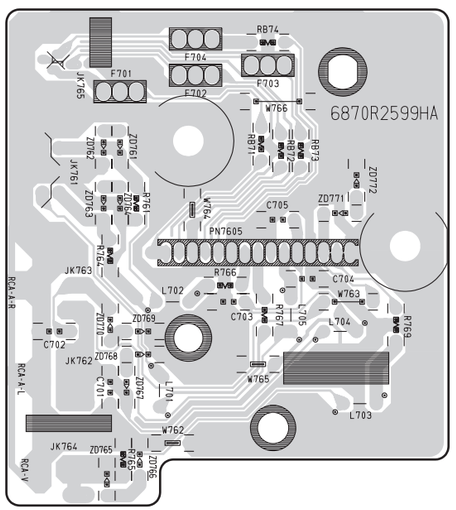
LOCATION GUIDE

BC101	E4	C152	K2	L101	B2	R135	J4
BC102	E2	C153	L4	L102	B3	R136	I4
BC103	D6	C154	K2	L121	H5	R137	K4
BC104	E1	C155	J1	L122	H4	R138	K4
BD101	C3	C156	L4	L123	H3	R139	I5
C101	B4	C157	K4	L125	G3	R140	I4
C102	B2	D101	E4	L127	I1	R141	K4
C103	C4	D102	D5	P101	J5	R142	J4
C105	D4	D103	D2	P102	L3	R143	J4
C106	E4	D104	E3	P103	K1	R144	J4
C108	D5	D121	G5	P104	K1	R145	J4
C110	A2	D122	G3	PW101	B5	R146	G5
C111	C5	D123	G2	Q120	I4	R147	H4
C112	D5	D124	G2	Q121	J4	R148	G4
C114	D3	D125	G1	Q122	J4	R149	L3
C115	D2	D126	G4	Q123	J4	R150	L4
C116	E2	D127	F3	Q124	I4	R151	I2
C117	D3	D128	G3	Q125	K3	R154	J3
C119	C2	D129	G4	Q126	L4	R155	K1
C120	C4	D130	F5	R100	B4	R156	J2
C121	E6	D132	K4	R103	D3	R157	J2
C122	G5	D133	K4	R105	E5	R159	I2
C123	G3	D134	J4	R107	G3	R160	I3
C124	H5	D151	H3	R109	D5	R161	H3
C125	I3	D153	J2	R112	D2	R162	G3
C126	H2	D155	K4	R113	E2	R163	G3
C128	H4	FH01	A5	R114	D3	R167	I2
C129	G2	FH02	A4	R115	D2	R168	J2
C130	H4	IC101	D4	R121	E5	R169	J3
C131	G3	IC102	E6	R122	E5	T101	E4
C132	H4	IC103	E6	R123	E6	T102	E2
C133	K3	IC104	D2	R124	E5	TH01	C3
C134	J4	IC105	F3	R125	E5	V101	B5
C135	I4	IC106	G3	R126	F6	ZD101	C4
C136	G4	IC151	H2	R127	I5	ZD102	C2
C137	G4	IC152	K2	R128	K3	ZD103	L3
C139	H1	IC154	I3	R129	K3	ZD104	C5
C140	I1	IC157	J1	R130	I3	ZD105	C3
C141	F3	IC160	I2	R131	H3	ZD151	G3
C142	F4	J101	B3	R132	F3	ZD152	L4
C150	L2	J102	B2	R133	F3	ZD153	I4
C151	K2	J103	J2	R134	J4		

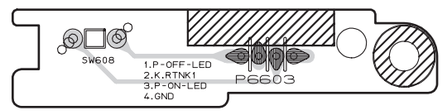
C-3 JACK Circuit Board Diagram, C-4 TIMER Circuit Board Diagram, C-5 KEY Circuit Board Diagram



C-3 JACK Circuit Board Diagram

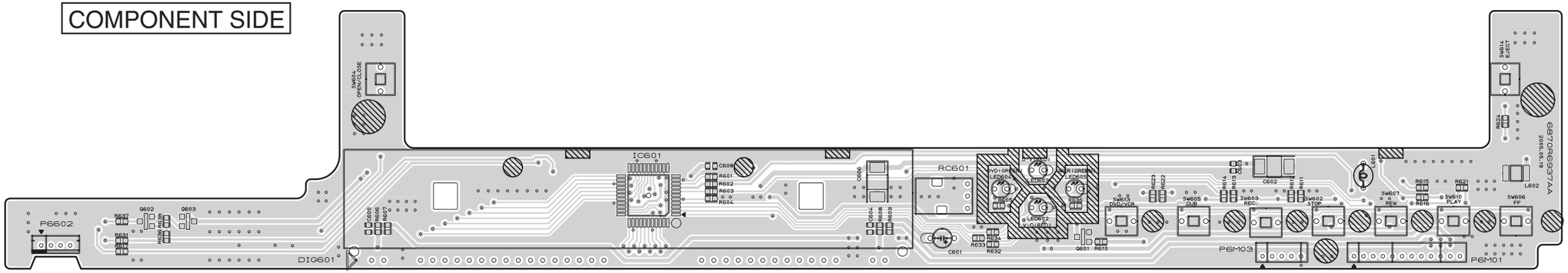


C-5 KEY Circuit Board Diagram

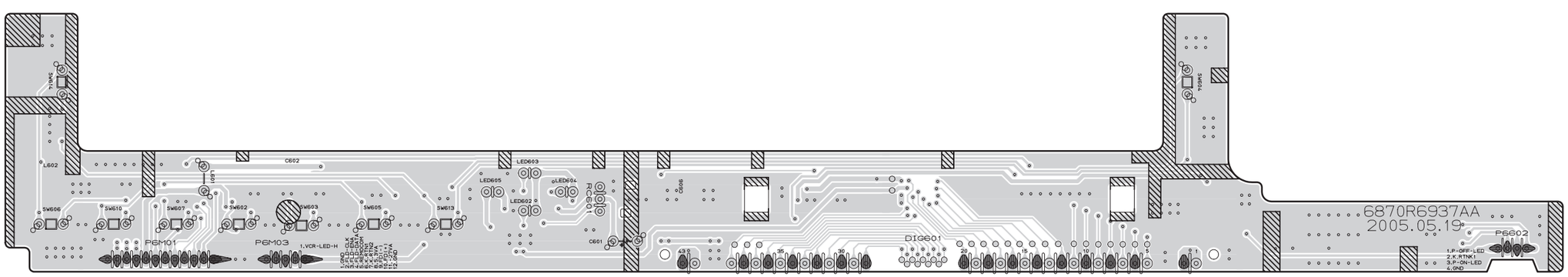


C-4 TIMER Circuit Board Diagram

COMPONENT SIDE

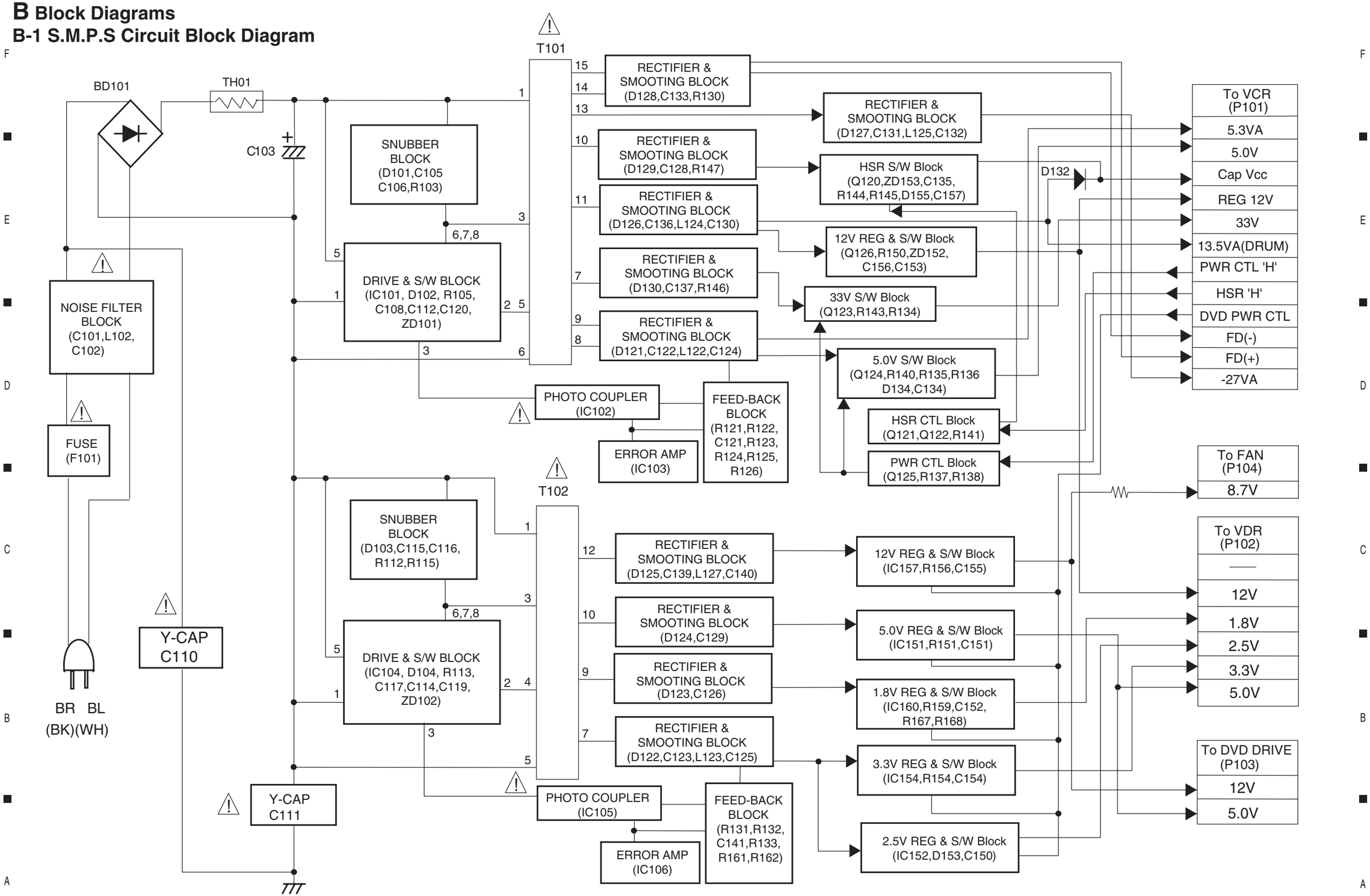


CONDUCTOR SIDE



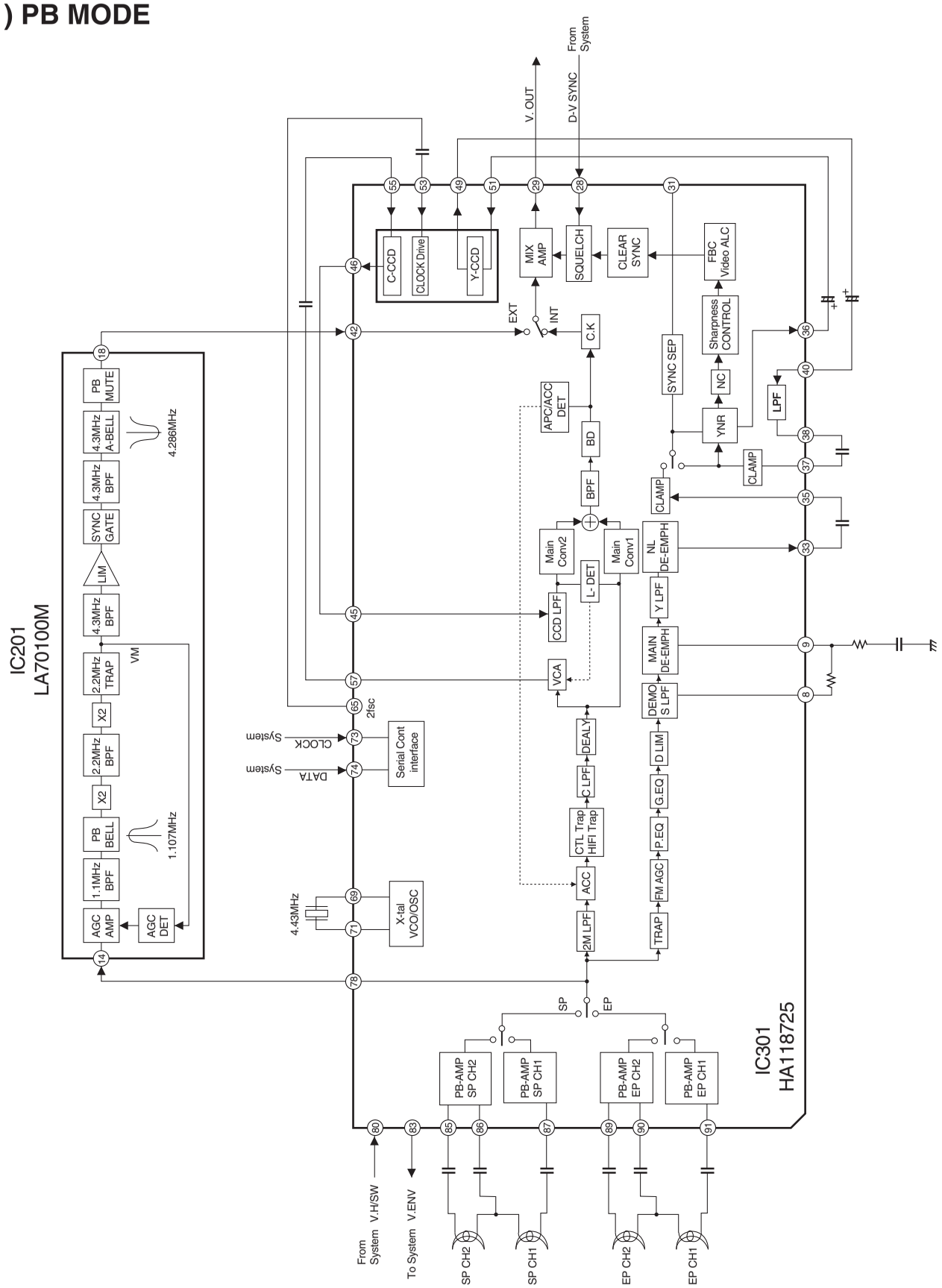
B Block Diagrams

B-1 S.M.P.S Circuit Block Diagram

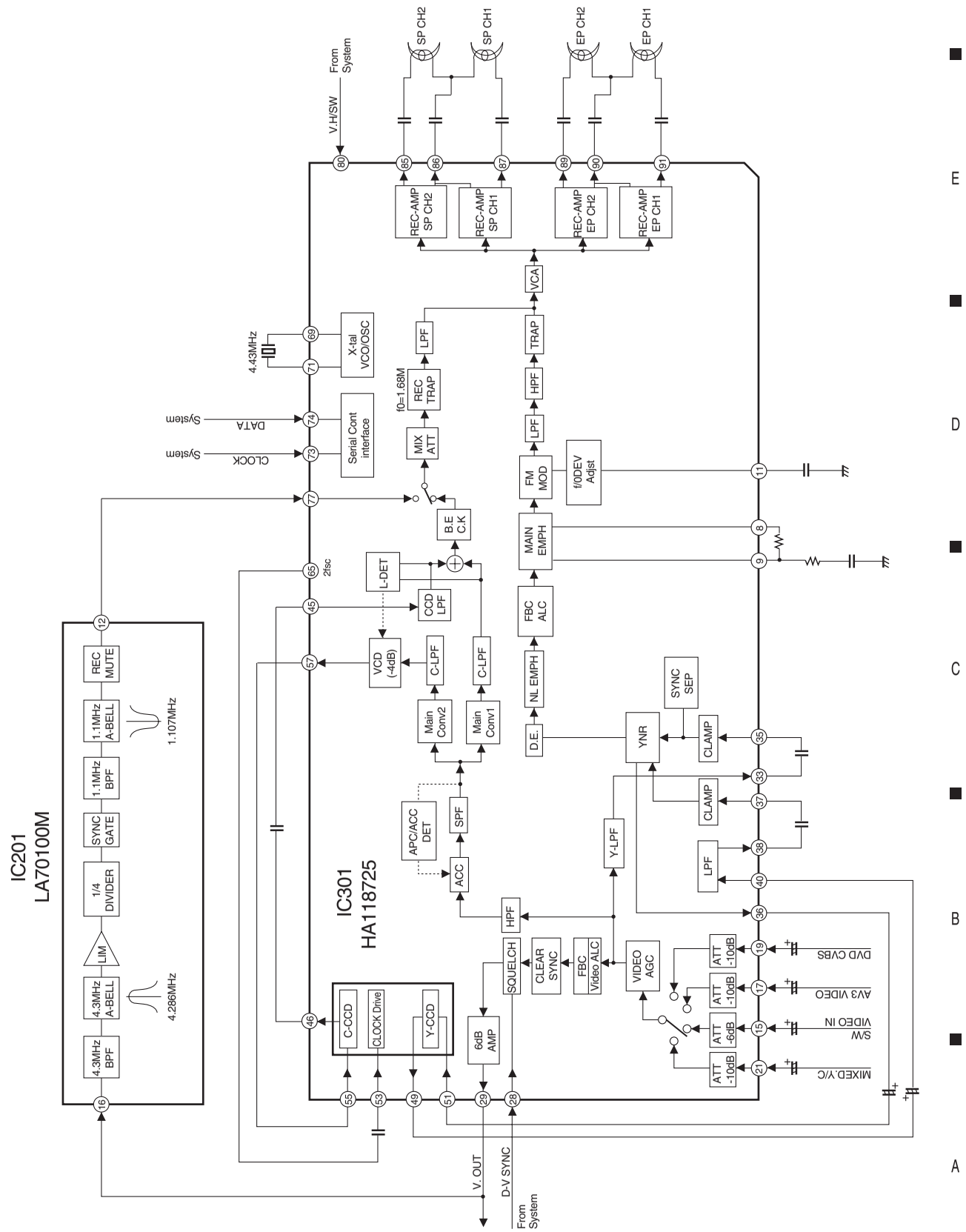


B-2 VIDEO Circuit Block Diagram

1) PB MODE

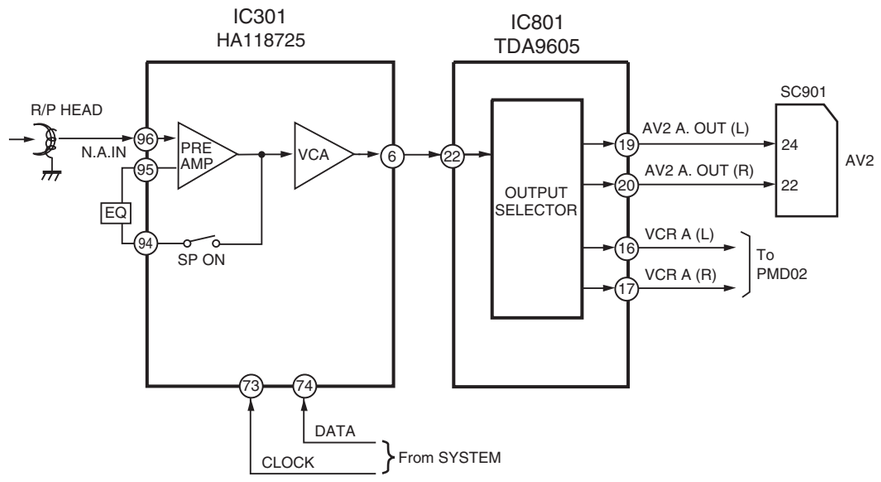


2) REC MODE

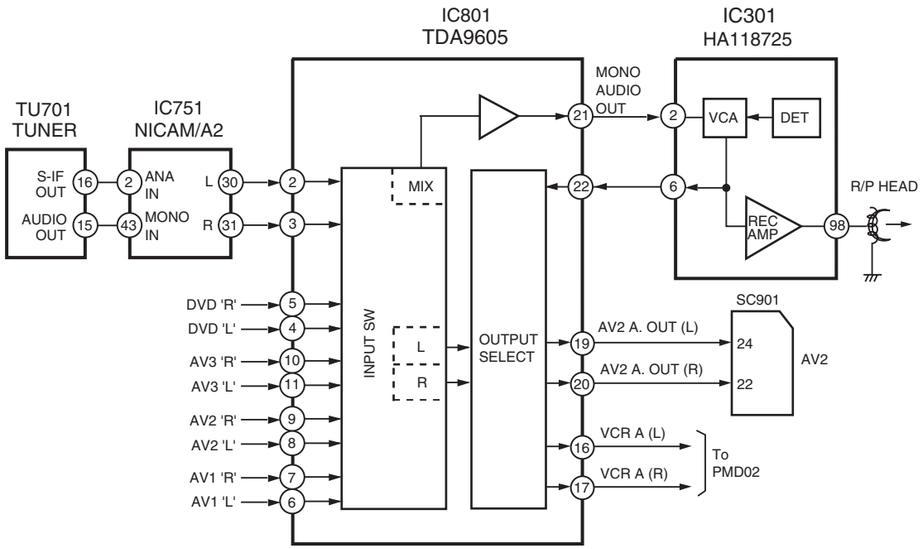


B-3 AUDIO Circuit Block Diagram

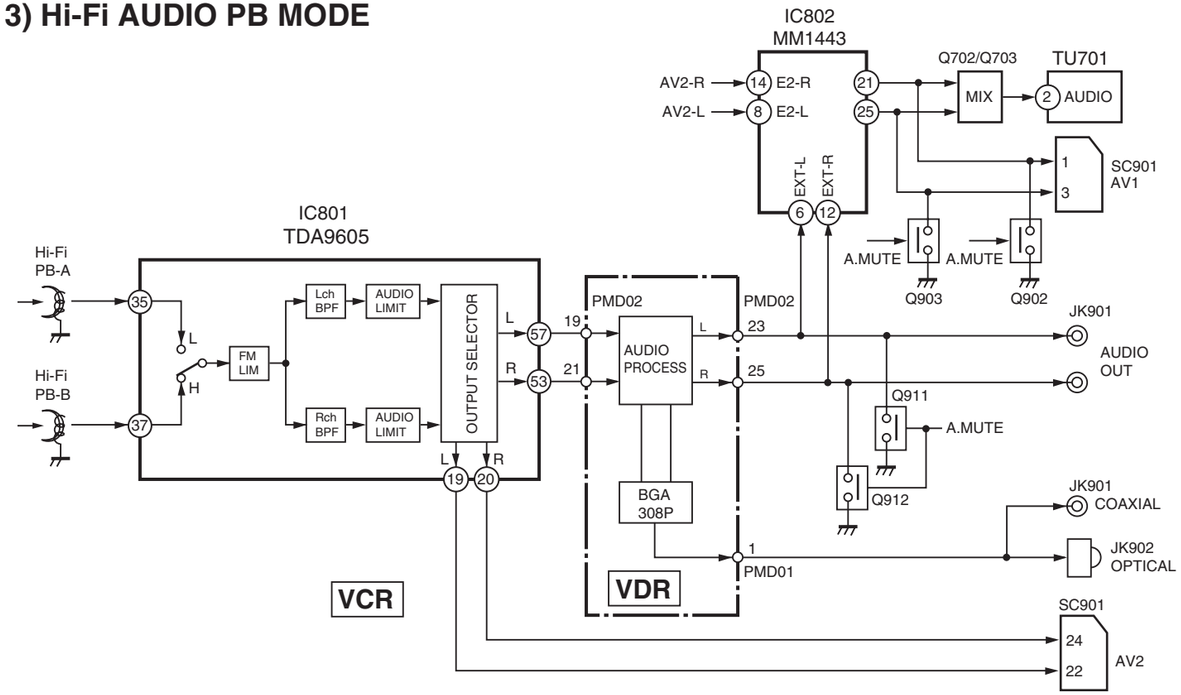
1) LINEAR AUDIO PB MOD



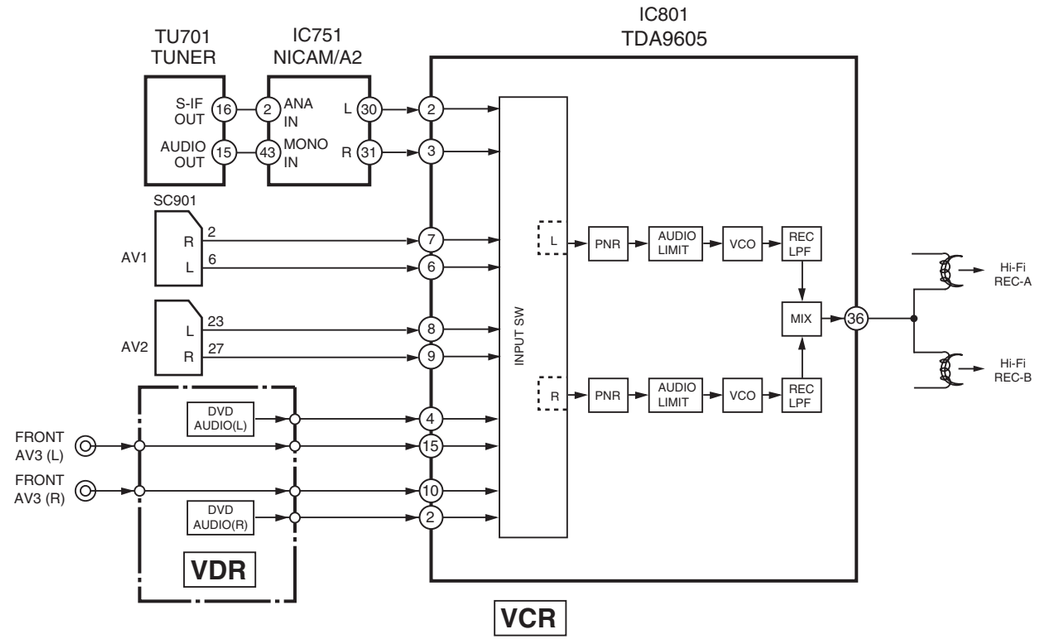
2) LINEAR AUDIO REC MOD



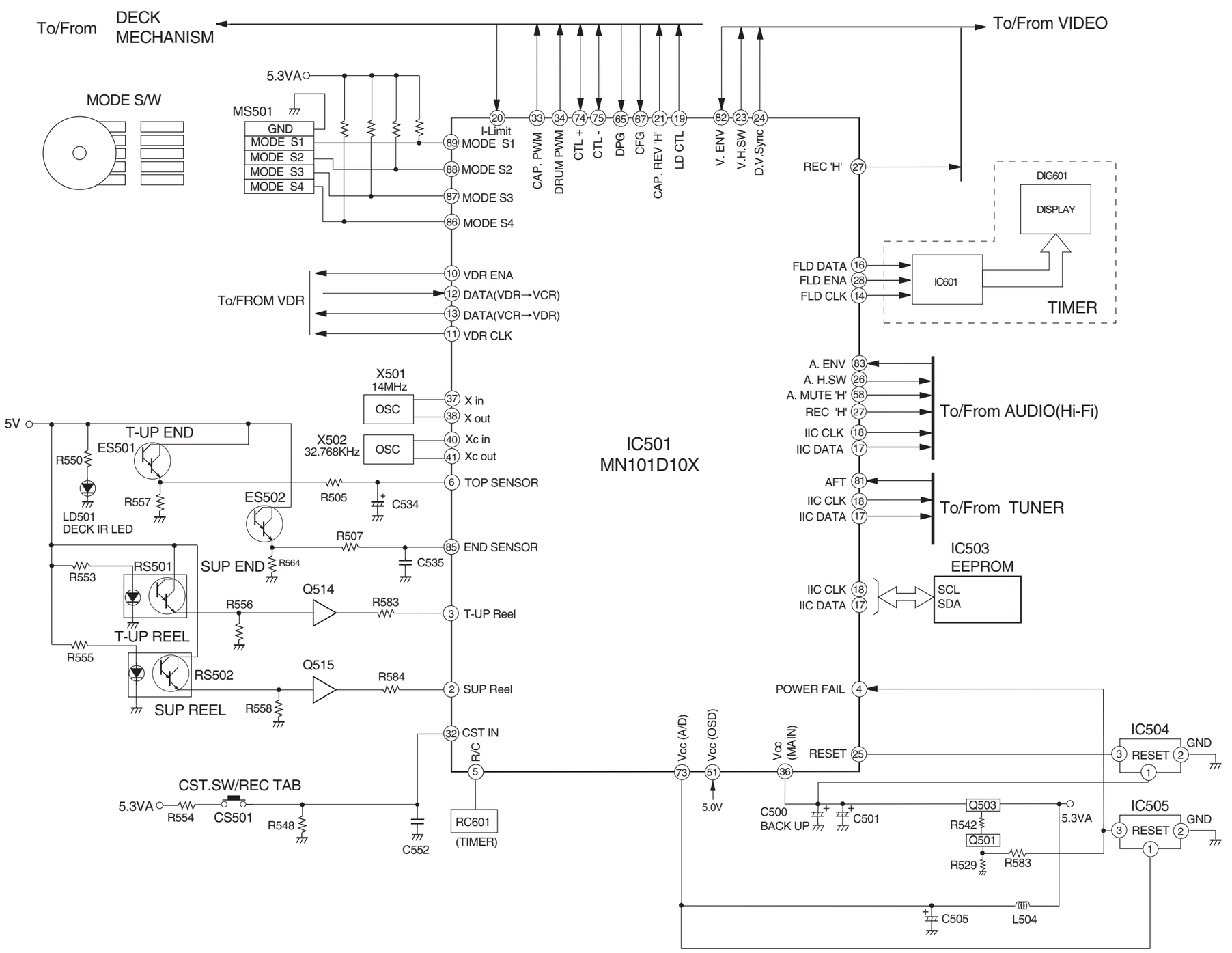
3) Hi-Fi AUDIO PB MODE



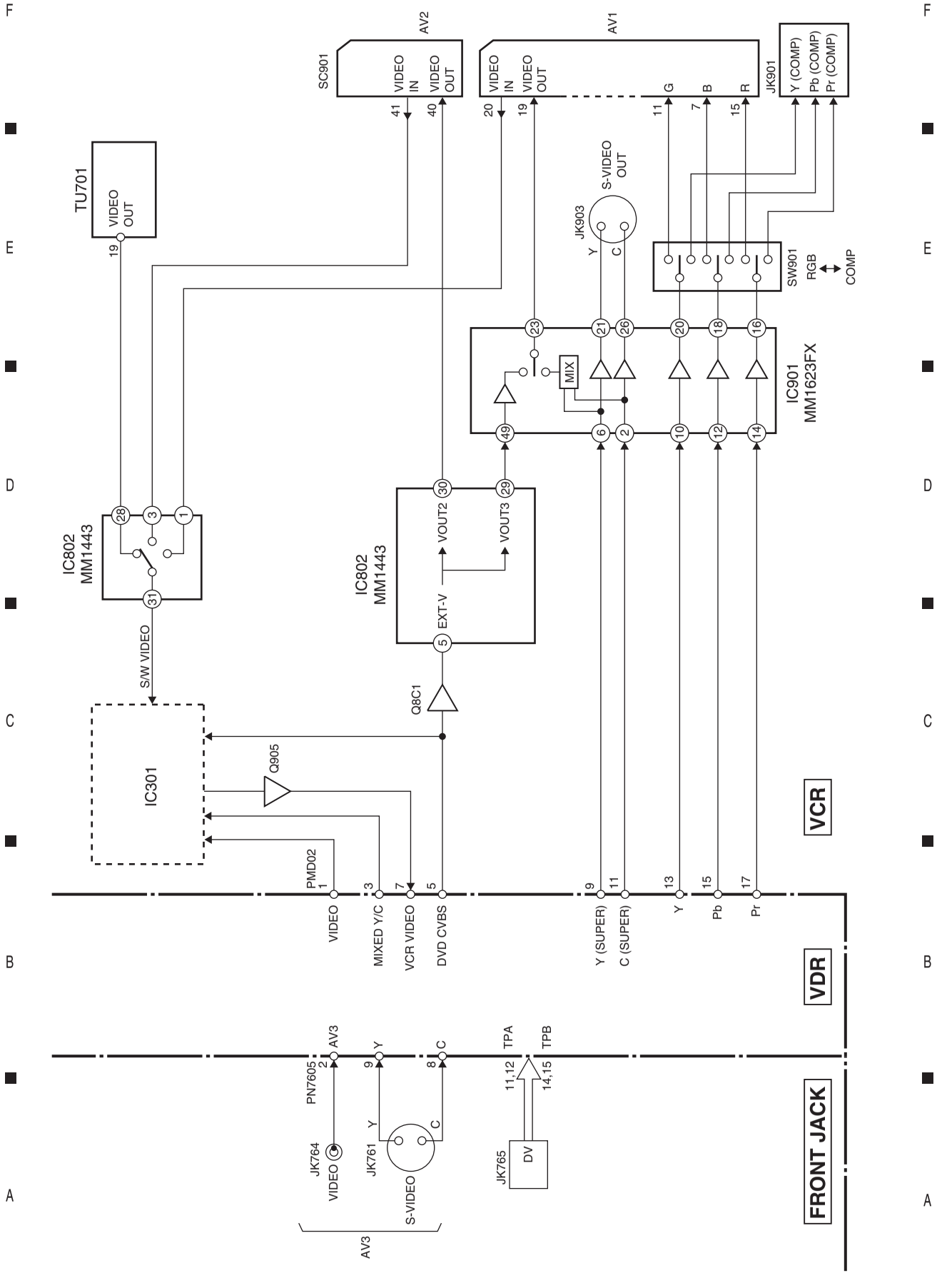
4) Hi-Fi AUDIO REC MODE



B-4 SYSTEM Circuit Block Diagram



B-5 VIDEO I/O Circuit Block Diagram



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